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Digital Technologies in the Contemporary Educational Reality

Views, Counterviews, Challenges, and Perspectives

4-6 April 2025, Preveza, Greece

Πρακτικά Συνεδρίου

Ψηφιακά Μέσα στη Σύγχρονη Εκπαιδευτική Πραγματικότητα

Θέσεις, Αντιθέσεις, Προκλήσεις και Προοπτικές

4-6 Απριλίου 2025, Πρέβεζα

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ΔΗΜΟΣΖΗΡΟΥ

Περιφερειακή Ενότητα Πρέβεζας
ΠΕΡΙΦΕΡΕΙΑ ΗΠΕΙΡΟΥ

ΔΗΜΟΣ ΠΡΕΒΕΖΑΣ

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Executive Editor:

Dr. Fani Biskanaki

Director

Secondary Education Administration of Preveza

Greece

Editors:

Fotini Dimakopoulou

Educational Quality Supervisor

Secondary Education Administration of Preveza

Greece

Dina Baga

Computer Scientist, Department of Informatics

Secondary Education Administration of Preveza

Greece

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Secondary Education Administration of Preveza (DDE Prevezas)

Address: 9 Aminta, GR48100 Preveza, Greece

Tel: +30 26820 24135

email: mail@dide.pre.sch.gr

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Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας (ΔΔΕ Πρέβεζας)

Διεύθυνση: Αμύντα 9, Τ.Κ. 48100 Πρέβεζα, Ελλάδα

Τηλ: +30 26820 24135

email: mail@dide.pre.sch.gr

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Welcome Message from the the Scientific Committee Chair

Dear colleagues,

Distinguished guests,

It is with great pleasure and honor that I welcome you to the conference on 'Digital Media in Modern Educational Reality: Positions, Contrasts, Challenges, Perspectives'.

We are living in an era defined by rapid technological advancements, which decisively influence the way we teach, learn, and interact within the educational space. The integration of digital media and artificial intelligence into education is no longer a future prospect, but a present reality that calls upon us to reflect, position ourselves, and take action.

The title of our conference accurately captures the multi-layered nature of the discussion we are invited to pursue. There are positions that champion the limitless potential of technology, but also contrasts expressing justified concerns regarding the human-centered dimension of education. We face challenges related to equal access, digital literacy, critical thinking, and data protection, while simultaneously opening up encouraging perspectives for personalized learning, creativity, and innovation.

This conference aspires to serve as a forum for fruitful dialogue, where educators and researchers will share experiences, present research data, and exchange views with respect for diversity of thought and scientific evidence. We are not looking for easy answers; instead, we aim to cultivate critical thinking and develop practices that serve the public interest and our educational mission.

I would like to extend my heartfelt thanks to you for your participation and your commitment to the continuous improvement of educational practice. Your presence here demonstrates that the educational community remains active, reflective, and future-oriented.

I wish you every success in the proceedings of the conference and hope you have highly constructive exchanges."

Sincerely,

Prof. Apostolos Tsagkaris

International Hellenic University, Thessaloniki, Greece

Scientific Committee Chair

Χαιρετισμός του Προέδρου της Επιστημονικής Επιτροπής

Αγαπητές συνάδελφοι και αγαπητοί συνάδελφοι, Αξιότιμοι προσκεκλημένοι,

Με ιδιαίτερη χαρά και τιμή σας καλωσορίζω στο συνέδριο με θέμα «Ψηφιακά Μέσα στη Σύγχρονη Εκπαιδευτική Πραγματικότητα: Θέσεις, Αντιθέσεις, Προκλήσεις, Προοπτικές».

Βρισκόμαστε σε μια εποχή που χαρακτηρίζεται από ραγδαίες τεχνολογικές εξελίξεις, οι οποίες επηρεάζουν καθοριστικά τον τρόπο που διδάσκουμε, μαθαίνουμε και αλληλεπιδρούμε στον εκπαιδευτικό χώρο. Η ενσωμάτωση των ψηφιακών μέσων και της τεχνητής νοημοσύνης στην εκπαίδευση δεν αποτελεί πλέον μια μελλοντική προοπτική, αλλά μια παρούσα πραγματικότητα που μας καλεί να αναστοχαστούμε, να τοποθετηθούμε και να δράσουμε.

Ο τίτλος του συνεδρίου μας αποτυπώνει με ακρίβεια το πολυεπίπεδο χαρακτήρα της συζήτησης που καλούμαστε να διεξάγουμε. Υπάρχουν θέσεις που υποστηρίζουν τις απεριόριστες δυνατότητες της τεχνολογίας, αλλά και αντιθέσεις που εκφράζουν δικαιολογημένες ανησυχίες για την ανθρωποκεντρική διάσταση της εκπαίδευσης. Αντιμετωπίζουμε προκλήσεις που αφορούν την ισότιμη πρόσβαση, την ψηφιακή παιδεία, την κριτική σκέψη και την προστασία των δεδομένων, ενώ ταυτόχρονα ανοίγονται ενθαρρυντικές προοπτικές για εξατομικευμένη μάθηση, δημιουργικότητα και καινοτομία.

Το συνέδριο αυτό φιλοδοξεί να αποτελέσει χώρο γόνιμου διαλόγου, όπου εκπαιδευτικοί και ερευνητές θα μοιραστούν εμπειρίες, θα παρουσιάσουν ερευνητικά δεδομένα και θα ανταλλάξουν απόψεις με σεβασμό στην πολυφωνία και την επιστημονική τεκμηρίωση. Δεν αναζητούμε εύκολες απαντήσεις, αλλά στοχεύουμε στη διαμόρφωση κριτικής σκέψης και στην ανάπτυξη πρακτικών που θα υπηρετούν το δημόσιο συμφέρον και το εκπαιδευτικό μας έργο.

Σας ευχαριστώ θερμά για τη συμμετοχή σας και τη δέσμευσή σας στη συνεχή βελτίωση της εκπαιδευτικής πράξης. Η παρουσία σας εδώ αποδεικνύει ότι η εκπαιδευτική κοινότητα παραμένει ενεργή, στοχαστική και προσανατολισμένη στο μέλλον.

Σας εύχομαι καλή επιτυχία στις εργασίες του συνεδρίου και εποικοδομητικές ανταλλαγές απόψεων.

Με εκτίμηση,

Απόστολος Τσαγκάρης, Καθηγητής,

Διεθνές Πανεπιστήμιο της Ελλάδος, Θεσσαλονίκη, Ελλάδα

Πρόεδρος Επιστημονικής Επιτροπής

Message from the Organizing Committee Chair

The conference proceedings feature 154 peer-reviewed papers. The majority of these fall under Topic 10 (Good Practices for Utilizing Digital Technologies in Teaching Practices) and Topic 13 (Artificial Intelligence in Education). Significant interest was also shown in the following thematic areas: 1 (Research on the development, application, and use of modern technologies in modern schooling, education, and learning), 2 (Pedagogical integration of digital media in teaching practices), 3 (Utilization and evaluation of digital and technological media), 15 (Gamification in Education), 24 (Teaching with digital media), and 27 (Educational administration using digital technologies). Conversely, no papers were submitted for Topics 20, 21, and 22, which cover Second-Generation E-Learning (Learning 2.0), Mobile Learning (Mobile learning, BYOD), and Open Educational Resources, respectively.

The proceedings include abstracts for all accepted papers published in both English and Greek, featured in the respective sections titled “Conference Abstracts” and “Περιλήψεις Άρθρων”. Authors were given the option to choose the language for their full paper submission. Consequently, full papers written in English (71 papers) are presented in the section titled “Conference Full Papers”, while those written in Greek (83 papers) are included under “Πλήρεις Εργασίες Συνεδρίου”.

Each abstract and full-paper section (in both English and Greek) is subdivided into the 28 conference topics. Within these topics, papers are listed in alphabetical order based on the filename submitted for review. The proceedings conclude with a detailed table of contents listing the titles of all papers.

Kinds Regards,

Dr. Fani Biskanaki

Director of Secondary Education Administration of Preveza, Greece

Organizing Committee Chair

Μήνυμα της Προέδρου της Οργανωτικής Επιτροπής

Στα πρακτικά του συνεδρίου παρουσιάζονται 154 εργασίες που αξιολογήθηκαν από κριτές. Οι περισσότερες από αυτές εντάσσονται στο Θεματικό Πεδίο 10 (Καλές πρακτικές αξιοποίησης ψηφιακών τεχνολογιών στη διδακτική πράξη) και στο Θεματικό Πεδίο 13 (Αξιοποίηση της Τεχνητής Νοημοσύνης στην Εκπαίδευση). Σημαντικό ενδιαφέρον εκδηλώθηκε επίσης για τα εξής θεματικά πεδία: 1 (Έρευνα για την ανάπτυξη, εφαρμογή και χρήση σύγχρονων τεχνολογιών στο σχολείο, την εκπαίδευση και τη μάθηση), 2 (Παιδαγωγική ενσωμάτωση των ψηφιακών μέσων στη διδακτική πράξη), 3 (Αξιοποίηση και αξιολόγηση των ψηφιακών και τεχνολογικών μέσων), 15 (Παιχνιδοποίηση / Gamification στην Εκπαίδευση), 24 (Διδασκαλία με ψηφιακή μέσα) και 27 (Διοίκηση της εκπαίδευσης με χρήση ψηφιακών τεχνολογιών). Αντίθετα, για τα Θεματικά Πεδία 20, 21 και 22 —που αφορούν στην Ηλεκτρονική Μάθηση Δεύτερης Γενιάς (Learning 2.0), την Κινητή Μάθηση (Mobile learning, BYOD) και τους ανοικτούς εκπαιδευτικούς πόρους αντίστοιχα— δεν υποβλήθηκε καμία εργασία.

Στα πρακτικά περιλαμβάνονται οι περιλήψεις όλων των εργασιών που αξιολογήθηκαν και εγκρίθηκαν προς δημοσίευση, τόσο στην αγγλική όσο και στην ελληνική γλώσσα, στις αντίστοιχες ενότητες με τους τίτλους “Conference Abstracts” και «Περιλήψεις Άρθρων». Στους συγγραφείς δόθηκε η δυνατότητα να επιλέξουν τη γλώσσα συγγραφής του πλήρους κειμένου τους. Έτσι, οι πλήρεις εργασίες που συντάχθηκαν στην αγγλική (71 εργασίες) παρουσιάζονται στην ενότητα “Conference Full Papers”, ενώ εκείνες που γράφτηκαν στην ελληνική (83 εργασίες) περιλαμβάνονται στην ενότητα «Πλήρεις Εργασίες Συνεδρίου».

Κάθε ενότητα περιλήψεων και πλήρων εργασιών (σε ελληνικά και αγγλικά) χωρίζεται στα 28 Θεματικά Πεδία του Συνεδρίου. Εντός αυτών, τα κείμενα παρουσιάζονται με αλφαβητική σειρά, με βάση το όνομα του αρχείου που υποβλήθηκε προς κρίση. Τα πρακτικά ολοκληρώνονται με έναν αναλυτικό πίνακα περιεχομένων που περιλαμβάνει τους τίτλους όλων των άρθρων.

Με εκτίμηση,

Δρ. Φανή Μπισκανάκη

Διευθύντρια της Διεύθυνσης Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας

Πρόεδρος Οργανωτικής Επιτροπής

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ΘΠ24: Διδασκαλία και ψηφιακά μέσα 1719
ΘΠ25: Η ψηφιακή αφήγηση στη διδακτική πράξη 1739
ΘΠ26: Εκπαιδευτική αξιολόγηση με τη χρήση ψηφιακών μέσων και εργαλείων 1779
ΘΠ27: Διοίκηση Εκπαίδευσης και ψηφιακές τεχνολογίες 1791
ΘΠ28: Επαγγελματική ανάπτυξη εκπαιδευτικών με την αξιοποίηση νέων τεχνολογιών 1821

Conference Scope

The Secondary Education Administration of Preveza, the International Hellenic University, the Regional Primary & Secondary Education Administration of Epirus, the Ionian University, the Preveza Regional Unit of the Region of Epirus, the Municipality of Ziros, the Municipality of Parga, the Municipality of Preveza, and the Chamber of Commerce of Preveza—acting as supporting bodies of the Secondary Education Administration of Preveza —undertook the active support of this scientific initiative. The initiative aims at the enhancement of education, the promotion of research, and the dissemination of scientific knowledge within the educational community, as well as the local and wider society, through the presentation of contemporary scientific perspectives and pedagogical trends.

The 1st International Scientific Conference entitled *"Digital Media in Contemporary Educational Reality: Views, Counterviews, Challenges, and Perspectives"* aspires to serve as a forum for fruitful academic dialogue on the dynamic relationship between digital media, pedagogy, and education.

The organizing bodies of the Conference aim to: (a) forefront international discussions concerning the interactive relationship between emerging technological developments and instructional design; (b) encourage researchers to explore and examine the multiple dimensions of the field; (c) contribute to the educational process by advancing theoretical and methodological tools, as well as applied knowledge, for the integration of digital media into teaching and learning; (d) highlight innovative educational designs that make use of digital media in school education and in adult education, both formal and informal; and (e) create favorable conditions for scholarly reflection and the reconsideration of the role of digital media in contemporary educational practice.

Σκοπός Συνεδρίου

Η Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας, το Διεθνές Πανεπιστήμιο της Ελλάδας, η Περιφερειακή Διεύθυνση Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης Ηπείρου, το Ιόνιο Πανεπιστήμιο, η Περιφερειακή Ενότητα Πρέβεζας της Περιφέρειας Ηπείρου, ο Δήμος Ζηρού, ο Δήμος Πάργας, ο Δήμος Πρέβεζας και το Επιμελητήριο Πρέβεζας, αρωγοί στο έργο της Διεύθυνσης Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας ανέλαβαν την ενεργή υποστήριξη του επιστημονικού εγχειρήματος, που επιδιώκει την αναβάθμιση της εκπαίδευσης, την έρευνα και τη διάχυση της επιστημονικής γνώσης στην εκπαιδευτική κοινότητα, στην τοπική και ευρύτερη κοινωνία, με την παρουσίαση σύγχρονων επιστημονικών θέσεων και παιδαγωγικών τάσεων .

Το 1ο Διεθνές Επιστημονικό Συνέδριο "Ψηφιακά Μέσα στη Σύγχρονη Εκπαιδευτική Πραγματικότητα. Θέσεις, Αντιθέσεις, Προκλήσεις και Προοπτικές" φιλοδοξεί να αποτελέσει ένα πεδίο γόνιμου ακαδημαϊκού διαλόγου για τη δυναμική σχέση ψηφιακών μέσων, παιδαγωγικής και εκπαίδευσης.

Οι οργανωτικοί φορείς του Συνεδρίου επιδιώκουν: α) να φέρουν στο προσκήνιο τις συζητήσεις που διεξάγονται διεθνώς αναφορικά με την αλληλεπιδραστική σχέση των νέων τεχνολογικών επιτευγμάτων και του διδακτικού σχεδιασμού, β) να ενθαρρύνουν τους ερευνητές και τις ερευνήτριες να διερευνήσουν και να εξετάσουν τις ποικίλες διαστάσεις του πεδίου, γ) να συνεισφέρουν στην εκπαιδευτική διαδικασία, στα θεωρητικά - μεθοδολογικά εργαλεία και στην εφαρμοσμένη γνώση για την ένταξη των ψηφιακών μέσων στη διδακτική, δ) να αναδείξουν καινοτόμους εκπαιδευτικούς σχεδιασμούς με την αξιοποίηση ψηφιακών μέσων στη σχολική εκπαίδευση και στην εκπαίδευση ενηλίκων, τυπική και άτυπη και ε) να δημιουργήσουν ευνοϊκές συνθήκες για επιστημονικούς προβληματισμούς και επαναπροσδιορισμούς σε σχέση με το ρόλο των ψηφιακών μέσων στην εκπαιδευτική πραγματικότητα.

Thematic Areas (TA)

1. Research on the development, implementation, and use of contemporary technologies in the modern school, education, and learning.
2. The pedagogical integration of digital media into teaching practice (Learning Theories, Curricula, and Digital Media).
3. Utilization and evaluation of digital and technological media.
4. The digital divide and emerging inequalities.
5. Digital and visual literacy.
6. Digital ethics.
7. Digital citizenship.
8. Inclusive digital education.
9. The sustainable digital school.
10. Best practices in the pedagogical use of digital technologies.
11. Dynamic learning environments and digital educational tools.
12. The Internet of Things and education.
13. The use of Artificial Intelligence in education.
14. Pedagogical applications of educational robotics.
15. Gamification in education.
16. Virtual, augmented, and mixed reality in education.
17. Online educational environments for enhancing blended and distance learning.
18. Social networks and education.
19. Online learning communities.
20. Second-generation e-learning (Learning 2.0).
21. Mobile learning (Mobile Learning, BYOD).
22. Open educational resources.
23. Free and open-source software for education.
24. Teaching and digital media.
25. Digital storytelling in teaching practice.
26. Educational assessment using digital media and tools.
27. Educational administration and digital technologies.
28. Teachers' professional development through the use of new technologies.

Θεματικά Πεδία (ΘΠ)

1. Έρευνα για την ανάπτυξη, εφαρμογή και χρήση σύγχρονων τεχνολογιών στο σύγχρονο σχολείο, στην εκπαίδευση και τη μάθηση.
2. Η παιδαγωγική ενσωμάτωση των Ψηφιακών Μέσων στη διδακτική πράξη (Θεωρίες Μάθησης, Προγράμματα Σπουδών και Ψηφιακά Μέσα)
3. Αξιοποίηση και Αξιολόγηση των Ψηφιακών και Τεχνολογικών Μέσων
4. Ψηφιακό χάσμα και νέες ανισότητες
5. Ψηφιακός-Οπτικός Γραμματισμός
6. Ψηφιακή Ηθική
7. Ψηφιακή πολιτειότητα (Digital Citizenship)
8. Συμπεριληπτική ψηφιακή εκπαίδευση
9. Αειφόρο ψηφιακό σχολείο
10. Καλές πρακτικές αξιοποίησης ψηφιακών τεχνολογιών στη διδακτική πράξη
11. Δυναμικά περιβάλλοντα μάθησης και Ψηφιακά Εκπαιδευτικά Εργαλεία
12. Διαδίκτυο των πραγμάτων και εκπαίδευση
13. Αξιοποίηση της Τεχνητής Νοημοσύνης στην Εκπαίδευση
14. Διδακτική Αξιοποίηση της Εκπαιδευτικής Ρομποτικής
15. Παιχνιδοποίηση (Gamification) στην Εκπαίδευση
16. Εικονική, Επαυξημένη και Μικτή Πραγματικότητα στην Εκπαίδευση
17. Διαδικτυακά εκπαιδευτικά περιβάλλοντα για την ενίσχυση της μικτής και της εξ αποστάσεως εκπαίδευσης
18. Κοινωνικά δίκτυα και εκπαίδευση
19. Διαδικτυακές Κοινότητες Μάθησης
20. Ηλεκτρονική Μάθηση Δεύτερης Γενιάς (Learning 2.0)
21. Κινητή Μάθηση (Mobile learning, BYOD)
22. Ανοικτοί εκπαιδευτικοί πόροι
23. Ελεύθερος και ανοικτός κώδικας λογισμικού για την εκπαίδευση
24. Διδασκαλία και ψηφιακά μέσα
25. Η ψηφιακή αφήγηση στη διδακτική πράξη
26. Εκπαιδευτική αξιολόγηση με τη χρήση ψηφιακών μέσων και εργαλείων
27. Διοίκηση Εκπαίδευσης και ψηφιακές τεχνολογίες
28. Επαγγελματική ανάπτυξη εκπαιδευτικών με την αξιοποίηση νέων τεχνολογιών

Conference Scientific Committee

- Tsagkaris Apostolos, Professor, International Hellenic University (Chair)
- Paraskevas Michalis, Professor, University of Peloponnese; Vice-Chair of the Board, Computer Technology Institute and Press "Diophantus"; Head of the National Support Service for eTwinning Greece; Coordinator of the Greek School Network
- Tzionas Panagiotis, Professor, International Hellenic University
- Xanthos Stelios, Professor, International Hellenic University
- Korlos Apostolos, Professor, International Hellenic University
- Chatzigeorgiou Chrysoula, Professor, International Hellenic University
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- Plakitsi Aikaterini, Professor, University of Ioannina
- Mikropoulos Anastasios, Professor, University of Ioannina
- Kalles Dimitrios, Professor, Hellenic Open University
- Kyratsis Panagiotis, Professor, University of Western Macedonia
- Papastergiou Thomas, Associate Professor, Sorbonne Paris Nord University, Laboratoire d'Informatique de Paris Nord (LIPN)
- Longo Francesco, Associate Professor, University of Calabria, Italy
- Asimakopoulos Konstantinos, Associate Professor, International Hellenic University
- Exarchos Themistoklis, Associate Professor, Ionian University
- Simeli Ioanna, Assistant Professor, International Hellenic University
- Tsongas Konstantinos, Assistant Professor, International Hellenic University
- Efkolidis Nikolaos, Assistant Professor, University of Western Macedonia
- Papadopoulou Souzana, Assistant Professor, International Hellenic University
- Pangalos Ioannis, Assistant Professor, International Hellenic University
- Kitsantas Thomas, Lecturer, University of Ioannina
- Papadimitriou Sofia, PhD, Head of Educational Radio, Television and Digital Media, Ministry of Education, Religious Affairs and Sports; Tutor-Counsellor, Hellenic Open University
- Tzotzis Anastasios, PhD, University of Western Macedonia
- Manavis Athanasios, PhD, University of Western Macedonia

Επιστημονική Επιτροπή Συνέδριου

- Τσαγκάρης Απόστολος, Καθηγητής, ΔΙΠΑΕ (Πρόεδρος)
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- Τζιώνας Παναγιώτης, Καθηγητής, ΔΙΠΑΕ
- Ξανθός Στέλιος, Καθηγητής, ΔΙΠΑΕ
- Κορλός Απόστολος, Καθηγητής, ΔΙΠΑΕ
- Χατζηγεωργίου Χρυσούλα, Καθηγήτρια, ΔΙΠΑΕ
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- Μικρόπουλος Αναστάσιος, Καθηγητής, Πανεπιστήμιο Ιωαννίνων
- Καλλές Δημήτριος, Καθηγητής, ΕΑΠ
- Κυράτσης Παναγιώτης, Καθηγητής, Πανεπιστήμιο Δυτικής Μακεδονίας
- Παπαστεργίου Θωμάς, Αναπληρωτής Καθηγητής, Πανεπιστήμιο Sorbonne Paris Nord, LIPN
- Longo, Francesco, Associate Professor, University of Calabria, Italy
- Ασημακόπουλος Κωνσταντίνος, Αναπληρωτής Καθηγητής, ΔΙΠΑΕ
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- Κιτσαντάς Θωμάς, Λέκτορας, Πανεπιστήμιο Ιωαννίνων
- Παπαδημητρίου Σοφία, Δρ., Προϊσταμένη Εκπαιδευτικής Ραδιοτηλεόρασης και Ψηφιακών Μέσων - ΥΠΑΙΘΑ, ΣΕΠ ΕΑΠ
- Τζώτζης Αναστάσιος, Δρ., Πανεπιστήμιο Δυτικής Μακεδονίας
- Μανάβης Αθανάσιος, Δρ., Πανεπιστήμιο Δυτικής Μακεδονίας

Conference Organising Committee

- Biskanaki Fani, PhD, Administrator of the Secondary Education Administration of Preveza (Chair)
- Besi Marina, PhD, Deputy Regional Director of Regional Primary & Secondary Education Administration of Epirus
- Sakellaropoulou Evdoxia, Regional Educational Quality Supervisor, Regional Primary & Secondary Education Administration of Epirus
- Vasileiou Kleopatra, PhD, Director of the Primary Education Administration of Arta
- Logotheti Stamatia, Director of the Secondary Education Administration of Ioannina
- Michalis Ilias, Director of the Primary Education Administration of Preveza
- Mitsionis Vasileios, Director of the Secondary Education Administration of Thesprotia
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- Passa Sofia, Education Consultant for Primary School Teachers, Primary Education Administration of Preveza
- Chasiotis Nikolaos, Education Consultant for Electronics, Secondary Education Administration of Ioannina; Pedagogical Supervisor of School Units, Secondary Education Administration of Preveza
- Ntoka Aglaia, Educational Quality Supervisor, Primary Education Administration of Arta
- Ntamani Aikaterini, Education Consultant for Preschool Teachers, Primary Education Administration of Arta

Οργανωτική Επιτροπή

- Μπισκανάκη Φανή, Δρ., Διευθύντρια της Δ.Δ.Ε Πρέβεζας (Πρόεδρος)
- Μπέση Μαρίνα, Δρ., Αναπληρώτρια Περιφερειακή Διευθύντρια ΠΔΕ Ηπείρου
- Σακελλαροπούλου Ευδοξία, Περιφερειακή Επόπτρια Ποιότητας της Εκπαίδευσης Π.Δ.Ε. Ηπείρου
- Βασιλείου Κλεοπάτρα, Δρ., Διευθύντρια της Δ.Π.Ε Άρτας
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- Δημακοπούλου Φωτεινή, Επόπτρια Ποιότητας της Εκπαίδευσης Δ.Δ.Ε. Πρέβεζας
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- Νταμάνη Αικατερίνη, Σύμβουλος Εκπαίδευσης Νηπιαγωγών Δ.Π.Ε. Άρτας

INVITED SPEAKERS - ΠΡΟΣΚΕΛΗΜΕΝΟΙ ΟΜΙΛΗΤΕΣ

(In their order of appearance in the Conference Program –
Κατά τη σειρά αναγραφής τους στο Πρόγραμμα του Συνεδρίου)

Keynote Speaker:
Kitsantas Anastasia, PhD, Professor,
Program in Educational Psychology, Division of Educational Psychology and Research Methods, George Mason University, USA



Anastasia Kitsantas is Professor of Educational Psychology and a former Director of the Office of Doctoral Studies and the Division of the Educational Psychology, Research Methods and Education Policy in the College of Education and Human Development at George Mason University. Her research interests focus on the development of Self-Regulated Learning (SRL) and student motivation across various areas of human functioning. She has also studied the role of learning technologies in supporting student SRL. She is the editor, co-author, or author of four books and over 150 publications many of which are directed toward the training of self-regulation. She has received funding for her scholarship from various agencies. She is the former Editor-in-Chief of The Journal of Experimental Education and is serving on the Editorial Boards of several journals. She is the recipient of the 2019 Barry J. Zimmerman Award for Outstanding Contributions to the fields of studying and SRL research by the Studying and SRL Special Interest Group of the American Educational Research Association. She is also a Fellow of the American Psychological Association's: Division 15, Educational Psychology, the American Educational Research Association, and the Association for Psychological Science.

Speech Title:
"Leveraging Digital Technologies to Boost Learner Self-Regulation and Achievement"

This talk explores how digital technologies embedded in virtual platforms can be utilized to enhance self-regulated learning (SRL) and improve overall learning outcomes. Drawing on existing research, the presentation highlights the importance of using digital tools to model, emulate, provide guided practice, and scaffold learning experiences to foster critical thinking, deep engagement with the material, and the development of learner independence. Additionally, the talk emphasizes the significance of teaching prompt engineering, a crucial skill that enables students to craft effective inputs for AI models. It also underscores the role of SRL skills in facilitating productive interactions with AI. Key takeaways for both instructors and learners will be provided.

Κεντρική Ομιλήτρια:
Αναστασία Κιτσαντά, PhD, Καθηγήτρια,
Πρόγραμμα Εκπαιδευτικής Ψυχολογίας, Τομέας Εκπαιδευτικής Ψυχολογίας και Ερευνητικών Μεθόδων, Πανεπιστήμιο George Mason, ΗΠΑ

Η Αναστασία Κιτσαντά είναι Καθηγήτρια Εκπαιδευτικής Ψυχολογίας και πρώην Διευθύντρια του Γραφείου Διδακτορικών Σπουδών και του Τομέα Εκπαιδευτικής Ψυχολογίας, Ερευνητικών Μεθόδων και Εκπαιδευτικής Πολιτικής στο Κολλέγιο Εκπαίδευσης και Ανθρώπινης Ανάπτυξης του Πανεπιστημίου George Mason. Τα ερευνητικά της ενδιαφέροντα εστιάζουν στην ανάπτυξη της Αυτορρυθμιζόμενης Μάθησης (Self-Regulated Learning - SRL) και στα κίνητρα των μαθητών σε διάφορους τομείς της ανθρώπινης λειτουργίας. Έχει επίσης μελετήσει τον ρόλο των τεχνολογιών μάθησης στην υποστήριξη της αυτορρυθμιζόμενης μάθησης των μαθητών. Είναι επιμελήτρια, συν-συγγραφέας ή συγγραφέας τεσσάρων βιβλίων και περισσότερων από 150 δημοσιεύσεων, πολλές από τις οποίες κατευθύνονται προς την εκπαίδευση στην αυτορρύθμιση. Έχει λάβει χρηματοδότηση για το επιστημονικό της έργο από διάφορους φορείς. Είναι πρώην Αρχισυντάκτρια (Editor-in-Chief) του περιοδικού *«The Journal of Experimental Education»* και συμμετέχει στις Συντακτικές Επιτροπές

(Editorial Boards) αρκετών επιστημονικών περιοδικών. Είναι η αποδέκτρια του Βραβείου Barry J. Zimmerman 2019 για την Εξέχουσα Προσφορά στους τομείς της μελέτης και της έρευνας για την Αυτορρυθμιζόμενη Μάθηση (SRL) από την Ειδική Ομάδα Ενδιαφέροντος (SIG) για τη Μελέτη και την Αυτορρυθμιζόμενη Μάθηση του Αμερικανικού Οργανισμού Εκπαιδευτικής Έρευνας (AERA). Είναι επίσης Εταίρος (Fellow) της Αμερικανικής Ψυχολογικής Εταιρείας (APA: Τμήμα 15, Εκπαιδευτική Ψυχολογία), του Αμερικανικού Οργανισμού Εκπαιδευτικής Έρευνας (AERA) και της Ένωσης για την Ψυχολογική Επιστήμη (APS).

Θέμα Ομιλίας:
«Αξιοποίηση των Ψηφιακών Τεχνολογιών για την Ενίσχυση της Αυτορρύθμισης και της Επίδοσης των Μαθητών»

Αυτή η ομιλία εξετάζει πώς οι ψηφιακές τεχνολογίες που είναι ενσωματωμένες σε εικονικές πλατφόρμες μπορούν να χρησιμοποιηθούν για την ενίσχυση της αυτορρυθμιζόμενης μάθησης (SRL) και τη βελτίωση των συνολικών μαθησιακών αποτελεσμάτων. Βασιζόμενη στην υπάρχουσα έρευνα, η παρουσίαση αναδεικνύει τη σημασία της χρήσης ψηφιακών εργαλείων για τη μοντελοποίηση, την προσομοίωση, την παροχή καθοδηγούμενης πρακτικής και την πλαισίωση (scaffolding) των μαθησιακών εμπειριών, με σκοπό την καλλιέργεια της κριτικής σκέψης, τη βαθιά ενασχόληση με το υλικό και την ανάπτυξη της αυτονομίας του μαθητή. Επιπλέον, η ομιλία τονίζει τη σημασία της διδασκαλίας της μηχανικής εντολών (prompt engineering), μιας κρίσιμης δεξιότητας που επιτρέπει στους μαθητές να διαμορφώνουν αποτελεσματικά δεδομένα εισαγωγής (inputs) για μοντέλα Τεχνητής Νοημοσύνης (AI). Υπογραμμίζει επίσης τον ρόλο των δεξιοτήτων αυτορρυθμιζόμενης μάθησης (SRL) στη διευκόλυνση παραγωγικών αλληλεπιδράσεων με την Τεχνητή Νοημοσύνη. Στο τέλος, θα δοθούν βασικά πρακτικά συμπεράσματα (key takeaways) τόσο για τους εκπαιδευτικούς όσο και για τους μαθητές.

Invited Speaker:
Polyxeni Pagge, Professor
Department of Early Childhood Education, University of Ioannina, Former Dean of the School of Education, University of Ioannina, Greece



Polyxeni (Jenny) Pagge is a Professor in the Department of Early Childhood Education at the University of Ioannina. She is the former Dean of the School of Education and the Director of the Laboratory of New Technologies and Distance Education. Professor Pagge has developed significant scientific, research, and administrative work at the University of Ioannina, collaborating with numerous universities and research centers both in Greece and abroad. She actively participates in many associations and scientific societies, is a member of the Society for Epirus Studies (Εταιρεία Ηπειρωτικών Μελετών - E.H.M) in Ioannina, has served as President of the Board of Directors of the 'Klearchos Papadiamantis' Foundation in Konitsa, and has developed important initiatives within the Epirus Road Accident Prevention Society (EPTA) [Εταιρεία Πρόληψης Τροχαίων Ατυχημάτων Ηπείρου (ΕΠΤΑ)]. Additionally, she has collaborated with the Municipalities of Ioannina, Preveza, and Konitsa on issues related to education, technology, and innovation development.

Speech Title:

"ICT in Modern Education: Challenges and Prospects"

Προσκεκλημένη Ομιλήτρια:
Παγγέ Πολυξένη, Καθηγήτρια Παιδαγωγικού Τμήματος Νηπιαγωγών Πανεπιστημίου Ιωαννίνων, τ. Κοσμήτορας Σχολής Επιστημών Αγωγής Πανεπιστημίου Ιωαννίνων

Η Πολυξένη (Τζένη) Παγγέ είναι Καθηγήτρια του Παιδαγωγικού Τμήματος Νηπιαγωγών στο Πανεπιστήμιο Ιωαννίνων. Είναι τ. Κοσμήτορας της Σχολής Επιστημών Αγωγής καιΔιευθύντρια του Εργαστηρίου Νέων Τεχνολογιών και Εκπαίδευσης από Απόσταση. Η κ. Παγγέ έχει αναπτύξει σημαντικό επιστημονικό, ερευνητικό και διοικητικό έργο στο Πανεπιστήμιο Ιωαννίνων συνεργαζόμενη με πολλά άλλα πανεπιστήμια και ερευνητικά κέντρα στη χώρα μας και στο εξωτερικό. Συμμετέχει ενεργά σε πολλούς συλλόγους και επιστημονικές εταιρίες, είναι μέλος της Εταιρείας Ηπειρωτικών Μελετών Ιωαννίνων, υπήρξε πρόεδρος του ΔΣ του Ιδρύματος 'Κλέαρχος Παπαδιαμάντης' στην Κόνιτσα και έχει αναπτύξει σημαντικές δράσεις στην Εταιρεία Πρόληψης Τροχαίων Ατυχημάτων Ηπείρου (ΕΠΤΑ). Επιπλέον, συνεργάστηκε με τους Δήμους Ιωαννιτών, Πρέβεζας και Κόνιτσας σε θέματα εκπαίδευσης, τεχνολογίας και ανάπτυξης της καινοτομίας.

Θέμα Ομιλίας:

«Οι ΤΠΕ στην σύγχρονη εκπαίδευση: Προκλήσεις και προοπτικές»

Invited Speaker:
Dimitrios Kalles,
Professor School of Science and Technology, Hellenic Open University



Dimitris Kalles is a Professor at the Hellenic Open University, specializing in "Artificial Intelligence – Applications," and serves as the Director of both the Undergraduate Study Program in "Computer Science" and the Postgraduate Study Program in "Data Science and Machine Learning." He holds a Diploma in Computer Engineering and Informatics (1991) from the University of Patras and a Ph.D. (1995) from the University of Manchester Institute of Science and Technology (UK). His research interests lie in the Theory and Applications of Artificial Intelligence, with an emphasis on Machine Learning, as well as in Integrated Environments, Technologies, and Methodologies for Developing Educational Activities. He has worked as an engineer and researcher at the Computer Technology Institute, as Technical Director at Ahead Relationship Mediators S.A. (where he also served as a member of the Board of Directors), and as an evaluator for the European Commission and other organizations. He is a member of the Hellenic Artificial Intelligence Society, of which he has also served as President.

Speech Title:
"Artificial Intelligence: New Hopes and Old Fears"
The purpose of this talk is to highlight some key components and applications of Artificial Intelligence and, by looking back at its history, to raise questions regarding how much time will pass before we take it for granted.

Προσκεκλημένος Ομιλητής:
Καλλές Δημήτριος,
Καθηγητής Σχολής Θετικών Επιστημών και Τεχνολογίας, Ελληνικού Ανοιχτού Πανεπιστημίου

Ο Δημήτρης Καλλές είναι Καθηγητής στο Ελληνικό Ανοικτό Πανεπιστήμιο στο αντικείμενο «Τεχνητή Νοημοσύνη – Εφαρμογές» και Διευθυντής του Προπτυχιακού Προγράμματος Σπουδών «Πληροφορική» και του Μεταπτυχιακού Προγράμματος Σπουδών «Data Science and Machine Learning». Έχει Δίπλωμα Μηχανικών Ηλεκτρονικών Υπολογιστών και Πληροφορικής (1991) από το Πανεπιστήμιο Πατρών και Ph.D. (1995) από το University of Manchester Institute of Science and Technology (UK). Τα ερευνητικά του ενδιαφέροντα είναι σε Θεωρία και Εφαρμογές Τεχνητής Νοημοσύνης με έμφαση στη Μηχανική Μάθηση και σε Ολοκληρωμένα Περιβάλλοντα, Τεχνολογίες και Μεθοδολογίες Ανάπτυξης Εκπαιδευτικών Δραστηριοτήτων. Έχει εργαστεί ως μηχανικός και ερευνητής στο Ινστιτούτο Τεχνολογίας Υπολογιστών, ως Τεχνικός Διευθυντής στην εταιρία Ahead Relationship Mediators A.E., της οποίας διατέλεσε και μέλος του Δ.Σ, και ως αξιολογητής για την Ευρωπαϊκή Επιτροπή και για άλλους οργανισμούς. Είναι μέλος της Ελληνικής Εταιρίας Τεχνητής Νοημοσύνης, της οποίας έχει διατελέσει Πρόεδρος.

Θέμα Ομιλίας:

Τεχνητή Νοημοσύνη: νέες ελπίδες και παλιοί φόβοι
Σκοπός της ομιλίας είναι να αναδείξει μερικές βασικές συνιστώσες και εφαρμογές της Τεχνητής Νοημοσύνης καi ανατρέχοντας στην ιστορία της, να θέσει τον προβληματισμό σχετικά με το πόσο καιρός θα περάσει μέχρι να τη θεωρούμε δεδομένη.

Invited Speaker:
Thomas Papastergiou,
Associate Professor, Sorbonne Paris Nord University, LIPN, France



Thomas Papastergiou is an Associate Professor at University Sorbonne Paris Nord, in Villetaneuse, Île-de-France, France. His research interests are in Artificial Intelligence and Machine Learning domain, and more specifically on Explainability for AI models (XAI). The applications of his research cover a broad domain, mainly in medical, bio-medical and health domain, that range from cancer detection in medical imaging (CT, pathology images), frailty status assessment and prediction for elderly people, as well as in de novo drug discovery (in sicilo novel drug generation), using explicable AI generative models.

Speech Title:
«Large Language Models in Education: Techniques, Applications, Insights"»

In this brief talk, I will begin by reviewing the two fundamental architectures of Large Language Models (LLMs)—BERT-like and GPT-like—along with their training processes and the challenges associated with building LLM base models. I will also discuss the economic and environmental concerns surrounding their development. Next, I will explore how LLMs can be applied in education, highlighting both existing and potential applications from the perspectives of educators and students. The focus will be on two distinct educational applications of LLMs: (1) Enhancing teaching plans through simulated teacher-student interaction scenarios generated by LLMs. (2) Utilizing GPT-3-driven pedagogical agents to foster children's curiosity and question-asking skills. Finally, I will briefly share my personal experience with an LLM-based tool used in teaching graduate students in the USPN Computer Science master's program.

Προσκεκλημένος Ομιλητής:
Παπαστεργίου Θωμάς,
Αναπληρωτής Καθηγητής Πανεπιστήμιο Sorbonne Paris Nord, LIPN, Γαλλία

Ο Θωμάς Παπαστεργίου είναι Αναπληρωτής Καθηγητής στο Πανεπιστήμιο Sorbonne Paris Nord, στο Βιλτανέζ (Villetaneuse) της περιφέρειας Île-de-France στη Γαλλία. Τα ερευνητικά του ενδιαφέροντα εμπίπτουν στον τομέα της Τεχνητής Νοημοσύνης και της Μηχανικής Μάθησης, και πιο συγκεκριμένα στην Εξηγήσιμη Τεχνητή Νοημοσύνη (Explainable AI - XAI). Οι εφαρμογές της έρευνάς του καλύπτουν ένα ευρύ φάσμα, κυρίως στον ιατρικό, βιοϊατρικό τομέα και τον τομέα της υγείας, που εκτείνεται από την ανίχνευση καρκίνου σε ιατρική απεικόνιση (αξονικές τομογραφίες - CT, ιστοπαθολογικές εικόνες), την αξιολόγηση και πρόβλεψη της κατάστασης ευπάθειας σε ηλικιωμένους, έως και την εκ νέου ανακάλυψη φαρμάκων (in silico παραγωγή νέων φαρμάκων), με τη χρήση παραγωγικών μοντέλων εξηγήσιμης Τεχνητής Νοημοσύνης.

Θέμα Ομιλίας:
«Μεγάλα γλωσσικά μοντέλα στην εκπαίδευση: τεχνικές, εφαρμογές, εμπειρίες»

Σε αυτή τη σύντομη ομιλία, θα ξεκινήσω αναλύοντας τις δύο θεμελιώδεις αρχιτεκτονικές των Μεγάλων Γλωσσικών Μοντέλων (LLMs) —τύπου BERT και τύπου GPT— μαζί με τις διαδικασίες εκπαίδευσής τους και τις προκλήσεις που σχετίζονται με τη δημιουργία βασικών μοντέλων (base models) LLM. Θα συζητήσω επίσης τις οικονομικές και περιβαλλοντικές ανησυχίες που περιβάλλουν την ανάπτυξή τους. Στη συνέχεια, θα εξετάσω πώς τα LLMs μπορούν να εφαρμοστούν στην εκπαίδευση, αναδεικνύοντας τόσο τις υπάρχουσες όσο και τις πιθανές εφαρμογές από την πλευρά των εκπαιδευτικών και των μαθητών. Η έμφαση θα δοθεί σε δύο διακριτές εκπαιδευτικές εφαρμογές των LLMs: (1) Την ενίσχυση των διδακτικών πλάνων μέσω σεναρίων προσομοίωσης αλληλεπίδρασης δασκάλου-μαθητή που δημιουργούνται από LLMs. (2) Τη χρήση παιδαγωγικών πρακτόρων (pedagogical agents) βασισμένων στο GPT-3 για την καλλιέργεια της περιέργειας και των δεξιοτήτων διατύπωσης ερωτήσεων στα παιδιά. Τέλος, θα μοιραστώ εν συντομία την προσωπική μου εμπειρία από ένα εργαλείο βασισμένο σε LLM, το οποίο χρησιμοποιήθηκε στη διδασκαλία μεταπτυχιακών φοιτητών στο πρόγραμμα σπουδών Πληροφορικής (Master's) του USPN.

Invited Speaker:

Dr. Sofia T. Papadimitriou
Head of Educational Radiotelevision and Digital Media – Ministry of Education, Religious Affairs and Sports, Adjunct Faculty (SEPO) at the Hellenic Open University



Sofia T. Papadimitriou studied Mathematics, holds a Master's degree in Computer Science and Operational Research from the National and Kapodistrian University of Athens, and completed her PhD at the School of Humanities of the Hellenic Open University in the field of distance education in 2014, with a dissertation titled "The role of tutors and the development of a support mechanism in a Collaborative Learning environment in Distance Education." In 2020, she completed her postdoctoral research at the University of the Aegean on "Teachers' Digital Media Literacy in Online Learning Environments for School-based Distance Education." Since 2015, she has been the Head of the Department of Educational Radiotelevision and Digital Media at the Ministry of Education, Religious Affairs, and Sports. She teaches "Digital Media in Education and Communication" and supervises master's theses in the postgraduate program "Education and Technologies in Distance Teaching and Learning Systems – Educational Sciences" at the Hellenic Open University. She has participated in 70 National and International Conferences with papers in the fields of Open and Distance Education, Open Educational Resources (OER), and the integration of Digital and Audiovisual Media in Learning. She has co-authored book chapters in collective volumes published by IGI Global Books, Routledge Publishing, Ellinoekdotiki, and Gutenberg (http://eap.academia.edu/SofiaPapadimitriou)

Speech Title:

"Digital and Media Literacy: Empowering Citizens' Digital Skills"

Continuous technological advancements, particularly the shift from mass communication to online communication, fuel the transformation of teaching and learning processes. New literacies have emerged over the past 50 years, such as media literacy, information literacy, and Information and Communication Technologies (ICT) literacy, arising from the need for citizens to develop new skills in modern society. Digital literacy can be considered a broader term that encompasses these other literacies, emerging in the "Information Age" of a networked society.

This presentation focuses on the new literacies of the digital era, with an emphasis on Digital and Media Literacy, as well as the systematic efforts of European countries and organizations to address the required new knowledge and skills. Within the framework of these efforts, the European Framework for the Digital Competence of Educators (DigCompEdu) and the European Digital Competence Framework for Citizens (DigComp2.0) are presented. These frameworks provide a common language and approach that support dialogue and the exchange of best practices across borders.

Furthermore, European programs implementing the core axes of the DigCompEdu and DigComp2.0 frameworks and contributing to the transformation of education are showcased. These programs offer digital literacy opportunities to both young people and adult citizens, and particularly to educators, enabling them to expand their knowledge and acquire a broader range of skills in critical thinking, digital content creation, safety, communication management, and information handling in the digital world. Given that educators serve as role models for the next generation, equipping them with digital skills to become "digitally competent" is of vital importance.

Digital competences are essential in the social and personal aspects of our lives, whether related to work or leisure, in the public or private sector. The digital divide creates conditions of exclusion and leads to a democratic deficit, as it prevents equal access for all citizens. Improving citizenship is the primary goal of digital competence development. Consequently, digital literacies lie at the very core of modern democratic and digital citizenship.

Προσκεκλημένη Ομιλήτρια:

Δρ Σοφία Θ. Παπαδημητρίου

Προϊσταμένη Εκπαιδευτικής Ραδιοτηλεόρασης και Ψηφιακών Μέσων – Υπουργείο Παιδείας Θρησκευμάτων και Αθλητισμού, Συνεργαζόμενο Εκπαιδευτικό Προσωπικό Ελληνικού Ανοιχτού Πανεπιστημίου

Η Σοφία Θ.Παπαδημητρίου σπούδασε στο Μαθηματικό τμήμα, έκανε μεταπτυχιακό στην Πληροφορική και Επιχειρησιακή Έρευνα του Εθνικού Καποδιστριακού Πανεπιστημίου Αθήνας και ολοκλήρωσε τη διδακτορική διατριβή της στη Σχολή Ανθρωπιστικών Σπουδών του Ελληνικού Ανοικτού Πανεπιστημίου στο πεδίο της εξ αποστάσεως εκπαίδευσης το 2014 με θέμα «Ο ρόλος των διδασκόντων και η ανάπτυξη μηχανισμού υποστήριξής τους σε περιβάλλον Συνεργατικής Μάθησης στην εξ Αποστάσεως Εκπαίδευση». Το 2020 ολοκλήρωσε τη μεταδιδακτορική της έρευνα στο Πανεπιστήμιο Αιγαίου με θέμα «Ψηφιακός Γραμματισμός Εκπαιδευτικών σε Οπτικοακουστικά Μέσα σε Διαδικτυακά Περιβάλλοντα Μάθησης για τη Σχολική εξ Αποστάσεως Εκπαίδευση». Από το 2015 είναι προϊσταμένη του Τμήματος Εκπαιδευτικής Ραδιοτηλεόρασης και Ψηφιακών Μέσων του Υπουργείου Παιδείας, Θρησκευμάτων και Αθλητισμού. Διδάσκει «Ψηφιακά Μέσα στην Εκπαίδευση και την Επικοινωνία» και επιβλέπει διπλωματικές εργασίες στο μεταπτυχιακό πρόγραμμα «Εκπαίδευση και Τεχνολογίες σε συστήματα εξ αποστάσεως διδασκαλίας και μάθησης – Επιστήμες της Αγωγής» του Ελληνικού Ανοικτού Πανεπιστημίου. Έχει συμμετοχή σε 70 Πανελλήνια και Διεθνή Συνέδρια με άρθρα στη θεματική της Ανοικτής και εξ Αποστάσεως Εκπαίδευσης, των Ανοικτών Εκπαιδευτικών Πόρων και της αξιοποίησης των Ψηφιακών και Οπτικοακουστικών Μέσων στη Μάθηση. Συμμετέχει στη συγγραφή κεφαλαίων σε συλλογικούς τόμους των εκδόσεων IGI Global Books, Routledge Publishing, Ελληνοεκδοτική και Gutenberg. (http://eap.academia.edu/SofiaPapadimitriou,)

Θέμα Ομιλίας:

«Ψηφιακός Γραμματισμός και Γραμματισμός στα Μέσα: Ενδυνάμωση των Ψηφιακών Δεξιοτήτων των Πολιτών»

Οι διαρκείς εξελίξεις της τεχνολογίας, ιδιαίτερα η μετάβαση από τη μαζική στη διαδικτυακή επικοινωνία τροφοδοτεί τον μετασχηματισμό των διαδικασιών διδασκαλίας και μάθησης. Νέοι γραμματισμοί έχουν αναδυθεί τα τελευταία 50 χρόνια όπως ο γραμματισμός στα Μέσα, ο πληροφοριακός γραμματισμός, ο γραμματισμός στις Τεχνολογίες Πληροφορίας και Επικοινωνίας (ΤΠΕ) ως αναγκαιότητα των νέων δεξιοτήτων που χρειάζεται να αναπτύξουν οι πολίτες στη σύγχρονη κοινωνία. Ο ψηφιακός γραμματισμός μπορεί να θεωρηθεί ένας γενικότερος όρος, ο οποίος εμπεριέχει τους υπόλοιπους γραμματισμούς, που αναδύονται στην «Εποχή της Πληροφορίας μιας Δικτυωμένης Κοινωνίας.

Η παρουσίαση εστιάζει στους νέους γραμματισμούς της ψηφιακής εποχής με έμφαση στον Ψηφιακό Γραμματισμό και τον Γραμματισμό στα Μέσα καθώς και στις μεθοδικές προσπάθειες των ευρωπαϊκών χωρών και οργανισμών να προσεγγίσουν τις νέες γνώσεις και δεξιότητες που απαιτούνται. Στο πλαίσιο των προσπαθειών αυτών παρουσιάζονται το Ευρωπαϊκό Πλαίσιο Ψηφιακών Δεξιοτήτων των Εκπαιδευτικών (DigCompEdu) και το Ευρωπαϊκό Πλαίσιο Ψηφιακών Δεξιοτήτων των Πολιτών (DigComp2.0), τα οποία παρέχουν μια κοινή γλώσσα και προσέγγιση που υποστηρίζει τον διάλογο και την ανταλλαγή βέλτιστων πρακτικών διασυνοριακά.

Στη συνέχεια παρουσιάζονται Ευρωπαϊκά προγράμματα που εφαρμόζουν τους άξονες των Ευρωπαϊκών Πλαισίων DigCompEdu και DigComp2.0 και συμβάλλουν στον μετασχηματισμό της εκπαίδευσης. Τα προγράμματα αυτά προσφέρουν ευκαιρίες Ψηφιακού Γραμματισμού τόσο σε νέους όσο και σε ενήλικες πολίτες και ιδιαιτέρως στους εκπαιδευτικούς, ώστε να επεκτείνουν τις γνώσεις τους και να κατακτήσουν ένα ευρύτερο φάσμα δεξιοτήτων κριτικής σκέψης, δημιουργίας ψηφιακού περιεχομένου, ασφάλειας, διαχείρισης της επικοινωνίας και πληροφορίας στον ψηφιακό κόσμο. Δεδομένου ότι οι εκπαιδευτικοί αποτελούν πρότυπα για την επόμενη γενιά, είναι ζωτικής σημασίας να οπλιστούν με ψηφιακές δεξιότητες ώστε να είναι «ψηφιακά επαρκείς».

Οι ψηφιακές ικανότητες είναι απαραίτητες στις κοινωνικές και προσωπικές πτυχές της ζωής μας, σχετίζονται με την εργασία ή τον ελεύθερο χρόνο, στον δημόσιο ή τον ιδιωτικό τομέα. Το ψηφιακό χάσμα δημιουργεί όρους αποκλεισμού, οδηγεί σε έλλειμμα δημοκρατίας, καθώς δεν επιτρέπει την ίση πρόσβαση στους πολίτες. Η βελτίωση της πολιτειότητας είναι ο πρωταρχικός στόχος της ανάπτυξης ψηφιακών ικανοτήτων. Συνεπώς, οι ψηφιακοί γραμματισμοί τοποθετούνται στον πυρήνα της σύγχρονης δημοκρατικής και ψηφιακής πολιτειότητας.

Invited Speaker:
Michalis Paraskevas, Professor
University of the Peloponnese, Vice President of CTI "Diophantus", Head of the National Support Organisation for eTwinning



Michalis Paraskevas is a Professor in the Department of Electrical and Computer Engineering at the University of the Peloponnese, specializing in signal processing systems, broadband networks, and telematics services. He is the Vice President of the Computer Technology Institute and Press "Diophantus" (CTI), coordinator of the Greek School Network, head of the eTwinning National Support Organisation (NSO) in Greece, manager of the stop-bullying.gov.gr platform, and coordinator of the NetLearn research group. He has 30 years of expertise in the design and operation of broadband networks, telecommunication systems, e-learning services, and e-government platforms. He directs research and development projects that have received national and international distinctions. He has published more than 100 scientific papers, authored 4 university textbooks, and participated in the organization of numerous conferences. He teaches in postgraduate programs at the Universities of Peloponnese and Thessaly and served as the inaugural Chair of the Department of Electrical and Computer Engineering at the University of the Peloponnese (2019-2021) (https://paraskevas.ece.uop.gr/)

Speech Title:
"eTwinning: Building a Strong Community of Innovative Teachers"
eTwinning is a flagship initiative of the European Commission. Throughout its twenty years of operation, it has shaped a dynamic community of teachers in Europe, promoting collaboration and innovation in school education. Through the secure European School Education Platform, teachers connect, exchange ideas, and implement collaborative projects, integrating new technologies and pedagogical approaches. With over 1,500,000 registered teachers, eTwinning serves as a hub for professional teacher development, offering training programs, webinars, and access to tools aimed at improving instruction.
The eTwinning National Support Organisation (NSO) provides educators with professional development through free webinars, workshops, and MOOCs, covering topics such as the pedagogical utilization of ICT, educational robotics, and Artificial Intelligence. Furthermore, it supports teachers in finding partners for international projects, provides technical and pedagogical assistance, and promotes best practices through awards and quality labels. Finally, it organizes conferences and special networking initiatives, reinforcing the momentum of the eTwinning community and the dissemination of innovation in education. The contribution of the eTwinning initiative is invaluable in shaping an educational culture of collaboration, enhancing teachers' skill development, and promoting interdisciplinary and digital learning.

Προσκεκλημένος Ομιλητής:
Παρασκευάς Μιχάλης,
Καθηγητής Πανεπιστημίου Πελοποννήσου, Αντιπρόεδρος Ι.Τ.Υ.Ε. «Διόφαντος», Επικεφαλής Εθνικού Οργανισμού Υποστήριξης eTwinning

Ο Μιχάλης Παρασκευάς είναι Καθηγητής στο Τμήμα Ηλεκτρολόγων Μηχανικών και Μηχανικών Υπολογιστών του Πανεπιστημίου Πελοποννήσου, με ειδίκευση στα συστήματα επεξεργασίας σημάτων, τα ευζωνικά δίκτυα και τις τηλεματικές υπηρεσίες. Είναι Αντιπρόεδρος του ΙΤΥΕ «Διόφαντος», συντονιστής του Πανελλήνιου Σχολικού Δικτύου, επικεφαλής του Εθνικού Οργανισμού Υποστήριξης eTwinning στην Ελλάδα, υπεύθυνος της πλατφόρμας stop-bullying.gov.gr και συντονιστής της ερευνητικής ομάδας NetLearn. Διαθέτει 30 χρόνια εμπειρίας στον σχεδιασμό και τη λειτουργία ευρυζωνικών δικτύων, τηλεπικοινωνιακών συστημάτων και υπηρεσιών ηλεκτρονικής μάθησης και ηλεκτρονικής διακυβέρνησης. Διευθύνει ερευνητικά και αναπτυξιακά έργα, τα οποία έχουν δεχθεί εθνικές και διεθνείς διακρίσεις. Έχει δημοσιεύσει περισσότερες από 100 επιστημονικές εργασίες, έχει συγγράψει 4 πανεπιστημιακά βιβλία και έχει συμμετάσχει στη διοργάνωση πολλών συνεδρίων. Διδάσκει σε μεταπτυχιακά προγράμματα στα Πανεπιστήμια Πελοποννήσου και Θεσσαλίας και διετέλεσε πρόεδρος του Τμήματος Ηλεκτρολόγων Μηχανικών και Μηχανικών Υπολογιστών του Πανεπιστημίου Πελοποννήσου κατά την ίδρυσή του (2019-2021). (https://paraskevas.ece.uop.gr/)

Θέμα Ομιλίας:

«eTwinning: Κτίζοντας μια Ισχυρή Κοινότητα Καινοτόμων Εκπαιδευτικών»

Το eTwinning είναι μια εμβληματική δράση της Ευρωπαϊκής Επιτροπής. Στα είκοσι χρόνια λειτουργίας της έχει διαμορφώσει μια δυναμική κοινότητα εκπαιδευτικών στην Ευρώπη που προάγει τη συνεργασία και την καινοτομία στη σχολική εκπαίδευση. Μέσω της ασφαλούς πλατφόρμας European School Education Platform, οι εκπαιδευτικοί συνδέονται, ανταλλάσσουν ιδέες και υλοποιούν συνεργατικά έργα, ενσωματώνοντας νέες τεχνολογίες και παιδαγωγικές προσεγγίσεις. Με πάνω από 1.500.000 εγγεγραμμένους εκπαιδευτικούς, το eTwinning αποτελεί έναν πυρήνα επαγγελματικής ανάπτυξης των εκπαιδευτικών, προσφέροντας επιμορφωτικά προγράμματα, διαδικτυακά σεμινάρια και πρόσβαση σε εργαλεία για τη βελτίωση της διδασκαλίας. Ο Εθνικός Οργανισμός Υποστήριξης (ΕΟΥ) eTwinning παρέχει στους εκπαιδευτικούς επιμόρφωση μέσω δωρεάν διαδικτυακών σεμιναρίων, εργαστηρίων και MOOCs, καλύπτοντας θέματα όπως η παιδαγωγική αξιοποίηση των ΤΠΕ, η εκπαιδευτική ρομποτική και η Τεχνητή Νοημοσύνη. Επιπλέον, υποστηρίζει τους εκπαιδευτικούς στην αναζήτηση συνεργατών για διεθνή έργα, παρέχει τεχνική και παιδαγωγική βοήθεια και προωθεί τις καλές πρακτικές μέσω βραβεύσεων και ετικετών ποιότητας. Τέλος, οργανώνει συνέδρια και ειδικές δράσεις δικτύωσης, ενισχύοντας τη δυναμική της κοινότητας eTwinning και τη διάχυση της καινοτομίας στην εκπαίδευση. Η συμβολή της δράσης eTwinning είναι ανεκτίμητη στη διαμόρφωση μιας εκπαιδευτικής κουλτούρας συνεργασίας, ενισχύοντας την ανάπτυξη δεξιοτήτων των εκπαιδευτικών και προάγοντας τη διαθεματική και ψηφιακή μάθηση.

Invited Speaker:

Spyridon-Georgios Soulis, Professor

Department of Primary Education, Chair of the Department of Primary Education, University of Ioannina



Spyridon-Georgios Soulis studied in Greece and Germany, at the University of Cologne —as an IKY (State Scholarships Foundation) scholar— where he received his PhD in the field of Special Education. Currently, he serves as a Professor of Special Education in the Department of Primary Education at the University of Ioannina, where he has also been the Department Chair since 2020. He is the Director of the Laboratory of Special Education and Needs, as well as the Director of the Postgraduate Study Program "Special Education" within the same department. He has published monographs, articles, and research papers both in Greece and abroad, focusing on: a) Inclusive Education, b) Pedagogy and Didactics for individuals with disabilities and/or special educational needs, c) Teacher Education, d) Parent Education, and e) Individuals with high intellectual functioning.

Speech Title:

"Digital Technology in Education: Is the Teacher's Role Being Abolished?"

Teaching with the use of digital technology serves as a driving force for educational reform at the dawn of the second quarter of the 21st century. As a supportive tool and analytical aid in the classroom, digital technology enhances the effectiveness, precision, and variety of instructional approaches by leveraging intelligent platforms, appropriate tools, and applications. A crucial aspect of the educational process is understanding the relationship that develops between digital technology and the role of the educator, given the challenges and dilemmas emerging within this new learning environment.

This presentation examines the role of the teacher in the context of the increasing presence of digital technology in the educational process. More specifically, it attempts to address the question of whether digital technology can replace the physical presence of the teacher in the school classroom. At the same time, it highlights the redefinition of the teacher's role, which will render the educator's presence even more essential for a higher quality of life for citizens in a society that is constantly evolving and where past certainties are being questioned.

Προσκεκλημένος Ομιλητής:

Σπυρίδων-Γεώργιος Σούλης,

Καθηγητής Παιδαγωγικού Τμήματος Δημοτικής Εκπαίδευσης (ΠΤΔΕ), Πρόεδρος ΠΤΔΕ, Πανεπιστημίου Ιωαννίνων

Ο Σπυρίδων-Γεώργιος Σούλης σπούδασε στην Ελλάδα και στη Γερμανία, στο Πανεπιστήμιο της Κολονίας - ως υπότροφος του ΙΚΥ, όπου έλαβε Διδακτορικό Τίτλο στον τομέα της Ειδικής Παιδαγωγικής. Σήμερα υπηρετεί ως Καθηγητής με γνωστικό αντικείμενο την Ειδική Αγωγή στο Παιδαγωγικό Τμήμα Δημοτικής Εκπαίδευσης του Πανεπιστημίου Ιωαννίνων, του οποίου είναι και Πρόεδρος από το 2020. Είναι Διευθυντής του Εργαστηρίου Ειδικής Αγωγής και Εκπαίδευσης και Διευθυντής του Προγράμματος Μεταπτυχιακών Σπουδών «Ειδική Αγωγή και Εκπαίδευση» του ίδιου Τμήματος. Έχει δημοσιεύσει μονογραφίες, άρθρα και έρευνες στην Ελλάδα και στο εξωτερικό που αναφέρονται: α) στην Παιδαγωγική της Συμπερίληψης, β) στην Παιδαγωγική και στη Διδακτική των ατόμων με αναπηρία ή και ειδικές εκπαιδευτικές ανάγκες, γ) στην εκπαίδευση των εκπαιδευτικών, δ) στην εκπαίδευση γονέων και ε) στα άτομα με υψηλή νοητική λειτουργικότητα.

Θέμα Ομιλίας:

«Ψηφιακή Τεχνολογία στην εκπαίδευση: Καταργείται ο ρόλος του εκπαιδευτικού;»

Η διδασκαλία με τη χρήση ψηφιακής τεχνολογίας αποτελεί κινητήρια δύναμη για τη μεταρρύθμιση της εκπαίδευσης στις απαρχές της δεύτερης εικοσιπενταετίας του 21ου αιώνα. Ως υποστηρικτικό εργαλείο και

αναλυτής στη σχολική τάξη, η ψηφιακή τεχνολογία ενισχύει την αποτελεσματικότητα, την ακρίβεια και την ποικιλία των διδακτικών προσεγγίσεων, αξιοποιώντας ευφυείς πλατφόρμες, κατάλληλα εργαλεία και εφαρμογές. Καθοριστική σημασία στην εκπαιδευτική διαδικασία κατέχει η κατανόηση της σχέσης που αναπτύσσεται μεταξύ της ψηφιακής τεχνολογίας και του ρόλου του εκπαιδευτικού εξαιτίας των προκλήσεων και των διλημμάτων που διαμορφώνονται στο νέο μαθησιακό περιβάλλον. Στην παρούσα εισήγηση εξετάζεται ο ρόλος του εκπαιδευτικού στο πλαίσιο της ολοένα και περισσότερο παρουσίας της ψηφιακής τεχνολογίας στην εκπαιδευτική διαδικασία. Ειδικότερα επιχειρείται να απαντηθεί το ερώτημα εάν η Ψηφιακή Τεχνολογία μπορεί να αντικαταστήσει τη φυσική παρουσία του εκπαιδευτικού στη σχολική τάξη. Παράλληλα καταγράφεται η επανανοηματοδότηση του ρόλου του εκπαιδευτικού, ο οποίος θα καταστήσει την παρουσία του εκπαιδευτικού περαιτέρω αναγκαία για μια ποιοτικότερη ζωή των πολιτών σε μια κοινωνία που διαρκώς θα εξελίσσεται και θα αμφισβητούνται βεβαιότητες των περασμένων χρόνων.

Invited Speaker:
Anastasios Mikropoulos, Professor
Department of Primary Education, University of Ioannina



Anastasios Mikropoulos holds a degree from the Department of Physics at the University of Ioannina. His doctoral research, conducted at the National Hellenic Research Foundation and the Universities of Manchester and Szeged, focused on non-linear optics and optical signal processing. Currently, he is a Professor at the University of Ioannina. His research interests include learning technologies in general and special education, with an emphasis on extended reality (XR) and educational neuroscience. He has published more than 240 internationally recognized papers and serves as a member of the editorial and review boards for various international scientific journals and conferences. He has taught at undergraduate and postgraduate levels in both Greek and international universities. Professor Mikropoulos is a founding member and elected president of the Hellenic Scientific Association of Information and Communication Technologies in Education (ETPE). In both 2022 and 2024, he was included in the top 2% of the most influential scientists worldwide.

Speech Title:
"Why and How Digital Technology in Teaching and Learning"

Effective pedagogical interaction aimed at learning requires social and socio-cognitive learning theories—namely, student-centered instructional models. It demands interactive learning technologies that enhance student engagement with both the teaching practice and the learning process. Digital technology provides opportunities to utilize multiple representations, offer experiences that accommodate multiple perspectives, embed learning within realistic and social contexts, encourage reflection, and develop metacognitive skills. These are essential prerequisites for constructing non-inert knowledge, which justifies the use of digital technology in the first place.
From a pedagogical standpoint, the method of utilization involves cognitive tools used by students to represent their knowledge, necessarily engaging them in high-level cognitive processes. From a technological perspective, the appropriate implementation of digital technology is selected for specific content. A key element is leveraging the unique characteristics of each technology for each given instructional situation. For example, learning management systems (LMS) or shared documents can be used for the remote collaborative application of brainstorming. For conducting experiments in natural sciences, mobile technologies are recommended, whereas virtual environments are proposed for studying ancient dwellings.

Προσκεκλημένος Ομιλητής:
Μικρόπουλος Αναστάσιος, Καθηγητής Παιδαγωγικού Τμήματος Δημοτικής Εκπαίδευσης,
Πανεπιστημίου Ιωαννίνων

Ο Αναστάσιος Μικρόπουλος είναι πτυχιούχος του Τμήματος Φυσικής του Πανεπιστημίου Ιωαννίνων. Η διδακτορική του έρευνα στο Εθνικό Ίδρυμα Ερευνών, στα Πανεπιστήμια Manchester και Szeged αφορούσε σε θέματα μη γραμμικής οπτικής και οπτικής επεξεργασίας σήματος. Σήμερα είναι καθηγητής στο Πανεπιστήμιο Ιωαννίνων. Στα ερευνητικά του ενδιαφέροντα περιλαμβάνονται οι τεχνολογίες μάθησης στη γενική και ειδική εκπαίδευση με έμφαση στην εκτεταμένη πραγματικότητα και η εκπαιδευτική νευροεπιστήμη. Έχει δημοσιεύσει περισσότερες από 240 εργασίες με διεθνή αναγνώριση. Είναι μέλος της συντακτικής και κριτικής επιτροπής διεθνών επιστημονικών περιοδικών και συνεδρίων. Έχει διδάξει σε προπτυχιακά και μεταπτυχιακά τμήματα σε ελληνικά Πανεπιστήμια και Πανεπιστήμια του εξωτερικού. Είναι ιδρυτικό μέλος και εκλεγμένος πρόεδρος της Ελληνικής Επιστημονικής Ένωσης Τεχνολογιών Πληροφορίας και Επικοινωνιών στην Εκπαίδευση-ΕΤΠΕ. Τα έτη 2022 και 2024 συγκαταλέχθηκε στο 2% των επιστημόνων με τη μεγαλύτερη επιρροή παγκοσμίως.

Θέμα Ομιλίας:

«Γιατί και πως ψηφιακή τεχνολογία στη διδασκαλία και τη μάθηση»

Η αποτελεσματική παιδαγωγική αλληλεπίδραση με σκοπό τη μάθηση απαιτεί κοινωνικές και κοινωνιογνωστικές θεωρίες μάθησης, δηλαδή μαθητοκεντρικά διδακτικά μοντέλα. Απαιτεί διαδραστικές τεχνολογίες μάθησης, που ενισχύουν την εμπλοκή του μαθητή με τη διδακτική πράξη και τη μαθησιακή διαδικασία. Η ψηφιακή τεχνολογία παρέχει δυνατότητες για χρήση πολλαπλών αναπαραστάσεων, παροχή εμπειριών με τη συνεκτίμηση πολλαπλών οπτικών, ενσωμάτωση της μάθησης σε ρεαλιστικά και κοινωνικά πλαίσια, ενθάρρυνση αναστοχασμού, ανάπτυξη μεταγνωστικών δεξιοτήτων. Αυτά είναι ζητούμενα για την οικοδόμηση μη αδρανούς γνώσης, και ο λόγος χρησιμοποίησης της ψηφιακής τεχνολογίας. Ο τρόπος αξιοποίησης της από παιδαγωγικής πλευράς είναι τα γνωστικά εργαλεία που χρησιμοποιούνται από τον/τη μαθητή/ρια για να αναπαραστήσει τη γνώση του/της εμπλέκοντας τον/την απαραίτητα σε νοητικές διεργασίες υψηλού επιπέδου. Από τεχνολογικής πλευράς, επιλέγεται η κατάλληλη υλοποίηση της ψηφιακής τεχνολογίας για ένα συγκεκριμένο περιεχόμενο. Σημαντικό στοιχείο αποτελεί η αξιοποίηση των μοναδικών χαρακτηριστικών κάθε τεχνολογίας για την εκάστοτε διδακτική κατάσταση. Για την εξ αποστάσεως συνεργατική εφαρμογή του καταιγισμού ιδεών για παράδειγμα, μπορούν να χρησιμοποιηθούν συστήματα διαχείρισης μάθησης ή κοινόχρηστα έγγραφα. Για τη διεξαγωγή πειραμάτων στις φυσικές επιστήμες προτείνονται οι φορητές τεχνολογίες, ενώ για τη μελέτη μιας αρχαίας κατοικίας εικονικά περιβάλλοντα.

Invited Speaker:
Dr. Spyridon Papadakis
Computer Science Education Counselor (PE86), Adjunct Faculty (SEPO) at the Hellenic Open University



Dr. Spyridon Papadakis is a Computer Science Education Counselor (PE86), with areas of scientific responsibility spanning the Directorates of Primary and Secondary Education of Achaea, as well as the Directorates of Primary and Secondary Education of Cephalonia. He is also an Instructor and member of the Adjunct Faculty (SEPO) at the Hellenic Open University (HOU). His research interests include a deep understanding of how people interact, collaborate, work, and learn within technology-enhanced blended learning environments, as well as the application of modern learning theories using new and emerging learning technologies in distance education and blended learning, with a particular emphasis on the field of learning design for the professional development of teachers. He has authored 12 books and more than 150 scientific papers published in international and Greek scientific journals and conference proceedings. Among these is the teacher training textbook for Level A (Introductory) ICT training. (https://users.sch.gr/papadakis/new/el/cv/)

Speech Title:
"From Traditional Teaching to Collaborative Learning: Modern Educational Models Supported by Digital Media in the Classroom"

In the era of digital education and artificial intelligence, the need for more engaging and effective instructional approaches is more imperative than ever. This presentation focuses on the transition from traditional teaching to collaborative learning, leveraging modern educational models and advanced digital media. Specifically, it will present the Flipped Classroom model and the implementation of small-group collaborative learning through Team-Based Learning (TBL), aimed at actively engaging students in the learning process. Additionally, it will highlight the use of the Learning Activity Management System (LAMS) as a tool for designing and implementing educational activities that enhance student interaction, critical thinking, and collaboration. Through examples and best practices, the talk will demonstrate how digital media can transform the instructional approach, making learning more dynamic, experiential, and effective.

Προσκεκλημένος Ομιλητής:
Παπαδάκης Σπυρίδων, Δρ.
Σύμβουλος Εκπαίδευσης Πληροφορικής (ΠΕ86)Διδάσκων – Μέλος ΣΕΠ, Ελληνικού Ανοικτού Πανεπιστημίου

Ο Δρ. Σπυρίδων Παπαδάκης είναι Σύμβουλος Εκπαίδευσης Πληροφορικής (ΠΕ86) με περιοχές επιστημονικής ευθύνης τις Διευθύνσεις Πρωτοβάθμιας Εκπαίδευσης Αχαΐας, Δευτεροβάθμιας Εκπαίδευσης Αχαΐας, Πρωτοβάθμιας Εκπαίδευσης Κεφαλληνίας και Δευτεροβάθμιας Εκπαίδευσης Κεφαλληνίας και Διδάσκων – Μέλος Συνεργαζόμενου Εκπαιδευτικού Προσωπικού (Σ.Ε.Π) Ελληνικού Ανοικτού Πανεπιστημίου (Ε.Α.Π). Τα ερευνητικά του ενδιαφέροντα περιλαμβάνουν τη βαθιά κατανόηση του τρόπου με τον οποίο οι άνθρωποι αλληλεπιδρούν, συνεργάζονται, εργάζονται και μαθαίνουν σε τεχνολογικά υποστηριζόμενα περιβάλλοντα μικτής μάθησης και στην εφαρμογή σύγχρονων θεωριών μάθησης με νέες και αναδυόμενες τεχνολογίες μάθησης στην εξ αποστάσεως εκπαίδευση και τη μικτή μάθηση με έμφαση στο πεδίο του μαθησιακού σχεδιασμού (learning design) στην επαγγελματική ανάπτυξη των εκπαιδευτικών. Έχει συγγράψει 12 βιβλία και περισσότερα από 150 επιστημονικά άρθρα σε διεθνή και ελληνικά επιστημονικά περιοδικά και συνέδρια. Μεταξύ αυτών το βιβλίο επιμόρφωσης των εκπαιδευτικών για το Α επίπεδο επιμόρφωσης. (https://users.sch.gr/papadakis/new/el/cv)

Θέμα Ομιλίας:
"Από την Παραδοσιακή Διδασκαλία στη Συνεργατική μάθηση: Σύγχρονα Μοντέλα Εκπαίδευσης με Ψηφιακά Μέσα υποστήριξης στην Τάξη"

Στην εποχή της ψηφιακής εκπαίδευσης και της τεχνητής νοημοσύνης, η ανάγκη για πιο ελκυστικές και αποτελεσματικές διδακτικές προσεγγίσεις είναι πιο επιτακτική από ποτέ. Η παρούσα ομιλία εστιάζει στη μετάβαση από την παραδοσιακή διδασκαλία στη συνεργατική μάθηση, αξιοποιώντας σύγχρονα εκπαιδευτικά μοντέλα και προηγμένα ψηφιακά μέσα. Ειδικότερα, θα παρουσιαστεί το μοντέλο της Ανεστραμμένης Τάξης (Flipped Classroom) και η εφαρμογή της συνεργατικής μάθησης σε μικρές ομάδες (Team-Based Learning - TBL), με στόχο την ενεργή συμμετοχή των μαθητών στη μαθησιακή διαδικασία. Παράλληλα, θα αναδειχθεί η χρήση του Learning Activity Management System (LAMS) ως εργαλείου σχεδιασμού και υλοποίησης εκπαιδευτικών δραστηριοτήτων που ενισχύουν τη διάδραση, την κριτική σκέψη και τη συνεργασία των μαθητών. Μέσα από παραδείγματα και καλές πρακτικές, η ομιλία θα αναδείξει πώς τα ψηφιακά μέσα μπορούν να μεταμορφώσουν τη διδακτική προσέγγιση, καθιστώντας τη μάθηση πιο δυναμική, βιωματική και αποτελεσματική.

Invited Speaker:
Themistoklis Exarchos, Associate Professor
Ionian University

Themis Exarchos is an Associate Professor in the Department of Informatics at the Ionian University, Corfu, and Director of the Bioinformatics and Human Electrophysiology Laboratory. He holds a Diploma in Computer Engineering and Informatics from the University of Patras and a Ph.D. in Medical Informatics from the Faculty of Medicine at the University of Ioannina. He has published more than 65 journal articles, over 80 papers in conference proceedings, and more than 15 book chapters. He has worked for over 20 years on research and development projects funded by the EU and other organizations.

Speech Title:
"Developing Large Language Models to Support Teachers in Essay Evaluation"

Large Language Models (LLMs) are transforming the educational process, enabling the accurate and consistent analysis and grading of essays while offering the potential for personalized recommendations. The AISE project leverages this cutting-edge technology to support secondary education teachers through an LLM-based digital platform. The proposed methodology involves collecting and annotating essays from four countries (Greece, Cyprus, Croatia, Serbia), splitting them into training and test sets, constructing specialized knowledge bases for each evaluation dimension (Content, Organization, Language), and finally, utilizing Retrieval-Augmented Generation (RAG) for their thorough evaluation. Early results from 451 essays demonstrate a satisfactory balanced evaluation accuracy (e.g., 83.3% in the Content dimension), where the application of the RAG technique drastically reduces the phenomenon of hallucinations in LLMs. In conclusion, the AISE project highlights the value of LLMs in education for effective evaluation within the learning process.

Προσκεκλημένος Ομιλητής:
Έξαρχος Θεμιστοκλής,
Αναπληρωτής Καθηγητής, Ιόνιο Πανεπιστήμιο

Ο Θέμης Έξαρχος είναι Αναπληρωτής Καθηγητής στο Τμήμα Πληροφορικής του Ιονίου Πανεπιστημίου, Κέρκυρα και Διευθυντής του Εργαστηρίου Βιοπληροφορικής και Ανθρώπινης Ηλεκτροφυσιολογίας. Είναι διπλωματούχος μηχανικός, από το Τμήμα Μηχανικών Η/Υ και Πληροφορικής του Πανεπιστημίου Πατρών και κάτοχος διδακτορικού διπλώματος στην Ιατρική Πληροφορική από την Ιατρική Σχολή του Πανεπιστημίου Ιωαννίνων. Έχει περισσότερες από 65 δημοσιεύσεις σε περιοδικά, περισσότερες από 80 δημοσιεύσεις σε πρακτικά συνεδρίων και περισσότερες από 15 δημοσιεύσεις σε βιβλία. Έχει εργαστεί για περισσότερα από 20 χρόνια σε ερευνητικά και αναπτυξιακά έργα, χρηματοδοτούμενα από την ΕΕ και άλλους φορείς.

Θέμα Ομιλίας:
«Ανάπτυξη μεγάλων γλωσσικών μοντέλων για την υποστήριξη καθηγητών στην αξιολόγηση εκθέσεων»

Τα Μεγάλα Γλωσσικά Μοντέλα (ΜΓΜ) μετασχηματίζουν την εκπαιδευτική διαδικασία, επιτρέποντας την ανάλυση και βαθμολόγηση εκθέσεων με ακρίβεια και συνέπεια δίνοντας την δυνατότητα παροχής προσωποποιημένων συστάσεων. Το έργο AISE αξιοποιεί αυτήν την τεχνολογία αιχμής για την υποστήριξη καθηγητών δευτεροβάθμιας εκπαίδευσης μέσω μιας ψηφιακής πλατφόρμας βασισμένης σε ΜΓΜ. Η προτεινόμενη μεθοδολογία περιλαμβάνει συλλογή και επισημείωση εκθέσεων από τέσσερις χώρες (Ελλάδα, Κύπρος, Κροατία, Σερβία), τον διαχωρισμό τους σε σύνολα εκπαίδευσης και δοκιμής, την δημιουργία εξειδικευμένων βάσεων γνώσης ανά διάσταση αξιολόγησης (Περιεχόμενο, Οργάνωση, Γλώσσα) και τέλος την χρήση ενίσχυσης μέσω ανάκτησης γνώσης (retrieval augmented generation - RAG) για την ενδελεχή αξιολόγησή τους. Πρώιμα αποτελέσματα από 451 εκθέσεις δείχνουν επαρκή εξισορροπημένη ακρίβεια αξιολόγησης (π.χ. 83.3% στην διάσταση του Περιεχομένου), όπου η χρήση της τεχνικής RAG μειώνει δραστικά το φαινόμενο των ψευδαισθήσεων στα ΜΓΜ. Εν κατακλείδι, το έργο AISE αναδεικνύει την αξία των ΜΓΜ στην εκπαίδευση για την αποτελεσματική αξιολόγηση στην εκπαιδευτική διαδικασία.

Invited Speaker:
Longo Francesco,
Associate Professor, University of Calabria, Italy



Francesco Longo is currently Associate Professor at University of Calabria, Italy (where he is part of the Industrial Engineering group) and Director of the Modeling & Simulation Center - Laboratory of Enterprise Solutions (MSC-LES Lab). He has a strong background in Modeling & Simulation as well as VR, AR and MR applied to different sectors. He oversees the development and implementation of the cutting-edge research and initiatives in which the MSC-LES lab is involved. With a passion for technology and enabling methodologies, he has a track record of successful R&D projects and publications and he serves as General and Program Chair in well known international Conferences such as I3M (International Multidisciplinary Modeling & Simulation Multiconference) and ISM (International Conference on Industry of the Future and Smart Manufacturing).

Speech Title:
«An overview of trends, challenges and opportunities in integrating AI, VR and AR in Management Engineering Education»

This talk investigates how the convergence of different enabling technologies and methodologies of the Fourth and Fifth Industrial Revolutions (Industry 4.0 and 5.0) can be seamlessly used for education and training in the enlarged Industrial Engineering domain. The presentation passes through different real-world case studies that make use of Artificial Intelligence, Simulation, Virtual Reality, Augmented Reality and Mixed Reality highlighting their potentials and benefits both as stand-alone approaches and as integrated solutions. For each case study, tools, development approaches and related systems functionalities will be presented.

Προσπεκλημένος Ομιλητής:
Longo Francesco, Αναπληρωτής Καθηγητής, Πανεπιστήμιο της Καλαβρίας, Ιταλία

Ο Francesco Longo είναι Αναπληρωτής Καθηγητής στο Πανεπιστήμιο της Καλαβρίας στην Ιταλία (όπου ανήκει στην ομάδα Μηχανολόγων Μηχανικών Παραγωγής και Διοίκησης) και Διευθυντής του Κέντρου Μοντελοποίησης & Προσομοίωσης - Εργαστήριο Επιχειρησιακών Λύσεων (MSC-LES Lab). Διαθέτει ισχυρό υπόβαθρο στη Μοντελοποίηση & Προσομοίωση, καθώς και στην Εικονική (VR), Επαυξημένη (AR) και Μικτή Πραγματικότητα (MR) εφαρμοσμένες σε διάφορους τομείς. Επιβλέπει την ανάπτυξη και την υλοποίηση της έρευνας αιχμής και των πρωτοβουλιών στις οποίες εμπλέκεται το εργαστήριο MSC-LES. Με πάθος για την τεχνολογία και τις μεθοδολογίες ενδυνάμωσης, έχει στο ενεργητικό του επιτυχημένα έργα Έρευνας και Ανάπτυξης (R&D) και δημοσιεύσεις, ενώ υπηρετεί ως Γενικός Πρόεδρος και Πρόεδρος Προγράμματος σε γνωστά διεθνή συνέδρια, όπως το I3M (International Multidisciplinary Modeling & Simulation Multiconference) και το ISM (International Conference on Industry of the Future and Smart Manufacturing).

Θέμα Ομιλίας:
«Μια επισκόπηση των τάσεων, προκλήσεων και ευκαιριών στην ενσωμάτωση της Τεχνητής Νοημοσύνης (AI), της Εικονικής (VR) και της Επαυξημένης Πραγματικότητας (AR) στην εκπαίδευση Μηχανικών Παραγωγής και Διοίκησης»

Η παρούσα ομιλία εξετάζει πώς η σύγκλιση διαφορετικών τεχνολογιών και μεθοδολογιών ενδυνάμωσης της Τέταρτης και Πέμπτης Βιομηχανικής Επανάστασης (Industry 4.0 και 5.0) μπορεί να χρησιμοποιηθεί απρόσκοπτα για την εκπαίδευση και την κατάρτιση στον διευρυμένο τομέα της Μηχανικής Παραγωγής και Διοίκησης. Η παρουσίαση αναλύει διάφορες πραγματικές μελέτες περίπτωσης (case studies) που αξιοποιούν την Τεχνητή Νοημοσύνη, την Προσομοίωση, την Εικονική Πραγματικότητα, την Επαυξημένη Πραγματικότητα και τη Μικτή Πραγματικότητα, αναδεικνύοντας τις δυνατότητες και τα οφέλη τους τόσο ως αυτόνομες

προσεγγίσεις όσο και ως ολοκληρωμένες λύσεις. Για κάθε μελέτη περίπτωσης, θα παρουσιαστούν τα εργαλεία, οι προσεγγίσεις ανάπτυξης και οι σχετικές λειτουργικότητες των συστημάτων.

Invited Speaker – Closing Statement:

Filipovic Nenad, Professor,
Faculty of Engineering, University of Kragujevac, Serbia, Director of Science Fund of Serbia Nenad, Serbia



Nenad Filipovic is Director of Science Fund of Republic Serbia and Vice-director of BIOIRC Bioengineering Research Center, former Rector of University of Kragujevac, Serbia, full Professor at Faculty of Engineering and Head of Center for Bioengineering at University of Kragujevac, Serbia. He was Research Associate at Harvard School of Public Health in Boston, US. His research interests are in the area of computational mechanics, artificial intelligence, biomedical engineering, cardiovascular disease, fluid-structure interaction, biomechanics, bioinformatics, biomedical image processing, medical informatics, multi-scale modeling, software engineering, parallel computing, computational chemistry and bioprocess modeling. He is author and co-author 11 textbooks and 9 monographies, over 400 publications in peer review journals and over 10 software for modeling with finite element method and discrete methods from fluid mechanics and multiphysics. He also leads a number of national and international projects in EU and US in area of bioengineering, artificial intelligence and software development. He leads joint research projects with Harvard University and University of Texas in area of bio-nano-medicine computer simulation. He also leads a number of national and international projects in area of bioengineering and bioinformatics. He is Editor in Chief for EAI Endorsed Transaction on Bioengineering and Bioinformatics and EAI Endorsed Transactions on Pervasive Health and Technology, Managing Editor for Journal of Serbian Society for Computational Mechanics, President of Serbian Society of Mechanics and member of European Society of Biomechanics (ESB), European Society for Artificial Organs (ESAO) and IEEE member.

Προσκεκλημένος Ομιλητής- Χαιρετισμός Λήξης:

Filipovic Nenad, Καθηγητής, Σχολή Μηχανικών, Πανεπιστήμιο του Κραγκούγιεβατς, Σερβία – Διευθυντής του Ταμείου Επιστημών της Σερβίας

Ο Nenad Filipovic είναι Διευθυντής του Ταμείου Επιστημών της Δημοκρατίας της Σερβίας, Αναπληρωτής Διευθυντής του Κέντρου Βιοϊατρικής Έρευνας BIOIRC, πρώην Πρύτανης του Πανεπιστημίου του Κραγκούγιεβατς (Σερβία), Τακτικός Καθηγητής στη Σχολή Μηχανικών και Επικεφαλής του Κέντρου Βιομηχανικής στο Πανεπιστήμιο του Κραγκούγιεβατς. Έχει διατελέσει Ερευνητικός Συνεργάτης (Research Associate) στη Σχολή Δημόσιας Υγείας του Πανεπιστημίου Χάρβαρντ (Harvard School of Public Health) στη Βοστώνη των ΗΠΑ. Τα ερευνητικά του ενδιαφέροντα εστιάζουν στους τομείς της υπολογιστικής μηχανικής, της τεχνητής νοημοσύνης, της βιοϊατρικής μηχανικής, των καρδιαγγειακών παθήσεων, της αλληλεπίδρασης ρευστού-δομής (fluid-structure interaction), της εμβιομηχανικής, της βιοπληροφορικής, της επεξεργασίας βιοϊατρικών εικόνων, της ιατρικής πληροφορικής, της μοντελοποίησης πολλαπλών κλιμάκων (multi-scale modeling), της τεχνολογίας λογισμικού, των παράλληλων υπολογισμών, της υπολογιστικής χημείας και της μοντελοποίησης βιοδιεργασιών.

Είναι συγγραφέας και συνσυγγραφέας 11 πανεπιστημιακών συγγραμμάτων και 9 μονογραφιών, έχει περισσότερες από 400 δημοσιεύσεις σε επιστημονικά περιοδικά με κριτές, και έχει αναπτύξει πάνω από 10 λογισμικά μοντελοποίησης με τη μέθοδο των πεπερασμένων στοιχείων (finite element method) και διακριτών μεθόδων από τη ρευστομηχανική και την πολυφυσική (multiphysics). Διευθύνει επίσης μια σειρά από εθνικά και διεθνή έργα στην ΕΕ και τις ΗΠΑ στους τομείς της βιομηχανικής, της τεχνητής νοημοσύνης και της ανάπτυξης λογισμικού. Επιπλέον, ηγείται κοινών ερευνητικών προγραμμάτων με το Πανεπιστήμιο Χάρβαρντ και το Πανεπιστήμιο του Τέξας στον τομέα της υπολογιστικής προσομοίωσης στη βιο-νανοϊατρική, καθώς και πολλών εθνικών και διεθνών έργων στους τομείς της βιομηχανικής και της βιοπληροφορικής.

Είναι Αρχισυντάκτης (Editor in Chief) των επιστημονικών περιοδικών EAI Endorsed Transaction on Bioengineering and Bioinformatics και EAI Endorsed Transactions on Pervasive Health and Technology, Διευθυντής Σύνταξης (Managing Editor) του περιοδικού Journal of Serbian Society for Computational Mechanics, Πρόεδρος της Σερβικής Εταιρείας Μηχανικής, καθώς και μέλος της Ευρωπαϊκής Εταιρείας Εμβιομηχανικής (ESB), της Ευρωπαϊκής Εταιρείας Τεχνητών Οργάνων (ESAO) και του IEEE.

WORKSHOPS – ΕΡΓΑΣΤΗΡΙΑ

«Robotics in Education» - «Ρομποτική στην Εκπαίδευση»



Apostolos Tsagkaris, Professor
International Hellinic University

Απόστολος Τσαγκάρης,
Καθηγητής,
Διεθνές Πανεπιστήμιο της Ελλάδος



Maria Chatzikykrou, PhD Candidate,
International Hellenic University

Μαρία Χατζηκύκρου, Υποψηφια Διδακτωρ
Διεθνές Πανεπιστήμιο της Ελλάδος



Konstantinos Kamoutsis, PhD Canditate
International Hellenic University

Καμούτσης Κωνταντίνος
Διεθνές Πανεπιστήμιο της Ελλάδος

Workshop Description

The educational robotics workshop is designed for primary and secondary education teachers who wish to integrate robotics into their teaching practice. The goal is to familiarize participants with the fundamental principles of robotics and to understand how it can be utilized as a tool for discovery learning.

The workshop begins with an introduction to educational robotics and its philosophy. Teachers learn about the benefits of incorporating robotic activities in the classroom, such as developing computational thinking, enhancing collaboration and creativity, as well as cultivating problem-solving skills. Examples from international applications and research data demonstrating the effectiveness of this method are discussed.

In the theoretical part, participants become familiar with basic robotics concepts such as motors, sensors (ultrasonic, color, touch), control structures (loops, conditions), and programming logic. Various educational robotics platforms are presented, with emphasis on user-friendly systems such as LEGO.

The hands-on part constitutes the main focus of the workshop. Teachers are divided into groups and build simple robotic vehicles using the available kits. They learn to program their robots using programming blocks, starting from simple movement commands (e.g., moving forward for a specific distance) and progressing to more complex scenarios involving sensor usage (e.g., obstacle avoidance, line following).

During the practical activities, teachers face real challenges and learn debugging and problem-solving techniques. This hands-on experience helps them understand the difficulties their students might encounter, as well as develop support strategies.

A significant part of the workshop concerns teaching methodology. Discussion topics include ways to integrate robotics into various subject areas (mathematics, physics, language), designing robotic activities based on real-life scenarios, and utilizing gamification to increase student engagement. Teachers learn how to create progressive learning scenarios, starting from simple tasks and gradually increasing complexity.

The workshop concludes with group presentations, where each team demonstrates the solution they developed for a given challenge. This not only reinforces collaborative learning but also provides ideas for activities they can implement in their classrooms. Teachers leave with practical materials, lesson plans, and the confidence to begin their own journey in educational robotics.

Περιγραφή Εργαστηρίου

Το σεμινάριο εκπαιδευτικής ρομποτικής απευθύνεται σε εκπαιδευτικούς πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης που επιθυμούν να εντάξουν τη ρομποτική στη διδακτική τους πράξη. Στόχος είναι η εξοικείωση των συμμετεχόντων με τις βασικές αρχές της ρομποτικής και η κατανόηση του τρόπου με τον οποίο αυτή μπορεί να αξιοποιηθεί ως εργαλείο ανακαλυπτικής μάθησης.

Το workshop ξεκινά με μια εισαγωγή στην εκπαιδευτική ρομποτική και τη φιλοσοφία της. Οι εκπαιδευτικοί γνωρίζουν τα οφέλη της ενσωμάτωσης ρομποτικών δραστηριοτήτων στην τάξη, όπως η ανάπτυξη υπολογιστικής σκέψης, η ενίσχυση της συνεργασίας και της δημιουργικότητας, καθώς και η καλλιέργεια δεξιοτήτων επίλυσης προβλημάτων. Συζητούνται παραδείγματα από διεθνείς εφαρμογές και ερευνητικά δεδομένα που αποδεικνύουν την αποτελεσματικότητα της μεθόδου.

Στο θεωρητικό μέρος, οι συμμετέχοντες εξοικειώνονται με βασικές έννοιες της ρομποτικής όπως οι κινητήρες, οι αισθητήρες (υπερήχων, χρώματος, αφής), οι δομές ελέγχου (loops, conditions) και η λογική προγραμματισμού. Παρουσιάζονται διάφορες πλατφόρμες εκπαιδευτικής ρομποτικής, με έμφαση σε εύχρηστα συστήματα όπως το LEGO.

Το πρακτικό μέρος αποτελεί το κύριο σημείο του σεμιναρίου. Οι εκπαιδευτικοί χωρίζονται σε ομάδες και κατασκευάζουν απλά ρομποτικά οχήματα χρησιμοποιώντας τα διαθέσιμα κιτ. Μαθαίνουν να προγραμματίζουν τα ρομπότ τους χρησιμοποιώντας blocks προγραμματισμού, ξεκινώντας από απλές εντολές κίνησης (π.χ. κίνηση προς τα εμπρός για συγκεκριμένη απόσταση) και προχωρώντας σε πιο σύνθετα σενάρια που περιλαμβάνουν χρήση αισθητήρων (π.χ. αποφυγή εμποδίων, ακολουθία γραμμής).

Κατά τη διάρκεια των πρακτικών δραστηριοτήτων, οι εκπαιδευτικοί αντιμετωπίζουν πραγματικές προκλήσεις και μαθαίνουν τεχνικές debugging και επίλυσης προβλημάτων. Αυτή η hands-on εμπειρία τους βοηθά να κατανοήσουν τις δυσκολίες που ενδέχεται να αντιμετωπίσουν οι μαθητές τους, καθώς και να αναπτύξουν στρατηγικές υποστήριξης.

Ένα σημαντικό κομμάτι του workshop αφορά τη διδακτική μεθοδολογία. Συζητούνται τρόποι ενσωμάτωσης της ρομποτικής σε διάφορα γνωστικά αντικείμενα (μαθηματικά, φυσική, γλώσσα), η σχεδίαση ρομποτικών δραστηριοτήτων βασισμένων σε σενάρια πραγματικής ζωής, και η αξιοποίηση της παιχνιδοποίησης για την αύξηση του engagement των μαθητών. Οι εκπαιδευτικοί μαθαίνουν πώς να δημιουργούν προοδευτικά σενάρια μάθησης, ξεκινώντας από απλές εργασίες και αυξάνοντας σταδιακά την πολυπλοκότητα.

Το σεμινάριο κλείνει με παρουσιάσεις των ομάδων, όπου κάθε ομάδα επιδεικνύει τη λύση που ανέπτυξε σε μια δοσμένη πρόκληση. Αυτό όχι μόνο ενισχύει τη συνεργατική μάθηση, αλλά δίνει και ιδέες για δραστηριότητες που μπορούν να μεταφέρουν στην τάξη τους. Οι εκπαιδευτικοί αποχωρούν με πρακτικό υλικό, σχέδια μαθημάτων, και την αυτοπεποίθηση να ξεκινήσουν τη δική τους πορεία στην εκπαιδευτική ρομποτική.

Conference Abstracts

TA1: Research on the development, implementation, and use of contemporary technologies in the modern school, education, and learning.

INNOVATIVE APPROACHES TO TEACHING: THE CONTRIBUTION OF AUGMENTED AND VIRTUAL REALITY TO LEARNING ENGLISH THROUGH PHYSICAL ACTIVITY

Vasiliki Karmi
PE06 English Language Teacher
Directorate of Secondary Education of Kerkyra
Kerkyra, Greece
e-mail: vaskarmi1976@gmail.com

Panagiotis Androutsopoulos
PE11 Educational Advisor
Directorate of Secondary Education of Ilias
Pyrgos Ilias, Greece
e-mail: panagiotisandrouts@gmail.com

ABSTRACT

This research paper examines the application of Augmented Reality (AR) and Virtual Reality (VR) in the teaching of English language through physical activity in upper secondary and lower secondary schools in western Greece.

The impact of digital technologies on improving language skills and enhancing motor engagement was evaluated using a sample of 65 students and 15 teachers. Based on the principles of active learning, the project included interactive scenarios in which students practised language skills through physical and collaborative activities.

The results showed significant improvements in participation, language proficiency (vocabulary, pronunciation) and memory through movement. Additionally, enhanced social interaction and cooperation were observed. Notwithstanding the favourable outcomes, certain challenges were identified, including the substantial cost of the necessary equipment and the necessity for teacher training in the use of these technologies.

Therefore, combining AR and VR with physical activity emerges as an innovative educational practice with potential application in wider educational settings.

Keywords: Digital media, AR, VR, English language, physical activity.

STOP MOTION: A DESIGN-BASED TOOL FOR EDUCATIONAL MATERIAL DEVELOPMENT

Athina Tziarou
Product and Systems Design Engineer
Department of Product and Systems Engineering, University of Western Macedonia
Kila Kozani, GR50100, Greece
e-mail: athinatziarou@gmail.com

Nikolaos Efkolidis
Associate Professor
Department of Product and Systems Engineering, University of Western Macedonia
Kila Kozani, GR50100, Greece
e-mail: nefkolidis@uowm.gr

Panagiotis Kyratsis
Professor
Department of Product and Systems Engineering, University of Western Macedonia
Kila Kozani, GR50100, Greece
e-mail: pkyratsis@uowm.gr

ABSTRACT

The present study investigates the application of the Stop Motion technique as a tool for the creation of educational material, highlighting its contribution to active learning and to the development of cognitive, social, and technical skills. Stop Motion is particularly suitable for pedagogical applications that promote experiential and creative learning, enhancing students' personal expression, collaboration, and narrative competence. Through the use of physical materials, tools, and technological media, students gain hands-on learning experiences, assume the roles of creators and storytellers, and learn how to plan and implement complex projects with pedagogical content.

The study examines both the theoretical foundation of the method and its practical implementation. Furthermore, it presents the benefits and challenges associated with integrating Stop Motion into the classroom, as well as suggestions for its effective use by educators. Finally, the interdisciplinary and inclusive potential of the technique is emphasized, as it allows for adaptation to students' needs, fostering pedagogical innovation and the active participation of all learners. This approach reflects contemporary teaching methodologies, in which the learner is placed at the center of the educational process and technology functions as a supportive means for the development of creativity and a culture of collaboration.

Keywords: stop motion, educational material, digital storytelling, experiential learning, creativity, collaborative learning, technology in education, prototyping, project-based learning (PBL), inclusion, emotional empowerment

THE FUTURE OF DISTANCE LEARNING FROM THE PERSPECTIVE OF SECONDARY SCHOOL STUDENTS IN THE PREFECTURES OF ATTICA AND CYCLADES

Vlassopoulos Gerasimos
Postdoctoral Researcher, PhD, MSc, Educator PE82
University of West Attica, Department of Biomedical Sciences – School of Health and Care Sciences
Athens, Greece
e-mail: makisvlass@gmail.com

ABSTRACT

Periods of crisis often trigger radical social transformations. In Greece, the COVID-19 pandemic emerged in February 2020, leading to school closures and the mandatory implementation of distance learning.

This study investigates the future of Distance Education (DE) through the perspective of secondary education students. We employed a mixed sampling method (Stratified and Cluster sampling), involving 462 Junior High and High School students from the Prefectures of Attica and the Cyclades. The research was conducted in May 2020. We collected data via LimeSurvey and performed the statistical analysis using SPSS (v.25) under an academic license. The methodology included a reliability check of the questionnaire using Cronbach's alpha, descriptive statistics, factor analysis, and Chi-square testing.

The Chi-square analysis revealed that 76.2% of students did not wish for the future implementation of DE, while only 13% considered it a significant form of education and favored its future use.

In conclusion, Distance Education was not methodically organized based on pedagogical methods and techniques, leading to its rejection by the educational community. The views of secondary school students (General and Vocational High Schools) were negatively affected; consequently, they do not support a potential future application of DE, given the failure to implement its core governing principles.

Keywords: Distance Education, E-learning, Information and Communication Technologies (ICT), Synchronous Learning, Asynchronous Learning.

Abbreviations: Simple Random Sampling (SRS), Distance Education (DE), Information and Communication Technologies (ICT).

FACTORS AFFECTING STUDENTS' PARTICIPATION IN DISTANCE LEARNING DURING THE PANDEMIC

Zioga Styliani
ICT Teacher, 1st General High School of Ioannina
Ioannina, Greece
email: ziogastella68@gmail.com

ABSTRACT

This study explores the experience of high school students with distance learning during the pandemic, examining the factors that influenced their response. The aim was to investigate students' interest and the technological and pedagogical factors that affected their participation, analyze their perceptions regarding support, interaction, educational materials, the quality of learning management systems, and the role of the family. The research was conducted in October 2020 with 100 first- and second-year high school students from Ioannina, using a digital questionnaire consisting of 12 closed-ended and multiple-choice questions. The results showed that reliance on technology created problems (equipment, connectivity), negatively impacting student participation, while teachers had to take on new roles. Students faced technical issues that were resolved relatively quickly, but the culture of conventional education made adaptation to distance learning difficult. They expressed negative perceptions regarding communication and support from teachers, as well as the quality of educational materials, while the family played a significant role in their support.

Keywords: Distance Learning, Pandemic, Support, Interaction

KNOWLEDGE OF PHYSICAL EDUCATION TEACHERS IN PRIMARY AND SECONDARY EDUCATION

Zougras Dionisios
Physical Education Teacher, Postgraduate Student
Ionian University
Zakynthos. Greece
email: zougras77@yahoo.gr

Kabassi Katerina
University Professor, Dean of the School of Environment
Ionian University
Zakynthos, Greece
e-mail: kkabassi@ionio.gr

Flabouras Nietos Ilias
Principal of 1st Primary School of Zakynthos, PhD
Ionian University
Zakynthos, Greece
e-mail: hflabouras@yahoo.gr

Flaboura Nietou Yakinthi
Student at School of Physical Education and Sport Science
National and Kapodistrian University
Athens, Greece
e-mail: yakinthinietou@gmail.com

ABSTRACT

This research paper examines the application of Artificial Intelligence (AI) in the field of Physical Education, with an emphasis on teachers' knowledge. The use of AI in education has rapidly expanded in recent years, offering significant potential to adapt and enhance the educational experience. However, in the domain of Physical Education, its adoption remains limited, primarily due to a lack of knowledge and training. This study aims to explore the level of understanding and acceptance of AI among educators, focusing on its prospects for integration into teaching practices.

The study followed a quantitative research approach, collecting data through online questionnaires distributed to Physical Education teachers across Greece. The sample consisted of 250 Physical Education teachers working in primary and secondary education. Data analysis was conducted using descriptive and inferential statistical methods with the SPSS software.

The results revealed significant gaps in teachers' knowledge of AI. 23.6% reported no familiarity, while 37.2% indicated a low level of familiarity. Only 32.4% reported a moderate level, and the percentages of those who felt highly familiar were remarkably low (High: 6.0%, Very high: 0.8%). Familiarity with basic principles, such as AI functions and types, was also limited, with some participants recognizing only the most widely known applications. A positive correlation was found between professional development in ICT and AI ($\rho = 0.176$, $p = 0.005$). Teachers who had received ICT training were more likely to have experience with or interest in AI-related training. This suggests that prior education in technology generally increases interest in more specialized areas. About practical experience, most teachers reported not having used AI technologies in education or other sectors.

The research's findings highlight a strong need for professional development in AI for Physical Education teachers. Participants recognized the importance and usefulness of such initiatives for the educational process. Despite the relative lack of familiarity that emerged in the results, the majority of participants evaluated the training in this area as very useful, a result that highlights the need for professional development in this field.

Keywords: Artificial Intelligence, Physical Education, Knowledge, Education.

VIVLIOTHINKY: A COLLABORATIVE LEARNING PROJECT FOR THE DEVELOPMENT OF SOCIAL AND DIGITAL SKILLS BASED ON THE E-GRAFIS SERVICE OF THE PANHELLENIC SCHOOL NETWORK

Kritikakis Markos
Computer Teacher
Secondary education
Athens, Greece
e-mail: hp2221203@hua.gr

Sofianopoulou Chryssa
Professor Department of Informatics and Telematics
Harokopio University
Athens, Greece
e-mail: csofian@hua.gr

ABSTRACT

The new Curricula are based on learning outcomes, i.e. everything that students need to know, understand and be able to apply after completing each learning process, shifting the focus of emphasis from the subject matter, the teachers and the teaching process to the students and the expected learning outcomes. At the core of the teaching methodology are the creation of guided learning environments, self-motivation, collaborative action in groups, inquiry-based learning, experiential approach, collaborative problem solving, communicative approach and transformative logic.

The present teaching scenario, has as its theme the "digital" organization of the school library and was implemented within the framework of a cultural program with the participation of students of a Day High School in Attica, enhancing collaborative learning with the help of ICT and achieving cognitive teaching objectives related to spreadsheets, collaborative documents and web explorations. Its implementation was based on the use of the e-grafis service provided by the Panhellenic School Network and has as a prerequisite the creation and use of Student Accounts for all participants. The design of the scenario includes four implementation phases, cognitive and psycho-emotional objectives, feedback before each new phase, evaluation at the end and reflection on the activities.

For the design and implementation of the educational scenario, the project method was applied and the teaching strategies followed were direct teaching and discovery learning. During the implementation of the scenario, it was observed that collaborative learning with the help of computers promotes the cultivation of social skills such as communication and cooperation and the cultivation of digital skills, mainly through the management of collaborative environments for the implementation of activities. At the same time, it was found that the use of Digital Media in cultural programs or in skills workshops can enhance the dynamics of teaching, stimulate student interest, improve the learning climate and enhance the effectiveness of the educational process. The topic of the project and the guidance from the teacher were mentioned as the main positive factors, while the time of the project was mentioned as the most important negative factor. Finally, the different speed at which the members of a group work was mentioned as the most important problem of collaborative action.

Keywords: collaborative learning, e-grafis, web exploration, ICT, educational scenario, curriculum, cultural program

TEACHING QUANTUM THEORY IN SECONDARY EDUCATION: THE DOUBLE-SLIT EXPERIMENT AND THE DEVELOPMENT OF AN ICT-BASED EDUCATIONAL SCENARIO FOR 9TH GRADE STUDENTS

Maria Magaliou
Physics Teacher - PHD candidate, Department of Pedagogy and Primary Education,
National and Kapodistrian University of Athens
email: mvpmag@gmail.com

ABSTRACT

Quantum physics, despite its perceived complexity, forms the foundation of numerous modern technologies shaping our daily lives. From the computers we use to medical diagnostic imaging, quantum theory is integral to contemporary living. However, in Greece, its teaching in Secondary Education is primarily limited to students preparing for university entrance exams, thus excluding a significant portion of the student population from engaging with these fascinating concepts. Quantum theory raises profound questions about the nature of reality, knowledge, and the role of the observer. The double-slit experiment, an iconic phenomenon illustrating fundamental quantum concepts and philosophical implications, is notably absent from the Greek secondary school curriculum. Yet, teaching it can be a powerful tool not only for fostering scientific understanding but also for developing critical thinking.

This paper proposes a teaching scenario for 9th-grade students (third year of Gymnasium, in the Greek system) that leverages Information and Communication Technologies (ICT), specifically educational videos and PhET Colorado simulations ("Wave Interference," "Quantum Wave Interference"), to introduce the double-slit experiment. The scenario aims to promote active student participation, develop critical thinking skills, and connect scientific knowledge with broader philosophical and societal questions.

The core research question explored is: How can a teaching scenario utilizing ICT enhance the instruction of the double-slit experiment in Secondary Education, and how do students perceive and accept the teaching of quantum topics through these tools? Specifically, the research focuses on evaluating the effectiveness of ICT in teaching quantum concepts like wave-particle duality and how these technologies assist students in achieving a more accessible and meaningful understanding of the Double-Slit Experiment.

Preliminary findings from the pilot implementation of the scenario with 9th-grade students indicate that introducing basic quantum concepts at this age is feasible. The integration of ICT appeared to significantly increase student interest, enhance participation, and contribute to the development of a deeper understanding of quantum phenomena, particularly wave-particle duality as manifested in the double-slit experiment. While these initial results are encouraging, further large-scale research is required to fully assess the effectiveness of ICT and investigate the factors influencing student acceptance and comprehension of these abstract scientific domains.

Keywords: Quantum physics, Teaching scenario, Double-slit experiment, Information and Communication Technologies (ICT), Critical thinking

SCIENCE TEACHERS' ATTITUDES AND BELIEFS TOWARDS THE USE OF AI TOOLS IN EDUCATION

Toli Georgia
PhD in Physics, High School Principal,
Neochori, Arta, Greece

Kardaras Ioannis
PhD in Physics, High School Principal,
Pyli Trikala, Greece

KoutsikosAthanasios
MSc in Physics, Dep. High School Principal, Experimental High School,
Velestino, Greece

ABSTRACT

As the development of AI-based tools progresses and their use in science teaching expands, it becomes obvious that it creates many opportunities to improve teaching and consequently learning outcomes. Moreover, the study of teachers' beliefs and attitudes towards the integration of T.N. in the educational process emerges as an important issue. The results of many studies in science (S.E.) teaching indicate the diverse and imminent roles of A.I. in education. However, P.E. teachers have, in the last decade, faced a particularly challenging challenge, the use of A.I. in the classroom without a significant central planning to support them.

The present study investigates the attitudes and beliefs of 40 teachers of secondary education in Thessaly and Epirus, towards the integration of the existing tools in their classrooms. In particular, this research studies the teachers' views on the AI tools, such as Gemini, the program for summarizing pdf files with artificial intelligence, Gamma.app, which have a potential role in improving pedagogical practices. To collect the survey data on the evaluation of teachers' attitudes and beliefs, a 19-question closed-ended questionnaire was designed and distributed to them and the responses were given on the 4-point Likert scale.

The results of the responses show that although the majority of teachers are familiar with the use of computers and the use of interactive whiteboards in their daily teaching, they feel largely skeptical about the use of AI tools and furthermore they state that they have incomplete knowledge of these tools and that they believe that they are unprepared to proceed in using these tools effectively in the classroom, The results indicate the need to create a training program for teachers in order to improve their knowledge and skills.

Keywords: teachers, questionnaire, artificial intelligence

EDUCATIONAL ACTIVITIES AND INNOVATION: THE SAFFRON OF KOZANI AND BEE-BOT AS TEACHING TOOLS

Antigoni Tsirou ICT Teacher, MSc
Directorate of Primary Education of Kozani, Ministry of Education and Religious Affairs
Kozani, Greece
e-mail: tsirouant@gmail.com

ABSTRACT

This research explores the effectiveness of the "Saffron of Kozani" educational activity in combination with the use of the Bee-Bot robot in mixed groups of primary education students in the Kozani region. The study focuses on connecting local culture, traditions, and the economic significance of saffron with the educational process, while also leveraging innovative robotics technology to enhance group learning and programming skills.

As part of the study, an electronic questionnaire (via Google Forms) was created and distributed to 32 educators after the completion of the saffron-related educational activities. The educators responded anonymously, and the data was automatically collected and processed, allowing for a systematic analysis of their views regarding the connection between the teaching topic and real life, as well as the use of the Bee-Bot robot in the classroom.

The methodology included recording demographic data (gender, age, educational level, years of service), indicating a sample of experienced educators, with a dominant presence of women and significant professional experience. The research results reveal that the educators consider the topic of saffron to be closely linked to the students' everyday lives, highlighting its value in terms of local culture, customs, and the regional economy.

At the same time, the use of the Bee-Bot robot enhanced collaborative learning, promoting mutual interaction, critical and creative thinking, as well as hands-on familiarization with basic principles of computational thinking. Educators observed notable benefits regarding the participation of all students, including those who are academically weaker, and the reinforcement of socio-emotional skills.

The overall findings confirm a positive attitude toward the integration of innovative practices in teaching, emphasizing the need for further training in the use of robotic tools. This abstract offers a concise overview of the research, inviting the reader to delve deeper into the methodology and findings, which contribute to improving educational practice.

This study presents not only the direct impact of innovative methods on learning but also the prospects for future applications that can enhance the quality of the educational process.

Keywords: Saffron of Kozani, Bee-Bot , differentiated instruction, teamwork, robotics, experiential learning.

EXPLORING THE DYNAMICS OF FRIENDSHIP NETWORKS USING ARTIFICIAL INTELLIGENCE ALGORITHMS: A STUDY IN A SPECIAL EDUCATION SCHOOL

Tsoni Rozita
Educator, Adjecence Faculty, Hellenic Open University
Igoumenitsa, Greece
tsoni.rodanthi@ac.eap.gr

Tsironis Thomas
Επαγγελματική Εκπαιδευτικός, Director of Special Highschool of Igoumenitsa
Igoumenitsa, Greece
thomatsironis@gmail.com

Verykios S. Vassilios
Professor, Hellenic Open University
Patras, Greece
verykios@eap.gr

ABSTRACT

Friendship is a fundamental condition for the healthy development of individual and social relationships, especially during the sensitive period of adolescence. While friendship is generally understood to be reciprocal and bidirectional, in the context of special education the distinction between friendship, companionship, and caregiving is often blurred. This ambiguity can lead to relationships that lack the mutual dynamics typically observed in mainstream schools, generating feelings of disappointment, isolation, and social exclusion.

This paper seeks to highlight the dynamics of friendship ties in a small special secondary school by employing directed network analysis. Through social network analysis, we compute metrics—some of which draw on artificial intelligence algorithms—to identify key roles and structural particularities within the students' friendship network. These metrics reveal hidden patterns and dynamics that are not immediately visible, offering valuable insights into their social interactions. The aim of the study is to provide educators and specialist practitioners with a tool to strengthen social relationships, combat isolation, and prevent bullying. The analysis uses anonymized data from 22 active students, each of whom nominated 3 to 5 friends.

The students are distributed across all eight grades of the Special Gymnasium–Lyceum (junior–senior high school), and their ages range from 14 to 22. In addition to basic measures that characterize the interaction network—such as in-degree and out-degree—we calculated centrality indices including closeness centrality, eigenvector centrality, betweenness centrality, and each node's eccentricity. We also computed the PageRank score as well as HITS (hubs and authorities). Particularly important results emerged from the measure of reciprocity, which was calculated both individually for each student and for the network as a whole. The findings point to differentiated student roles that go beyond simple popularity, with implications for the network's future evolution and for strengthening its cohesion. The graph analysis derived from these data, using the aforementioned metrics, provides a deeper understanding of the structure and dynamics of friendship relations, opening new avenues for promoting social inclusion and improving students' quality of life through targeted interventions.

Keywords: Special Education, Friendship, Social Networks, Link Analysis.

INVESTIGATION OF PRIMARY SCHOOL STUDENTS' KNOWLEDGE ABOUT ARTIFICIAL INTELLIGENCE IN EDUCATION

Flabouras Nietos Ilias
Principal of 1st Primary School of Zakynthos, PhD
Ionian University
Zakynthos, Greece
e-mail: hflabouras@yahoo.gr

Kabassi Katerina
University Professor, Dean of the School of Environment
Ionian University
Zakynthos, Greece
e-mail: kkabassi@ionio.gr

Zougras Dionisios
Physical Education Teacher, Postgraduate Student
Ionian University
Zakynthos. Greece
email: zougras77@yahoo.gr

Flaboura Nietou Ilia
Postgraduate Student
Panteion University
Athens, Greece
e-mail: ilianietou@gmail.com

ABSTRACT

The purpose of this study is to investigate the knowledge of primary school students regarding the use of artificial intelligence (AI) in education. To this end, a quantitative survey was conducted with a sample of 321 primary school students attending 4th, 5th, and 6th grade in the prefecture of Zakynthos. Data were collected through the distribution of a printed questionnaire to the students. The results of the study showed that the majority of students were familiar with the concept of artificial intelligence (78.5%) and had either used AI themselves or their parents had (59.7%). Data analysis revealed that students tend to agree that AI can create educational games that make learning more fun, can be used to develop educational games, can help students learn new languages more easily, and can assist in solving math problems with step-by-step explanations. Overall, students have a moderate to high level of knowledge about AI, a neutral attitude towards it, and moderately recognize its benefits in various aspects of everyday life. Finally, the findings indicated that an increase in students' knowledge and the formation of a more positive perception of AI positively influence their attitude towards the use of artificial intelligence in the educational process.

Keywords: Artificial intelligence, education, student knowledge, primary education

TA2: The pedagogical integration of digital media into teaching practice (Learning Theories, Curricula, and Digital Media).

THE IMPACT OF DIGITAL TECHNOLOGIES IN THE TEACHING OF PHYSICAL EDUCATION: IMPACT ANALYSIS AND PERFORMANCE ASSESSMENT OF STUDENTS AND TEACHERS

Panagiotis Androutsopoulos
PE11 Educational Advisor
Directorate of Secondary Education of Ilias
Pyrgos Ilias, Greece
e-mail: panagiotisandrouts@gmail.com

Vasiliki Karmi
PE06 English Language Teacher
Directorate of Secondary Education of Kerkyra
Kerkyra, Greece
e-mail: vaskarmi1976@gmail.com

ABSTRACT

This research paper examines the impact of integrating digital technologies into Physical Education teaching in secondary education, with particular emphasis on gamification and the use of virtual reality (VR) and augmented reality (AR).

Through collecting qualitative and quantitative data from 15 teachers and 60 students in schools managed by the Regional Directorate of Education of Western Greece, this study aims to evaluate how these technologies enhance student participation, motivation, and motor skill development.

The findings demonstrate that digital tools enhance the level of student interest and engagement, particularly among those who demonstrate a limited level of engagement within the conventional teaching paradigm. However, critical challenges have emerged, particularly with regard to providing teachers with adequate training and technical support.

The study concludes with recommendations for the pedagogically informed integration of technology in Physical Education, with a view to improving teaching quality and promoting educational equity.

Keywords: Digital technologies, physical education, gamification, virtual reality (VR), educational outcomes

TEACHING THE COMPLETE LITERARY WORK "*HONOR AND MONEY*" BY K. THEOTOKIS USING I.C.T.

Vontitsou Anna
Teacher of Greek language
Second grade of Greek upper secondary school
Preveza, Greece
avontitsou@yahoo.gr

ABSTRACT

This presentation highlights the integration of I.C.T. (Information and Communication Technologies) in the teaching of literature in the second grade of Greek upper secondary school (B' Lyceum), focusing specifically on the novella *Honor and Money* by Konstantinos Theotokis. The use of digital tools—such as the internet, interactive whiteboard, e-class platform, audiovisual material (eBook, film), and artificial intelligence (language models)—contributes to the achievement of educational goals through innovative teaching methods.

The introduction outlines the curriculum frameworks of 2011, 2021, and 2023–2024, which aim to promote critical and digital literacy. It then discusses the positive role of I.C.T. in education, particularly in literature teaching, while also acknowledging the challenges involved.

The core of the presentation analyzes a teaching proposal based on the entire novella by Theotokis, implemented via the e-class platform. It describes the teaching model, methods, instructional steps, supporting materials, and sample worksheets. These include comprehension questions, opinion analysis, narrative techniques, intertextuality, paragraph visualization, changes in narrative mode or perspective, and guided written production with the help of A.I.

The presentation concludes by summarizing the outcomes of the interactive relationship between I.C.T. and literature teaching.

Keywords: literature, blended teaching model, use of I.C.T., artificial intelligence (A.I.), digital literacy, new curricula.

ASIA MINOR CATASTROPHE AND ASIA MINOR MONUMENTS: AN EDUCATIONAL INITIATIVE USING DIGITAL TOOLS

Giannouli Sofia
Philologist, PE02
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

ABSTRACT

This paper examines an educational initiative by the History student club titled "Asia Minor Catastrophe and Asia Minor Monuments", which was implemented at the 1st Model Junior High School of Preveza during the school year 2022-2023. The initiative aimed to foster a deeper understanding of both the history and memory of the Asia Minor Catastrophe by integrating innovative digital tools into the educational process. The paper analyzes how the use of technology enhanced the understanding of historical events, enabling students to approach and present history in a contemporary and interactive manner.

The methodology employed included the use of digital platforms for searching, analyzing, and processing historical sources, as well as developing student projects and creating presentations using presentation software (e.g., PowerPoint). Concurrently, digital tools were utilized for gathering photographic material, designing digital posters, and organizing digital events. A significant phase of the program involved the creation of a song, which was composed and produced using music software (such as GarageBand and FL Studio), alongside the development of a digital radio program where students presented historical data through a modern communication medium.

The main findings indicate the positive impact of using digital tools on enhancing student collaboration and creativity. The application of technological tools allowed students to participate actively in all phases of the project, strengthening critical thinking and their ability to produce digital content. Notably, the creation of the song and the digital radio program served as a highlight of the learning process, effectively combining music and historical memory with technology and offering students a powerful avenue for creative expression.

The results demonstrate that the combined use of traditional teaching methods and digital tools significantly enhances the educational process, equipping students with valuable skills for the modern era. Students developed competencies in critical thinking, expression, and collaboration within a digital environment, gaining experiences that reinforce their capacity to approach historical topics creatively and contemporarily.

Keywords: Asia Minor Catastrophe, historical memory, digital tools.

MUSIQUE CONCRÈTE AS AN INSTRUMENT FOR DIGITAL STORYTELLING: AN ELECTROACOUSTIC COMPOSITION WORKSHOP WITHIN THE FRAMEWORK OF THE MUSIC ENSEMBLES COURSE

Dimitrakopoulos Aristotelis
PhD Candidate at Ionian university, Substitute Secondary Education Teacher, Composer
Music School of Preveza, Greece

ABSTRACT

This scientific article explores the integration of Musique Concrète within the educational methodology of digital storytelling, examining the potential for integrating pre-designed sound into narrative practice. The emergence of Musique Concrète marked the advent of an era of experimentation in 20th-century music composition, with its fundamental tools consisting of digital processing, modification, and the re-arrangement of pre-recorded sounds. Its defining characteristic was the subversion of conventional boundaries in "traditional composition", as it challenged strict musical rules and fostered the formation of diverse soundscapes. Concurrently, the concept of digital storytelling is examined as an educational tool, which combines the use of technological means into the educational process with exploratory learning and reflection to formulate a structured and engaging narrative.

The composition workshop, which has been developed within the framework of the Music Ensembles' course in Music Schools, investigates methods through which students can develop their musical-narrative skills. This is achieved -not through the use of speech and visual media- but by employing sound design and the formation of original compositions in the model of Musique Concrète.

In order to develop the research objectives, the methodological axis of autoethnography is utilised, through which the teacher designs and modifies the lesson plan, balancing between the didactics of technical means and the philosophy of composition. The free software (DAW) Audacity is implemented for digital sound editing, and the Soundcloud streaming service is employed for archiving and cataloguing the students' compositions.

The research project focuses on the teaching of Musique Concrète to students from Middle and High School of Greek Music Schools, with a view to stimulating imagination, promoting collaborative work and deepening students' understanding of sound as a unique material for a storytelling. The overarching objective of the workshop is the composition of original music by the students themselves. This endeavour is of twofold significance: firstly, it serves as an inaugural portfolio for future reference; secondly, it amalgamates the elements of narration and sound design in the nascent stages of the sonification process. Furthermore, students' utilisation of the free software (DAW) Audacity for sound design enhances their technological proficiency and promotes the use of digital tools in the educational process. Simultaneously, the paper proposes an extension to the the curriculum of the Music Ensembles' course, with the aim of enhancing the educational goals of artistic expression and creation. Consequently, it presents the compositional process as an educational methodology that encourages creativity, digital literacy and technical proficiency.

Keywords: digital storytelling, electroacoustic composition, music education, digital literacy

RECONNECTING STUDENTS: ENSURING EMOTIONAL GROWTH IN A DIGITALLY DRIVEN EDUCATIONAL SYSTEM

Maria Kardama
English Language and Literature Teacher
1st Vocational School of Kato Achaia
Patra, Greece.
Email: mkardama@gmail.com

ABSTRACT

In today's educational setting, students who are largely dependent on media technologies for learning and communication may tend to prefer computer-mediated communication over face-to-face interaction. While digital technologies have numerous advantages, such transformation can hinder the development of some core social skills such as friendship making, teamwork and dealing with actual life, social issues that require emotional maturity and empathy. This presentation explores the potential long-term effects of excessive dependence on digital technology on the ability of students to engage in personal, interpersonal communication. We will look at the dilemma teachers facing in juggling digital learning with opportunities for students to gain essential soft skills in class. We will also discuss ways of integrating both digital and face-to-face interactions to produce balanced students who have the emotional intelligence needed to cope with complex social situations. Based on case studies, research, and real-life scenarios, valuable input will be given on how to encourage a balanced approach toward digital media in education so that students achieve good results academically as well as develop socially and emotionally.

Montessori School and Limited Screen Time, Flipped Classroom with In-Person Discussion, Tech-Free Study Hours, Online and Offline Reading Mix, Mindful Break Zones, Digital Detox Challenges are but a few modern pedagogical approaches that integrate technology while prioritizing human interaction to equip students with both technical knowledge and the interpersonal skills needed for success in their future career and personal life. By consistently recognizing and validating feelings and logical thinking, students are supported to build confidence, creativity and resilience, leading to a more supportive and participative classroom than the digitally based one. “Education must begin with the solution of the teacher-student contradiction, by reconciling the poles of the contradiction so that both are simultaneously teachers and students”, Paulo Freire highlights. This very much fosters interactive learning in which technology should serve to augment, not replace human contact and soft skill building. Even if technology can replicate real scenarios, communication, teamwork, empathy, and leadership develop best out of human interaction. Global competency goes far beyond language fluency. Good Emotional Intelligence (EI) is accumulated through real dialogues, clashes, and listening, which cannot be provided by a single technology tool. Teaching and learning require social concession, bargaining, and joint decision-making, which work best in real environments. Literally, technology needs to support—but not replace—the human connections that make learning really exciting and meaningful.

Key words: emotional intelligence, real life scenarios, human interaction, soft skills, balanced teaching approach

THE ROLE OF TEACHERS IN THE EFFECTIVE IMPLEMENTATION OF DIFFERENTIATED INSTRUCTION THROUGH THE UTILIZATION OF NEW TECHNOLOGIES

Keramida Areti
Education Counsellor
e-mail: aretikeramida@gmail.com

ABSTRACT

Modern learning theories acknowledge the need for an inclusive educational process that respects and takes into account the diversity of students within the framework of differentiated instruction. This methodology is based on the assumption that the teaching process needs to be differentiated and adapted according to the experiences, needs, diversity of the student population, as well as the specific characteristics of each class. The parameters that are differentiated include the learning environment, the content and process of learning, and the learning products, that is, how students demonstrate what they have learned.

Such a learning process, which pedagogically utilizes the theoretical assumptions of constructivism and new technologies, requires teachers to distance themselves from the traditional, conservative teacher-centered teaching model, which is often characterized by a skeptical attitude towards innovation in teaching and education in general. In the context of the above framework, this paper examines the role of the teacher in differentiated instruction, that is, how teachers should think and act before, during, and after the teaching process, reflecting and closely "listening" to the classroom in order to contribute to its successful implementation. Thus, we describe the characteristics that teachers need to have if they wish to move away from the traditional teacher-centered approach to teaching English and adopt an approach that focuses on students, their interests, learning styles, and needs, while also effectively utilizing new technologies.

In this discussion, we avoid "mechanistic" approaches from both Greek and foreign literature that focus on the "roles" of the teacher, because such an inflexible view does not align with the character of differentiated instruction, which, while an organized and systematic process, does not force the teacher to adopt specific and fixed classroom behaviour. Therefore, in this paper, the concept of the teacher's "role" refers to the characteristics that are useful for teachers attempting to apply the findings of research related to differentiated instruction and the use of new technologies.

Since the implementation of differentiated instruction requires the acceptance of a broader philosophy of the learning process, teachers need to adopt this philosophy and way of thinking for their teaching practice, be willing to move outside their "comfort zone" and try new ideas and teaching practices. It is important to move away from the perception of themselves as holders and distributors of knowledge and towards a view of their role as closer to that of "orchestrators of learning opportunities" taking on the role of a mentor. Additionally, it is essential that teachers systematically observe and monitor their students during individual or group work, identify their students' difficulties when they arise and provide support.

Finally, for their professional development, it is necessary for teachers to have knowledge of the theoretical principles of differentiated instruction, as this knowledge will help them identify the characteristics needed by teachers who aim to apply differentiation in teaching through new technologies at a practical level. At the same time, reflective and critical study of the primary literature will support them in their efforts to implement in the Greek educational system research findings from different educational systems with their own characteristics and particularities.

Keywords: differentiated instruction, new technologies, teachers' role

LEVERAGING MULTILITERACIES AND CREATIVE WRITING IN THE STORYTELLING TEACHING

Kostara Effrosyni
PhD Greek Language teacher, Laboratory Teaching Staff,
Department of Educational Sciences and Social Work
University of Patras, Greece
e-mail: frinikostara@g.upatras.gr

Kriketou Theodora
MEd Greek Language teacher, Secondary Education Teacher
Secondary Education of Achaia, Greece
e-mail: theodora.kriketou@gmail.com

ABSTRACT

The present article discusses issues that occupy an important place in the new Curricula and concerns, on one hand, the formulation of an alternative proposal for the teaching of storytelling, through the utilization of multiliteracies and creative writing, and, on the other hand, the investigation of the results that emerged from the implementation of this proposal. The teaching plan was designed and implemented for the purposes of Modern Greek Language course by the Greek Language teacher and Laboratory Teaching Staff of the Department of Educational Sciences and Social Work at the University of Patras, Ms. Effrosyni Kostara, and the Greek Language teacher at a High School, Ms. Theodora Kriketou and was applied during the 2024-2025 school year in the context of a model teaching session to first-year high school students in an urban school of Patras. After the completion of the teaching session, both the students and the teachers who attended the lesson were provided with questionnaires in order for the researchers to ascertain a) the effectiveness from the use of multiliteracies and creative writing in the teaching of storytelling and b) the contribution of multimodal texts to the development of creative writing skills.

Initially, the article presents the key aspects of multiliteracies theory and the contribution of creative writing in the development of students' linguistic and communicative skills, as well as to the enhancement of their creativity. Then, the implemented teaching scenario is outlined, the main goal of which is for students to discover and understand the macrostructure of narrative through the use of a multimodal text (video) and the collaborative production of their own narrative text in a specific communicative framework. The teaching approach includes activities for decoding semiotic modes of multimodal texts and creative writing, aiming to develop students' visual and critical literacy, as well as to cultivate collaborative storytelling skills. The methodology leverages collaborative group teaching and inquiry-based learning with the application of dialogic discussion techniques in plenary and student groups.

Finally, the article discusses the findings of the questionnaires distributed to students and teachers which are structured around three main axes. The first axis concerns the application of multiliteracies, the second focuses on the utilization of creative writing and the third is anchored on the results of the transition from the processing of multimodal text to creative writing. Based on the findings, the students understood the structure of narrative through the use of non-written text (video) and became familiar with other semiotic modes (such as images and sound) that can not only convey messages but also to present the development of a story. Furthermore, collaborative text production in groups helped students generate more ideas and express emotions more freely. Finally, it was observed that the multimodal elements of the video helped in the creation of their own stories, as the use of images contributed in shaping the style and atmosphere, while music and sound effects inspired ideas for the emotional development of the characters in the story.

Keywords: multiliteracies, multimodal texts, creative writing, creative storytelling.

TRANSFORMING PHYSICS TEACHING: THE ROLE OF CRITICAL PEDAGOGY AND ICTS

Maria Magaliou
Physics Teacher - PHD candidate, Department of Pedagogy and Primary Education,
National and Kapodistrian University of Athens, Greece
email: mvpmag@gmail.com

ABSTRACT

Modern physics teaching faces the challenge not only of transmitting knowledge but also of cultivating Critical Scientific Literacy, which involves developing critical thinking and connecting science with social issues. This paper examines how Critical Pedagogy, along with Information and Communication Technologies (ICTs), can contribute to achieving this crucial goal. While ICTs offer significant potential for making physics teaching more interactive and effective, their successful integration is hampered by considerable challenges. Critical Pedagogy, rooted in the work of Freire, provides the foundational framework for fostering dialogue, questioning, and the connection of physics with social and technological developments, essential components of Critical Scientific Literacy, making the subject matter more accessible and relevant. ICTs complement this approach by offering interactive environments, simulations, and opportunities for collaborative learning, thereby enhancing understanding, particularly of abstract concepts, within this critical framework. The paper identifies the key difficulties in ICTs integration concerning teachers, students, infrastructure, and pedagogy. The literature review suggests that the combined application of Critical Pedagogy and ICTs offers a powerful synergy that can transform physics teaching into an active, interactive, and socially oriented process, potentially mitigating some of these identified challenges and fostering Critical Scientific Literacy. Students develop critical thinking, actively construct knowledge, and understand physics as a living science connected to society, thus shaping responsible, engaged citizens equipped with Critical Scientific Literacy.

Keywords: Critical Pedagogy, Critical Scientific Literacy, Information and Communication Technologies (ICTs), Physics Teaching, Social justice

IMPACTFUL TECHNOLOGIES IN ACCOUNTING AND AUDITING: A BESTOWED EDUCATIONAL BURDEN

Magoula Angeliki Eleni
PhD Candidate
Department of Accounting and Finance, University of West Attica
Egaleo, Greece
e-mail: aemagoula@uniwa.gr

Charamis Dimitrios
Assistant Professor
Department of Accounting and Finance, University of West Attica
Egaleo, Greece
e-mail: dcharamis@uniwa.gr

Sykianakis Nicos
Professor
Department of Accounting and Finance, University of West Attica
Egaleo, Greece
e-mail: niksyk@uniwa.gr

ABSTRACT

The subversive dynamics of the new technologies are recognised as factors of everyday life, nowadays, affecting both professional and academic elements, from the standpoint of basic education to the highest tier of knowledge. The present paper examines these new technologies that appear to imbalance at a great extent the academic community, namely big data analytics (BDA), robotic process automation (RPA), artificial intelligence (AI), Internal of Things (IoT) and distributed ledger technologies (DLT). The specific disruptive impetus is viewed through the disciplines of accounting and auditing, since graduates from the respective faculties face numerous challenges at the commencement of their professional engagement, lacking competitive skills and exhibit refusal in incorporating new technological methods at a later stage of their professional life.

This literature review attempts to sensitize the bearers of knowledge to adopt at the maximum level possible all the emerging technologies in both disciplines at all echelons of education, whilst exploring the importance of such incorporation for the receiver of knowledge and competency at the academic level. It finds that while new technologies augment the professional requirements of any activity entailed in accounting and auditing, the obligation for competency development is entrusted and bound to the higher education institutions of the respective fields. Data enhance the request to incorporate and adopt the practical use of the respective technologies, within the academic curriculum in a variety of methods, via multi facet technological tools and in a different degree of implementation. Furthermore, areas of improvement and deviation trends are presented, while assessing the tendency to retain academic curriculum status quo and flagging the negative factors of transmitting knowledge regarding new and impactful technologies via legacy tools, methods and applications. Moreover, the paper illustrates that the demand for updated formation of knowledge is downward directed to the previous tier of education, as a precursor of evolutionary competency customization.

Finally, this review finds strong evidence to support the prerequisite of soft skills development and improvement to the arsenal of the respective professional in order to manage the emerging technologies, to address their practical implications and to maximise their holistic aptitude as scholars, intellectuals and professionals. In conclusion, the present paper suggests areas and topics for future research in the level of Higher Education and the relative academic practices of implementation.

Keywords: Accounting, Auditing, Education, Emerging Technologies.

THE TRANSITION OF TECHNOLOGY AND THE ROLE OF "NEW ORALITY" IN THE EDUCATIONAL PROCESS OF THE APPLIED ARTS

Mastorakos Dimitrios
PhD candidate, Department of Photography and Audiovisual Arts
School of Applied Arts and Culture
University of West Attica
28 Ag. Spyridonos str., Egaleo, Campus 1, GR-12243
dmastorakos@uniwa.gr

Ntarara Evangelia
PhD candidate, Department of Photography and Audiovisual Arts
School of Applied Arts and Culture
University of West Attica
28 Ag. Spyridonos str., Egaleo, Campus 1, GR-12243
entarara@uniwa.gr

ABSTRACT

The research into the combined use of analog and digital technology in education, and specifically in the teaching of photographic act, constitutes the core focus of this article. The research questions center on the relationship between technology and photographic work, the transition from analog to digital photographic technology, and the understanding and use of media within the educational process. According to Bolz, the significance of a medium can only be understood through its interaction with other media - both contemporary and obsolete - and that older media serve as metaphorical aids for orientation within the digital realm (Bolz, 2008). Based on this perspective, a hands-on activity was designed as an educational practice in photography, which serves as the case study for the article. The methodology of the activity combines aspects of transformative and "incidental learning" (Bolz, 2008), alongside insights from visual culture scholars such as Gillian Rose. In the context of our current era - what Ong (2015) refers to as the "new orality," which connects new technologies to education and the role of digital imagery - the article seeks to intersect and integrate theoretical approaches and hands-on practices, aiming to draw conclusions regarding contemporary visual culture. The interaction between terms and critical theories brought to light both the influence of obsolete media on artistic production and the dynamic nature of the transition to new technologies. The activity was accompanied by a questionnaire, the findings of which offer valuable observations for educational practices and applications. The participants were primarily photography students, the majority of which responded positively, demonstrating that education through experiential practices has the potential to modify users' behavior towards a medium. At the same time, it revealed the participants' ability to understand and distinguish among different practices that define contemporary media. Overall, the playful dimension of the medium and the combined use of analog and digital technology emerged as an effective and valuable educational tool.

Keywords: new orality, digital photography, camera obscura, education, hands-on activity

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THE NECESSITY OF THE PEDAGOGICAL INTEGRATION OF DIGITAL MEDIA IN TEACHING PRACTICE

Sygkouna Ioanna
Teacher, Philologist
Principal of the 3rd junior high school o Preveza
Preveza, Greece
e-mail: isiguna@yahoo.gr

ABSTRACT

The study examines learning as an active and dynamic process, in which students acquire knowledge through personal involvement and interaction with their environment, as well as with tools that support thinking and communication. It presents key theoretical approaches such as constructivism, which emphasizes the importance of experience and social interaction in the learning process, and activity theory, which views learning as a collective process shaped by social and cultural structures. Particular emphasis is placed on visual literacy, as images play a central role in modern communication, requiring students to develop skills in analyzing and creating visual content. Furthermore, the study highlights the transformative role of technology in the learning process, with the integration of Web 2.0 tools and the use of Bloom's digital taxonomy for developing higher-order thinking skills. Finally, it underlines the importance of pedagogical integration of digital media and the continuous professional development of educators, in order to provide learning experiences tailored to the needs and demands of the 21st century.abstract should include the focus of your paper, i.e., what your paper is about, a brief description of the steps or methodology used, the main findings of the paper, and its results.

Keywords: digital Media, pedagogical theories, learning.

FROM THEORETICAL APPROACH TO DIGITAL LEARNING

Tsifetaki Elpida
Principal of General Upper Secondary School,
General Upper Secondary School P. Diasellou,
Arta, Greece
e-mail: mail@lyk-panag.art.sch.gr

Kitsati Natalia
Ph.D, Secondary School Biology Teacher (PE04.04),
General Upper Secondary School P. Diasellou,
Arta, Greece
e-mail: mail@lyk-panag.art.sch.gr

Bokou Aikaterini,
MSc, Secondary School Teacher of Greek Philology (PE02),
General Upper Secondary School P. Diasellou,
Arta, Greece
e-mail: mail@lyk-panag.art.sch.gr

ABSTRACT

The pedagogical integration of digital media into teaching practice refers to the use of technologies and digital tools to support and enhance teaching and learning. These media offer new opportunities for educators and students, enabling them to interact with the content in innovative and engaging ways.

Modern curricula, grounded in contemporary learning theories, increasingly incorporate digital media into the teaching of both STEM and Humanities subjects. This integration promotes active engagement and fosters a deeper, more comprehensive understanding of new knowledge.

In remote schools located in mountainous areas, such as the General Lyceum of P. Diasello in Arta, the challenge is greater. Although the school is technologically equipped—with interactive touchscreens and a fully independent IT lab—connectivity remains low or even non-existent. Despite this limitation, educators strive daily to integrate as many digital tools as possible into their teaching. The aim is to make learning more engaging and participatory, aligning with the framework set by the United Nations' Goal 4: Quality Education.

Indicative digital tools used include: Mentimeter, Mozabook, Storybird, Google Forms, Canva, and Kahoot. By interacting with these tools, students enhance their active participation in enjoyable ways, collaborate in teams, achieve a holistic understanding of new knowledge, and become able to transfer what they've learned to other learning environments. In this way, education becomes of higher quality for both students and teachers.

In conclusion, in a constantly evolving world, education must rise to its role—especially in semi-mountainous schools, which are tasked with bridging both learning and technological gaps for the new generation of students. This endeavor represents a powerful strategy for ongoing education, yet it requires a coordinated approach to overcome challenges and fully harness the potential of digital learning.

Keywords: digital tools, learning theories, quality education, STEM, Humanities

TA3: Utilization and evaluation of digital and technological media.

DIGITAL TRANSFORMATION AT THE MUSIC SCHOOL OF AMFISSA "ELENI KARAINDROU": EXPERIENCES, CHALLENGES, AND PROSPECTS FROM THE IMPLEMENTATION OF INNOVATIVE DIGITAL TOOLS IN EDUCATIONAL PRACTICE

Athanasiou Ioannis
PhD Candidate, University of Macedonia, Music Science Educator PE79.01
Music School of Amfissa “Eleni Karaindrou”
Amfissa, Greece
e-mail: athanasiou@uom.edu.gr

Georgoula Evangelia
PhD Candidate, University of West Attica, School Principal, English Language and Philology Educator PE06
Music School of Amfissa “Eleni Karaindrou”
Amfissa, Greece
e-mail: georgoula.pr@gmail.com

ABSTRACT

This paper presents the experience from the implementation of an Action Plan titled "Music Technology in the Educational Process: Discovering Productivity through Recording", which was applied at the Music School of Amfissa during the 2024-2025 school year, within the framework of the Internal School Evaluation by the Institute of Educational Policy (IEP). The main goal of the Action Plan was to enhance students' music education through the innovative use of music technology and recording, supported by the ESPA program "Upgrade of Music Education in Music Schools" (2023-2026). Specific objectives included developing students' technical skills in recording and sound editing, fostering creativity through the production of musical works, and understanding the importance of technology in the professional music field. Implementation involves organized workshops on recording and music production, utilizing modern equipment and digital software (Cubase, Audacity, Dorico, MuseScore). The program was applied gradually, with students creating group musical projects and taking an active role in all production stages. The evaluation methodology focused mainly on a qualitative approach (interviews, observation, analysis of works). The Action Plan directly contributed to the more effective implementation of cultural programs. Key challenges involved managing resources, ensuring student engagement, and supporting teachers. The paper concludes by highlighting the prospects for the sustainable use of digital technologies in Music Schools based on the findings of this completed study.

Keywords: Digital Technologies, Music Education, Creativity, Cultural Programs, Greek Music School

THE BENEFITS OF DISTANCE LEARNING FROM THE PERSPECTIVE OF SECONDARY SCHOOL STUDENTS IN THE PREFECTURES OF ATTICA AND CYCLADES

Vlassopoulos Gerasimos
Postdoctoral Researcher, PhD, MSc, Educator PE82
University of West Attica, Department of Biomedical Sciences – School of Health and Care Sciences
Athens, Greece
e-mail: makisvlass@gmail.com

ABSTRACT

COVID-19 first emerged in China in December 2019. After its declaration as a global pandemic in March 2020, numerous EU member states suspended the operation of educational institutions. In Greece, the first SARS-CoV-2 case was reported in February 2020. Shortly after the ninth confirmed case, a 48-hour localized closure of educational institutions was announced for specific prefectures on March 5–6. Despite the pandemic's multifaceted negative impacts, it acted as a catalyst for strategic decisions and the acceleration of the country's digital transformation. The school closures triggered an immediate transition toward the implementation of Distance Education (DE).

This study explores the perceived benefits of DE through the lens of secondary education students. A mixed sampling method (Stratified and Cluster sampling) was employed, involving 462 Junior High and High School students from the Prefectures of Attica and the Cyclades. The research was conducted in May 2020. Data were collected via LimeSurvey and analyzed using SPSS (v.25). The methodological framework included Cronbach's Alpha reliability analysis, descriptive statistics, factor analysis, and Chi-square tests.

Findings indicate that 78.1% of students perceived minimal benefits from DE, whereas only 6.9% reported significant benefits.

Although DE supported the Greek educational system across all levels during the pandemic, the majority of secondary education students stated that they did not benefit from this mode of instruction. Their initial expectations remained unfulfilled, and they reported a failure to acquire the anticipated theoretical knowledge.

A comparative analysis of these findings with international literature reveals common challenges and disparities related to the specificities of national educational systems, technological infrastructure, and distinct cultural and economic factors.

Keywords: Distance Education, E-learning, Information and Communication Technologies (ICT), Synchronous Learning, Asynchronous Learning.Abbreviations: Simple Random Sampling (SRS), Distance Education (DE), Information and Communication Technologies (ICT).

THE FLORENTINE RENAISSANCE AND THE GREEK SCHOLARS: A CONNECTION THROUGH DIGITAL MEDIA

Gaki Vasiliki
Chemist, PE04.02 & Computer Science PE86
Evening Vocational High School Of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

Giannouli Sofia
Philologist, PE02
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

Ntentes Ilias
Economist, PE80 & Electronic, PE84
1st High School of Preveza
Preveza, Greece
e-mail: iliasde@hotmail.com

ABSTRACT

This study examines the influence of Greek scholars from the Byzantine and Post-Byzantine periods, such as Chalkokondyles, Chrysoloras, and Laskaris, on the Florentine Renaissance, utilizing digital media and information and communication technologies (ICT). The aim was to highlight the pivotal contribution of these significant figures to the shaping of the intellectual landscape of the Renaissance and to explore how the transmission of Greek philosophy and ancient Greek texts influenced the development of Western thought and art. The project employed modern digital tools, including PowerPoint presentations, images, videos, and audio recordings, to create a multidimensional presentation offering a comprehensive understanding of the topic.

Guided by their teachers, the students used digital tools to develop a presentation that emphasized the connections between the classical Greek heritage and the artistic and philosophical developments of the Renaissance. Furthermore, they composed and set to music an original poem about the period, thereby deepening their engagement with the artistic and cultural dimensions of the subject and combining textual analysis with musical expression. This process helped students understand how Greek scholars, through the revival of ancient Greek texts, influenced Italian Renaissance intellectuals and artists, fostering a cultural dialogue that shaped the trajectory of Western civilization.

The students' work was presented at a student conference, where the use of digital media was combined with live student presentations. PowerPoint served as the primary presentation tool, while the students provided live explanations and interacted with the audience, elaborating on the findings of their research. This live presentation allowed the students to clarify key aspects of their work and enhance engagement with participants.

The results of our study were highly positive. Students gained a deep understanding of the Florentine Renaissance and the contribution of Greek scholars to the intellectual and cultural flourishing of the era. Additionally, they developed digital skills alongside their ability to create multidimensional presentations. The integration of music and video significantly enriched the learning process, fostering a more dynamic and impactful educational experience. The combination of theoretical analysis with modern technology offered students the opportunity to develop a cross-cultural approach to the topic, enhancing their creativity and communication skills.The abstract should include the focus of your paper, i.e., what your paper is about, a brief description of the steps or methodology used, the main findings of the paper, and its results.

Keywords: Florence, Renaissance, Byzantine Scholars, Digital and Technological Media.

EVALUATION OF AN EDUCATIONAL APPLICATION FOR ANDROID MOBILE DEVICES, FOR UNDERSTANDING 5TH GRADE PHYSICS CONCEPTS USING VOICE ASSISTANT

Domouchtsis Stergios
Postgraduate student, MA "Educational Sciences: Applications of Information and Communication Technologies in Education and Lifelong Learning"
Department of Educational and Social Policy - University of Macedonia
Thessaloniki, Greece
e-mail: stdomus@sch.gr

Lefkos Ioannis
Laboratory Teaching Staff (E.DI.P.)
Laboratory of Informatics & Robotics for Education & Society (LIRES)
Department of Educational & Social Policy - University of Macedonia
Thessaloniki, Greece
e-mail: lefkos@uom.edu.gr

Domouchtsis Nikolaos
Teacher (PE83), ENEGYL of Messolonghi (Integrated Special Vocational High School - Lyceum)
Messolonghi, Greece
e-mail: nikos_domis@hotmail.com

ABSTRACT

The present study investigates the use of mobile learning in the teaching of Physics in primary school, with particular emphasis on the concept of Heat. The theoretical framework is based on several learning theories, such as behaviorist learning theory, discovery learning theory, constructivism, and social constructivism, in order to provide a holistic explanation of students' scientific learning. The research also explores the current state of science education in Greece, highlighting students' perspectives and challenges in understanding the concept of heat. It further examines the motivations, benefits, and drawbacks of mobile learning, analyzing the principles of mobile learning design and the process of developing educational applications.

The study employs a combination of usability and effectiveness research approaches, adopting a mixed-method methodology. The usability study evaluates the degree of ease of use and engagement offered by the educational application, while the effectiveness study measures the application's impact on students' understanding of Heat. A case study approach is utilized to provide valuable insights into students' learning experiences and outcomes. The sample consists of primary school students, and data are collected through pre- and post-tests, questionnaires, and classroom observations.

Findings indicate that the use of mobile learning applications can significantly enhance students' engagement and their comprehension of physics concepts. The usability evaluation reveals high levels of satisfaction and simplicity of use, while the effectiveness evaluation demonstrates substantial improvements in information retention and students' ability to apply concepts. The study concludes with a discussion of the anticipated advantages of mobile learning, offering evidence-based recommendations for educators and policymakers to support the integration of technology into science education.

Keywords: voice assistant, Android, usability, effectiveness, application

RICHARD MAYER'S MULTIMEDIA LEARNING AND THE CREATION OF EDUCATIONAL VIDEO IN CONTEMPORARY TEACHING MODELS

Zachariadi Vasiliki
Teacher of Applied Arts (8901), MSc in Public Discourse and Digital Media
4th Vocational High School
Larissa, Greece-
email: baso1010@yahoo.gr

ABSTRACT

The rapid advancement of technology has rendered educational video a key tool in teaching, enhancing learning through a variety of stimuli. According to Richard Mayer's Multimedia Learning Theory, learning becomes more effective when information is presented through audiovisual means, engaging both the visual channel (images, videos, diagrams) and the auditory channel (speech, sounds, music). This theory is based on three fundamental principles: dual processing of information, the limited capacity of working memory, and the active processing of cognitive load.
Educational video is dynamically integrated into all modern learning models, reinforcing understanding and the assimilation of knowledge. In the Flipped Classroom model, students engage with educational videos before the lesson, allowing in-person instruction to be enriched with collaborative and experiential activities. In the Blended Learning model, videos serve as a bridge between traditional and online learning, offering flexibility and personalization.

Furthermore, educational video plays a central role in Differentiated Instruction, as it can be adapted to various difficulty levels, learning preferences, and learning paces. In Inclusive Education, multimedia elements support access for students with learning difficulties, using subtitles, narration, and interactive tools. Educational videos contribute to improved comprehension and more effective lesson organization. Similarly, in Tiered Instruction, teachers create multiple versions of the same video, tailored to students' abilities.

The effective creation of educational videos requires the application of Mayer's principles, including spatial and temporal alignment of text and image, elimination of extraneous information (minimizing cognitive load), and active student engagement through questions and interactive components.

In conclusion, the use of educational video—when grounded in the principles of multimedia learning—can transform the teaching process, making it more adaptable, personalized, interactive, and effective, while enhancing students' comprehension and engagement in today's classroom.

Keywords: Multimedia Learning, educational video

RESEARCH CONCLUSIONS ON THE USE OF SOCIAL NETWORKING SITES BY ADOLESCENTS

Katsaros Konstantinos
Information Technology Education Consultant PE86
Directorate of Secondary Education of Aetolia-Acarnania
e-mail: katsaros74@sch.gr

ABSTRACT

This study investigates the use of social networking sites by Secondary Education students, focusing on habits, potential risks arising from their use, and possible ways to address them.

Data was collected using a questionnaire completed by 80 second-grade high school students (32 boys and 48 girls), aged 16-17, from an urban school in Lefkada. The questionnaire aimed to record habits, frequency, and manner of social network usage, identify potential risks (such as cyberbullying, data breaches, addiction), and examine whether the impact of these risks differs by gender.

Findings confirm the application of the Digital Addiction Theory (Young, 1998) concerning excessive use, the Social Learning Theory (Bandura, 1977) in platform and behavior choices, and the Risk Perception Theory (Slovic, 1987) in gender differences.

According to the results, most students use social networks daily, primarily for communication with friends/family and entertainment, and less for information. Instagram, TikTok, and Snapchat are the most popular platforms, while Facebook and X are less favored.

A significant percentage of students reported encountering risks or knowing someone close who had unpleasant experiences. Data processing highlighted that female students experience discomfort more frequently, which leads them to be more concerned about data security, unlike male students who are less cautious regarding online risks.

The study also reveals that most students have been taught basic protection methods (such as password management, privacy settings, blocking unwanted users, searching on relevant websites) but often fail to apply these practices due to negligence or other reasons.

Education on digital safety and promoting a healthy online environment are deemed essential by both educators and parents. Emphasis should also be placed on investigating the causes of gender differences observed in students' risk perceptions.

Keywords: Internet, social media, cyberbullying, safety

THE UTILIZATION OF NEW TECHNOLOGIES IN TEACHING: A STUDY IN HIGHER EDUCATION

Birtsas Vassilios
Academic Scholar
Department of Biomedical Sciences,
University of West Attica
Egaleo, Greece
e-mail: birtsas@gmail.com

Karkalousos Petros
Associate Professor
Department of Biomedical Sciences,
University of West Attica
Egaleo, Greece

Batrinou Anthimia
Assistant Professor
Department of Food Science and Technology,
University of West Attica
Egaleo, Greece

Kriebardis Anastasios
Professor
Department of Biomedical Sciences,
University of West Attica
Egaleo, Greece

Papageorgiou Efstathia
Professor
Department of Biomedical Sciences, University of West Attica
Egaleo, Greece

ABSTRACT

Introduction: Using new technologies in teaching practice has reshaped the educational landscape, offering innovative tools that enhance the learning experience. Information and Communication Technologies (ICTs) enable interaction, collaboration, and access to educational resources regardless of geographical constraints. At the same time, they promote personalized learning and creativity, while supporting professors in organizing and presenting knowledge. However, their effective integration requires appropriate training, technical support, and a strategic approach to realise their full potential.

Purpose: The study examines the use of ICT in higher education, analysing the benefits, challenges, and the extent of their integration by professors. It also explores teachers' perceptions of the usefulness, challenges, and implications of ICT in teaching and learning.

Method: The study is based on two axes: the literature review and the data collection through a questionnaire. The literature provides the theoretical background for the use of ICT, while the questionnaire records the views and experiences of 62 university teachers on the integration of ICT in the educational process.

Results: The majority of university teachers (96.8%) have integrated ICT into their teaching practices, with positive perceptions of the usefulness, relevance, and safety of these technologies. However, significant barriers were highlighted, such as lack of technical support, inadequate appropriate software, and time constraints, especially for specific age groups. Despite the frequent use of basic tools such as the internet and desktop applications, more specialized tools such as interactive whiteboards and digital testing software remain unused. In addition, a strong desire for further training was recorded, focusing on advanced computer skills, internet security, and the use of Web 2.0 tools.

Discussion: The study highlights the significant contribution of ICT to improving the educational process, while at the same time highlighting the barriers that limit their full exploitation. Although university teachers recognize the value of ICT, additional support and targeted training are needed to enhance their skills. The design of training programs and the adaptation of educational policies to teachers' needs are considered necessary to optimize the integration of ICT and improve the overall educational experience.

Keywords: ICT, Teaching Practice, Training, Obstacles and Challenges.

MODEL FOR MONITORING DIETARY INTAKE, LIFESTYLE, AND PHYSICAL ACTIVITY OF PATIENTS USING INFORMATION AND COMMUNICATION TECHNOLOGIES

Biskanaki Fani,
PhD, MSc, Director of Secondary Education Administration of Preveza
Preveza,Greece
email: fani.biskan@gmail.com

Giannakou Anastasia,
PhD, MSc, Director of the 4th General Lyceum of Ioannina «AKADIMIA»
Ioannina, Greece
email: giannakougeorgiou@gmail.com

ABSTRACT

This study investigates the use of information and communication technologies (ICT) in the daily practice of nutrition-dietetics and physical education professionals, focusing on the monitoring of dietary intake and physical activity. The literature indicates that mobile applications, particularly when combined with wearable devices, constitute effective tools for promoting healthy dietary habits and enhancing individuals' adherence to recommended practices. Within this study, the most suitable application was selected from thirty available on the Play Store and App Store and implemented in an experimental procedure involving two patients, in order to evaluate its practical utility and contribution to health management. The results highlight the effectiveness of m-Health tools in monitoring and guiding individuals, while also emphasizing the need for further research with more diverse samples to investigate the long-term benefits and potential risks associated with the sustained use of these technologies. Overall, ICT provides significant opportunities for both health professionals and patients, facilitating personalized monitoring and support, improving adherence to healthy lifestyle behaviors, and enhancing overall health outcomes.

Keywords: ICT, m-Health, nutrition applications, physical activity applications

RESEARCH ON THE UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES BY SECONDARY EDUCATION TEACHERS IN THE PREFECTURE OF IOANNINA

Britsa Eleonora
ICT Teacher PE86-MEd
Directorate of Secondary Education, Ioannina, Greece
e-mail:eleonbritsa@gmail.com

ABSTRACT

The purpose of this work was the investigation of the use of Information and Communication Technologies by teachers who teach in the school units of secondary education of Ioannina's Prefecture. Through the participation of 139 teachers from different subjects on the internet filling out a relevant questionnaire dealt with issues such as: the availability of and access to logistical equipment, the rate of use of available ICT, the type of activities in which ICT are used, the type of learning and teaching material used by teachers, key factors that negatively affect the use of ICT, the participation of teachers in training activities for ICT in teaching, as well as teachers' views and attitudes on ICT during teaching and more generally within the school unit. The questionnaire data was collected in the penultimate two months of 2018. Many of the research results are in line with those of the latest European Schoolnet research. Among the most important conclusions of the research are the following: there is a failure of adequate logistical equipment for the use of ICT which is the most negative factor for using ICT in teaching and learning, there is a greater tendency in ICT utilization, teachers of Theoretical Courses create often their own digital material due to a possible lack of ready relevant material and consult more material from the school network and the school databases while at the same time learning more on a personal level for the ICT in their spare time in order to be able to cope with modern requirements, training in ICT by the staff of the school is very rare, the important role of training due to frequent engagement of teachers with the fields they have been trained on is highlighted, the most important positive contribution of the use of ICT is to strengthen students' cooperation, while radical changes are needed in schools to fully exploit ICT in teaching and learning.

Keywords: Information and Communication Technologies (ICT), Use and Exploitation of ICT in Teaching, Secondary Education, Opinions, Attitudes, Training.

THE APPLICATION OF SENTIMENT ANALYSIS IN HISTORY SCHOOL TEXTBOOKS: THE CASE OF ASIA MINOR

Bitzenis Aristidis
Professor, University of Macedonia
Thessaloniki, Greece
bitzenis@uom.edu.gr

Nosios Marios
PhD Candidate, University of Macedonia
Thessaloniki, Greece
mnosios@uom.edu.gr

Koutsoupias Nikos
Professor, University of Macedonia
Thessaloniki, Greece
nk@uom.edu.gr

Kokkoris Christos
PhD Candidate, University of Macedonia
Thessaloniki, Greece
ckokkoris@uom.edu.gr

ABSTRACT

This study examines the affective framing of the Asia Minor Catastrophe (1922) in official Greek secondary-school history textbooks through a lexicon-based sentiment analysis. A corpus of all textbook excerpts explicitly referencing Asia Minor was compiled, from which passages reflecting both political and socio-cultural dimensions were manually selected. Preprocessing was conducted in R, including lowercase conversion, tokenization, and removal of stop words. Using a Greek sentiment lexicon, polarity scores were assigned to individual tokens; raw valence sums were aggregated and normalized by passage length to facilitate robust inter-excerpt comparisons. Results indicate that textbook narratives are overwhelmingly neutral (84.2% of labels), suggesting an objective, fact-driven pedagogical approach. Negative sentiment accounts for 14.1% of labels, clustering around descriptions of conflict, displacement, and loss, thereby underscoring the catastrophic nature of these events. Positive sentiment is minimal (1.6%), appearing only in brief references to communal solidarity or reconstruction efforts. Lexicographic profiling further reveals frequent usage of terms such as *ελλάδα* (Greece), *αθήνα* (Athens), and the inclusive pronoun *μάς* (our), reflecting a collective national perspective, alongside temporal markers (*αιώνα*, *χρόνια*) that reinforce chronological structuring. These findings demonstrate that Greek history textbooks maintain scholarly neutrality, punctuated by intensified negativity in trauma-focused sections, with scant positive counterpoints. Furthermore, this study exemplifies the value of computational methods for empirically mapping affective dimensions within educational narratives and lays the groundwork for the development of culturally sensitive, domain-specific sentiment models in historical scholarship.

Keywords: Sentiment Analysis, Asia Minor, Natural Language Processing, History

DEVELOPING ORIGINAL TEACHING MATERIAL FOR GERMAN AS A FOREIGN LANGUAGE USING ARTIFICIAL INTELLIGENCE SOFTWARE AND DIGITAL TOOLS

Dr. Rizopoulou Aikaterini
Substitute Teacher of German as a Foreign Language
50th Middle School of Athens
Athens, Greece
e-mail: krizopoulou@gmail.com

ABSTRACT

School textbooks for teaching and learning the German language as a foreign language in Greek public secondary schools are devoid of any accompanying audio material. This presents a particular challenge for German as a foreign language (GFL) teachers and pupils, especially in the first grade of middle school, where the language proficiency level is defined as A1- (Pre-A1), that is below the first basic language level as described in the Common European Framework of Reference for Languages (CEFR).

Although in recent years some efforts have been made by the Institute of Educational Policy (IEP) or by individual educators to create some GFL audio materials and this material is digitally available on the *Photodentro* platform of the National Repository of Educational Material, the number of audios specifically for the Pre-A1 language level remains extremely limited. In many cases, the available material either significantly exceeds the target language level or does not align with the topics covered in the school textbook.

Finding or adapting GFL listening materials and creating suitable listening activities to develop pupils' listening comprehension skills proves to be a challenging task for GFL-teachers. This paper examines whether recent advancements in Artificial Intelligence, particularly the development of Text-To-Speech and Voice-Transformation software, can help bridge this gap in teaching and learning German as a foreign language in Greek public middle schools.

Research over the past decade has shown that various Text-To-Speech software tools can support second language vocabulary learning, while also improving learners' reading skills by functioning as 'out loud readers' of individual words, phrases, or even entire texts. Additionally, empirical evidence suggests that beginner-level foreign language learners, particularly in English classes, seem to remain unaffected by the potentially unnatural prosody of audio files generated by such software.

However, the question arises as to whether Artificial Intelligence can advance foreign language listening skills beyond the phonetic reproduction of isolated written words or sentences. Specifically, this paper focuses on the question, whether such software (in this case, Murf.AI) can be used to generate GFL audio material that sounds as 'natural' as possible and exhibits human-like characteristics. Furthermore, it explores how the final audios can be made available for use — either as audio files in an online classroom (e-Class), or as audio files accompanying a video created with holistic digital and print media creation platforms (such as Canva), or, further, as audio files integrated into a gamification platform (such as Genial.ly).

As a general conclusion, it can be said that current developments in Artificial Intelligence enable the autonomous creation of fairly realistic and adaptable audio material, tailored to the linguistic and learning profile of each classroom, to support and enhance the development of listening skills in foreign language teaching and learning.

Keywords: German as a foreign language, secondary education, listening comprehension, oral comprehension, text-to-speech, foreign languages, artificial intelligence, software.

ADOLESCENTS' PERSPECTIVES ON ELECTRONIC GAMES

Elpida Christoforidou
PhD of the Department of Fine Arts and Sciences of Arts, University of Ioannina
Larissa, Greece
e-mail: mauve2310@yahoo.gr

ABSTRACT

"There are some games that teach you how to become a better person." This was the statement of a thirteen-year-old participant in of a study conducted between 2021 and 2022, which aimed to research the cultural and socio-political dimensions of engagement with electronic games within adolescent culture. One of the research objectives was to explore adolescents' views on the value of electronic games, while another question that arose was whether and to what extent electronic games shape models of action and thinking in young people.

The research, which involved adolescents aged 12-17 from the Municipality of Thessaly, was divided into two parts. In the first stage, 485 questionnaires were collected from secondary schools in the region of Thessaly, which were analyzed using SPSS. In the second stage, 42 semi-structured interviews were conducted, for which thematic analysis was carried out.

According to the results of the research, electronic games represent a modern form of entertainment for children, a space for socializing with friends, an anxiety-relieving setting, a place for learning and raising awareness about various socio-political issues, and a means of self-improvement. Additionally, for some teenagers, electronic games were evaluated as artistic creations of equal value to a film, a music piece, or even a painting. In their view, a videogame has value for various reasons, such as its aesthetic properties (graphics, story, music), the intensive work involved in its creation, its ability to fulfill various needs (entertainment, relaxation, learning, challenges, creativity, social interaction, etc.), its connection to reality, and its mentoring, such as giving lessons of survival. The element of 'survival' fascinates adolescents, and one reason for this attraction lies in the opportunity to create a society from scratch.

McGonigal (2010), a video game designer, argues that electronic games are an inventive platform for changing the world and that within the game, children become the best version of themselves, developing a social network, building confidence, and engaging in meaningful activities that bring them pleasure. Indeed, these thoughts are reinforced by the results of the present research. The world of videogames forms a second parallel world, where adolescents, as members of a group, solve problems, create and/or try to improve things and situations – something that gives meaning to their actions – and have, consciously or not, various gaming socio-political experiences that encourage them to change things for the better.

Keywords: electronic games, adolescents, value, representations.

TA4: The digital divide and emerging inequalities.

THE DIGITAL DIVIDE IN PRIMARY EDUCATION IN GREECE: CHALLENGES, EMERGING INEQUALITIES, AND INCLUSIVE PRACTICES

Maria Kastoura
Primary School Teacher (PE70)
Primary School of Nea Mesimvria, Directorate of Primary Education of Western Thessaloniki
Thessaloniki, Greece
e-mail: kastmara@yahoo.com

Georgios Margaritis
Principal, Primary School Teacher (PE70)
Primary School of Nea Mesimvria, Directorate of Primary Education of Western Thessaloniki
Thessaloniki, Greece
e-mail: gmarg43@hotmail.gr

ABSTRACT

The digitalization of education has brought to light inequalities in access to technology, digital literacy, and educational infrastructure, particularly in primary education. This study investigates the digital divide in Greek primary schools through a review of the literature, focusing on the challenges, emerging inequalities, and inclusive practices implemented to mitigate it.

The literature review reveals that access to Information and Communication Technologies (ICT) in Greek primary schools is unevenly distributed. Urban schools tend to have more technological infrastructure, while rural schools face significant shortages in equipment and connectivity. At the same time, students from low-income families often lack access to electronic devices and stable internet connections, which excludes them from modern learning practices.

Beyond basic access, the study highlights the concept of "secondary digital inequality," which refers to differences in the skills required to effectively use technology. Students from affluent families tend to develop higher levels of digital literacy, whereas students from disadvantaged backgrounds often acquire only rudimentary skills, leading to long-term educational and professional consequences.

Moreover, teacher training in ICT remains fragmented and unevenly distributed, affecting the effective integration of technological tools in teaching. The lack of cohesive educational policy and limited government funding have resulted in low ICT adoption in daily instructional practice. Although digital education programs have been introduced, their implementation is often fragmented, with many schools relying on external funding and private initiatives.

To address these challenges, inclusive practices are being developed in Greek primary education. Teacher training programs focus on enhancing digital skills, enabling the creation of interactive and inclusive learning experiences. School-based digital literacy initiatives, such as coding workshops and interactive programs, promote equitable access to technology. Additionally, community partnerships with private stakeholders provide schools with technological equipment and financial support.

Despite positive initiatives, barriers remain. The absence of a comprehensive national strategy for digital education and the reliance on external funding raise concerns about the sustainability of actions. While ICT can enhance teaching and learning, their inadequate or improper integration may further widen the gap between students.

In conclusion, the study underscores the urgent need for comprehensive strategies to bridge the digital divide. Unequal access to technology, disparities in digital literacy, and insufficient support for educators perpetuate educational inequalities. However, inclusive practices, such as targeted teacher training and school-based digital literacy programs, can foster a more equitable digital learning environment. Achieving genuine digital inclusion requires a collaborative approach involving educators, policymakers, and the wider community.

Keywords: Digital Divide, Primary Education, Educational Inequality, Digital Literacy, ICT Access, Inclusive Education.

DIGITAL TRANSFORMATION IN EDUCATION: OPPORTUNITIES, CHALLENGES, AND EMERGING INEQUALITIES IN THE AGE OF ARTIFICIAL INTELLIGENCE

Athanasia Balomenou
Regional Education Quality Supervisor of Western Greece, Education Counselor for Secondary Education (PE03 – Mathematics) in Achaia,
Regional Directorate of Primary and Secondary Education of Western Greece,
Patras, Greece
e-mail: smpalom@upatras.gr

Pinelopi Tsakoumagkou
Teacher of French Philology (PE05),
Directorate of Secondary Education of the Cyclades
Mykonos, Greece
e-mail: ptsak21@gmail.com

Ioannis Tsakoumagkos
Chemical Engineer
University of Patras
Patras, Greece
e-mail: giannistsak6@gmail.com

ABSTRACT

In the past decade, education worldwide has been undergoing a profound transformation due to the rapid advancement of digital technologies. Digital transformation is not limited to supporting traditional teaching methods, but fundamentally reshapes the way knowledge is acquired, shared, and experienced, as well as how educational institutions are organized and managed. The integration of innovations such as artificial intelligence, machine learning, MOOCs, and virtual classrooms has opened new pathways in learning, offering greater accessibility, personalization, and scalability.

However, this evolution comes with serious challenges. Despite the opportunities it presents, digital transformation can intensify existing social and economic inequalities, creating a new "digital divide." Unequal access to digital tools, infrastructure, and skills - especially among vulnerable social groups or remote communities - remains a major obstacle to equitable education.

This paper analyzes the dual nature of digital transformation and highlights the need for participatory, fair, and inclusive policies. It adopts the methodology of literature review and policy text analysis. It explores the key challenges in the digital transformation of education and, in its final section, proposes specific strategies—such as investing in technological infrastructure and strengthening the digital skills of students, educators, and citizens—so that technology can meaningfully contribute to reducing educational inequalities.

Keywords: digital transformation, primary and secondary education, digital gap, digital divide

DIGITAL INEQUALITIES IN THE 21ST CENTURY

Angelos Rondogiannis
ICT and Music Educator (PE86 – TE16), MSc
Ministry of Education, Greece
email: arondo@sch.gr

Dr. Amalia Plaskasoviti
German Philology Educator (PE07)
Ministry of Education, Greece
email: amaliaplaskoviti@gmail.com

ABSTRACT

This study focuses on the digital divide (digital illiteracy) and the inequalities that stem from it, particularly in relation to essential digital competencies such as internet navigation and the use of basic digital tools (e.g., word processing, email communication). In a contemporary context marked by hyper-information and rapid technological advancement, the inability of individuals to competently operate digital devices (e.g., smartphones) or utilize computers in everyday life appears incongruous and contrary to common societal expectations.

Digital illiteracy refers to the inability of individuals to effectively engage with digital technologies and to leverage the functionalities these technologies offer across key areas of daily life—work, education, communication, and social engagement. The lack of digital skills has profound socioeconomic consequences, limiting access to employment opportunities, educational advancement, and civic participation. This limitation produces tangible social and practical disadvantages, reinforcing inequality and unequal treatment across multiple dimensions of daily experience.

The present research was conducted at the 2nd Experimental Lyceum of Lefkada "Angelos Sikelianos" during the 2024–2025 academic year, within the framework of the Institute of Educational Policy's Active Citizenship Initiative. The project aimed to empower students who possessed a foundational level of digital proficiency to assist other individuals—primarily family members such as parents and grandparents—in acquiring essential digital skills (e.g., online communication, interaction with public services and financial institutions), thereby enhancing their capacity to participate meaningfully in a digital society. Simultaneously, the project sought to cultivate among students an awareness of the various forms, causes, and mechanisms underlying digital inequality, and to explore possible strategies for its mitigation (e.g., access, content creation, digital participation, infrastructure improvement, and policy design).

The methodology involved the selection of participants from diverse social backgrounds (age, gender, geographical location, socioeconomic status, educational level), the administration of structured questionnaires (online and face-to-face), individual interviews, quantitative data analysis, and comparative analysis using data from international organizations (e.g., UNESCO, Eurostat) and public data repositories. Students were actively involved throughout all phases of the research process—from goal setting and situational analysis to data collection, stakeholder engagement (public and private sector entities), and public awareness campaigns. Based on the findings, students formulated and recorded their own proposals aimed at enhancing digital literacy and reducing the digital divide.

The research underscores the critical importance of fostering digital competencies in students, given the central role of technology in modern learning environments and societal development. Bridging digital inequalities and ensuring equitable access to digital technologies and opportunities can contribute to a more inclusive, innovative, and socially cohesive society.

Keywords: Digital literacy, digital illiteracy, digital divide, technological inequality, e-skills.

TA5: Digital and visual literacy.

SCHOOL LIBRARY AS A LEARNING HUB: ACTION PLAN FOR DIGITAL UPGRADING

Giannakou Anastasia
PhD, MSc, Director of the 4th General Lyceum of Ioannina «AKADIMIA»
Ioannina Greece

Voulgari Ioanna
Teacher of Religious Studies of the 4th General Lyceum of Ioannina «AKADIMIA»
Ioannina, Greece

ABSTRACT

This paper presents the implementation of a comprehensive action plan for the modernization of the school library, aiming to foster learning, creativity, and both digital and traditional reading literacy. The initiative went beyond the renovation of the physical space, focusing instead on the creation of a multifaceted and functional learning environment that integrates digital and traditional infrastructures, advanced technological tools, and collaborative teaching practices. The project was carried out with the active participation of students, teachers, and external partners, with the overarching goal of transforming the library into a dynamic hub of knowledge, innovation, and social interaction.

The main outcomes include the development of original educational and audiovisual material, the design of interactive reading promotion programs, the establishment of partnerships with cultural and academic institutions, and the integration of the library into national and international networks for the exchange of good practices. Evaluation was conducted using a combination of quantitative and qualitative criteria, such as community participation, quality of collaboration, completion of activities, use of digital resources, and user satisfaction. The results highlighted the potential of school libraries as multidimensional learning spaces that meet the demands of the 21st century, enhance digital literacy, and function as hubs of social participation and innovation.

Keywords: Digital literacy , Information literacy, Educational digital tools, Hybrid libraries, Knowledge dissemination, Technological innovation, Sustainability of practices.

VISUALIZING LEARNING: DESIGN PRINCIPLES, IMPLEMENTATION, AND BENEFITS OF INFOGRAPHICS IN THE EDUCATIONAL LEARNING PROCESS

Ioannis N. Dimitrakopoulos,
MSc, Educator, PE82 Sector
DDE Preveza – 2nd Gymnasium of Preveza
Preveza, Greece
email: jndimit@gmail.com

ABSTRACT

This scientific article explores the contribution of infographics to the learning process by examining their design principles, pedagogical applications, and effects on students' cognitive development. Infographics combine visual and linguistic elements, offering an efficient way to organize and present complex information. In recent years, their use has significantly increased as they have proven to be particularly effective in facilitating the understanding and assimilation of both fundamental and complex concepts through structured visual data representation. According to literature, cognitive learning theory integrating multiple information channels enhances memory recall and promotes a deeper understanding of concepts.

Following a primary methodological approach of literature review, the article analyzes their usage in education as well as the challenges arising from their use. Through systematic analysis of research data and theoretical perspectives, the article highlights their contribution to the learning process. Alongside, it notes potential difficulties that emerge from their use, underscoring that an overly large amount of information without necessary guidance may cause cognitive overload, adversely affecting information processing and assimilation.

Particular emphasis in the publication is placed on the use of infographics across interdisciplinary fields (natural sciences, language education, social sciences, etc.) and their significance as a tool for development, creation, and application through the use of specialized methodological tools such as Napkin and Venngage platforms. The case studies developed provide specific and measurable data on how visual graphics can support teaching, enhance understanding of concepts, and improve the learning experience.

The immediate goal of the research is to highlight the educational significance of infographics in both informal and formal educational environments. Their ability to transform complex information into comprehensible visual formats enhances cognitive engagement, inclusive learning, and reflective thinking through visual and digital literacy. Students' participation in their creation strengthens skills such as data analysis, communication, and collaboration.

The paper is directed towards the entire educational community and also challenges educators to develop imagination and creativity, aiming for a modern, structured, and technologically informed practice

Keywords: Infographics, Digital and Visual Literacy, Charts, Learning

THE IMPLEMENTATION OF MULTIMODALITY IN LANGUAGE TEACHING: A SYSTEMATIC LITERATURE REVIEW

Mavraganis Vasileios
Educator / Teacher PE70 & PE02,
PhD Candidate, Department of Educational Sciences and Early Childhood Education (TEEAPH)
University of Patras
Patras, Greece
email: vmavragan@gmail.com

ABSTRACT

Multimodality is considered an innovative approach in the field of education, as it integrates a variety ofsemiotic resources with the aim of enhancing learning and comprehension. It offers a more comprehensive learning experience by allowing students to engage with educational content through multiple and diverse modes of representation. This approach goes beyond written text to include visual and digital forms, which are integral elements of the contemporary world. Through multimodality, students are able to develop a deeper understanding of concepts, improve their language skills, and foster critical thinking and creativity.The aim of this study is to explore the implementation of multimodality in language teaching within primary education, emphasizing its impact on both students and educators. The research is based on a systematic review of the literature, drawing from primary sources. A total of 33 qualitative, quantitative, and mixed-method studies were selected, written in either Greek or English and published between 2000 and 2025. Keywords used in the database searches were directly related to the title and content of the research. Studies were excluded if they were not relevant to the research topic, lacked a clearly defined sample, involved a limited sample size, or did not include qualitative or quantitative data. The findings highlight the positive influence of multimodality on language instruction in primary education. The use of multimodal texts and interactive tools significantly contributes to the improvement of students' reading abilities, allowing information to be presented in diverse ways that support comprehension, memory, and knowledge retention. Students exposed to multimodal content exhibit greater engagement and interest in language learning while also developing their critical thinking skills through information synthesis and analysis. Furthermore, incorporating multimodal elements into textbooks—such as images, interactive stories, and educational software—has been shown to strengthen students' connection with language content, making learning more appealing, accessible, and effective.However, the study also identifies certain challenges in applying multimodality. Many educators lack adequate training in the use of multimodal tools and software, which hinders effective implementation in the classroom. Additionally, infrastructure limitations, restricted access to modern technological resources, and time constraints often pose barriers to integrating multimodal activities. Nonetheless, ongoing technological advancements and emerging educational policies suggest that multimodality is gaining traction and is expected to play an increasingly important role in future language education. The development of targeted training programs for teachers, the integration of multimodal strategies into instructional practice, and the improvement of multimodal educational software are considered essential steps toward the effective implementation of this approach in primary education.

Keywords: Multimodality, language teaching, primary education.

MULTILITERACIES IN SCHOOL EDUCATION: UTILIZING DIGITAL CONCEPT MAPPING ENVIRONMENTS

Totolou Angeliki
Teacher, Sociologist
Doctoral Candidate
Ionian University
Argostoli, Greece
e-mail: antotolou@gmail.com

Heliades George
Associate Professor
Ionian University
Argostoli, Greece
e-mail: g.heliades@gmail.com

ABSTRACT

This article refers to diagrammatic representations of knowledge with a particular focus on concept mapping. In the digital era, learning environments are undergoing significant transformations in response to emerging challenges. The learning process is freed from spatial and temporal constraints and is constantly evolving with the ultimate goal of upgrading the learning experience. Undoubtedly, interactivity is a central issue and a requirement at the same time. Under these conditions, the concept of multiliteracies acquires renewed dimensions and perspectives. Starting from the utilization of concept mapping in teaching and learning, the benefits of this approach will be mentioned. Concept mapping is applied across various subject areas. In this case, the field of application is drawn from the course of Social and Political Education, which encompasses a wide range of topics and concepts. Emphasis is placed on promoting meaningful learning. Furthermore, the potential uses of concept mapping are analyzed in relation to information processing and synthesis, the development of ideas and concepts, the acquisition of new knowledge, and the cultivation of critical thinking and creativity. It is worth mentioning that concept mapping enables the visualization of relationships between concepts, which contributes to an in-depth understanding of the subject. As a result, concept mapping emerges as an educational strategy that can promote innovative educational designs in digital learning environments.

Keywords: multiliteracies, multimodality, concept mapping, digital media.

TA6: Digital ethics.

ARTIFICIAL INTELLIGENCE AND ETHICS: CHALLENGES AND SOLUTIONS

Samonas Konstantinos
Teacher of Greek Language and Literature
Directorate of Secondary Education of Preveza, Gymnasio Lourou
Preveza, Greece
e-mail: samkon@sch.gr

ABSTRACT

In this article we focus on the theme of Digital Ethics, particularly in the field of Ethics in Artificial Intelligence (AI) and the challenges arising from its introduction into education. It begins with a presentation of the term AI. Then, it explores the ways AI has been integrated into education and the potential benefits it can bring to areas such as administration and management, teaching and learning—such as personalized learning, the creation of high-quality pedagogical content tailored to students' needs, timely and accurate assessment and feedback, as well as predictive interventions for students facing difficulties. Next, the article highlights the most significant challenges related to the introduction and use of AI in education, such as privacy, data protection, algorithmic bias and opacity, the digital divide, plagiarism, and broader risks to academic integrity. It then presents the ethical frameworks of deontology, utilitarianism, and virtue ethics, and examines existing codes of ethics—particularly those issued by international and transnational institutions such as UNICEF, the OECD, and the European Union—as well as the legal framework developed within the EU (e.g., the GDPR and the AI Act). The analysis reveals that ethical codes often fail to produce the desired outcomes due to various factors, such as corporate or national competition and the dependency of scientific advancement on funding from investors who may have self-serving interests. This underscores the need for stronger institutional safeguards. Finally, in the article is mentioned the role of schools in cultivating not only the knowledge and skills necessary for the creative use of AI, but also a moral conscience in its application by students as future adults. This is crucial in mitigating harmful practices and outcomes for society. It also stresses the need for teacher training in these areas so that educators can serve as role models for their students.

Keywords: Artificial Intelligence, Ethics, Education.

TA7: Digital citizenship.

ACTIVE CITIZENSHIP AND THE DIGITAL WORLD THE ROLE OF EDUCATION IN SHAPING ACTIVE STUDENT-CITIZENS IN THE DIGITAL PUBLIC SPACE

Dimakopoulou Foteini
Education Consultant for Social Sciences, M.Ed/M.Sc
Quality Education Supervisor, Directorate of Secondary Education of Preveza
Preveza, Greece

Dimakopoulou Maria
Preschool Teacher, Directorate of Primary Education of Achaia
Patras, Greece

ABSTRACT

This study examines the concept of active citizenship in the modern digital world, focusing on the crucial role of education in shaping active, responsible and critically thinking students-citizens. Through theoretical and conceptual analysis, the transformations of citizenship in the light of digitalization, globalization and multiculturalism are explored, as well as the emergence of digital citizenship as a key dimension of modern democratic participation. Particular emphasis is placed on the connection of digital citizenship with digital intelligence, which includes cognitive, social, emotional and ethical skills necessary for safe and responsible participation in the digital public space. The study shows that education must go beyond the simple cultivation of technical skills and adopt a holistic approach, which fosters critical thinking, digital ethics and active participation. In conclusion, digital citizenship education is a key prerequisite for strengthening democracy and building an inclusive and responsible digital society**Λέξεις-κλειδιά:** ενεργός πολιτειότητα, ψηφιακός πολίτης, ψηφιακή νοημοσύνη εκπαίδευση ψηφιακού πολίτη.

Keywords: active citizenship, digital citizenship, digital intelligence, digital citizen education.

SCIENCE AND THE DIGITAL CITIZEN: AN EDUCATIONAL SCENARIO APPLIED TO CHEMISTRY

Malamou Konstantina
Chemistry teacher, Directorate of Secondary Education of Ioannina
Ioannina, Greece
e-mail: nmalamou@gmail.com

Malamou Sevasti
Physics teacher, Directorate of Secondary Education of Ioannina
Ioannina, Greece
e-mail: smalamou@gmail.com

ABSTRACT

The article has to do with a teaching scenario in Chemistry, aiming to mobilize and reflect on issues of pseudoscience or misleading the public, on scientific issues in a digital world full of information overload, challenges and deceptions. Based on the discovery-investigation and collaborative group method, using modern digital tools, the teaching scenario has its main goal the education of active and concerned students-digital citizens on issues of science and scientific deception. It can serve as a guide to be adapted to other Science subjects such as Biology and Physics, serving corresponding teaching objectives for students in the 3rd year of middle school and high school classes.

Keywords: science, scientific deception, natural sciences, pseudoscience, digital citizen

TA8: Inclusive digital education.

DIGITAL AUDIO TOOLS IN MATHEMATICS EDUCATION FOR STUDENTS WITH VISUAL IMPAIRMENTS: AN ANALYSIS OF APPLICATIONS AND A CASE STUDY

Dimakis Efthymios
PhD Candidate - Special Education Mathematician
Department of Primary Education, University of Ioannina - Secondary Education Directorate of Ioannina
Ioannina, Greece
email: efdimakis@gmail.com

Agiannitou Dialechti
Special Education Mathematician
Secondary Education Directorate of Lesvos
Ioannina, Greece
email: dagiannitou@gmail.com

Soulis Spyridon - Georgios
Professor of Special Education - Director of the Special Education and Training Laboratory
Department of Primary Education, University of Ioannina
Ioannina, Greece
email: ssoulis@uoi.gr

ABSTRACT

The education of students with visual impairments is a complex and dynamically evolving field, requiring specialized approaches to ensure effective learning, inclusion, and empowerment. Efforts to integrate students with visual impairments into regular educational environments have gained momentum. Research highlights the importance of accessibility in both the physical and digital.

Multimodality in learning refers to the fact that student's process knowledge through different sensory channels. In the case of students with visual impairments, the auditory channel takes on a leading role, as it functions as the primary means of receiving and organizing information. Furthermore, according to constructivism, learning is not a passive process but an active construction of knowledge through interaction with the environment. Digital audio tools enable students with visual impairments to interact with educational materials, explore concepts, and construct knowledge through auditory and sensory experience.

The use of digital technologies in teaching students with visual impairments has made a significant contribution to improving their access to knowledge. Audio-based tools allow for the understanding of mathematical and other scientific concepts through auditory information. Text-to-speech (TTS) software, audio labels, and interactive applications with audio guidance enhance student autonomy, while audio diagrams and descriptive narratives facilitate the absorption of complex information. In addition, touch technologies combined with audio feedback provide multisensory support, facilitating the learning process. The use of these tools promotes inclusive education, allowing the active participation of students with visual impairments in the classroom and enhancing their learning experience.

In this paper, modern audio tools that enhance the learning process are examined, with an emphasis on teaching mathematical and scientific concepts. Tools that are currently in circulation are presented and special reference is made to those that can be obtained by students and teachers for free. For the practical investigation of the effectiveness of these tools, a case study was carried out and presented. The student of the 3rd grade of the F.D. high school with partial vision loss participated in a program of enhanced mathematical teaching using digital tools. The educational approach includes the use of NVDA software for reading mathematical symbols, Desmos for audio feedback for function graphs, interactive touch applications for understanding geometric shapes, and the integration of audio descriptions into interactive learning environments. The results demonstrate improved student understanding and engagement, highlighting the importance of integrating adaptive learning technologies.

Keywords: special education, audio digital media, case study, visual impairment

DIGITAL HIVES ON E-ME FOR TEACHING GREEK TO REFUGEE CHILDREN: ENHANCING INCLUSIVE EDUCATION THROUGH CONNECTIVISM AND GAMIFICATION

Despina Zeka-Paschou
Educator, Primary Education (PE 70),
Ministry of Education, Religious Affairs and Sports (YPAITHA)
Principal of Nea Kerasounta Primary School
Preveza, Greece
e-mail: despozeka@yahoo.gr

ABSTRACT

The integration of refugee children into the Greek educational system requires flexible and innovative approaches that incorporate digital tools and interactive learning methods. While attending face-to-face lessons remains our primary goal, students' frequent absences due to social and family factors create learning gaps. To address these challenges and leverage the digital tools provided by the Panhellenic School Network, a digital Hive was created on the e-me platform, based on Connectivism and Gamification theories as means to enhance inclusive education.

In the e-me Hive, refugee students can access educational material continuously, participate in interactive activities, communicate with their teachers, and collaborate with their classmates. At the same time, the platform facilitates parental involvement in the learning process, creating a digital educational ecosystem that transcends the boundaries of the physical classroom. Gamification is utilized through interactive quizzes, games, and challenges, which increase student engagement and motivation. These activities, tailored to the linguistic needs of refugee children, enable them to learn Greek in an enjoyable manner. Additionally, continuous feedback and self-assessment opportunities within the platform enhance students' active participation and autonomy.

Through interactive vocabulary and grammar exercises tailored to students' language proficiency levels, audiovisual materials, available digital dictionaries in languages such as Farsi and Arabic, and gamification-based activities such as quizzes and games, the platform serves as a communication tool that facilitates interaction between students, educators, and parents. Furthermore, it may also function as a language learning tool for the parents of refugee students.

The initial results indicate increased student engagement, as the digital and gamified environment makes learning more attractive. There is also an improvement in linguistic development, thanks to the multimodal approach and access to personalized learning materials. Additionally, the platform enhances students' exposure to the Greek language, even outside of school settings.

This presentation showcases how the e-me platform, through the creation of specialized Hives, functions as a dynamic tool for digital and inclusive education. The integration of Connectivism and Gamification creates an engaging, interactive, and participatory learning environment, enhancing the linguistic and social inclusion of refugee children, making learning more flexible, accessible, and interactive.

Keywords: Inclusive education, Greek language learning, refugees, Reception Classes (ZEP), digital tools, e-me, Connectivism, Gamification

SEARCHING FOR THE SCHOOL FOR ALL: POLESEMY, STAGES OF REALIZATION AND MATERIAL/DIGITAL DESIGN

Charoupias Aristides
Adjunct Faculty
University of Nicosia
Athens, Greece
email: acharoupias@gmail.com

Imellou Olga
Special and Inclusive Education Advisor
A΄Athens Primary Education Directorate
Athens, Greece
email: olgimellou@sch.gr

ABSTRACT

In the Greek educational reality, the transition to the new paradigm of the school for all students often appears to be hindered by terminology issues. The central focus of these obstacles is the undifferentiated rendering of the term “inclusion”. The term “inclusion”, which is a central influential concept of the new paradigm, in the Greek literature is rendered with terms such as: /ensomatosi/, /entaxi/, /symperilipsi/, /synekpaedefsi/, etc., a condition that makes communication on relevant issues difficult and often leads to a dead end for practitioners and researchers in the field. Considering the rapid developments related to the ability to access the internet via fixed and mobile devices and the emergence and spread of Artificial Intelligence (AI) in society, work and education, the educational community shows increased interest in Information and Communication Technologies (ICT) in the school/teaching context. Taking into account: (a) the systematic ranking of our country below the international average of the countries participating in the Programme for International Student Assessment (PISA), (b) the digital divide and (c) the trend of enhancing the utilization of information, services, entertainment and social interaction offered by ICT and AI, the necessary prerequisites for the implementation of material and digital design in school for all students are examined, with emphasis on the meaning of the term "inclusion". The results of our bibliographic research are presented synthetically and critically commented. The paper concludes with a discussion and relevant proposals/recommendations. The clarification of the polysemy of the term "inclusion" is proposed to be realized through a four-level/stage approach, which holistically defines and analytically describes the school for all students, both in its material and digitally supported version. On the way to 2030, the new reality makes it urgent to prioritize the transition towards education/school for all students, by ensuring adequate guarantees/resources, so that... no student is left behind. Through the effort to design and implement the new paradigm, guarantees are being claimed for the integration into the guidelines of national curricula and teacher training programs of new educational institutions, such as the Center for Applied Special Technology (CAST) in the USA, which, with centralized design and experimental implementation, will be able to support the transition to the new paradigm with options for reasonable use of technology, formative/final evaluation of the necessary services and, necessarily, reflection towards improving the new revised paradigm.

Keywords: Special/Inclusive Education, inclusion, Information and Communication Technologies, Digital Divide, Artificial Intelligence, CAST, PISA.

TEACHING GREEK IN THE INTERCULTURAL CLASSROOM USING THE DIGITAL LANGUAGE LEARNING TOOL "AKELIUS LANGUAGES"

Stavroula Kalaitzidou
Primary school teacher
32nd Athens primary school
Athens, Greece
e-mail: sk8720@windowslive.com

ABSTRACT

The non-profit organization Akelius was founded in 2007 by Roger Akelius, a Swede businessman interested in mathematics, programming and engineering. Apart from charity, helping children in need and providing refuges with medical treatment, the foundation also deals with educational issues through the digital platform "Akelius languages", which was launched in 2018. The platform is being developed by sixty programmers in Berlin, Germany and Nicosia, Cyprus, with the cooperation of UNICEF foundation. "Akelius Languages" is an app that provides an effective method to learn foreign languages, focusing in oral and reading comprehension. With this digital tool, students between 6-18 years old are given the opportunity to learn the Greek language in a faster and more playful way, while they also gain confidence and adapt more easily to the school environment. So far, the platform is available in English, French, German, Greek, Italian, Portugese, Russian, Spanish and Swedish, while it is being used in twelve countries, Albania, Greece, Italy, Poland, Mexico, Bhutan, Bosnia and Herzegovina, Lebanon, Kazakhstan, Mauritania, Cape Verde and Sao Tome/ Principe. It contains language exercises and quiz, songs, crosswords and bingo games, grammar theory, while, as it is still in the process of developing, it is gradually being enriched with mathematics, art and history activities.

According to UNICEF data, it is already used by more than 10,500 refugee children in Greece. To date, approximately 1,600 teachers in public schools and non-formal education centers have been trained in the use of the platform. In particular, in Greek public schools it has been integrated into reception classes (ZEP) but also into general classes, in primary and secondary education, when the student population consists mainly of students with an immigrant and refugee background. The way in which the platform activities will be combined with teaching is the responsibility of the teacher, as there are no ready-made lesson plans. Lesson design is left to the flexibility and creativity of the teacher. Students enter the platform using their personal tablets and headphones, and engage in the activity assigned to them, depending on the content of the day's lesson. The hardware equipment is provided by the Akelius program and is kept in each classroom, as well as provision for internet connection and printed teaching materials. The use of the Akelius application is free, there is no subscription or advertising messages. The platform works both offline and online, but an internet connection is preferable, as students can create their own personal account and monitor their progress.

The benefits of using such a platform are multiple, as the lesson becomes interactive and personalized, as students progress at their own pace, while the teacher can give more selective attention to specific students. Regarding learning outcomes, research conducted by UNICEF in Akelius classes compared to classes with the same student population, but without the use of the platform, demonstrates that there was an 8% improvement in listening comprehension, 9% in reading ability, 25% in oral expression and 34% in written language. Qualitative research has shown that by using the platform, students gained self-confidence, motivation for learning, collaboration and consistency in their presence at school. At the same time, there are benefits for teachers as well, in an era where the use of digital media and new technologies in teaching is now required. This type of blended teaching develops teachers' digital skills, contributing to a more organized and structured lesson. I have personally joined the program and am using the Akelius platform in teaching my class during the school years 2023-2024 (1st grade of elementary school) and 2024-2025 (2nd grade) with students who are entirely foreign speakers. The school is located in the center of Athens and the student population is largely refugee/immigrant. This school, along with the Athens Intercultural Education High School, are the only schools in Greece that piloted the online program for the first time during the 2023-2024 school year.

Keywords: Akelius languages electronic platform, teaching of Greek, students with a refugee/immigrant background

INCLUSIVE EDUCATION WITH DIGITAL MEDIA FOR STUDENTS WITH ASD: A FOCUS ON THE TEACCH PROGRAM

Kravvaritis, Christoforos
Special Education Teacher (PE04.01 EAE)
Unified Special Vocational High School of Messolonghi
Messolonghi, Greece

Patropoulos, Athanasios
Special Education Teacher (PE86 EAE)
Unified Special Vocational High School of Messolonghi
Messolonghi, Greece

Domouchtsis, Nikos
Special Education Teacher (PE83 EAE)
Unified Special Vocational High School of Messolonghi
Messolonghi, Greece

Konstantinou, Georgios
Physical Education Teacher (PE11)
Principal, 1st Primary School of Thestieis
Messolonghi, Greece

ABSTRACT

This paper explores Inclusive Education for students with Autism Spectrum Disorder (ASD) through the use of digital tools, with a particular focus on the TEACCH educational program. The main objective is to investigate the challenges faced by students with ASD in the educational system and to evaluate the contribution of digital tools in enhancing their learning experience.

The methodology employed is based on a literature review and the collection of qualitative data through discussions with experts in the education of individuals with ASD. The study examines the fundamental difficulties these students face, the structure and implementation of the TEACCH program, and the role of digital technologies in teaching.

The research findings highlight that structured educational approaches, such as TEACCH, when combined with digital tools, facilitate the learning process and promote the social inclusion of students with ASD. Specifically, applying these methods in the teaching of Robotics and Natural Sciences shows that the use of visualization and clear activity structure improves students' understanding and autonomy.

The study underscores the importance of structured approaches in the education of students with ASD, as they support communication, social interaction, and behavior. Technology plays a vital role in personalized learning and social integration, with educators being key to the effective implementation of programs like TEACCH and the use of digital tools.

In Natural Sciences, students with ASD benefit from clear, visual instructions during experiments and lab activities, while in Robotics, visual diagrams support assembly and programming. The consistent use of visual tools across both subject areas enhances the learning experience and facilitates knowledge generalization.

In conclusion, the integration of the TEACCH program with the capabilities offered by digital media represents an effective approach to enhancing the educational experience of students with ASD. Technology enables personalized instruction, fosters collaboration among all stakeholders (educators, parents, specialists), and eases students' transitions between various academic domains. Moreover, it allows children with ASD to actively participate and comprehend complex concepts through a structured digital or in-person approach. The TEACCH program is further complemented and enriched within the classroom and extended into the child's daily life through initiatives such as EarlyBird and Cygnet.

Keywords: Autism Spectrum Disorder (ASD), Inclusive Education, Digital Media, TEACCH, EarlyBird, , Holistic Approach

IMPLEMENTATION OF WEBQUESTS ALIGNED WITH THE PRINCIPLES OF INCLUSIVE DIGITAL EDUCATION WITHIN THE FRAMEWORK OF THE ERASMUS+ KA210 PROJECT "MEDITERRANEAN DIET FOR OVERALL HEALTH"

Mylona Aspasia
Teacher PE88.04
1st EPAL Nafpaktou
Nafpaktos, Greece
e-mail: milonaaspasia@gmail.com

Soukou Anthi
Teacher PE88.01
2o Esperino EPAL Acharnon
Acharnes, Greece
e-mail: anthiegeop@gmail.com

Schizas Aristeidis
Teacher PE86
2o Esperino EPAL Acharnon
Acharnes, Greece
e-mail: arschizas@gmail.com

ABSTRACT

This paper aims to highlight the effectiveness of the use of WebQuests as an Inquiry-Based teaching approach aligned with the principles of Inclusive Digital Education. The exploration and implementation of this method took place within the framework of the Erasmus+ project "Mediterranean Diet for Overall Health" (MedDiet4Health), which is an approved Erasmus+ KA210 initiative involving two Vocational schools in Greece (in the field of Agriculture, Food and Environment), one General Secondary School in Slovakia and a non-governmental organization (NGO) in Turkey.

This 18-month project aimed at designing a three-modules digital course that integrates the Mediterranean Diet into daily teaching practice. The course supports the Sustainable Development Goals (SDGs), with a particular emphasis on target 4.7 and the goals 2, 12, 14, 15 and 17, contributing to the development of learners' knowledge and skills for the promotion of sustainable development and lifestyles, cultural diversity awareness and the role of culture in sustainability.

Within this context, 60 WebQuests were developed, implemented by pilot students and redesigned in alignment with the principles of Inclusive Digital Education. These WebQuests explore the Mediterranean Diet both as an element of cultural heritage and as a sustainable, healthy dietary model, encouraging commitment to its values. Additionally, 20 more WebQuests were created to support the celebration of international awareness days connected to the project themes.

The paper presents the theoretical framework, the stages of development and implementation and the assessment tools used. It also offers a reflective analysis of the teaching practices applied during the project and presents the outcomes achieved.

Keywords: WebQuests, Mediterranean Diet, Inclusive Digital Education

INCLUSIVE DIGITAL EDUCATION AND CULTURAL HERITAGE: AN INNOVATIVE APPROACH TO MUSEUM EDUCATION IN CORRECTIONAL FACILITIES

Papandritsa Artemis
Early Career Fellow in Hellenic Studies 2024–2025, CHS Harvard University
Postdoctoral Researcher in Museology
Department of Archives, Library Science and Museology
Ionian University
email: artpapandr@yahoo.gr

Papaioannou Georgios
Professor of Museology
Department of Archives, Library Science and Museology
Ionian University
email: gpapaioa@ionio.gr

ABSTRACT

Inclusive digital education constitutes a central pillar of contemporary educational practice, aiming to ensure equitable access to knowledge for all learners, regardless of social or geographical limitations (Ainscow, 2020). Within this framework, the use of digital tools for teaching vulnerable social groups -such as inmates in Correctional Facilities- is of particular significance. The research project "*Museum Tours for Inmates - the ancient Greek encounters*" (*MuTourIn*), funded by a Fellowship from the Center for Hellenic Studies at Harvard University, represents an innovative initiative that makes the most out of cultural heritage and digital technology to support the education and social inclusion of incarcerated individuals.

MuTourIn is a continuation and evolution of the successful project "*Museum Whispers in the Panopticon*," which made the most out of digital platforms to deliver digital museum tours from around the world. This new endeavor focused specifically on connecting the ancient Greek cultural heritage with the correctional education. Through the combination of digital tours and interactive discussions, MuTourIn aimed to foster cognitive development, cultural understanding, and the cultivation of 21st-century skills such as critical thinking and communication (Kidd, 2019). This initiative highlights the potential of digital cultural heritage as a tool for education and social integration, bridging the gap between incarcerated populations and the broader cultural and academic spheres, while also enhancing access to learning and promoting skills such as collaboration and intercultural awareness.

Moreover, the integration of cultural heritage into the education of inmates offers multiple benefits, as it reinforces lifelong learning and builds bridges between museums and the Second Chance Schools operating within Correctional Institutions (Watkins and Mortimore, 2022). Although existing research has emphasized the positive impact of art and education on the reintegration process, the combination of museums, classical studies, and correctional settings remains a relatively unexplored field (McGregor, 2020).

The challenges encountered during the project concerned technological infrastructure, pedagogical approaches, and the need for institutional support to ensure the sustainable development of such initiatives. Nevertheless, *MuTourIn* - through qualitative data which was derived from interviews with inmates in 7 out of the 12 Second Chance Schools operating in Greek Correctional Facilities who participated in the digital museum tours- provides valuable insights that can be utilized to design sustainable strategies combining the digital cultural heritage with social inclusion.

In conclusion, the use of digital museum tours and the pedagogical application of cultural heritage form new horizons for inclusive education. MuTourIn has demonstrated that technology can serve as a bridge across social divisions, advancing both education and social transformation through engagement with culture.

Keywords: Inclusive education, cultural heritage, digital museum tours, Correctional Facilities

TA9: The sustainable digital school

THE SUSTAINABLE DIGITAL SCHOOL: A MODEL OF EDUCATION FOR THE 21ST CENTURY

Gounari Nektaria,
EL.E.ET.P.E.A
Philologist, 1st General Lyceum of Salamina,
email: ngounari@yahoo.gr

ABSTRACT

The digitization of education and the need for sustainability constitute two critical pillars for the development of a modern educational model. This article proposes the "Sustainable Digital School" model, which integrates technology with sustainability principles to promote a holistic, inclusive and environmentally responsible education. Through theoretical analysis and the presentation of practical applications, the article explores how the incorporation of digital tools, education on climate change, and participatory learning can create a sustainable educational environment for the 21st century.

Keywords: Sustainability, digital education, sustainable school, technology in education, 21st century.

EDUCATION AND ENTERPRENEURSHIP IN THE AGE OF DIGITAL TRANSFORMATION

Dr. Cleopatra N. Vasiliou
Director of the Directorate of Primary Education of Arta
Arta, Greece
email: kleopatravasileiou@gmail.com

Nikolaos Skentos
Acting Head of the Financial Department
Directorate of Primary Education of Arta
Arta, Greece
email: nskentos@hotmail.com

ABSTRACT

Technological developments in the field of entrepreneurship are rapid as a result of the digital transformation of the economy. Modern schools are called upon to adapt their teaching and general educational strategies within the framework of the operation of the sustainable school. In addition, entrepreneurship is an essential and necessary skill for tomorrow's citizens and benefits both their personal and professional development. Entrepreneurship education plays a key role in a country's competitiveness and the sustainable development of its economy and competitiveness. Promoting entrepreneurship in education encourages and guides students to develop an entrepreneurial spirit and shape innovative solutions. The basic idea is for students to understand basic financial concepts, such as money management, which is part of financial literacy and entrepreneurship, and to acquire skills to create their own digital business. The philosophy of a learning organization, like a school, is to learn how to learn. Students are trained to work in groups, to submit ideas and suggestions based on interests and to conceive business ideas which, through collaboration and teamwork, through the design and simulation of a simple and standard business plan that will lead to the implementation of their The purpose of this research is the literature review and secondary analysis of data and literature, through the processing of existing research and statistics related to the developments in the application of entrepreneurship in education within the context of digital governance and the recording of good practices in the field. The original idea with the use of modern innovative digital tools. thematic Create and Innovate-Creative thinking and initiative, in the field of entrepreneurship, both domestically and internationally. The research text aims to highlight the challenges that arise for schools in the era of digital governance in the field of entrepreneurship and the implementation of active citizenship through strengthening actions in combination with skills workshops.

Keywords: entrepreneurship, education, creative thinking, digital environments

THE GREEN, DIGITAL NEIGHBORHOOD OF KINDERGARTEN

Tsingerlioti Anna
Kindergarten Teacher
M.Ed. in Mathematics Education, University of Western Macedonia
33rd Kindergarten of Evosmos
e-mail: atsiggerlioti@gmail.com

ABSTRACT

This paper focuses on the participation of the 33rd Kindergarten of Evosmos in the educational program "Green Neighborhoods," implemented by the Directorate of Primary Education of Western Thessaloniki through the Environmental Education Coordinator, in collaboration with NOUS, the Institute of Digital Learning and Communication. The aim of the program is to raise students' awareness of the need to preserve and protect greenery in their immediate environment and neighborhood, and to promote their engagement in actions intended to improve the environment and enhance their quality of life. The paper presents the steps followed in implementing the program, utilizing digital tools such as Google Earth to create a collaborative digital map in which students depict their ideal neighborhood in terms of green spaces. Through inquiry-based learning and participation in playful activities, students are encouraged to develop initiative, responsibility, and action regarding their school environment. By collecting evidence from field studies, children become more sensitized and make informed decisions about the broader conditions of their neighborhood.

Emphasis is placed on the opportunities that digital tools provide for enriching the learning experience and facilitating communication among students, while also highlighting the need for a critical approach to their use. Students become familiar with digital tools and media, share their ideas with other schools, and exchange real-life experiences. At the same time, the learning experience is enhanced, and children's holistic development is supported, as they are given opportunities to develop digital skills and responsible attitudes toward technology use.

The program was implemented within the framework of transforming the kindergarten into a sustainable school, adopting a holistic approach aligned with the values of sustainability in pedagogical, social, and environmental domains.The abstract should include the focus of your paper, i.e., what your paper is about, a brief description of the steps or methodology used, the main findings of the paper, and its results.

Keywords: digital map, sustainable school, kindergarten

TA10: Best practices in the pedagogical use of digital technologies.

A NEW APPROACH TO TEACHING NEW TECHNOLOGIES BASED ON FI AND FD COGNITIVE STYLES

Maria Chatzikyrkou
International Hellenic University
Thessaloniki, Greece
e-mail: maria.chatzikyrkou@gmail.com

Apostolos Tsagaris
International Hellenic University
Thessaloniki, Greece
e-mail: tsagaris@gmail.com

ABSTRACT

This proposal aims to highlight a new approach for the effective teaching of Robotics and New Technologies. To ensure a successful process, it is proposed to diagnose the learning styles of the learners and then to provide differentiated teaching that will achieve the intended inclusion and maximize learning outcomes. For this reason, the most well-known bipolar contrast regarding cognitive learning styles will be used, the one proposed by Witkin and his colleagues (1977) and distinguishes learners into two bipolar categories, namely those who learn without depending on their environment (Field-Independent Learners = FI) and those who make learning directly dependent on their environment (Field-Dependent Learners = FD).

Witkin and his colleagues' research led to the creation of a diagnostic tool, the Group Embedded Figures Test (GEFT), which measures the presence of the bipolar FI/FD characteristics in learners, and defines which of them tend towards the first and which towards the second category. Related research has shown that FI learners prefer to learn better by utilizing traditional means compared to learners belonging to the FD category. The latter are more influenced by their social environment than by their personal motivations, as well as by praise and criticism compared to FIs, who are more productive and egocentric, solve problems through intuition and utilize "true-false" testing strategies.

The different Cognitive Learning Style that each student possesses is part of the fundamental assumption that each child is unique, which means in simple words, various differences in cognitive and social development between children. Given that these characteristics affect learning, the field of Differentiated Teaching is considered one of the most appropriate educational approaches to manage all forms of diversity in the modern classroom, which aims to offer learning for each child individually, taking into account their particularities in the construction of knowledge and teaching. Therefore, Differentiated Teaching is a modern, child-centered and promising approach that includes many innovative approaches and at the same time a challenge for researchers and educators.

Teaching new technologies on the other hand is essential to prepare students for the future, develop their skills and create a digitally literate and innovative society. Living in a digital age, where technology permeates every aspect of life, students need digital skills to succeed in education, work and society and to equip themselves with the necessary knowledge and skills to meet the demands of the 21st century. After all, new technologies offer tools and platforms that encourage critical thinking, analysis and problem solving so that students learn to evaluate information, make decisions and create innovative solutions. Finally, teaching new technologies helps students develop digital literacy, that is, the ability to use technology responsibly, safely and ethically and to protect their privacy, recognize misinformation and avoid the dangers of the internet. In summary, this proposal analyzes the components of two learning styles, those who learn dependently on their environment and those who learn independently. Then, the method of planning activities based on differentiated teaching is explained so that the learning process is effective.

Keywords: Field-Independent Learners, Field-Dependent Learners, Cognitive Learning Style

THE USE OF THE INTERNET IN LANGUAGE EDUCATION IN THE 3RD GRADE OF THE GREEK SENIOR HIGH SCHOOL (LYCEUM)

Gkaravelas Konstantinos
Assistant Professor, Department of Philosophy,
University of Ioannina
Ioannina, Greece
e-mail: kgkaravelas@uoi.gr

Christou Theophano
Postdoctoral Researcher, Linguistics Division, Department of Philology,
University of Ioannina
Ioannina, Greece
e-mail: t.christou@uoi.gr

ABSTRACT

This paper presents a teaching proposal developed in the context of language education for third grade students in the Greek senior high school (Lyceum) on the topic of gender-based violence, considering the requirements of the new curriculum for language education in the Greek senior high school (Lyceum). The project is based on the use of Information and Communication Technologies (ICT) in language education and is implemented through a WebQuest structured according to the model proposed by Dodge (1995). The purpose of WebQuest is to familiarize students with authentic language material and to work collaboratively and creatively on a topic that is familiar to them and sparks their interest. The first section provides a theoretical introduction to the use of the Internet in language teaching, followed by a brief explanation of the term "WebQuests" and a presentation of the six phases of this teaching proposal.

Keywords: Language Education, Internet, Critical Literacy, WebQuests

ARCHITECTURAL DESIGN AND DEVELOPMENT OF BRAILLE TRANSCRIPTION AND LEARNING SOFTWARE

Angelis Alexandros
PhD candidate University of Ioannina
Department of Informatics & Telecommunications, University of Ioannina
Arta, Greece
email: a.angelis@uoi.gr

Angeli Kalliopi
Master's Program in Data Science, Statistics and Decision Analysis
Stockholm University
Stockholm, Sweden
email: kalligeli01@gmail.com

ABSTRACT

This paper deals with the architectural design and development of a Braille code transcription and learning software, with the aim of enhancing accessibility for people with visual impairments. The software supports the transcription of Greek and English texts into Braille and at the same time offers an easy-to-use learning environment for the code. The methodology is based on the Flat Architecture, which includes: (a) the User Layer, where the user enters the text, (b) the Business Logic Layer, where the language recognition and transcription algorithms are implemented, (c) the Data Layer, using character mapping tables. The main findings of the paper are the development of an accurate and efficient transcription tool, the user-friendliness of the interface, as well as the possibility of future scalability. The final product contributes substantially to the educational and social integration of people with visual impairments, offering a modern tool for everyday use.

The learning and transcription algorithms include character validity checking, language recognition, special symbol management, and accurate Braille mapping. The interface is designed based on accessibility and universal design principles for seamless use by people with visual impairments.

The evaluation of the system demonstrated high transcription accuracy, fast response and positive feedback from users and educators, while future extensions are proposed such as support for mathematical Braille, integration of voice output and interfacing with Braille display devices.

The work significantly contributes to the promotion of educational equity and social inclusion through innovative accessibility technologies.

Keywords: Software Architecture, Braille Code, Accessibility, Text Transcription, Computer-Assisted Learning, Flat Architecture.

"INTERNATIONAL JOINT CLASSES": A CASE STUDY ON THE INTEGRATION OF DIGITAL TECHNOLOGIES IN AN INTERNATIONAL SCHOOL COLLABORATION

Antoniou Aikaterini
Educator in Nursing and Agricultural Sciences, School Principal
Day Junior High School of Neochori, Directorate of Secondary Education of Arta, Greece
e-mail: katerinaaaant@gmail.com

Griva Eleftheria
Philologist in Special Education and School Life Counselor
Day Junior High School of Neochori, Directorate of Secondary Education of Arta, Greece
e-mail: elgriva@yahoo.gr

ABSTRACT

In this paper, we present a best practice for the use of digital technologies, as implemented within the framework of the program entitled "International Joint Classes," organized by the Metropolitan Office of Education of the Republic of Korea. The program utilized communication and distance learning technologies with the aim of fostering a deeper understanding of cultural diversity and enhancing communication skills. This international, inter-school, and collaborative project involved three schools—namely, the Day Junior High and Senior High School of Neochori in Arta, Greece, and Yang Chung Middle School in Seoul, South Korea—and was an initiative of the Greek school. The program was conducted from May to December 2024. The selected topic was "World War II and its Impact on the Two Nations." The project included both synchronous online meetings and asynchronous remote teaching sessions using the materials produced by the students.

The first part of this paper highlights the significance of modern digital tools in education and teaching. The rapid development of digital and technological media has brought about substantial changes in the learning process, creating new opportunities and challenges for the educational community. Therefore, it is deemed essential to leverage and evaluate these tools in contemporary educational settings by examining their potential and contribution to enhancing teaching practices. In the second part, we present our school's contributions and the digital tools employed in the aforementioned program. These tools facilitated the creation of a dynamic online learning community that promoted collaboration and interaction through the exchange of information, historical sources, and viewpoints regarding the events of World War II. It is noteworthy that all project work was conducted in English. The main digital tools used to support interactivity and a multimodal approach to learning included:

- Padlet – A user-friendly, interactive platform for collaborative learning. It functions as a virtual bulletin board where content and multimedia (documents, images, videos, audio, etc.) can be posted and accessed at any time. It was selected as the common platform for posting group assignments by students from all three schools.
- Veed – A simple video editing tool. This was chosen by one student group to convert a PowerPoint presentation into a video, introducing team members and their local area.
- Canva – A versatile design platform that enables the creation of a wide range of interactive multimedia content, including infographics, posters, presentations, worksheets, and comics. This tool was chosen by one group to design a poster on the 1943 Kommeno Massacre in Arta.
- Prezi – A multimedia presentation software. This intuitive application requires no prior design or programming experience. One student group used it to create an engaging presentation on key dates and significant events of World War II in Greece. Another group, addressing the same topic, created a historical timeline using the Preceden tool.
- Vocaroo – A very simple audio recording tool that generates mp3 files. This was selected by students to record key terms related to World War II.

The third part presents the conclusions and evaluation of this experience, which highlighted the positive contribution of digital tools in enhancing critical thinking, collaboration, and the understanding of historical events from diverse cultural perspectives.

Keywords: international program, World War II, digital tools.

DECIDING BASED ON DATA: AN INNOVATIVE INSTRUCTIONAL SCENARIO USING THE PROJECT METHOD IN A SECOND CHANCE SCHOOL

Apostolou Georgios
Mathematician (PE03)
International Hellenic University
Ioannina, Greece
e-mail: apgeorge2004@yahoo.com

Panagiotou Alexandra
English Language and Literature Teacher (PE06)
Secondary Education
Arta, Greece
e-mail: apanagiotou10@hotmail.com

Mari Maria
Computer Science Teacher (PE86)
Secondary Education
Filippiada, Greece
e-mail: mari.maria2@yahoo.gr

ABSTRACT

Second Chance Schools (SCS) constitute a significant educational institution aimed at adult learners, offering them a renewed opportunity to complete basic education and develop the knowledge and skills necessary for effective integration into the labor market and society. Within this context, an instructional scenario was designed and implemented using the project-based learning (PBL) method. The aim was to foster understanding of the importance of data and its role in informed decision-making.

Learners engaged with a contemporary and practical issue: how to make informed decisions based on data rather than subjective assumptions or misleading information. In an era where information is abundant yet often unreliable, the ability to analyze and interpret data is critical. Participants were trained to utilize tools such as online statistical resources, brainstorming, ChatGPT, SWOT analysis, descriptive statistics, Pareto diagrams, control charts, and Excel to process and evaluate information from various sources. The learning process began with an exploration of the importance of data and the scientific approach to truth-seeking and decision-making. Building on prior instruction in mathematics, computer literacy, and social sciences, learners acquired basic statistical skills and applied analytical practices to everyday situations. They then selected topics of personal or professional interest, collected and organized data, and used the available tools to analyze it. Through this process, they learned to distinguish reliable from unreliable sources, identify patterns and trends, and draw conclusions based on objective evidence.

Participation in the project significantly enhanced learners' self-confidence, as they witnessed firsthand the utility of data analysis and methodical thinking in decision-making. Furthermore, through collaboration and discussion, they developed skills in teamwork, reasoning, and reflective thinking. This pedagogical approach transcended the classroom, equipping learners with the competencies needed to become more active and informed citizens. The results of the implementation demonstrated strong engagement, as learners recognized the value of evidence-based thinking in both professional and personal contexts. This project can serve as a model for instructional practice that promotes critical thinking and scientific reasoning in decision-making, offering a meaningful learning experience tailored to the needs of adult learners.

Keywords: Second Chance Schools, Decision-Making, Instructional Scenario, Project Learning Method, Data.

THE FOREST …MY LIFE: EXPERIENTIAL LEARNING WITH DIGITAL TOOLS

Grammatikopoulou Sofia
Preschool Teacher, Head Teacher
2nd Preschool of Triadi
Thessaloniki, Greece
e-mail: sophiagram@hotmail.com

Mallidou Malessa Evangelia
Preschool Teacher
6th Preschool of Thermi
Thessaloniki, Greece
e-mail: lia2ms@gmail.com

ABSTRACT

A school-project related to the forest was implemented in the school year 2024-25. Digital tools of new technologies were included both in the didactic planning and throughout the implementation. The aim was for children to discover knowledge and become interested in the forest as an ecosystem and as sensory enjoyment of nature through experiential activities, to strengthen their environmental awareness and active citizenship. Interactive and digital media were used, highlighting the dynamic relationship between digital pedagogical and educational technologies. The methodology followed was based on a child-centred, research -based approach, combining exploration and collaborative learning.

Keywords: forest, active citizen, digital technologies

INTEGRATING ARTIFICIAL INTELLIGENCE IN EDUCATION: TEACHING TELEWORKING AND REMOTE COMMUNICATION IN A΄ CLASS OF LYCEUM

Evangelia Dimoula
ICT Professor, PE86
2nd Model Gymnasium of Athens
Athens, Greece
e-mail: edimoula@gmail.com

Aikaterini Riga
Director, ICT Professor, PE86
26th Experimental Lyceum of Athens - Maraslion
Athens, Greece
e-mail: katsouf12@gmail.com

ABSTRACT

The present study explores the systematic integration of Artificial Intelligence (AI) in the teaching of A΄ Lyceum, focusing on the teaching approach of topics related to teleworking and distance communication. The purpose of the paper is to demonstrate how AI tools can support the acquisition of basic skills from remote collaboration while enhancing students' autonomy and creativity. The research intervention was based on a modern educational project-based learning scenario, integrating applications such as ChatGPT, automatic presentation creation systems and collaborative project organization platforms. The methodological approach, the pedagogical framework and the tools used are presented, with emphasis on the practical application of teleworking in a school environment. The results highlight the importance of AI as a tool to differentiate teaching, support metacognitive skills, and enhance student collaboration and participation. AI has also helped personalize teaching, improve communication skills, and promote professional readiness. The paper proposes prospects for the future use of AI for the teaching of complex skills, emphasizing the importance of developing pedagogical frameworks and ethical guidelines for its sustainable integration into educational practice.

Keywords: Artificial Intelligence, Teleworking, Collaborative Learning, Digital Tools, Educational Innovation

THE (INSTEAD OF A BLACKBOARD) ELECTRONIC COMPUTER, A KEY, FOR THE IMPLEMENTATION OF THE (IN-CLASS) COURSE, BY THE STUDENTS THEIR OWN

Kappe Stamatia
cont. Educational PE08, OEP.ETY*
Larissa, Greece
email: stamatiakappe12@gmail.com

Dimoulas Konstantinos
honorary 1st School Counselor
Philologists and scientific pedagogical guidance of each specialty, OEP.ETY*
Larissa, Greece
email: dimoulask@yahoo.gr

Dimoulas Euripides
Electrical engineer and computer engineer PE18, OEP.ETY*
Larissa, Greece
email: euripides5@hotmail.com

Velliou Elli
ad. Educational PE18, OEP.ETY*
Larissa, Greece
email: ellivelliou14@gmail.com

Papadimitriou Theodora
editor Educational PE03, OEP.ETY*
Larissa, Greece
email: dorapapadim@gmail.com

Koutsavlaki Angeliki
editor Educational PE02, OEP.ETY*
Larissa, Greece
email: akoutsavlaki@yahoo.com

Ververas Nikolaos
unaddressed Educational PE02, OEP.ETY*
Larissa, Greece
email: lyrikos@gmail.com

*** OEP.ETY:** Organization of Education on Psychobioanalysis «ἐκ τῶν ὑστέρων»

ABSTRACT

The transformation of the frontal system (in which the desks are one behind the other, opposite the teacher's chair) into a lesson with children in subgroups does not give the classroom the (without competition, between the children, due to the tightening of interpersonal relationships, within the subgroup, to deal with other subgroups) student-centeredness that we seek, as the subgroups operate, anyway, competitively, towards each other. The purpose of the practice was the student-centeredness of the class as a whole, with the desks in a circle and (due to the abolition of the chair) with the teacher (from being the ruler of the class, from his chair, which he was), now, simply, the coordinator of the lesson, which will be conducted (due to the mitigation of the tightening of the children's relationships, which was intensifying, to deal with the children of the other subgroups, which will no longer exist) non-competitively, but competitively, among themselves, by the children themselves. The practice (completely his personal initiator) was applied in school units, of secondary, mainly, formal and informal, education, from 1979 (the year of his appointment as a teacher) to 2013 (the year of his retirement). Its (as a completely personal, personal practice) methodology is based on the transformation of the frontal, towards the teacher, desk placement into a circular one, abolishing the teacher's seat, making the parallel, individual, one-way, from and to the teacher, actions of the students of the frontal system group action, in which, now, they will be able, de facto, to have, everyone the same opportunity to be co-creators of the common work of the class. Initially, a sociogram is designed, obviously, for the relations of the children, in the department, by the children or even the teacher, for any use, by the children and the teacher, and a discussion follows, for the statute of the class's operation, its drafting and signing. The meeting for conducting the children's lesson is held as follows. From the previous day, the children are informed about the lesson of the day, in order to process it. After a very short, informal introduction by the teacher, the class, in effect, becomes, in a circle, an immense laboratory. Each child, having a complete picture of the actions of the others, can be a regulator of the result. The lesson is a single (not as parts of examination and delivery) discussion platform. The teacher does not have a permanent seat, but moves around, where necessary, for the best coordination of the lesson. In the circular placement of the desks, the blackboard has also been abolished. During the period of implementation of the practice, it had been replaced with cardboards, to demonstrate to others what was written on it. Now, however, the last problem that the practice faced is being overcome, with its replacement by so many computer screens, for each child. Each child will be able to write or draw or form or whatever, on their computer, and all the other children will see this, who will also be able to participate, in what this child did, interactively, for any, common, result. The product produced is captured in (shared, competitive, evolving) "books", by the children, for each lesson, for all interests, as "Free Optional Work, for home". Since the children are, as co-creators, the creators of the lesson, they are also the ones who evaluate it. The evaluation forms are collected at the end of each week, month, quarter, four-month, semester, year, to extract the average score, by the department, for each child, with the teacher having, with the sociogram as an advisor, any (if any) possibility of modifying (the average of the self-intersecting, this, evaluation) intervention. The

positive results are reflected in the scientific development of the children, which (positive comments from third parties, deposited, in the "Archive of Student Creation" of the Organization) was (also) due to this practice. However, due to the fatigue, which it entails, for the teacher, although very positively accepted, it did not, unfortunately, have an impact.

Keywords: teacherless lesson, self-regulation of the classroom, self-study, circular seating, conference lesson, cross-assessment

MISINTERPRETATION OF MESSAGE, DUE TO CERN, DUE TO CATARACTIVE PROJECTION OF IMAGES, ON THE COMPUTER SCREEN

Ververas Nikolaos
unaddressed Educational PE02, OEP.ETY*
Larissa, Greece
email: lyrikos@gmail.com

Dimoulas Konstantinos
honorary 1st School Counselor
Philologists and scientific pedagogical guidance of each specialty, OEP.ETY*
Larissa, Greece
email: dimoulask@yahoo.gr

Dimoulas Euripides
Electrical engineer and computer engineer PE18, OEP.ETY*
Larissa, Greece
email: euripides5@hotmail.com

Velliou Elli
ad. Educational PE18, OEP.ETY*
Larissa, Greece
email: ellivelliou14@gmail.com

Papadimitriou Theodora
editor Educational PE03, OEP.ETY*
Larissa, Greece
email: dorapapadim@gmail.com

Koutsavlaki Angeliki
editor Educational PE02, OEP.ETY*
Larissa, Greece
email: akoutsavlaki@yahoo.com

Kappe Stamatia
cont. Educational PE08, OEP.ETY*
Larissa, Greece
email: stamatiakappe12@gmail.com

*** OEP.ETY:** Organization of Education on Psychobioanalysis «ἐκ τῶν ὑστέρων»

ABSTRACT

The image contains a multitude of information, which is perceived as a whole, the complexity of the relationships of the parts of which makes it difficult, with its complexity, in fact, to interpret it. This difficulty is greater, in the case of the need to give, in a hurry, an answer to it. This work aimed to study the ability to recognize emotional facial expressions, in their sudden projection, on the computer screen, in the context of a lesson, which the teacher should be aware of. In the research that we present in this work, (61 men and 104 women =) 165 subjects, who live in Greece, 25-55 years old, of average educational level, participated. The Ekman and Friesen series of 65 slides of faces with one (from the whole or part of the face) or more emotions (F.A.S.T., 1971) was used. The subjects had to, in a first projection, identify one (definitely, and only one) of the seven universally recognized emotions (happiness, sadness, fear, anger, surprise, disgust, contempt) and, in a second phase, with the same projection order, assign a (definitely, and only one) score, from 0 (absence of emotion) to 8 (intense presence of emotion), to each of these emotions, on prefabricated answer sheets, both times. The projection time of each slide was, progressively, 10΄΄-5΄΄ and 25΄΄-10΄΄ and the intermediate time, for noting the answers, was 5΄΄ and 10΄΄, respectively, for these phases. The data were entered into seven, as many as the emotions, aggregated tables, for each gender. From these, for each slide, the percentage of emotional meaning preferences and the average intensity attributed to them by all subjects were obtained. Then, based on the slides that accounted for 20% or more of the acceptance of the subjects of the two groups (men - women), for their specific emotional meaning, a dictionary of emotional meaning was constructed, which was attributed by each group, for each group. In this, the comparable cases, intragroup and intergroup, are shown. The statistical analysis ($\chi 2$, for intensity, and t test, for frequency) concerns the control of: a) the intensity, based on the rating, attributed, by the subjects, to each emotion, b) the frequency of recognition of emotions, and, in comparison with international standards, c) the intensity of emotions that were truly recognized, d) the frequency of emotions that were truly recognized. The results show the following: The ability to recognize emotions is, in general, good, to a comparable degree, within and between groups, deteriorating, despite the progressive ease of true recognition, which comes from practice, as the projection time decreases and the available time for this recognition decreases. People, in general, do not see very different emotions, in the face, even when it comes to different genders. Without the stress of the fast process, we make the most recognitions and true recognitions of emotions, while, with it, the score we give to the emotions we recognize is usually higher than the score we give without it. The difference, with women excelling in the recognition and true recognition of emotions, from men, without this stress, with it, seems to be essentially non-existent. In the case of the fast process, with the stress that creeps in, in the single-meaning expressions, we do better than in the multi-meaning ones, as, of course, in the slower process, without this stress. In general, the ability to recognize emotions is better without the stress of the fast process, and especially in women. With the stress of studying,

to absorb, organize and interpret, within the minimum available time, a large volume of information, our brain becomes confused, which makes it difficult for us to recognize the message being transmitted to us, resulting in, how much more so, if we are dealing with moving images, not static ones, wrong assessments.

Keywords: information fatigue, brain fog, accurate message recognition

INNOVATIVE TEACHING APPROACHES: ENHANCING INDEPENDENT LEARNING THROUGH ARTIFICIAL INTELLIGENCE AND MUSIC

Zoi, Sofia
Electronics Teacher
1st Vocational High School of Ioannina
Ioannina, Greece
email: sofzoi7@sch.gr

ABSTRACT

The experience of teaching fundamental concepts of electrotechnology to high school students has highlighted the significant difficulties faced in understanding electricity related problems. Many students exhibit gaps in prerequisite knowledge, they are unfamiliar with the methodology of Physics and struggle to develop independent learning skills through textbook study. Additionally, phone use for social media, music and games distracts them from the learning process. These observations underline the need for an alternative teaching approach that combines digital technology and the students' interests within the learning process.

Taking above factors into account, a teaching scenario was developed and implemented, leveraging modern artificial intelligence and music tools. The primary objective of this scenario is to encourage students to engage with their textbooks, familiarize themselves with the laws and theories of their study of interest in order to establish a foundation for independent comprehension without the need for auxiliary methods. This approach does not focus solely on understanding physical phenomena but primarily on developing autonomy in studying and the students' ability to seek out and interpret textbook information.

The teaching methodology is based on Lev Vygotsky's theory, which emphasizes the importance of social interaction in learning. The implementation involves the use of the SUNO application, supplemented by the Audacity and Openshot software.

The teacher (or a group of teachers) creates a music piece incorporating lyrics related to science concepts and contemporary sounds without requiring musical knowledge. Students listen to the song and watch the accompanying video. Then, they identify corresponding information in their textbooks and link it to the scientific terminology. Additionally, they complete conceptual charts, which serve as knowledge organization tools. This process evolves into students creating their own music pieces. They are divided into groups and after they study the theoretical terms of a new chapter, they compose their own lyrics and song. This activity aims to primarily strengthen students' ability to comprehend scientific concepts independently as presented in the school textbook and secondarily enhance creativity and collaboration.

This scenario was applied in teaching the units "Basic concepts of direct current" initially, followed by "Electromagnetism" to sophomore students. Findings from the implementation suggest that artificial intelligence and music can serve as learning motivators increasing student engagement and enhancing memory recall of scientific concepts.

This study highlights the importance of utilizing innovative tools in science education and proposes further exploration of similar approaches in the future. It's a dynamic scenario, that with minimal adjustments, can be easily applied on other subjects. Additionally, for younger students, it offers flexibility for an intersectional approach involving subjects such as Literature, Technology, Informatics and Music. The integration of multimedia technologies and creative activities can be an effective strategy to enhance students' learning experience and autonomy in the educational process.

Keywords: innovative teaching approaches, artificial intelligence, music, educational tools, independent learning, learning experience.

ART AND DIGITAL MEDIA IN EDUCATION: A CASE STUDY AT THE EVENING VOCATIONAL HIGH SCHOOL OF PREVEZA

Thanasara Evangelia
Economics–Tourism, PE80 & Italian Philology, PE34
1st Vocational High School of Karpathos
Karpathos, Greece
e-mail: gonzalitsa@gmail.com

Gaki Vasiliki
Chemist, PE04.02 & Computer Science PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

ABSTRACT

This case study was conducted within the framework of the Research Project course of the first grade curriculum at the Evening Vocational High School of Preveza and addresses the use of art combined with digital media in the educational learning process. Students' engagement with art began with an introduction to world-famous painters through digital presentations and videos. Then, students recreated characteristic works of these artists as murals on a classroom's blank walls, which were previously undecorated. The reproduction of the artworks on the walls utilized a projection screen, computer, and digital applications for image editing. The activity mainly involved adult students, who constitute the majority of the school's population.

The aesthetic experience is particularly interesting, as it represents an innovative educational method that can contribute to Transformative Learning and has been applied not only in adult education but across all educational levels in recent years.

Observing a work of art during an educational process stimulates impulses and activates the learners' critical thinking. For this reason, the purpose of this action was to evaluate the implementation of learning through art, the aesthetic transformation of a school classroom with artworks, and the familiarization with basic digital tools. Aiming to highlight an alternative teaching method for adult students at the Evening Vocational High School, the study investigated students' attitudes during the activity and the contribution of art to their active participation, enhancement of critical thinking, and the potential redefinition of stereotypical views and assumptions.

The goal was to explore the extent to which learners utilize all their senses, use their imagination, draw on existing knowledge and experiences, and develop the ability to think critically during the educational intervention through the use of artworks combined with basic digital media.

Thirteen students aged between 18 and 61 participated, and observation was chosen as the methodological tool, providing an opportunity to collect data emerging from real situations through learners' statements, gaining more personal information.

The educational intervention contributed both to learners' familiarization with art and digital media. Additionally, it fostered collaboration and exchange of personal experiences. Participants managed to process their prior perceptions, think critically about them, and in some cases revise them, developing reflective dialogue. The involvement of emotions and the liberation of thought and expression led to a change in attitude towards this novel learning experience, initially met with reservation but gradually with pleasure and enthusiasm. The positive impressions gained and new knowledge acquired motivated further engagement with art, which contributes to the ability to perceive things from different perspectives and the possible redefinition of assumptions.

Keywords: Adult Education, Transformative Learning, Art, Digital Media, Critical Thinking.

DIGITAL TOOLS FOR EFFECTIVE TEACHING PRACTICE

Eirini Karaviti
Music Instructor, Principal of the Junior and Senior High School of Chalandritsa, Achaia,
Patras, Greece
email: renakaraviti@gmail.com

Nektaria Koutsopoulou
English Language Instructor, Principal of the Junior and Senior High School of Fares,
Patras, Greece
email: riaki1981@yahoo.gr

ABSTRACT

The subject of this thesis is the presentation of five innovative web 2.0 tools that have the following characteristics: they are very easy to use and do not require special digital skills, they are completely free of charge or they have a free version with a wide range of possibilities for the user and arouse interest, which makes them suitable for integration into the learning process. As teachers who love their profession and who constantly aim to improve the quality of their teaching and enrich it with new media and modern teaching methods, we are looking for easy-to-use tools to create quizzes, exercises, presentations, new textual genres and general teaching material for our classroom. Therefore, we attend various seminars and trainings related to educational issues. Among them, we highlight the eTwinning seminars, where modern tools are presented, among other things, to be used in various ways in the learning process.

We have used several of them in our lessons and some of them we have distinguished particularly for their characteristics but also for their multifaceted pedagogical use in the learning process. These are EDpuzzle, Book Creator, Quizziz, Wordwall and Artsteps. In our work we deal separately with each of the tools and explain with examples and pictures how easy they are to use and how they can find effective application in the learning process. We emphasize their basic characteristics and comment on how they are used pedagogically.

Keywords: quizzes, multimedia digital enrichment.

THE ADVANTAGES OF ELECTRONIC BOOKS IN HISTORY TEACHING: A CASE STUDY FOR THE 3RD GRADE OF SECONDARY SCHOOL

Lefka Vasiliki
Secondary education teacher
Secondary school of Bizani
Ioannina, Greece
email: vlefka@sch.gr

Tsiouri Efthimia
Secondary education teacher
Secondary school of Perama
Ioannina, Greece
email: mtsiouri@sch.gr

ABSTRACT

In modern educational environments, the integration of digital media and tools into teaching practice is emerging as a crucial factor for enhancing the learning experience and promoting active learning. Especially in history teaching, electronic books (e-books) constitute a modern and dynamic form of digital media that can be effectively used to offer multiple benefits. These benefits include the enrichment of teaching material with multimedia elements such as interactivity, the enhancement of student-centered learning, the promotion of differentiated teaching, and the development of digital skills in students. This paper proposes, as a good practice for using digital media in the educational process, the creation and use of an original e-book for the combined teaching of various history units of history in the 3rd grade of secondary school. In particular, it presents the case of an e-book created with the Book Creator platform, designed specifically to serve as a tool for teaching the most significant historical milestones in the formation of the Greek state's borders, within the 3rd -grade history curriculum. By leveraging various multimedia elements such as maps, images, videos, voice narration, and interactive and collaborative activities, the e-book aims to make history learning more engaging and effective for students. Its ease of use, diverse interactive content creation capabilities, and flexibility in adapting to the needs of both the lesson and the student contribute to a better understanding of historical narratives, a development of historical thinking, and a critical approach to historical sources by students, as well as fostering student self-initiative and digital literacy. The conclusions from the pilot implementation of the e-book in the classroom, the students' impressions, their responsiveness, and their interaction with the book provide significant information about its overall contribution to the learning process, the understanding of the past, and the conquer of historical knowledge.

Keywords: e-book, history teaching, digital media, Book Creator, student-centered learning, multimedia elements

EXPLORING THE WORLD WITH GEOGRAPHIC INFORMATION SYSTEMS (GIS): GEOGRAPHY IN PRACTICE

Bagkou Evangelia
Teacher, Geoinformatics & Surveying Engineer – MSc. in Environment,
3rd Experimental Primary School of Evosmos
e-mail: li.mpagkou@gmail.com

Vasiloudi Angeliki
Teacher, Postgraduate Student
3rd Experimental Primary School of Evosmos, A.U.Th.
e-mail: vasiloudia@gmail.com

ABSTRACT

Education, and geography, in particular, require innovative programs and original ideas. The New Curriculum for Geography in Primary Education (2021) introduces Geographic Information Systems (GIS) into teaching practice. However, it does not provide specific guidelines for teachers on how to achieve this goal. To bring Geography into practice, we have integrated GIS into the curriculum allowing students to explore the world using these systems.

This innovative initiative will be carried out with 22 sixth-grade students at the 3rd Experimental Primary School of Evosmos, from February to June 2025. The program takes place during school hours and is integrated into the activities of the second and third school trimesters. It is carried out in collaboration between the class teacher and the ICT teacher specializing in GIS.

This study aims to present examples of activities of this innovative approach to teaching Geography. Specifically, the objectives of the program include: (a) Promoting students' spatial awareness through the use of Geographic Information Systems (GIS), (b) Developing data analysis and problem-solving skills, (c) Promoting collaboration and teamwork through the study of geographical topics; and, d) Connecting Geography to everyday life and modern societal needs.

Through these activities (data collection, creation of linear – point – polygon files, export of final maps), students engage in basic mapping functions, analyze geographic data, and create interactive maps on which they visualize the information they collect.

Expected learning outcomes include:

1. The development of skills that include the use of technology and geographic data
2. Critical thinking through information analysis and synthesis
3. Spatial awareness and understanding of the natural and man-made environment.
4. Developing basic skills in digital design programs.

Topics covered in this course include: a) The natural characteristics of Greece (mountains, rivers, seas), b) Human activities and population distribution, and c) Environmental issues (e.g. green spaces, pollution). Students will work in teams with assigned roles and apply data collection, analysis, and visualization methods.

To accomplish the goals of the program, students will use ArcGIS Online software, Geography textbooks, online maps, geographic databases, and photographic material collected by the students. ArcGIS Online software was chosen because it was considered by educators to be the most reliable design program and can be used for free for a certain period.

This initiative has not been previously implemented at our school. However, it is based on internationally recognized practices for teaching geography using modern technological tools such as Geographic Information Systems (GIS). The program is an initiative that introduces students to the use of innovative methods, adapted to the needs of the educational community for the development of skills.

Keywords: Geographic Information Systems (GIS), Interactive maps, innovative actions, ArcGIS, Geography Teaching, Elementary School

THE USE OF PODCASTS IN LITERATURE COURSES – A QUALITATIVE APPROACH

Botsari Lamprini
Filologist, PE02
Zosimaia model high school of Ioannina
Ioannina, Greece
e-mail: lmpotsari@gmail.com

Azeli Erasmia
Filologist, PE02
Zosimaia model high school of Ioannina
Ioannina, Greece
e-mail: erasmiazeli@gmail.com

ABSTRACT

This research paper examines the use of podcasts as a modern educational tool in the teaching of literature courses. The aim of the study is to investigate the pedagogical value of podcasts, to understand how they shape the learning experience of students, as well as to evaluate their effectiveness in improving understanding and critical approach to literature, language and history. The methodology of this specific research is based on qualitative methods, including semi-structured interviews with philologists and secondary school students, as well as content analysis of selected educational podcasts. Particular emphasis is placed on evaluating interactivity, narrative approach and the degree of student engagement in the learning process through the audio experience. At the same time, factors that influence the acceptance of podcasts as a learning medium are explored, such as thematic content, quality of production, linguistic adaptation and relevance to school curricula. The findings of the research reveal that the use of podcasts in teaching can offer multiple benefits. Specifically, it enhances learning flexibility, allowing students to acquire knowledge at any time and from any environment. In addition, the narrative format and the use of audio create a more vivid and enriched learning experience, which can increase students' attention, concentration and engagement. However, challenges are also recorded, such as the absence of visual stimuli, which are critical for some teaching units, as well as the need for carefully selected and quality-controlled content. In conclusion, the research highlights the potential of podcasts as a complementary teaching tool for literature courses, highlighting the need for their integration into organized educational strategies. The creation of specialized educational content, adapted to the needs of students, is proposed, as well as the training of teachers in their effective use. With appropriate pedagogical guidance, podcasts can contribute substantially to the cultivation of critical thinking, creativity and active participation of students in the learning process

Keywords: podcasts, literature education, philology, multimodal learning, qualitative research, student engagement

BEST PRACTICES FOR INTEGRATING DIGITAL TECHNOLOGIES IN TEACHING: A HOLISTIC APPROACH

Anastasia Paliatsou
Greek Philology Teacher, M.Ed.
Principal of 1st General Lyceum of Filippiada
Directorate of Secondary Education of Preveza
Preveza, Greece
email: natassapal@gmail.com

Costas Assimakopoulos
Professor
Department of Organization Management, Marketing and Tourism
International Hellenic University
Thessaloniki, Greece
email: casim@ihu.gr

ABSTRACT

The present study focuses on best practices for integrating digital technologies into teaching through a holistic approach. Its aim is to present contemporary pedagogical strategies that leverage digital tools, highlight their advantages and inherent challenges, and propose specific applications in both the Greek and international contexts. Through the literature review, the exploration of innovative practices and the analysis of relevant policies and recommendations, the study aspires to provide a comprehensive resource for educators, researchers and educational institutions.

The methodological approach relied on an extensive review of recent research and case studies, aiming to identify current trends and innovative pedagogical practices using digital tools in education. The analysis was thematically organized, examining the implementation of technologies in blended and hybrid learning, the pedagogical potential of multimedia and interactive tools, the utilization of Virtual Learning Environments (VLEs) in teaching, as well as assessment and feedback practices through Learning Management Systems (LMS) and the role of Artificial Intelligence (AI) in enhancing personalization and optimizing the learning process.

The findings indicate that the purposeful, targeted and pedagogically informed use of digital technologies can significantly enhance active engagement, collaboration and self-regulation among learners, while also improving teaching quality and enabling real-time personalized assessment and feedback. In conclusion, it is argued that the systematic integration of digital tools within a holistic strategy framework fosters flexible, adaptive and effective learning environments.

Keywords: Digital learning tools, innovative pedagogical practices, VLEs, Artificial Intelligence, personalized learning, digital assessment systems.

"UTILIZATION OF SOIL MOISTURE SENSORS IN EDUCATIONAL PRACTICE THROUGH DIGITAL MEDIA"

Karachristos Christoforos
Secondary Education Teacher
2nd High School of Aitoliko
email: karachristos.x@gmail.com

Diamantopoulos Marios
Secondary Education Teacher
Unified Special Vocational High School of Koropi
email: diamantmarios@gmail.com

Pantermali Maria
Secondary Education Teacher
Unified Special Vocational High School of Messolonghi
email: mpantermali@gmail.com

Patropoulos Athanasios
Headteacher, Secondary Education Teacher
Unified Special Vocational High School of Messolonghi
email: apatrop@gmail.com

ABSTRACT

The integration of digital tools into modern educational practices is a critical factor in enhancing teaching and developing STEM skills among students. Although there is no specific definition in the European Union, STEM generally refers to the fields of science, technology, engineering, and mathematics, which are considered vital for innovation, economic growth, and prosperity. STEM education emphasizes critical thinking, problem-solving, and creativity, combining theory with practical application.

In this context, this study presents the use of soil moisture sensors in combination with technological tools to enhance the learning process in the "Plant Production" course for the second grade of the Unified Special Vocational High School (E.N.E.E.GY.-L.) in Mesolongi. The program was implemented by students under the guidance of their teachers within the framework of the course's laboratory instruction.

This approach enables the collection, analysis, and visualization of real-time soil moisture data. Students actively participate in placing sensors in the school garden, recording moisture data through digital platforms and software such as Arduino and Raspberry Pi, and comparing measurements with traditional irrigation practices. In this way, they develop foundational knowledge in agronomy, informatics, and mathematics, while strengthening critical thinking and problem-solving skills.

Furthermore, this interdisciplinary approach facilitates the connection between theoretical knowledge and practical application, making learning more experiential and tailored to students' needs. Additionally, the use of data fosters environmental awareness and an understanding of the importance of rational management of natural resources, such as water in irrigation.

The study outlines the stages of designing and implementing the program, as well as the pedagogical benefits derived from using soil moisture sensors in educational practice. It also analyzes the technical and instructional tools used, the challenges encountered, and the prospects for further development of the method within the context of special education.

The results of the implementation demonstrate that integrating soil moisture sensors and digital tools into the teaching process enhances experiential learning, develops STEM and digital literacy skills, and improves collaboration between students and teachers. Consequently, it is proposed that this methodology be extended to other educational levels to create innovative learning environments that leverage technology for the benefit of education and sustainable development.

Keywords: Soil moisture sensors, digital tools in education, interdisciplinary learning, STEM strategies

eTwinning: BUILDING A STRONG COMMUNITY OF INNOVATIVE TEACHERS

Paraskevas Michael
Professor of the University of Peloponnese, Vice President of CTI "Diophantus",
Head of National Support Organization for eTwinning
Patras, Greece
email: mparask@cti.gr

ABSTRACT

eTwinning has been designated a flagship action by the European Commission with the objective of fostering educational innovation, promoting collaborative learning, developing digital skills and encouraging intercultural understanding. Since 2005, Greece has cultivated a dynamic community of teachers, schools and pedagogical students who have implemented thousands of collaborative projects, many of which have received high distinctions. The eTwinning National Support Organization cultivates competences related to ICT, AI and modern teaching methodologies through a variety of means, including its Open Online Courses, STEM activities, the Initial Teacher Education initiative and other actions. The network of ambassadors and institutional partners facilitate the dissemination of good practices and participation in international competitions, while publications and digital repositories support the dissemination of knowledge. The Greek experience corroborates the function of eTwinning as a catalyst for the transformation of educational culture and the establishment of robust learning communities at both the national and European levels.

Keywords: eTwinning, Teacher training, Professional development, MOOCs, STEM education, AI in education

THE USE OF DIGITAL TOOLS IN THE ASSEEEMENT OF THE HUMAN RIGHTS CLIMATE IN THE SCHOOL ENVIROMENT

Roussa Maria
Nursing, PE87.02
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: roussaki2@gmail.com

Giannouli Sofia
Philologist, PE02
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

Chasanis Vasileios
Electrical Engineer, PE83 & Computer Scientist, PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: vasileioschasanis@gmail.com

Ntentes Ilias
Economist, PE80 & Electronic, PE84
1st High School of Preveza
Preveza, Greece
e-mail: iliasde@hotmail.com

Gaki Vasiliki
Chemist, PE04.02 & Computer Science PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

Thanasara Evangelia
Economics–Tourism, PE80 & Italian Philology, PE34
1st Vocational High School of Karpathos
Karpathos, Greece
e-mail: gonzalitsa@gmail.com

ABSTRACT

This study focuses on assessing the "temperature" of Human Rights within the educational community, aiming to evaluate the climate in relation to human rights and the implementation of the principles outlined in the Universal Declaration of Human Rights. The objective is to highlight the importance of equality, safety, and the protection of students' rights. The methodology used involves a Google Forms questionnaire based on 25 critical statements directly related to human rights, such as safety, equal access to education, participation in democratic processes, and freedom of expression. The questions evaluate the application of these rights in everyday school life, using a scale from 1 to 4 to provide a quantitative estimate of the state of human rights. The questionnaire was distributed via participants' emails and school websites, ensuring broad accessibility.

A total of 235 students from four schools participated in the evaluation: the 1st General High School of Preveza, the Evening Vocational High School of Preveza, the 1st Vocational High School of Karpathos, and the 1st Vocational High School of Heraklion, Crete. The goal was to conduct a comprehensive review of the perceptions and experiences within the school community. Excel was used to process the responses, extract statistical conclusions, and create charts to visualize the results. The evaluation process aimed to document the prevailing climate and analyze areas that may require improvement. Particular emphasis was placed on identifying areas of discrimination based on gender, race, physical and intellectual ability, as well as on issues related to student and school community participation in decision-making processes. A significant goal was to ensure equal access to education for all members of the community and to combat inequality and discrimination.

The assessment of the Human Rights "Temperature" was combined with the use of modern digital tools, which enhanced participation and collaboration among students, teachers, and others. The digital tools used included computers, tablets, mobile phones, projectors, and the internet. Online meetings were organized via Zoom to discuss the results and exchange views. Challenges related to the use of digital media in the educational process were also acknowledged. The study highlighted the need for measures to protect personal data and privacy within the educational community. The findings suggest that the "Temperature" of Human Rights can be improved through continued education and the implementation of strategies that promote equality and acceptance of diversity. At the same time, the integration of digital tools into the educational process not only increased student participation but also strengthened communication and transparency within the community. Google Docs was used to draft a digital report of the research findings, ensuring immediate access for all participants from the four schools. PowerPoint was also used to create an interactive presentation of the report's key points.In conclusion, the study demonstrates the need for a comprehensive approach that combines the evaluation of human rights with the application of strategies and digital tools. It emphasizes the importance of ongoing efforts to promote social justice, solidarity, and respect for human rights within the educational community.

Keywords: Human rights, educational community, digital media.

PRESENTATION OF BEST PRACTICES IN THE USE OF DIGITAL TECHNOLOGIES IN TEACHING PRACTICE AND IMPLEMENTATION OF DIFFERENTIATED TEACHING AND ASSESSMENT ACTIVITIES WITH DIGITAL TOOLS, ACCORDING TO THE NEW 2023 CURRICULUM FOR THE FRENCH LANGUAGE

Sita Ntounta Evangelia
Teacher of French Language (PE05)
Directorate of Secondary Education of Ioannina, M.Ed. HOU
Arta, Greece
e-mail: evangelia.sita@gmail.com

Aggeli Dimitra
Postgraduate Student in "Policy, Administration and Evaluation in Education"
Department of Primary Education (NKUA)
Teacher of French Language (PE05), Directorate of Primary Education of Ionian Islands, M.Ed. HOU
Arta, Greece
e-mail: dimoulaaggeli71@gmail.com

ABSTRACT

"Presentation of Best Practices in the Use of Digital Technologies in Teaching Practice and Implementation of Differentiated Teaching and Assessment Activities with Digital Tools, According to the New 2023 Curriculum for the French Language"

The integration and utilization of digital technologies in foreign language education play a leading role in the implementation of the New Curriculum's objectives in a constantly evolving digital world that is rapidly moving into the era of the enormous impact of artificial intelligence tools. Their pedagogically oriented use in teaching, based on lesson planning and expected learning outcomes, enriches its content with rich authentic and up-to-date material. The learning process becomes more attractive and playful for students, who actively participate with experiential activities in digital environments, thus developing digital literacy skills as well as a range of other soft and social skills, gradually transforming the classroom into a community of creative learning.

The purpose of this presentation is to highlight the possibilities that digital tools offer for the differentiation of teaching and assessment, as well as to present specific practices and examples of their application in educational practice. Furthermore, it seeks to examine the challenges and prospects associated with the integration of new technologies in instructional design according to the New Curricula.

More specifically, our presentation will highlight that digital tools support the provision of personalized learning experiences that meet the needs and interests of each student, create flexible learning environments that allow students to learn in their own way and pace, and develop digital skills in students and teachers.

Additionally, it will highlight that the e-portfolio, as a dynamic repository of learning artifacts, emerges as a significant tool in learning assessment. By incorporating principles of authentic assessment, the e-portfolio allows for the holistic representation of the learning journey, focusing on the development of metacognitive skills and the enhancement of self-regulation. Through the collection of various artifacts, the e-portfolio promotes introspection and critical analysis, facilitating formative assessment and providing continuous feedback for improving learning.

Finally, our proposals are addressed to educators, researchers, educational policy makers, and other stakeholders, suggesting actions to promote differentiated teaching and assessment using digital tools, contributing to the development and implementation of innovative teaching practices that meet the needs of 21st-century students.

Keywords: digital tools, differentiated teaching, e-portfolio, new curricula

THE USE OF ARTIFICIAL INTELLIGENCE (AI) INTERFACES AS A TOOL TO ENHANCE EXPERIENTIAL LEARNING IN KINDERGARTEN

Tallou Konstantina
Educational Advisor PE60
Ioannina Secondary Educational Service Area Office
Ioannina, Greece
email: ktallou@sch.gr

Kasioumi Danai
Nursery Teacher
Dodecanese Islands
Rhodes, Greece
email: Danai.kass@gmail.com

Kasioumi Myrto
Economist ΠΕ86
QSMSRC, Budapest University of Technology and Economics,
Budapest, Hungary
email: kasioumi.myrto@gtk.bme.hu

ABSTRACT

The teaching scenario presented was designed in accordance with the Thematic Areas and Expected Learning Outcomes of the new Preschool Curriculum, focusing on the stages of plant development (Physical Sciences), while also involving the Thematic Areas of Social Sciences and Information and Communication Technologies (ICT). The objective of the scenario is to utilize Artificial Intelligence (AI) interfaces as a tool to enhance experiential learning through interactive and collaborative activities.

The 5e didactic learning model (Engage, Explore, Explain, Elaborate, Evaluate) proposed by the new Curriculum for Preschool Education follows and is structured as follows: the learning and process begins with the introduction of an interactive voice AI through which a virtual bee appears in the classroom and asks for help from the students to learn how the plant grows. In this way, the children's interest and curiosity about the subject is activated (Engage). Then, the toddlers are divided into groups, they search for information about the growth of plants using educational digital material, while the role of the teacher is coordinating and guiding, as through targeted questions he encourages the children to formulate their initial knowledge and to better understand it by enriching it (Explore). The Interpretation phase follows, where the bee asks for further clarifications and the children, using AI tools, collaborate again in small groups and present to the plenary the result of their work and what they have learned, thus strengthening their linguistic development and promoting their critical thinking (Explain). For the Elaborate activity, digital assessment games (e.g. Wordwall, Quizizz, LearningApps) are used both for assessment and for the repetition of concepts in a playful way to capture the children's knowledge in a natural and enjoyable way. In this way, toddlers develop creative thinking and digital expression skills. The last stage, that of Assessment, is completed with self-assessment and peer-assessment activities, to cultivate metacognitive skills in students and their ability to reflect on their learning process.

In conclusion, this specific teaching scenario highlights the potential of Artificial Intelligence in preschool education, proposing a multidimensional, interactive and collaborative approach to learning. The use of innovative technologies not only enhances the learning process but also shapes the school of the future, in which digital innovation coexists with pedagogical creativity.

Keywords: Artificial Intelligence Interfaces, 5e teaching model, digital learning, early childhood education and AI.

THE USE OF DIGITAL TECHNOLOGIES IN CHEMISTRY TEACHING: A STUDY OF ELECTRICAL CONDUCTIVITY OF SOLUTIONS THROUGH PhET COLORADO INTERACTIVE SIMULATION

Tzanaki Nikoletta
Secondary Education Teacher, Chemist MSc
3rd Gymnasium of Preveza, Directorate of Secondary Education of Preveza
Preveza, Greece
e-mail: letzan@gmail.com

ABSTRACT

The integration of digital technologies into Chemistry teaching promotes active student engagement and a deeper understanding of scientific concepts. This study presents an instructional proposal for exploring the electrical conductivity of aqueous solutions, combining real experimentation with the interactive PhET Colorado simulation "Sugar and Salt Solutions". The teaching approach is grounded in Inquiry-Based Learning (IBL) and was implemented with 8th-grade students over two class sessions. In the first phase, students worked in groups to formulate hypotheses and conduct experiments with aqueous solutions of salt (NaCl) and sugar ($C_{12}H_{22}O_{11}$), recording and analyzing their results. In the second phase, they used the simulation to observe the dissociation of NaCl into ions, thereby understanding the relationship between chemical structure and conductivity.

The presented teaching intervention significantly departs from traditional instructional approaches by promoting inquiry-based learning and engaging students as active participants in the educational process. Students worked within a dialogic learning environment, developing critical thinking skills and a solid understanding of fundamental Chemistry concepts, such as conductivity and the nature of chemical compounds. The success of the intervention—structured around the 5E model (Engage, Explore, Explain, Elaborate, Evaluate)—was evident in the students' worksheets, which demonstrated high rates of correct responses and effective use of scientific terminology, indicating conceptual understanding and the ability to apply knowledge in new contexts.

At the same time, the use of both real and virtual experiments contributed to a multimodal teaching approach, making abstract concepts more accessible. The combination of these methods enhanced student participation and autonomy, especially among those who typically struggle. Students engaged actively in the learning process, developing skills in interpretation, prediction, and collaboration, and demonstrated the ability to transfer and extend their knowledge. The intervention highlights that the use of inquiry-based learning and digital tools, such as PhET simulations, can transform Chemistry instruction into a dynamic, experiential, and meaningful learning experience.

Keywords: electrical conductivity, PhET Colorado simulation, Inquiry-Based Learning (IBL), 5E model, multimodal learning.

INTERDISCIPLINARY APPROACH IN ENVIRONMENTAL EDUCATION: ENVIRONMENTAL ENGINEERING, CREATIVE WRITING, ARTIFICIAL INTELLIGENCE, AND DIGITAL MEDIA.

Toki Christina,
High school teacher, mechanical engineer, MSc, PhD
1st Technical High School of Artas

Peklari Vasiliki,
High school literature teacher, MSc
1st Technical High School of Artas

Stavros Mpardakas,
High school, electrical engineer, MSc
1st Technical High School of Artas

ABSTRACT

The interdisciplinary approach constitutes a fundamental pillar of modern educational practice, as it leverages knowledge and skills from different fields, creating a holistic learning experience. This presentation is a characteristic example of this approach, as it combines environmental engineering, creative writing, artificial intelligence, and digital media into a unified environmental educational activity.

The activity took place in a Vocational Upper Secondary School (EPAL) and focused on marine pollution, a significant environmental issue, aiming to raise students' awareness through a process of scientific understanding and creative expression. Specifically, in the first stage, students were informed about the causes and effects of marine pollution, acquiring scientific knowledge that formed the basis for the creation of their poems. Subsequently, they utilized creative writing techniques, such as selecting topic-related words, using images as stimuli for writing, and associative writing, to transform scientific information into poems. In the third stage, artificial intelligence was used to create images that reflected the content of the poems. Finally, the poems and images were compiled into an interactive digital book, which was the result of a collective effort. This collaboration highlighted the importance of interdisciplinarity, as each field complemented and enriched the other, creating a comprehensive educational experience.

The activity showcased the potential of digital tools in modern education, offering students the opportunity to express themselves creatively, develop digital skills, understand the topic through problem visualization, and enhance their environmental sensitivity. At the same time, it emphasized the importance of interdisciplinary collaboration, which allows students to address complex issues from multiple perspectives, strengthening their critical thinking. The presentation highlights the pedagogical benefits of this approach, the challenges encountered during its implementation, and future prospects for further utilization of technology in the educational process.

Keywords: Interdisciplinary approach, environmental education, creative writing, digital media.

PEDAGOGICAL USE OF DIGITAL AND TECHNOLOGICAL MEDIA IN THE TEACHING OF ENGLISH: A THEORETICAL AND PRACTICAL APPROACH

Tsiplakidis Iakovos, Special Teaching Staff, Department of Fine Arts and Art Sciences, School of Fine Arts, University of Ioannina, Greece, Associate Educational Staff of the Hellenic Open University
e-mail: itsiplak [at] uoi.gr

ABSTRACT

This paper focuses on an innovative educational design through the utilization of digital and technological tools in the teaching of English as a foreign language, which offer the potential to enhance the quality of the teaching and learning process. In this context, it proposes the pedagogical use of digital media, authentic sources, videos sourced from the internet, and Web 2.0 collaborative tools for the implementation of WebQuests. This design is proposed based on personal experience as well as research findings showing that the integration of digital and technological tools in teaching provides multiple benefits and that their effective utilisation is achievable and realistic, rather than merely theoretical.

The pedagogical use of digital media, collaborative tools and the internet for the implementation of WebQuests increases student motivation and fosters active engagement in the teaching and learning process. This is because WebQuests are grounded on topics and research areas that align with the students' interests and draw on their experiences in pedagogically sound ways. Furthermore, WebQuests encourage student initiative, support autonomous learning and a cross-curricular approach, addressing the problem of lack of engagement and indifference, since they constitute a student-centered approach. Additional benefits include the potential they provide for collaboration, the development of critical and creative thinking and inquiry-based learning, given that WebQuests encourage critical collection, analysis and processing of information and data, involving more than rote learning and quoting information. Another beneficial outcome is that they naturally integrate all language skills into teaching, that is, reading, writing, listening and reading within an authentic communicative context.

This paper focuses on the practical application of the basic principles of educational theory. We first present a brief review of the literature and research conducted in relation to the pedagogical utilisation of WebQuests, the use of online resources and videos from the internet in the context of teaching English as a foreign language. Drawing on the relevant literature, we then propose a WebQuest designed for students at the B1 proficiency level in English. The paper outlines the basic design, the implementation stages and the anticipated benefits, particularly those related to fostering collaborative learning, encouraging critical and creative thinking, utilizing authentic material and developing all language skills. Additionally, we provide guidance in relation to the effective implementation of the WebQuest, ensuring that the digital and technological tools are used meaningfully and innovatively to enhance student motivation and support language acquisition. English teachers can adapt the suggested activities and expand the scope of the proposed WebQuest, the use of digital and technological media and collaborative tools in order to suit the specific needs of their students and the broader context in which their teaching takes place.

Keywords: digital and technological tools, WebQuests, internet, English language

"GUYS, LET'S GO TO THE CHURCH!" A GOOD PRACTICE IN THE RELIGIOUS STUDIES LESSON USING MULTIMEDIA MATERIAL

Fakazis Ioannis
Educational Theologist,
5th General High School of Corfu
Corfu, Greece
e-mail: ifakazis@sch.gr

ABSTRACT

This article refers to a Religious Studies lesson that took place at Deskio High School of Parga during the 2022-2023 school year and was attended by 3rd grade students. More specifically, the thematic unit we dealt with concerned the chapter "Worship and Art in East and West", and particularly the part of the architecture and painting of the Orthodox Christian church, so we considered it appropriate to utilize relevant software. Some of the goals we set were: to recognize which style a Christian church belongs to, to know basic information about the church's iconography and its symbolism, to learn about the worship life that takes place in the Orthodox church etc. The material we used was Flora Tzanakaki's book "Let's Go to Church!", which contains a CD with software and activities.

The software includes in the main menu the basic sections: "Contents", which include 18 subsections with the main points of the presentation, so that someone can individually select the specific part they want to watch; the "Opening presentation", where the user can watch all the sections as a single presentation from the software avatar; the "360 degrees", where the possibility of a 360-degree virtual tour of the center of the temple is given; the "Activities", which contain digital activities that correspond to some of the sections presented by the avatar in the software.

The classroom lesson took place in three phases. Initially, students were briefed, given basic information about the topic and the software that would be used. The software was then shown on a video projector, with a virtual tour by an avatar in an ecclesiastical temple in Athens, providing basic information about the architecture and worship life in the Christian temple. We then proceeded to resolve digital activities existing in the software in question, related to the screening that took place earlier. Some of the activities we were engaged in had to do with: the rhythms of the temples, the orientation of the temple, the parts of the temple, the icons of the iconostasis and the illustration of the temple. In these exercises, four images are usually given, e.g. with the basic church styles (basilica, basilica with dome, cruciform with dome, catacomb), and four boxes with the names of each style. The user should drag each image with the cursor to the correct box.

The next phase was a visit to a local Orthodox church and church museum with a guided tour by the priest of the church. The students observed the church exhibits, parts of the church and the hagiographies, and they had the opportunity to ask questions and clarifications from the priest and their theologian. In the third phase, a worksheet was given where students, working in groups, answered questions about the lesson and the teaching visit that took place in the previous days.

Regarding the goals we set, we consider that they were achieved to a satisfactory degree, while the students' learning motivation also increased. We have generally utilized and continue to utilize new technologies both before and after the school year that we mention in our article (e.g. use of interactive whiteboards, use of PowerPoint, videos from YouTube etc.). In conclusion, we considered that the use of multimedia material constitutes an alternative teaching approach to the Religious Studies course in High School, which goes hand in hand with the general development of digital media in society and in education, and which can greatly contribute to the better assimilation of the teaching material by students.

Keywords: Orthodox Christian church, software, virtual tour, display, activities, visit.

TA11: Dynamic learning environments and digital educational tools

THE ESEP PLATFORM (EUROPEAN SCHOOL EDUCATION PLATFORM) AS A MEANS OF DEVELOPING DIGITAL SKILLS FOR EDUCATORS & STUDENTS – ETWINNING & ERASMUS+

Zantraveli Varvara
English Teacher - Principal - MED - eTwinning NSO Member
4th Gymnasio Prevezas
Preveza, Greece
e-mail: barbarazadraveli@yahoo.gr

ABSTRACT

The present study will focus on how the recently unified platform, ESEP (European School Education Platform), can serve as a means for promoting, developing, and cultivating the digital skills of members of the educational community.

The European School Education Platform (ESEP) is the meeting point for the educational community across Europe, including school staff, students, researchers, and policymakers. The platform also hosts eTwinning, the online community for schools in Europe. The benefits for educators are numerous. It aims at their professional development by providing access to a variety of continuous professional development courses, both online and in person, allowing teachers to enhance their skills and stay informed about the latest educational practices. It offers networking opportunities through the eTwinning community, where educators can connect, collaborate, and share ideas with colleagues from all over Europe, fostering a culture of shared learning and innovation. Lastly, it contributes to resource sharing, as it provides a rich repository of teaching materials and resources, enabling educators to access and contribute content that supports effective teaching strategies.

Similarly, the platform fosters collaborative learning among students. Through their participation in eTwinning projects, ESEP allows students to engage in joint projects with peers from different countries, promoting cultural exchange and teamwork. Additionally, it enhances digital literacy by involving students in activities that help them develop essential digital skills through the use of various online tools and platforms for learning and collaboration. Students can also obtain certificates recognizing their participation and achievements, boosting their motivation and enriching their educational profiles.

The ESEP platform has a significant impact on the educational community, strengthening the connections and collaboration between educators and students at the European level. By participating in programs such as eTwinning, teachers gain access to innovative teaching practices, while students familiarize themselves with modern technological tools, simultaneously developing communication and teamwork skills. Moreover, the platform facilitates the exchange of educational materials and best practices, supporting the continuous professional development of educators and promoting lifelong learning. Through these capabilities, ESEP plays a crucial role in shaping a unified and dynamic European educational space, where knowledge and innovation are shared and utilized for the benefit of all community members.

Despite its advantages, the use of the ESEP platform also comes with challenges. One of the main issues users face is the need to become familiar with the platform's environment, as time and training are required for its full utilization. Additionally, unequal access to technology and digital skills may pose a barrier for some educators and students, limiting their participation in available activities. Language differences can also create challenges, as communication and collaboration among users from different countries require sufficient language proficiency. Despite these difficulties, the continuous development and adaptation of the platform, along with the support provided to users, can help address these challenges, ensuring that ESEP remains a valuable resource for the European educational community.

This study will emphasize on the cultivation of digital skills, particularly through the description of specific projects in which teachers and students from the 4th Junior High School of Preveza participate during the implementation of eTwinning and Erasmus+ projects.

Keywords: ESEP, digital skills, educators, students, eTwinning, Erasmus+

DRAGGING AS A DYNAMIC MODELING OF THE TRADITIONAL, STATIC EUCLIDEAN ENVIRONMENT IN DYNAMIC GEOMETRY ENVIRONMENTS

Mastrogiannis Alexios
Quality Supervisor of Education
Primary Education of Aitoloakarnania
Missolonghi, Greece
e-mail: alexmastr@yahoo.gr

Fragkopoulos Georgios
Primary School Principal
Primary Education of Aitoloakarnania
Agrinio, Greece
e-mail: gfraggy@sch.gr

ABSTRACT

Traditional, static approaches offer techniques for mastering geometric concepts which can, of course, function as “scaffolds” and tools for the acquisition of knowledge. In the digital realm inhabited by today’s digital-native students, however, it becomes rather necessary to introduce and integrate technological, mediating tools as teaching media. Learning activities are designed and carried out more easily with the deployment of technology. Indeed, the learning of Geometry enjoys “preferential treatment” from Technology, since with the help of digital tools students model geometric topics and, within richly interactive learning environments, study a multitude of geometric forms.

The dynamic modeling of the traditional, static Euclidean environment through dragging (drag mode) is the most significant hallmark of Dynamic Geometry Environments. Dragging introduces motion, modification, and transformation into static Euclidean Geometry while preserving the fundamental relations and properties of figures, and it appears to be a powerful core of rich teaching and learning possibilities. The exploratory affordances of dragging constitute important cognitive supports and a strong pedagogical tool for fostering geometric reasoning, especially in the formation of hypotheses and conjectures. Constructing a figure on the screen represents an entire class of geometric objects, since, for example, when creating a circle, dragging yields infinitely many circles with a simple movement of the mouse.

This paper will present, in detail and with examples, seven different types of dragging, which students undergo during the process of solving open-ended problems and in relation to the use of the mouse: Wandering dragging, test dragging, dummy locus dragging, line dragging, as well as bound, guided and linked dragging are the critical forms of dragging, through which various representations of shapes are presented with a "cinematic" visualization.

Keywords: Dragging, Geometry, Dynamic Environments, Systems

MAPPING CULTURE AND ENVIRONMENT: A DIGITAL EDUCATIONAL ODYSSEY

Laskari Lemonia
Teacher, PE04.02, MSc
1st Model High School "Manolis Andronikos", Thessaloniki
e-mail: lemilaskari@yahoo.gr

Tsioupli Evgenia
Teacher, PE02, PhD
1st Model High School "Manolis Andronikos", Thessaloniki
e-mail: evtsioupli@gmail.com

ABSTRACT

This paper presents an innovative educational project that integrates digital tools to promote multiliteracies and experiential learning. Focusing on the cultural and environmental connections between Thessaloniki and Constantinople, the project centers around the Sustainable Development Goals 14 (Life Below Water), 15 (Life on Land), and 17 (Partnerships for the Goals). Using ArcGIS software, students created an interactive map that traces a land-and-sea route highlighting key cultural, historical, and ecological sites. Through this process, they developed digital literacy, environmental awareness, and cultural sensitivity. The program enhanced students' critical thinking and collaborative skills while fostering active citizenship and interdisciplinary understanding. ArcGIS enabled the combination of geospatial data processing with creative expression, supporting an integrated approach to education. Ultimately, the project demonstrates how the synergy of technology, culture, and environmental education can foster sustainability and cooperation. The student-created digital map serves as both a learning artifact and a public invitation to explore the shared heritage and future of these two historic cities.

Keywords: digital media, multiliteracies, ArcGIS, interactive map, critical thinking.

REINTERPRETATION OF VAN HIELE LEVELS OF GEOMETRIC THINKING UNDER THE ADVOCACY OF THE ADVANTAGES OF DYNAMIC GEOMETRY ENVIRONMENTS

Mastrogiannis Alexios
Quality Supervisor of Education
Primary Education of Aitoloakarnania
Missolonghi, Greece
e-mail: alexmastr@yahoo.gr

Fragkopoulos Georgios
Primary School Principal
Primary Education of Aitoloakarnania
Agrinio, Greece
e-mail: gfraggy@sch.gr

ABSTRACT

School Geometry, when presented axiomatically, assumes that students think in a formally deductive way. Another theory, however, concerning the learning of Geometry is the van Hiele theory, which today has a major influence on school Geometry, since despite the vast amount of research on geometric thinking, no proposal has attracted as much attention as the theory of the van Hiele levels of geometric thought. Indeed, the added value of the van Hiele model has been acknowledged in the description, study, and highlighting of geometric thinking. The van Hiele model consists of two main aspects. The first is a hierarchical sequence of five levels of reasoning processes and geometric thought. The second focuses on the development of students' intuition and emphasizes the learning phases, that is, the means employed by a teacher in order to increase the performance of their students through these different levels of thinking.

Research has shown that Dynamic Geometry Software supports students in the study of geometric concepts within motivating frameworks that activate and make use of the van Hiele theory. Activities based on the van Hiele levels of thought become easier and more effective with the presence of various technological tools, especially through Dynamic Geometry Software. This paper, after describing the van Hiele theory, goes on to argue in favor of Dynamic Geometry Software as advantageous tools of non-static visualization, capable of promoting students' thinking. Furthermore, it proposes—also through examples—a reformulation and reinterpretation of the five levels of van Hiele thinking, in the light of Dynamic Geometry Environments.

Keywords: Geometry, Dynamic Environments, Systems, van Hiele

TA12: The Internet of Things and education.

THE INTERNET OF THINGS IN EDUCATION: TECHNOLOGICAL APPLICATIONS, PEDAGOGICAL PERSPECTIVES AND ADOPTION CHALLENGES

Giourgas Angelos
University of Ioannina, Department of Informatics and Telecommunications
Postgraduate Student
Preveza, Greece
e-mail: pint00162@uoi.gr

ABSTRACT

This paper investigates the theoretical and technological foundations of the Internet of Things (IoT), as well as the challenges and prospects of its integration into the educational process.

Drawing on current research studies, theoretical frameworks, and empirical data, it examines the architecture and operation of IoT systems in education, and their convergence with emerging technologies such as Artificial Intelligence (AI), Cloud Computing, and Machine Learning (ML).

The study presents key IoT applications in educational settings, including smart classrooms, interactive whiteboards, wearable devices for tracking physiological and learning metrics, and automated platforms for learning analytics. It further discusses how IoT can enhance personalized learning, optimize resource management, and broaden access to educational tools.

A critical evaluation of the benefits and limitations of IoT in education is provided, with particular attention to issues such as data privacy and security, infrastructure costs, and the need for specialized technological training for educators.

Finally, the paper explores future developments in IoT adoption within the educational community, positioning it within a wider technological landscape. The transformative potential of IoT—especially when integrated with Augmented Reality (AR), Virtual Reality (VR), and blockchain—promises the emergence of more intelligent, adaptive, and secure educational environments. The systematic implementation of IoT requires the development of strategic policies, robust ethical and legal frameworks, and the establishment of sustainable technological infrastructures.

Keywords: Internet of things (IoT), smart education, artificial intelligent (AI), machine learning (ML), augmented and virtual reality (AR/VR), Blockchain.

TA13: The use of Artificial Intelligence in education

TEACHING THE AGE OF THE EARTH USING CHATGPT

Kouzas Dimitrios
Science Teacher (04.05 Geologist, 86 Computer Science)
MSc, PhD Candidate TEAPI - NKUA
3rd Gymnasium of Preveza, Greece
e-mail: dkoyzas@yahoo.gr

Athanasiou Kyriakos
Emeritus Professor
Biology teaching and Health Education
TEAPI – NKUA, Athens
e-mail: kathanas@ecd.uoa.g r

ABSTRACT

The rapid advancement of artificial intelligence (AI) and its integration into education create new opportunities for teaching natural sciences, offering dynamic tools that enhance the learning process. This study explores the use of ChatGPT as a support tool for teaching the age of the Earth in secondary education. Specifically, it presents a teaching scenario that combines active inquiry, collaborative learning, and critical thinking, enabling students to interact with ChatGPT for searching, processing, and evaluating scientific information.

The methodology is based on a blended learning model, which combines traditional teaching with technology. In this approach, students formulate questions, analyze responses, and compare ChatGPT's information with established scientific sources. Additionally, the study investigates the challenges associated with AI use in education, such as the need for digital literacy, information reliability, and the role of teachers as mediators in the learning process. The proposed teaching scenario consists of three parts: 1. Introductory teaching, where fundamental concepts about the age of the Earth and scientific dating methods are presented. 2. Interaction with ChatGPT, where students organized into groups, pose questions, search for answers, and evaluate the information received. 3. Evaluation and feedback to compare learning progress and explore students' experience of using the tool.

The quantitative analysis of the research is based on the following data collection tools: Pre-test and post-test, measuring students' cognitive development before and after using ChatGPT. Likert-scale questionnaires to capture students' experience and their perception of the reliability and usefulness of such tools. Statistical data analysis, extracting conclusions about the effectiveness of integrating ChatGPT into teaching practices.

It was concluded that the use of ChatGPT enhanced learning engagement, encouraged an enquiry approach and the development of students' critical thinking. Through statistical analysis of the data, it was concluded that it improved the cognitive level and the degree of understanding of the concepts. However, it highlights the need for appropriate pedagogical guidance and educational policy to ensure the proper use of such AI tools in the educational process.

Keywords: Artificial Intelligence, Education 4.0, ChatGPT, Age of the Earth

ARTIFICIAL INTELLIGENCE AND HYBRID TEACHING TOWARDS REVOLUTIONIZING TERTIARY EDUCATION

Peter J. Stavroulakis
Department of Maritime Studies, University of Piraeus
Piraeus, Greece
e-mail: pjstav@gmail.com

Periklis Prousaloglou
Senec.AI
Athens, Greece
e-mail: pprousaloglou@gmail.com

Maria-Christina Kyriakopoulou-Roussou
Freelance Researcher
Athens, Greece
e-mail: maritina.roussou@yahoo.gr

ABSTRACT

The COVID-19 pandemic provided (amongst its tragedy) a springboard of electronic existence for many aspects and functions of society. All possible constituents of operations, amidst lockdowns and social distancing, shifted their operations online. As such, education had to follow as well, with a high range of applicability and effectiveness, ranging from many best practices surfacing, but also many discrepancies, such as new ways to cheat, and laptops being logged into, yet unattended. The post-pandemic reality has left the world trying to mitigate and heal from many outcomes of the coronavirus, but at the same time, and especially with reference to the education sector, relinquishing a plethora of instruments that can be utilized in teaching, thus unravelling a novel range of possibilities, and opportunities, for education.

Many universities in the world where participation in class is not mandatory, are registering record-low numbers of attendance, to the point of creating two distinct segments of students and designating them as active and inactive. Simultaneously, the experience gathered from electronic means of learning can provide a readily available solution towards inclusiveness and boosting of participation, as well as continuity in teaching. Thereby the education sector has the potential to utilize tools for streaming lectures, recording them, and sharing them on privately and/or publicly accessible video/streaming platforms, yet the question surfaces as to how the issues arising may be mitigated, such as how personal data can be safeguarded, and at the same time attendance in class maximized, as distance and hybrid teaching technologies can be perceived as drawing students away from the classroom, thereby burdening the already problematic situation of low attendance.

In the plight for the utilization of technology in education, a plethora of instruments may be used, but at the same time the educational value that is carved in class must be upheld. This situation emerges as a dilemma since on the one hand technology may facilitate the streamlined delivery of the curriculum, enabling the attainment of the respective learning outcomes, yet it may be seen as a segue towards degradation of the class culture and interaction, thus maybe leading to an eventual drop in attendance. Herein lies the research gap and contribution of the present work. After the pandemic a reasonable question surfaces, as to the instruments that can be still usable to promote distance learning, hybrid classes, and the branding of education, that many educational institutions have been taking advantage of many years, even before the pandemic. Here, notable examples refer to, e.g., MIT OpenCourseWare (with 5.63 million subscribers and 7.5 thousand videos, where entire courses have been bundled in video lists and can be accessed free of charge), Harvard, Brown University, and many others, that are using technology as a means of promoting knowledge and their brand, while crucially, boosting attendance in class as well.

Insight as to the technologies that may revolutionize teaching hopefully will allow for higher engagement, but at the same time care must be given so that technology is not abused. With the help of artificial intelligence, this paper provides a framework of the most effective strategies that can boost attendance in the classroom in tandem with the use of distance learning, hybrid teaching, presenting, and collaborating, to create a toolkit for the utilization of technology in education that will abide by specific legislation governing synchronous and asynchronous learning, safeguard personal data, and at the same time boost in-class attendance. This research is important as it provides much needed focus and analysis for a topic requiring enrichment within its body of knowledge. The research focuses on tertiary education, but its results can be replicated in all arrays of teaching.

Keywords: tertiary education, hybrid teaching, education participation, e-learning, class attendance, inclusion in education.

FOSTERING PROBLEM-SOLVING IN STEM: A HANDS-ON AI-DRIVEN GAS DETECTOR PROJECT

Nikolaos G. Alexis
Educator, Researcher
Ministry of Education, Religious Affairs and Sports,
Andrea Papandreou 37, Marousi 15122, Greece
School of Chemical Engineering, National Technical University of Athens,
Zografou Campus, Athens, 15772, Greece

Evangelia A. Pavlatou
Professor NTUA
School of Chemical Engineering, National Technical University of Athens,
Zografou Campus, Athens, 15772, Greece

ABSTRACT

This study explores the effectiveness of Problem-Based Learning (PBL) and Maker Education in enhancing problem-solving skills among secondary school students through the development of an AI-driven Gas Detector. By integrating Artificial Intelligence (AI) with hands-on STEM learning, this research provides practical insights into innovative educational approaches that encourage critical thinking and technical competency.

A mixed-methods approach was employed, involving 32 secondary students from Electrical, Electronics, and Automation engineering fields. Participants were categorized into three groups: Maker Learning (hands-on projects), Virtual Learning (simulations), and Classic Learning (traditional instruction). The study evaluated students' problem-solving attitudes using pre- and post-intervention assessments via the Problem-Solving Inventory and gathered qualitative insights through semi-structured interviews. While the small sample size limits broad generalization, the results provide meaningful insights into the effectiveness of AI-enhanced maker learning.

Findings indicate that while all groups showed improvements in problem-solving skills, the Maker Learning group exhibited the most significant advancements. Students reported high engagement levels and highlighted the real-world applicability of their learning experiences. Additionally, the study identified challenges such as resource constraints, instructor training, and the need for structured AI integration in educational settings. A more extensive analysis of the quantitative data is planned to strengthen the findings.

To enhance practical applicability, this presentation will include concrete examples of AI integration in the classroom, discuss best practices for implementation, and address potential challenges in scaling AI-driven maker projects. The discussion will provide educators and researchers with actionable insights for developing technology-driven, experiential learning activities in STEM curricula, with a focus on fostering both technical and soft skills in secondary education.

Keywords: Problem-Based Learning (PBL), Maker Education, STEM, Artificial Intelligence (AI), AI-driven Gas Detector.

CREATIVE STUDENTS OR CREATIVE CHATGPT? SECONDARY EDUCATION STUDENTS' PERCEPTIONS OF THE IMPACT OF GENERATIVE ARTIFICIAL INTELLIGENCE ON CREATIVE THINKING.

Giotakou Konstantina
Teacher of Greek Literature
2nd Protypo Gymnasium of Volos
Email: nadia_giotakou@yahoo.gr

ABSTRACT

A fundamental characteristic of human personality is creative thinking. Although humans are inherently creative beings, the extent to which this capacity develops largely depends on the degree of support provided by the sociocultural environment, including education. Cultivating creativity has become a primary objective for most educational systems in the 21st century. Nevertheless, schools in Greece appear to struggle with fostering the conditions necessary for students to think "outside the box." Empirical evidence suggests that creativity is enhanced through student engagement in creative writing processes, particularly when generative artificial intelligence is incorporated (AI), which opens new avenues in the complex process of writing. However, the integration of AI technology has also raised significant concerns, with many arguing that it may lead to dependency and, ultimately, to a weakening of the human element.

The aim of the present study is to investigate lower secondary school students' perceptions of the impact of artificial intelligence on creative thinking. Specifically, the study seeks to address the following research questions: 1) How do students evaluate the influence of artificial intelligence on creativity? 2) How do students perceive the appropriate use of artificial intelligence in cultivating creative thinking?

The present research adopts an exploratory, qualitative design with a phenomenological approach, aiming to understand the expectations and significance that students themselves attribute to artificial intelligence. Moreover, it is situated within the theoretical framework of self-determined learning and Vygotsky's sociocultural theory of cognitive development. Twenty lower secondary school students engaged in creative writing activities using ChatGPT. Given the limited existing knowledge regarding how students engage in creative writing with the assistance of writing tools and how instruction should be structured when using such tools, the lesson was designed as a workshop. It included specific learning objectives and activities aimed at the development of the cognitive skills of recall, understanding, application, analysis, and reflection. Upon completing the activities, participants assessed the creativity in their work using a rubric based on the criteria of imagery, voice, characters, and narrative (Mozaffari, 2013; Zedelius et al., 2018). They also completed an open-ended questionnaire and participated in focus groups.

The descriptive data were analyzed thematically and revealed that participants used AI to overcome challenges encountered during the writing process. With its assistance, they gained access to alternative ideas that nurtured divergent thinking and problem-solving skills, while also supporting emotional development through the satisfaction of psychological needs. However, the findings also indicated that not all students possessed the ability to critically evaluate outputs, generate original ideas, or maintain an authentic personal voice. A deeper understanding of the emerging potentials and limitations of AI could help educators design instruction more thoughtfully and adopt more effective strategies for enhancing creativity.

Keywords: creative thinking, artificial intelligence, student perceptions, secondary education

FOSTERING THE SOFT SKILL OF CRITICAL THINKING THROUGH AI IN PRIMARY EDUCATION

Michael Theodorou
Principal of the Primary School of Graikochori
Primary Education Directorate of Thesprotia - Greece
email: mtheodor@sch.gr

Dimitra Gioka
Principal of the Primary School of Asproklisi - Sagiada
Primary Education Directorate of Thesprotia - Greece
email: dgioka@sch.gr

ABSTRACT

This study explores the use of chatbots to foster the soft skill of critical thinking in upper primary school students. Teaching scenarios were designed across five subject areas (Language, History, Civics, Geography, and Skills Labs), utilizing a combination of three free tools: ChatGPT, Gemini 2.0 Flash, and Gemini 2.0 Flash Thinking. These scenarios were implemented in two primary schools in the region of Thesprotia, and the evaluation of the outcomes was conducted through semi-structured interviews with five educators.

The findings revealed that chatbots played a significant role in designing activities that enhance skills such as analyzing and comparing viewpoints, justifying or challenging opinions, identifying implicit messages and fake news, forming evidence-based judgments, and solving problems. Additionally, the tools generated innovative ideas that went beyond the educators' initial lesson plans.

However, limitations were observed regarding the accuracy of specific information during prompting, which was addressed through the complementary use of web searching. Overall, the study confirms the potential of AI tools as supportive mechanisms in educational practice, while also highlighting the need for critical digital literacy among both teachers and students. Lastly, the research lays the foundation for future, larger-scale programs framed within the Theory of Change.

Keywords: chatbots, fostering critical thinking, primary school

e- TWINNING PROGRAM: "PHOTO MAGIC, FROM OLD PHOTOS TO AI"

Vasiliki Kalokidou
Primary Education Teacher (PE60 - Early Childhood Educator)
MSc 23rd Kindergarten of Stavroupoli, Thessaloniki, Greece
e-mail: vaso.kal74@gmail.com

Kyriaki Rousseti
Primary Education Teacher (PE60 - Early Childhood Educator)
MSc 2nd Kindergarten of Neon Malgaron, Thessaloniki, Greece
e-mail: krous81@gmail.com

ABSTRACT

The project is a European initiative implemented on the ESEP platform during the 2024–2025 school year. Nineteen members from Greece, Turkey, Portugal, Italy, and Romania participate in the project. Its founders are the 23rd Kindergarten of Stavroupoli, Thessaloniki, and ICS di Scandale from San Mauro Marchesato, Italy.

The program focuses on the pedagogical use of Artificial Intelligence and its integration into existing learning environments and educational platforms. The starting point is a suitcase that is randomly found outside the kindergarten, filled with old photographs and personal objects belonging to a woman from an earlier era. The photographs serve as the trigger for beginning our journey—from old photographs to Artificial Intelligence. This journey introduces learners to the history of photography, black-and-white and color photography, portrait photography, street photography, and alternative forms of photography, aiming to cultivate empathy and sensitivity. These activities are combined with the possibilities offered by Artificial Intelligence tools for the enhancement, creation, editing, and transformation of images.

The Artificial Intelligence tools used in the project are the following:
https://www.bing.com/images/create, https://www.remove.bg/el, https://padlet.com/, https://deepai.org/, https://genially.com/, https://www.canva.com/, https://www.artbreeder.com/, https://ai.nero.com/, http://vidnoz.com/, https://en.linoit.com/, https://www.cartoonize.net/

Keywords: Preschool Education, European Programs, Artificial Intelligence

THE INTEGRATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION: ADVANTAGES AND DISADVANTAGES

Dr. Kottara Chara
Fulltime Lecturer
Department of Business Administration, University of West Attica
250 Thebes Str. 12241 Egaleo, Greece
email: hkottara@uniwa.gr

Dr. Lagou Maria
Economist – PhD Department of Accounting & Finance, University of West Attica
Adult educator at SAEK
email: la44mar@yahoo.gr

ABSTRACT

The integration and application of Artificial Intelligence in recent years has been on an upward trajectory, affecting key pillars of the global economy. Its dynamic course has not left education unaffected, on the contrary, today there is a strong interest in its exploration. This research is a bibliographic article through which existing studies are utilized, with the aim of examining artificial intelligence in the field of education and more specifically identifying both its advantages and disadvantages. It is considered important to explore the field under consideration through the presence of applications such as ChatGPT and Gemini, which are frequently used by trainees.

The research findings help members of the educational community and the respective bodies to assess the necessity of a smooth transition to a new normality, ensuring every ethical issue. The rational use of ChatGPT and Gemini is essential to maintaining the balance between the dual relationship of instructor and trainee.

For the needs of this scientific work, the researchers used secondary research through the literature, which refers to a systematic method of review and critique regarding the scientific field under consideration, helping to identify current knowledge, gaps and future research directions. A systematic search was carried out in reputable databases, libraries, electronic repositories and other scientific sources to collect research on artificial intelligence in education with the ultimate goal of evaluating its advantages and disadvantages.

Keywords: Artificial Intelligence, Education, ChatGPT, Gemini

ARTIFICIAL INTELLIGENCE IN PRIMARY EDUCATION CASE STUDY: WRITTEN EXPRESSION IN THE 6TH GRADE

Laparidou Kleopatra
Professional Title: Educator PE 70, M.Ed
Professional Institution: Drepanos Primary School, Kozani, P.D.E. Kozani
Location: Greece
email: lapkl@yahoo.gr

ABSTRACT

The study examines the applications of Artificial Intelligence (AI) in primary education, focusing on improving the learning process, personalizing education, and supporting teachers. Through a literature review and analysis of existing applications, the main uses of AI are highlighted, including personalized learning, automated assessment, intelligent assistants, and educational games.

Particular emphasis is placed on AI's role in developing language skills ,integrating students with special with special needs, and creating interactive learning environments. As part of the study, a teaching scenario for sixth-grade students is presented, where AI tools such as ChatGPT, Language Tool , Book Creator and Imagine support the writing process, enhancing students' creativity and digital skills.

The findings indicate that AI contributes to differentiated learning, increased student engagement, and the development of 21 st-century skills. However, challenges such as ethical considerations, data privacy, and the teacher's role in AI-driven education are acknowledged. Despite these challenges ,AI in education offers significant opportunities for modernizing teaching practices and enriching the learning experience.

Keywords: Artificial Intelligence, Writing Production, Technology, Education

ARTIFICIAL INTELLIGENCE IN THE FIGHT AGAINST SCHOOL BULLYING

Markolefas Nikolaos
PhD Candidate at University of Peloponnese,
Tripoli, Greece
e-mail: n_markolefas@hotmail.com

Lampiri Pavlina
PE06 English Language Teacher, MSc at University of Manchester,
Athens, Greece
e-mail: pavlampiri@yahoo.com

Tziaferi Styliani
Associate Professor University of Peloponnese,
Tripoli, Greece
e-mail: stziafer@go.uop.gr

ABSTRACT

Nowadays, millions of students worldwide do not have a safe school environment, as in schools around the world children and adolescents learn to live in fear as a consequence of school bullying. The relevant study highlights the severity and complexity of the social phenomenon called school bullying. In the last decade, mainly as a result of rapid digitization, mobile applications and computers have had a decisive impact on children's lives as students live and learn through them to a significant extent. The aim of this study is to enhance our understanding of how smart, interactive technologies address learning and empower applications users in the fight against bullying.

Keywords: School bullying, artificial intelligence, anti-bullying applications.

UTILIZATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION SYSTEM IN CYPRUS: GLOBAL TRENDS AND LOCAL INITIATIVES

Mella Maria
Mathematics Instructor
Private Sector of Education in Greece
MSc Student in Artificial Intelligence
European University Cyprus
Email: mm235312@students.euc.ac.cy

Appiou Nikiforou Marina
Assistant Professor of Mathematics
European University Cyprus
Email: M.Nikiforou@euc.ac.cy

Kyprianou Georgios
ICT Instructor
Public Sector of Education in Cyprus
Scientific Collaborator
European University Cyprus
Email: G.Kyprianou@external.euc.ac.cy

ABSTRACT

The rapid advancement of Artificial intelligence (AI) has brought significant changes to the use of digital media in everyday education, introducing numerous opportunities as well as challenges that require further exploration regarding AI's role in teaching and learning. AI-powered tools are reshaping pedagogical approaches by enabling personalized learning experiences, intelligent teaching systems, and adaptive assessments. However, these developments raise concerns about data privacy and ethical dilemmas.

In Cyprus, the integration of AI into the educational system remains at an early stage, despite the growing desire and strong interest in improving teaching methods. This research examines both the perspectives of the global educational community and the level of familiarity of Cypriot educators in primary, secondary, and higher education regarding the potential integration of AI into the educational landscape. The questionnaire, completed by the stakeholders, highlights perceptions regarding the concept of AI, the level of familiarity with AI tools, the emotions triggered by a possible integration, and the degree of willingness to adopt AI in educational environments. Additionally, it includes questions about the advantages and disadvantages of AI tools in education. It is worth noting that many educators are concerned about whether the appropriate infrastructure for integrating such tools into educational settings currently exists or how soon it could be developed. Moreover, most educators wish to have the right to accept or reject AI integration, as they are the direct transmitters of knowledge.

The adoption of AI tools requires the proper preparation of educators, which underscores the urgent need for seminars and conferences where educators can share their perspectives, experiences, and concerns. The insights obtained from this research contribute to the broader dialogue on digital transformation in education, outlining strategic directions for the responsible and effective integration of AI into the educational system.

Keywords: AI in education, adaptive learning, Cyprus education system, global educational community, AI integration benefits, AI anticipated challenges

ARTIFICIAL INTELLIGENCE IN EDUCATION: A BIBLIOMETRIC ANALYSIS OF RESEARCH TRENDS AND FUTURE DIRECTIONS - FIRST EVIDENCE

Maria Mitroulia[1]
PhD candidate
email: m.mitroulia@uoi.gr

Thomas Kitsantas[2]
Lecturer

Konstantinia Tsiligianni[3]
Laboratory Teaching Staff

Evangelos Chytis[4]
Professor

[1,2,3,4] University of Ioannina, Department of Accounting and Finance, Greece

ABSTRACT

Artificial intelligence (AI) in education has evolved in recent years into one of the most dynamic and fast-growing research domains. Its increasing integration into educational processes has created new opportunities for innovation in teaching and learning, but also exposed issues including ethics, academic integrity, and effective pedagogy. This study conducts a comprehensive bibliometric analysis of global research activity on AI in education, aiming to map the evolution, emerging trends, key thematic clusters, and future directions of the field. The dataset comprises relevant publications indexed in the Scopus database from 2016 to 2024, analyzed using the Bibliometrix R and VOSviewer software. The findings indicated an exponential growth of academic interest in scientific interest after 2019, with dominant research themes such as applications of large language models (LLMs), AI ethics, learning personalization, and academic integrity. This research study contributes to a comprehensive understanding of the current research and to the formation of a contemporary view of the cognitive field, providing useful suggestions.

Keywords: Artificial intelligence, education, bibliometric analysis, Scopus database

PERCEPTIONS OF FUTURE EDUCATORS REGARDING THE UTILIZATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION

Bassounas Athanasios
Educational Consultant in Informatics
Directorate of Secondary Education of Ioannina
e-mail: basounas@sch.gr

ABSTRACT

The utilization of Artificial Intelligence (AI) is one of the main fields of interest in the recent years, for both educators and educational researchers. The present study explores the perceptions of future educators regarding the potential of AI for both teachers and students, the challenges and risks associated with its use and the conditions necessary for the effective and beneficial integration of AI into all aspects of the learning process. The research was conducted among students of the Annual Pedagogical Training Program (E.P.PAI.K) of the Higher School of Pedagogical and Technological Education (A.S.PAI.T.E.), representing various fields and with various levels of teaching experience. These students are potential future educators in Primary and Secondary school education. Data collection was carried out using an anonymous online questionnaire with both closed (Likert scale) and open-ended questions. The questionnaire gathered demographic data, information on the technological proficiency of the students, their familiarity with digital technology and AI and its applications, their opinion regarding the use of AI by teachers and students and the consequences it may have and, finally, the prerequisites for effective and safe utilization.

The research findings indicate that the future educators are highly familiar with digital technology and particularly AI and they often use AI applications. They believe that AI can support educators in lesson planning, development of instructional material and as a means to attract and engage their students' attention. They also acknowledge that AI can be beneficial for students (to a lesser extent compared to teachers), mainly in familiarization with technology and knowledge acquisition. However, the participants of the study recognize risks and challenges associated with AI integration in education. A significant proportion of the respondents expressed their concern about that fact that AI could hinder and diminish students' critical thinking skills, as well as fostering dependence on technology and isolation from authentic human interactions. Other risks are plagiarism and intellectual property violation. Moreover, most future educators fear that AI might diminish the role of the teacher. Finally, nearly all future teachers emphasized the necessity of establishing clear policies for the ethical and effective use of AI in education. They also strongly advocated for systematic training and ongoing support to equip educators with the skills required in this evolving technological environment.

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Keywords: Artificial intelligence, educators' perceptions, digital technology in education.

COUNSELING GUIDANCE AND DIGITAL MEDIA: A SYSTEMATIC LITERATURE REVIEW (1998–2025)

Nosios Marios
PhD Candidate, University of Macedonia
Thessaloniki, Greece
email: mnosios@uom.edu.gr

Mpellos Dimitrios
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: jimmyakan@gmail.com

Venetsanos Antonis
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: myp25004@uom.edu.gr

Charmpa Dimitra
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: dimitracharmpa@hotmail.com

Katsaros Apostolos Charalampos
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: myp25009@uom.edu.gr

Bitzenis Aristidis
Professor, University of Macedonia
Thessaloniki, Greece
email: bitzenis@uom.edu.gr

Komporozou Maria
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: myp25007@uom.edu.gr

Koutsoupias Nikos
Professor, University of Macedonia
Thessaloniki, Greece
email: nk@uom.edu.gr

ABSTRACT

This study examines the scholarly output on digital career guidance and counselling through a quantitative bibliometric approach. A corpus of 167 publications from 1998 to early 2025 was analyzed using descriptive statistics, keyword co-occurrence, trend-topic methods, and thematic mapping to elucidate publication dynamics, author collaborations, and conceptual structures. Results show a stable annual publication rate, an average of 10.8 citations per document, and a mean of 3.7 authors per publication, with only 14.4% of papers involving international co-authorship. Journal articles emerged as the predominant dissemination venue, supplemented by conference proceedings and book chapters. Trend-topic analysis reveals an intellectual progression from institutional and infrastructure concerns (2001–2005), through e-learning and computer-assisted instruction (2005–2012), to sector-specific applications in medical education (2010–2014), culminating in recent interest in affective, motivational, and artificial-intelligence paradigms (2022–2023). Thematic mapping identifies *humans*, *mentoring*, and the *internet* as well-developed (motor) themes, while AI-related terms and chatbots emerge as new topics. These findings delineate a mature research domain with shifting thematic emphases. Future studies may advance global collaboration, examine the ethical dimensions of AI-mediated counseling tools, and address digital inequities within career guidance systems.

Keywords: Counseling, Digital Media, Systematic Review, Scientometrics

THE USE OF ARTIFICIAL INTELLIGENCE IN THE EDUCATION OF STUDENTS WITH LEARNING DISABILITIES – A SYSTEMATIC REVIEW

Papalexandratou Parthenopi
Postgraduate Student
University of West Attica – Department of Public and Community Health
Athens, Greece
e-mail: envihealth2344@uniwa.gr

Stathopoulou Agathi
Laboratory Teaching Staff
University of West Attica – Department of Public and Community Health
Athens, Greece
e-mail: a.stathopoulou@uniwa.gr

Skanavis Constantina
Professor
University of West Attica – Department of Public and Community Health
Athens, Greece
e-mail: kskanavi@uniwa.gr

ABSTRACT

Learning disabilities are a neurodevelopmental disorder that affects a significant percentage of students worldwide, creating academic and socioemotional challenges that can impact adulthood. Although learning disabilities cannot be fully resolved, individuals living with them can significantly enhance their abilities with the help of appropriate teaching methods and support tools. Early detection of learning disabilities and provision of appropriate intervention are paramount not only to support students with learning disabilities in addressing their academic needs but also to enhance their social and emotional well-being, their proper development and their quality of life. Artificial intelligence offers innovative capabilities to support students with learning disabilities by providing personalized digital tools and learning strategies tailored to their specific educational needs. The aim of this study is to examine, through a systematic literature review, the most recent applications of artificial intelligence that have been developed to support students with learning disabilities and their effectiveness in improving their academic performance. Through the literature search in the Scopus, PubMed, and Google Scholar databases, a limited number of studies were identified regarding the role of artificial intelligence in the education of students with learning disabilities. However, the aforementioned studies demonstrated that artificial intelligence can enhance the educational path of individuals with learning disabilities and facilitate the learning process, improving their academic performance, reducing the challenges and inequalities they face and thereby providing equal opportunities for success in the educational field. The systematic review of the existing literature, combined with the findings of the study, highlights significant gaps and needs in the integration of artificial intelligence in the education of students with learning difficulties. Specifically, for the further development of artificial intelligence in education, it is essential that applications focusing on the learning needs of school- aged students with learning disabilities and not only university students with learning disabilities be developed. Additionally, the research primarily focuses on dyslexia, leaving other learning difficulties unexplored, highlighting the need for further studies. Moreover, the lack of research regarding teachers' perceptions underscores the necessity of investigating their role in the integration of artificial intelligence into teaching. Finally, it is recommended that further research be conducted on existing applications with a view to improving personalization algorithms and ensuring optimal performance in the education of students with learning disabilities.

Keywords: Artificial intelligence, learning disabilities, personalized learning, digital tools, learning strategies, personalized interventions.

ARTIFICIAL INTELLIGENCE IN EDUCATION POSSIBLE OBSTACLES AND RISKS

Petsiou Charikleia
Education Consultant for Mathematics
Secondary Education Directorate of Ioannina
Ioannina, Greece
e-mail: harapetsiou@yahoo.gr

ABSTRACT

When integrating Artificial Intelligence (AI) into the field of education, various challenges and potential threats are likely to arise. Despite the promising potential of AI, its reckless application carries significant risks. The main areas of concern include dilemmas such as algorithmic bias, lack of transparency, privacy, human communication and the development of critical thinking. In addition, there are practical obstacles related to the logistical infrastructure and teacher training.

The research approach of the paper is qualitative and is based on semi-structured interviews with 23 primary and secondary education teachers from various parts of Greece, of various specialties, who have experience with popular AI chatbots. Concerns related to misinformation, role distortion and student dependence on AI systems were highlighted. The research concludes that there is a need for a prudent and responsible approach to the adoption of AI, accompanied by the formulation of appropriate policies and guidelines, in order to maximize the benefits and minimize the negative impacts.

Keywords: Artificial Intelligence, AI chatbots, Education, risks-barriers, preventive measures, solution management

SEARCH vs PROMPT: NEW APPROACHES TO EDUCATION INCLUDING ARTIFICIAL INTELLIGENCE

Evangelia Dimoula
Informatics Teacher, PE86
2nd Model Junior High School of Athens
Athens Greece
email: edimoula@gmail.com

Aikaterini Riga
Principal, Informatics Teacher, PE86
26th Experimental Senior High School of Athens (Marasleio)
Athens Greece
email: katsouf12@gmail.com

Panagiota Kontzinou
Mathematics Teacher, PE03
26th Experimental Senior High School of Athens (Marasleio)
Athens Greece
email: pkontzinou11@gmail.com

ABSTRACT

This paper explores the comparative potential of two digital approaches in the learning process: traditional information search and the use of prompts in artificial intelligence language models. Focusing on classroom applications, it examines how these practices affect cognitive engagement, the development of 21st-century skills, and students' and teachers' attitudes toward knowledge.

By drawing on case studies from teaching Computer Science, Mathematics, and Environmental Education, the study highlights the opportunities and limitations of each approach. The methodology combines qualitative analysis of AI-integrated teaching scenarios with a systematic review of peer-reviewed academic literature.

Findings reveal that traditional search demands strong filtering and source evaluation skills, yet it is time-consuming and prone to misinformation. Prompting, in contrast, delivers immediate, personalized, and explanatory responses, fostering inquiry and metacognition. However, overreliance on AI-generated content can hinder learner autonomy.

The study concludes that a blended pedagogical approach is most effective. It recommends integrating both search and prompting practices within thoughtful, digitally supported educational frameworks that empower students as critical and creative knowledge constructors.

Keywords: Artificial Intelligence, Education, Prompting, Searching, Digital Literacy

ARTIFICIAL INTELLIGENCE TO AUTOMATICALLY ASSESS STUDENT PERFORMANCE: THE CASE OF AISE PROJECT

Fani Biskanaki
Director
Diefthinsi Defterovathmias Ekpaidefsis Nomou
Prevezas, Greece

Athanasios Sypsas
Diefthinsi Defterovathmias Ekpaidefsis Nomou
Prevezas, Greece

Venediktos Hadjisavva
3rd Technical and Vocational School of Education and Training of
Lemessos, Cyprus

Andreas Paraskeva
3rd Technical and Vocational School of Education and Training of
Lemessos, Cyprus

Maria Evripidou
3rd Technical and Vocational School of Education and Training of
Lemessos, Cyprus

Achilleas Kostoulas
Doumag LTD
Cyprus

Ognjen Pavić
University of Kragujevac,
Serbia

Lazar Dašić
University of Kragujevac,
Serbia

Tijana Geroski
University of Kragujevac,
Serbia

Nenad Filipović
University of Kragujevac,
Serbia

Ana Orlović Kovačević
CARNET
Croatia

Themis Exarchos
Ionian University
Corfu, Greece

Costas Assimakopoulos
International Hellenic University
Greece

George Stalidis
International Hellenic University
Greece

Jelena Pavić
City of Kragujevac, University of Kragujevac
Serbia

Daniel Štifanić, Zlatan Car
Faculty of Engineering, University of Rijeka, Croatia
e-mail: eponymo.onoma@organisation.gr

ABSTRACT

This paper presents the methodology, results, and ongoing work of the AISE project (Artificial Intelligent platform to support Students by assessing their performance skills through predictive models created from their writing skills), funded under the Erasmus+ program. The project aims to apply state-of-the-art AI methods, especially retrieval-augmented generation (RAG) combined with Large Language Models (LLMs), for the automatic evaluation of student essays across three dimensions: Content, Organization, and Language. Essays were collected from secondary education students in Greece, Cyprus, Serbia, and Croatia, processed, and assessed using a modular AI pipeline. The results demonstrate high alignment with human ratings, especially in the Content dimension, while highlighting challenges in assessing linguistic subtleties. The AISE project paves the way for scalable, transparent, and personalized feedback systems in educational environments.

Keywords: Artificial Intelligence, Erasmus+, Language processing, Automatic Essay Scoring, Secondary Education.

AI-ASSISTED TASK ADAPTATION/CREATION (AIATAC): A FRAMEWORK FOR INTEGRATING ARTIFICIAL INTELLIGENCE IN THE TEACHING OF ENGLISH AS A FOREIGN LANGUAGE

Tagkas Periklis
Professor
Department of Accounting and Finance, University of Ioannina
Postgraduate Programme "The Teaching of English as a Foreign/International Language", Hellenic Open University
Preveza, Greece
e-mail: ptagkas@uoi.gr

Hadgopoulos Pericles-John
Specialized Technical Laboratory Staff
Department of Accounting and Finance, University of Ioannina
Preveza, Greece
e-mail: phadgop@uoi.gr

ABSTRACT

This paper focuses on the role of AI as a valuable tool in English language learning, assisting teachers in their multifaceted roles. Generative AI can assist in the creation of vocabulary/grammar/speaking exercises or dialogues (in an "open" curriculum), or the adaptation of existing ones (in "fixed" curricula), based on the teaching situation and learners' profiles. However, it is important to state that AI-assisted activities need to conform to methodological criteria. The AIATAC framework was inspired by the fact that trainee English teachers at Master's level at the Hellenic Open University reported using AI to design image-enhanced task sheets, as part of their lesson planning. Content analysis of such lesson plans was conducted, and the results were evaluated as positively correlated with increased student motivation and participation in class. Subsequently, the AIATAC framework was conceptualized as a result of the realistic need to extend and apply AI-assisted task adaptation or creation, in a principled manner, conforming to the methodology of the teaching of English as a Foreign Language. The AIATAC framework can also be applied to the teaching of English for Specific/Academic Purposes (ESP/EAP) or even EMI (English as a Medium of Instruction). This possibility is currently under consideration at the University of Ioannina, as part of teaching ESP at the Department of Accounting and Finance, which involves integrating AI into the synchronous (class/IT lab) and asynchronous (self-study/ecourse) components, using generic or more specific AI applications. The AIATAC framework can best be implemented in a laboratory with the required equipment, offering students access to applications and online tools. In the paper, it is analyzed how this pilot framework can be used in a methodologically appropriate way.

Keywords: English language teaching, generative AI, context-specific, task creation/adaptation, AIATAC framework.

TA14: Pedagogical applications of educational robotics

TA14: Pedagogical applications of educational robotics

COMPARATIVE USABILITY EVALUATION OF MECHATRONIC SYSTEMS

Apostolos Tsagaris
International Hellenic University
Thessaloniki, Greece
e-mail: tsagaris@gmail.com

Maria Chatzikyrkou
International Hellenic University
Thessaloniki, Greece
e-mail: maria.chatzikyrkou@gmail.com

ABSTRACT

This paper studies the interaction of children aged 5-12 years with a modern mechatronic system by comparing the results obtained from three usability assessment tools. The mechatronic system is an autonomous robotic vehicle that was built with the help of the Lego Mindstorms EV3 Education educational package. The construction is used by 100 children aged 5-12 years in three scenarios of different difficulty and then each of these children answers three questionnaires. The first questionnaire that assesses usability is the SUS (System Usability Scale) and consists of 10 questions, the second is the USE (Usefulness, Satisfaction, Ease of Use) which consists of 30 questions which are divided into four sections and assess usefulness, ease of use, ease of learning and satisfaction respectively. The third questionnaire was created and adopted from previous research (Tsagaris, 2023) and consists of 20 questions divided into four sections assessing effectiveness, efficiency, satisfaction and ease of use.

The survey included a sample of 100 children, aged 5-12 years (5-6 48%, 7-8 26%, 9-10 16%, 11-12 10%), of whom 84% were boys and 16% were girls, of whom 48% reside in western Thessaloniki and 52% reside outside Thessaloniki. From the results of the first questionnaire (SUS), one concludes that the use of the mechatronics system creates the will for frequent use (94% Agree), is not complicated (80% Agree), exudes confidence during use (98% Agree) is easy to learn (70% Agree), and that for the younger ages of 5-6 years, unlike children 11-12 years, the assistance of a technician is required to use it.

According to the results of the second questionnaire (USE), in its first section assessing Usability, 92% agree that it helps them be more efficient, 98% agree that it is useful and 98% also agree that it does everything they expected it to do. In its second section assessing Ease of Use, 92% say that it is easy to use, 94% agree that it is user-friendly, 96% state that it is flexible and that they can recover from mistakes quickly and easily. In its third section assessing Ease of Learning, 90% easily remember how to use it and 80% state that it is easy to learn and use. The fourth and final section of the second questionnaire assesses Satisfaction, with 100% stating that they are happy with the interface, 96% saying they would recommend it to a friend and 98% saying it is great.

As for the third questionnaire, in the first five questions assessing Effectiveness, 96% disagree that mistakes are made during interaction, while 100% agree that the interface works as expected. In its second section, which concerns Efficiency, 100% agree that interaction is easy and 92% agree that there is freedom of movement for the user. Satisfaction is what is assessed in the third section of the questionnaire, with 100% agreeing that operating the system is not tiring and that changing the command is easy, while in the fourth section, which assesses Ease of Use, 96% state that it is flexible in selecting movements, 100% that the commands are memorable, and that training is easy.

Keywords: Educational Robotics, Mechatronics Systems, Usability Assessment

Wedosave: FORGOTTENBABYSYNDROME – ROBOTIC LIFE PROTECTION SYSTEM AGAINST FORGOTTEN BABY SYNDROME

Nikolaos Avgoulas
Computer Science Teacher PE86
Deputy Principal of the 11th Primary School of Kalamaria
e-mail: navgou11dim@gmail.com

ABSTRACT

Wedosave: ForgottenBabySyndrome is a robotic application designed and programmed by the 6th-grade students of the 11th Primary School of Kalamaria. It includes appropriate automation to prevent incidents of Forgotten Baby Syndrome.

The project lasted six weeks, during which the students became familiar with the MICROBIT microcontroller and its programming environment. They worked in groups of four and followed targeted activities aimed at understanding how the device functions and exploring its capabilities to solve the given problem.

Forgotten Baby Syndrome refers to situations in which a driver accompanying a minor — especially an infant — may forget the child's presence in the car cabin and leave, placing the child in a hazardous environment, particularly during the summer months.

The robotic setup includes weight sensors fitted to the child's seat and a temperature sensor for measuring the interior temperature of the vehicle. There are also alerting devices such as a mobile phone and smart watch to notify the guardian, along with mechanisms to activate the car alarm so that a passerby may help remove the child from the vehicle and bring them to a cooler environment.

Additionally, an automated mechanism was constructed to open a window and allow fresh air to cool the child until the guardian or a passerby can intervene and remove the child from danger.

All the components — such as the window mechanism, sensors, and alert systems — are built using Microbits, which communicate with each other via radio waves.

Wedosave offered multiple educational benefits as it was based on: · Constructivism, as students documented, designed, built, and analyzed various aspects of the problem-solving process.

- Collaborative learning, as they worked in teams of 3 to 4, · Interdisciplinary approach, incorporating knowledge from physics and electric circuits, biology, and the human body's cooling mechanisms.
- Project-based learning, progressing through various stages (design, analysis, construction, and presentation).
- Personalized learning, as students could choose which part of the project they wanted to focus on more.

Due to the significant impact of Wedosave, apart from its presentation at the Student IT Conference of the Regional Directorate of Central Macedonia and the Student Robotics Festival of the Experimental High School of the University of Macedonia and the Secondary Education Robotics Festival of the Prefecture of Pella, the students also had the opportunity to give interviews to various media outlets, gaining experience and confidence in their efforts and abilities.

Keywords: Forgotten Baby Syndrome, STEM, Microbit, robotics, programming.

INTEGRATING ALGORITHMIC THINKING AND PROGRAMMING INTO SECONDARY EDUCATION THROUGH EDUCATIONAL ROBOTICS: A CASE STUDY BASED ON THE NEW GREEK CURRICULUM OF IEP

Angelos Rondogiannis
Computer Science & Music Educator (PE86 – TE16)
Department of Computer Science Education,
2nd Experimental General Lyceum of Lefkada, Greece
email: arondo@sch.gr

ABSTRACT

This article presents a case study exploring the integration of algorithmic thinking and programming in upper secondary education through educational robotics. The intervention is grounded in the new national Informatics curriculum developed by the Greek Institute of Educational Policy (IEP), focusing on the thematic area "Algorithmic Thinking – Programming of Computing Systems" and specifically the sub-topic "Programming of Robots and Hardware."

Through a scenario based on the use of Arduino microcontrollers and simulation platforms such as Tinkercad, students were guided in constructing and programming automated systems. The approach blends simulation with physical computing, fostering students' engagement with real-world technological applications. Emphasis was placed on constructivist and experiential learning, collaborative project work, and the cultivation of core digital skills.

The study was implemented during the 2023–2024 academic year with 11th-grade students, highlighting increased engagement, improved programming literacy, and enhanced problem-solving and collaborative abilities. Findings suggest that educational robotics serves as a powerful medium for delivering key computing concepts while promoting creative and critical thinking.

Keywords: Educational Robotics, Algorithmic Thinking, Physical Computing, Secondary Education, Arduino

CROCUS CULTIVATION ALGORITHM – EXPLORING NATURE'S STEPS THROUGH PROGRAMMING

Antigoni Tsirou
Computer Science Teacher, MSc
Directorate of Primary Education of Kozani, Hellenic Ministry of Education and Religious Affairs
Kozani, Greece
e-mail: tsirouant@gmail.com

ABSTRACT

The project titled "Crocus Cultivation Algorithm – Exploring Nature's Steps through Programming" presents an innovative teaching approach for primary school students that combines programming with the exploration of natural phenomena. The core focus is the development of algorithmic thinking through experiential, visual, and tactile learning, using a digital layout that depicts the stages of saffron (Crocus Kozanis) cultivation.

Drawing on her experience in computer science, the educator designed and printed a visual layout illustrating each cultivation stage of the crocus plant. When placed on a classroom table, students are prompted to identify the specific stage indicated by the teacher and construct the corresponding algorithm. Before programming the Bee-Bot robot, the teacher introduces command cards (created by herself) that represent movements such as "forward," "backward," "right," "left," "pause," "start," and "reset." These cards are arranged sequentially next to the layout, offering a visual representation of the steps required for cultivation.

The methodology is implemented through hands-on activities that actively engage students in designing and executing the algorithm with the robot. Beyond enhancing technical skills, the activity fosters critical thinking and collaboration. The key findings indicate that linking theoretical knowledge with practical application through experiential learning improves students' understanding of algorithmic concepts and promotes teamwork.

Moreover, results show that the use of visual and tactile tools contributes to creating an engaging learning environment where students develop problem-solving skills and gain confidence in applying technological solutions. This approach enables learners to connect natural processes with programming, highlighting the importance of sequence and structure in a multidimensional learning context. Additional observations confirm the method's positive impact on creativity and educational outcomes.

Keywords: algorithmic thinking, programming, experiential learning, visual learning, tactile learning, collaboration, crocus cultivation.

TA15: Gamification in education

STUDY OF THE EFFECTIVENESS OF INNOVATIVE TEACHING INTERVENTIONS FOR LEARNING THE BOHR ATOMIC MODEL AND THE PERIODIC TABLE

Adramerina Aikaterini
PhD Candidate
Department of Chemistry, Aristotle University of Thessaloniki
Thessaloniki, Greece
email: katerinaadra@gmail.com

Koutalas Vasilios
Laboratory Teaching Staff
Department of Chemistry, Aristotle University of Thessaloniki
Thessaloniki, Greece
email: bkoutalas@chem.auth.gr

Charistos Nikolaos
Assistant Professor
Department of Chemistry, Aristotle University of Thessaloniki
Thessaloniki, Greece
email: nicharis@chem.auth.gr

ABSTRACT

Topics such as Bohr's Atomic Model and the organization of elements in the Periodic Table continue to pose considerable challenges in the teaching of Chemistry, particularly for students in the first year of upper secondary education. In response to this pedagogical difficulty, the present study explores the impact of alternative teaching strategies compared to traditional instruction, employing digital interactive environments, tabletop educational games, and robotic systems. It examines the extent to which these approaches contribute to students' conceptual understanding of Bohr's Atomic Model and the Periodic Table and enhance their active engagement in the learning process. The research design was structured in two phases, beginning with a pilot implementation for the refinement and adjustment of the tools, followed by the main. Analysis of both quantitative and qualitative data reveals that game-based strategies significantly enhance not only cognitive achievement but also students' participation compared to traditional instruction. Although the robotics-based intervention was promising, it did not yield similarly high learning gains. These findings underscore the need to redefine Chemistry instruction by adopting teaching models that respond to diverse student learning styles. The comparison of these innovative interventions with traditional instruction reveals clear differences in both performance and motivation, offering valuable research-based insights for the transformation of Chemistry teaching practices.

Keywords: Chemistry, gamification, instructional interventions, digital tools, robotics, Bohr's Atomic Model.

LEARNING ABOUT THE MACEDONIAN STRUGGLE

Maria Kikidou
School Principal, English Language Teacher
Primary Education of Pella Prefecture
MA Bilingual Translation
MA in Education Sciences with New Technologies
Edessa, Greece
Email: mkikidou@yahoo.gr

Filippos Gkiouros
Lawyer
President of the Yessios Museum (NPO)
Edessa, Greece
Email: contact@yessiosmuseum.com

Design, implementation, and evaluation of educational museum programs has been a core priority for the Urban Non-Profit Organization "Yessios Museum - The Macedonian Struggle and Edessa."

More specifically, within a multisensory environment—the Museum's galleries—and an interactive educational framework that utilizes and highlights the value of New Technologies (ICT) and Web 2.0 tools, an initiative was undertaken to promote the cultural skills of secondary school students. This was achieved through engagement with the museum's collection, local history, and cultural heritage.

The design of the educational program "Learning about the Macedonian students aged 13–17, was based on various methods, techniques, approaches, and environments. Particular emphasis was placed on the principles of the game-based learning approach (Domnus, 2010); consequently, a digital educational escape room was developed. The design followed the three fundamental stages of the task-based learning approach—pre-task, main task, and post-task (Willis, 1996). Furthermore, the program incorporated alternative evaluation methods to record the emotional engagement of the participating students.

Keywords: game-based learning, museum educational programs, educational escape rooms.

DESIGN AND DEVELOPMENT OF A VIRTUAL REALITY EDUCATIONAL APPLICATION FOR THE TEACHING OF "DE STIJL" DESIGN MOVEMENENT

Nazlidou Ioanna
PhD Candidate
Department of Product and Systems Design Engineering, University of Western Macedonia
Kila Kozani, GR50100 Greece
e-mail: ionnaz@gmail.com

Efkolidis Nikolaos
Associate Professor
Department of Product and Systems Design Engineering, University of Western Macedonia
Kila Kozani, GR50100 Greece
e-mail: nefkolidis@uowm.gr

Kalamakidou Ioanna
Student
Department of Product and Systems Design Engineering, University of Western Macedonia
Kila Kozani, GR50100 Greece
e-mail: joannakalam@gmail.com

Kyratsis Panagiotis
Professor
Department of Product and Systems Design Engineering, University of Western Macedonia
Kila Kozani, GR50100 Greece
e-mail: pkyratsis@uowm.gr

ABSTRACT

This case study is part of a broader research project of the University of Western Macedonia that concerns the combination of innovative technological tools and educational methods in order to improve learning outcomes and enhance the learning process.

The research was conducted at the Department of Product and Systems Design Engineering and focuses on the design and development of a digital application in a virtual reality environment, aiming to work as a supportive educational tool for the teaching of design movements. The proposed application introduces virtual reality technology to educate students of the department on the De Stijl design movement. The educational process is enhanced by utilizing game-based learning strategies that serve specific educational goals. The final application resembles a virtual reality game, based on the logic of educational escape rooms. The educational content is harmoniously integrated into the overall design of the application, through the creation of specially designed quizzes and puzzles that users are required to solve. The ultimate goal is for students, through interaction with objects in the virtual environment, to become familiar and better understand key historical facts, aesthetic criteria and the main design principles of the design movement

The application was designed according to a methodological framework that adopts elements from design thinking and creative process for the development of new products. The design was guided by the potential use of virtual reality technology and the integration of gamification as a basic learning method.

The application was tested on the premises of the faculty. The early evaluation process involved an initial sample of 8 students of the department. The methodology followed included the completion of questionnaires and the answering of knowledge-based questions related to the educational subject, before and after using the application. The results showed a significant improvement in learning outcomes regarding student performance. Out of a total of 10 questions, the average number of correct answers was 6.63 before using the application and 9.00 after its use (increase of 35.75%). There was also an increase in students' positive opinion on the integration of virtual reality technology into the learning process, before and after using the application (increase of 15.15%) as well as their opinion on educational games (increase of 8.82%). Regarding the overall experience, the results showed that students evaluated their experience with the application very positively, with an average score of 4.5 (90%) on the 5-point Likert scale. As for the excitement factor, students rated it at 4.38 (87.50%). In terms of how motivating and engaging the experience felt, the rating was 4.63 (92.50%).

Overall, the initial evaluation findings show a highly encouraging prospect for creating an engaging educational experience that significantly stimulates students' interest and enthusiasm for the educational subject. This study is expected to contribute to the ongoing research in the field of technological advancements and the implementation of innovative practices in educational settings, aiming to optimize the learning experience and learning outcomes. It explores and proposes creative ways to combine immersion technology tools with game-based learning methodologies while focusing on specific educational goals.

Keywords: Learning methodologies, immersive technologies, virtual reality, gamification, product design.

WHEN HISTORY BECOMES A GAME: UTILIZING ARTIFICIAL INTELLIGENCE AND GAMIFICATION IN HISTORY TEACHING.

Dr. Evángelos Sitas
Teacher PE02
1o Junior High School - DSE Aitolokarnanias, Greece
e-mail: vagsit@gmail.com

ABSTRACT

Most students have always maintained that History is a difficult subject, and that success comes through memorization of the curriculum. This paper proposes a new approach that aims to improve student engagement by freeing them from the shackles of frontal narration and memorization. We will propose methods for integrating AI into gamified teaching activities and examine whether the use of these mechanisms can improve student engagement and cognitive performance compared to traditional teaching methods.

Initially, the students' needs were analyzed, and the educational objectives were determined. Then the gamified activities were designed. With the help of artificial intelligence, we adapted and improved the existing activities. Two groups of students participated in the research and their division into an experimental group and a control group was done randomly. We compared the results of the groups using diagnostic and final assessments. The pilot implementation showed increased engagement and improved student performance compared to traditional methods.

In recent years, gamification has emerged as a modern pedagogical approach, which in its simplest version, using challenges, rewards and leaderboards, has been shown to improve the learning experience. Today, artificial intelligence is perhaps one of the biggest trends in the field of digital technology and is increasingly evolving as the technology of the future, revolutionizing both the way we teach and the way we learn. The combination of these two can offer significant benefits to education in general and to the teaching of history in particular.

Λέξεις – κλειδιά: gamification, artificial intelligence, history teaching, innovative pedagogies.

GAMIFICATION AND DIGITAL STORYTELLING AS TOOLS FOR DEVELOPING SCREENING ACTIVITIES FOR PRAGMATIC DEFICITS IN CHILDREN

Koskeridou Marina
Undergraduate Student,
Department of Speech and Language Therapy
University of Ioannina
Panepistimioupoli B', 45500, Ioannina, Greece
e-mail: slt01263@uoi.gr

Toki Eugenia
Professor,
Department of Speech and Language Therapy
University of Ioannina
Panepistimioupoli B', 45500, Ioannina, Greece
e-mail: toki@uoi.gr

ABSTRACT

Pragmatic skills are fundamental for children's social interaction and academic success. Traditional screening methods can be unengaging for young learners, prompting interest in digital, game-based alternatives. This study explores the feasibility of the digital activities, combining gamification and digital storytelling, as a screening tool for pragmatic deficits in primary school children.

We designed and developed the interactive digital activities using PowerPoint, integrating narrative elements and game mechanics to assess various aspects of pragmatic competence. Six children aged 8–12 years participated, each with parental written consent. Individual sessions were conducted in supportive environments, and usability, engagement, and overall experience were evaluated through structured interviews.

Children responded positively to the digital activities, reporting high levels of interest and engagement. Most found the interface intuitive and the activities enjoyable, especially the interactive dialogue component. Minor technical or usability issues were noted by a few participants, but did not detract significantly from the experience.

Initial findings of this study suggest that a digital activities format may offer a child-friendly, engaging approach for preliminary screening of pragmatic skills. As this was a feasibility study with a small, non-clinical sample, further research with larger and more diverse groups is required to validate the tool's effectiveness and expand its application in educational and clinical settings.

Keywords: Pragmatics, interactive screening, feasibility study, gamification, digital storytelling, children

GAMIFICATION IN SECONDARY EDUCATION: BENEFITS, IMPLEMENTATION AND CHALLENGES

Chatziantonakis Dimitrios
Secondary Education Teacher, PE 82. Ms, Med.
1st Vocational High School of Nea Ionia, Volos, Greece
e-mail: dxatzh@gmail.com

ABSTRACT

Modern educators constantly seek innovative teaching approaches that enhance the learning process and engage students. One of the most widely adopted techniques is gamification, which incorporates game elements, mechanisms, and characteristics into non-game contexts. Through the use of badges, points, leaderboards, and challenges, gamification aims to increase student participation, boost motivation, and improve interactivity in the educational process. In secondary education, the implementation of gamification can contribute to the creation of a more engaging learning environment, enhancing both student involvement and teaching effectiveness. At the same time, educators tend to have a positive attitude toward its application, recognizing the benefits of its integration.

This study focuses on the applications of gamification in secondary education in Greece, examining both the benefits and challenges associated with its implementation. Initially, a literature review was conducted, analyzing research studies and articles that present gamification applications in secondary education, both in general and special education settings. The findings highlight the advantages and potential of gamification in diverse learning environments, demonstrating its association with increased student engagement, higher learning motivation, and improved interaction between students and teachers.

Subsequently, a quantitative study was conducted through a questionnaire survey involving 45 secondary education teachers from various disciplines in the Magnesia and Larissa regional education departments. The objective of the study was to identify the main challenges that educators face when implementing gamification in their teaching practices. The findings reveal that despite educators' positive attitudes, significant barriers hinder the adoption of gamification. Specifically, the key obstacles identified include the lack of teacher training, insufficient technological infrastructure, large class sizes, and limited instructional time.

The study concludes that the successful integration of gamification in secondary education requires institutional support, an upgrade of school infrastructure, and targeted teacher training. These factors are essential to fully harness the potential of this technique for the benefit of the learning process.

Keywords: Gamification, Secondary Education, Benefits, Challenges, Student Engagement

THE USE OF DIGITAL GAMES FOR TEACHING READING IN MULTILINGUAL GREEK PRIMARY SCHOOL CLASSROOMS: THE CASE OF D_READ-NARRATE

Christou Theophano
Post-Doctoral Researcher
Linguistics Division, Department of Philology, University of Ioannina
Ioannina, Greece
e-mail: t.christou@uoi.gr

Mastropavlou Maria
Associate Professor
Linguistics Division, Department of Philology, University of Ioannina
Ioannina, Greece
e-mail: mmastrop@uoi.gr

Prentza Alexandra
Teaching Fellow
Linguistics Division, Department of Philology, University of Ioannina
Ioannina, Greecee-mail: aprentza@uoi.gr

ABSTRACT

This paper presents an innovative educational software, D_Read-Narrate, designed to support the language, reading and narrative skills of monolingual but mainly bilingual children (8-12 years old) attending Greek public primary schools. As part of the D_Read-Narrate project, software was developed using parts of iRead, an already developed software (https://iread-project.eu/) under the Horizon 2020 funding program to promote the reading skills of students with dyslexia, beginning readers and students learning English as a foreign language. Our aim is to present the design of the software and how it works and to analyze an exemplary lesson plan for its use in educational practice. This software was developed in the framework of the project: "Digital applications for teaching reading and narrative skills in multilingual Greek primary school classes D_READ-NARRATE". This project is carried out within the framework of the National Recovery and Resilience Plan Greece 2.0, funded by the European Union – NextGenerationEU (Implementation body: HFRI). It aims to develop a set of educational web applications that improve the language skills of primary school students learning Greek as a second language (L2). The software includes educational tools (digital classrooms, assessment, assignment of tasks), language assessment software before, during and after use, and student profiles with stored performance data and personalized feedback. From March 2025, the software will be used in public primary schools with reception classes and in schools with many bilingual pupils (e.g. schools for intercultural education) to evaluate its effectiveness.

Keywords: Smart Games, reading, bilinguals, language skills

Virtual AlgoLab: VR GAME DEVELOPMENT FOR DATA STRUCTURES AND ALGORITHMS

Anagnostou Pavlos
Student
Department of Computer Science and Engineering
University of Ioannina, Greece
e-mail: cs05440@uoi.gr

Ntermaris Nikolaos
Student
Department of Computer Science and Engineering
University of Ioannina, Greece
e-mail: cs05477@uoi.gr

Chroni Maria
Teaching and Research Staff
Department of Computer Science and Engineering
University of Ioannina, Greece
e-mail: mchroni@uoi.gr

ABSTRACT

This paper is focused on the teaching of fundamental concepts of Data Structures and Algorithms through the development of an interactive Virtual Reality (VR) educational environment. The aim is to enhance conceptual understanding through experiential and experimental interaction, leveraging the capabilities of VR technology.

Virtual AlgoLab is an educational VR game, implemented on the Unity platform, which includes a virtual space with four independent minigames. Each minigame has been designed to reflect and highlight a fundamental concept of computer science: linked lists, nodes, Hamilton cycles, and binary search. The user interface is ergonomic and simplified, with the aim of supporting navigation by novice users with no previous experience in VR systems.

The game's functionality focuses on actively engaging users through navigation, selection, and interaction with objects and concepts that correspond to algorithmic processes or data structures. The design was based on pedagogical principles of active learning and conceptual transfer in digital environments.

To assess the effectiveness of the game in achieving its purpose, tests were conducted with elementary school students and university students. It was observed that VR Algolabs successfully attracts the interest of all age groups, while users who evaluated it did not have any difficulty in understanding the objective and theoretical background of each minigame.

Keywords: Virtual Reality, AlgoLab, educational game, Data Structures, Algorithms, Unity.

TA16: Virtual, augmented, and mixed reality in education

VIRTUAL LABORATORIES IN STEM SECONDARY EDUCATION

Athanasios Sypsas
Adjunct faculty member, School of Science and Technology
Hellenic Open University, Greece
e-mail: athanasios.sypsas@ac.eap.gr

Vasilis Zafeiropoulos
Adjunct faculty member, School of Science and Technology
Hellenic Open University, Greece
e-mail: vasiliszaf@eap.gr

Evgenia Paxinou
Adjunct Professor, School of Humanities
Hellenic Open University, Greece
e-mail: paxinou.evgenia@ac.eap.gr

Dimitris Kalles
Professor
Hellenic Open University, Greece
e-mail: kalles@eap.gr

ABSTRACT

The integration of virtual laboratories (VLs) into secondary STEM (Science, Technology, Engineering, and Mathematics) education is transforming traditional teaching practices by providing interactive, cost-effective, and flexible learning environments. This study investigates the instructional approaches, benefits, challenges, and prospects of VLs in enhancing scientific learning. VLs simulate real lab environments, enabling students to conduct experiments digitally, manipulate variables, and visualize complex phenomena—promoting engagement, motivation, and inquiry-based learning. Despite their advantages, limitations such as the lack of tactile experience, the need for teacher training, curriculum alignment, and digital access disparities remain significant. A blended learning approach combining physical and virtual labs is recommended to ensure comprehensive skill development. With emerging technologies like AI, augmented reality, and collaborative platforms, the future of VLs in secondary STEM education appears promising. Overall, VLs have the potential to play a critical role in preparing students for higher STEM education by fostering conceptual understanding and essential 21st-century skills.

Keywords: Virtual laboratories, Secondary education, STEM

TA17: Online educational environments for enhancing blended and distance learning

PREPARING DISTANCE EXAMINATIONS IN THE ERA OF ARTIFICIAL INTELLIGENCE. A CASE STUDY: THE HOU MASTER'S PROGRAMME EDUCATION & TECHNOLOGIES IN DISTANCE TEACHING AND LEARNING SYSTEMS – EDUCATIONAL SCIENCES (ETA)

Evangelia Manousou
Assistant Professor
Hellenic Open University
Athens, Greece
e-mail: manousoug@eap.gr

Yiannis Gkiosos
Associate Professor, Director of the MSc Programme "Educational Technology and Human Resources Development" (ETA)
National and Kapodistrian University of Athens
Athens, Greece
e-mail: gkiosos.ioannis@ac.eap.gr

Antonia Maria Chartofylaka
Tutor (SEP) HOU, Assistant Director of Programme of Studies
Hellenic Open University
Athens, Greece
e-mail: chartofylaka.antonia@ac.eap.gr

Kyriaki Rassia
PhD Candidate
Hellenic Open University
Athens, Greece
e-mail: kyriaki.rassia@ac.eap.gr

Maria Koutsoumba
Professor, Coordinator of Module ETA52
National and Kapodistrian University of Athens
Athens, Greece
e-mail: makouba@phed.uoa.gr

ABSTRACT

Distance examinations, introduced during the COVID-19 pandemic and still in use at the Hellenic Open University (HOU), constitute a process that requires continuous redefinition. These examinations not only introduce new challenges but also demand alternative assessment strategies to ensure the validity and reliability of results. Key issues include student identification and invigilation processes, the selection of exam formats and questions, and the alignment of these with learning objectives.

In this context, technology has played a pivotal role in this transformation, integrating tools such as similarity detection software (Turnitin) and specialized invigilation systems. At the same time, the emergence of Artificial Intelligence (AI) amplifies these challenges, requiring more sophisticated approaches to prevent non-authentic student participation. For instance, the Open-book examinations, widely adopted in the Master's Program Education & Technologies in Distance Teaching and Learning Systems – Educational Sciences (ETA), highlight critical thinking as the primary factor of evaluation. Focusing on these skills constitutes a cornerstone of the educational process and reflects contemporary requirements.

The paper aims to present and systematically analyze the implemented processes, highlighting both benefits and challenges through the case study of the HOU Master's Program 'Education & Technologies in Distance Teaching and Learning Systems – Educational Sciences (ETA)'. Furthermore, it discusses the evolution of assessment methods, emphasizing the importance of ensuring that students engage meaningfully and demonstrate the knowledge and skills acquired during their courses.

Methodologically, this paper examines the assessment practices applied in the HOU Master's Program ETA between 2020 and 2025, covering eleven semesters. It explores exam design and evaluation strategies and the way they aligned with technological and pedagogical advances. The study investigates how instructors adapt to the integration of tools such as Turnitin to prevent plagiarism, and AI applications to promote authentic student engagement. Furthermore, the implementation of some of the practices adopted within the framework of the format of these distance exams is being investigated.

Keywords: distance education, technology, digital exams, validity, reliability, authentic assessment, critical thinking

DIGITAL MEDIA AND SPECIFIC LEARNING DISABILITIES (SLDS): OPPORTUNITIES, CHALLENGES, AND PROSPECTS FOR EQUITABLE EDUCATION

Efthymios Tsitsikas
PhD Candidate, University of the Aegean
Department of Mediterranean Studies: Archaeology, Linguistics, International Relations
Teacher, Ministry of Education, Religious Affairs and Sports
Rhodes & Arta, Greece
email:: msd21007@aegean.gr

Katerina Th. Frantzi
Professor, University of the Aegean
Department of Mediterranean Studies: Archaeology, Linguistics, International Relations
Rhodes, Greece
email: frantzi@aegean.gr

Chrysoula Triviza
Teacher, Ministry of Education, Religious Affairs and Sports
Pyrgos, Greece
email: siliatrv@gmail.com

ABSTRACT

Specific Learning Disabilities (SLDs) are neurodevelopmental disorders that affect core academic skills, making the implementation of individualized and inclusive educational approaches essential. The integration of digital technologies into contemporary educational practice, particularly during and after the COVID-19 pandemic, has introduced new opportunities for supporting students with SLDs, while simultaneously revealing persistent inequalities related to access and pedagogical use of digital tools.

The aim of this study is to examine the effectiveness of digital technologies in supporting students with SLDs and to critically explore the challenges associated with digital accessibility and educational inclusion. Methodologically, the study is based on a systematic review and secondary analysis of data drawn from international reports published by organizations such as UNESCO, the OECD, and the European Commission during the period 2020–2023, adopting a comparative perspective across different categories of SLDs.

The findings indicate higher levels of adoption and technological maturity for digital interventions targeting dyslexia compared to other learning difficulties, such as dyscalculia. At the same time, a significant digital divide and a lack of specialized teacher training are identified in the Greek educational context when compared to other Western countries. Overall, the study highlights the need for a comprehensive digital strategy grounded in the principles of Universal Design for Learning, aiming to ensure equitable access and meaningful educational inclusion for all students with Specific Learning Disabilities.

Keywords: Specific Learning Disabilities; digital technologies; digital divide; distance education; inclusion

TA18: Social networks and education

SOCIAL NETWORK AND EDUCATION

Koulis Ioannis
Director of the 9th Primary School of Arta
Directorate of Primary Education of Arta
Greece
e-mail: janniskoulis@gmail.com

ABSTRACT

Social networking platforms have become an integral part of contemporary life, influencing nearly all sectors, including education. Their incorporation into the educational process has opened new horizons, while at the same time posing significant challenges. The present paper aims to examine this relationship, analyze the relevant legal framework, and propose guidelines for the appropriate use of social networks within the educational environment.

More specifically, the rapid advancement of technology and the widespread integration of digital platforms into everyday life have transformed the ways in which individuals learn, communicate, and collaborate. Within the educational context, social networks offer opportunities for interactive learning, collaboration, and access to rich educational resources. However, their use is not without risks. Issues such as privacy protection, data security, cyberbullying, and the need for digital literacy constitute major concerns that require careful consideration and effective management.

For this reason, the paper explores both the opportunities and the challenges arising from the use of social networking platforms in education. Its objective is to highlight how these platforms can enhance the learning process, facilitate communication between students and educators, and promote innovation in teaching practices. At the same time, the legal and ethical dimensions of social media use are examined, with particular emphasis on the protection of students' personal data and rights.

The discussion also focuses on the responsible use of social networks, proposing guidelines and good practices that can be adopted by educators and educational institutions. Emphasis is placed on the benefits of digital literacy, the importance of raising students' awareness of online risks, and the role of educators as mentors in the digital era. Furthermore, the paper investigates how social networks can contribute to the development of a more inclusive and equitable educational system by providing access to knowledge and resources for students from diverse social and geographical backgrounds.

In conclusion, this paper seeks to offer a comprehensive approach to the relationship between social networks and education, combining theoretical analysis, practical applications, and legal perspectives. Through collective reflection and the exchange of ideas, it aims to outline a roadmap for the safe, responsible, and effective use of social networking platforms in education, for the benefit of both students and the educational community as a whole.

Keywords: social networks, education, teaching, inclusion.

TA19: Online learning communities

EXPLORING THE INNOVATION OF HARVARD'S "OUT OF EDEN LEARN" ONLINE LEARNING PLATFORM: A CASE STUDY IN A PRIMARY EFL CLASSROOM

Dermitzaki Kyriaki
English Language Teacher, M.Ed.
4th Primary School of Preveza
Preveza, Greece
e-mail: kdermitz@gmail.com

ABSTRACT

The emergence of new technologies and their infinite applications in all aspects of our lives, have affected the educational systems globally. In the Greek state school context many educators feel that the time has come to embrace new media pedagogies in their everyday lessons, not as a mere technological tool, but as a vehicle to amend their teaching approaches, promoting continuous professional development among fellow teachers and 21st century competences among students through their inspiring collaboration in Communities of Practice and Learning. The present study discusses the design, implementation and evaluation of our engagement in the English language classroom of the 4th Primary School of Preveza with the unique online learning community of "Out Of Eden Learn" (OOEL) of Project Zero in the Graduate School of Education in the University of Harvard. More specifically, the results of our participation in the various learning journeys designed by the Harvard researchers team since our initial "Skills Labs" pilot phase in 2020 on a national level and the international collaborations in the following years, revealed very positive results of students' intrinsic motivation enhancement as well as promotion of multiliteracies, fostering inclusive, digital and critical thinking skills in an interconnected, culturally and linguistically rich learning environment.

Keywords: Online Learning Communities, 21st century competences, Thinking routines, "Out of Eden Learn", Digital learning, Multiliteracies

TA20: Second-generation e-learning (Learning 2.0)

TA21: Mobile learning (Mobile Learning, BYOD)

TA22: Open educational resources

TA23: Free and open-source software for education

TEXT ANALYSIS WITH OPEN SOURCE SOFTWARE TOOLS IN EDUCATIONAL COUNSELING: A STUDY OF STUDENT-COUNSELOR CONFERENCES

Koutsoupias Nikos
Professor, University of Macedonia
Thessaloniki, Greece
nk@uom.edu.gr

Nosios Marios
PhD Candidate, University of Macedonia
Thessaloniki, Greece
mnosios@uom.edu.gr

Haliotou Katerina
UE Administrative-Financial sector
D.E.A. Social Sciences and Humanities
Universite Paris 8
haliotou@gmail.com

ABSTRACT

This study examines the implementation of RQDA, an open-source software for qualitative text analysis, in the systematic analysis of educational counseling sessions. Eight recorded sessions, each approximately one hour in duration, were transcribed, imported into RQDA, and systematically organized through the software's project interface. Inductive thematic coding produced five types of visualizations: code frequency bar charts, thematic maps, code co-occurrence networks, verbal tree diagrams, and word clouds. The qualitative thematic analysis showed that the sections concerning the implementation of an action plan, the provision of information, and timely response accounted for over 85% of all codings, highlighting the dominant emphasis on practical guidance and real-time support. Less frequent codes, such as listening skills, relationship building, and emotional reassurance, highlighted secondary emotional dimensions. Co-occurrence networks confirmed strong relationships between action planning and information sharing, while word visualizations revealed recurring linguistic patterns of collaborative decision-making. The results demonstrate the ability of RQDA to enhance the transparency and repeatability of qualitative analysis, as well as to be effectively integrated into statistical procedures in mixed-methods research. Within the framework of future studies, it would be advisable to adopt mixed-method designs, combining in-depth qualitative data with quantitative measurements, to deepen the understanding of counseling processes and enhance methodological rigor.

Keywords: RQDA, Qualitative Analysis, Open Source Software Tools, Educational Consulting

TA24: Teaching and digital media

VISUALIZATION OF PHYSICAL QUANTITIES OF ELECTROSTATIC FIELD, SPATIOTEMPORAL VARIATIONS OF WAVES, ATOMIC ORBITALS, AND DETERMINATION OF FUNCTIONAL CHARACTERISTICS OF CIRCUITS THROUGH SOFTWARE

Varsamis Agisilaos
Teacher of Physics (M.Sc., Ph.D.), Header of School Physics Laboratory
6th General Lyceum of Larissa
Larissa, Hellas (Greece)
e-mail: avars@sch.gr

ABSTRACT

The purpose of this work is to demonstrate the usefulness of scientific software in understanding, calculating and deepening the concepts of the physical sciences, through combinatorial and animated visualizations. It is particularly important especially for physical quantities and concepts that are abstract and there is no direct supervision over them (e.g., the field quantities, atomic and wave phenomena). All of the above is done with the using of the MAPLE and MATCAD software. Additionally, a powerful alternative proposal for the study of electrical circuits is given through the TINA simulation software in relation to the classical laboratory and its effectiveness is demonstrated, especially in cases where the laboratory activity cannot be carried out due to endogenous problems.

In the first part of the paper, the characteristic physical quantities of the electrostatic field are created and depicted, such as the intensity, the equipotential curves or surfaces, dynamic lines in two and three dimensions for a single charge, as well as, for a combination of charges.

In the second part of the paper, wave phenomena are presented in the plane and in space, such as the spatiotemporal propagation of a wave of constant amplitude, but also with damping, the spatiotemporal production of a standing wave, the spatiotemporal production and evolution of beats and waves interference.

In the third part of the paper, atomic orbitals are produced and designed. The atomic orbitals s, p, d, f and the hybrid sp^2 are depicted in the plane and in space, as well as, density diagrams and various sections of them in space.

In the last part of the paper, the study of electrical and by extension electronic circuits is presented, through the POSTPROCESSING feature of the electrical and electronic circuit simulation software TINA.

Keywords: Electrostatic Field, Waves, Atomic Orbits, Electrical Circuits.

EDUCATION AND DIGITAL MEDIA- INSPIRATION FOR THE IONIAN POET THROUGH "KALLIPATEIRA"

Giannouli Sofia
Philologist, PE02 (Secondary Education Teacher)
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

ABSTRACT

This paper examines the application of innovative pedagogical approaches in Ancient Greek language instruction, focusing on the combined use of traditional teaching and digital tools for the analysis of Pausanias' text "Kallipateira" and Lorentzos Mavilis' poem, also titled "Kallipateira."

The aim of this work is to highlight how modern technology can be integrated into the teaching of Ancient Greek, enhancing the learning experience and broadening the possibilities of understanding ancient texts. Specifically, it seeks to present how digital tools and artificial intelligence contribute to the analysis, comprehension, and retention of literature, while simultaneously strengthening students' cognitive skills.

The objective is to explore the synergistic use of traditional teaching methods with contemporary technology to bolster the learning process and underscore the significance of digital technology in modern education. The integration of technological tools, such as artificial intelligence (AI), chatbots, and text analyzers, offers personalized explanations and facilitates the understanding of the historical and literary elements of the works. This approach not only enhances text comprehension but also contributes to the development of critical thinking and the strengthening of students' digital literacy.

The application of Howard Gardner's Theory of Multiple Intelligences through digital tools fostered the development of various types of intelligence, enhancing students' linguistic, logical-mathematical, spatial, social, and intrapersonal intelligences. Specifically, tools like Google Docs strengthened linguistic intelligence, Google Sheets and Excel enhanced logical-mathematical intelligence, while Google Earth contributed to the development of spatial intelligence. Collaborative learning through tools such as Padlet and Trello enhanced social intelligence, promoting students' collaborative skills. Concurrently, reflective tools like Mind Maps and Journals strengthened intrapersonal intelligence, fostering personal reflection and self-awareness. The use of tools such as PowerPoint for presentation, the internet for research, and e-Class for managing and monitoring the learning process strengthened students' digital skills, offering a comprehensive and contemporary approach to learning. This implementation of innovative technologies highlights the importance of digital technology in education, broadening learning opportunities and preparing students for their future in the digital world.

Keywords: Ancient Greek, Kallipateira, Literature, Digital Media.

TEACHING HISTORY USING DIGITAL MEDIA: PRESENTATION OF A TEACHING PLAN

Ziagkou Mantha
PE 71 Teacher
Xirolofos Primary School – Ancient Elea
Email: mziagkoy@gmail.com

Makarios Lambros
Teacher PE 70
Xirolofos Primary School – Ancient Elea
Email: lamprosmakarios88@gmail.com

ABSTRACT

Teaching history is a particular pedagogical challenge, requiring critical thinking, interpretation of historical sources, and connecting the past and present. The use of digital media provides new opportunities in this direction, making historical knowledge more interactive and accessible to students.

The integration of technology into history education includes the use of interactive maps, virtual representations, multimedia material, digital archives, and educational platforms. These tools allow students to explore historical events through visualised data, analyse primary sources and participate in experiential activities. For example, geographic information systems (GIS) and applications such as Google Earth enable historical mapping, facilitating understanding of the spatiotemporal context of events. In addition, virtual and augmented reality (VR/AR) technologies enable "digital visits" to historical sites, enhancing the experiential approach to history.

Multimedia stuff, like documentaries, interactive videos, and historical archives, offers a multimodal teaching approach that meets different learning needs. At the same time, digital storytelling enhances students' creative participation, allowing them to construct their own historical narratives by combining sources, images, and videos.

Gamification is another innovative teaching mechanism, as it incorporates elements of challenge, reward, and collaboration. Platforms such as Kahoot!, Quizizz, and Mission US allow historical knowledge to be assimilated through interactive activities, increasing students' interest.

Despite the possibilities offered by technology, there are challenges that require careful management. The reliability of digital sources, the development of a critical approach to information, and the training of teachers in the use of digital tools are key factors for the successful integration of technology into history teaching.

In conclusion, the use of digital media in teaching history is not simply a technological modernisation, but a pedagogical upgrade that enhances critical thinking, experiential learning and a deeper understanding of the historical past. With the proper use of these tools, history becomes more accessible and appealing, shaping active and conscious citizens.

This paper examines the role of digital technologies in teaching history, focusing on contemporary methods that utilize interactive maps, virtual representations, multimedia material, and gamification tools through the presentation of a two-hour teaching plan for a sixth-grade history class on the topic: "The second siege and the exodus of Messolonghi."

The integration of digital technologies into the teaching of the module contributed significantly to strengthening historical thinking and active student participation. The use of interactive maps and virtual representations facilitated understanding of the spatiotemporal context of events, while multimedia material and digital storytelling promoted experiential and creative learning. In addition, the use of gamified activities enhanced interest and content assimilation. At the same time, students developed critical analysis skills for digital sources. However, challenges emerged related to the management of teaching time and the need for systematic training of teachers in the use of digital media.

Keywords: history teaching, digital media, interactive learning, virtual representations, gamification, technology in education

THE VIDEO COURSE AS A MEANS OF TEACHING AND ASSESSMENT IN VOCATIONAL EDUCATION. DESIGN AND IMPLEMENTATION OF A VIDEO COURSE IN VOCATIONAL HIGH SCHOOL COURSES

Theofanous Ioannis
Teacher PE82
1st EPA.L. Preveza
Preveza, Greece
Email: igtheofanous@gmail.com

Mouranou Sofia
Teacher PE87, PE02
1st EPA.L. Preveza
Preveza, Greece
Email: mouranou@yahoo.gr

ABSTRACT

This paper provides an in-depth exploration of the video lesson as an essential digital teaching and assessment tool in vocational education. It advocates for the integration of video lessons by VET teachers, emphasizing their potential to enhance existing educational practices.

The paper presents a range of software options for creating video lessons, showcasing their versatility and pedagogical advantages while acknowledging challenges such as potential technical issues and the necessity for adequate training. The development of a video lesson is demonstrated using the Ted Ed platform, which enables educators to create interactive lessons by embedding questions and educational resources directly within the video content.

The study examines two video lessons designed for Vocational High School students: one focused on "Oral Hygiene" and the other on "Automotive Engine Cooling Systems." This methodology allows teachers to evaluate students' progress and engagement while also facilitating self-assessment for the students themselves. Feedback was collected through a questionnaire completed by students after the lessons, providing valuable insights into the effectiveness of this teaching approach and points for improvement. The conclusions underscore the significance of video lessons in vocational education and affirm their efficacy as a teaching tool.

Keywords: Video lesson, TedEd, flipped classroom, Health Education, Thermodynamics, EPAL.

THE INFLUENCE OF CHARLES BAUDELAIRE ON THE POEMS: "ITHACA" BY C.P. CAVAFY AND "JOURNEY TO KYTHERA" BY KOSTAS OURANIS THROUGH DIGITAL STORYTELLING

Dr. Kopsaris Kosmas
Director of the 2nd Gymnasium of Preveza
e-mail: kkopsaris@hotmail.com

ABSTRACT

The aim of this specific presentation is to detect and capture the intertextual aspects of Baudelairean poetry in emerging Greek poets through digital storytelling. Initially, the importance of storytelling, its contribution to the educational process, as well as the basic elements that govern narratology will be explained. The basic principles of digital storytelling, the stages of its creation in relation to the learning benefits at the level of recruitment will be examined.Methodological tools for utilizing digital storytelling will be presented, with the main goal of students acquiring an expansive perspective and understanding of literature at a comparative and intertextual level. Emphasis will be placed on the selection of appropriate digital tools that highlight the idea of the journey to utopia as a key means of visual storytelling with strong cinematic resonances. The concept of travel is catalytic as a motif for activating creative imagination. On this basis, Baudelairean poetry launched ground probes into the activation of the invisible mechanisms that hold the cosmic order together. Baudelaire's constant echo is evident in modern and postmodern Greek poetry in issues related to escape to the hereafter as a non-place, constituting a potential field of alternative experience of being. Baudelaire poetically marked the eternal transition within the crowd. He determined the destiny of modern man, condemned to the vigorous struggle of opposing forces, to the border between light and darkness, to the search for inner fullness and emptiness, to the claim of a smooth tomorrow that would counteract the collapse into the depths of existence. Through digital storytelling in literature, students will be able to assimilate in a highly creative way the importance of travel as a means of inner search and at the same time familiarization at the level of external reality with hitherto unexplored fields. The impact of digital storytelling on poetry marks the activation of the magic of poetic images to the fullest, creating a unique poetics of technology. The expected goals of this specific presentation are related to cultivating a broad perspective in students and, at the same time, familiarizing them with poetry as a timeless field of inspiration.

Keywords: digital storytelling, narratology, iconographic storytelling.

THE APPLICATION OF DIGITAL MEANS FOR DISTANCE TEACHING OF TECHNICAL SUBJECTS: APPLICATION STUDY FOR ROAD DESIGN COURSE

Lemonakis Panagiotis
Assistant Professor
School of Civil Engineering, Division of Transport and Project Management, Highway Laboratory, Aristotle University of Thessaloniki
Thessaloniki, Greece
e-mail: plemo@civil.auth.gr

Kaliabetsos Georgios
PhD
University of Thessaly, Department of Civil Engineering
Volos, Greece
e-mail: gekalia@uth.gr

Fotini Kehagia,
Professor
School of Civil Engineering, Division of Transport and Project Management, Highway Laboratory, Aristotle University of Thessaloniki
Thessaloniki, Greece
e-mail: fkehagia@civil.auth.gr

ABSTRACT

Distance learning and the examination of higher education courses are challenging tasks for both teachers and students. The qualitative and quantitative characteristics of the information to be communicated make the investigation and use of the most appropriate digital media necessary. In addition, the reduced and sometimes non-existent interaction between teachers and students and the limited, therefore, feedback throughout the educational process require the implementation of innovative teaching procedures. The recent mandatory implementation of all teaching activities in higher education and not only because of the pandemic, has highlighted the weakness of the system of teachers and digital media in order to maintain a level of study equal to that prevailing in the pre-pandemic era. At the same time, however, it was also an opportunity, especially because of the extended duration of distance education, to develop tools and procedures that will be able to offer an increased level of knowledge at any time. Besides, the realization of distance education in secondary education in the event of an extraordinary or unforeseen event has recently been legislated by the Ministry of Education, Religious Affairs and sports as well as the possibility of distance training in higher vocational schools (former Institute of Vocational Training (IVT)). In higher education, distance assessment of students under conditions has been in force for three years, which was recently applied in many universities during the final exams of the fall semester of the academic year 2023-2024. It is therefore possible that distance learning will be repeated in the future and hence it is necessary to look for methods that will deliver the expected result.

This paper describes how the educational process was covered, including the final assessment of students, in the context of a higher education course taught at the Department of Civil Engineering of the University of Thessaly and related to the Highway Engineering. This course is included in the study guides of the Departments of civil and rural and surveying engineering both in Greece and abroad. Both the technical means and the methodology applied throughout the academic semesters are analyzed and statistics on student performance are presented before and during the period of the distance learning process. It is worth noting that within the framework of this course the students developed a particularly demanding semester theme concerning the integrated study of a road project with weekly progress monitoring sessions and strict intermediate progress dates using a design program.

The research showed that during distance learning, the initial interest in developing the semiannual theme was high but fewer students than in other years completed it. In addition, during the first distance examination period, the percentage of successful students was particularly high, which decreased to pre-pandemic levels in the following examination periods.

The project aspires, among other things, to contribute to those fellow teachers who seek an effective process of distance delivery of lessons and conducting examinations using digital media. What has also been shown in the context of the research is that with the available digital media in universities, the levels of knowledge offered both qualitatively and quantitatively during the distance and in-person teaching and examination of this course and others with similar requirements and way of teaching, based on the percentage of students who received a promoted degree, may be similar.

Keywords: Distance teaching, distance evaluation, semester theme, digital media.

ORGANIZING THE MUSIC LESSON WITH PADLET

Michailidou Matina
Music Science Educator
6th Junior High School of Kozani
Kozani, Greece
email: tiniomi22@gmail.com

ABSTRACT

The integration of digital technologies into teaching practices constitutes an integral part of modern educational reality, offering new possibilities for organizing and enriching the learning process. In this context, the present work focuses on the use of the digital platform Padlet as a tool for managing and enhancing the teaching of Music in secondary education.

Padlet is an interactive online application that allows the creation of collaborative digital boards, where teachers and students can post multimedia content such as texts, images, videos, and audio files. The flexibility of this tool makes it particularly suitable for the Music course, as it enables the creation of collective projects, the posting of student recordings, the exploration of musical genres, and collaboration in compositional and analytical musical tasks.

Specifically, this work presents best practices for utilizing Padlet in Music teaching, with an emphasis on the creation of interactive activities (interactive maps of musical genres, posting of recordings and exchange of opinions, collaborative music composition, research projects on composers and musical movements, creation of interactive quizzes and games, analysis of musical works and listening with comments, digital portfolios of music assignments, creation of an electronic classroom), all of which enhance the learning experience.

The prerequisites for creating a Padlet by the teacher involve setting up an account on the platform through registration with an email or via a Google/Microsoft account, selecting the appropriate plan (free or premium version), connecting with students (access via invitation code, link, or integration into a learning management system, e.g., Google Classroom, Microsoft Teams), setting privacy and collaboration preferences (public, password-protected, private), and adapting the layout (various formats such as grid, timeline, map) to fit the needs of the lesson.

The use of Padlet in the Music classroom provides a dynamic and collaborative approach to learning, enhancing student engagement and fostering creativity and critical thinking. Moreover, the use of multimedia content allows the adaptation of instruction to different learning styles, facilitating differentiation and personalization of the educational process.

This work will present the Padlets that have been created in recent years for the needs of the Music course in all three grades of Junior High School. Each academic year, every class has its own Padlet, where data related to the annual project and weekly teaching content is posted.

Padlet is a particularly useful digital tool for organizing the Music course, allowing the development of a more participatory and creative educational experience. Through the presentation of these best practices, the importance of integrating digital technologies into teaching practices is highlighted, contributing to the shaping of a modern and effective learning environment.

Keywords: teaching, Music lesson, digital tools, Padlet

SOPHOCLES' ANTIGONE IN PRESCHOOL EDUCATION: DIGITAL TOOLS AND PEDAGOGICAL APPROACHES.

Papageorgiou Foteini
Early Childhood Educator, MSc
Eighth Nursery School of Ioannina

Damani Aikaterini
Educator PE 60,MSc, Phd
Primary Education Consultant of Arta

ABSTRACT

Ancient Tragedies in preschool education can be an important teaching tool. Teachers must integrate them into everyday educational life and incorporate them into the curriculum. The benefits of Drama, as a teaching method, are multiple. First of all, Drama can offer teachers the opportunity to reach students who have difficulty following the educational process, which is based on traditional methods, increasing their interest in what is happening in the classroom. In addition, it has been shown that it connects students with themselves and others, transforms the traditional learning environment and challenges students to approach knowledge in a different, multi-sensory way, which integrates students as a whole within the educational process and utilizes knowledge, experiences, and emotions throughout the process. Emotion, which is at the heart of drama, is often ignored in education. However, an educational process that relies only on logic and isolates emotion cannot offer students a holistic cognitive act and, by extension, a holistic education.

This paper focuses on investigating the role that Sophocles' Antigone approach can play in Preschool Education, utilizing digital tools to enhance the learning experience. The aim is to highlight the values of the play – Free Will, Religion and its relationship with the City, Unwritten Divine Laws, Justice, Duty, Love – and to search for teaching practices for teaching them to preschool children. The methodology of the work is based on the use of digital tools, such as interactive presentations with images, videos and audio, digital games that enhance the understanding of the values of the play, as well as applications such as Puppet Pals and Toontastic, which allow children to create and narrate their own versions of the story. In addition, digital design is utilized as a tool of expression and reflection, giving children the opportunity to visually capture their ideas and feelings. The findings of the study show that the integration of digital tools in the teaching of Antigone in preschool education enhances children's active participation, promotes creative thinking and facilitates the understanding of abstract concepts. The results highlight the importance of interactive learning and the use of technology in shaping an attractive and pedagogically effective teaching environment.

Keywords: Drama, Sophocles, Antigone, Values, Preschool Education, Digital Tools, Pedagogical Approaches.

THE CORRELATION BETWEEN DIGITAL LITERACY AND COMMUNICATIVE LANGUAGE ACTIONS IN FOREIGN LANGUAGE LEARNING. GERMAN LANGUAGE: EXAMPLES FROM TEACHING PRACTICE WITH PRIMARY SCHOOL STUDENTS

Dr Papadimitriou Evangelia
Senior Fellow Teacher
University of Thessaly
Volos, Greece
email: evpap@uth.gr

Harmanta Argyroula-Arietta
German language Teacher in primary education
Halkida , Evia
email: ariettaharma@gmail.com

ABSTRACT

Teaching of foreign languages has been significantly transformed by the Common European Framework of Reference for Languages (CEFR), which is an international guideline that categorizes language proficiency into three main levels: A (basic user), B (independent user), and C (proficient user). It also defines learning outcomes as can- do-statements at the end of a learning process. Consequently foreign language educators can structure their teaching focusing on the learning objectives, learning strategies and assessment, which are defined by descriptors of communicative activities at each proficiency level. According to Common European Framework of Reference for Languages, which prioritizes learning outcomes approach and diverse methodological strategies, foreign language teachers have the flexibility to continually update and enrich course content focusing on applied communication and on the individual learner's interests, needs and achievements.

Therefore, in the last few years integrating digital literacy into everyday communicative and linguistic activities has become essential. The updated CEFR (2020) includes learning outcomes related to digital competencies. Given that digital tools also shape and transform students' social and educational environment, it is important for teaching to explore key questions such as: How does the integration of digital tools support the alignment of digital activities with learning objectives and the development of personalized learning in foreign language education? How can digital tools, (for example educational platforms or interactive games) can promote metacognitive skills like self-regulated learning or self-assessment? How can language teachers use these tools to support effectively differentiated instruction or blended and distance learning? In what ways can digital literacy increase student interaction, collaborative learning in foreign language teaching?

The presentation will conclude with concrete examples showcasing their implementation of digital tools in German language teaching to 5th-grade students at Level A (Beginners).

Keywords: German language, primary school, digital literacy, communicative language activities, digital competencies, differentiated instruction.

DIGITAL PATHWAYS TO ANTIQUITY: TEACHING ANCIENT GREEK THROUGH EPIGRAPHY AND EDUCATIONAL TECHNOLOGY

Rosidou Dimitra
Philologist, M.A. in Language Teaching and New Technologies in Language Communication and M.A in Ancient Greek Philology. Member of DiGIA research project.
Aristotle University of Thessaloniki
Thessaloniki, Greece
email: rosidoudimitra@gmail.com

ABSTRACT

In recent years, there has been a growing scholarly interest in examining both educators' and students' attitudes toward Classical Studies, as well as the impact of using technological tools—such as educational applications, digital educational games, software, and other platforms—in the teaching of philological subjects. This interest arises from the observation that students often show low motivation for learning Ancient Greek language and literature. It has long been acknowledged—over the past five decades—that the integration of *Information and Communication Technologies* (ICT) into educational systems offers multiple benefits, but also presents notable challenges.

The theoretical framework of this study is based on the view that the engaging environment of digital games and the flexible learning environment enabled by successful ICT integration can serve as sources of learning motivation.

This paper focuses on the potential use of digital media in teaching the Ancient Greek language, aiming to familiarize students with both the language and the culture through the study of Ancient Greek inscriptions. Without such inscriptions, our understanding of ancient Greek civilization would be incomplete and potentially distorted, as literary and historical texts alone cannot fully capture the complexity of the ancient Greek world.

Inscriptions, as primary and direct sources, provide invaluable information and are often preserved in better condition than other written records due to the durability of the materials on which they were inscribed. Ancient Greek epigraphy, more specifically, concerns the study of inscriptions written in the Greek language and alphabet on hard materials such as stone, marble, pottery, wood, bone, or metal.

The aim of this study is to demonstrate how digital tools can facilitate access to and interpretation of inscriptions, thereby enhancing students' engagement with the Ancient Greek language and deepening their connection to the ancient world.

The methodology follows a multidimensional approach, combining theoretical research with practical application. Initially, a literature review was conducted on the teaching of Ancient Greek and the use of digital media. Subsequently, an educational program was designed and implemented, focusing on the development of digital learning objects—such as the *Phrasikleia*—which can be adapted for use at all levels of education, including university students of Philology. These activities are carried out within the framework of the DiGIA research project, based in the Department of Philology at Aristotle University of Thessaloniki.

Through interactive engagement, students develop critical thinking and linguistic skills, while gaining a deeper appreciation of the historical and cultural significance of inscriptions. At the same time, direct contact with authentic epigraphic material opens up new pedagogical possibilities, making the study of Ancient Greek more accessible and engaging.

Keywords: Ancient Greek epigraphy, Ancient Greek language, digital learning object

USE OF DIGITAL TOOLS IN EDUCATION

Vasiliki Sarkatzi
Mathematics Teacher (PE03), Informatics Teacher (PE86), MEd, MSc
Principal of the 3rd General Lyceum of Trikala "Odysseas Elytis"
Trikala, Greece
email: sarkatzikiki@gmail.com

ABSTRACT

The paper addresses the integration of digital tools in education and how they influence teaching and learning. The introduction highlights the use of digital tools such as educational platforms (e.g. Google Classroom), interactive courses (e.g. Kahoot!), educational videos (e.g. YouTube), and collaboration tools (e.g. Microsoft Teams). These tools enhance learning, facilitate communication and collaboration, and enable personalized learning experiences for each student.

In the literature review, the paper analyzes the role of Information Technology and ICT in education. It refers to the need for students to acquire basic knowledge about technology and ICT, while at the same time developing critical thinking and social behavior skills. Despite students' familiarity with digital technologies, research data shows that students do not fully utilize the potential of ICT in the learning process. Therefore, education must incorporate activities that enhance critical thinking and problem-solving skills.

The paper also examines the learning theories that influence the integration of ICT in the educational process, such as behaviorism and constructivism.. It also presents the evolution of the integration of ICT in education, from the use of mass media to their full integration into the educational process.

A significant part of the paper concerns Mobile Learning (m-learning), which uses portable devices such as mobile phones and tablets to support learning, while highlighting the importance of collaboration, critical thinking and lifelong learning. It is characterized by interactive elements, personal adaptation and immediate feedback, enhancing the effectiveness and interaction in the learning process. Finally, the paper refers to the use of Artificial Intelligence (AI) in education, which offers personalized learning experiences and supports the educational process with the help of algorithms and neural networks.

Overall, the integration of digital tools and ICT in education offers many possibilities for improving teaching and learning, but requires a careful approach to their effective utilization.

Keywords: Digital Tools, Artificial Intelligence, Mobile Learning, education, ICT

THE UTILIZATION OF AUTOMATED EDUCATIONAL VIDEO SUMMARIES IN THE EDUCATIONAL PROCESS

Chasanis Vasileios
Electrical Engineer, PE83 & Computer Scientist, PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: vasileioschasanis@gmail

Gaki Vassiliki
Chemist, PE04.02 & Computer Scientist PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

Chasanis Konstantinos
Mathematician, PE03
High School of Myrina
Limnos, Greece
e-mail: kxasanis@gmail.com

ABSTRACT

The increasing use of educational videos in teaching creates new challenges and opportunities for improving the learning process. Automated summaries of educational videos, based on machine learning algorithms, offer an innovative tool that can be utilized for enhancing comprehension, student self-assessment, and feedback from educators. This work explores the ways in which automated summarization of educational videos can contribute to the more effective organization of the educational process.

The integration of educational videos in teaching may have helped educators; however, their comprehension can be demanding at times, particularly when the content is technical or of long duration. Automated summarization of a video can provide students with a brief and comprehensive presentation of its main points, facilitating information absorption and reducing cognitive load. Additionally, students can use the summaries for previewing content before viewing or for quick review after video completion, thus enhancing comprehension and memorization of basic concepts. We must not forget that students live in an era of rapid technological development and in the age of "speed" where they are bombarded daily with dozens of brief pieces of information in text format (Twitter) and video (shorts, TikTok). A relatively short summary of an educational video, beyond its educational nature, appears to better match the information pattern that students receive daily, making it more accessible and attractive compared to a long-duration video.

The main benefits for students include quick material review as well as better understanding of key points. Comparing an automated summary with the summary that students have created on the same topic can help them identify any oversights, misunderstandings, or gaps in their comprehension. This process enhances their metacognitive skills and helps them become more autonomous in their learning. They can also utilize summaries to quickly review the basic points of a chapter before examinations.

From the educators' perspective, automated summaries can be utilized as a feedback tool or for personalizing instruction. Educators can review the generated summaries to identify which video points challenge students and adjust their teaching approach accordingly. Furthermore, the ability to generate summaries at different levels of detail allows for differentiated instruction, responding to the needs of students with different levels of comprehension, different readiness levels, different interests, and generally different learning profiles. Another important application concerns accessibility. Automated summaries can support students with learning difficulties or those who prefer written information over auditory information, especially when the video is in a foreign language and subtitles can be incorporated into the summary. By providing a concise version of educational content, students can better understand key points, even if they struggle with direct processing of spoken language. Additionally, both students and educators can quickly identify the most important points of a video, save time, and improve the learning experience. For summary extraction, software (Chasanis et al., 2014) was used on educational videos from the Electrical Engineering Department and the Health Department, and overall student acceptance exceeded 80%.

In conclusion, automated generation of educational video summaries constitutes a powerful tool that can enhance the educational process on multiple levels. It helps students organize knowledge, self-assess, and improve their skills, while simultaneously offering educators useful means of feedback and instructional differentiation. The integration of these tools in modern education can lead to a more flexible, effective, and accessible learning environment.

Keywords: video summarization, educational video, self-assessment

TA25: Digital storytelling in teaching practice

THE CONTRIBUTION OF DIGITAL STORYTELLING TO LITERATURE IN SECONDARY EDUCATION: THE CASE OF THE PLATONIC ALLEGORY OF THE CAVE

Dr. Kopsaris Kosmas
Director of the 2nd Gymnasium of Preveza
e-mail: kkopsaris@hotmail.com

ABSTRACT

The aim of this specific presentation is to convey the catalytic concepts that underlie the allegory of the cave through digital storytelling. Initially, an overview will be given of the importance of literary education in the 21st century, as well as the importance of literature in the modern era as a means of utilizing new literacies. Reference will be made to the extent to which digital storytelling can contribute to the familiarization, creative deepening and assimilation of themes governed by strong conceptual divisions, such as knowledge-ignorance, light-darkness, bonds-freedom, theoretical life as opposed to active-practical life. The role of students in the design and successful implementation of this specific educational scenario will be emphasized. The Platonic myth of the cave constitutes an inexhaustible reservoir of inspiration for modern creators. Methodologically, digital storytelling is applied during the reading phase of the allegory and at a second level in the post-reading phase so that students can make complex critical associations and intertextual approaches. For a diagnostic approach through digital storytelling, students were assigned tasks, such as constructing a timeline capturing the stages of disengagement using the online tool timerime or creating a multimedia poster using the online tools popplet or glogster.

On this basis, the retelling of the Platonic allegory of the cave through the tools of digital storytelling contributed significantly to the students' understanding of its difficult philosophical concepts, making philosophical narrative more understandable and contributing to the consolidation of the concept of representation in literature, as well as more specific narrative means and techniques, such as dialogue or imitation.

At the same time, digital exploitation through this specific case is useful for understanding the deeper and universal meanings inherent in Plato's allegory of the cave as a literary genre that communicates with numerous works of modern literature. Therefore, the Platonic echo is related to the possibility of self-realization when the current reality crushes self-activity and heterodetermines the individual. Through a digital narrative, students, like every reader, have the opportunity to be initiated into the sanctuaries of Plato's cave, following the prisoners on the uphill path towards the freedom of existence. This implies that through a digital representation, students are able to internalize and fully grasp a theoretical model that may seem particularly difficult and inaccessible to them.

In summary, through digital tools, students become active markers of a represented story, they experience the Platonic allegory, having the sense of a personal contribution to the transition of the prisoners from darkness to light. The philosophical journey thus turns into a personal journey to the full knowledge of the cosmic mechanism as the missing point and at the same time the ultimate goal of the Platonic allegory of the cave.

Keywords: digital storytelling, Platonic allegory

DIGITAL STORYTELLING AS A CRUCIAL PEDAGOGICAL FRAMEWORK FOR ENHANCING THE FUNCTIONAL MANAGEMENT OF FRIENDLY RELATIONSHIPS IN STUDENTS FROM A SPECIAL PRIMARY SCHOOL

Mastrogiannis Alexios
Quality Supervisor of Education
Primary Education of Aitoloakarnania
Missolonghi, Greece
email: alexmastr@yahoo.gr

Tsakiri Georgia
Teacher PE70.50
Primary Education of Aitoloakarnania
Agrinio, Greece
email: gogoulini17@windowslive.com

Katsiopi Paraskevi
Primary School Principal
Primary Education of Aitoloakarnania
Agrinio, Greece
email: voulakats@gmail.com

ABSTRACT

Storytelling is a fundamental dimension of human culture. It is a natural way of communicating and organizing experiences over time. Its power lies in its ability to evoke emotions, because it inspires the imagination, attracting more and better interest than any other form of information. Particularly, in the educational context, storytelling helps students to express themselves better, to develop their imagination and vocabulary, as well as facilitating the externalization of emotions, the development of empathy, critical thinking, and social skills.

Digital storytelling employs multimedia applications, such as text, sounds, music, comics and video. Over the past 25 years, it has evolved into a particularly powerful cognitive tool and teaching medium. By combining the ancient art of storytelling with the capabilities of technology, it provides a multi-sensory learning environment. In Special Education, digital storytelling contributes to the activation of interest and the facilitation of the achievement of learning objectives, constituting an important teaching and learning tool, especially in language instruction.

This paper presents a teaching proposal based on a digital fairy tale entitled “Two friends, what friends!”, which was designed and authored by a Special School teacher, for students with disabilities and/or special educational needs. Through the study of this specific story, students are given the opportunity to develop their linguistic and social awareness, as well as to learn about the true human wealth, by highlighting the high values of friendship, acceptance and mutual support. Given that students in Special Schools have difficulty making friends, such interventions are considered necessary for their integration, their healthy social development, as well as for their overall development as active and equal citizens.

Keywords: Digital storytelling, friendship, Special Education

DIGITAL STORYTELLING AS A TOOL FOR CULTIVATING CRITICAL THINKING IN STUDENTS

Dr Ntoka Aglaia
Supervisor of Quality in Education, DIPE of Arta
Consultant for Primary Education
Primary Education Directorate of Arta

ABSTRACT

This literature review examines in depth the relationship between digital storytelling and the development of critical thinking in students. The aim of this study is to highlight how the creation, analysis, and evaluation of digital narratives can significantly enhance students' ability to assess information critically, formulate valid arguments, and solve complex problems creatively.

The methodology followed is based on a systematic literature review, with selection criteria including relevance to the field of digital storytelling and critical thinking, publication in reputable scientific journals, and the chronological proximity of the studies (last decade). The sources include theoretical articles, empirical studies, and meta-analyses focusing on the educational applications of digital storytelling.

This review covers a wide range of research studies and examines the applications of digital storytelling in various educational settings, from primary to higher education. It delves into the challenges and opportunities arising from the integration of digital storytelling into educational practice, as well as its impact on the development of 21st-century skills, such as collaboration, communication, and creativity.

Among the key thematic areas analyzed are the precise definition and fundamental characteristics of digital storytelling, the theoretical frameworks linking storytelling to critical thinking, specific applications of digital storytelling in education, the tools and techniques used for creating and analyzing digital stories, and the outcomes of digital storytelling in developing critical thinking skills. Additionally, challenges and recommendations for the effective integration of digital storytelling in education are explored.

The contribution of this review lies in highlighting both the key findings of existing research and the existing gaps. Specifically, it is found that digital storytelling positively impacts critical thinking, but more empirical studies are needed to examine its long-term effects and its adaptation to different educational environments.

In summary, this literature review concludes that digital storytelling is a highly promising tool for fostering critical thinking in students. The creation and analysis of digital stories can significantly enhance active learning, collaboration, and the development of skills essential for success in the modern digital world. The effective integration of digital storytelling in education requires appropriate training and support for educators, access to modern technological tools, and the creation of a supportive learning environment that encourages innovation and creativity.

Keywords: Digital storytelling, critical thinking, skills development

DIGITAL STORYTELLING IN EARLY CHILDHOOD EDUCATION AND SPECIAL EDUCATION. CHILDREN CREATE DIGITAL STORIES

Panagiotidou Evangelia
Kindergarten Teacher (PE60)
M.Ed.: "Education in Intercultural Readiness", Democritus University of Thrace (DUTH)
email: litspan@hotmail.com

Vellios Labros
Inclusion Class Teacher (PE70)
M.B.A.: "Business & Organization Administration", University of Ioannina (UOI)
email: vellioslam@yahoo.gr

Manousi Marianthi
Special Education Teacher (PE71)
M.Ed.: "Education in Intercultural Readiness", Democritus University of Thrace (DUTH)
email: maniaman246@gmail.com

Manousi Dimitra Panagiota
Special Education Teacher (PE60EAE)
M.Ed.: "Special Education and Training", University of Nicosia
email: Dimitra2man@gmail.com

ABSTRACT

Today's children live in a digital world and new technologies are an important element of children's culture. Prensky (2006) used the term "digital natives" to refer to today's children who speak the digital language of computers, video games and the internet. In contrast, those who were not born in the digital age are considered "digital immigrants" because they have adopted many aspects of ICT, just like those who learn a second language later in life. (Nikolopoulou, 2018).

In the context of education, the benefits of digital technology are particularly emphasized, as computers offer children access to new, unknown worlds and stimulate their thirst for learning.

A special place in the field of preschool education and Special Education is occupied by storytelling, which effectively contributes to learning. After all, learning is effective when it is offered to children in a multimodal, enjoyable and entertaining way.

With the emergence of new technologies, a new form of storytelling was created, digital storytelling (Digital Story telling), from which children derive many benefits, acquire further skills and not just a simple acquaintance and familiarity with computers. They interact with their classmates, creating relationships of intimacy and trust, express themselves creatively and acquire digital skills.

Keywords: New Technologies, Digital Storytelling, Preschool Education, Special Education

TA26: Educational assessment using digital media and tools

THE USE OF EYE-TRACKING TECHNOLOGY FOR THE ASSESSMENT OF PRAGMATIC SKILLS IN CHILDREN: A SYSTEMATIC REVIEW

Gargala Vasileia
PhD Candidate,
Department of Speech and Language Therapy,
University of Ioannina,
University Campus B', 45500, Ioannina, Greece
e-mail: v.gargala@uoi.gr

Toki Eugenia
Professor,
Department of Speech and Language Therapy,
University of Ioannina,
University Campus B', 45500, Ioannina, Greece
e-mail: toki@uoi.gr

ABSTRACT

Pragmatic competence is a crucial component of social communication, especially during childhood. Children with Pragmatic Language Impairment (PLI) or other Neurodevelopmental Disorders (NDDs) often present with deficits that affect their social integration. Eye-tracking technology offers an innovative and objective assessment tool, enabling the recording and analysis of eye movements and attentional focus during communication tasks. This systematic review, conducted according to PRISMA 2020 guidelines, analyzes 43 relevant studies (2019–2025) from PubMed, aiming to evaluate the application of eye-tracking in the detection of early pragmatic indicators. The findings suggest that eye-tracking technology can identify subtle early differences in children's social-communicative abilities, thereby contributing to timely diagnosis. Reduced duration of social gaze and limited use of smiling during interaction are associated with increased symptoms in children with autism and difficulties in processing social cues. The use of eye-tracking enhances diagnostic validity, supports early intervention, and is proposed as a tool to be integrated within therapeutic and educational programs.
This technology offers new perspectives for improving the quality of life of children with neurodevelopmental disorders through targeted and evidence-based intervention.

Keywords: eye-tracking, pragmatic skills, neurodevelopmental disorders, early diagnosis, speech and language therapy, educational intervention

TA27: Educational administration and digital technologies

T.P.E. AS A TOOL FOR MANAGING AND IMPROVING PERFORMANCE IN EDUCATION

Chasiotis Nikolaos
Electronics Education Consultant P.E.84 Epirus
Counsellor's Office, Ioannina DPE
Veria, Greece
email: nikoshasi@gmail.com

ABSTRACT

The organizational and administrative reconstruction of the modern Greek school unit has as its main objective the smooth and efficient operation of the unit, in its internal context of operation, but also in the wider social fabric that exists and evolves. The use of Information and Communication Technologies (ICT) is a recurring reality and can offer, through practical and modern technological tools, more efficient and effective performance of human resources. Without affecting what type of organization it will be, i.e. whether it serves a school or a company, an efficient and reliable management information system, (MIS) is always a great investment for the organization. Its evaluation at regular intervals to judge the return on this investment is necessary.

An essential role of Educational Information Systems is to reduce, in the phase of planning individual measures of educational policy, the lack of certainty by providing information that can be used to make the right decisions in the right way. In other words, the benefits implied by the use of educational information systems are linked to the increase in the efficiency and effectiveness of the administration and educational staff of any school organization. Efficiency is related to the ability to make decisions correctly. Effectiveness refers to the ability to make the right decisions. Therefore, making the right decision does not mean making the right decision.

Educational Information Systems do not directly provide standardized decisions to users, nor do they suggest a pre-designed way of making decisions that ensures success. They serve the persons involved with educational issues in the decision making process by providing a range of selected information that are the outputs of processing appropriate data entered into the computer. Therefore, the person who will be considered to make some important decisions, from the field of education, will rely not only on the information provided by the information system, but also on his/her experience, judgment and intuition. Finally, one issue to be considered is the functionality of the existing information system and the need to rebuild or expand it.

The aim of this paper is to present the potential of information systems to provide a productive and efficient way to serve the needs of school structures. They are a useful tool in the hands of the administration, as they are able to know at any time the programming that has been carried out as well as all the important information related to it.

Keywords: Information technology, Digital reconstruction, Educational information systems.

THE CONTRIBUTION OF INFORMATION SYSTEMS IN EDUCATION: EVALUATING THE EFFECTIVENESS OF MYSCHOOL

Kotzamouratoglou Georgios
Secondary Education Teacher, Educator in Electrical Engineering and Economics
1st Vocational Training Center of Preveza, Secondary Education Directorate of Preveza
Preveza, Greece
email: kotzamou@sch.gr

ABSTRACT

The digital era and the integration of information systems in organizations have led to significant changes in the management of educational structures, with information systems playing a crucial role in educational administration. This paper evaluates the contribution of Myschool information system to Greek education, its effectiveness, advantages and disadvantages, as well as proposals for its improvement, based on a literature review.

Myschool is an integrated system that allows the centralized management of information regarding infrastructure, students, teachers, and school unit processes. Its implementation has significantly improved educational administration by reducing bureaucracy, increasing transparency, and facilitating decision-making. The key benefits of using Myschool include the effective management of student records, the reduction of workload, and instant access to attendance, grading, and monitoring data. Digitalization has accelerated data processing and storage, providing a comprehensive overview of the educational status of each school unit. Additionally, Myschool enhances communication between teachers, parents, and administrative staff, offering continuous updates on student progress.

Despite its advantages, there are issues regarding the need for further simplification, facilitation, and automation of tasks within Myschool platform. Many teachers and administrative staff struggle to use it effectively due to a lack of training. This highlights the need for interface and functionality improvements to make it more user-friendly. The lack of guidance and training results in reduced efficiency and limited use of the system's capabilities. Further automation in data entry and updating processes would help reduce the workload for educators and administrators. The ability to extract data in a specific format from other programs (e.g., Excel, timetable software) would facilitate the faster input of large data volumes (such as laboratory equipment) or the easier entry of school timetables generated by other software. Ideally, Myschool should also include a timetable generation feature. Additionally, functionalities such as recording meeting minutes or automatically identifying teacher shortages and surpluses would assist in better planning for the upcoming academic year.

Furthermore, integration with other government platforms could streamline tasks, reducing the need for multiple data entries and enabling instant data validation. The system appears to be less capable in data analysis compared to international systems. A comparison of Myschool with systems such as SIMS (UK) and PowerSchool (USA), along with the examination of existing studies, revealed that the Greek system lags in data analysis and adaptability to school needs.

To enhance Myschool, proposed improvements include the addition of data analysis tools, integration with other platforms, and the development of a more user-friendly environment. Continuous user training, strengthening security mechanisms, and enabling data retrieval from other applications, are also crucial for optimizing the system's usage. Additionally, differentiated access for teachers, students, and parents could further enhance Myschool's role.

In conclusion, Myschool has played a significant role in modernizing Greek education by providing new tools for managing and analyzing educational data. However, for it to offer even more benefits, continuous system development, user-oriented adaptation, ongoing training, and improved data security and accessibility are essential. The future development of Myschool can significantly contribute to improving the effectiveness and quality of educational administration in Greece and enhancing teaching processes.

Keywords: Information systems, educational administration, Myschool, Digital data management.

EVALUATION OF THE MYSCHOOL PLATFORM: TEACHERS' VIEWS, PROBLEMS AND IMPROVEMENT STRATEGIES

Gaki Vassiliki
Chemist, PE04.02 & Computer Scientist PE86
Evening Vocational High School of Preveza
Preveza, Greece
email: iliasde66@gmail.com

ABSTRACT

This research focuses on the use of the MySchool platform by teachers and analyses their views on its functionality, its impact on school administration and the problems they face when using it. The aim is to investigate teachers' use of the platform, evaluate its functionality, and identify the problems and needs that arise during its use. It aims to understand how teachers perceive the contribution of the platform to the educational and administrative process of the school, to highlight differences in views between new and experienced teachers, as well as principals, and to suggest strategies for enhancing functionality and resolving the technical issues they face.

The research, which was carried out at a national level, is part of my thesis in the framework of the postgraduate program "Business and Organization Management" of the Department of Accounting and Finance of the University of Ioannina. The research is based on a sample of 143 teachers, of which 75 are women and 68 are men. The majority of the participants are aged 36-50 years old, hold a postgraduate degree, work in secondary schools and have not been trained in the Myschool information system and have no experience of using other information systems.

The results show that teachers' views on the MySchool platform are generally positive, with most of them finding it easy to use and the experience positive. However, variations in the evaluation of the platform are identified, mainly focusing on technical problems, such as difficulty in compatibility with other systems. Despite these difficulties, teachers acknowledge that MySchool contributes significantly to school data management and administrative tasks, although the survey shows that it has not significantly reduced their administrative burden.

Teachers express the need for new features on the platform, such as the possibility to request certificates online and receive real-time notifications, which would greatly facilitate their daily work.

The research concludes that there is a need for technical improvements to the platform and its integration with other digital applications and systems in order to enhance its overall functionality and better serve the needs of teachers and the school community. Suggestions for improving MySchool include developing new tools and optimising existing ones to enhance the efficiency and usability of the platform in the educational process.

Keywords: myschool, research, functionality, user perceptions.

DIGITAL TRANSFORMATION AND EDUCATION: THE CONTRIBUTION OF MANAGEMENT INFORMATION SYSTEMS MYSCHOOL

Gaki Vassiliki
Chemist, PE04.02 & Computer Scientist, PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

ABSTRACT

The paper focuses on the study and analysis of Management Information Systems in the field of education, with particular emphasis on the MySchool system in Greece. Its aim is to examine the role of these systems in the effective management and storage of school data and their contribution to the digital transformation of the educational system. The paper highlights the importance of Management Information Systems, such as Student Information System, Learning Management System, Decision Support System, etc., in enhancing administrative and academic processes, supporting strategic decision making and achieving greater transparency and efficiency in educational institutions.

The methodology used includes a review of the literature on Management Information Systems in education, the analysis of the Greek MySchool system, as well as the reference to international studies and examples from other countries. There, the challenges associated with the implementation of these systems, such as resistance to change, lack of qualified staff and technological limitations are evaluated.

The findings of the study show that Management Information Systems, such as MySchool, contribute significantly to the better management of student and school data, as well as to the facilitation of administrative processes. At the same time, the integration of scattered systems into a single platform enhances transparency and efficiency, allowing for continuous monitoring of learning performance, teacher evaluation and improved strategic decision-making. During the COVID-19 pandemic, MySchool helped support electronic communication, demonstrating the necessity of digital technology in education.

Overall, the paper highlights the importance of Management Information Systems in the educational process, recognizing their advantages in the development of educational systems and strategic decision making, while highlighting the challenges associated with their implementation. The success of these systems depends on their appropriate support, training and adaptation to the current needs of education.

Keywords: Digital transformation, Management Information Systems, MySchool, education.

QUALITATIVE EVALUATION OF OPSYD AS AN EGOV SYSTEM FOR EDUCATION MANAGEMENT

Baga Dina
Administrative Personnel – Computer Scientist
Dieuthinsi Deuterovathmias Ekpedeusis Prevezas
Preveza, Greece
e-mail: dinabaga@sch.gr

Siriou Anastasia
Secondary School Teacher
Tripoli, Greece
e-mail: ansiriou@gmail.com

Skartsili Vassiliki
Administrative Personnel
Kentro Eksipiretisis Politon (Greek Citizen Service Offices)
Kalamata, Greece
e-mail: vasilikiskartsili8@gmail.com

Koulogeorgiou Dimitra
Vodafone Personnel
Tripoli, Greece
e-mail: dimitrakoulo.sar90@gmail.com

ABSTRACT

This qualitative study evaluates OPSYD (Integrated Information System for Primary and Secondary Education), an e-Government system integral to the management of personnel in Greek Primary and Secondary Education. OPSYD, classified as a human resources management information system, enables two-way interaction between educators and regional Education Directorates, allowing electronic application submissions, document uploads, and formal requests. The research, conducted between February and June 2024 through structured interviews in the regions of Epirus and Peloponnese, involved 15 non-permanent teaching staff and 7 administrative personnel from regional education directorates. The interviews aimed to document user interactions, identify difficulties, and gather suggestions for improving administrative processes.

Key findings reveal that the primary concerns are not technical issues with OPSYD itself, but rather challenges stemming from administrative procedures and their implementation, particularly the fragmentation across multiple information systems. This user group advocates for a single information system or automatic data transfer between systems and suggests allowing file updates at any time, not solely during open calls. Administrative personnel reported significant time waste due to repetitive data entry across different systems like MySchool, eDataCenter, and the Human Resource Register, none of which interoperate for automatic data synchronization.

The study concludes that designing and implementing interoperability solutions between existing information systems is imperative to enable mass data input and automated synchronization, thereby reducing processing times and allowing staff to focus on substantive tasks. It also proposes enhancing communication capabilities to facilitate timely error correction for applicants. Recommendations include decoupling document updates in OPSYD from call announcements, allowing continuous submission, and integrating AI-supported chatbots, supervised by human experts, to provide guidance to applicants. Furthermore, incorporating specialized knowledge for assigning educational specialties into the eDiplomas system would ensure automatic and accurate updating of educational specialties directly from universities.

Keywords: OPSYD, e-Government, Human Resources Management, Education Management, Administrative Procedures, Interoperability

REPORT ON THE FIRST SIX-MONTH EXPERIENCE FROM THE IMPLEMENTATION OF THE TEACHERS' ASSOCIATION DIGITAL BOOK OF ACTIONS IN SCHOOL UNITS: FROM THE CONSOLIDATED ADMINISTRATIVE RELATIONSHIPS OF TEACHERS TO THE CONSOLIDATION OF THE DIGITAL BUREAUCRACY

Christou Nikolaos
Director of the 1st High School of Arta, Computer Science,
DIDE Arta, Greece
email: nchristou@sch.gr

Kotsifakos Dimitrios
Director of the 1st Laboratory Center of Agios Dimitrios,
DIDE 4th Athens,
Post–Doctoral Fellow, Department of Business Administration,
University of West Attica, Athens, Greece,
email: dkotsifakos@uniwa.gr

Psaromiligos Ioannis
Professor of the Department of Business Administration,
University of West Attica, Athens, Greece,
email: yannis.psaromiligkos@uniwa.gr

ABSTRACT

The law on the introduction of the "Digital Teachers' Association Register" (No. 3446/16-05-2024 – Government Gazette 2988/B/28-05-2024) on May 28, 2024, and its implementation in September 2024 in schools, marked significant qualitative and quantitative changes in school administration. For those schools that implemented and applied the law and incorporated it as a "digital management" tool within their administrative procedures, they encountered underlying contradictions and conflicts of time, contradictions during implementation, but also challenges from the benefits. The implementation of this law marked a transition from the established standardized practices of the Associations' procedures to a new regulatory reality, which introduced elements and characteristics of digital transformation into the school unit, recognized by all teachers. This article, which is part of the fruitful academic dialogue of the Conference on a dynamic relationship between digital media, administrative care, and educational work, is presented in the form of a "report" and reflects experiences, difficulties, and prospects from this new reality. The presentation, from the perspective of the administration and management control of schools, does not gloss over, especially those points of the application of the law on the "Digital Book of Teachers' Association Proceedings," which acted as an obstacle to the smooth implementation of administrative work, nor does it ignore the ominous prospect of establishing collegial relationships in subordinate and hierarchical relationships that reinforce digital bureaucracy, rather than facilitating the exercise of administrative work. Above all, however, it does not hide the fact that, ultimately, superficial information is not enough for the digital transformation of schools; rather, investment is needed in the digital literacy of all members of the school community, without exclusion or bias. However, this is not a matter of legislation, but of a comprehensive, authentic, transformative administrative policy for all schools.

Keywords: Education Administration and digital technologies, Digital Book of Acts of the Teachers' Association, administrative relations of teachers, digital bureaucracy

EDUCATIONAL LEADERSHIP IN THE DIGITAL ERA: CHALLENGES, INNOVATIONS, AND TRANSFORMATIVE PRACTICES

Evangelia Boutsiou
Principal, Primary School Teacher (PE70)
1st Primary School of Stavroupoli, Directorate of Primary Education of Western Thessaloniki
Thessaloniki, Greece
email: eboutsiou@gmail.com

Georgios Margaritis
Principal, Primary School Teacher (PE70)
Primary School of Nea Mesimvria, Directorate of Primary Education of Western Thessaloniki
Thessaloniki, Greece
email: gmarg43@hotmail.gr

ABSTRACT

The digital transformation of education has radically redefined the role of educational leaders, who are now required to navigate complex environments, develop new competencies, and shape strategies that meet the demands of 21st-century education. This paper explores the main challenges, emerging innovations, and transformative practices that are reshaping educational leadership in the modern digital age.

A key challenge is the digital divide, which creates inequalities in access to technological infrastructure and digital learning opportunities. Simultaneously, increasing concerns about data privacy require the implementation of strict policies and the appointment of data protection officers within schools. The need for ongoing professional development emerges as a critical factor for the effective integration of technology in teaching, while the adoption of emerging technologies such as artificial intelligence, cloud computing, and big data demands strategic planning and targeted training.

In response to these challenges, educational leaders adopt innovative approaches, such as data-driven decision-making, which enhances the effectiveness of educational interventions and policies. Adaptive and transformational leadership fosters flexibility, collaboration, and the creation of transparent, cooperative educational environments. At the same time, tools like online learning platforms and micro-credentials are being leveraged to strengthen teachers' digital literacy and support their professional advancement.

Particular emphasis is placed on transformative practices such as personalized learning, which uses technology to tailor educational content to students' needs and interests, thereby boosting engagement and achievement. Equally important is collaborative decision-making, which promotes the involvement of all stakeholders—teachers, students, and parents—in shaping school strategy, fostering a sense of trust and shared ownership. The paper highlights examples of innovative approaches implemented in schools and educational networks, underscoring the potential of modern leadership models.

In conclusion, educational leadership in the digital era requires a redefinition of strategies, strengthening of professionalism, and the adoption of a culture of continuous learning and adaptation. Educational leaders must lead with vision, blending expertise, collaboration, and technological integration to meet the demands of contemporary education. This paper provides a conceptual framework and a set of practical tools that contribute to the scientific and professional dialogue on education in the age of digital transformation.

Keywords: Educational Leadership, Digital Transformation, School Management, Educational Innovation, Data-Driven Decision Making, Professional Development

EDUCATIONAL DIGITIZATION: CHALLENGES, OPPORTUNITIES, AND ITS IMPORTANCE FOR MODERNIZATION AND EQUALITY IN THE EDUCATIONAL PROCESS

Ntentes Ilias
Economist, PE80 & Electronics, PE84
1ºGeneral Higj School of Preveza
Preveza, Greece
email: iliasde66@gmail.com

ABSTRACT

This paper examines digitisation in education, focusing on understanding its basic concepts, its historical development, global trends, its importance and its application in public education, as reflected in the relevant literature. It aims to provide a comprehensive overview of the various dimensions of digitisation in education, as well as the challenges and opportunities arising from the use of technologies in educational processes. In addition, it aims to highlight the importance of digitisation for modernising education and enhancing students' skills, while examining its impact on equity and accessibility in education.

First, the paper examines the definition and scope of digitisation in education. Some of the main features of digitisation include the integration of digital tools and resources, such as e-platforms, digital textbooks and online learning platforms, which enable teaching and learning in a variety of environments and formats. Digitisation extends to many areas, such as the storage and distribution of materials, the interaction between students and teachers and the possibility of customised learning pathways for students.

The process of digitisation started with the introduction of computers in classrooms and gradually evolved with the use of online tools and platforms. Today, digitisation is promoting the development of new pedagogical models that combine interactivity and personalisation of learning, allowing students to interact with the teaching material and actively participate in the educational process. Through these tools, it is possible to better organise and monitor the educational process and to ensure the proper functioning of schools.

A key element of the work is the analysis of digitisation in education, which strengthens students' digital literacy skills, preparing them for the demands of the 21st century and the modern labour market. The development of skills such as critical thinking, creativity and problem-solving is becoming imperative to ensure the smooth integration of students into the information and technology society. In addition, digitisation offers the possibility of effective management of the educational environment, both at administrative and pedagogical level, making educational processes more efficient, flexible and adapted to modern needs.

This paper then focuses on enhancing equity in education by ensuring that educational resources are accessible to all students, regardless of socio-economic status or geographical location. The COVID-19 pandemic has accelerated this process, making digital solutions essential to ensure uninterrupted education in challenging circumstances. The increased reliance on digital technologies during the pandemic highlighted their fundamental importance for the adaptation and effectiveness of the education system in emergency situations. Today, digitalisation is recognised as a critical element for the modernisation and evolution of education, contributing to the transformation of the educational process in the era of digital transformation.

Keywords: Digitization, education, modernization.

THEORETICAL APPROACHES TO THE PERCEPTION OF INFORMATION SYSTEMS USERS EDUCATION MANAGEMENT

Ntentes Ilias
Economist, PE80 & Electronics, PE84
1st General High School of Preveza
Preveza, Greece
email: iliasde@hotmail.com

ABSTRACT

This paper aims to analyze the theoretical approaches related to the acceptance and adoption of new technologies in the field of education, with particular reference to Educational Management Information Systems (EMIS). Its main purpose is to investigate the parameters that influence the use of these systems by their users, such as teachers, school principals, and other educational stakeholders, as well as to analyze the theoretical concepts related to their usage, through the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Rogers' Diffusion of Innovations Theory.

The objective of the study is to understand the factors that affect the acceptance of Educational Management Information Systems by their users, and to explore the strategies required to enhance the effectiveness of these systems in the educational sector. The paper focuses on examining the implementation of EMIS in various educational environments, analyzing the challenges and difficulties users face, and the potential impacts these challenges may have on the adoption and effectiveness of such systems.

The methodology followed aims to investigate theoretical approaches and evaluate their application at a practical level. Additionally, the study seeks to identify the barriers users encounter during the implementation of EMIS and to analyze strategies that could strengthen their adoption. Central to the discussion is the need for effective user support and training, as well as the improvement of infrastructure necessary for their successful implementation.

The study focuses on analyzing parameters associated with the positive or negative impact of user perceptions regarding the usability and usefulness of Educational Management Information Systems. It also examines the importance of social influence and facilitating conditions in the acceptance of these technologies.

This research presents important findings and proposals for improving EMIS in order to enhance efficiency and equity in education through the use of new technologies.

Keywords: Educational Management Information Systems, Methodology, Users

THE ATTITUDES AND PERCEPTIONS OF PRIMARY AND SECONDARY EDUCATION EXECUTIVES IN THE GREEK EDUCATION SYSTEM, ON THE ADMINISTRATION OF EDUCATION AND THE INNOVATIONS THAT ARE IMPLEMENTED

Paschodimas Georgios
Secondary Education Teacher, PE11 Physical Education
Preveza, Greece
email: g.paschodimas@yahoo.gr

ABSTRACT

This research was carried out for the needs of writing the teacher's Thesis in the context of completing the Postgraduate Program entitled "Administration & Organization of Educational Units" at the International Hellenic University, which was completed in June 2024.

The study presents important findings regarding: the profile, perceptions of educational executives on educational administration, the needs and challenges they face, as well as the priorities for improving the educational system.

For the needs of publishing research data at the 1st International Scientific Conference of Preveza entitled: "Digital Media in Modern Educational Reality, Positions, Contrasts, Challenges and Prospects", results of the study that deal with the evaluation of the use of digital media as innovative practices in educational administration, with the aim of upgrading administrative procedures and improving communication within the educational organizationwere sought.

This study explored, among other things, how digital transition can contribute to reducing bureaucracy, saving time and resources, as well as enhancing transparency and collective decision-making. A quantitative methodology was used to carry out the research, collecting data through structured questionnaires distributed to teachers and administrators from various levels of the education system. The sample was selected purposively to ensure the representativeness of the population and to capture different perspectives on the use of digital media in daily administrative practice. The data analysis was carried out using statistical methods, allowing conclusions to be drawn about the effects and challenges that accompany the integration of digital technology.

Keywords: digital media, educational administration, innovation, digital transition, vocational training.

DIGITAL MEDIA AND MANAGEMENT OF EDUCATIONAL UNITS

Chalvantzis Vassilios, PE79.01
Director of Preveza Music School
Preveza, Greece
email: billchalv@gmail.com

ABSTRACT

The integration of digital media in educational management has significantly changed the way schools and academic institutions operate. With the rapid advancement of technology, digital tools have become essential for school principals, teachers, and administrators, enhancing communication, decision-making, and overall effectiveness. This paper explores the role of digital media in educational management, highlighting the benefits, challenges, and best practices for effective implementation.

Digital media includes a wide range of technological tools, such as social media platforms, learning management systems (LMS), cloud-based collaboration tools, and data analytics software. Platforms such as Google Workspace for Education and Microsoft 365 Education enable real-time collaboration, document management, and task organization, offering a comprehensive solution for school management.

One of the key advantages of digital media in school management is its ability to facilitate instant and transparent communication. Applications such as Zoom, Microsoft Teams and Google Meet support online meetings, ensuring seamless interaction between school staff, students and parents. In addition, social networking platforms such as Facebook, Twitter and LinkedIn help educational institutions communicate with their communities, share updates and promote their activities.

Learning management systems (LMS) such as Moodle, Google Classroom and Blackboard have revolutionized education management by simplifying course management, tracking and sharing resources. Teachers can organize lesson plans, distribute assignments and monitor student progress through these tools, making the process more transparent and efficient.

Data analytics plays a crucial role in modern educational management. Tools like Google Forms, Microsoft Forms, and Power BI allow administrators to collect and analyze data related to student performance, engagement, teacher effectiveness, and resource allocation. Using predictive analytics, school administrators can identify trends, proactively address challenges, and improve academic outcomes.

In addition, digital media supports participatory governance by encouraging collaboration between teachers, students, and stakeholders. Tools like Slack, Trello, and Asana offer platforms for effective project management, task coordination, and improved teamwork.

Despite their numerous advantages, the adoption of digital media in educational institution management presents several challenges. Data security and privacy are major concerns, which is why solutions like GDPR Compliance Tools (OneTrust, TrustArc) are required to manage personal data. In addition, the digital divide is a problem, as not all educational institutions have equal access to technological resources. Resistance to change among teachers and administrators can also hinder the successful implementation of digital tools. Providing adequate training and professional development programs is crucial to overcome these barriers. By investing in training programs and technological solutions, educational institutions can fully utilize digital tools, ensuring their effective and sustainable integration into school administration.

In conclusion, digital tools have revolutionized the management of educational institutions by improving communication, enhancing decision-making and streamlining administrative tasks. While challenges such as data security, the digital divide and resistance to change remain, adopting strategic policies and investing in professional development can ensure the successful integration of digital tools into education. As technology continues to evolve, educational institutions must embrace digital transformation to create more effective, inclusive, and adaptive learning environments.

Keywords: Digital media, educational unit management.

TA28: Teachers' professional development through the use of new technologies

SELF-TRAINING OF TEACHERS USING E-LEARNING-LAMAP IN THE FRENCH EDUCATION SYSTEM

Grivopoulos Konstantinos
Physics teacher,
Neochorion General high school
Messolonghi, Greece
e-mail: kgrivop@gmail.com

ABSTRACT

The e-learning platform Lamap was created to meet the training needs of French teachers in the field of science education. The platform's administrators and trainers offer kindergarten teachers, primary school teachers, and secondary school teachers a series of video tutorials for learning and consolidating the inquiry-based science education, but also address topics of broader interest, adapted to the school level that each user-educator is interested in. In particular, the page on digital self-training course "démarches d'investigation" helps prepare teachers for student-centered teaching of natural sciences using the investigative method, familiarizing them with its individual stages. Users of the platform have access to scientific and educational material. In addition, they interact with their colleagues to exchange experiences, opinions, ideas, etc., through forums organized by topic. In this way, teachers develop professional skills from a distance at a time of their choosing and at their own pace.

The text is structured as follows: the introduction is followed by a definition of the concepts of self-education, learning communities, and the inquiry-based science education. Next, the architecture of the e-learning lamap platform is presented, along with how it works in the self-training and interaction of teachers.

Keywords: self-education, inquiry-based science education, digital e-learning tool-Lamap.

THE GENDER DIMENSION IN THE UTILIZATION AND USE OF DIGITAL TECHNOLOGY (BY TEACHERS, MALE AND FEMALE) IN SECONDARY EDUCATION

Efstathiadou Anna
Teacher PE02 Philology
1st Ptolemaida High School
Kozani, Greece
email: annitaefkoz@gmail.com

ABSTRACT

Since the 1980s, a decade in which New Technologies gradually made their presence apparent in many areas of human activity - in work, in education, in science, in politics - until today, gender differences have been observed in the access, use and exploitation of Information Technologies. The qualitative improvement of educational systems, the equal provision of digital skills, the reshaping of the educational system through digital transformation is a goal of strategic importance for the European Union and, of course, for Greece.

Modern research shows that gender, as a social construct, continues to be a significant factor of inequality in the field of digital technology. This is because stereotypical perceptions regarding the relationship between gender and new technologies reflect the widespread view that digital skills are a male field of action rather than a subject of women's occupation and specialization. Teachers themselves, both men and women, consider their students to be more capable than their female students in using and exploiting the potential of digital technology. Female teachers have lower expectations and limited confidence in their ability to integrate and use digital technology in everyday teaching practice.

This paper attempts a bibliographic overview of gender differences regarding the degree of utilization and use of digital technology by secondary education teachers in the educational process during the last two decades, especially, with the complete "penetration" and prevalence of ICT in all areas of human activity and expression, especially after the pandemic period. The COVID-19 epidemic crisis had serious consequences for education and training and created new data in the educational reality.

Specifically, gender differences are examined in terms of the attitudes and perceptions of female teachers towards the ever-increasing use of technology in education, the understanding of the urgent need to acquire digital skills for more effective adaptation to modern educational data, the digital skills possessed by female teachers compared to their male colleagues, their knowledge of digital tools (software, platforms, applications), and the degree of utilization of a wide range of digital technologies in the learning process and any changes that have occurred over the decades.

Keywords: gender differences, digital technology, teachers in secondary education, digital skills, digital literacy

THE PROFESSIONAL AND SCIENTIFIC DEVELOPMENT OF TEACHERS AS A CRITICAL DIMENSION AND PROSPECT OF ARTIFICIAL INTELLIGENCE CAPABILITIES

Mastrogiannis Alexios
Quality Supervisor of Education
Primary Education of Aitoloakarnania
Missolonghi, Greece
e-mail: alexmastr@yahoo.gr

Passa Sofia
Quality Supervisor of Education
Primary Education of Preveza
Preveza, Greece
e-mail: sofipassa@gmail.com

Katsiopi Paraskevi
Primary School Principal
Primary Education of Aitoloakarnania
Agrinio, Greece
e-mail: voulakats@gmail.com

ABSTRACT

The training of teachers constitutes a key factor for the substantial upgrading of the quality of education. A well-trained teacher can significantly improve their pedagogical and teaching skills, enhance their scientific self-awareness, professional confidence, and enthusiasm, thereby creating the conditions that will enable them to respond more fully and successfully to the diversity and heterogeneity of their students' needs. The continuous scientific and professional development of teachers is considered essential not only for novice but also for experienced educators, since, apart from everything else, it strengthens both their passion and the effectiveness of their multifaceted and complex role. Although difficulties have been observed in changing teachers' teaching practices and beliefs, the value of targeted training programs is widely acknowledged—provided, of course, that these bridge the gap between theory and practice, as the great John Dewey had already emphasized back in 1914.

In today's digital era, teacher training is more necessary than ever. Beyond enhancing and optimally transforming the processes, dimensions, and parameters of teaching and learning, it can also highlight and provide new pedagogical skills to practicing educators—skills essential for creating interactive and constructive learning environments that respond to contemporary socio-economic and technological conditions. Towards meeting this challenging modern educational demand, the use of Artificial Intelligence (AI) in teacher training emerges as an indispensable digital mediation, as it can offer innovative and radical opportunities for supporting their professional and scientific development. AI can provide teachers with rich opportunities for microlearning and lifelong learning, analyze large volumes of educational data, suggest targeted pedagogical and instructional interventions, create personalized and differentiated teaching plans as well as realistic scenarios, and provide continuous and objective feedback. From now on, AI will play a significant role and share in building an effective training model, capable of supporting teachers in their demanding and multifaceted role, thereby ultimately enhancing the overall quality of educational work and consolidating the positive impact of the students' learning experience.

In this direction, the present study will present practical applications of AI, which can support the professional and scientific development of teachers and contribute significantly to the reform of the educational process, as well as to the constantly sought improvement of the quality of education.

Keywords: Artificial Intelligence, training, development, teacher

DIGITAL PROFESSIONAL DEVELOPMENT & EDUCATION: THE TEACHER IN THE TECHNOLOGICAL AGE

Poulios Christos
Education Counselor (PE81), M.Ed., MSc
Directorate of Secondary Education (DDE) of Ioannina

ABSTRACT

The professional development of teachers is an integral component of quality education, while rapid technological advancements create new opportunities and challenges. This study examines the contribution of digital professional development to enhancing teachers' instructional practice through the use of innovative tools such as distance learning, online training platforms, communities of practice, and artificial intelligence. The analysis is based on a literature review and presentation of selected case studies from the European and Cypriot educational contexts.

Keywords: digital professional development, teachers, distance learning, artificial intelligence, professional growth.

PERCEPTIONS AND ATTITUDES OF PRESERVICE SPEECH THERAPISTS TOWARD EYE-TRACKING TECHNOLOGY IN THE DIAGNOSIS AND SUPPORT OF READING SKILLS

Peklári Vasiliki
Philologist in Special Education, MSc,
PhD Candidate,
Department of Speech and Language Therapy
University of Ioannina,
Ioannina, Greece
e-mail: vpeklari@uoi.gr

Toki Eugenia
Professor,
Department of Speech and Language Therapy
University of Ioannina,
Ioannina, Greece
e-mail: toki@uoi.gr

ABSTRACT

This study explores the use of eye-tracking technology for the diagnosis and intervention of reading difficulties, focusing on the perceptions of undergraduate students in the Department of Speech and Language Therapy at the University of Ioannina. The aim of the study is to record the extent to which students perceive the benefits of this technology, their attitudes towards its integration in clinical speech and language therapy practice, and the challenges they may encounter during its application. The sample consists of 49 undergraduate students (M:5, F:44) who voluntarily participated by completing an anonymous questionnaire. The results indicate that students recognize the significant contribution of eye-tracking technology in enhancing diagnostic accuracy and developing individualized therapeutic interventions. However, several challenges are identified, such as the high cost of equipment, the need for specialized training, and the difficulty of incorporating the technology into established intervention practices. Preservice speech therapists recommended future research to further investigate the integration of eye-tracking technology in the education of speech therapists and related professionals, aiming to strengthen the clinical skills of future practitioners and to support the effective use of this technology for the early detection and intervention of difficulties affecting reading skills.

Keywords: Eye-tracking technology, assessment of reading difficulties, eye gaze monitoring, diagnosis, intervention, speech and language therapy

Conference Full Papers

TA1: Research on the development, implementation, and use of contemporary technologies in the modern school, education, and learning

INNOVATIVE APPROACHES TO TEACHING: THE CONTRIBUTION OF AUGMENTED AND VIRTUAL REALITY TO LEARNING ENGLISH THROUGH PHYSICAL ACTIVITY

Vasiliki Karmi
PE06 English Language Teacher
Directorate of Secondary Education of Kerkyra
Kerkyra, Greece
e-mail: vaskarmi1976@gmail.com

Panagiotis Androutsopoulos
PE11 Educational Advisor
Directorate of Secondary Education of Ilias
Pyrgos Ilias, Greece
e-mail: panagiotisandrouts@gmail.com

ABSTRACT

This research paper examines the application of Augmented Reality (AR) and Virtual Reality (VR) in the teaching of English language through physical activity in upper secondary and lower secondary schools in western Greece.

The impact of digital technologies on improving language skills and enhancing motor engagement was evaluated using a sample of 65 students and 15 teachers. Based on the principles of active learning, the project included interactive scenarios in which students practised language skills through physical and collaborative activities.

The results showed significant improvements in participation, language proficiency (vocabulary, pronunciation) and memory through movement. Additionally, enhanced social interaction and cooperation were observed. Notwithstanding the favourable outcomes, certain challenges were identified, including the substantial cost of the necessary equipment and the necessity for teacher training in the use of these technologies.

Therefore, combining AR and VR with physical activity emerges as an innovative educational practice with potential application in wider educational settings.

Keywords: Digital media, AR, VR, English language, physical activity.

INTRODUCTION

The rapid development of Information and Communication Technologies (ICT) has had a significant impact on the emergence of new fields of application for innovative teaching approaches, which enhance the learning experience in an experiential and interactive way. The integration of Augmented Reality (AR) and Virtual Reality (VR) within the educational process is a particularly dynamic area of development, as these technologies facilitate the simulation of realistic situations and the immersion of students in environments characterised by increased interaction and cognitive engagement (Radianti et al., 2020). In the field of language education, particularly English language instruction, AR and VR technologies have the potential to facilitate the creation of multimodal environments that allow students to engage in authentic, realistic linguistic interactions. Research has demonstrated that such environments promote active participation, enhance motivation, and foster both communicative skills and linguistic autonomy in students (Chen, 2016; Godwin-Jones, 2018).

Concurrently, the correlation between language learning and physical activity aligns with the tenets of experiential and embodied learning, according to which physical movement serves as an enhancer of cognitive processing and memory (Shapiro & Stolz, 2019). The integration of movement-focused activities within the context of language education, particularly in conjunction with AR and VR technologies, fosters a multidisciplinary approach to learning, thereby enhancing both the linguistic and motor skills of students (Ferrer-Torregrosa et al., 2015).

This paper focuses on exploring the contribution of Augmented and Virtual Reality technologies to English language learning through physical activity, analysing the theoretical framework, pedagogical benefits and practical applications of this approach. The primary objective of the present study is to examine the role of AR and VR technologies in educational practice, with an emphasis on their interdisciplinary use in the field of language and physical education. The integration of these elements appears to be associated with increased active student participation, the development of problem-solving skills, and the enhancement of learning through experiential training (Radianti et al., 2020; Bacca et al., 2014).

The present research aims to evaluate the effectiveness of virtual and augmented reality technologies in improving language communication and developing motor skills. Previous studies have shown that such learning environments enhance multisensory engagement, leading to a better understanding of concepts and vocabulary (Chen, 2016; Parmaxi, 2020). The study also examines the attitudes and perceptions of students and teachers towards the use of these technologies in educational practice, with particular reference to Dunleavy and Dede's (2014) finding that acceptance of such tools is directly related to their integration into teaching and pedagogical use. Furthermore, the study seeks to identify the key challenges and conditions necessary for successfully implementing VR and AR technologies in teaching practice (Shin, 2021). Obstacles such as equipment, technical support, and teacher training are critical factors affecting the efficacy of such interventions (Liu et al., 2017).

THEORETICAL FRAMEWORK

The integration of VR and AR technologies in the educational process has emerged as an innovative approach to enhance learning, especially in fields that require experiential engagement and active participation, such as language education and physical education (Radianti et al., 2020). VR and AR technologies offer rich multisensory experiences, enabling students to interact with 3D environments and actively participate in experiential learning scenarios (Dede, 2009). As posited by Dunleavy and Dede (2014), augmented reality functions as a cognitive enhancer, furnishing information at the point of action and thereby reinforcing the connection between theory and practice. Conversely, virtual reality facilitates complete immersion in a digital environment, rendering it conducive to situational simulation, kinesthetic practice and experiential learning (Slater & Wilbur, 1997). Conversely, AR integrates digital components into the physical environment, thereby facilitating a more robust connection between theoretical concepts and practical applications (Billinghurst et al., 2015).

In the field of language education, the integration of VR and AR technologies fosters the development of authentic communicative environments which provide students with the opportunity to hone their language skills in virtual scenarios that emulate real-life contexts, thereby enhancing interactive communication and fostering cultural empathy (Lin & Lan, 2015). As asserted by Godwin-Jones (2016) and Chen (2016), such technologies have been shown to facilitate participatory learning and vocabulary development, while concomitantly enhancing students' motivation and engagement in the learning process.

In a similar manner, in physical education, the use of VR and AR technologies facilitates the simulation of sporting activities and the comprehension of kinesiological concepts through visualisations and interactions (Gao et al.,

2020). These digital applications allow students to engage in practice in controlled environments, thereby providing safety and the ability to monitor performance with real-time feedback (Flynn et al., 2018). Furthermore, research has demonstrated that the integration of such technologies has been shown to enhance motor learning, motivational engagement and improve students' physical self-concept (Barkley et al., 2019).

Acceptance on behalf of the teachers as well as their attitudes towards these technologies play a pivotal role in the success of their integration in the classroom. The Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh et al. (2003) underscores the significance of factors such as expected performance, the effort of use, social influence, and facilitating conditions in influencing teachers' intention to adopt new technologies. Concurrently, as asserted by Rogers (2003), the adoption of innovation is favoured when technology is perceived to be compatible with the needs, values and culture of the users. Consequently, the training of teachers and the enhancement of their technological competence have become necessary conditions for the successful integration of VR and AR technologies into educational practice (FitzGerald et al., 2013).

However, the implementation of these technologies is not without its challenges. Issues related to high equipment costs, lack of technical support and the need to customise the curriculum constitute major constraining factors (Radianti et al., 2020). Teachers have expressed reservations regarding the efficacy of these technologies, and some have encountered challenges in designing suitable teaching scenarios with VR/AR, particularly in school settings with restricted access to digital resources (Dunleavy, 2014).

METHODOLOGY

Statistical analysis

The initial data analysis was performed using Microsoft Excel software for the purpose of organisation and preliminary processing. The statistical analysis was conducted using SPSS software (version 25). As part of the descriptive analysis, qualitative variables were recorded using absolute and relevant frequencies, while quantitative variables were described using mean values and standard deviations.

RESULTS

Demographic characteristics

Table 1.
Demographics of the participating teachers (N=15)

Questions	N	Percentage / M ± SD
Sex		
Male	8	53.3%
Female	7	46.7%
Age	15	40.53 ± 7.873
Years of teaching experience	15	14.53 ± 7.782

The present research study is comprised of a sample of 15 teachers and 65 students from lower secondary (gymnasio) and upper secondary (lykeio) schools within the jurisdiction of the Regional Directorate of Primary and Secondary Education of Western Greece (PDEDE). The demographic characteristics of the teaching staff are presented in detail in Table 1. Of the total number of participating teachers, 8 were male (53.3%) and 7 were female (46.7%). The mean age of the teachers was calculated to be 40.53 years (Standard Deviation = 7.873), while the mean years of teaching experience was 14.53 years (Standard Deviation = 7.782).

In addition, the demographic characteristics of the students are presented in Table 2. Of the total 65 students, 34 were female (52.3%) and 31 were male (47.7%). The majority of them attend lower secondary school (53.8%), while 46.2% attend upper secondary school. The mean age of the participating students was 15.34 years (SD = 0.94).

Table 2.
Demographics of the participating students (N=65)

Questions	N	Percentage / M ± SD
Sex		
Male	31	47.7%
Female	34	52.3%
Grade level		
Lower secondary school	35	53.8%
Upper secondary school	30	46.2%
Age	65	15.34 ± 0.94

Table 3 presents data on the training and experience of teachers in relation to the use of AR and VR technologies. Of the total 15 participants, 5 (33.3%) have attended seminars or workshops related to the use of these technologies in education. With respect to the level of experience, the majority of teachers (53.3%) reported having "a little" experience, while 26.7% reported "moderate" and 20.0% reported "a lot" of experience.

Table 3.
Teachers' experience in using AR/VR technologies

Questions	N	%
Have you attended any seminars or workshops on using AR/VR technologies?		
Yes	5	33.3%
No	10	66.7%
Do you have experience in using AR and VR technologies?		
A little	8	53.3%
Moderate	4	26.7%
A lot	3	20.0%

Evaluation of AR/VR technologies

In order to ascertain the impact of the AR/VR programme on teaching practice, teachers were invited to respond to a series of questions. Responses were recorded using a four-point Likert-type scale (1 = Not at all, 2 = Not really, 3 = Yes, to some extent, 4 = Yes, to a great extent), with higher values indicating greater positive impact. The mean values and standard deviations are presented in Table 4 and Graph 1. Teachers' opinions indicated that the most significant impact was found in the activation and participation of students, which was rated at a high level (M = 3.47). The impact of the programme on enhancing cooperation and communication among students was also rated at a satisfactory level (M = 3.00). Conversely, the enhancement in pronunciation (M = 2.80) and vocabulary (M = 2.67) is evaluated as favourable, albeit to a lesser extent.

It is noteworthy that the majority of teachers (86.7%) consider that the simulations employed during the programme reflect authentic communication situations. In relation to the extent to which AR/VR technologies contribute to the enhancement of the teaching process, 46.7% of respondents indicated that these technologies enhance it 'a lot', 40.0% considered the enhancement to be moderate, and 13.3% consider that these technologies enhance teaching 'very much'.

Table 4.
Mean values and standard deviations of teachers' views on the impact of AR/VR technologies on teaching and students

Questions	Mean Values	Standard Deviation
Did you notice an improvement in collaboration and communication among students during the use of AR/VR activities?	3.00	0.378
Did you notice an improvement in student engagement and participation in the lesson during the use of AR/VR activities?	3.47	0.640
Did you notice an improvement in students' vocabulary skills during the use of AR/VR activities?	2.67	0.617
Did you notice an improvement in students' pronunciation during the use of AR/VR activities?	2.80	0.775

Graph 1.
Mean values and standard deviations of teachers' views on the impact of AR/VR technologies on teaching and students

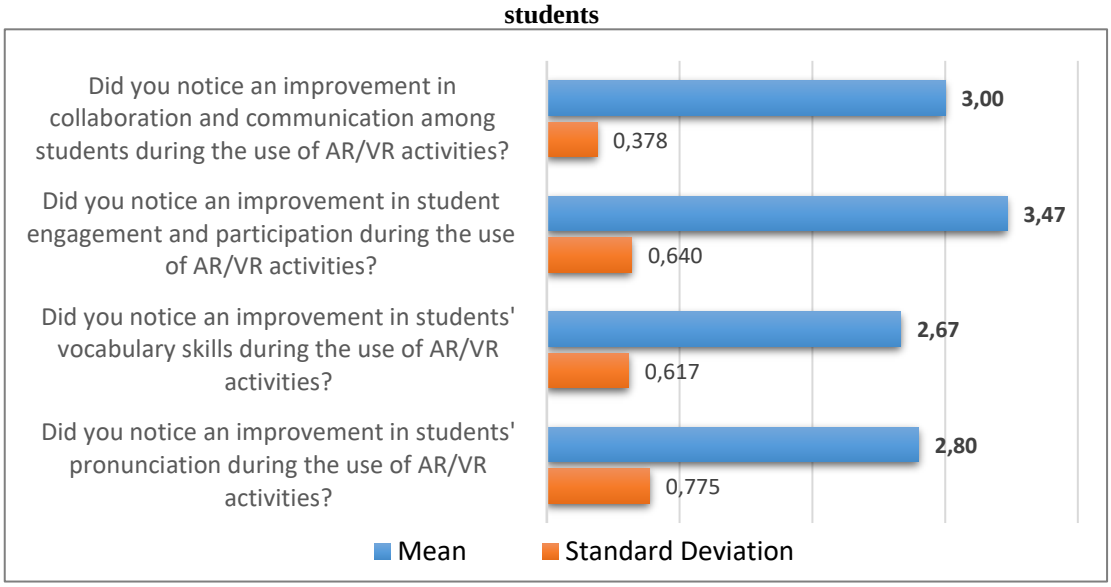


Table 5.
Teachers' views on enhancing teaching with AR/VR technologies

Questions	N	%
Do you think that the simulations used reflect real communication situations?		
Yes	13	86.7%
No	2	13.3%
Do you think that AR/VR technologies enhance teaching?		
Moderately	6	40.0%
A lot	7	46.7%
Very much	2	13.3%

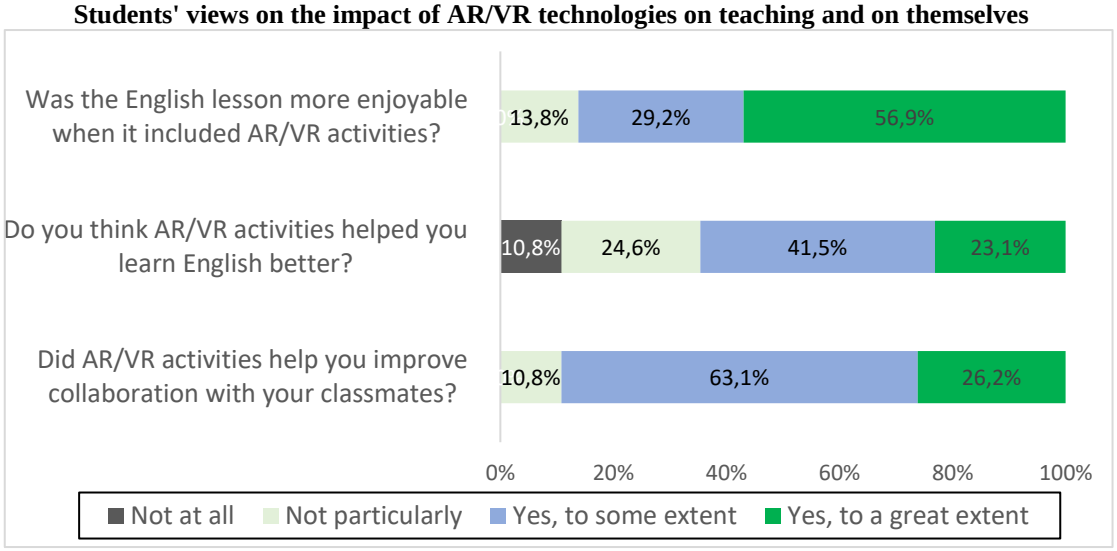
Concurrently, the data presented in Table 6 indicates that the majority of students found the English lesson more enjoyable when it incorporated activities using AR/VR technologies. The majority of participants provided a positive evaluation of the experience, with many reporting that it was highly enjoyable. Furthermore, a considerable proportion of students indicated that these activities contributed to enhanced English language learning, although agreement with this statement was not equally unanimous. In conclusion, the majority of students conceded that the use of AR and VR technologies contributed to some extent to improving collaboration with their peers.

Table 6.
Students' views on the impact of AR/VR technologies on teaching and on themselves

Questions	Not at all	Not particularly	Yes, to some extent	Yes, to a great extent
Was the English lesson more enjoyable when it included the AR/VR activities?	-	13.8%	29.2%	56.9%
Do you think AR/VR activities helped you learn English better?	10.8%	24.6%	41.5%	23.1%
Did AR/VR activities help you improve your cooperation with your classmates?	-	10.8%	63.1%	26.2%

As demonstrated in Table 7, the majority of students evaluated the activities employing AR/VR technologies as more interactive and enjoyable in comparison to conventional English teaching methods. Specifically, 40.0% of students rated them as "much more" interactive, while 30.8% rated them as "more" interactive. 27.7% of respondents found no substantial difference, while only one student reported finding them "less" interactive and fun. Furthermore, a significant proportion of participants (87.7%) indicated their preference for teaching with AR/VR technologies, should they have the option.

Graph 2.
Students' views on the impact of AR/VR technologies on teaching and on themselves



In conclusion, the vast majority of teaching staff (93.3%) reported encountering challenges during the programme's implementation. These challenges were predominantly related to the cost of required equipment or the lack of adequate technical support. A comparatively smaller proportion of 6.7% of respondents indicated that they did not face such difficulties. With regard to the need for further training in the effective use of AR/VR technologies within the classroom setting, a divergence of opinion amongst teachers is evident: 66.7% of respondents expressed the view that training is not necessary, while the remaining 33.3% considered it to be important for the optimal use of these tools in the educational environment.

Table 5.
Students' preferences towards teaching with AR/VR technologies

Questions	N	%
How interactive and fun did you find AR/VR activities compared to traditional teaching methods?		
Less	1	1.5%
Almost the same	18	27.7%
More	20	30.8%
Much more	26	40.0%
If you could choose between traditional teaching and teaching with the additional use of AR/VR technologies, which would you prefer?		
Traditional teaching?	4	6.2%
Teaching with AR/VR?	58	87.7%
I am not sure	3	4.6%

Graph 3.
Students' preferences towards teaching with AR/VR technologies

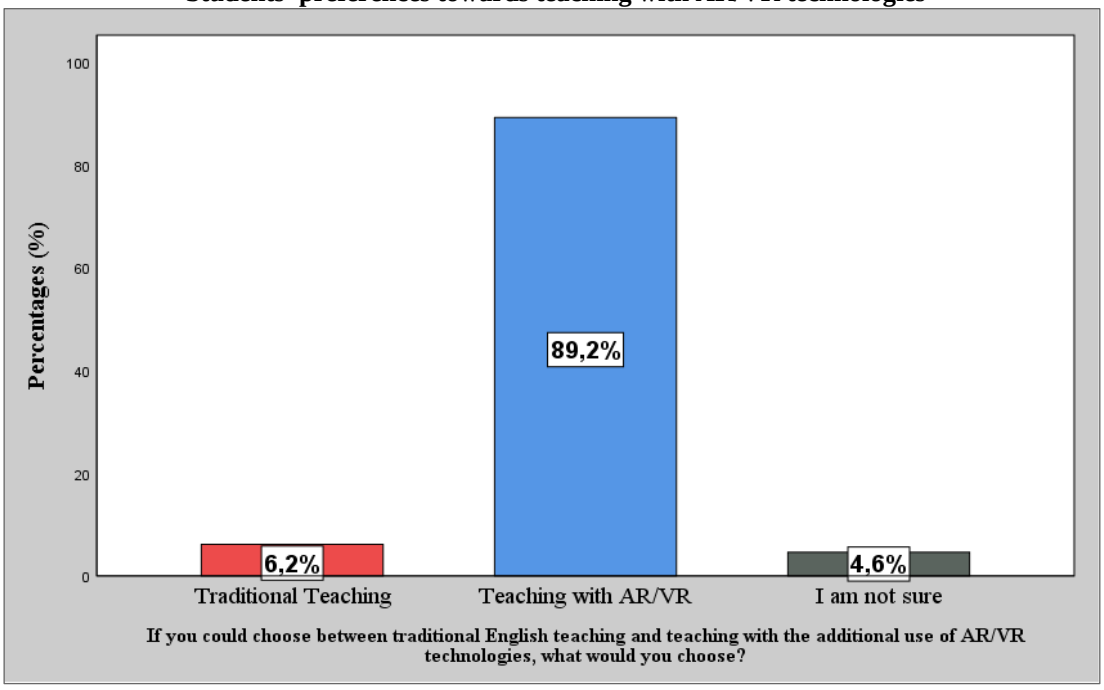


Table 8.
Difficulties encountered when using technologies and need for additional training

Questions	N	%
Did you experience any difficulties in terms of equipment costs or technical support?		
Yes	14	93.3%
No	1	6.7%
Do you think it is important for teachers to receive additional training on how to use AR/VR technologies effectively in the classroom?		
Yes	5	33.3%
No	10	66.7%

MAIN FINDINGS – CONCLUSIONS

The integration of VR/AR technologies has been demonstrated to enhance the learning experience, thereby improving participation, interest, language and social skills among students. In particular, a substantial improvement was observed in English comprehension and use, with a particular focus on oral communication, a finding that is corroborated by previous studies (Lin & Lan, 2015; Chiu et al., 2022). At the same time, the cultural simulations facilitated by VR have been demonstrated to foster intercultural empathy, thereby enhancing acceptance and respect for diverse cultural expressions as posited by Schott & Marshall (2018).

The findings of this study indicated that VR activities of a physical-motor nature had a particularly positive effect on students' cooperation and social interaction, which is in line with the results of Bonner & Reinders (2020). Participants expressed heightened interest and motivation during the lesson, identifying the approach with VR/AR technologies as more engaging than conventional teaching, consistent with the findings of Merchant et al. (2014).

However, the implementation of these technologies is not without its challenges. It has been documented that there are difficulties in adapting some students to the demands of the new technological environments. Furthermore, there are shortcomings in the equipment of some schools, and there are varying levels of technological competence among teachers. The efficacy of implementation appeared to be contingent on the provision of adequate teacher training, thereby corroborating the conclusions of Fowler (2015) and Makransky & Lilleholt (2018).

The findings of the research demonstrate that the use of VR and AR in the educational process serves to enhance the interdisciplinary and experiential nature of learning, thereby linkikg language, culture and physical activity within an integrated learning environment. The efficacy of language teaching is enhanced by its foundation in realistic, experiential communication scenarios, while physical education activities that employ simulations foster teamwork, social interaction and student motivation. The comprehensive use of these technologies necessitates the provision of suitable technological equipment, comprehensive and sustained pedagogical training for educators and institutional endorsement from educational policy.

RECOMMENDATIONS

The integration of virtual and augmented reality technologies within educational curricula necessitates meticulous strategic interventions both at the level of educational policy and teaching practice. Firstly, it is imperative to establish systematic training programmes for teachers, which should focus not only on the technical aspects of equipment management but also on pedagogical approaches that maximise the learning value of VR and AR technologies. The training programme should be designed to develop skills in designing experiential and multimodal learning scenarios.

Concurrently, substantial support of school units with the requisite technological equipment, such as virtual reality headsets, devices compatible with augmented reality applications, and specialised software, is imperative to ensure equitable access to digital learning experiences for all students. Infrastructure is a prerequisite for the successful implementation of these technologies on a large scale.

Moreover, the incorporation of VR/AR technologies into interdisciplinary teaching programmes, integrating language, physical education and intercultural education, has the potential to facilitate the holistic development of students. The cultural simulations provided by VR environments have been demonstrated to engender empathy, respect for diversity and acceptance of cultural difference, thereby enhancing intercultural awareness.

The development of social skills through group VR activities in the context of physical education or cooperative learning is of particular importance. These activities have been demonstrated to enhance social cohesion, interaction and collective problem solving.

In order to evaluate the effectiveness of interventions, it is necessary to create systematic evaluation tools that capture the progress, challenges and effects of VR/AR technologies on the learning process. It is finally proposed that pilot projects be implemented at varying levels of education, encompassing both primary and secondary education. The objective of this initiative is twofold: firstly, to conduct a comprehensive study of the varied needs of students according to their age group; and secondly, to formulate educational policies that are both evidence-based and targeted.

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TEACHING QUANTUM THEORY IN SECONDARY EDUCATION: THE DOUBLE-SLIT EXPERIMENT AND THE DEVELOPMENT OF AN ICT-BASED EDUCATIONAL SCENARIO FOR 9TH GRADE STUDENTS

Maria Magaliou
Physics Teacher - PHD candidate, Department of Pedagogy and Primary Education,
National and Kapodistrian University of Athens
email: mvpmag@gmail.com

ABSTRACT

Quantum physics, despite its perceived complexity, forms the foundation of numerous modern technologies shaping our daily lives. From the computers we use to medical diagnostic imaging, quantum theory is integral to contemporary living. However, in Greece, its teaching in Secondary Education is primarily limited to students preparing for university entrance exams, thus excluding a significant portion of the student population from engaging with these fascinating concepts. Quantum theory raises profound questions about the nature of reality, knowledge, and the role of the observer. The double-slit experiment, an iconic phenomenon illustrating fundamental quantum concepts and philosophical implications, is notably absent from the Greek secondary school curriculum. Yet, teaching it can be a powerful tool not only for fostering scientific understanding but also for developing critical thinking.

This paper proposes a teaching scenario for 9th-grade students (third year of Gymnasium, in the Greek system) that leverages Information and Communication Technologies (ICT), specifically educational videos and PhET Colorado simulations ("Wave Interference," "Quantum Wave Interference"), to introduce the double-slit experiment. The scenario aims to promote active student participation, develop critical thinking skills, and connect scientific knowledge with broader philosophical and societal questions.

The core research question explored is: How can a teaching scenario utilizing ICT enhance the instruction of the double-slit experiment in Secondary Education, and how do students perceive and accept the teaching of quantum topics through these tools? Specifically, the research focuses on evaluating the effectiveness of ICT in teaching quantum concepts like wave-particle duality and how these technologies assist students in achieving a more accessible and meaningful understanding of the Double-Slit Experiment.

Preliminary findings from the pilot implementation of the scenario with 9th-grade students indicate that introducing basic quantum concepts at this age is feasible. The integration of ICT appeared to significantly increase student interest, enhance participation, and contribute to the development of a deeper understanding of quantum phenomena, particularly wave-particle duality as manifested in the double-slit experiment. While these initial results are encouraging, further large-scale research is required to fully assess the effectiveness of ICT and investigate the factors influencing student acceptance and comprehension of these abstract scientific domains.

Keywords: Quantum physics, Teaching scenario, Double-slit experiment, Information and Communication Technologies (ICT), Critical thinking

INTRODUCTION

The emergence of quantum physics in the early 20th century marked a profound paradigm shift in the understanding of the nature of reality. Fundamental concepts such as energy quantization, wave-particle duality, inherent uncertainty, superposition, and entanglement were introduced, revealing a universe governed by rules radically different from those of deterministic classical physics. In the classical world, knowing the initial conditions allowed for precise prediction of future states. In contrast, quantum mechanics describes the world in terms of probabilities, where uncertainty is an integral characteristic at a fundamental level. These revolutionary ideas not only reshaped science in depth but also profoundly influenced technology and philosophy, transforming how we perceive the world and knowledge (Müller & Wiesner 2002· Müller & Mishina, 2021). Despite its abstract nature and apparent distance from immediate daily experience, quantum physics now forms the bedrock for numerous modern technologies that shape our daily lives. From the development of lasers and semiconductors, medical imaging (e.g., MRI), to cryptography and the cutting edge of computational science with quantum computers, the principles of quantum mechanics play a central and increasingly vital role (Krijtenburg-Lewerissa et al., 2018· Staderman et al., 2021).

Recognizing the pivotal importance of quantum theory for understanding the modern world and future developments, many countries globally have integrated it into the science curricula of secondary education. Examples include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom (England and Scotland) (Stadermann et al., 2021). In contrast to this global trend, in Greece, the teaching of quantum physics at the Lyceum level remains extremely limited. It primarily reaches students intensively preparing for university entrance exams, and even then, only those aiming for science faculties. This situation creates significant educational exclusion, leaving a broad segment of the student population without meaningful exposure to the fundamental and revolutionary ideas of quantum mechanics.

The double-slit experiment is undoubtedly one of the most iconic and illuminating experiments in the history of physics, uniquely demonstrating wave-particle duality and the concepts of superposition and interference. Nevertheless, it is not systematically taught in Secondary Education in Greece. Its instruction, however, if approached appropriately, can become a powerful educational tool. It is not limited to merely presenting a physical phenomenon but offers the potential for cognitive understanding of the foundations of quantum physics, as well as for developing critical thinking skills, fostering familiarity with the Nature of Science (NOS), and exploring the philosophical implications of quantum theory.

Within the framework of addressing the above challenge and the necessity of introducing quantum concepts in Secondary Education, this paper proposes and presents a teaching scenario. This scenario leverages Information and Communication Technologies (ICT), specifically the use of educational videos and the interactive simulations "Wave Interference - Interference, Double Slit, Diffraction" and "Quantum Wave Interference" from the PhET Colorado platform. The aim is to teach the double-slit experiment to 9th-grade students. The scenario's approach does not stop at simply presenting scientific information but aims at promoting active student participation, developing their critical thinking skills, and connecting scientific knowledge with broader philosophical and societal questions that emerge from quantum theory. Our goal is to make quantum physics more accessible and understandable for this age group.

RESEARCH QUESTION AND METHODOLOGY

The core research question investigated through the implementation of the scenario is: 'How can the application of an educational scenario utilizing ICT enhance the teaching of the double-slit experiment in secondary education, and how do students perceive and accept the teaching of quantum topics through these tools?'. More specifically, we are interested in exploring how the scenario affects the effectiveness of the teaching, the understanding of quantum concepts, such as wave-particle duality, and students' acceptance of using ICT for approaching these abstract topics. To answer this question, we designed a methodological approach that includes the pilot implementation of the teaching scenario in 9th-grade classes. Subsequently, we proceeded to collect data through various tools, such as questionnaires administered to students, analysis of their worksheets, and observation of classroom teaching.

THE DOUBLE-SLIT EXPERIMENT: A HISTORICAL JOURNEY FROM CLASSICAL TO QUANTUM UNDERSTANDING

The double-slit experiment holds a distinguished position in the history of physics, recognized as one of the most pivotal, famous, and fundamental experiments ever conducted (Crease, 2002). Its significance is immeasurable, as it contributed decisively to the understanding of the dual nature of light and matter and acted as a catalyst for the radical revision of classical notions regarding the behavior of microscopic particles.

The initial version of the experiment was performed by Thomas Young in 1801, with the primary goal of providing experimental confirmation for the wave theory of light, which was at that time disputed by Newton's prevailing corpuscular theory. In its classical setup, a source of monochromatic light is directed towards a screen with two narrow, parallel slits. The light passing through these slits, acting as two coherent wave sources, creates a characteristic interference pattern on an observation screen behind the diaphragm. This pattern consists of alternating bright and dark bands (fringes), which are the direct result of the constructive and destructive interaction (interference) of light waves, thus confirming its wave nature (Cantor 1970). Interestingly, in its earliest form, Young did not use exactly two slits but a different approach. He covered a window with opaque paper having a small hole for a fine beam of sunlight to pass through, and then placed a thin object (card) within this beam. The bands of color on the sides of the shadow and the parallel lines within the shadow that he observed arose from the diffraction of light passing near the two edges of the object and their subsequent interference. The observation that the disappearance of these bands when one edge of the shadow was obstructed proved that they resulted from the interaction (interference) of light from the two sides. The appearance of the lines regardless of the intensity of light, even at low intensities, further reinforced the interpretation that they were the result of the interference of two portions of the wave aspect of light (Young, 1804).

The year 1927 was a landmark year for the establishment of quantum mechanics, as two independent experimental findings – by Davisson and Germer (Davisson & Germer 1927) in the USA, and by George Paget Thomson and Alexander Reid (Thomson & Reid 1927) in Scotland – provided undeniable evidence for the wave nature of electrons. These discoveries, resulting from experiments on electron diffraction by crystalline lattices, overturned the classical view of electrons as simple, localized particles. The observed diffraction patterns were similar to those seen in the diffraction of light, indicating that electrons behave like waves and confirming the correctness of the wave-particle duality theory proposed by Louis de Broglie (NobelPrize.org). De Broglie was awarded the Nobel Prize in Physics in 1929 for his discovery, officially recognizing the wave nature of electrons as a fundamental principle of physics.

The direct extension of the double-slit experiment to quantum particles, such as electrons, was first achieved by Claus Jönsson in the 1960s, while later Pier Giorgio Merli (1974) repeated it by emitting "one electron at a time." Jönsson's experiment was recognized as "the most beautiful experiment" in a Physics World poll in 2002. In this quantum version, a source emits particles towards a screen with two slits, and detection occurs on a screen or detector. When both slits are open and no attempt is made to observe the path of each particle, after accumulating a large number of particles, an interference pattern forms on the screen, perfectly analogous to that observed in the case of waves. However, the most striking and counter-intuitive result appears when an attempt is made to observe or record which slit each particle passed through. In this case, the interference pattern vanishes and is replaced by a distribution corresponding to the behavior of classical particles, as if they had passed through either one or the other slit, never both simultaneously. This phenomenon underscores the fundamental effect of the act of measurement or observation on the behavior of quantum systems, confirming the statistical and probabilistic nature of quantum phenomena and serving as strong evidence for Heisenberg's Uncertainty Principle (Plotnitsky, 2010, pp. 57-65). Essentially, the double-slit experiment with individual particles provides the clearest experimental demonstration of wave-particle duality, superposition (the particle seems to pass through "both" when unobserved), and the central importance of measurement in quantum mechanics.

As an educational tool, the double-slit experiment offers the advantage of allowing qualitative understanding of its results, even without specialized technical knowledge of quantum theory. A full quantitative analysis, of course, requires the use of the mathematical formalism of quantum mechanics (Plotnitsky 2010). It is a particularly effective means for highlighting central quantum concepts, such as wave-particle duality, the probabilistic nature of measurements, and the phenomenon of wave function collapse (Plotnitsky, 2010· Sayer et al., 2017). Although understanding these concepts can present difficulties for many learners, the double-slit experiment maintains its reputation as one of the most instructive examples for approaching quantum physics (Sayer et. al 2017).

TEACHING SCENARIO

Teaching Scenario Title: "The Dual Nature of Light: A Journey into the World of Waves and Particles"
Thematic Unit: Waves and Light - Introduction to Quantum Theory
Grade: 9th Grade (Gymnasium)
Duration: 4 teaching hours (180 minutes)
Introduction/Rationale: The double-slit experiment is one of the most impressive and fundamental experiments in the history of physics. It reveals in a simple and direct way the quantum nature of matter and light, showing that particles (such as electrons or photons) can behave simultaneously as waves and particles. By teaching it in high school, we give students a first taste of the "strange" but fascinating world of quantum mechanics. The double-slit experiment challenges our classical understanding of reality and prompts students to think critically about the nature of matter.

Furthermore, it serves as an excellent starting point for introducing basic quantum concepts, such as wave-particle duality, without requiring complex mathematics.

Prerequisite Knowledge: To basically understand the double-slit experiment, students need to have some prior knowledge such as those presented in (Table 1).

Table 1
Prerequisite Knowledge

Basic understanding of waves	Know what a wave is and properties such as superposition and interference of waves (example: water waves).
Basic understanding of particles	Have a simple idea of what a particle is (e.g., a marble) and its classical behavior.

Advanced knowledge of physics or mathematics is not required. Teaching the double-slit experiment can be made understandable and fascinating even with simple words and analogies, as long as we focus on conceptual understanding rather than mathematical details.

Learning Objectives: The learning objectives are presented in (Table 2)

Table 2.
Learning Objectives

Cognitive	Students should be able to understand the phenomenon of interference and diffraction of waves. Students should be able to describe the double-slit experiment and its results. Students should be able to distinguish the nature of light (wave and particle). Students should be introduced to basic concepts of quantum theory.
Psychomotor	Students should be able to use simulations to investigate interference and diffraction phenomena. Students should be able to design and interpret interference diagrams. Students should be able to draw conclusions from experimental data and observations.
Affective/Social	Students should develop their critical thinking and problem-solving skills. Students should be able to collaborate in groups and exchange opinions. Students should wonder about the nature of reality and the limits of classical physics. Students should realize the evolution of scientific knowledge and the questioning of established ideas.

The equipment required for the teaching is listed in (Table 3).

Table 3.
Equipment required

Teaching Resources	Interactive whiteboard or projector Computers or tablets with internet access Student worksheets Educational videos (suggestions below) PhET Colorado Simulations: "Wave Interference - Interference, Double Slit, Diffraction" (https://phet.colorado.edu/en/simulations/wave-interference) Quantum Wave Interference" (https://phet.colorado.edu/en/simulations/quantum-wave-interference
Suggested Educational Videos (Indicative)	Το πείραμα της διπλής σχισμής. Double slit experiment. https://www.youtube.com/watch?v=ZeWAXsHCKTs&t=3s Double slit experiment (Through the Wormhole, S2E6), Anton Zeilinger https://www.youtube.com/watch?v=WAvqTOOyWGg The Weird Experiment that Changes When Observed https://www.youtube.com/watch?v=5kfGRO6msQw&t=324s

Lesson Flow (Scenario Phases): The instructional scenario consists of five phases as presented in (Table 5).

Table 4.
Scenario Phases

Phase 1: Introduction Activating Prior Knowledge & Creating Interest (30 minutes)	**Challenge Question**: "What do you know about light? Is it a wave or a particle? What evidence do we have for each case?" (Write answers on the board). Briefly discuss the historical views on the nature of light. **Recall Knowledge about Waves**: Briefly discuss the properties of waves (wavelength, frequency, amplitude, interference, diffraction) using simple examples (water waves, sound). We can show a short video depicting these phenomena in water waves. **Introduction to the "Mystery" of Light**: Show the video "Double slit experiment (Through the Wormhole, S2E6), (Anton Zeilinger)" which refers to the double-slit experiment (without explaining it yet). Ask: "What is happening here? Why does light create this pattern?" in order to create curiosity about the experiment.
Phase 2: Exploration Experimentation with PhET Simulations (60 minutes)	**Group Work**: Divide students into small groups (3-4 people). Each group works on a computer/tablet. **"Wave Interference" Simulation**: Instructions: Provide worksheets with instructions for the simulation. Ask students to explore the various options (water waves, sound waves, light). Focus on "Double Slit": Guide students to focus on the "Double Slit" option for water waves and light. Experimentation: Ask them to change parameters (e.g., slit separation) and observe how the interference pattern on the screen changes. Recording Observations: In the worksheet, ask them to draw the interference pattern they observe and describe what happens in words. Guiding questions: "What do you see on the screen? How does the pattern change when you change the wavelength? The distance between the slits?" **Group Discussion**: Each group discusses its observations and attempts to interpret the interference pattern based on their knowledge of waves.
Phase 3: Understanding – Explanation with Videos and Class Discussion (45 minutes)	**Show Educational Video**: Show the video: "Το πείραμα της διπλής σχισμής. Double slit experiment." Pause the video at critical points to explain or emphasize important concepts. **Explanation of the Double-Slit Experiment with Light:** **Wave nature of light**: Discuss how the double-slit experiment with light confirms the wave nature of light. Focus on the concept of interference and how bright and dark areas are created in the pattern. **Introduction of the concept of the photon**: Introduce the photon as the "particle" of light. Pose the question: "What will happen if we send photons one by one through the slits?" **"Quantum Wave Interference" Simulation:** Instructions: Open the "Quantum Wave Interference" simulation. Select "electrons" as particles (or "photons"). Experimentation: Set the simulation to "shoot" electrons (or photons) one by one through the double slit. Observe what happens on the screen. Discussion: "What do you observe? Is an interference pattern created again, even when we send the particles one by one? How is this possible?" **Dual Nature of Light and Matter**: Discuss the astonishing result: even "particles" like electrons and photons exhibit wave-like behavior and create an interference pattern! Introduce the concept of the wave-particle dual nature of light and matter in quantum mechanics. Refer to the scientists who studied the phenomenon.

Phase 4: Extension Critical Thinking, Philosophical and Social Implications (25 minutes)	**Question for Reflection**: "What does this mean for our understanding of reality? If particles behave as waves too, how can we describe them? Does observation affect reality?" **Discussions**: Discuss topics arising from quantum theory: The nature of light is singular and exclusively quantum: it consists of photons. Limits of classical physics: The double-slit experiment shows the limits of classical physics and the need for a new theory (quantum mechanics) to describe the microcosm. The Effect of Observation on the Understanding of Reality. **Social Implications**: Mention how quantum mechanics has led to technological revolutions (laser, transistors, computers, medical imaging). Emphasize the importance of basic scientific research, even if the applications are not immediately apparent.
Phase 5: Assessment Reflection and Consolidation (20 minutes)	**Brief Summary**: Ask students to summarize the main points they learned about the double-slit experiment and the nature of light. **Closed and Open-Ended Questions:** Closed-ended: E.g., "What pattern is created on the screen in the double-slit experiment with light? (a) A spot, (b) Two lines, (c) An interference pattern." Open-ended: E.g., "What is the most interesting idea you learned today and why? What question remained unanswered for you?" **Optional Homework**: Suggest students research more information about quantum physics, the double-slit experiment, or philosophical questions related to science. We can ask them to write a short text with their thoughts.

RESULTS AND CONCLUSIONS OF THE PILOT APPLICATION

The pilot implementation of the proposed teaching scenario, meticulously designed to introduce 9th-grade students to the seminal double-slit experiment and associated foundational quantum concepts through the strategic utilization of Information and Communication Technologies (ICT), yielded several significant findings that merit detailed discussion.

Firstly, and perhaps most notably, the pilot study unequivocally ascertained the feasibility of introducing and effectively teaching basic quantum concepts at the 9th-grade level. This includes core principles highlighted by the iconic double-slit experiment, such as wave-particle duality, the phenomena of interference and diffraction at the quantum scale, and the probabilistic nature of quantum events. This outcome directly challenges and offers a counter-narrative to the widespread, and often deeply entrenched, perception within educational circles that quantum theory is excessively complex, mathematically prohibitive, or conceptually unsuitable for students of this age group. The successful execution and testing of the scenario demonstrated compellingly that, when coupled with an appropriate pedagogical methodology and enabling technological tools, students possess the capacity to approach, engage with, and achieve a foundational comprehension of fundamental aspects of quantum behavior. This suggests that early exposure, when carefully scaffolded, can lay crucial groundwork for future scientific literacy.

Furthermore, the integration of ICT emerged as a central and indispensable factor in the overall success of the teaching scenario and the demonstrable enhancement of the student learning process. Specifically, the deployment of targeted educational videos to introduce concepts and the interactive PhET simulations ("Wave Interference" and "Quantum Wave Interference") to allow for exploration and experimentation, proved pivotal. The positive impacts observed through this ICT integration can be elaborated as follows: (1) Significantly Increased Student Interest and Motivation: Students exhibited a markedly heightened interest and curiosity in the subject matter. Quantum physics, often perceived by students as inherently inaccessible, counter-intuitive, or "exotic," became a topic of genuine engagement. The ability to visualize complex phenomena, such as wave interference patterns and the behavior of individual quanta, combined with the interactive and exploratory nature of the digital tools, appeared to effectively pique their curiosity, overcome initial apprehension, and sustain their attention throughout the learning modules. (2) Enhanced Active Participation and Collaborative Learning: A discernible increase in the active participation of students was recorded across various classroom activities. This included more robust engagement in discussions, a greater willingness to contribute ideas, and a more focused exploration of the simulations. The interactive elements of the digital tools seemed to empower students, encouraging them to ask probing questions, seek clarifications from both peers and the instructor, and

collaboratively make sense of the observed phenomena. This fostered a more dynamic and student-centered learning environment. (3) Facilitation of Deeper Conceptual Understanding: There were clear and compelling indications that the students developed an improved and potentially deeper conceptual understanding of the examined quantum phenomena. This was particularly evident in their grasp of the challenging concept of wave-particle duality and how this duality is experimentally manifested and observed through the double-slit experiment. The PhET simulations, in particular, played a crucial role by providing a virtual laboratory where students could manipulate variables and observe outcomes, thereby helping them to "visualize" highly abstract concepts and to forge meaningful connections between their direct observations within the simulated environment and the underlying theoretical principles. This visual and interactive bridge proved instrumental in demystifying complex ideas and fostering a more intuitive, rather than purely rote, understanding.

In essence, the pilot study provides strong preliminary evidence that a thoughtfully designed, ICT-enhanced approach can make the foundational concepts of quantum physics accessible and engaging for younger secondary school students, thereby opening new avenues for science education.

In summary, these preliminary findings strongly support the hypothesis that ICT possesses significant positive potential as tools for the effective teaching of the double-slit experiment and related quantum concepts at the Secondary Education level, paving the way for the introduction of quantum physics at an earlier stage of education. However, it is imperative to acknowledge the pilot and limited nature of the current implementation. These results, while encouraging, are initial indications and necessitate further extensive investigation and validation on a larger scale. Future research is required for the following reasons: (1) Evaluation on a Larger Scale: The application of the scenario is needed on a broader and more representative sample of students and in different school environments, to evaluate the generalizability of the findings and the effectiveness of ICT under varied conditions. (2) Examination of Influencing Factors: It is crucial to thoroughly investigate the various factors that may influence students' acceptance and understanding of these inherently abstract and often counter-intuitive scientific concepts. These may include their prior knowledge in physics, their learning profile, the overall use of ICT in the broader educational process, as well as the socio-cultural context. (3) Continuous Scenario Improvement: The results of expanded research should be used for the continuous improvement and adaptation of the teaching scenario, making it more effective and adaptable to the needs of students and teachers. (4) Long-Term Goal: The ultimate long-term goal of this research is to contribute to educational innovation in physics teaching and, more broadly, to enhance "quantum literacy" in society, starting by strengthening the teaching of quantum physics at the early stages of secondary education in Greece, thus bridging the gap with international trends.

FINAL CONCLUSION

Quantum physics, though complex, is fundamental to modern technology and understanding the universe, yet its foundational concepts, like those illustrated by the double-slit experiment, are not adequately addressed in Greek secondary education, leading to educational disparity. This study proposes and pilots an ICT-enhanced teaching scenario for 9th graders focusing on the double-slit experiment to address this gap. Preliminary results are promising, suggesting that introducing quantum ideas at this level is feasible and that tools like PhET simulations boost student interest, engagement, and conceptual understanding, particularly of wave-particle duality. While these findings highlight the potential of ICT in making abstract quantum phenomena more accessible, they also underscore the need for further large-scale research. Future work should broaden the study's scope, examine influencing factors on student learning, and refine the teaching methodology to promote wider quantum literacy.

In culmination, this study provides a compelling preliminary case for rethinking the approach to quantum physics education in Greek secondary schools. By strategically leveraging the power of ICT and adopting innovative pedagogical approaches, it is possible to introduce these fundamental concepts earlier and more effectively. The overarching aspiration is to promote wider quantum literacy, cultivate critical thinking skills, empower students with a contemporary scientific worldview, and thereby align Greek science education more closely with progressive international trends and the evolving demands of the 21st century.

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TA2: The pedagogical integration of digital media into teaching practice (Learning Theories, Curricula, and Digital Media)

THE IMPACT OF DIGITAL TECHNOLOGIES IN THE TEACHING OF PHYSICAL EDUCATION: IMPACT ANALYSIS AND PERFORMANCE ASSESSMENT OF STUDENTS AND TEACHERS

Panagiotis Androutsopoulos
PE11 Educational Advisor
Directorate of Secondary Education of Ilias
Pyrgos Ilias, Greece
e-mail: panagiotisandrouts@gmail.com

Vasiliki Karmi
PE06 English Language Teacher
Directorate of Secondary Education of Kerkyra
Kerkyra, Greece
e-mail: vaskarmi1976@gmail.com

ABSTRACT

This research paper examines the impact of integrating digital technologies into Physical Education teaching in secondary education, with particular emphasis on gamification and the use of virtual reality (VR) and augmented reality (AR).

Through collecting qualitative and quantitative data from 15 teachers and 60 students in schools managed by the Regional Directorate of Education of Western Greece, this study aims to evaluate how these technologies enhance student participation, motivation, and motor skill development.

The findings demonstrate that digital tools enhance the level of student interest and engagement, particularly among those who demonstrate a limited level of engagement within the conventional teaching paradigm. However, critical challenges have emerged, particularly with regard to providing teachers with adequate training and technical support.

The study concludes with recommendations for the pedagogically informed integration of technology in Physical Education, with a view to improving teaching quality and promoting educational equity.

Keywords: Digital technologies, physical education, gamification, virtual reality (VR), educational outcomes

INTRODUCTION

The integration of digital technologies into school education has become an integral part of modern teaching practice. These innovations are not confined to theoretical subjects; they also extend to physical education, offering novel possibilities through tools such as virtual reality (VR), augmented reality (AR) and gamification (Casey et al., 2017). The use of these technologies enhances the learning experience, rendering courses more engaging and interactive, thereby facilitating improvements in students' fitness and motor learning (Chen & Shen, 2021).

Contemporary studies posit that the integration of digital technologies into Physical Education can enhance student participation, particularly among those who demonstrate low engagement in the context of traditional teaching methodologies (Baek et al., 2020). Gamification, for instance, fosters environments in which students are motivated to participate through mechanisms of reward and progress (Zainuddin et al., 2020). Concurrently, VR and AR technologies can simulate exercise and sports performance conditions, facilitating the safe and accurate practice of complex skills (Wang et al., 2022).

Nevertheless, the successful integration of these technologies is contingent on the attitudes and competencies of the teaching staff. It has been reported by a significant number of teachers that they encounter difficulties when using digital media, primarily due to a lack of training or inadequate technical support (Kirkland & Sutch, 2009). Consequently, the investigation of these perceptions is imperative for the development of educational policies that can effectively facilitate technology integration in Physical Education (Papastergiou, 2009).

The objective of this research study is to examine the impact of digital technologies on the teaching of Physical Education, with a particular focus on the evaluation of the learning experience from the perspectives of both students and teachers. In particular, it seeks to investigate the impact of gamification, VR and AR on students' participation and motivation in physical activities (Chen & Shen, 2021) and evaluate their contribution to the enhancement of students' physical and sporting skills (Baek et al., 2020). It also aims to record teachers' views on the effectiveness and challenges of using digital media in teaching practice (Kirkland & Sutch, 2009), identify teachers' training needs for integrating technologies in a pedagogically sound way and, finally, highlight the benefits and limitations of technological integration in physical education, with the aim of making recommendations for improving teaching quality.

The aforementioned data form the research framework of the study, which seeks to answer key questions such as: What effect does the integration of digital technologies, such as gamification and virtual and augmented reality, have on students' participation in Physical Education lessons? How does the use of these tools contribute to improving students' sporting skills and physical condition? What are teachers' perceptions regarding the effectiveness of integrating digital technologies into physical teaching practice and the challenges that accompany this process? What training and technical support do teachers need in order to integrate these technologies into their teaching effectively? And finally, what difficulties have been identified by students and teachers when implementing these technological tools in PE lessons?

THEORETICAL FRAMEWORK

The integration of digital technologies in the teaching of Physical Education is an innovative and promising step towards upgrading the learning experience, as well as towards enhancing students' motor and sports skills. Virtual and augmented reality contribute to a more engaging and interactive learning environment by enabling students to participate in simulated sporting activities (Slater et al., 2020). Concurrently, wearable devices, such as smartwatches, provide real-time feedback, allowing students to monitor their progress and improve their fitness based on data collected during exercise (Swan et al., 2021). Nevertheless, the absence of adequate teacher training in the pedagogically informed use of digital tools, as well as the necessity for ongoing technical and administrative support, constitute significant obstacles to their full and effective integration into teaching practice (Hutchison & Reinking, 2011). Furthermore, ensuring that all students have equal access to technological infrastructure and tools is a key factor in avoiding educational inequalities and enhancing equal opportunities in the school environment (Kukulska-Hulme, 2012).

METHODOLOGY

Statistical Analysis

The statistical analysis of the data was conducted using SPSS software (version 25), with Microsoft Excel being used for preliminary data processing. In the descriptive part of the analysis, categorical variables are presented through absolute and relative frequencies, while quantitative variables are described by mean values and standard deviations. In

the inductive part of the study, a two-factor analysis of variance was employed, with one of the factors being repeated (two-way mixed ANOVA). The level of statistical significance in the inductive tests was set at $\alpha = 0.05$.

RESULTS

Demographic Characteristics

The present research study is comprised of a sample of 15 Physical Education teachers and 60 students from lower secondary (gymnasio) and upper secondary (lykeio) schools within the jurisdiction of the Regional Directorate of Primary and Secondary Education of Western Greece (PDEDE). Table 1 presents the demographic characteristics of the teaching staff. The majority of the participants are male (66.7%), while female teachers represent 33.3% of the sample. The mean age of the teachers is 40.2 years (Standard Deviation = 5.979), while the mean duration of professional experience in Physical Education teaching is 14.07 years (Standard Deviation = 5.325). It is noteworthy that all participating teachers have a minimum of five years of teaching experience.

Table 6.
Demographics of the participating teachers (N=15)

Questions	N	Percentage / M ± SD
Sex		
Male	10	66.7%
Female	5	33.3%
Age	15	40.2 ± 5.979
Years of experience in teaching Physical Education	15	14.07 ± 5.325

The demographic characteristics of the student sample are presented in Table 2. The majority of the subjects are male (58.3%), while the female population constitutes 41.7% of the sample. With respect to grade level, 55.0% of the sample attend lower secondary school (gymnasio), while 45.0% attend upper secondary school (lykeio). The mean age of the students was calculated at 15.4 years (Standard Deviation = 0.924).

Table 7.
Demographics of the participating students (N=60)

Questions	N	Percentage / M ± SD
Sex		
Male	35	58.3%
Female	25	41.7%
Grade level		
Lower secondary school	33	55.0%
Upper secondary school	27	45.0%
Age	60	15.4 ± 0.924

With regard to the use of digital tools in the teaching process, the majority of the teachers (66.7%) indicated that they employ them on occasion, while a smaller percentage reported infrequent use (20.0%) or frequent use (13.3%). Teachers were asked to identify the digital tools they have incorporated into their practice by answering multiple-choice

questions. The results are presented in two forms: firstly, as a percentage of the total number of participants, and secondly, as a percentage per individual cases. Wearable devices, including smartwatches, emerged as the most prevalent technology (33.3% of all teachers; 92.9% of category users), followed by gamification (28.2% | 78.6%), augmented reality (20.5% | 57.1%) and virtual reality (17,9% | 50,0%).

Table 8.
Use of digital tools by teachers

Multiple choice questions	Total response rate	Percentage per case
If you use tools such as the following, which ones have you tried to apply in your teaching?		
Gamification	28.2%	78.6%
Virtual Reality (VR)	17.9%	50.0%
Augmented Reality (AR)	20.5%	57.1%
Smartwatches or other wearables	33.3%	92.9%

The majority of students consider that digital technologies have a positive (66.7%) or very positive (18.3%) impact on PE lessons, while smaller percentages adopt a neutral (13.3%) or negative (1.7%) attitude. Overall, 85% of students positively received these technologies. Concurrently, 31.7% of students report using devices such as smartwatches or other similar wearable technologies. With regard to their preferences for the most appealing digital tools, gamification achieves the highest preference rate (61.7%), followed by VR with 23.3%, AR with 10.0% and, finally, wearable devices with 5.0%).

Table 9.
Students' preferences with regard to the use of digital technologies

Questions	N	%
What impact do you think digital technologies have had on Physical Education teaching?		
Negative	1	1.7%
Neutral	8	13.3%
Positive	40	66.7%
Very positive	11	18.3%
Are smartwatches or other similar wearables used in your PE lessons?		
Yes	19	31.7%
No	41	68.3%
Which of the following digital tools/methods do you like best?		
Gamification	37	61.7%
Virtual Reality (VR)	14	23.3%
Augmented Reality (AR)	6	10.0%
Smartwatches or other wearables	3	5.0%

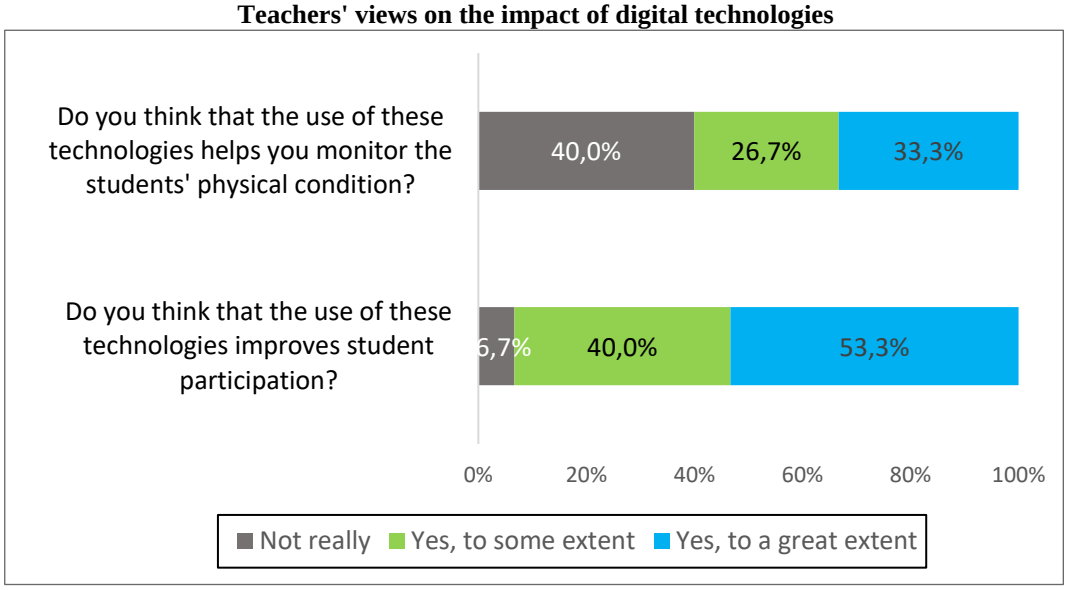
Impact of digital technologies

Teachers have asserted that the integration of digital technologies facilitates the monitoring of students' fitness, with 33.3% rating them as very useful and 27.6% as useful to some extent. The majority of participants (60%) consider that these technologies contribute significantly to the monitoring of students' physical performance, while the remaining 40% do not consider them to be particularly useful for this purpose. Concurrently, the majority of teaching professionals posit that these technologies enhance student engagement in Physical Education, with 53.3% reporting a significant improvement and 40.0% a moderate improvement. A mere 6.7% of respondents did not observe any change in student engagement.

Table 10.
Teachers' views on the impact of digital technologies

	Not really	Yes, to some extent	Yes, to a great extent
Do you think that the use of these technologies helps you monitor students' physical condition?	40.0%	26.7%	33.3%
Do you think that the use of these technologies improves student participation?	6.7%	40.0%	53.3%

Graph 4.
Teachers' views on the impact of digital technologies



Teachers have been found to offer a favourable assessment of the contribution of digital technologies in enhancing sports skills among students. Specifically, 40.0% of the participants consider that the technologies contribute to a very large extent, while 26.7% consider that their impact is moderate. A further 26.7% of respondents attribute a very positive impact to technologies, while only 6.7% consider their contribution to be limited.

At the same time, students were invited to respond to a series of questions regarding the use of digital technologies in PE lessons, employing a five-point scale to gauge their level of agreement or disagreement (1: Strongly agree, 2: Agree, 3: Neutral, 4: Disagree, 5: Strongly disagree). As demonstrated in Table 6 and Graph 3, the mean agreement value for the statement “The use of digital technologies makes PE classes more fun” was found to be the highest (M = 4.02). This was followed by the statement “The use of digital technologies makes me want to participate more in PE classes” (M = 3.90). Furthermore, the responses ranged from neutral to agreement for the statements “The use of digital technologies in PE motivates me to exercise outside of school” (M = 3.62) and “The use of digital technologies helps me to improve my physical condition” (M = 3.57).

As illustrated in Table 7, teachers' perspectives on the obstacles and needs related to the use of digital technologies in physical education teaching are elucidated. A mere 13.3% of the participants stated that they had undergone training on the use of these technologies. The primary obstacle identified by teachers is the lack of appropriate equipment (73.3%), followed by a lack of technical support (20.0%) and insufficient training (6.7%). With regard to the necessity for supplementary training and support, 33.3% of teachers consider it to be quite necessary, while 6.7% regard

it as very necessary. This indicates that, in total, 40% of respondents recognise a need for such support, in contrast to the 60% who do not perceive a particular necessity for it.

Graph 5.
Teachers' views on the impact of digital technologies on students' sports skills

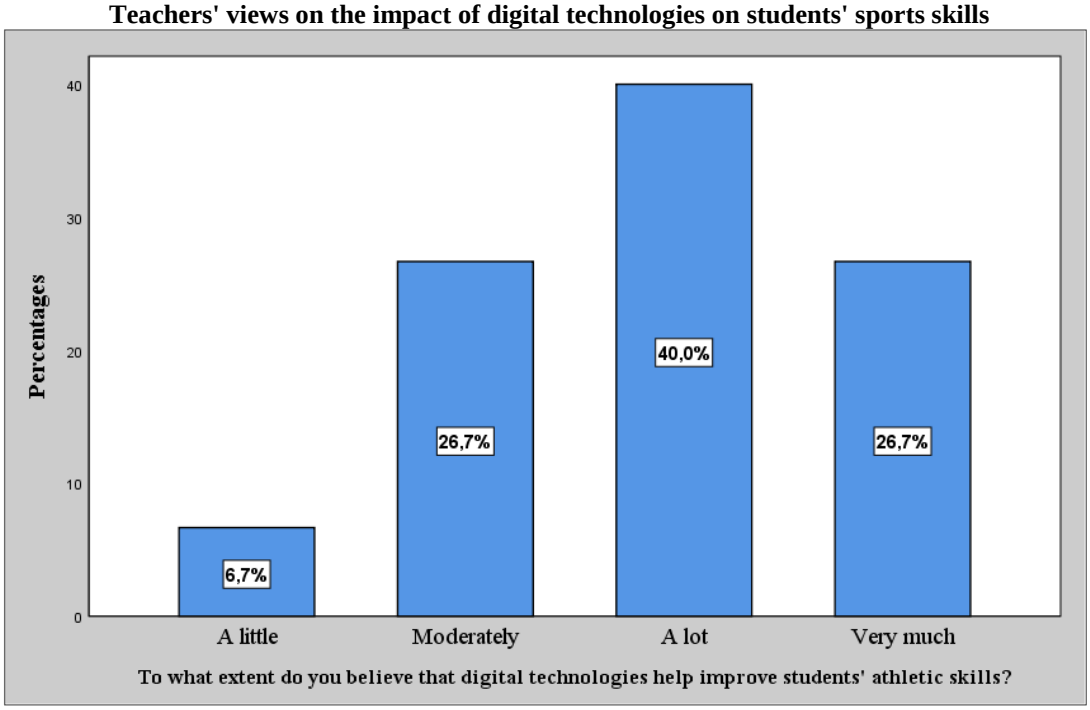


Table 11.
Means and standard deviations for students' views on the impact of digital technologies

The use of digital technologies…	Mean Values	Standard Deviation
… makes me want to participate more in PE classes	3.90	0.796
… makes PE classes more fun	4.02	0.854
… motivates me to exercise outside of school	3.62	0.922
… helps me improve my physical condition	3.57	0.927

Improving student endurance

The students' endurance levels were evaluated using the Cooper test, which involves a fixed running time of 12 minutes and participants are asked to run the maximum distance possible within this time frame. Two measurements were used for the analysis: the first from the previous semester and the second from the current semester. Furthermore, the sample was divided into two groups according to the use of mobile devices (smartwatches or others) during sport. Two-factor analysis of variance (two-way ANOVA) revealed a statistically significant effect of the factor 'Time' ($F(1,58) = 138.872$, $p < 0.001$), with the overall sample showing an improvement in distance travelled from the previous ($M = 2254.6$ m) to the current semester ($M = 2492.8$ m). In addition, a statistically significant interaction was identified between the factors 'Time' and 'Device use' ($F(1,58) = 104.364$, $p < 0.001$), suggesting a differential evolution of performance depending on the use of mobile devices. As demonstrated in Table 8 and Graph 4, students using smartwatches or other mobile devices exhibited an average enhancement of 20.0%, while the remaining students demonstrated an average improvement of 1.4%.

Graph 6.
Means and standard deviations for students' views on the impact of digital technologies
Obstacles presented and needs' analysis of teachers

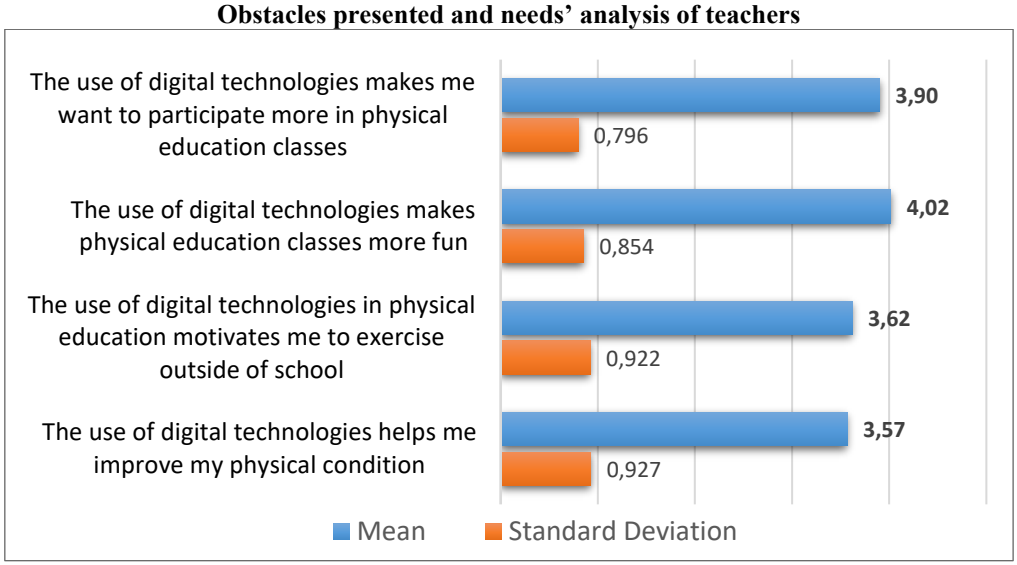


Table 12.
Teachers' views on the obstacles to using digital technologies and their training needs

Questions	N	%
Have you attended any training courses on the use of digital technologies in Physical Education?	PP	
Yes	2	13.3%
No	13	86.7%
What is the most important obstacle encountered when using digital technologies in Physical Education?		
Lack of appropriate equipment	11	73.3%
Lack of technical support	3	20.0%
Lack of training	1	6.7%
Do you think it is necessary for teachers to receive additional training and support in order to use these tools?		
Not particularly necessary	9	60.0%
Quite necessary	5	33.3%
Absolutely necessary	1	6.7%

MAIN FINDINGS – CONCLUSIONS

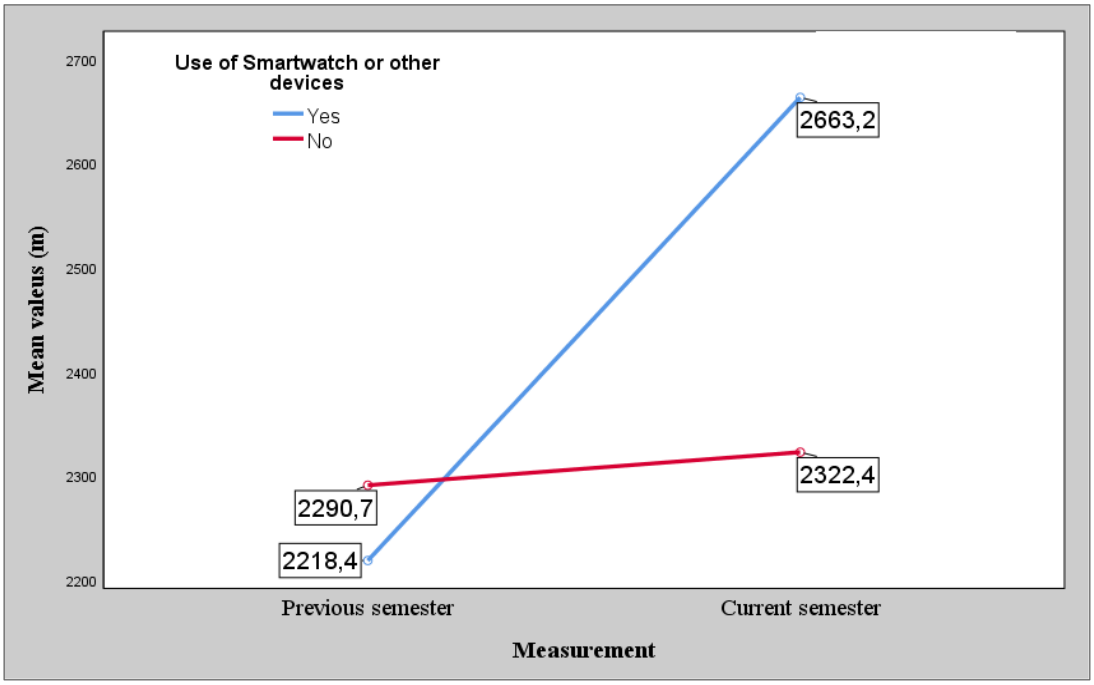
The study by Swan et al. (2021) supports the effectiveness of wearable devices in monitoring student fitness, as they provide teachers with accurate data, enabling them to tailor exercise programmes to each student's needs. In this study, teachers confirmed that using these devices facilitates progress monitoring and enhances students' self-esteem. These findings align with those of Slater et al. (2020) and Hutchison and Reinking (2011), which emphasise the positive influence of digital tools on student participation and engagement, particularly through virtual reality and gamification. The use of such tools fosters an interactive and motivating learning environment that promotes active participation and engagement, as Zichermann and Cunningham (2011) report, noting that students who participate in activities with gamified features show enhanced performance. However, the teachers in this study also articulated a need for more

support and professional development to enable them to use technologies more effectively. These challenges are consistent with the literature, as Hutchison and Reinking (2011) point out that successful integration of technology into the educational process requires teacher training, technical support and reliable infrastructure.

Table 13.
Mean values on Cooper test measures among students based on their use of smartwatches or other mobile devices

	Previous semester	Current semester	Percentage change
Use of smartwatches or other devices	2218.4	2663.2	20.0%
Without using devices	2290.7	2322.4	1.4%

Graph 7. Mean values on Cooper test measures among students based on their use of smartwatches or other mobile devices



CONCLUSIONS – RECOMMENDATIONS

This study emphasised the vital role of digital technologies, particularly gamification, virtual reality, and mobile fitness monitoring applications, in enhancing the pedagogy and learning outcomes of Physical Education. These technologies have not only served as innovative support tools, but have also shaped a new educational paradigm centred on active, experiential and personalised learning. The findings of the data analysis demonstrated that the gamification approach resulted in enhanced levels of engagement, motivation and collaboration among students, including those who had previously shown little interest in PE lessons. Concurrently, virtual reality offered safe simulations, providing new forms of interactive, multimodal learning that enhance cognitive and motor development. Furthermore, wearable technology and mobile applications enabled continuous self-monitoring, personalised feedback and targeted interventions, thereby improving students' physical performance and psychosocial empowerment.

Nevertheless, the implementation of these technologies is not without obstacles. The key challenges that have emerged in this context include inadequate infrastructure and equipment, lack of specialised training and resistance from teachers, due either to insecurity or limited technical support. In order to address these challenges and to ensure sustainable integration of technologies in PE, it is suggested that teachers should receive continuous professional development

through systematic training programmes focused on the use of tools such as virtual reality, gamification and digital measurement applications, so that teachers acquire the necessary technical and pedagogical skills (Voogt et al., 2015).

Concurrently, it is imperative to reinforce the technological infrastructure within educational institutions, as the implementation of educational programmes requires modern equipment, mobile devices, motion sensors and high-speed internet access, which are indispensable for the effective integration of technologies (Selwyn, 2012). Furthermore, the promotion of personalised learning through digital media can allow students to follow personalised learning pathways, set their own goals and progress at their own pace, enhancing their autonomy and self-esteem (Tomlinson, 2014). The implementation of pilot actions and research interventions through innovative action-research programmes can help evaluate the effectiveness of technologies and develop good practices (Hattie, 2009).

In conclusion, the establishment of partnerships with the community and external stakeholders, including parents, health and technology professionals, local authorities and universities, has been demonstrated to enhance educational programmes, thereby affording them social legitimacy and multi-level support (Fullan, 2007).

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ASIA MINOR CATASTROPHE AND ASIA MINOR MONUMENTS: AN EDUCATIONAL INITIATIVE USING DIGITAL TOOLS

Giannouli Sofia
Philologist, PE02
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

ABSTRACT

This paper examines an educational initiative by the History student club titled "Asia Minor Catastrophe and Asia Minor Monuments", which was implemented at the 1st Model Junior High School of Preveza during the school year 2022-2023. The initiative aimed to foster a deeper understanding of both the history and memory of the Asia Minor Catastrophe by integrating innovative digital tools into the educational process. The paper analyzes how the use of technology enhanced the understanding of historical events, enabling students to approach and present history in a contemporary and interactive manner.

The methodology employed included the use of digital platforms for searching, analyzing, and processing historical sources, as well as developing student projects and creating presentations using presentation software (e.g., PowerPoint). Concurrently, digital tools were utilized for gathering photographic material, designing digital posters, and organizing digital events. A significant phase of the program involved the creation of a song, which was composed and produced using music software (such as GarageBand and FL Studio), alongside the development of a digital radio program where students presented historical data through a modern communication medium.

The main findings indicate the positive impact of using digital tools on enhancing student collaboration and creativity. The application of technological tools allowed students to participate actively in all phases of the project, strengthening critical thinking and their ability to produce digital content. Notably, the creation of the song and the digital radio program served as a highlight of the learning process, effectively combining music and historical memory with technology and offering students a powerful avenue for creative expression.

The results demonstrate that the combined use of traditional teaching methods and digital tools significantly enhances the educational process, equipping students with valuable skills for the modern era. Students developed competencies in critical thinking, expression, and collaboration within a digital environment, gaining experiences that reinforce their capacity to approach historical topics creatively and contemporarily.

Keywords: Asia Minor Catastrophe, historical memory, digital tools.

INTRODUCTION

The Asia Minor Catastrophe and its consequences are significant historical events that continue to affect Greece and Turkey today. The historical memory surrounding this catastrophe and the displacement of the Greeks of Asia Minor constitute a fundamental element of the national and collective identity of the Greeks. However, the study and teaching of these events are not limited to transmitting classical teaching methods but require adopting innovative approaches to make historical knowledge more accessible and comprehensible to students.

This paper examines the student initiative of the History club at the 1st Model Junior High School of Preveza, titled "Asia Minor Catastrophe and Asia Minor Monuments". The aim of this initiative was to enhance students' historical knowledge and memory of the Asia Minor Catastrophe, combining traditional teaching methods with the use of digital tools and new technologies. By integrating these tools into the educational process, students had the opportunity to approach history in a more interactive, creative, and contemporary way. The paper analyzes the methods used, the educational practices followed, and the results of this educational action.

HISTORICAL CONTEXT AND PURPOSE OF THE INITIATIVE

The Asia Minor Catastrophe (1922) was a defining event in the history of Hellenism. The study of this catastrophe has multiple dimensions: political, social, and cultural. Its consequences were catalytic for the Greek population of Asia Minor, as well as for the relationship between Greece and Turkey. Therefore, preserving the memory of the Asia Minor Catastrophe is fundamental for national consciousness and understanding its historical and social impacts.

The Asia Minor Catastrophe resulted from a series of strategic and political failures that occurred during the Asia Minor Campaign in 1922. The defeat of the Greek army in confrontation with the Turkish army, combined with the failure of the plan to establish a Greek state in Asia Minor, led to the collapse of the Greek presence in the region. This defeat resulted in a broader humanitarian crisis, with hundreds of thousands of Greeks, mainly from Asia Minor and Pontus, being forced to abandon their homes and seek refuge in Greek territory. Their displacement reached massive proportions, leading Greece to receive a large wave of refugees, primarily in the southern regions and Western Macedonia, but also in other areas of the country, which were forced to adapt to the needs of this new demographic composition (Agantzidis, 2012).

Preveza was one of the cities that received refugees after the Asia Minor Catastrophe of 1922. From that year onwards, the city witnessed a significant demographic shift, as a large number of Greek refugees from Asia Minor and Pontus settled in the area, bringing about substantial changes in its social and economic structure. These refugees brought with them, besides their forced removal from their homes, a rich cultural and social heritage, which included their culture, traditions, linguistic peculiarities, and religious beliefs (Anagnostopoulos, 2005). These elements of the Asia Minor and Pontian heritage were integrated and interacted with the existing culture of Preveza, enriching the composition of the local society. This interaction had long-term effects, as the refugees contributed to the renewal and restructuring of the city's social, cultural, and economic aspects. The cultural richness of the refugees, expressed through their music, gastronomy, customs, and arts, not only enriched the local society but also contributed to preserving a vibrant memory of their historical heritage, which has been preserved and continues to influence the contemporary cultural identity of Preveza (Petmezas, 2001).

The educational initiative of the student History club aimed to integrate modern technology into the presentation of these historical events, enhancing students' awareness of historical memory and creating new, more contemporary teaching methods.

THE CONTRIBUTION OF REFUGEES TO PREVEZA

Preveza, as a coastal city on the Ionian Sea, became a natural destination for many refugees who, after the Asia Minor Catastrophe of 1922, sought a new beginning and refuge away from their homes. Their integration into the local community, however, was not without challenges. The refugees, who had suffered a significant humanitarian crisis, faced serious difficulties in adapting, primarily due to the lack of basic resources, the inability to find housing and employment, as well as social and cultural differences with the already established population of the city. Despite the adverse conditions, the refugees managed to organize new communities and gradually integrate into the social and economic life of Preveza (Anagnostopoulos, 2005; Garidis, 2015).

Specifically, the refugees from Asia Minor and Pontus brought with them a rich cultural heritage, which, although initially alien to the local community, gradually began to integrate into the cultural life of the city. Their music, gastronomy, dances, and traditions became fundamental elements of daily life, enriching Preveza's cultural landscape. Particularly, the musical tradition of the refugees, with songs and tunes originating from Asia Minor and Pontus, left an indelible mark on the local music scene, shaping musical preferences and influencing the collective identity of the city (Tsirpanlis, 1994; Papadopoulou, 2010).

The preservation and dissemination of this musical heritage is evident in various local events and festivals, where the traditional sounds of Asia Minor and Pontus continue to coexist with the other cultural elements of the region, offering a rich and multifaceted cultural identity. In this way, the refugees contributed to the enriched cultural character of Preveza, fundamentally influencing its social and cultural development (Garidis, 2015; Anagnostopoulos, 2005; Papadopoulou, 2022).

THE EDUCATIONAL INITIATIVE AND THE USE OF DIGITAL TOOLS

The educational initiative of the History student club at the 1st Model Junior High School of Preveza, implemented during the 2022-2023 academic year, focused on integrating the historical memory of the Asia Minor Catastrophe and the refugees using modern digital tools. The goal of the initiative was for students to approach the historical events of 1922 and their historical dimension by combining historical knowledge with contemporary technology, in order to create digital projects that reflected the history, memories, and experiences of the refugees.

The use of digital tools constituted one of the main pillars of the program. Students used presentation tools, such as PowerPoint and image editing software, to create detailed and comprehensive presentations about the Asia Minor Catastrophe and its monuments. Through these tools, students researched the historical period, processed visual material, and highlighted the significance of refugee testimonies and the preservation of historical memory (Papanikolaou, 2019; Selwyn, 2016; Raptis & Rapti, 2011).

Furthermore, students created a digital photo album containing photographs and historical material related to the local refugees of Preveza. This album served as a dynamic and touching retrospect into the history of the refugees, showcasing their contribution to the local community and capturing their personal stories and memories. The students undertook the collection and processing of these photographs, focusing on the value of historical documentation and the preservation of collective memory.

Notable was also the creation of a song, which represented a unique artistic approach by the students to express the feelings and memories of the refugees. The lyrics were written by the supervising teacher, who, influenced by the significance of the historical event, also referenced the 100 years since the Asia Minor Catastrophe. The musical composition of the lyrics was carried out with the help of digital tools, such as GarageBand and FL Studio software. This process offered students the opportunity to combine music with history, creating a work that not only expressed the refugees' emotions but also inspired them to discover new forms of expression and creativity. This music was incorporated into the educational events and the presentation of their work, enhancing the emotional and historical dimension of the program.

As part of the initiative, students also conducted interviews with four refugee families in Preveza, who originated from Asia Minor and Pontus. These interviews constituted an extremely significant process, as students had the opportunity to hear firsthand the personal stories of the refugees and understand the challenges and difficulties they encountered in their attempt to integrate into their new homeland. These interviews were recorded and integrated into the educational process, allowing students to process and analyze the historical testimonies and experiences of the refugees.

The use of digital tools was not limited to merely recording historical information. The digital presentation of these projects through events, such as the radio program, constituted one of the most creative stages of the program. Students presented the results of their research on the Municipal Radio Station of Preveza, where they discussed the integration of refugees into the city and their living conditions. Through their participation in this radio broadcast, students were able to communicate their work to a wider audience and offer listeners a thorough account of the refugees' historical journey and their contribution to Preveza. This broadcast, as a contemporary means of communication, brought historical memory into the present, offering a vivid picture of the refugee experience, while simultaneously enhancing the local community's awareness of the value of refugee history (Kapsalis, 2010).

The integration of these modern digital tools into the educational process provided students with the opportunity to develop skills related to critical thinking, research, collaboration, and expression through digital media. The creation of posters, digital photo albums, and interviews constituted a significant educational experience that contributed to strengthening students' historical and cultural consciousness, while the presentation of their work through the radio program reinforced the connection between historical memory and contemporary means of communication.

EDUCATIONAL BENEFITS AND SOCIAL IMPACT

The educational initiative developed at the 1st Model Junior High School of Preveza, focusing on the historical memory of the Asia Minor Catastrophe and the integration of refugees into the local community, offered students valuable educational benefits that enhanced their skills in various areas. The combination of traditional teaching methods and modern digital tools was a powerful factor in developing competencies that are not limited to the field of history but extend to broader areas of contemporary education.

1. Development of Critical Thinking and Creativity.

The students' engagement with creating digital projects, such as presentations, interviews, and multimedia material, significantly enhanced their creativity, as it encouraged them to move beyond stereotypes and the narrow boundaries of traditional teaching. Writing lyrics for the song, composing musical pieces, and producing various digital applications were processes that activated their imagination and allowed them to express themselves through new forms of art and communication. Through these activities, the students not only developed their creative thinking but also experienced a more experiential and meaningful form of learning.

At the same time, important skills of critical thinking, analysis, and synthesis were cultivated—skills necessary for a deeper understanding of historical events and for connecting them with contemporary reality. They were not merely limited to knowing the facts of the Asia Minor Catastrophe; instead, through the research process, they developed the ability to evaluate, compare, and analyze the consequences of the Catastrophe on the local community of Preveza.

Exploring the history of the refugees, collecting and interpreting data regarding their settlement and integration in the city, as well as searching for personal stories and testimonies, prompted them to approach the events from different perspectives. In this way, they cultivated empathy, historical awareness, and a more multidimensional understanding of the past—elements that contribute substantially to shaping active and critically thinking citizens.

2. Development of Collaboration and Communication Skills

The development of collaborative skills was a key element of the project, as the students worked in groups and shared different roles and responsibilities. Through this process, they cultivated coordination, mutual support, and a sense of collective responsibility. At the same time, the need to organize their work, plan the steps, and manage the available time contributed significantly to the development of organizational skills.

Their participation in the radio broadcast was also particularly important. Presenting their research and highlighting the stories of the refugees through a modern means of communication strengthened their ability to express themselves with clarity and confidence. The experience of public presentation was one of the most vivid and dynamic moments of the program, as the students had the opportunity to address a wider audience, simultaneously enhancing their communication and public relations skills.

Overall, the project demonstrated how essential collaboration, cooperative learning, and effective communication are within the school environment, offering students experiences that foster their personal and social development.

3. Enrichment of Historical Knowledge and Cultural Consciousness

The in-depth exploration of the historical memory of the Asia Minor Catastrophe and its integration into the educational process allowed students to realize the importance of preserving historical and cultural heritage. Through the digital recording of testimonies and the creation of interviews with refugee families, students came into direct contact with the human dimension of history, understanding the difficulties faced by refugees and the significance of their integration into the local community.

The preservation of the refugees' cultural heritage through traditions, music, and personal stories was a significant element of the teaching process. Students' participation in the production of musical works and the creation of digital photo albums contributed to the consolidation of this cultural consciousness, while simultaneously offering a contemporary way to understand the value of the past in the development of Preveza's identity and culture.

4. Development of Contemporary Skills

The use of digital tools provided students with the opportunity to acquire contemporary skills that are essential for their participation in the digital society. Familiarity with tools such as PowerPoint, image editing software, GarageBand, and FL Studio enhanced their IT skills, while their involvement in digital content production processes equipped them with useful knowledge for the future. These skills are crucial for their success in the digital age and for their development as responsible and creative citizens.

5. Social Impact and Community Participation

Through the radio broadcast, the events, and the dissemination of their digital creations, the students made a substantial contribution to raising social awareness within the local community of Preveza. The active participation of refugees in the interviews and the presentation of their personal experiences strengthened the sense of social solidarity and community cohesion, making the local society more sensitive to issues of historical memory and the refugee experience.

This initiative highlighted the role of education as a bridge between past and present, as a means of promoting creativity, and as a force that supports a society which respects its history, recognizes the value of cultural heritage, and cultivates cooperation and social cohesion. At the same time, the project was not confined to the limits of the school community but gained a broader social dimension, encouraging communication with the local community and fostering a climate of mutual understanding and acceptance of diversity.

Overall, the combined use of traditional teaching methods with digital tools not only enhanced the educational process but also offered students a holistic approach to learning, preparing them for the challenges of the modern world.

CONCLUSION

The project "Asia Minor Catastrophe and Asia Minor Monuments," implemented by the History student club of the 1st Model Junior High School of Preveza during the academic year 2022-2023, demonstrates the multifaceted value and positive impact of using digital tools in the educational process. This initiative, which combined the study of the historical memory of the Asia Minor Catastrophe with the use of modern technological means, provided students with rich educational benefits that will accompany them throughout their educational journey and beyond.

The utilization of digital tools and their integration into a program that combined history with art, music, and contemporary forms of communication, offered students the opportunity to develop skills essential for their participation in the modern world. The use of tools such as PowerPoint for creating presentations, music composition software like GarageBand and FL Studio, and their involvement in digital events and broadcasts, enhanced the understanding of historical events in an innovative and interactive way.

Beyond its technological dimension, this initiative contributed decisively to strengthening historical memory and cultural heritage, particularly concerning the Asia Minor Catastrophe, and highlighted the importance of preserving this memory for future generations. Through conducting interviews, digitizing photographic documents, and setting lyrics commemorating the 100 years since the catastrophe to music, students came into direct contact with history, approaching it from a personal and emotional perspective.

The integration of technology into the educational process is not limited to enhancing the understanding of historical events but offers students an opportunity to develop creative and social skills. Students actively collaborated in the production of digital projects, thus developing their capacity for teamwork, communication, and creative expression. Their participation in radio broadcasts, the creation of digital posters and invitations, as well as the presentation of their work at local events, provided students with the opportunity to express themselves within a broader social context, reinforcing their sense of social participation and responsibility.

A distinct characteristic of this educational approach was its focus on the historical memory of the Asia Minor Catastrophe, which was a significant event for Greece and its people. Referencing the 100 years since the catastrophe offered students the opportunity to examine the impact of this event on the local community of Preveza and other areas of Greece, providing a new dimension to their understanding of history.

Undoubtedly, the results of the initiative demonstrate the positive impact of digital tools on the educational process. Their integration not only improves the understanding of history but also empowers students' skills and prepares them for the contemporary demands of the digital world. Furthermore, the combined use of traditional and digital teaching methods allows students to approach historical and social issues in a new, innovative, and interactive way, making them aware of the value of historical memory, cultural heritage, and their social responsibility.

In conclusion, the initiative "Asia Minor Catastrophe and Asia Minor Monuments" is an excellent example of how education can combine history with technology, creating a unique learning experience for students and enhancing their knowledge not only in the field of history but also in areas such as collaboration, creativity, and digital literacy.

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MUSIQUE CONCRÈTE AS AN INSTRUMENT FOR DIGITAL STORYTELLING: AN ELECTROACOUSTIC COMPOSITION WORKSHOP WITHIN THE FRAMEWORK OF THE MUSIC ENSEMBLES COURSE

Dimitrakopoulos Aristotelis
PhD Candidate at Ionian university, Substitute Secondary Education Teacher, Composer
Music School of Preveza, Greece

ABSTRACT

This scientific article explores the integration of Musique Concrète within the educational methodology of digital storytelling, examining the potential for integrating pre-designed sound into narrative practice. The emergence of Musique Concrète marked the advent of an era of experimentation in 20th-century music composition, with its fundamental tools consisting of digital processing, modification, and the re-arrangement of pre-recorded sounds. Its defining characteristic was the subversion of conventional boundaries in "traditional composition", as it challenged strict musical rules and fostered the formation of diverse soundscapes. Concurrently, the concept of digital storytelling is examined as an educational tool, which combines the use of technological means into the educational process with exploratory learning and reflection to formulate a structured and engaging narrative.

The composition workshop, which has been developed within the framework of the Music Ensembles' course in Music Schools, investigates methods through which students can develop their musical-narrative skills. This is achieved -not through the use of speech and visual media- but by employing sound design and the formation of original compositions in the model of Musique Concrète.

In order to develop the research objectives, the methodological axis of autoethnography is utilised, through which the teacher designs and modifies the lesson plan, balancing between the didactics of technical means and the philosophy of composition. The free software (DAW) Audacity is implemented for digital sound editing, and the Soundcloud streaming service is employed for archiving and cataloguing the students' compositions.

The research project focuses on the teaching of Musique Concrète to students from Middle and High School of Greek Music Schools, with a view to stimulating imagination, promoting collaborative work and deepening students' understanding of sound as a unique material for a storytelling. The overarching objective of the workshop is the composition of original music by the students themselves. This endeavour is of twofold significance: firstly, it serves as an inaugural portfolio for future reference; secondly, it amalgamates the elements of narration and sound design in the nascent stages of the sonification process. Furthermore, students' utilisation of the free software (DAW) Audacity for sound design enhances their technological proficiency and promotes the use of digital tools in the educational process. Simultaneously, the paper proposes an extension to the the curriculum of the Music Ensembles' course, with the aim of enhancing the educational goals of artistic expression and creation. Consequently, it presents the compositional process as an educational methodology that encourages creativity, digital literacy and technical proficiency.

Keywords: digital storytelling, electroacoustic composition, music education, digital literacy

INTRODUCTION

The rapid expansion of digital technologies has significantly reshaped contemporary music education, introducing innovative pedagogical approaches that enhance creativity, participation, and interdisciplinary learning. As music classrooms increasingly integrate digital tools, educators are exploring new methods to engage students in active, experiential, and reflective artistic practices. Within this evolving educational landscape, sound is no longer perceived solely as a musical element but as a narrative medium capable of conveying meaning, emotion, and storytelling. This shift invites renewed attention to electroacoustic practices and experimental composition as powerful frameworks for teaching musical expression in the digital age. Musique Concrète, a compositional approach that emerged in the mid-twentieth century, represents a pivotal transformation in the history of music. By employing recorded environmental sounds as primary compositional material, Musique Concrète challenged traditional Western musical norms centered on notation, pitch hierarchies, and instrumental performance. Instead, it introduced techniques of sound recording, editing, manipulation, and reassembly, allowing composers to construct meaning through sonic texture, rhythm, and timbre. The practice redefined the boundaries of composition by embracing noise, everyday sound, and technological mediation, ultimately expanding the aesthetic and conceptual possibilities of music creation.

At the same time, digital storytelling has gained prominence as an educational methodology that combines narrative thinking, technological literacy, and creative production. Digital storytelling encourages learners to construct structured narratives through multimedia elements such as sound, image, text, and video, fostering critical thinking, collaboration, and reflective learning. While many applications of digital storytelling emphasize spoken narration or visual media, the role of sound as an independent narrative force remains underexplored. Sound possesses unique expressive capabilities: it can suggest atmosphere, shape temporal flow, evoke memory, and guide emotional interpretation without relying on verbal language.

This study positions Musique Concrète as a methodological bridge between electroacoustic composition and digital storytelling, proposing sound-centered narrative creation as an innovative educational practice. Specifically, it examines an electroacoustic composition workshop implemented within the Music Ensembles course in Greek Music Schools. The workshop introduces students to the artistic principles of Musique Concrète while engaging them in the process of designing sonic narratives using recorded and manipulated sound material. Rather than composing through conventional musical notation or instrumental performance, students construct original compositions through sound design, layering, transformation, and montage. The pedagogical framework of the project is grounded in autoethnographic methodology, enabling the teacher-researcher to design, evaluate, and refine the learning process through reflective practice. This approach allows for a dynamic balance between technical instruction - such as digital audio editing - and philosophical inquiry into the nature of sound, listening, and composition. The free digital audio workstation Audacity serves as the primary tool for sound processing, while the SoundCloud platform functions as an archive and dissemination space for students' final works, reinforcing both digital literacy and creative ownership.

The target group consists of middle and high school students enrolled in Greek Music Schools, with the broader educational objective of fostering imagination, collaborative creativity, and critical listening skills. Through hands-on engagement with sound recording and electroacoustic composition, students develop an understanding of sound as a raw narrative material capable of structuring meaning and storytelling. The workshop culminates in the production of original compositions that serve both as a creative portfolio and as an introduction to sonification and sound-based narrative thinking.

By integrating Musique Concrète into digital storytelling pedagogy, this research contributes to the expansion of music education beyond traditional performance-based models. It proposes composition as an exploratory learning process that strengthens creativity, technical competence, and digital fluency, while also enriching the Music Ensembles curriculum with contemporary artistic and technological perspectives.

MUSIQUE CONCRÈTE: HISTORICAL AND THEORETICAL FRAMEWORK

Musique Concrète emerged in the mid-twentieth century as a radical departure from traditional Western compositional practices, fundamentally redefining the relationship between sound, technology, and musical meaning. Pioneered by French composer and theorist Pierre Schaeffer in the 1940s, Musique Concrète introduced a compositional paradigm based on the manipulation of recorded sounds rather than the abstraction of musical notation. Schaeffer's seminal work Traité des objets musicaux established the conceptual foundation of this practice, proposing the notion of the sound object (objet sonore)—a sound perceived independently from its source or cause (Schaeffer, 1966). Through this framework, listening becomes an analytical and phenomenological act, emphasizing sonic texture, duration, and timbral qualities over traditional harmonic or melodic structures.

Central to Schaeffer's theory is the concept of reduced listening (écoute réduite), which encourages listeners to focus on the intrinsic properties of sound rather than its referential or symbolic associations. This approach marked a shift from representational to perceptual listening, allowing composers to explore sound as autonomous material. In this sense, Musique Concrète did not merely introduce new compositional techniques; it proposed a reorientation of musical thought, situating listening itself as a core creative and epistemological process.

Subsequent theorists expanded and refined Schaeffer's ideas, situating Musique Concrète within broader cultural, technological, and aesthetic contexts. Palombini (1993) emphasizes the movement's dual identity as both an artistic and scientific endeavor, highlighting the role of emerging recording technologies in shaping new compositional possibilities. He argues that Musique Concrète reflects a historical convergence of artistic experimentation and technological innovation, wherein sound recording became not only a tool but also a compositional medium. This technological mediation transformed the studio into a creative laboratory, enabling processes such as looping, splicing, time-stretching, and spatialization.

Michel Chion further advanced the theoretical discourse by examining the audiovisual and perceptual dimensions of sound. In his analysis of electroacoustic and acousmatic music, Chion (1993) explores how sound detached from its visible source acquires narrative, symbolic, and affective power. His work underscores the psychological and semiotic potential of sonic material, reinforcing the idea that sound can function as an expressive and communicative medium beyond traditional musical syntax.

From an educational and aesthetic perspective, Eisner's contributions to arts-based cognition provide a broader interpretive lens for understanding Musique Concrète as a form of artistic inquiry. Eisner (2002) argues that artistic practices cultivate modes of thinking that extend beyond linguistic and logical reasoning, fostering perceptual sensitivity, imaginative exploration, and interpretive flexibility. Within this framework, Musique Concrète can be viewed not only as a historical compositional movement but also as a model for creative experimentation and experiential learning.

Collectively, the theoretical perspectives of electro-acoustic music composition reveal Musique Concrète as a multidimensional practice that intersects music, technology, perception, and cognition. Its emphasis on recorded sound, listening awareness, and sonic transformation continues to influence contemporary electroacoustic composition and pedagogical innovation, positioning it as a vital reference point for modern sound-based artistic and educational practices.

DIGITAL STORYTELLING AS A PEDAGOGICAL METHOD

Digital storytelling has emerged as a powerful pedagogical approach that integrates narrative, technology, and learner-centered instruction to foster meaningful and engaging educational experiences. At its core, digital storytelling involves the creation of short multimedia narratives that combine text, images, audio, music, and video to communicate ideas in a structured and expressive form. In educational contexts, this methodology extends traditional storytelling by incorporating digital tools that support creativity, reflection, and multimodal literacy.

Robin (2008) conceptualizes digital storytelling as a transformative instructional strategy that enhances students' ability to synthesize information, think critically, and communicate effectively. By engaging learners in the processes of story planning, scriptwriting, media production, and presentation, digital storytelling promotes higher-order cognitive skills and deep learning. This structured production cycle encourages students to construct knowledge actively rather than consume information passively, aligning with constructivist and experiential learning theories.

Sadik (2008) further emphasizes digital storytelling as a meaningful technology-integrated approach that strengthens student engagement and motivation. According to his findings, digital storytelling supports project-based learning by providing students with authentic creative tasks that require problem-solving, collaboration, and self-regulation. The process of designing and producing digital stories also enhances students' technological fluency, enabling them to develop both creative and technical competencies within a cohesive learning framework.

Within the digital storytelling model, pedagogy typically unfolds through interconnected stages: idea generation, narrative structuring, media collection, digital production, and sharing with an audience. Each phase supports metacognitive awareness, creativity, and communication, reinforcing the integration of artistic expression with academic learning objectives. Furthermore, the multimodal nature of digital storytelling accommodates diverse learning styles, enabling students to combine visual, auditory, and narrative modes to construct rich and personalized meaning.

In sum, digital storytelling represents a holistic educational methodology that unites narrative thinking, technological proficiency, and creative expression. Its capacity to cultivate engagement, critical reflection, and multimodal literacy makes it a highly effective model for contemporary education, particularly in disciplines that emphasize storytelling, digital *(media)* production, and artistic innovation.

LINKING MUSIQUE CONCRÈTE AND DIGITAL STORYTELLING

The conceptual and pedagogical linkage between Musique Concrète and Digital Storytelling arises from a shared emphasis on sound as an expressive, narrative, and meaning-making medium. Both practices challenge conventional hierarchies in artistic creation by privileging process, experimentation, and multimodal communication over fixed formal structures. While Musique Concrète redefines music composition through the manipulation of recorded sound, Digital Storytelling reimagines narrative construction through the integration of digital media. Their convergence provides a fertile framework for contemporary music education, particularly in contexts where creative composition remains underrepresented in formal curricula.

As a contemporary composer and educator, one is frequently confronted with a persistent gap in the structure of music education: the limited institutional presence of composition as a core subject in music school curricula. While instrumental performance, music theory, and musicological studies constitute the dominant components of formal training, systematic instruction in musical creation is often marginalized. This imbalance becomes particularly evident when considering pathways to tertiary music education, where composition is recognized as a foundational discipline alongside performance and musicology. The discrepancy raises a critical pedagogical question: to what extent does secondary music education cultivate the compositional competencies necessary for students to engage meaningfully with advanced studies in composition?

Linking Musique Concrète with Digital Storytelling offers a strategic response to this educational challenge. Musique Concrète provides students with accessible compositional tools that do not require advanced instrumental technique or traditional notation, allowing them to engage directly with sound as raw material. Digital Storytelling, in turn, offers a structured narrative framework through which sonic materials can be organized into coherent expressive forms. Together, these approaches enable learners to explore composition as both a technical and conceptual practice, fostering skills in critical listening, creative decision-making, and narrative thinking.

Within this integrative framework, sound functions not merely as musical texture but as a narrative agent capable of shaping atmosphere, guiding emotional interpretation, and structuring temporal progression. The act of composing thus becomes analogous to storytelling: selecting, transforming, and arranging sonic elements to construct meaning. This perspective aligns with contemporary discourse on electroacoustic creativity, which highlights the narrative and dramaturgical potential of ε-based composition (Rich, 2010).

Pedagogically, this linkage supports a shift from reproduction-based learning toward creative authorship. Students are encouraged to move beyond interpretative performance and engage in original compositional processes that integrate technological fluency, artistic exploration, and reflective practice. The establishment of a composition workshop within the Music Ensembles course exemplifies this approach, positioning composition not as an isolated specialization but as an essential dimension of musical literacy.

Ultimately, connecting Musique Concrète with Digital Storytelling addresses both an artistic and an educational imperative. It contributes to the enrichment of music curricula by embedding composition within collaborative, technology-enhanced learning environments, while simultaneously preparing students for the conceptual and technical demands of higher-level compositional study. Through this linkage, composition is reframed as an accessible, meaningful, and pedagogically vital practice within contemporary music education.

METHODOLOGY AND RESEARCH APPROACH

This study adopts a qualitative, arts-based research design to examine the pedagogical integration of Musique Concrète and Digital Storytelling in secondary music education. The methodological framework draws on three complementary strands: (a) literature analysis on Musique Concrète in secondary education, (b) autoethnography in artistic and music pedagogy, and (c) qualitative research into digital storytelling as a methodology oriented in the Arts.

First, the educational design of the composition workshop is informed by qualitative studies and literature analysis that investigate electroacoustic and sound-based composition in secondary school contexts. Research indicates that Musique Concrète offers an accessible entry point into composition by enabling students to work with recorded sound

rather than relying on advanced instrumental technique or traditional notation (Burnard, 2012). These studies emphasize the value of experiential learning, experimentation with sound materials, and student-led creative decision-making in developing contemporary musicianship. Similarly, O'Neill (2014) highlights how technology-mediated composition fosters creativity, agency, and critical listening in adolescent learners. Drawing on these insights, the present study structures learning activities around sound recording, editing, montage, and narrative-driven sonic composition.

Furthermore, the research employs autoethnography as a core methodological tool, positioning the teacher-researcher's lived experience as both a source of data and a mode of analysis. Autoethnography in arts and education enables systematic reflection on teaching practice, curriculum design, and artistic identity by integrating personal narrative with scholarly interpretation (Ellis et al.,2011). In music education specifically, autoethnographic approaches support inquiry into creative pedagogy, classroom interaction, and the affective dimensions of artistic learning (Chang, Ngunjiri, & Hernandez, 2016). Through reflective journaling, lesson-plan documentation, and ongoing critical self-analysis, the study examines how pedagogical choices evolve in response to student engagement, artistic outcomes, and institutional constraints.

Qualitative research on digital storytelling informs the integration of narrative and sound-based composition. Digital storytelling has been widely recognized as an effective educational methodology for fostering creativity, student voice, multimodal literacy, and reflective learning (Robin, 2008; Sadik, 2008). Within this framework, narrative structuring, media selection, and digital production are understood as meaning-making processes that parallel artistic composition. By embedding sound design within a storytelling model, the study situates electroacoustic composition as a narrative practice that supports both artistic expression and cognitive development.

Data collection includes reflective teaching logs, classroom observations, instructional materials, and qualitative analysis of students' electroacoustic compositions. These materials are analyzed thematically to identify patterns related to creative growth, narrative thinking, technological competence, and collaborative learning. Through triangulating educational literature, autoethnographic reflection, and digital storytelling research, the study seeks to generate a nuanced understanding of how Musique Concrète can function as both a compositional practice and a pedagogical strategy in secondary music education.

FINDINGS AND EDUCATIONAL IMPLICATIONS

The implementation of the composition workshop underscored the pedagogical significance of sound as an autonomous narrative medium within music education. The evaluation process aimed to examine the educational, aesthetic, technological, and reflective outcomes of the learning experience as they emerged in the authentic classroom setting. A dual analytical perspective—combining learner-centered observation with teacher-led reflective analysis—proved essential in capturing both the internal creative processes of students and the pedagogical dynamics shaping their engagement with Musique Concrète and digital storytelling.

Qualitative analysis indicated that working with Musique Concrète enhanced students' narrative abilities by encouraging them to conceptualize sound not merely as musical material, but as a vehicle for meaning, emotion, and storytelling. Through the processes of sound recording, editing, transformation, and montage, students learned to construct narrative structures using sonic events alone, without reliance on spoken language or visual imagery. This compositional approach fostered imaginative thinking and strengthened students' capacity to organize sound in ways that convey atmosphere, temporal flow, and expressive intent.

The workshop also contributed to the refinement of students' aesthetic sensitivity. Focused listening activities and sound manipulation exercises promoted heightened awareness of timbre, texture, spatiality, and sonic detail. As students evaluated their own and their peers' compositions, they developed critical listening skills and an increasingly nuanced understanding of sound as an artistic and communicative medium. The integration of digital storytelling principles further supported this process by encouraging learners to frame their compositions within coherent narrative trajectories, reinforcing creative decision-making and reflective interpretation.

From a technological standpoint, students demonstrated significant growth in digital competence. Hands-on engagement with digital audio tools facilitated the acquisition of practical skills in sound editing, layering, and processing, while simultaneously cultivating a broader perception of technology as a creative and expressive resource. The production and archiving of original electroacoustic compositions enabled students to build personal creative portfolios, strengthening their sense of artistic identity, authorship, and long-term creative development.

Although compositions were produced individually, collaboration emerged through structured peer reflection and collective discussion of compositional strategies, aesthetic choices, and narrative intentions. Students engaged in dialogic critique, shared listening sessions, and guided feedback activities, fostering a reflective learning environment in which ideas, techniques, and artistic perspectives were exchanged. This reflective collaboration supported metacognitive awareness, encouraged constructive self-assessment, and deepened students' understanding of the compositional process.

Overall, the findings suggest that Musique Concrète can serve as an effective bridge between music creation and digital storytelling, positioning sound at the center of a multimodal, narrative-driven learning experience. The workshop demonstrates that sound-based composition not only enhances musical creativity but also strengthens imagination, digital literacy, critical listening, and reflective artistic practice.

COMPARATIVE PERSPECTIVES

In order to contextualize the integration of Musique Concrète and Digital Storytelling, it is important to compare this approach with other educational practices. For example, project-based and inquiry-based learning share similar goals in fostering creativity and critical thinking. Arts-based research further emphasizes the importance of multimodality and experiential learning (Eisner, 2002; Bresler, 2007). In this light, Musique Concrète storytelling can be seen as part of a larger movement toward transdisciplinary pedagogy.

In order to contextualize the integration of Musique Concrète and Digital Storytelling within contemporary music education, it is useful to compare this approach with other interactive and arts-based pedagogical models that emphasize creativity, participation, and experiential learning. Across diverse educational frameworks, there is a growing shift away from transmissive teaching toward learner-centered methodologies that prioritize exploration, reflection, and creative authorship.

Project-based learning and inquiry-based learning share fundamental affinities with the present approach, particularly in their emphasis on student agency, problem-solving, and the construction of knowledge through sustained creative processes. Like Musique Concrète storytelling, these models encourage learners to develop original outputs through iterative experimentation, critical evaluation, and meaningful engagement with content. However, while project-based learning often prioritizes conceptual or interdisciplinary problem-solving, sound-based narrative composition uniquely foregrounds listening, sonic imagination, and aesthetic decision-making as primary cognitive and expressive skills.

Similarly, participatory and improvisational pedagogies—such as creative music-making, live composition, and interactive performance practices—promote responsiveness, collaboration, and embodied musical understanding. These approaches foster real-time creative thinking and collective meaning-making, whereas Musique Concrète composition situates creativity within a studio-based, reflective, and technologically mediated environment. This distinction enables deeper engagement with sound manipulation, temporal structuring, and post-production processes, expanding students' awareness of composition beyond performance-centered paradigms.

Arts-based education and arts-based research further provide a relevant comparative framework, emphasizing multimodality, experiential inquiry, and the cultivation of aesthetic cognition. From this perspective, Musique Concrète and Digital Storytelling align with broader pedagogical movements that recognize artistic creation as a form of knowledge production. By integrating sound, narrative, and digital media, this approach supports transdisciplinary learning, bridging music, media studies, storytelling, and technological literacy within a cohesive educational model.

Compared with visual-centered digital storytelling practices, the sound-oriented focus of Musique Concrète offers a distinctive contribution by positioning auditory perception as the primary narrative driver. This shift challenges dominant visual hierarchies in media education and promotes the development of deep listening, sonic awareness, and auditory imagination. Moreover, it enables students to engage with narrative meaning in non-verbal, abstract, and emotionally nuanced ways.

In this broader comparative context, Musique Concrète storytelling can be understood as part of an evolving educational movement toward interactive, transdisciplinary, and artistically grounded pedagogy. Its integration within music education complements and extends existing creative learning models by foregrounding sound as both a compositional material and a narrative medium, thereby enriching the landscape of contemporary arts-based educational practice.

IMPLICATIONS FOR TEACHER TRAINING

The integration of Musique Concrète in Digital Storytelling also raises questions about teacher preparation. Educators must acquire technical skills with audio software and cultivate openness to experimental methods. Teacher training programs could integrate workshops on sound-based composition, collaborative design, and digital media literacy. The TPACK framework (Mishra & Koehler, 2006) provides a strong model for preparing educators to integrate technology, pedagogy, and content knowledge effectively.

As digital storytelling increasingly gains recognition as a tool for artistic expression and narrative construction, music educators must be equipped with both the conceptual and practical skills necessary to guide students through sound-based creative processes (Robin, 2008; Sadik, 2008). Teacher training programs should emphasize the pedagogical value of digital storytelling as a compositional framework that supports creativity, student voice, and multimodal learning. By engaging future educators in narrative-based sound composition, teacher preparation can foster a deeper understanding of how sound, structure, and meaning intersect within digital media environments. This aligns with research highlighting the role of storytelling in promoting reflective learning, critical thinking, and learner-centered instruction (Hull & Katz, 2006; Ohler, 2013).

Furthermore, professional development should include hands-on training in digital audio tools and sound editing platforms, enabling teachers to confidently implement electroacoustic composition activities in classroom settings. Familiarity with digital audio workstations, sound manipulation techniques, and media archiving platforms enhances teachers' capacity to support students in producing original creative work while simultaneously strengthening their own digital literacy (Burnard, 2012; Savage, 2005). Such training positions technology not merely as a technical resource, but as an expressive and pedagogical medium.

Equally important is the cultivation of reflective and arts-based teaching practices. Educators must be prepared to facilitate critical listening, aesthetic evaluation, and narrative interpretation within sound-centered learning environments. Training in arts-based and practice-led research approaches can support teachers in documenting classroom processes, interpreting creative outcomes, and continuously refining their instructional strategies (Barrett & Stauffer, 2009; Eisner, 2002). This reflective orientation encourages teachers to view composition not only as a curricular topic but as an evolving artistic inquiry.

In addition, digital storytelling in composition invites a shift from performance-dominated music education toward more inclusive models that value creation, experimentation, and authorship. Teacher education programs should therefore promote pedagogical frameworks that legitimize composition as a core musical competency, empowering educators to integrate creative sound work into ensemble courses and general music curricula.

Overall, preparing teachers to employ digital storytelling as a compositional tool requires an interdisciplinary training model that combines music pedagogy, media literacy, creative technology, and reflective practice. Such preparation equips educators to support innovative sound-based learning experiences that enhance creativity, narrative thinking, and contemporary musical expression.

LIMITATIONS AND FUTURE RESEARCH

While the present study demonstrates the pedagogical value of integrating Musique Concrète and Digital Storytelling in music education, several limitations should be acknowledged. First, the research is situated within a specific educational and cultural context, which may limit the generalizability of the findings to other institutional settings, age groups, or curricular frameworks. The workshop was implemented within a particular course structure, and its outcomes may vary if applied in different school systems, technological environments, or levels of musical expertise.

A further limitation concerns the qualitative and practice-based nature of the research design. Although in-depth reflective analysis provides rich insights into students' creative and narrative development, it does not allow for large-scale statistical validation or direct comparison with control groups using alternative pedagogical methods. Additionally, the reliance on the teacher-researcher's autoethnographic perspective introduces an interpretive dimension that, while valuable for reflective inquiry, may be influenced by subjectivity and personal artistic priorities.

Technological constraints also represent a potential limitation. Access to digital audio tools, recording equipment, and software proficiency can affect both the quality of student output and the feasibility of replicating the workshop in less technologically equipped educational environments. Variations in students' prior digital literacy may further shape learning outcomes, creating uneven levels of engagement or technical confidence.

Future research could expand this study in multiple directions. One promising avenue involves the application of sonification in the natural and positive sciences, where data is transformed into sound to support scientific interpretation, pattern recognition, and conceptual understanding. Investigating how Musique Concrète techniques might intersect with sonification could open interdisciplinary pathways linking artistic sound design with scientific data representation, enhancing both creative expression and STEM learning.

Moreover, the integration of immersive technologies such as virtual reality (VR) and augmented reality (AR) could significantly expand the expressive and pedagogical possibilities of Musique Concrète storytelling. Immersive environments could enable students to experience spatialized soundscapes, interact with sonic narratives in three-dimensional virtual spaces, and construct multisensory narrative worlds that deepen engagement and embodiment. Such developments may transform sound-based storytelling into a fully immersive compositional and narrative practice (Bacca et al., 2014; Parong & Mayer, 2018).

Additional future research could explore longitudinal impacts on students' creative identity, compositional skill development, and career pathways, as well as comparative studies examining Musique Concrète storytelling alongside other creative pedagogies. Expanding the scope to include cross-cultural, interdisciplinary, and technology-enhanced contexts would further contribute to understanding the evolving role of sound-based composition in contemporary education.

CONCLUSIONS

This study demonstrates that the integration of Musique Concrète within the framework of Digital Storytelling constitutes a viable and pedagogically meaningful approach to contemporary music education. By repositioning sound as both a compositional material and a narrative medium, the proposed workshop expands traditional music pedagogy beyond performance and notation, emphasizing creativity, listening awareness, and artistic authorship.

The findings indicate that engaging students in electroacoustic composition fosters the development of narrative thinking, aesthetic sensitivity, and critical listening skills. Through processes of sound recording, transformation, and montage, learners acquire the ability to structure meaning and emotion through sonic events, reinforcing the expressive potential of sound independent of verbal or visual media. At the same time, the integration of digital storytelling principles supports reflective learning, imaginative exploration, and coherent narrative construction within sound-based compositions.

Beyond artistic outcomes, the project highlights the educational value of composition as a core musical competency. By incorporating Musique Concrète into the Music Ensembles curriculum, the study addresses a longstanding gap in formal music education regarding systematic training in creative music-making. The workshop model demonstrates that composition can be taught in accessible, technology-supported, and pedagogically structured ways that benefit students with diverse musical backgrounds and technical abilities.

Furthermore, the research underscores the importance of digital literacy in modern music education. Students' engagement with digital audio tools enhances technological competence while promoting an understanding of technology as an expressive and creative partner in artistic production. The formation of personal creative portfolios further strengthens learners' sense of artistic identity, ownership, and long-term creative development.

In conclusion, linking Musique Concrète with Digital Storytelling offers a compelling framework for reimagining music education as a space of experimentation, narrative exploration, and creative inquiry. The approach not only enriches compositional pedagogy but also contributes to broader educational goals, including imagination, critical reflection, and interdisciplinary learning. As music education continues to evolve in response to technological and cultural change, sound-based storytelling emerges as a powerful model for fostering innovative, inclusive, and future-oriented artistic learning.

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RECONNECTING STUDENTS: ENSURING EMOTIONAL GROWTH IN A DIGITALLY DRIVEN EDUCATIONAL SYSTEM

Maria Kardama
English Language and Literature Teacher
1st Vocational School of Kato Achaia
Patra, Greece.
Email: mkardama@gmail.com

ABSTRACT

In today's educational setting, students who are largely dependent on media technologies for learning and communication may tend to prefer computer-mediated communication over face-to-face interaction. While digital technologies have numerous advantages, such transformation can hinder the development of some core social skills such as friendship making, teamwork and dealing with actual life, social issues that require emotional maturity and empathy. This presentation explores the potential long-term effects of excessive dependence on digital technology on the ability of students to engage in personal, interpersonal communication. We will look at the dilemma teachers facing in juggling digital learning with opportunities for students to gain essential soft skills in class. We will also discuss ways of integrating both digital and face-to-face interactions to produce balanced students who have the emotional intelligence needed to cope with complex social situations. Based on case studies, research, and real-life scenarios, valuable input will be given on how to encourage a balanced approach toward digital media in education so that students achieve good results academically as well as develop socially and emotionally.

Montessori School and Limited Screen Time, Flipped Classroom with In-Person Discussion, Tech-Free Study Hours, Online and Offline Reading Mix, Mindful Break Zones, Digital Detox Challenges are but a few modern pedagogical approaches that integrate technology while prioritizing human interaction to equip students with both technical knowledge and the interpersonal skills needed for success in their future career and personal life. By consistently recognizing and validating feelings and logical thinking, students are supported to build confidence, creativity and resilience, leading to a more supportive and participative classroom than the digitally based one. “Education must begin with the solution of the teacher-student contradiction, by reconciling the poles of the contradiction so that both are simultaneously teachers and students”, Paulo Freire highlights. This very much fosters interactive learning in which technology should serve to augment, not replace human contact and soft skill building. Even if technology can replicate real scenarios, communication, teamwork, empathy, and leadership develop best out of human interaction. Global competency goes far beyond language fluency. Good Emotional Intelligence (EI) is accumulated through real dialogues, clashes, and listening, which cannot be provided by a single technology tool. Teaching and learning require social concession, bargaining, and joint decision-making, which work best in real environments. Literally, technology needs to support—but not replace—the human connections that make learning really exciting and meaningful.

Key words: emotional intelligence, real life scenarios, human interaction, soft skills, balanced teaching approach

INTRODUCTION

The modern digitalized educational system, with artificial intelligence (AI) reshaping education in many key ways, has rapidly transformed from a futuristic concept to a common reality. In 2025, AI technologies revolutionize the education world to present surprising opportunities for productive learning at the individual level, administrative efficiency, and improved educational performance (Luckin et al., 2016; Holmes et al., 2019). From intelligent tutoring lesson plans of early years to AI-based orchestration of classrooms, digital age influence on education goes really deep and seems far-reaching.

AI is breaking down the walls of traditional schooling, unveiling a world in which learning flows seamlessly, at the unique pace of every individual. With materials that accommodate a range of learning styles and abilities, information no longer exists within strict parameters, reaching each learner at their point of need, creating an environment in which all learners can thrive (Selwyn, 2019; Williamson & Eynon, 2020).

Evidently, all educators somehow interrelated to the learning process have been more or less familiar with several digital media such as interactive whiteboards, learning applications, e-books, e-learning platforms such as Coursera, Khan Academy, and Moodle for interesting and affordable learning opportunities, videos and podcasts to facilitate visual and auditory learning, virtual and augmented reality (VR/AR) in subjects such as science and history, gamification tools such as Kahoot! and Duolingo to grab students' attention, online collaboration platforms such as Google Classroom, Microsoft Teams, and Zoom to simplify communication and collaboration among teachers and students or students in different countries, chatbots, 3D printing to bring STEM concepts into reality through tangible models, and online test tools such as Quizzes and Socrative for instant feedback to make the process of learning more entertaining and efficient (Redecker, 2017; Luckin et al., 2016; Dillenbourg et al., 2021).

We will not elaborate on the profound positive influence of the aforementioned means of learning, as it is self-evident that fostering practical application of them yields enduring benefits deeply appreciated in everyday schooling. This article explores the possible or expected long-term effects of excessive digital dependence on students' ability to engage in personal and interpersonal communication. We will discuss the challenges that educators face in balancing digital learning with opportunities for students to develop essential soft skills (Greenhow & Lewin, 2016; OECD, 2021). Mainly, we will present strategies for integrating both digital and personal interactions to nurture well-rounded students who are equipped with the emotional intelligence needed to navigate complex social dynamics (Goleman, 1995; Mayer et al., 2008). Through case studies and practical examples, the article will provide some insights into how to encourage a balanced approach to digital media in education, ensuring that students not only excel academically but also grow emotionally and socially.

THE DOUBLE-EDGED SWORD OF TECHNOLOGICAL INTEGRATION

As nothing is ever a coin with only one side, always having both merits and flaws, the digital transformation of education faces several challenges nowadays. In a nutshell, over-reliance on technology can lead to students' becoming fully-dependent on devices, diminishing or zeroing their critical thinking, creativity, and attention span. Furthermore, the rise of online learning can reduce social interactions, halt communication skills, and isolate students from essential face-to-face collaboration. The lack of regulation in digital platforms may lead to unreliable sources, and the absence of standardized quality control to inconsistent learning input. Moreover, prolonged screen time can harm students' physical health, namely eye strain or backache and poor posture, giving on to a total avoidance of physical activity. Digital tools may also promote shallow learning, reducing deep engagement with the new content of the academic modules. Multitasking and simultaneous use of social media hinders focused study time while if a classroom environment allows both teachers and students to be busy working on their digital tools during the learning period, then they will never learn themselves in depth and personal needs will never be addressed or diagnosed. Finally, not all educators are equally equipped to integrate technology effectively, which means chaotic learning conditions and loss of discipline that will dominate the classroom landscape.

At this precise moment, it is imperative that we pause, take a deep breath, and embark on a self-inquiry status about the balance between AI and EI in education and the possibility of re-directing students back to a less digitalized educational system. Do online interactions (e.g., chats, emails, online discussions) promote students' development of empathy, or do they create emotional detachment? Can students successfully perceive and express emotions in an online learning environment? Do online tools support mindfulness and emotional self-regulation, or do they promote impulsive behavior (e.g., instant responses, no reflection at all)? What effects does less in-person interaction have on students' comprehension of tone, facial expressions, and body language? Are students learning how to navigate conflicts

constructively in digital spaces, or does online communication increase misunderstandings and cyberbullying? Are we responsible for the dehumanization of our students' learning because of the excessive use of technology-driven education that prioritizes digital efficiency over emotional growth?

John Dewey underlines that “Education is not preparation for life; education is life itself.” emphasizing the need for holistic education, blending digital tools with real-life skills development. Pedagogists and school psychologists are alarmingly noticing that the modern student is constantly plugged in but unfortunately feeling disconnected. The digital world offers multi-folded, on the spot connection, but it also brings isolation, stress, and emotional exhaustion. Looking for their personal identity between social media pressures, online learning, and the constant bombardment of notifications, students often struggle to find real, deep connections and authentic conditions to formulate their own self icon .The dopamine from social media has already replaced the excitement for meaningful everyday relationships, and the pressure to always be “on” can be draining. The modern student, unarmed with the essential toolkit of soft skills, becomes a highly knowledgeable but socially and emotionally struggling individual.

If we wish to outline the modern student’s profile, we can effortlessly conclude that social media, online classes, and digital entertainment create an illusion of connectivity leading to vast loneliness. Many students struggle to express emotions beyond emojis and text messages, making relationships unstable, weak and impersonal. The unceasing effort to present and maintain a "perfect" online persona generates stress and anxiety, leading to emotional burnout. This inability to manage stress effectively affects their daily academic performance, personal growth, self-esteem development and, thus, future career prospects and decisions. Moreover, the instant problem solving possibilities provided by technology (quick Google searches, AI assistance, and automated solutions) reduces critical thinking and problem-solving skills. When facing real-world challenges, such as classroom conflicts, job interviews, workplace demanding situations, students often feel helpless or frustrated because they have not developed resilience. Without the ability to adapt to new environments, students may struggle in a difficult school condition or a workplace simulation that require quick decision-making and flexibility. Many students who lack handling mechanisms based on soft skills, resort to escaping reality harming their physical or psychological balance.

One of the most crucial soft skills is empathy, a word that is overused nowadays but not practically applied in the real school culture. What is empathy? Empathy is the ability to understand and share the feelings of others, to put yourself on other people’s shoes and try to walk with them .Unfortunately, in today’s digital-driven world, many students are struggling with a decline in empathy building up several social misunderstandings and finally losing trust to others and themselves. Empathy requires viewing things from another person's point of view, but a digital world is mostly self-centered. The fast-paced nature of the internet prioritizes immediate reactions over thoughtful responses permitting students to become unable to consider opposing perspectives. It is common that some students prefer to stay in echo chambers, interacting only with like-minded individuals, so as not to be stressed out about how to understand diverse experiences.

Without doubt, one of the collateral but still prevailing effect of the digital explosion in education is the desensitization of the young generation. Constant exposure to online conflicts, cyberbullying, and negative news makes students less sensitive to real-life suffering while the constant bombardment of information and online drama can make them emotionally numb. Real-life conversations require active, sympathetic listening and emotional presence, which digital interactions do not always encourage while the easiness in scrolling past distressing input without even realizing the seriousness of it, reduces emotional engagement with real-world problems that synthesize the current social status.

I definitely remember with some regret the story of one my students. A high school student, Panos, spent most of his school days retrieved in a remote school spot doing his assignments on his laptop while his communication with other adolescents outside school was only through social media platforms. He rarely interacted with his classmates in person. When he finally met someone he liked at a social event, he struggled with basic flirting and body language cues, making real-life romantic interactions awkward. Since much of his communication had been through screens, he found it difficult to read facial expressions or engage in meaningful face-to-face conversations with a result to sound anti-social and be rejected by the person he was interested in.

We are, therefore, inclined to believe that the tools that enhance or jet out the learning dynamics—these very same tools can, paradoxically, create barriers to personal development. As students become increasingly immersed in the screen-based lessons of an algorithm-driven curriculum, opportunities for organic conversation, teamwork, and interpersonal problem-solving are disappearing (Greenfield, 2015; Turkle, 2017). The enriched, unpredictable synthesis of face-to-face interactions led by a spontaneous exchange of ideas and illustrated by the bright signs of body language cannot be fully replicated by digital means (Sälzer & Prenzel, 2020).

In the current middle-school classroom with Gen Alpha students (Generation Alpha includes those born between 2010 and 2025, raised in the era of smartphones and AI), educators stand at the crossroads of innovation and tradition, tasked with weaving together the vast potential of digital learning with the enduring necessity of reconnecting them with human connection (McCrindle & Fell, 2021; Livingstone & Blum-Ross, 2020). Amidst this digital transformation, a fundamental challenge has emerged: How should teachers nurture the essential soft skills that define human interaction—communication, collaboration, problem-solving, and emotional intelligence (World Economic Forum, 2020)?

True learning lies farther and beyond sheer comprehension of facts; it is shaped by dialogue or even debate, moments of struggle and triumph shared with peers, the ability to read somebody's emotions and respond with empathy (Goleman, 1995; Mayer et al., 2008). In a world increasingly directed by technology, teachers should set the goal to ensure that the human elements of education will not get exfiltrated in the pursuit of efficiency (Selwyn, 2019). They must invent ways to integrate technology without allowing it to overshadow the fundamental need for individual growth, fostering an environment where both digital fluency and social intelligence thrive in harmony (Holmes et al., 2019). As we all realize, the challenge is not only to counterbalance digital learning with soft skills development, but to design a clear interplay between the two. The aim is the construction of a classroom culture where technology serves as a bridge rather than a barrier or an end in itself, where students accumulate knowledge but also manage to articulate their thoughts and feelings, becoming more adept at navigating the complexities of several aspects of human relationships. Only then can education fulfill its highest humanitarian purpose: to prepare young minds not just for a world of information, but a humane world of free-thinking, self-existent personalities (Nussbaum, 2010).

Maria Montessori advocates that "The greatest sign of success for a teacher is to be able to say, 'the children are now working as if I did not exist'', highlighting the importance of the learning atmosphere of independence, collaboration, and problem-solving far beyond the use of digital tools. There are some educational systems, institutions or methodologies that have already adopted a more balanced digital teaching approach with numerous positively encouraging effects on students learning achievements.

GLOBAL MODELS FOR BALANCED EDUCATION

Finland's Digital Learning Model: Digital tools like AI, VR, and gamification are integrated into teaching, with online platforms supporting remote and hybrid learning for students with special educational needs while teachers have flexibility in choosing digital resources and receiving continuous professional development in digital pedagogy. On the other hand, the curriculum encourages outdoor learning and hands-on projects based on interdisciplinary units or thematic modules, promoting creativity, teamwork, communication, and critical thinking. There is a strong focus on cybersecurity and responsible digital citizenship as a core subject, ensuring that students develop critical media literacy and ethical use of technology.

Montessori Schools and Limited Screen Time: A great deal of Montessori schools focus on hands-on learning where students are engaged in actual work. For example, instead of just learning chemical reactions, students mix vinegar and baking soda and see the reaction themselves. Similarly, medical students practice operations on mannequins, coding students build actual apps, and business students practice negotiations. Thus, learning is made more experiential, interactive, and effective. Additionally, age-based and progressive inclusion of digital media is compulsory limiting screen utilization by younger pupils. Instead of relying extensively on tablets, they advocate interactive cooperative work, kinesthetic manipulatives, and true problem-solving within the natural environment.

Singapore's Holistic Digital Learning Approach: Singapore has integrated digital learning into its curriculum while emphasizing mental health and digital literacy. Schools feature "cyber wellness" curricula that instruct pupils on responsible internet use, screen time management, and online manners. Educators receive special training in order to integrate cyber wellness topics into coursework. Schools make use of learning platforms like Student Learning Space (SLS) which have digital literacy modules and AI-powered tools that help track students' screen time and online behavior in a non-intrusive way. Finally, the Ministry of education collaborates with technology companies to make online learning spaces safer while laws against cyberbullying, doxing, and online harassment are strictly enforced.

Flipped Classroom Model: A blended method with digital media for self-instruction and interaction in class minimizes student workload and increases interaction. Students learn home lectures in an online class and engage using participative discourse or work on hands-on lab projects during lectures. The process allows students to learn on their own while they have free class time to engage actively. In a high school math class for example, the students watch a pre-recorded video on algebra concepts in their homes. They can pause, rewind, and replay the videos at their convenience,

which allows them to learn at their own pace. When they come to class the next day, instead of listening to a lecture, they do group problem-solving exercises, discuss tough questions, and receive immediate guidance from the teacher. Such interactive session helps consolidate their knowledge and allows the instructor to address problems on an individual basis.

PRACTICAL STRATEGIES FOR EDUCATORS

Nevertheless, for those of us who need to work within ordinary school systems, it is crucial to implement specific strategies to balance digital learning with emotional growth. We should always recognize the fact that global competency goes beyond language fluency. Let us see some of these strategies to enrich our toolkit:

Mix of Digital and Real-World Activities: Students conduct a research on a topic (e.g environmental issues) and then they organize fieldwork or they interview experts to test their prototype research paper. They write a blog, or present their findings creatively in posters, live presentations, or digital reports. This way, they meet the criteria for using both digital tools for research and accomplishing real-world engagement, teamwork, and public speaking.

Online and Offline Reading Mix: A reading program that combines e-books with physical books, encouraging students to experience different formats working continuously on formulating digital and traditional reading habits, allowing students to discover what works best for them.

Tech-Free Study Hours: Some school libraries define tech-free study zones.

Tech-Free Story Telling: Students read e-books, for example fairy tales or traditional myths, and then they have to narrate the story and have a class discussion about the literary aspects or the moral of the story.

Drawing Instead of Watching: The teacher may replace screen-based activities with creative art presentations on wall papers to analyze the topic of the lesson or the lesson outcomes.

Outdoor Exploration Lesson: The whole class spend a period outside engaging in hands-on learning, for example if the topic is about plant growth, growing vegetables in a school garden may follow online reading about photosynthesis.

Screen Time Reflection Exercises: Students are required to track their screen time for a specific period of time and analyze its impact on their sleep, mood, and school performance or general effectiveness. They, then, set personal goals to optimize their tech use in an effort to promote self-regulation and responsible digital habits.

Digital Collaboration with In-Person Debriefing: Students work on a shared Google Doc for a group project but afterwards they meet in person to discuss roles, brainstorm ideas, and refine their final presentation which in practice fully encourages digital literacy and interpersonal skills at the same time.

Power point Presentations with Peer Feedback: Students present their work using digital tools and the evaluation comes in a rubric designed by the students themselves and is explained orally as peer constructive feedback which entails verbal communication, critical thinking and emotional intelligence.

Realia and Class Discussions or Debates: The students are asked to use real world media to collect authentic dialogues, case studies or articles to create the thematic opinions to lead discussions or debates.

Family Digital Detox Challenge: Teachers assign students a challenge to do at home with their families so that the effort is continued at home and the wider school community is energized.

CONCLUSION

The present study highlighted the harmonious coexistence of Artificial Intelligence (AI) and Emotional Intelligence (EI) as a cornerstone for the transformation of secondary education. While AI offers unprecedented opportunities for personalized learning and administrative efficiency, the study emphasized the critical need for the simultaneous cultivation of EI to ensure a holistic and human-centered educational process. The interaction between EI skills and AI-based learning environments was explored. The findings are expected to demonstrate how EI influences students' willingness and ability to engage with these systems, leading to optimized learning outcomes.

Furthermore, the study examined the reciprocal influence between EI and AI algorithms, aiming to integrate emotional awareness into educational tools, thereby enhancing adaptability and personalization.

The study also shed light on potential risks arising from the lack of interaction of these two domains. It recognized the possibility of emotional detachment and decreased empathy in an overly digitized environment, underlining the need for strategies to counterbalance the impersonal nature of technology.

Specific strategies were proposed to balance digital learning with emotional development, including a blend of digital and real-world activities, screen-free study hours, non-digital storytelling, artistic expression, outdoor exploratory lessons, and screen-time reflection exercises.

Examples from educational systems such as the Finnish model, Montessori schools, Singapore's approach, and the Flipped Classroom Model were presented as exemplary practices for the successful integration of technology with the development of soft skills.

In our over-automatized world where screens often replace face-to-face connection, the heart of education must remain human. Reconnecting students emotionally is not a luxury—it's a great necessity. As we embrace the power of digital innovation, let us also champion compassion, empathy, and emotional growth. When students feel seen, heard, and valued, they don't just learn better—they live better. By weaving emotional well-being into the fabric of our digital classrooms, we can nurture not only smarter minds, but kinder hearts and stronger spirits. Always keep in mind that the future of education is not to be just digital—it's deeply human.

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LEVERAGING MULTILITERACIES AND CREATIVE WRITING IN THE STORYTELLING TEACHING

Kostara Effrosyni
PhD Greek Language teacher, Laboratory Teaching Staff,
Department of Educational Sciences and Social Work
University of Patras, Greece
e-mail: frinikostara@g.upatras.gr

Kriketou Theodora
MEd Greek Language teacher, Secondary Education Teacher
Secondary Education of Achaia, Greece
e-mail: theodora.kriketou@gmail.com

ABSTRACT

The present article discusses issues that occupy an important place in the new Curricula and concerns, on one hand, the formulation of an alternative proposal for the teaching of storytelling, through the utilization of multiliteracies and creative writing, and, on the other hand, the investigation of the results that emerged from the implementation of this proposal. The teaching plan was designed and implemented for the purposes of Modern Greek Language course by the Greek Language teacher and Laboratory Teaching Staff of the Department of Educational Sciences and Social Work at the University of Patras, Ms. Effrosyni Kostara, and the Greek Language teacher at a High School, Ms. Theodora Kriketou and was applied during the 2024-2025 school year in the context of a model teaching session to first-year high school students in an urban school of Patras. After the completion of the teaching session, both the students and the teachers who attended the lesson were provided with questionnaires in order for the researchers to ascertain a) the effectiveness from the use of multiliteracies and creative writing in the teaching of storytelling and b) the contribution of multimodal texts to the development of creative writing skills.

Initially, the article presents the key aspects of multiliteracies theory and the contribution of creative writing in the development of students' linguistic and communicative skills, as well as to the enhancement of their creativity. Then, the implemented teaching scenario is outlined, the main goal of which is for students to discover and understand the macrostructure of narrative through the use of a multimodal text (video) and the collaborative production of their own narrative text in a specific communicative framework. The teaching approach includes activities for decoding semiotic modes of multimodal texts and creative writing, aiming to develop students' visual and critical literacy, as well as to cultivate collaborative storytelling skills. The methodology leverages collaborative group teaching and inquiry-based learning with the application of dialogic discussion techniques in plenary and student groups.

Finally, the article discusses the findings of the questionnaires distributed to students and teachers which are structured around three main axes. The first axis concerns the application of multiliteracies, the second focuses on the utilization of creative writing and the third is anchored on the results of the transition from the processing of multimodal text to creative writing. Based on the findings, the students understood the structure of narrative through the use of non-written text (video) and became familiar with other semiotic modes (such as images and sound) that can not only convey messages but also to present the development of a story. Furthermore, collaborative text production in groups helped students generate more ideas and express emotions more freely. Finally, it was observed that the multimodal elements of the video helped in the creation of their own stories, as the use of images contributed in shaping the style and atmosphere, while music and sound effects inspired ideas for the emotional development of the characters in the story.

Keywords: multiliteracies, multimodal texts, creative writing, creative storytelling.

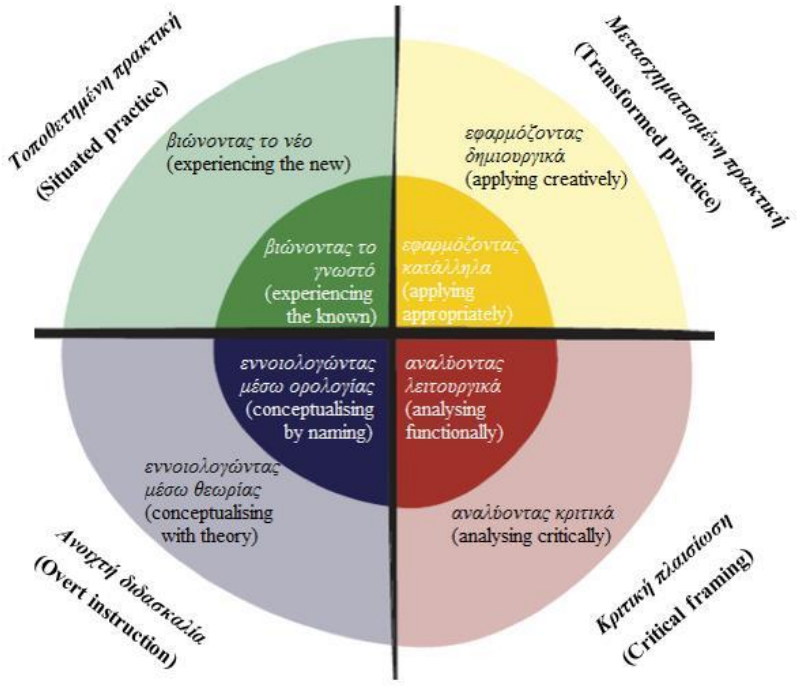
INTRODUCTION

UTILIZATION OF MULTILITERACIES IN LANGUAGE TEACHING

The contemporary educational reality is characterized by the rapid development of technologies and the increasing multimodality of texts circulated in everyday life. Students come into contact with multimodal texts, such as digital stories, interactive presentations and multimedia narratives, which helps them understand that meaning is not conveyed exclusively through written or oral language, but also through combinations of visual and auditory elements (Kalantzis & Cope, 2020). For this reason, the concept of multiliteracies, as formulated by the New London Group (1996), emphasizes the need for a broadened literacy that will include not only the understanding and production of written language, but also the cultivation of skills for understanding and producing meanings through a range of semiotic modes, such as image, sound and movement.

The utilization of multiliteracies in teaching is associated with the "functional use of language", that is, the processing of texts and the production of speech in authentic communicative contexts, with the aim of effective communication in various communicative conditions (Charalambopoulos & Chatzisavvidis, 1997). In this context, speech production in the theory of multiliteracies constitutes a dynamic process, which concerns not only the final product, but all the stages from the selection of material from a set of available resources (designed), the combination of elements and its composition (designing) to the new produced product (redesigned) (Cope & Kalantzis, 2000; Chatzisavvidis, 2013). This process is realized during teaching through four phases (Figure 1), that overlap with each other, without a linear sequence: a) situated practice, which concerns the utilization of students' experiences and their initial contact with types of "authentic" texts they encounter in everyday life, with the aim of provoking their interest, b) overt instruction, i.e., the process of presentation by the teacher and reception by the students of the new knowledge through collaborative group activities, c) critical framing, which concerns the critical consideration and interpretation of elements, through associations, comparisons, questions and d) transformed practice, which concerns the formation of a new text in a specific communicative context (Kalantzis & Cope, 1999; Chatzisavvidis, 2013).

Figure 1
Diagrammatic representation of the multiliteracies model



Source: Kalantzis & Cope, 1999

In the Greek educational reality, the integration of multiliteracies is a central axis of the modern Curricula, as they promote creativity, critical thinking and collaborative learning. Through their utilization, students develop digital literacy skills, improve their communicative competence and gain a deeper understanding of the types of texts they encounter (Kapsalis, 2021). In addition, the use of multimodal texts in teaching enhances differentiated learning, allowing students with different learning profiles to actively participate in the process (Karavaku, 2022). Besides, multiliteracies

are directly related to Gardner's theory of multiple intelligences (1999). Kostara (2024) specifically points out the importance of their utilization as a methodological tool for teaching Roma students, while Fterniati (2010) emphasizes the importance of the pedagogy of literacy and multiliteracies in the language course at primary school, stressing that the utilization of multimodal texts can enhance students' critical thinking and creativity, while, at the same time, enhances participation, providing opportunities for everyone, regardless of linguistic or cultural background, to express themselves and participate actively in the learning process (Serafini, 2014).

UTILIZATION OF CREATIVE WRITING/NARRATIVE IN LANGUAGE TEACHING

Creative Writing refers to the art of writing texts with imagination and creativity as primary elements. It gives children the opportunity to come into contact with the art of writing, while at the same time it entertains and educates, helping to relieve anxiety and enjoy the process (Vakali & Kotopoulos, 2023). It concerns the process of creating a new text, in which the writer's thoughts, reflections or memories are rendered in an attractive way, incorporating their ideas and feelings and organizing the events in a cohesive manner (Papantonakis & Kotopoulos, 2011). As evidenced by many research studies, Creative Writing provides the opportunity for artistic expression to students, familiarization with the rhythm and harmony of speech, with ways and techniques of literary writing, contributing to the development of multiple intelligence (Gunduz & Ozcan, 2016) and serving experiential - discovery learning in a student-centered teaching environment (Kotopoulos, 2012). For this reason, its entry into the Curricula of our country has been promoted (Vassiliou, 2016), while it now holds an important place in the new Curricula https://iep.edu.gr/el/nea-ps-provoli).

Storytelling in education is used for pedagogical purposes, entertainment, but also for the transmission and preservation of cultural elements (Iliopoulou, 2021), creating a safe framework for raising awareness on various issues. It constitutes an effective pedagogical method, which contributes to the empowerment of self-perception and identity (Hibbin, 2016; Gupta & Jha 2022), to the enhancement of memory (Schank, 1999), to the development of cultural sensitivity and to the cultivation of emotional intelligence (Mello, 2001). It enhances students' skills in understanding and producing speech (Maddumage, 2023), oral, written or multimodal, especially with the utilization of multiliteracies and new technologies (multimedia, sound, graphics, video). In particular, the narration of stories or fairy tales is a tool that can contribute to the highlighting of children's thoughts and the identification of their difficulties, helping them to understand their world more accurately (Miller & Pennycuff, 2008; Sakellariou, 2024). Finally, utilizing the power of story as fiction, Creative Narration and Writing helps in the externalization and communication of experiences and feelings, developing a spirit of cooperation among the participants, when it is done collaboratively (collaborative speech production).

GENERAL FRAMEWORK OF THE TEACHING PROPOSAL

The present teaching proposal was implemented in the 3rd teaching unit of the Modern Greek Language course at the 1st grade of Junior High School, as part of a model teaching, which was attended by teachers of an urban Junior High School of Patras, during the school year 2024-2025. The main objective of the design of this particular teaching is, on the one hand, for the students to practice collaboratively and exploratively in understanding the superstructure of narrative, through an audiovisual medium (video), and on the other hand, to apply in practice the theory concerning the text type of narrative, through writing their own narrative story and their involvement in creative writing activities.

In particular, the teaching proposal is organized in three phases. The first phase takes place in the classroom and lasts one (1) teaching hour. In this phase, students are taught, through the utilization of a multimodal text, the basic points of the superstructure of narrative followed by reflections and dialogic discussion. The second phase takes place during the second teaching hour and in this phase each group is asked to produce collaboratively, based on the superstructure of narrative they worked on during the first teaching hour, their own narrative story. In the third phase, which constitutes the evaluation of the model teaching, questionnaires are designed both for the students participating in the model teaching and for the observing teachers, in order to collect their views from their involvement in this experience and to evaluate the results of the utilization of multiliteracies and creative writing.

TEACHING GOALS – LEARNING OUTCOMES

Through this particular teaching, it is intended that students will be able to:

a. Knowledge

- recognize the basic axis of organization and the basic structure of a narrative text,
- identify the basic elements of the narrative: place, time, characters and their role in shaping the plot.

b. Understanding
- identify and critically comment on elements, such as a) the function of the antithetical presentation and conflict of two characters and b) the role of the reversal in the development of a narrative,
- point out the basic messages of the story.

c. Skills
- practice in observing the image, sound and moves and to be able to understand the significance of the different semiotic modes in presenting a message,
- transform the information of images, sounds and moves into a continuous narrative text,
- narrate, based on the superstructure of the narrative, a story with clarity.

d. Attitudes-Behaviors
- evaluate "stereotypical perceptions" and the way they can influence behavior,
- reflect and express their feelings to a familiar audience,
- appreciate, through their participation in group activities, the value of collaborative learning.

CLASS ORGANIZATION – TEACHING METHODOLOGY

The students are divided into four (4) groups of five (5) people. The instructor gives the groups a short time to designate the secretary and the representative of their group for the class plenary. Reciprocity and an equal distribution of work among the members of each group are encouraged. The teaching aids and materials used are the interactive whiteboard, on which the relevant video is presented, and the worksheets. Each group is provided with two copies of the worksheets in printed form, in order to facilitate the work of the groups. The instructor gives the necessary instructions, the groups study and answer, working simultaneously, on their two common worksheets, receiving the necessary support whenever they request it. The lesson plan follows the principles of inquiry-based learning and the collaborative group model. The indicative implementation time is estimated at two teaching hours.

TEACHING PROCEDURE - TEACHING PHASES

During the first teaching hour, after connecting with the previous lesson, which concerned the textual type of description, and after an introduction to the topic and information about the working method of the groups, the students watch a short video (SNACK ATTACK). Subsequently, divided into four (4) groups, they answer the activities of a common worksheet (Worksheet 1), lasting fifteen (15) minutes, in which they identify the basic elements of the narrative, the characters and their role in the development of the story, highlight its basic messages, comment on the semiotic modes of the audiovisual text and their role in conveying messages, and delve into the topic of "stereotypical perceptions" (critical literacy). In this phase, the students, utilizing the information they gather from the video, collectively record their answers on the worksheet and, subsequently, the representative of each group presents the work of their group to the class plenary, followed by discussion, synthesis, and drawing conclusions.

During the second teaching hour, the students, based on the theoretical framework of the superstructure of narrative, which emerged from the discussion of the first worksheet, are asked to answer a second worksheet (lasting 20 minutes), which concerns collaborative speech production (creative writing). In this, they are asked, based on what was discussed, to collaboratively write their own short narrative story with specific elements and criteria provided to them ("cognitive scaffolding"). The representative of each group presents their group's story to the class plenary and peer assessment takes place with a discussion about the strengths and weaknesses of the produced texts of the groups (lasting 20 minutes). Throughout the teaching process, the role of the instructor is guiding and supportive-advisory. A key objective is to smooth out any difficulties encountered by each group, so that their work is completed effectively within the predetermined time frame. This is followed by a brief self-assessment by the groups of the result of their writing work with specific criteria provided, and the teaching concludes with a recap of the main points, homework assignment, and announcement of the topic of the next lesson (lasting 10 minutes).

RESEARCH METHODOLOGY

MAIN PURPOSE OF THE RESEARCH AND CHARACTERISTICS OF THE SAMPLE

The main purpose of the research is to investigate the views of both the participating 1st grade Junior High School students and the observing teachers regarding the results of the utilization of multiliteracies and creative writing as alternative teaching methods for teaching Modern Greek Language in Junior High School. Forty-six (46) students (16 boys and 30 girls) from two 1st grade classes and fourteen (14) teachers participated in the research. In the two classes,

there are also six (6) registered Roma students, of whom two have inadequate attendance, while the other four female students, who participated in the teaching, have a very moderate cognitive background, and only one student is illiterate.

DATA COLLECTION TOOL

The research tool chosen for the purposes of this research is the questionnaire. To investigate the views of the participating a) students and b) teachers, two questionnaires were designed, the first with the target population being the students who participated in this model teaching (STUDENT QUESTIONNAIRE) and the second with the target population being the teachers who acted as observers (TEACHER QUESTIONNAIRE). The two questionnaires contain "closed-ended" questions, which have the advantage of being completed quickly and are suitable for statistical analysis, because they allow for clear and unambiguous answers. The answers are rated on a 5-point Likert scale. In addition, the questionnaire, as a methodological mechanism for recording and collecting data, is characterized by a series of comparative advantages (Robson, 2010), which align with the objectives of our research and are as follows:

- it offers a relatively simple and direct approach to investigating the behaviors of the sample, i.e., perceptions, attitudes, and values
- it facilitates the sincere and spontaneous expression of opinions due to the high degree of anonymity and confidentiality that it can ensure.

STRUCTURE OF QUESTIONNAIRES

Both questionnaires consist of three parts.

The first part of the student questionnaire concerns their demographic data (gender, age, nationality) in the form of three (3) closed-ended questions, while the corresponding part of the teacher questionnaire refers to their demographic data (gender, age, current employment status, years of experience in education, academic qualifications) in the form of five (5) questions. The second part of both questionnaires refers to the effectiveness of the utilization of multiliteracies and creative writing as methodological tools and is divided into three subsections. The first subsection, titled "**Multiliteracies**", consists of six (6) closed-ended questions, which concern the results of the application of multiliteracies in teaching, the second subsection, titled "**Creative Writing**", consists of five (5) closed-ended questions, which concern the results of the application of creative writing activity, and the third subsection, titled "**From Video-Multimodal Text to Creative Writing**", consists of seven (7) closed-ended questions, aiming to investigate the contribution of the utilization of multiliteracies to the production of written language by the students and the results of their combination in teaching. The third part of both questionnaires investigates elements concerning the "**Overall Perception and Experience**" and includes four (4) closed-ended questions.

QUESTIONNAIRE RESULTS

The following results emerge from the analysis of the answers of the participating students and the observing teachers of the sample.

Regarding the first axis, which concerns the demographic data of the students, it is observed that the majority of the sample consists of girls (60.8%, compared to 39.1% boys), while 100% of the sample has Greek nationality. Regarding the teachers of the sample, the presence of women is even stronger (85.7% women, 14.3% men), 50% of the sample lies in the 46-55 age group with extensive experience in education (21-30 years of service), while 60% have postgraduate studies in education.

Figure 2
Utilization of multimodal texts in daily teaching



In the second axis, which concerns the utilization of multiliteracies and creative writing, and specifically in the first subsection "Multiliteracies," 58.7% of the students in the sample answered that multimodal means (video, images, sound) are used quite often in daily teaching, while 57.1% of the teachers answered that they utilize such multimodal means with very high frequency (Figure 2).

Further, the vast majority of the students in the sample, as well as of the teachers, converge to the idea that, for the teaching of narration, images and sounds can convey messages just as effectively as words. Additionally, the students and teachers in their great majority (83% and 92%, respectively) agreed that the video they watched helped them understand the structure of the story (Figure 3).

Figure 3
Contribution of audiovisual text to the understanding of narrative structure



Regarding the function of the group, the students stated in their majority (63%) that the collaboration with the members of their group was particularly helpful for the better utilization of a multimodal text in understanding the narration, a finding that is consistent with the corresponding opinion of the majority of teachers. It is considered noteworthy that both the students (78%) and the teachers (92%) share in an absolutely positive manner the view that the different media (textual, visual, auditory) can be combined for the narration of a story (Figure 4).

Figure 4
Contribution of the combination of different semiotic modes in narrating a story



In the second subsection concerning Creative Writing, the majority of the students (82%) agreed that through collaborative creative writing activities they managed to recognize the basic structure of a story (beginning, middle, end, climax, resolution, characters) (Figure 5), as well as to express ideas and feelings in a more free manner (74%), elements that were also confirmed by the answers from all observing teachers. An additional interesting finding is that 70% of the students are favorably disposed to the view that working in a group helped them share more ideas for the narration of the story, an element with which the great majority of teachers also agrees.

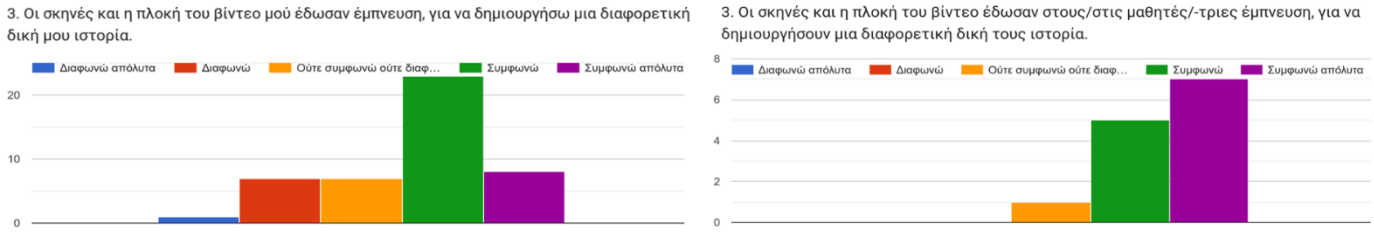
In the third subsection titled "From Video-Multimodal Text to Creative Writing," the students showed a positive attitude of 78% regarding how much the multimodal elements of the video (image, sound, music) can help them imagine the atmosphere of their own story (Figure 6), while they hold a more moderate stance, at a level of 55%, regarding as of whether the use of images and sounds in the video can help them think of new ways of narrating when writing their own story. In the corresponding questions, there is a partial differentiation in the views of the teachers, who show a clearly positive attitude in their entirety. Moreover, 67% of the students agreed that the multimodal elements of the video (image,

sound, music) can inspire the students to create a different story of their own, a finding with which the views of the teachers align perfectly.

Figure 5
Contribution of creative writing to the identification of the structure of narration



Figure 6
Contribution of multiliteracies to the production of narrative text



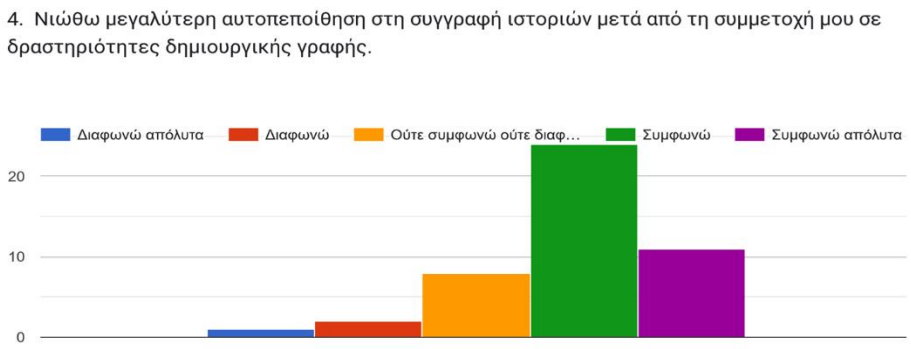
It is also considered significant that the students express themselves positively about the fact that the music and sound effects of the video gave them ideas for the emotional development of the characters in their story (72%). Finally, there is agreement in the opinions of the students and the observing teachers that the group discussion after the video screening helped the students to better organize their thoughts for writing their own story.

In the third and final axis concerning the "Overall Perception and Experience," the opinions of the students converge at an equivalent rate of 78%, firstly, that they feel that this specific teaching, which included the utilization of multiliteracies and creative writing, helped them improve their skills in narration (Figure 7) and, secondly, that they consider the utilization of multimodal means (video, image, sound) in the teaching of language courses important. Finally, it is evident that 76% of the students, through their participation in creative writing activities, feel greater confidence in writing stories (Figure 8), an opinion that was also confirmed by the vast majority of teachers.

Figure 7
Evaluation of teaching in terms of improving narration skills



Figure 8
Contribution of creative writing to enhancing confidence in writing



CONCLUSIONS

The evaluation of this teaching proposal, which focused on the teaching of narration through multiliteracies and creative writing activities, highlighted significant pedagogical benefits. The active and enthusiastic participation of the students in all stages of the teaching, their produced works, and the answers to the questionnaires confirm the successful understanding of the superstructure of narration and the acquisition of basic narrative skills.

The integration of audiovisual material, and specifically the utilization of video, facilitated the distinction of the fundamental elements of the narrative structure (place, time, characters, initial situation, problem, reaction, climax, solution). At the same time, the creative writing activity, and especially the collaborative speech production in groups, enhanced the self-confidence of the students, promoted collaborative work, and facilitated the understanding of the structure of narrative texts through the interaction between the members of the group.

Of particular importance is the positive impact of this specific teaching approach on students belonging to vulnerable population groups, such as the Roma, as well as on students with lower cognitive levels or limited familiarity with written language. The participation of these students, even the illiterate student, in the activities, albeit mainly at an oral level, highlights the importance of using multimodal texts (image, sound, speech) as a means of enhancing school participation and learning inclusion.

The adopted student-centered and experiential approach facilitated the taking of initiatives, strengthened interpersonal relationships within the student groups based on values such as respect and cooperation, and cultivated a climate of trust between students and the teaching instructor. Furthermore, the increased satisfaction of the students from their participation in creative writing activities highlighted the need for the utilization of alternative and creative approaches in the teaching of Modern Greek Language in Junior High School.

In conclusion, the integration of multimodal and audiovisual media in the teaching of Modern Greek Language, combined with creative writing activities, constitutes an innovative, effective, and inclusive teaching practice. This approach motivates students of different learning styles, differentiates teaching from the traditional, one-dimensional, and often discouraging text-centered methodology for many students, and fully aligns with the objectives of the new Curricula for Modern Greek Language in Junior High School.

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APPENDIX
WORKSHEETS

1ο ΦΥΛΛΟ ΕΡΓΑΣΙΑΣ
Χρονική διάρκεια: 15 λεπτά
https://www.google.com/search?q=snack+attack

Άσκηση 1

Πού πιστεύετε ότι θα μπορούσε κάποιος/α να παρακολουθήσει την ιστορία αυτή; Κυκλώστε τη σωστή απάντηση. **Π Ρ Ο Σ Ο Χ Η ! ! ! οι σωστές απαντήσεις μπορεί να είναι περισσότερες από μία.**

- Στην τηλεόραση
- Σε επιστημονικό περιοδικό
- Στο διαδίκτυο
- Σε δελτίο ειδήσεων

Άσκηση 2

Τι θέλει να δείξει η ιστορία που παρακολουθήσατε; Κυκλώστε τη σωστή απάντηση.

- Να περιγράψει τον σιδηροδρομικό σταθμό.
- Να περιγράψει τον χαρακτήρα της γιαγιάς και του νεαρού αγοριού.
- Να αφηγηθεί μια ιστορία που αφορά σε μια γιαγιά και σε ένα νεαρό αγόρι.
- Να πείσει ότι όλοι*ες* πρέπει να είμαστε πολύ προσεκτικοί*ές* με τα πράγματά μας.

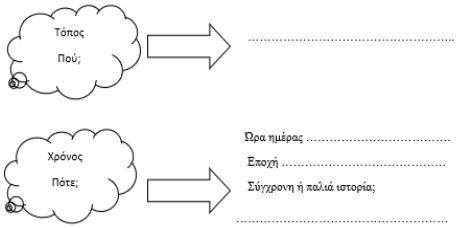
Άσκηση 3

Συμπληρώστε δίπλα από τις παρακάτω προτάσεις το γράμμα «Σ», αν είναι σωστές, και το γράμμα «Λ», αν είναι λανθασμένες.

- Η γιαγιά αγοράζει μπισκότα από το περίπτερο, για να ταΐσει τα πουλιά του πάρκου.
- Η γιαγιά και το νεαρό αγόρι κάθονται στο παγκάκι και ακούνε μουσική στο κινητό τους.
- Το νεαρό αγόρι αρπάζει με ύπουλο τρόπο το κουτί με τα μπισκότα της γιαγιάς.
- Το νεαρό αγόρι, μετά από την επίθεση που δέχτηκε από τη γιαγιά, προκειμένου να της δώσει το τελευταίο μπισκότο, ανακαλύφθηκε τόσο πολύ που το έφαγε ολόκληρο μόνο του.
- Στο τέλος, αποδεικνύεται ότι η γιαγιά είχε μπερδευτεί και είχε πάρει το γλύκισμα του νεαρού.

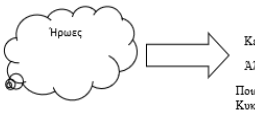
Άσκηση 4

Με βάση την ιστορία που παρακολουθήσατε, γράψτε στα παρακάτω συννεφάκια τις απαντήσεις σας.



……

Ώρα ημέρας ……
Εποχή ……
Σύγχρονη ή παλιά ιστορία;
……



Κεντρικός/-ή ήρωας/-ίδα ……
Άλλοι χαρακτήρες ……

Ποια σχέση έχουν μεταξύ τους οι δύο βασικοί ήρωες;
Κυκλώστε τη σωστή απάντηση:
α. γιαγιά-εγγονός
β. άγνωστοι
γ. μητέρα-γιος

Άσκηση 5

Με ποιο γεγονός ξεκινάει η ιστορία που παρακολουθήσατε;

……
……

Άσκηση 6

Συμπληρώστε τις παρακάτω προτάσεις, προκειμένου να συνεχίσετε την εξέλιξη ιστορίας:

Όταν το νεαρό αγόρι βλέπει το πακέτο με τα μπισκότα δίπλα του (τι κάνει και γιατί;)

……
Η γιαγιά, βλέποντας αυτό, αντιδρά (με ποιον τρόπο;)……
πιστεύοντας ότι ……
Δημιουργείται ένταση και ο θεατής παρακολουθεί τη γιαγιά να
……
και τον νεαρό να……
Στο τέλος, έρχεται το τρένο, η γιαγιά επιβιβάζεται σ' αυτό και τότε (τι συνειδητοποιεί και πώς;)
……
……
Η ιστορία τελειώνει με τη γιαγιά να …… ……
……
και τον νεαρό να ……

Άσκηση 7

Σας δίνονται κάποιες εικόνες από το βίντεο που παρακολουθήσατε, οι οποίες δεν έχουν μπει σε σωστή χρονική σειρά. Γράψτε στον κύκλο που βρίσκεται μέσα στην κάθε εικόνα έναν αριθμό από το 1-8, προκειμένου να βάλετε τις εικόνες σε σωστή χρονολογική σειρά.



Άσκηση 8

Σε ποιο σημείο της ιστορίας νιώσατε τη μεγαλύτερη αγωνία για το τι θα συμβεί στη συνέχεια;

……
……

Άσκηση 9

Ας δούμε τώρα τις συναισθηματικές διακυμάνσεις από τις οποίες περνάει η ηρωίδα μας. Μπορούμε να καταλάβουμε τα συναισθήματά της, παρατηρώντας τις εικόνες; Δείτε τις προσεκτικά και γράψτε κάτω από καθεμία εικόνα το βασικό συναίσθημα (ή και άλλα συναισθήματα) που πιστεύετε ότι νιώθει η ηρωίδα.









Άσκηση 10

Αν βλέπατε το ίδιο βίντεο χωρίς ήχο, πιστεύετε ότι θα ήταν το ίδιο ενδιαφέρον; Πώς κατά τη γνώμη σας, συμβάλλει ο ήχος στη μετάδοση του μηνύματος;

……
……
……

Άσκηση 11

Πώς θα χαρακτηρίζατε τη γιαγιά από τις αντιδράσεις της στην ιστορία και γιατί;
(περισσότερες από μία απαντήσεις)

- σοφή
- νευρική
- επιπόλαια
- εργατική
- στοργική

Αιτιολόγηση:……
……

Άσκηση 12

Πώς θα χαρακτηρίζατε το νεαρό αγόρι από τις αντιδράσεις του στην ιστορία και γιατί;
(περισσότερες από μία απαντήσεις)

- ανήσυχο
- ενθουσιώδες
- έκπληκτο
- επιθετικό
- ατάραχο

Αιτιολόγηση:……
……

Άσκηση 13

Ποιον από τους δύο ήρωες συμπαθήσατε περισσότερο; Αιτιολογήστε την επιλογή σας.

……
……

Άσκηση 14

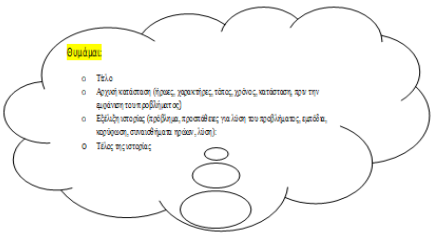
Δώστε έναν δικό σας τίτλο στην ιστορία που παρακολουθήσατε και γράψτε ένα μήνυμα που αντλήσατε από την ιστορία αυτή.

……

2ο ΦΥΛΛΟ ΕΡΓΑΣΙΑΣ (Χρονική διάρκεια: 20 λεπτά)

Συνεργατική παραγωγή λόγου

Αφού συμβουλευθείτε τις πληροφορίες που σας δίνονται στο παρακάτω συννεφάκι, δημιουργήστε με την ομάδα σας μια σύντομη δική σας **αφηγηματική ιστορία** (περίπου 200 λέξεων), η οποία να παρουσιάζει **την εξέλιξη** ενός **περιστατικού** που προκλήθηκε από μια **παρεξήγηση**, όπως στο βίντεο που παρακολουθήσατε. Ο/Η εκπρόσωπος κάθε ομάδας θα παρουσιάσει την ιστορία στην ολομέλεια της τάξης. Η ομάδα που θα συγγράψει την καλύτερη ιστορία θα βραβευθεί.



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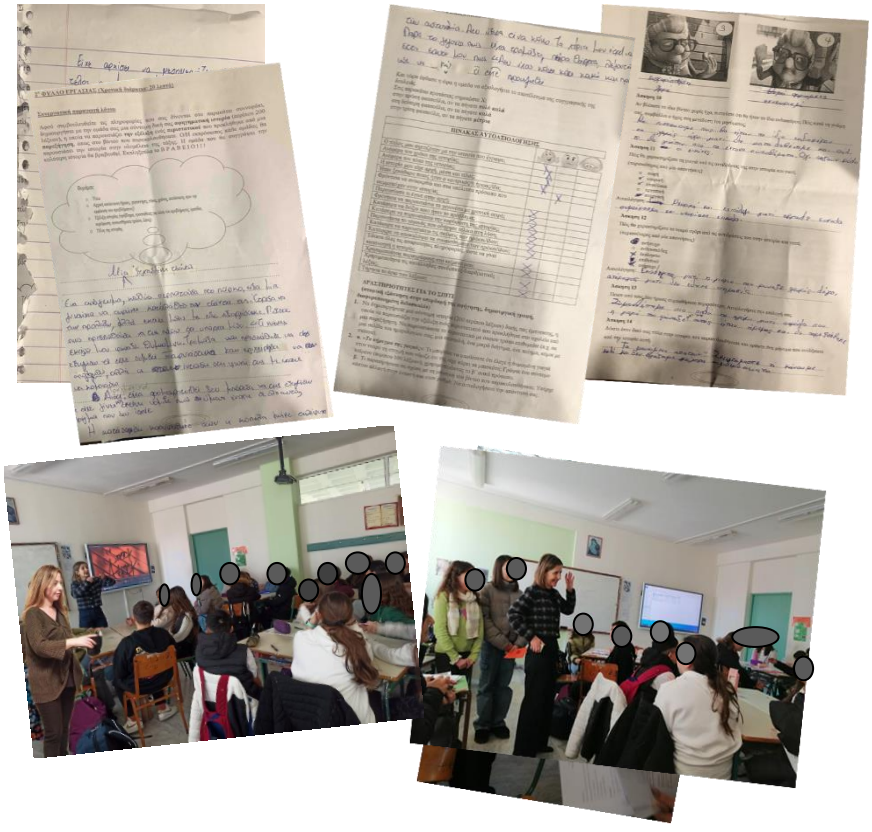
Και τώρα έφθασε η ώρα η ομάδα να αξιολογήσει το αποτέλεσμα της συγγραφικής της δουλειάς.
Στις παρακάτω προτάσεις σημειώστε Χ:
στην πράτη φατσούλα, αν τα πήγατε **πολύ καλά**
στη δεύτερη φατσούλα, αν τα πήγατε **καλά**
στην τρίτη φατσούλα, αν τα πήγατε **μέτρια**

ΠΙΝΑΚΑΣ ΑΥΤΟΑΞΙΟΛΟΓΗΣΗΣ			
Ο τίτλος μου σχετιζόταν με την ιστορία που έγραψα;			
Ανέφερα τον χρόνο της ιστορίας;			
Ανέφερα τον τόπο της ιστορίας;			
Η ιστορία μου είχε αρχή, μέση και τέλος;			
Ήταν ξεκάθαρο ποιος ήταν ο κεντρικός/ή ήρωας/ίδα;			
Φρόντισα να αναφερθώ και στα υπόλοιπα πρόσωπα που συμμετείχαν στην ιστορία;			
Παρουσίασα τι έγινε στην αρχή;			
Φρόντισα να παρουσιάσω τα γεγονότα με χρονική σειρά;			
Κατάφερα να δείξω ποιο ήταν το πρόβλημα;			
Κατάφερα να παρουσιάσω την κορύφωση της ιστορίας;			
Παρουσίασα το γεγονός που οδήγησε τελικά στη λύση;			
Κατάφερα να παρουσιάσω τις σκέψεις των ηρώων/ίδων;			
Κατάφερα να αποκαλύψω τα συναισθήματα των ηρώων/ίδων;			
Έδωσα όλες τις απαραίτητες πληροφορίες, ώστε να γίνει κατανοητή η ιστορία;			
Χρησιμοποίησα παραγράφους στο κείμενό μου;			
Χρησιμοποίησα τις κατάλληλες συνδετικές-διαρθρωτικές λέξεις;			
Τήρησα το όριο των λέξεων;			

ΔΡΑΣΤΗΡΙΟΤΗΤΕΣ ΓΙΑ ΤΟ ΣΠΙΤΙ (ατομική εξάσκηση στην υπερδομή της αφήγησης, δημιουργική γραφή, διαφοροποιημένη διδασκαλία)

1. Να δημιουργήσετε μια σύντομη ιστορία (200 περίπου λέξεων) δικής σας έμπνευσης, η οποία να παρουσιάζει την εξέλιξη ενός περιστατικού που προκλήθηκε στο σχολείο από μια παρεξήγηση. Να παρουσιάσετε το περιστατικό με όποιον τρόπο επιθυμείτε (π.χ. σε μια σελίδα του ημερολογίου σας, μια επιστολή, ένα μικρό διήγημα, ένα ποίημα, κόμικς με σκίτσα).
2. «***Το κήρυγμα της γιαγιάς***»: Τι μπορείτε να υποθέσετε ότι έλεγε η θυμωμένη γιαγιά στον νεαρό τη στιγμή που νόμιζε ότι της είχε πάρει τα μπισκότα; Γράψτε ένα σύντομο κείμενο (περίπου 100 λέξεων), χρησιμοποιώντας το β΄ ενικό πρόσωπο.

INDICATIVE STUDENT-PRODUCED WORKS



TRANSFORMING PHYSICS TEACHING: THE ROLE OF CRITICAL PEDAGOGY AND ICTS

Maria Magaliou
Physics Teacher - PHD candidate, Department of Pedagogy and Primary Education,
National and Kapodistrian University of Athens, Greece
Email: mvpmag@gmail.com

ABSTRACT

Modern physics teaching faces the challenge not only of transmitting knowledge but also of cultivating Critical Scientific Literacy, which involves developing critical thinking and connecting science with social issues. This paper examines how Critical Pedagogy, along with Information and Communication Technologies (ICTs), can contribute to achieving this crucial goal. While ICTs offer significant potential for making physics teaching more interactive and effective, their successful integration is hampered by considerable challenges. Critical Pedagogy, rooted in the work of Freire, provides the foundational framework for fostering dialogue, questioning, and the connection of physics with social and technological developments, essential components of Critical Scientific Literacy, making the subject matter more accessible and relevant. ICTs complement this approach by offering interactive environments, simulations, and opportunities for collaborative learning, thereby enhancing understanding, particularly of abstract concepts, within this critical framework. The paper identifies the key difficulties in ICTs integration concerning teachers, students, infrastructure, and pedagogy. The literature review suggests that the combined application of Critical Pedagogy and ICTs offers a powerful synergy that can transform physics teaching into an active, interactive, and socially oriented process, potentially mitigating some of these identified challenges and fostering Critical Scientific Literacy. Students develop critical thinking, actively construct knowledge, and understand physics as a living science connected to society, thus shaping responsible, engaged citizens equipped with Critical Scientific Literacy.

Keywords: Critical Pedagogy, Critical Scientific Literacy, Information and Communication Technologies (ICTs), Physics Teaching, Social justice

INTRODUCTION

Physics teaching in the 21st century faces a series of complex challenges, extending beyond the simple transmission of scientific concepts and principles. In the modern educational environment, physics is called upon to contribute to students' holistic development, cultivating skills essential for Critical Scientific Literacy, such as critical thinking, scientific inquiry, and social awareness (Osborne, 2010). Furthermore, the need to enhance student participation in the learning process and address educational inequalities is becoming increasingly urgent (UNESCO, 2015). Science education is a cornerstone for understanding the world around us and for shaping active citizens capable of meeting the challenges of our time. However, traditional teaching models, which are primarily focused on knowledge transmission, often fail to develop the critical thinking, creativity, and social awareness inherent in Critical Scientific Literacy. Within this framework, Critical Pedagogy and Information and Communication Technologies (ICTs) emerge as two powerful approaches that can be combined to fundamentally transform physics teaching, making it more engaging, effective, and socially just, particularly in fostering Critical Scientific Literacy.

This paper presents a literature review on the synergy between Critical Pedagogy and ICTs in physics teaching, focusing on its contribution to Critical Scientific Literacy. The goal is to explore how these two approaches, when effectively integrated, can contribute to students' active participation, the development of the specific critical thinking skills inherent in Critical Scientific Literacy, and the understanding of physics as a science inextricably linked to social issues and daily life. The central research question guiding this paper is: How can the combined application of Critical Pedagogy and ICTs improve physics teaching, enhancing the understanding of physical phenomena while also fostering Critical Scientific Literacy, thereby promoting social awareness and active citizenship among students?

RESEARCH QUESTION AND METHODOLOGY

The central objective of this paper is to investigate the transformative potential of integrating Critical Pedagogy with Information and Communication Technologies (ICTs) in the domain of physics education, specifically focusing on the development of Critical Scientific Literacy. This inquiry is encapsulated in the primary research question: How can the combined application of Critical Pedagogy and ICTs improve physics teaching, enhancing the understanding of physical phenomena while also fostering Critical Scientific Literacy, thereby promoting social awareness and active citizenship among students? This question seeks to explore not only the pedagogical efficacy of such a synergistic approach in terms of conceptual understanding but also its capacity to cultivate critical consciousness and civic engagement regarding scientific matters, aligning physics education with broader societal needs through the lens of Critical Scientific Literacy.

To address this multifaceted research question, the paper adopts a literature review methodology. This methodological approach was selected as it allows for a comprehensive synthesis of existing scholarly work, theoretical frameworks, and empirical findings pertinent to Critical Pedagogy, ICTs integration in education, and their specific application within physics teaching aimed at fostering Critical Scientific Literacy. The review will systematically examine academic journals, conference proceedings, books, and relevant reports to: (1) Identify the core tenets of Critical Pedagogy relevant to science education and the cultivation of Critical Scientific Literacy. (2) Explore the diverse applications and affordances of ICTs in creating interactive and engaging learning environments for physics that support a critical approach. (3) Investigate documented instances, theoretical arguments, and empirical evidence supporting the synergistic potential of combining these two approaches for the development of Critical Scientific Literacy. (4) Uncover the benefits for student learning, critical thinking development specifically within science, and the cultivation of social awareness regarding scientific and technological issues. (5) Identify potential challenges, limitations, and best practices associated with such an integration for fostering Critical Scientific Literacy.

By thoroughly analyzing and synthesizing the existing literature, this paper aims to provide a robust theoretical foundation for understanding how the deliberate fusion of Critical Pedagogy and ICTs can redefine physics teaching, making it a more dynamic, relevant, and empowering experience for students, thereby contributing to the development of scientifically literate (in the critical sense) and socially responsible citizens.

CRITICAL PEDAGOGY AS A THEORETICAL FRAMEWORK FOR PHYSICS TEACHING

Critical Pedagogy analyzes the ways in which educational systems contribute to the reproduction of social inequalities, while also exploring their potential as a tool for promoting social justice. According to this view, the learning process is not neutral but is shaped by the social, political, and economic forces prevailing in society. Consequently, education functions as a space where dominant ideologies are embedded in students' consciousness, thereby limiting their critical thinking and their ability to question existing structures and practices (Skordoulis & Katsiampoura, 2019).

Critical Pedagogy, rooted in the pioneering ideas of Paulo Freire, constitutes a radical educational philosophy that challenges traditional, authoritarian teaching methods and promotes education based on dialogue, questioning, and critical analysis of reality (Freire, 1970). At the core of Critical Pedagogy is the opposition to "banking-style education," where students are treated as passive recipients of knowledge, lacking the critical thinking and the ability to form their own opinions essential for Critical Scientific Literacy (Giroux, 2024, pp. 123-124). Instead, Critical Pedagogy advocates for an empowering education that recognizes students as active subjects of learning and cultivates their ability to question, investigate, and transform the world around them, fostering their Critical Scientific Literacy (Kincheloe, 2008, pp. 8-14).

Within the context of physics teaching, Critical Pedagogy can serve as a powerful theoretical framework for revising traditional teaching methods and introducing innovative practices aimed at fostering Critical Scientific Literacy. Physics teaching, when approached from a democratic perspective, does not align with traditional teaching and learning models based exclusively on authority. On the contrary, it necessitates building classroom interaction that promotes dialogue, a key component of developing critical understanding. The authoritarian structure of the classroom acts as a tool of control, hindering the development of balanced power dynamics among participants, and thus impeding the cultivation of critical perspectives needed for Critical Scientific Literacy. Through this organization, the educational system serves to define and distribute skills in a way that reproduces the existing social and economic structure (Skordoulis, 2014, pp. 263-264). Specifically, Critical Pedagogy encourages moving beyond the fragmented and decontextualized teaching of physics, proposing an approach that connects physics concepts with daily life and social issues, which is crucial for developing Critical Scientific Literacy (Hodson, 2014). Instead of presenting physics as a set of abstract theories and equations, Critical Pedagogy proposes highlighting the importance of physics for understanding and addressing real problems that concern society (Bencze & Alsop, 2014). For example, the teaching of thermodynamics can be linked to issues such as the energy crisis and climate change, encouraging students to critically question energy policies and the environmental impacts of technological development, thereby exercising aspects of Critical Scientific Literacy.

Critical Pedagogy emphasizes the importance of creating a learning environment based on dialogue, collaboration, and interaction among students and between students and teachers. According to this approach, the teacher does not function as the sole authority of knowledge but as a facilitator of the learning process, encouraging students to develop their critical thinking and form their own opinions through dialogue and questioning (Aronowitz, 2004, pp. 8-23). In the physics classroom, this can translate into activities that promote discussion, group work, and challenging assumptions, giving students the opportunity to express their ideas, question established knowledge, and construct their own understanding of physical phenomena, fostering the critical dimension of their scientific literacy. Through such practices, physics education becomes a tool of empowerment for students, promoting social justice and active citizenship, underpinned by Critical Scientific Literacy.

In today's world, increasingly shaped by science and technology, Critical Scientific Literacy is now an essential asset. It empowers us to evaluate scientific information, make sound decisions about our health, the environment, and other crucial issues. It allows us to participate knowledgeably in discussions about climate change, genetically modified organisms, or new technologies, and, crucially, to distinguish scientifically substantiated knowledge from misinformation, while also understanding the context and implications of that knowledge. Critical Scientific Literacy is not merely useful, but essential for survival and well-being in modern society. By strengthening science education in this way, we create more informed, critical, and capable citizens better equipped to face future challenges (Allchin, 2014). Critical Pedagogy empowers students to question and analyze information. Applied to science, it directly fosters the skills needed for Critical Scientific Literacy; it promotes critical thinking about scientific claims, methods, and their social implications. This helps in understanding the nature of science and in active participation in socio-scientific issues, making this form of scientific literacy a potent tool for active citizenship and social action (Luitel et al., 2022).

ICTs AS TOOLS FOR ENHANCING PHYSICS TEACHING

The integration of technology into physics teaching brings substantial changes. It transforms methods and enriches learning experiences, offering a dynamic approach. It facilitates the understanding of complex concepts, overcoming the difficulties often faced by traditional approaches, making learning more effective and engaging (Faresta et al., 2024). Information and Communication Technologies (ICTs) offer a wide range of tools and capabilities that can enhance physics teaching. In the modern digital age, ICTs are not merely supplementary tools but an integral part of the educational process, offering new ways to approach subject matter and facilitate interaction among students and between students and teachers (Greca et al., 2014). In the context of physics teaching, ICTs can be used to create interactive learning environments, provide simulations and virtual laboratories (Zacharias & Anderson, 2003), access online information sources, and enhance collaborative learning (Dillenbourg, 1999).

One of the most significant advantages of ICTs in physics teaching is the ability to provide interactive simulations and virtual laboratories. Physics often involves abstract concepts, phenomena occurring across various temporal or spatial scales (very small or very large), or situations that are difficult or impossible to observe directly or reproduce in the classroom or school laboratory. For example, visualizing electric fields, understanding the motion of atoms, observing waves in different media, or investigating experiments with very high energies or hazardous materials are often unfeasible in everyday teaching. This is precisely where the immense value of interactive simulations becomes apparent. They allow students to visualize these abstract concepts and processes. They can visualize electric charges and their fields, observe the behavior of molecules, the propagation and interaction of waves, or the motion of an object under the influence of various forces. The possibility of this direct visualization bridges the gap between theory and imagination, making concepts more accessible and understandable (Jimoyiannis & Komis, 2001).

Beyond visualization, the element of interactivity is crucial. In a simulation, students are not just passive observers. They can manipulate variables, change parameters (e.g., voltage in a circuit, mass of an object, frequency of a wave), and directly observe in real time how these changes affect the phenomenon. This experimentation capability allows students to formulate and test their own hypotheses, explore cause-and-effect relationships, and discover physical principles through active investigation (Adams et al., 2008).

Virtual laboratories go a step further, seeking to replicate entire laboratory procedures. Study results indicate that virtual laboratories improve student performance when used as a learning tool (Radhamani et al., 2014). Students can select virtual equipment, connect it correctly, perform measurements, and collect data. Adjustments and repetitions can be performed much faster in a virtual environment, thereby maximizing the time available for understanding and analysis. Practice in a virtual laboratory can prepare students for a real experiment, helping them understand the procedure and equipment, reducing errors, and increasing the efficiency of the actual lab. Furthermore, Measurement with Sensor systems (MBL) allows for real-time data collection and analysis, enhancing student engagement in authentic scientific processes (Sokoloff et al., 1999).

Furthermore, the use of simulations and virtual laboratories contributes to the development of critical thinking and scientific methodology. Through interactivity, students learn to ask questions, formulate hypotheses, design experiments (in the virtual environment or simulation), collect and analyze data, and draw conclusions. This brings them closer to the nature of science and the way scientists work (Rutten et al., 2012).

It is important to note that simulations and virtual laboratories cannot and should not completely replace real experiments. Interaction with the physical world, dealing with unforeseen situations, developing fine manipulative skills, and understanding the limitations of real equipment are aspects that only the traditional laboratory can offer. However, digital tools are an excellent complement, a means that enriches and extends the possibilities of physics teaching, making it more dynamic, accessible, and engaging for 21st-century students. Their successful integration requires appropriate pedagogical design by the teacher to maximize their potential for the benefit of the learning process (Hofstein & Lunetta, 2004).

Furthermore, ICTs facilitate access to a wide range of online information sources, such as scientific articles, educational videos, interactive websites, and online encyclopedias. This ease of access to information allows students to delve deeper into topics of interest, explore different aspects of physical phenomena, and develop self-directed learning skills (Suana, 2018).

Finally, ICTs support collaborative learning and communication among students and between students and teachers. Online learning platforms, discussion forums, and collaboration tools allow for the exchange of ideas, asking questions, and providing feedback, creating a learning community where students can learn from one another and collaborate on problem-solving (Dillenbourg, 1999). Of course, before implementing e-learning or blended learning modalities, teachers must consider the significant differences among students regarding their internet access, available technological tools, motivations for using the internet, and personal learning preferences. It is crucial not to assume equal technological access or familiarity for all students, as factors such as gender or grade level can significantly impact their effective participation (Suana, 2018). Furthermore, understanding students' motivations and preferences allows teachers to select or adapt appropriate and engaging digital content, thereby enhancing the learning experience and performance.

CHALLENGES AND DIFFICULTIES IN ICTs INTEGRATION IN PHYSICS

Despite the clear potential of ICTs discussed above, their successful implementation in the school environment, particularly in physics teaching, faces numerous significant challenges and difficulties. These obstacles are multifaceted

and impact various components of the educational system (Voogt, 2013). Understanding these barriers is crucial for developing effective strategies to overcome them and fully realize the benefits of ICTS integration.

For teachers, significant obstacles include the lack of sufficient training and professional development in the pedagogical utilization of ICTs (Hew & Brush, 2007). Teachers often lack not only the necessary technical skills but primarily the pedagogical knowledge required to integrate ICTs in a way that substantively supports learning objectives and promotes active learning in physics (Mishra & Koehler, 2006). Furthermore, resistance to changing established teaching practices, which may stem from insecurity, fear of the unknown, or adherence to traditional models, hinders the adoption of new technological tools. Concurrently, the increased workload associated with searching for, evaluating, adapting, and implementing lessons using ICTs, as well as managing potential technical problems during the lesson, can discourage teachers from using them systematically (Inan & Lowther, 2010).

For students, difficulties include the existence of the "digital divide," referring to unequal access to technology and the internet outside of school, as well as varying levels of digital literacy that can affect their ability to effectively use digital tools for learning (Warschauer, 2003). Moreover, potential distraction when using ICTs in the classroom, due to the availability of entertainment content or other non-educational applications, constitutes a management challenge for the teacher. Finally, technical access problems, such as weak internet connection, device incompatibility, or software issues, can disrupt the learning flow and lead to frustration for both students and the teacher.

Regarding infrastructure and resources, the lack of sufficient and modern technological equipment (computers, tablets, interactive whiteboards, network equipment) in schools constitutes a fundamental obstacle (Cuban, 2001 pp.177-181). The cost of purchasing, upgrading, and maintaining the equipment, as well as acquiring software licenses, is often prohibitive for school institutions. Furthermore, insufficient or non-existent technical support, which could quickly and effectively resolve technical issues, leaves teachers and students to address malfunctions independently, reducing the reliability and frequency of ICTs use.

Finally, significant challenges are identified within the pedagogical framework and content. Ineffective pedagogical integration of ICTs, where technology is used merely as a substitute for traditional methods instead of transforming the teaching process, limits its potential benefits (Hughes et al., 2006). The difficulty in assessing learning in ICTs-rich environments, especially concerning the evaluation of higher-order skills such as critical thinking and complex problem-solving, necessitates the development of new assessment tools and methods. Additionally, the challenge of selecting and evaluating appropriate, scientifically accurate, and pedagogically sound digital educational material for physics from the vast volume of available online resources requires teachers' time, expertise, and critical judgment.

COMBINING CRITICAL SCIENTIFIC LITERACY AND ICTS: A TRANSFORMATIVE SYNERGY FOR PHYSICS TEACHING

Addressing these pervasive challenges requires a comprehensive and nuanced approach. The combined use of Critical Scientific Literacy and ICTs in physics teaching emerges as a powerful synergy, capable of fundamentally reshaping the educational process and offering a renewed and more effective approach. ICTs, in this context, are not limited to the role of mere technological tools but serve as a catalyst, accelerating and reinforcing the practical application of the fundamental principles of Critical Scientific Literacy. Through this synergy, learning environments are created that do not settle for simple information transmission but aim to activate critical thinking, encourage active participation, and cultivate students' social awareness. For example, simulations and virtual laboratories can be used as a basis for inquiry-based activities led by students, enhancing autonomy and critical thinking (Veermans et al., 2000).

Specifically, ICTs provide concrete means and capabilities that facilitate the implementation of the core principles of Critical Scientific Literacy. The promotion of dialogue, a central element of Critical Scientific Literacy, finds a powerful ally in ICTs. Access to diverse sources of information can encourage students to question single-perspective narratives and seek alternative perspectives for understanding scientific concepts and social implications (Levinson, 2010). Collaborative activities using ICTs can enhance dialogue, interaction, and mutual support among students, creating a learning environment that promotes social justice and equal participation for all (Stahl et al., 2014). Online learning platforms, discussion forums, and collaboration tools, as mentioned earlier, create virtual spaces where students can exchange views, express concerns, and interact with each other and the teacher. Through these digital interactions, dialogue becomes more accessible and sustained, overcoming the limitations of traditional, often time-constrained, classroom dialogue.

Simultaneously, the encouragement of questioning, another fundamental element of Critical Scientific Literacy, is significantly enhanced through the use of ICTs. Direct access to diverse sources of information, with different

perspectives and origins, provided by ICTs, enables students to verify information, compare different interpretations, and question established knowledge (McGrew, 2018). The critical evaluation of online sources, recognizing potential biases, and distinguishing valid from unreliable information become essential skills for the critical student of the 21st century.

Furthermore, linking knowledge to social reality, a primary aim of Critical Scientific Literacy, finds valuable tools in ICTs. Interactive simulations and virtual laboratories, for example, can be used not only for understanding abstract physics concepts but also as a starting point for discussions about the social and ethical dimensions of scientific knowledge and technological applications. For instance, a simulation on electricity generation can lead to a critical discussion about the environmental impacts of different energy sources, social inequalities in energy access, and political decisions shaping the energy future.

The literature review confirms that the combined use of Critical Scientific Literacy and ICTs in physics teaching can transform the learning process, making it more experiential, interactive, and socially oriented. Through the effective combination of dialogue, questioning, critical analysis, and the use of technological tools, students gain not only a deeper understanding of scientific concepts but also develop critical thinking skills, essential skills for the modern world. Furthermore, they perceive physics not as an isolated body of abstract knowledge but as a dynamic science inextricably linked to society and everyday life. Finally, this holistic approach contributes to the creation of active and aware citizens, capable of facing the complex challenges of the 21st century and actively participating in shaping a more just and sustainable future for all (Kincheloe & McLaren, 2011).

ILLUSTRATIVE EXAMPLES OF THE COMBINED APPROACH

To further illustrate how Critical Scientific Literacy and ICTs can be synergistically applied in physics teaching, this section presents two brief examples, presented in (Table 1) and (Table 2)."These examples are designed to move beyond traditional knowledge transmission and engage students in critical thinking about physics concepts in relation to real-world issues and societal contexts, leveraging the capabilities offered by digital tools.

Table 1
Example 1: Newton's Laws of Motion, the ISS, and Critical Thinking

Physics Topic	Newton's Laws of Motion (Inertia, Force and Acceleration, Action-Reaction).
ICTs Tools	Interactive simulations (e.g., PhET simulations related to forces, motion, or gravity), Educational videos (e.g., videos from the European Space Agency - ESA - demonstrating life and experiments on the International Space Station - ISS).
Critical Pedagogy Dimension	Connecting abstract physics principles to a large-scale, complex technological project with significant global societal implications; prompting critical discussion about the role of science and technology in society, international collaboration, resource allocation (cost of space vs. other needs), and the broader benefits and ethical considerations of space exploration.
Teaching Approach	Students can begin by exploring Newton's Laws through interactive simulations like those offered by PhET. These simulations allow for direct manipulation of variables (mass, force, friction) and observation of resulting motion, building a foundational conceptual understanding. Subsequently, students can watch videos of astronauts on the ISS demonstrating seemingly counter-intuitive phenomena in microgravity (e.g., pushing off walls, how objects move when propelled, or the physics of maintaining orbit). Using these videos as concrete examples, the teacher can guide a discussion connecting the observed phenomena back to Newton's Laws, helping students see the universal applicability of these principles even in extreme environments. This sets the stage for critical engagement. The discussion can expand to the broader context of the ISS. While the ISS is a remarkable feat of engineering and a unique scientific laboratory, it also raises questions about its purpose and impact. Drawing on information about the benefits derived from ISS research, such as advancements in:

	Medicine and Health**:** Understanding and mitigating bone density loss and muscle atrophy, development of new pharmaceuticals, telemedicine, improved life support systems (air/water filtration). Environment and Earth Observation**:** Monitoring climate change and natural disasters, improving agricultural practices through Earth observation data. Technology and Industry: Development of new materials and coatings, improved communication and navigation systems. These points, while not directly physics concepts, provide the *context* for critical questioning. For instance, students can be prompted to discuss: Who benefits most from ISS research? What are the ethical considerations of using space resources or conducting experiments that might have terrestrial applications? How does the significant investment in projects like the ISS compare to investments in addressing immediate social problems on Earth? How does international collaboration on the ISS serve broader political or social goals? By linking the physics principles governing the station's operation to these real-world implications and benefits, students are encouraged to view physics not just as abstract theory, but as a science deeply embedded within societal structures and ethical considerations.

Table 2.
Example 2: Electrical Energy Production and Societal Impacts

Physics Topic	Principles of electricity generation (e.g., electromagnetic induction, energy transformation from various sources - thermal, kinetic, solar, nuclear - into electrical energy).
ICTs Tools	Educational videos illustrating different methods of electricity production (e.g., how power plants, solar farms, wind turbines, or nuclear reactors generate electricity).
Critical Pedagogy Dimension	Using the physics of energy production to initiate critical discussions about social justice, environmental ethics, public health, and the relationship between technology and society in the context of energy.
Teaching Approach	After introducing the basic physics principles underlying electricity generation (e.g., the concept of converting different forms of energy into electrical energy, the role of magnetic fields and conductors), students can watch a video showcasing various methods of energy production (e.g., fossil fuel power plants, hydroelectric dams, wind farms, solar arrays, nuclear power plants). The video provides visual and conceptual context for the different technologies and their scale. Building upon this foundation, the teacher can facilitate critical discussions using the video as a springboard and connecting it to the students' own experiences and the wider world. The following questions, framed through a critical pedagogy lens, can guide this exploration: Social Dimension: Energy Justice*:* Who has access to electrical energy and who does not? How are the benefits and burdens of electricity production and distribution allocated within society? How can we ensure equitable access to energy for all, regardless of income or geographical location? Social Impacts of Energy Choices*:* How do different energy sources affect local communities (e.g., jobs, pollution, health)? How do energy decisions influence relationships between different social groups (e.g., farmers vs. industrial workers, urban vs. rural areas)? Public Health: How does air pollution from electricity production affect human health, particularly in vulnerable populations (children, the elderly, individuals with respiratory problems)? Ethical Dimension: Environmental Ethics*:* What is our moral obligation to protect the environment from the impacts of electricity production? How do we

	balance the need for energy with the protection of ecosystems and biodiversity? Intergenerational Justice*:* Do we have a moral obligation to future generations to choose sustainable energy sources, even if they are more expensive in the short term? How do we account for the long-term consequences of our energy choices? Responsibility and Accountability*:* What are the ethical responsibilities of engineers, scientists, policymakers, and corporations involved in electricity production and distribution? How do we ensure transparency and accountability in energy decision-making? Technological Determinism vs. Social Choice: Is technology neutral, or does it embody inherent values? How do social values and political choices shape the development and application of electricity generation technologies? By prompting students to consider these questions, the activity moves beyond simply explaining *how* electricity is generated to exploring *why* certain methods are chosen, *who* benefits, *who* is harmed, and *what values* are embedded in our energy systems. The video serves as an initial point of reference, but the critical dialogue transforms the learning experience into an examination of physics in its broader socio-political context.

These examples demonstrate how readily available ICTS tools, when combined with a pedagogical approach rooted in Critical Pedagogy, can turn traditional physics topics into opportunities for developing critical thinking, fostering social awareness, and understanding the relevance of physics to real-world challenges.

CONCLUSION

This paper concludes that the thoughtful and synergistic integration of Critical Scientific Literacy and Information and Communication Technologies (ICTs) offers a potent and much-needed paradigm shift for physics education. Moving beyond traditional transmission models, Critical Scientific Literacy provides the essential philosophical and pedagogical compass, emphasizing the development of critical consciousness, dialogue, and the vital connection between scientific knowledge and pressing social justice issues. ICTs, in turn, serve as powerful enablers, offering dynamic platforms for interactive simulations, collaborative knowledge construction, access to diverse information sources, and innovative ways to make abstract physics concepts tangible and relatable, thereby bringing the principles of Critical Scientific Literacy to life within the classroom.

The synergy born from this combination has the profound potential to cultivate learning environments that are not only more engaging and effective in fostering a deep understanding of physical principles but are also inherently more equitable and socially just. Students are encouraged not merely to absorb facts but to actively question, analyze, and construct knowledge, thereby honing their critical thinking skills and developing a robust social awareness. This approach positions physics not as an isolated academic discipline, but as a living science intrinsically linked to societal developments, ethical considerations, and the students' own lived experiences.

While the path to seamless ICTs integration is acknowledged to be paved with challenges—ranging from teacher training and infrastructural limitations to ensuring equitable access and pedagogically sound implementation—the combined framework of Critical Scientific Literacy and ICTs offers promising strategies to mitigate these difficulties. By foregrounding purposeful pedagogical integration, where technology is a tool in service of critical learning objectives, and by advocating for comprehensive support systems for both educators and learners, many of these obstacles can be proactively addressed.

To fully harness and validate the transformative power of this integrated approach, further rigorous empirical research is imperative. Future investigations should focus on: (1) Evaluating the measurable impact of specific integrated teaching strategies on diverse student outcomes, including conceptual mastery in physics, the development of critical thinking dispositions, levels of engagement, and the propensity for informed social action. (2) Exploring the adaptability and effectiveness of these combined approaches across varied educational contexts, considering differences in student demographics, institutional resources, and cultural settings. (3) Developing, piloting, and refining specific, replicable teaching modules and curricular frameworks that exemplify this synergy, offering practical guidance for educators. (4)

Investigating the long-term effects of such pedagogical interventions on students' academic trajectories and their engagement as critically aware and responsible citizens.

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THE TRANSITION OF TECHNOLOGY AND THE ROLE OF "NEW ORALITY" IN THE EDUCATIONAL PROCESS OF THE APPLIED ARTS

Mastorakos Dimitrios
PhD candidate, Department of Photography and Audiovisual Arts
School of Applied Arts and Culture
University of West Attica
28 Ag. Spyridonos str., Egaleo, Campus 1, GR-12243
dmastorakos@uniwa.gr

Ntarara Evangelia
PhD candidate, Department of Photography and Audiovisual Arts
School of Applied Arts and Culture
University of West Attica
28 Ag. Spyridonos str., Egaleo, Campus 1, GR-12243
entarara@uniwa.gr

ABSTRACT

The research into the combined use of analog and digital technology in education, and specifically in the teaching of photographic act, constitutes the core focus of this article. The research questions center on the relationship between technology and photographic work, the transition from analog to digital photographic technology, and the understanding and use of media within the educational process. According to Bolz, the significance of a medium can only be understood through its interaction with other media - both contemporary and obsolete - and that older media serve as metaphorical aids for orientation within the digital realm (Bolz, 2008). Based on this perspective, a hands-on activity was designed as an educational practice in photography, which serves as the case study for the article. The methodology of the activity combines aspects of transformative and "incidental learning" (Bolz, 2008), alongside insights from visual culture scholars such as Gillian Rose. In the context of our current era - what Ong (2015) refers to as the "new orality," which connects new technologies to education and the role of digital imagery - the article seeks to intersect and integrate theoretical approaches and hands-on practices, aiming to draw conclusions regarding contemporary visual culture. The interaction between terms and critical theories brought to light both the influence of obsolete media on artistic production and the dynamic nature of the transition to new technologies. The activity was accompanied by a questionnaire, the findings of which offer valuable observations for educational practices and applications. The participants were primarily photography students, the majority of which responded positively, demonstrating that education through experiential practices has the potential to modify users' behavior towards a medium. At the same time, it revealed the participants' ability to understand and distinguish among different practices that define contemporary media. Overall, the playful dimension of the medium and the combined use of analog and digital technology emerged as an effective and valuable educational tool.

Keywords: new orality, digital photography, camera obscura, education, hands-on activity

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INTRODUCTION

The hands-on activity that constitutes the case study of the present research explores the usefulness of an analog - now considered obsolete - medium in facilitating the understanding of new technologies, particularly in the field of digital photography. Therefore, it was necessary to formulate research questions, the answers to which are useful to evaluate within the framework of a certain 'historicity' and a transition of positions and concepts in media philosophy - transitions that indicate a fundamental shift in the relationship between the medium user and the medium itself, from older to newer technologies. Within this context, the article presents both a theoretical foundation for conceptualizing these transitions and a research methodology capable of capturing the emerging, modern-day relationships between users and media. To this end, a questionnaire was developed and used alongside the hands-on activity to yield meaningful insights.

THE "NEW ORALITY": THEORETICAL APPROACHES

According to Bolz (2008), media history can be structured as a progression: from orality, to literacy, and now to digitality. The transition to and use of technology in audiovisual media - within the framework of the era we are currently experiencing, that of "new orality" - which, as Ong (2015) suggests, is associated with the use of media and is simultaneously involved in and utilized by the educational process, constitutes the main theoretical framework of the present research.

The research questions explored in this study focus on the relationship between technology and photographic practice, the transition from analog to digital photographic technology, and the understanding and use of media within the educational process. Additionally, the study examines concepts such as user-friendliness (or lack thereof) in different environments - analog or digital - as well as the transparency or opacity of the medium used to transmit information. Taking into account Bolz's assertion that the significance of a medium can only be understood through its interaction with other media - both contemporary and obsolete - and "that older media serve as metaphorical tools for orientation in the digital domain" (Bolz, 2008:23), a hands-on activity was developed as an educational practice for photography, which constitutes the case study of this article.

At the same time, the playful dimension of the medium is indirectly explored, linking the notions of media understanding and use, as well as incidental learning, as reinterpreted by Bolz "in playful, dynamic learning environments through digitality and video games" (Bolz, 2008:130), which is considered to support the overall educational process by enhancing participants' skills.

The concepts of media transparency-opacity, the user-friendliness (or lack thereof) of the environment, the playful dimension of the medium, and the combined use of analog and digital technology are significant components and critical research tools that require particular attention. Their impact shapes the potential qualitative and quantitative function of media in education, while also highlighting the transformations that have occurred over time—on technological, social, and ultimately interdisciplinary levels.

These changes become more comprehensible through the perspectives of thinkers presented within the philosophy of media, who refer to the same concepts across a span of just a few decades. Flusser (1998), in his essay "Towards a Philosophy of Photography", argued that through a device (apparatus) - in this case, the camera - operated by a human, technical images are produced, whose "purpose is to represent the world and make it comprehensible to human beings. But even while doing so, they intervene between humans and the world. They are meant to be maps but become screens. Instead of representing the world to humans, they obscure it, placing themselves in its place, to the extent that a person lives as a function of the images they have produced" (Flusser, 1998:12). This reconstruction of reality, through technical images, takes place within the interior of the photographic camera - a black box - which conceals from the average user the operations that occur inside it.

In his text, Flusser urges the photographer to attempt to discover new categories of the camera - ones that have been overlooked or are absent from the device's program. In doing so, the photographer "positions themselves within the metaprogram of the photographic industry", becoming a programmer of the apparatus and approaching new domains of cultural values and relationships (Flusser, 1998:35). Taking into account as well that artworks or photographs can be produced without the use of machines - a practice known as camera-less photography - and that certain cameras, such as pinhole or low-cost cameras and homemade ones, are designed like toys, "the playful dimension of the artistic process" is emphasized (Markidou, 2015:130).

In contrast to the above approach, we accept not knowing what happens inside the black boxes. As Bolz notes: "Each black box (e.g., a camera) corresponds to a user illusion that makes ignorance manageable. This is precisely what the word interface means - a surface with two sides. Every user interface is a two-faced construct that simultaneously conceals two black boxes: the complex technology and the user's mental system… To take something "at face value" means: I trust the surface, I do not seek what lies hidden beneath. To take things 'at interface value' means that, in the world of new media, it suffices for me to simply use the interface…" (Bolz, 2008:137). "User-friendliness, which arises from the use of new media [from analog to digital], is what the sociologist Helmut Schelsky described as the illusion of familiarity: functional simplicity combined with structural complexity - easy to use, but difficult to understand. The intelligence of smart products lies in concealing the abyss of incomprehension. Thus, use is severed from understanding… In technologies that are easier to use than to explain, play becomes the royal road to comprehension… raising the question: tool or toy?" (Bolz, 2008:141).

Based on the above, it could be argued that the concepts being examined - transparency/opacity, user-friendliness/familiarity, the playful dimension of the medium, and the parallel use of older and newer technologies - are interrelated terms that can frame and influence an educational process. These concepts constantly interact with one another and produce outcomes that arise both from the understanding and the mere use of media. The decisive factor that determines the degree of influence of either condition is the user's personal formation and their relationship with technology. At the same time, this fluctuation also influences and transforms the nature of the media themselves, rendering them either "hot or cool", according to the definition introduced by McLuhan. He argues that "a hot medium is one that extends one single sense in high definition, offering a wealth of data and thus requiring low participation from the receiver/user, whereas a cool medium is low in definition and demands high participation and completion by the receiver/user" (McLuhan, 1990:43). The outcomes generated by this fluctuation and the combined use of media could perhaps be paralleled with the concept and function of a hypertext - "a continuously shifting and ever-enriched form of writing in perpetuity" (Bolz, 2008:132). The case study that follows proposes the development of a hands-on activity as an educational practice for photography and seeks to explore the above questions and concerns.

CASE STUDY

METHODOLOGY

The methodology of the hands-on activity combines elements of transformative learning, "incidental learning", and research from visual scholars such as Gillian Rose. In "Visual Methodologies" (Rose, 2016), Rose develops a broad approach to contemporary visual research methods that promote the close examination of images and explore the full range of relationships embedded within the research framework, as well as the processes involved in the creation and production of images. Among these methods are photo-documentation and photo-elicitation, both of which use photographs as analytical data.

The hands-on activity developed by combining elements of these two methods was addressed to participants with a background in photography, mainly photography students of all academic levels, including students from the Erasmus program of the Department of Photography and Audiovisual Arts at the University of West Attica. The way in which the two methods were combined was creative and is analyzed below.

Initially, images were produced following a photo-documentation practice. For their production, a staged portrait photography approach was used in a studio setting through the construction of an installation (camera obscura) that represented the internal mechanisms of a camera and was the size of a small room. In addition to the creation and later exhibition of the images, data were collected via a questionnaire. This practice corresponds to a photo-elicitation method, which reveals the subjectivities of the participants. This is achieved by highlighting the students' experience through the use, understanding, and observation of the activity's key points, as well as through the collaboration between all participants - educators and learners.

The overall process aimed to produce outcomes on both a cognitive and a metacognitive level; therefore, in addition to the activity itself, the feedback obtained through the questionnaire distributed to the participants also had an impact on both levels. On the cognitive level, the goal was for participants to be able to describe the operating principle of the camera obscura and apply it in the creation of photographs. This process contributes, among other things, to the development of academic competencies - both in terms of understanding the technological aspects of an artwork - knowledge that is essential for the documentation of exhibition objects as typically presented in galleries and museums, databases, and websites - and in terms of the ritual dimension embedded in photographic practices, which often accompanies each technological shift.

At a metacognitive level, the activity aimed to foster critical reflection on contemporary mass photographic production and its integration into all aspects of everyday life. It should also be noted that at the conclusion of the activity, the images were exhibited in the same space, and their presentation contributed to a meta-reading of the images, which also carried a playful character. As such, the activity may provoke a broader shift in the ways images are approached, potentially challenging the "inevitability" of mass photographic production, as it has been articulated from the modernist period to its contemporary digital culmination. At the same time, the activity can serve as a point of reference and a source of inspiration for the creation of artistic work, or more precisely, for the integration of similar techniques both in the staging of the medium and in the identity of the work, so as to address or incorporate the dimension, connection, and interaction between the two technologies. Scholars of contemporary artistic photography, such as Charlotte Cotton, have analyzed examples of photographic artworks that are engaged with analog photography. In her chapter titled "Physical and Material", Cotton outlines how artists embed their relationship with analog photography, thereby highlighting the critical dimension of their work. As she notes, one of the recurring features of these artistic approaches is that they are “divorced from our day-to-day experiences of the medium” (Cotton, 2020: 299).

The influence of artists who use techniques of analog technology for educational practices, as well as the highlighting of the relationship between analog and digital technology within contemporary environments of image circulation, also contributed to the implementation of the activity. It should also be noted that the contemporary trend of institutions – primarily museums – aiming to create more spectacular exhibitions or holistic experiences through installations, similarly supports corresponding educational programs. Notable examples of influential artists are Abelardo Morell and Vera Lutter.

Abelardo Morell is a photographer widely known for his techniques and inverted depictions of the visible world. In an interview with Elizabeth Siegel, he mentions that his first attempts were made in 1980, when he transformed the classroom into a camera obscura in order to teach his students the photographic medium "with the aid of some magic" (Siegel, 2020).

Vera Lutter is a visual artist who uses large-scale camera obscura, creating images that differ from those of a conventional camera, which become unique because they cannot be reproduced. In her recent exhibition titled "Vera Lutter, Spectacular. An exploration of light", held from October 2024 to January 2025, curated by Francesco Zanot at the MAST gallery, a darkroom was set up, and her technique was utilized in educational activities for children (Vera Lutter, Spectacular. An exploration of light).

In the example of Heath Creel - a photographer, poet, and teacher belonging to the generation that grew up with new media such as mobile phones and Instagram, points of convergence between technologies are highlighted. Creel mentions that the roots of his engagement with artistic photography were the historical photographers William Eggleston and Lee Friedlander, whom he first noticed through social media, with the culmination of their influence coming through their photographic books. For Creel, photobooks represented a poetic vision and (as he states) showed that photographs have a way of transforming "cold space into a wholly-human world". Since then, through digital technology, he developed an intimate relationship with the camera, and as he moved towards analog technology, he "was shocked" by the ease with which he understood the process of analog photography (Duyao, 2023). Through Creel's example, W. J. T. Mitchell's assertion is illustrated, that every emerging technology encapsulates or condenses in some way the previous one, which was an additional reason for designing and implementing the hands-on activity based on the combination of analog and digital photographic technologies (Mitchell, 2006: 215).

DESCRIPTION

The hands-on activity "Alice in the Land of Photography 4" was carried out on June 21 and 22, 2024, with the activity concluding on June 26 with the exhibition of the photographs. The entire project was implemented at the photography space “YπOψH” and aimed to address and explore the research questions that were posed. The activity was carried out by: Dimitris Mastorakos, Eva Darara, and Pavlos Satoglou.

For the implementation of the activity, a life-sized darkroom (camera obscura) construction was created, simulating the layout of the interior of a camera. It had a lens and a variable focal plane made of frosted glass, while the lighting conditions in front of the lens allowed for differentiation and experimentation (image 1).

The activity was developed gradually: initially, participants could enter the interior of the structure to observe, experiment, and photograph with a digital camera the reflection of a subject outside the camera obscura (Image 2). Then, the images were extracted to a computer, and simultaneous feedback was provided through a questionnaire, designed to

include the evaluation of the activity and its impact on all the participants. Finally, the participants' portraits were printed, displayed, and exhibited in the space (image 3).

Image 1
Installation – Camera Obscura
Photograph: Dimitra Aktipi



Image 2.
Interior of the structure - Projection of an inverted image



METHODOLOGY AND STRUCTURE OF THE QUESTIONNAIRE

The questionnaire was structured by taking into account characteristics of qualitative methods, aiming to draw conclusions based on the cognitive and metacognitive levels targeted by the process. As mentioned earlier, the participants were related to photography or were photography students; therefore, the sampling can be considered as purposive sampling. The role of the questionnaire was not one-sided, so it was useful not only for the researcher but also, to some extent, for extending the experience of the participants in the activity - stimulating reflection, positioning concepts, and bridging theory and practice. One of its characteristics is the multiple possible answers, using methods like POE - post-occupancy evaluation - with a non-directive approach, interlinked questions, and predefined possible answers. Although POE methods are typically used for users of permanent building facilities to evaluate spaces, it was deemed appropriate to employ this characteristic in the present research, as it involves the space of an installation and the comfort of its users, for their familiarization with it and the final implementation of the activity.

Images 3,4.
Portraits
The first photograph is by Anastasia Vlachaki, while the double portrait was taken by Eva Darara




The questionnaire was structured into four parts, aiming to gather results in relation to: a. the characteristics of the participants, b. the evaluation of the activity, c. the extension of the experience and cognitive function, d. the focus on the comparison with characteristics of contemporary digital photography and the current circulation of photography through social networks.

QUESTIONNAIRE RESULTS

The comparative results are provided based on the aforementioned structure, and the questionnaire is presented in the following section:

a. The workshop was attended by twenty participants with an average age of thirty-five years, and an age range from 19 to 62 years. The majority of them use a mobile phone or a digital camera, while 1 in 4 uses an analog camera. The characteristics of the participants are derived from questions 1 and 2, showing that there was a diversity of ages, which means that a variety of experiences and perspectives were ensured within the framework of the defined sampling.

b. The responses resulting from questions 3, 4, 5, and 6 show that: 90% of the participants experienced the activity as a new and interesting experience (question 3). The overall process was considered the biggest surprise and was accepted by 80% of the participants, while the technical aspect had less of an impact: the camera obscura was noticed by 30%, and the inverted image by 10%. The question allowed for an additional response, and one participant made the following interesting observation: " The experience of waiting for the focusing process brings you back to the present moment" (question 4). The vast majority - 95% - were positively inclined and agreed that they would experiment with a similar setup or would most likely try it (question 5). Furthermore, 79% felt comfortable with the time available during the camera obscura installation (question 6).

c. The next three questions, 7, 8, and 9, focused on the details of the technical aspects of the process, such as the elements of the camera obscura, posing, the appearance of the inverted image on the frosted glass, its display in the camera, and how the image was projected or printed. This part of the questionnaire, among other things, aimed to expand the experience and act cognitively in relation to the technical terminology of an obsolete technology, in the direction of its creative interaction with new technologies. As already mentioned, it also sought to offer a meta-reading through the exhibition of the images.

The results drawn from questions 7, 8, and 9 indicate that: 84% preferred active participation over passive observation, as they chose experimentation or a combination of experimentation and photographing, in contrast to engaging exclusively in photographing, which received only 16% (question 7). Additionally, 72% felt at least somewhat comfortable with posing, but there is also a significant percentage of 28% who felt awkward (question 8). The next question brought about divided opinion thus no crucial conclusions can be drawn. Half of them replied that there are significant differences between how the image is captured on the frosted glass, in the camera, and how it was projected or printed, while the other 50% replied that there were no notable differences. Consequently, this ambiguous results should be examined as a flaw either in the process itself and the sequence of stages or in the question itself and its level of understanding (question 9).

d. The next two questions, 10 and 11, focused on comparing the process with the selfie and the need for communication and the contemporary circulation of photography through social networks. The results show that 78% of participants consider the use of the camera obscura a different experience compared to the selfie (question 10), and the same percentage desires social visibility for the images they produced (question 11).

Finally, regarding the question 12 - We have named the activity “Alice in the Land of Photography”. Would you like to suggest a different title? -, being irrelevant to the previous categories, the following answers were recorded: Magic Lantern, Dark Vanet, Something more related to a camera maybe, Going back to a different century, Room Obscura, In her own world, Inverted images: photographic captures in a darkroom, A journey to the past with the mind in the present, Alice in the darkroom. Last but not least, one person wrote that the title was perfect, while two other responders stated that they would not suggest a different title.

QUESTIONNAIRE

1. How old are you?

2 What type of camera do you use? (multiple replies possible)
a Mobile b. Digital camera c. Analog camera d. Other e. I don't use a camera

3. What did you think of the activity? Was it a new experience compared to photography?
a. Yes b. Quite interesting c. No, it's a familiar process to me d. I was indifferent

4. If the process was interesting or familiar, what in your opinion was the biggest surprise? (multiple replies possible)
a. The whole process b. The inverted image c. Digital download d. Viewing/printing e. The camera obscura
f. The total exposure of portraits g. Other (insert your reply)

5. Would you make or experiment with a similar camera obscura in your room or somewhere else?
a. Yes b. Possible c. No

6. Was the time you spent inside of the camera obscura enough?
a. Yes b. No

7. Did you want to photograph or experiment with the inverted image of camera obscura?
a. Photograph it b. Experiment c. Both d. Neither

8. Did you feel comfortable posing for a photo?
a. Very b. Enough c. A little d. Not at all

9. Do you think there are differences between how the image is recorded on the frosted glass, the camera and how it was projected/printed?
a. Yes, several differences b. No c. Not special

10. Do you think that taking pictures with a camera obscura is similar to taking selfies?
a. Yes, it looks very similar b. No differs

11. Do you feel the need to upload photos or videos of the activity on social media?
a. Yes, enough b. No c. Not particularly

12. We have named the activity "Alice in the land of photography". Would you like to propose a different title?

CONCLUSIONS

The majority evaluated the activity positively, demonstrating that the role of education through hands-on activities has the potential to modify users' behavior towards a medium, as Bolz notes (2008). Specifically, the opportunity for participants to enter the interior of the construction (camera obscura) and explore it, to become familiar with it, fostered a sense of intimacy and user-friendliness towards the installation. At the same time, it revealed participants' understanding and ability to distinguish between different practices that characterize contemporary media, such as the selfie. Despite the small number of participants, the results were significant - consequently, the questionnaire functioned as a pilot tool for similar activities. Possible new adaptations or revisions to the questionnaire, based on the results and observations derived, could improve future activities.

The conclusions that emerged should be viewed and assessed within the constantly evolving contemporary media environment - that of the "new orality"- which is currently unfolding and which, as Ong notes, "... is a more deliberate and self-conscious orality, based on the use of writing and print, both of which are essential for the construction, operation, and use of machinery" (Ong, 2015: 193–195).

The characteristics of this "new orality", along with technological innovations in the field of media - most recently that of artificial intelligence - correspond to a different type of writing and communication: that of the hypertext. Regarding this multilayered form of writing, Bolz observes that "...whether we are referring to hypertext (the electronic space of writing) or to multimedia, it is always a communicative offering that combines the sensory richness of television, the informational depth of print media, and the interactive capacity of the networked computer. Images, in particular, are gaining increasing importance, as they are faster, more concise, and more complex than language... Text can no longer keep up with the acceleration of our world" (Bolz, 2008:132).

Within this complex multimedia environment, which constantly interacts with both the user and its constituent elements - such as sound, image, and text - an obsolete technology, in combination with new media, may function as a site of denotation, contributing to the understanding of digital technology and, more broadly, to the educational process. The combined use of analog and digital technologies, which also integrates the playful dimension of the medium, has emerged as a valuable educational tool.

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THE NECESSITY OF THE PEDAGOGICAL INTEGRATION OF DIGITAL MEDIA IN TEACHING PRACTICE

Sygkouna Ioanna
Teacher, Philologist
Principal of the 3rd junior high school o Preveza
Preveza, Greece
e-mail: isiguna@yahoo.gr

ABSTRACT

The study examines learning as an active and dynamic process, in which students acquire knowledge through personal involvement and interaction with their environment, as well as with tools that support thinking and communication. It presents key theoretical approaches such as constructivism, which emphasizes the importance of experience and social interaction in the learning process, and activity theory, which views learning as a collective process shaped by social and cultural structures. Particular emphasis is placed on visual literacy, as images play a central role in modern communication, requiring students to develop skills in analyzing and creating visual content. Furthermore, the study highlights the transformative role of technology in the learning process, with the integration of Web 2.0 tools and the use of Bloom's digital taxonomy for developing higher-order thinking skills. Finally, it underlines the importance of pedagogical integration of digital media and the continuous professional development of educators, in order to provide learning experiences tailored to the needs and demands of the 21st century.abstract should include the focus of your paper, i.e., what your paper is about, a brief description of the steps or methodology used, the main findings of the paper, and its results.

Keywords: digital Media, pedagogical theories, learning.

LEARNING: AN ACTIVE PROCESS

The science of pedagogy has always sought methods for more effective knowledge transmission to students. In this pursuit, various theories have been developed to support this aim. Vygotsky, with his innovative ideas on learning and development, has had a significant influence on the Western world in recent decades, as educational interest shifted toward the communicative and cultural dimensions of learning (Raptis & Rapti, 2007).

Thus, in the early 20th century, the theory of constructivism emerged, focusing on the individual's personal involvement and capabilities during the educational process, rather than placing emphasis solely on teaching tools. The evolution of technology played a decisive role in the dissemination of this theory. Constructivism views learning as a dynamic and active process in which knowledge is acquired through experiences and real-world applications. This means that education is not confined to the four walls of the classroom but extends to various contexts, promoting critical thinking and flexibility in the application of knowledge. Students are encouraged to examine information from different perspectives, interact, and compare diverse viewpoints in order to achieve a more comprehensive understanding.

According to the constructivist theory, it is essential to create authentic and realistic learning environments that promote exploratory and open-ended learning instead of simply transmitting predetermined knowledge. It must be taken into account that reality is not absolute but a product of human perception and experience (Kanakis, 2011).

Vygotsky emphasized the importance of the sociocultural dimension of learning, arguing that cognitive development is inextricably linked to the cultural and social environment in which it occurs. An individual's progress does not depend solely on innate abilities but is influenced by interactions with the environment, social events, and the cultural tools that surround them (Raptis & Rapti, 2007). Of particular importance is mediation through tools that reflect the cultural and historical context of each society, as well as the educational practices that are adopted (Komis, 2015).

According to Vygotsky's theory, language is the primary sociocultural tool through which a child shapes their thinking and develops their identity within their community. Based on this idea, he introduced the concept of the Zone of Proximal Development (ZPD), which describes the difference between what a child can achieve independently and what they can accomplish with guidance and interaction with their environment (Raptis & Rapti, 2007). This theory is of critical importance for educational practice, as it underscores the need to adapt teaching to students' needs and capabilities.

In addition to the social environment, technology can also play a crucial role in the learning process, providing students with opportunities for active participation, critical thinking, and knowledge discovery. Digital technologies have already been integrated into many educational structures, shaping a new educational landscape that enhances learning through innovative methods (Smyrnaiou & Koutsidou, 2014). Technology can offer interactive learning environments, personalized tools, and access to a wealth of information, thereby contributing to the improvement of the educational experience and the development of essential 21st-century skills.

ACTIVITY THEORY

Activity Theory, as developed by Vygotsky, Leontiev, and Engeström, proposes an interpretive approach in which individuals' actions are examined within the context of a broader system, defined as an *activity* (Cong-Lem, 2022). The individual components of an activity form a complex system that functions as a dynamic learning model. This model includes the subject, the object, the goal, the tools, the individual actions and operations that influence the final outcome, as well as the social parameters such as rules, community, and division of labor (Komis, 2015).

Activity is considered a set of human actions and interactions that take place within both a physical and social environment. Within this context, individuals communicate, collaborate, and evolve through processes shaped by cultural and social factors. This interaction involves both interpersonal relationships and the use of material tools, linguistic symbols, and cultural elements, all of which contribute to the construction of knowledge. Conceptual change is achieved through socio-cognitive conflict and cognitive restructuring, which lead to the process of didactic transformation.

Participation in an activity involves performing specific actions within a defined framework, aimed at achieving a particular goal. This goal is accomplished through the use of mediating tools, methods, symbols, materials, procedures, and roles that define the interaction among participants (Komis, 2004).

The activity system consists of two fundamental elements: the subject and the object. The *subject* refers to the individual or group participating in the activity, while the *object* corresponds to the goal of the activity, defining both its

initiation and its completion. The tools used within the framework of an activity can be either material (such as computers and other technological devices) or cognitive (such as reasoning, discovery, and logical processing of information).

Furthermore, in contrast to traditional cognitive psychology—which focuses primarily on mental representations—activity theory places special emphasis on the significance of socially determined tools and symbols. The use of these elements not only shapes the way individuals think and act but also influences their broader educational and professional development through processes of interaction and collaboration (Komis, 2015).

THE UTILIZATION OF VISUAL LITERACY IN THE EDUCATIONAL PROCESS

In the modern western world, people of all ages are constantly exposed to a multitude of images, which they later integrate into their thinking and actions. Young people in particular choose visual media as a primary source of entertainment, making use of it in various forms such as cinema, video games, and mobile applications. This increasing engagement requires the development of visual literacy skills in order to understand, interpret, and evaluate the visual messages they encounter daily.

Today's society does not merely involve the passive reception of information; it demands that its citizens be capable of analyzing and decoding visual stimuli, attributing meaning and context to them. The modern citizen is expected to manage visual content with ease, a skill that constitutes a fundamental aspect of digital literacy. In a world where images tend to dominate over traditional written language, individuals of all ages—children, adolescents, and adults—spend a large part of their time exposed to a flood of audiovisual messages through television, the internet, advertisements, and various print and digital media. Nevertheless, "the gaze of the young viewer is saturated with images, yet untrained" (Grosdos, 2008).

Education plays a crucial role in the development of visual literacy, as appropriate knowledge and skills must be provided from the early stages of school life. These will enable students to become active and conscious producers and consumers of visual messages. The increasing importance of the image as a means of communication is linked to both economic developments and technological advances, which have significantly affected the way people communicate (Grosdos, 2008).

Regan (2008) highlights the importance of visual literacy, emphasizing that educators should develop strategies that encourage students to participate in activities promoting visualization, such as the creation of digital storytelling. The modern educational process should not only encourage students to receive and analyze images but also to use them creatively. In the classroom, students are not passive recipients of visual messages; they are taught to interpret, discuss, and communicate them with their peers. Furthermore, they are encouraged to produce their own images and other audiovisual media, actively participating in the creation of meaning and the exchange of information through visual language (Sadik, 2008; Vasilikopoulou, 2011).

TECHNOLOGY AS A TOOL IN EDUCATION

The rapid advancement of technology has brought about significant changes in the field of education, affecting both teachers and students. Modern technological capabilities have expanded and enriched teaching methods, radically transforming the educational environment. However, the educational system itself often struggles to adapt to these new conditions, failing to effectively integrate technological innovations into the learning process.

Younger generations of students are familiar with technology and can utilize digital media at all levels of education (Prensky, 2001). In the 21st century, skills that enhance digital, visual, and technological literacy are required, making the integration of technology into educational programs essential. Although traditional education mainly relies on printed materials, today's students must become familiar with technology by using e-books, emails, online information, and computer-based presentations (Brown, Bryan & Brown, 2005).

According to Koutsopoulos and Economou, the modern school must promote flexibility, collaboration, and equality of access to educational opportunities by shaping a technology-based environment (Koutsopoulos & Economou, 2015). At the same time, technology plays a crucial role in promoting equity, contributing to shaping students' futures (Forzani & Leu, 2012).

The use of technology as a tool to enhance student literacy has been the focus of many researchers. The 21st century demands innovative teaching approaches that incorporate technological possibilities, supporting the development

of digital literacy. Some argue that technology radically transforms literacy, while others claim it serves as a means of renewing and strengthening existing cognitive concepts (Brown, Bryan & Brown, 2005).

Glister (1997) defines digital literacy as the ability of an individual to communicate effectively in an ever-changing society by searching for and utilizing information. It is a process that involves reading, exchanging, evaluating, and synthesizing information, while encompassing different forms of literacy, such as technological, visual, and informational (Kafetzis, 2010).

In today's educational reality, students are no longer limited to traditional peer interactions, but use technological tools to communicate, search for information, and create multimedia content. Through technology, they gain the ability to process and reshape information using both linear and visual media (Kafetzis, 2010).

Bloom's taxonomy (1956) describes cognitive development and the higher mental processes related to learning. With its revised version by Anderson & Krathwohl (2001) and the modern integration of technology, the theory can be applied to digital learning, enabling more interactive and personalized educational experiences. Technology influences every level of Bloom's taxonomy:

Knowledge (Remembering): Tools such as search engines, digital dictionaries, and interactive quizzes help students quickly acquire and recall information.

Understanding: Interactive videos, podcasts, and explanatory apps allow for a deeper understanding of concepts.

Applying: Simulations, virtual labs, and programming tools enable hands-on practice in real-world scenarios.

Analyzing: Data analysis software and concept mapping applications allow students to identify relationships between pieces of information.

Evaluating: Online discussions, blogs, and critical analyses provide opportunities for students to form and defend opinions.

Creating: Content creation tools (such as design software, digital writing platforms, and programming) support the development of original work.

Moreover, Paivio's dual coding theory and Mayer's cognitive theory of multimedia learning highlight the importance of combining images and words in the learning process. Information introduced through different cognitive channels (visual and verbal) enhances comprehension and facilitates knowledge transfer to long-term memory, contributing to more effective problem-solving (Paivio, 2006; Bereiter & Scardamalia, 2014).

The development of Web 2.0 and its integration into education can facilitate student content creation by offering opportunities that would not be possible through traditional, non-digital, or offline tools. The term *Web 2.0* refers to a range of online applications and environments characterized by open access and interactivity. Unlike static web pages, users are not limited to passive consumption of information—they actively participate by commenting, creating their own pages, and generating new content. At the same time, they contribute to the collective evaluation of available digital material, enhancing collaborative learning and knowledge exchange. The use of ICT and online tools can significantly contribute to collaborative learning, the development of communication skills, and the cultivation of a lifelong learning culture (Tzimogiannis, 2007).

RECOMMENDATIONS / CONCLUSIONS

Curriculum

The integration of digital media into curricula requires a rethinking of how we perceive teaching and learning. It is not merely about adding new tools, but rather about a philosophical shift that acknowledges the importance of digital technology in students' development. New curricula should incorporate digital skills, as students must develop competencies such as searching for, evaluating, and using digital information, as well as creating digital content. Digital media can facilitate collaboration among students and between students and teachers, supporting cooperative learning. Digital technology can be adapted to the needs and interests of each student, offering personalized learning experiences, thus promoting individualized learning. Furthermore, digital media encourage creativity and innovation, and can be used to generate original content, develop new ideas, and solve problems in creative ways (Karipidis, 2013).

Digital Media

The selection of digital media for teaching practices should be based on specific pedagogical criteria. Digital tools should be: a) of high quality, with accurate and reliable content that meets students' needs, b) interactive, to promote active student participation in the learning process, c) accessible, d) flexible enough to be used in various contexts and for different purposes (Sofos, 2015).

Pedagogical Integration

The pedagogical integration of digital media into teaching practices requires educators to develop new skills and adopt new teaching approaches. Teachers must be able to effectively use digital tools to support student learning. They should be capable of creating digital content that is relevant to their subjects and meets the needs of their students. Additionally, teachers must be able to evaluate the effectiveness of the digital media they use in their teaching (Tzimogiannis, 2007; Kanakis, 2011).

The pedagogical integration of digital media presents both a challenge and an opportunity for the improvement of education. With appropriate support and guidance, teachers can harness the potential of digital technology to create a more effective and engaging learning environment for their students.

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FROM THEORETICAL APPROACH TO DIGITAL LEARNING

Tsifetaki Elpida
Principal of General Upper Secondary School,
General Upper Secondary School P. Diasellou,
Arta, Greece
e-mail: mail@lyk-panag.art.sch.gr

Kitsati Natalia
Ph.D, Secondary School Biology Teacher (PE04.04),
General Upper Secondary School P. Diasellou,
Arta, Greece
e-mail: mail@lyk-panag.art.sch.gr

Bokou Aikaterini,
MSc, Secondary School Teacher of Greek Philology (PE02),
General Upper Secondary School P. Diasellou,
Arta, Greece
e-mail: mail@lyk-panag.art.sch.gr

ABSTRACT

The pedagogical integration of digital media into teaching practice refers to the use of technologies and digital tools to support and enhance teaching and learning. These media offer new opportunities for educators and students, enabling them to interact with the content in innovative and engaging ways.

Modern curricula, grounded in contemporary learning theories, increasingly incorporate digital media into the teaching of both STEM and Humanities subjects. This integration promotes active engagement and fosters a deeper, more comprehensive understanding of new knowledge.

In remote schools located in mountainous areas, such as the General Lyceum of P. Diasello in Arta, the challenge is greater. Although the school is technologically equipped—with interactive touchscreens and a fully independent IT lab—connectivity remains low or even non-existent. Despite this limitation, educators strive daily to integrate as many digital tools as possible into their teaching. The aim is to make learning more engaging and participatory, aligning with the framework set by the United Nations' Goal 4: Quality Education.

Indicative digital tools used include: Mentimeter, Mozabook, Storybird, Google Forms, Canva, and Kahoot. By interacting with these tools, students enhance their active participation in enjoyable ways, collaborate in teams, achieve a holistic understanding of new knowledge, and become able to transfer what they've learned to other learning environments. In this way, education becomes of higher quality for both students and teachers.

In conclusion, in a constantly evolving world, education must rise to its role—especially in semi-mountainous schools, which are tasked with bridging both learning and technological gaps for the new generation of students. This endeavor represents a powerful strategy for ongoing education, yet it requires a coordinated approach to overcome challenges and fully harness the potential of digital learning.

Keywords: digital tools, learning theories, quality education, STEM, Humanities

INTRODUCTION

The rapid development of digital technologies has profoundly influenced educational systems worldwide, reshaping teaching practices and learning environments. In secondary education, the integration of Information and Communication Technologies (ICT) is increasingly associated with learner-centered approaches, active participation, and the development of higher-order cognitive skills. However, the effective pedagogical integration of digital tools remains a complex and context-dependent process, particularly in schools located in remote or underserved areas.

The object of the present study is the systematic investigation of the pedagogical integration of digital tools in a remote secondary school and its contribution to the learning process. The paper seeks to describe and analyze how digital tools, when embedded within a coherent pedagogical framework, can support meaningful learning experiences even in conditions of limited connectivity and technological infrastructure.

From a theoretical perspective, the integration of digital tools is closely linked to constructivist and sociocultural theories of learning. Constructivism emphasizes that learners actively construct knowledge through engagement in authentic learning activities (Bruner, 1996), while sociocultural theory highlights the mediating role of tools and social interaction in cognitive development (Vygotsky, 1978). Digital tools function as mediational means that facilitate collaboration, exploration, and reflective learning.

Despite persistent challenges such as digital inequality and limited access to technological resources, international research suggests that pedagogically grounded digital practices can contribute to reducing educational disparities and enhancing learning quality (OECD, 2015; European Commission, 2020). This study contributes to the existing literature by providing empirical evidence from a real-life educational context characterized by geographical isolation and infrastructural constraints.

PURPOSE OF THE STUDY

The purpose of this study is to provide a scientific description and qualitative analysis of the pedagogical use of digital tools in secondary education through a case study of the General Upper Secondary School of P. Diasello in Arta, Greece.

More specifically, the study aims to: examine how digital tools are integrated into everyday teaching practices in small-sized classes, explore their impact on student engagement, participation, and understanding, identify pedagogical benefits and challenges associated with digital learning in a remote school context, and assess the extent to which such practices align with international educational goals, particularly the United Nations Sustainable Development Goal 4 on Quality Education (UNESCO, 2017).

METHODOLOGY

The study adopts a qualitative research design based on the case study methodology, which is particularly suitable for the in-depth exploration of complex educational phenomena within their real-life contexts (Yin, 2018).

The research setting is the General Upper Secondary School of P. Diasello, located in a semi-mountainous and remote area of the region of Arta. The school operates under conditions of limited or unstable internet connectivity, although it is equipped with basic digital infrastructure, such as interactive software and standalone digital devices.

The participants include students from the 10th, 11th, and 12th grades, organized into small-sized classes of five to six students. Data collection was carried out through: systematic pedagogical observation during classroom instruction, reflective notes maintained by the teacher-researcher, and qualitative analysis of students' assignments and digital artifacts.

A range of digital tools was employed during instruction, including Mentimeter, Mozabook, Storybird, Google Forms, Canva, and Kahoot. These tools were selected based on their pedagogical affordances, flexibility, and feasibility of use in environments with limited connectivity.

DISCUSSION

The analysis of the collected data indicates that the pedagogically informed integration of digital tools positively influenced students' learning experiences. Consistent with international research findings, technology enhanced student

participation and understanding when embedded within a clearly articulated pedagogical framework (OECD, 2015; European Commission, 2020).

Mentimeter facilitated interaction and formative assessment by enabling anonymous student responses, thus reducing performance anxiety and encouraging broader participation. Mozabook supported the visualization of complex scientific concepts through simulations and interactive representations, reinforcing active knowledge construction (Bruner, 1996).

In humanities subjects, Storybird promoted creative expression and experiential learning, while Canva enhanced the visual organization and presentation of information, supporting collaborative learning practices. Google Forms proved effective for both formative and summative assessment, providing immediate feedback and enabling instructional adjustments. Kahoot introduced elements of gamification, increasing motivation and engagement, particularly among students with lower initial participation levels.

Overall, the findings underscore the central role of the teacher as a designer of learning experiences and as a mediator between technology and pedagogy, especially in contexts characterized by limited resources.

CONCLUSIONS

The present study demonstrates that the pedagogical integration of digital tools can meaningfully support quality education in remote secondary school settings. When aligned with contemporary learning theories and adapted to local conditions, digital tools enhance active participation, collaboration, and meaningful learning.

Nevertheless, the sustainable implementation of digital learning requires systematic institutional support, including investment in technological infrastructure and continuous professional development for teachers. Future research could extend the findings through comparative studies across different remote educational contexts.

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TA3: Utilization and evaluation of digital and technological media

DIGITAL TRANSFORMATION AT THE MUSIC SCHOOL OF AMFISSA "ELENI KARAINDROU": EXPERIENCES, CHALLENGES, AND PROSPECTS FROM THE IMPLEMENTATION OF INNOVATIVE DIGITAL TOOLS IN EDUCATIONAL PRACTICE

Athanasiou Ioannis
PhD Candidate, University of Macedonia, Music Science Educator PE79.01
Music School of Amfissa "Eleni Karaindrou"
Amfissa, Greece
e-mail: athanasiou@uom.edu.gr

Georgoula Evangelia
PhD Candidate, University of West Attica, School Principal, English Language and Philology Educator PE06
Music School of Amfissa "Eleni Karaindrou"
Amfissa, Greece
e-mail: georgoula.pr@gmail.com

ABSTRACT

This paper presents the experience from the implementation of an Action Plan titled "Music Technology in the Educational Process: Discovering Productivity through Recording", which was applied at the Music School of Amfissa during the 2024-2025 school year, within the framework of the Internal School Evaluation by the Institute of Educational Policy (IEP). The main goal of the Action Plan was to enhance students' music education through the innovative use of music technology and recording, supported by the ESPA program "Upgrade of Music Education in Music Schools" (2023-2026). Specific objectives included developing students' technical skills in recording and sound editing, fostering creativity through the production of musical works, and understanding the importance of technology in the professional music field. Implementation involves organized workshops on recording and music production, utilizing modern equipment and digital software (Cubase, Audacity, Dorico, MuseScore). The program was applied gradually, with students creating group musical projects and taking an active role in all production stages. The evaluation methodology focused mainly on a qualitative approach (interviews, observation, analysis of works). The Action Plan directly contributed to the more effective implementation of cultural programs. Key challenges involved managing resources, ensuring student engagement, and supporting teachers. The paper concludes by highlighting the prospects for the sustainable use of digital technologies in Music Schools based on the findings of this completed study.

Keywords: Digital Technologies, Music Education, Creativity, Cultural Programs, Greek Music School

INTRODUCTION

The contemporary educational landscape is characterized by the ever-increasing penetration of digital technologies, which are redefining teaching and learning methods. This digital transformation is not merely a trend but a fundamental shift that affects all levels and disciplines of education, including the arts. In the field of music education, technology has evolved from a simple auxiliary tool to a powerful catalyst for developing new skills, enhancing creativity, and bridging the gap between school-based knowledge and contemporary professional music practices. This evolution is crucial for music schools, which aim to provide a comprehensive education that is both artistically enriching and relevant to the demands of the 21st century.

This paper presents the experience from the application of the Action Plan "Music Technology in the Educational Process: Discovering Productivity through Recording." This initiative is being implemented at the Music School of Amfissa "Eleni Karaindrou" during the 2024-2025 school year, as part of the Internal School Unit Evaluation framework of the Institute of Educational Policy (IEP) and is supported by resources from the ESPA program "Upgrade of Music Education in Music Schools" (2023-2026). The project's core objective was to move beyond the superficial use of technology, aiming instead to cultivate students' digital literacy and integrate pedagogical practices that promote active participation, collaborative creation, and meaningful artistic expression (Redecker & Punie, 2017). Through this Action Plan, we explored the challenges, opportunities, and broader implications of embedding advanced music technology within the unique ecosystem of a Greek Music School.

THEORETICAL FRAMEWORK

The integration of music technology in education is a multifaceted process that is best understood through a combination of pedagogical and technological theories. The theoretical underpinnings of this Action Plan draw from established frameworks that emphasize active, student-centered, and technology-enhanced learning.

Project-Based Learning (PBL) and Constructivism

At its core, the Action Plan is aligned with the principles of Project-Based Learning (PBL), a constructivist approach where students gain knowledge and skills by working for an extended period to investigate and respond to an authentic, engaging, and complex question, problem, or challenge (Bell, 2010). In our context, the "project" was the creation of a complete musical piece, from arrangement and recording to final production. This process encourages students to take ownership of their learning, fostering autonomy, critical thinking, and collaboration (Condliffe et al., 2017). By engaging in a meaningful, real-world task, students are not just passive recipients of information but active constructors of their own musical and technical understanding, a central tenet of Papert's (1980) constructionism.

TPACK and the role of cognitive tools

The effective integration of technology in the classroom requires more than just technical proficiency. The Technological Pedagogical Content Knowledge (TPACK) framework posits that meaningful technology integration lies at the intersection of three core knowledge domains: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) (Mishra & Koehler, 2006). In our project:

- **Content knowledge (CK)** is the deep understanding of music theory, performance, and history.
- **Pedagogical knowledge (PK)** involves the strategies for student-centered learning, such as PBL and collaborative group work.
- **Technological knowledge (TK)** is the proficiency with the hardware and software used (DAWs, notation programs, etc.).

The goal was to operate at the nexus of these three, where technology is used in a pedagogically sound way to teach musical content. Tools like Digital Audio Workstations (DAWs) and notation software function as "cognitive tools" (Ruthmann & Tobias, 2017). They offload lower-level cognitive tasks (e.g., manual transcription of a score) and allow students to focus on higher-order processes such as creative decision-making, harmonic exploration, and sonic experimentation, thereby amplifying their musicality (King & Himonides, 2016).

IMPLEMENTATION METHODOLOGY OF THE ACTION PLAN

The Action Plan was structured as a year-long intervention at the Music School of Amfissa. The methodology was designed to be both systematic and flexible, allowing for adaptation based on student progress and emerging needs.

Target group and setting

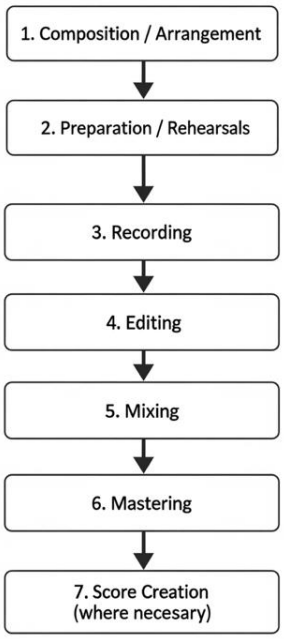
The primary target group consisted of the students participating in the "Greek Traditional Music" Club, which operates under the coordination of one of the authors. This specific group was chosen for two main reasons: firstly, it provided a stable and consistent cohort for the duration of the project, facilitating systematic monitoring. Secondly, it offered a unique opportunity to explore the fusion of traditional music idioms with modern production technologies, a central theme of the project.

Implementation stages

The project was implemented through a phased approach, ensuring a gradual and scaffolded learning experience:

1. **Initial phase: Foundational skills & familiarization:** The first stage focused on introducing students to the basic equipment and software. This included hands-on sessions covering signal flow (from microphone to computer), the functions of audio interfaces and mixing consoles, and the fundamental features of the software tools: Cubase and Audacity for audio recording and editing, and Dorico and MuseScore for music notation.
2. **Theoretical training: Structured workshops:** A series of workshops provided the necessary theoretical background. Topics were presented in a digestible format and include principles of acoustics, microphone types and placement techniques, an introduction to sound processing (equalization, compression, reverb), and the essentials of digital music notation.
3. **Practical practice: Applied scenarios:** Students applied their theoretical knowledge in structured, hands-on activities. Working both individually and in small, collaborative groups, they tackle specific tasks such as recording a single vocal or instrument track, creating simple rhythmic loops using MIDI, or editing pre-recorded audio files to correct timing and pitch issues.
4. **Group project production: The core creative phase:** This was the culminating stage where students worked as a production team. Divided into small groups, they took on the entire process of creating a musical piece.

Diagram 1
Flowchart of the Music Production process in the Club



This includes:

- **Composition/Arrangement:** Deciding on the musical material, whether an original composition or a creative arrangement of a traditional piece.
- **Pre-production:** Planning the recording sessions and rehearsing the material.
- **Recording:** Capturing the performances of all instruments and vocals.
- **Post-production:** This involved detailed editing (compiling the best takes), mixing (balancing the levels, panning, and effects of all tracks), and a basic form of mastering (preparing the final track for distribution).

- **Documentation:** Creating a digital score of their work where applicable.

This methodology combined direct instruction for foundational concepts with a discovery learning approach for creative tasks, empowering students to actively construct their knowledge (Hattie, 2012). The production process is illustrated schematically (Diagram 1).

EVALUATION METHODOLOGY

Due to the small, focused nature of the participant group, a qualitative-dominant evaluation methodology was deemed most appropriate. This approach allowed for a rich, in-depth exploration of the students' experiences, attitudes, and skill development, rather than a purely quantitative measurement. The overall design was that of an embedded single-case study, with the Action Plan as the case (Creswell & Poth, 2018). The evaluation included three phases.

Initial evaluation (baseline)

At the outset of the project, a short, anonymous questionnaire was administered to the students. Its purpose was to establish a baseline by gauging their pre-existing knowledge of music technology, assessing their self-perceived technical skills, and exploring their initial attitudes and expectations regarding the role of technology in music.

Formative evaluation (ongoing)

A continuous evaluation process is employed throughout the school year to monitor progress and allow for real-time adjustments to the teaching strategy. The methods include:

- **Systematic observation:** The coordinating teacher maintained a detailed observation journal, recording student engagement, collaboration within groups, problem-solving approaches, and moments of insight or difficulty during workshops.
- **Informal feedback & dialogue:** Regular, informal conversations with students provided immediate feedback on the clarity of instruction and the difficulty of tasks.
- **Focus groups:** At the end of each major project phase, short focus group discussions were conducted. These were designed to capture collective reflections, identify common challenges, and gather student suggestions for improvement.

Final evaluation (summative)

At the conclusion of the school year, a multi-faceted final evaluation was conducted:

- **Semi-structured interviews:** Individual interviews with each participating student explored their overall experience, the specific skills they believed they had acquired, and any shifts in their attitudes towards music and technology.
- **Artifact analysis:** The final musical works produced by the student groups were analyzed as primary data. The analysis used a rubric with criteria such as technical proficiency (clarity of recording, balance of the mix), creativity (originality of ideas, use of effects), and evidence of collaboration.
- **Triangulation:** To ensure the validity and reliability of the findings, the data from all sources (questionnaires, observation notes, focus groups, interviews, and artifact analysis) were triangulated, allowing for a comprehensive and nuanced understanding of the project's impact (Flick, 2018).

RESULTS AND DISCUSSION
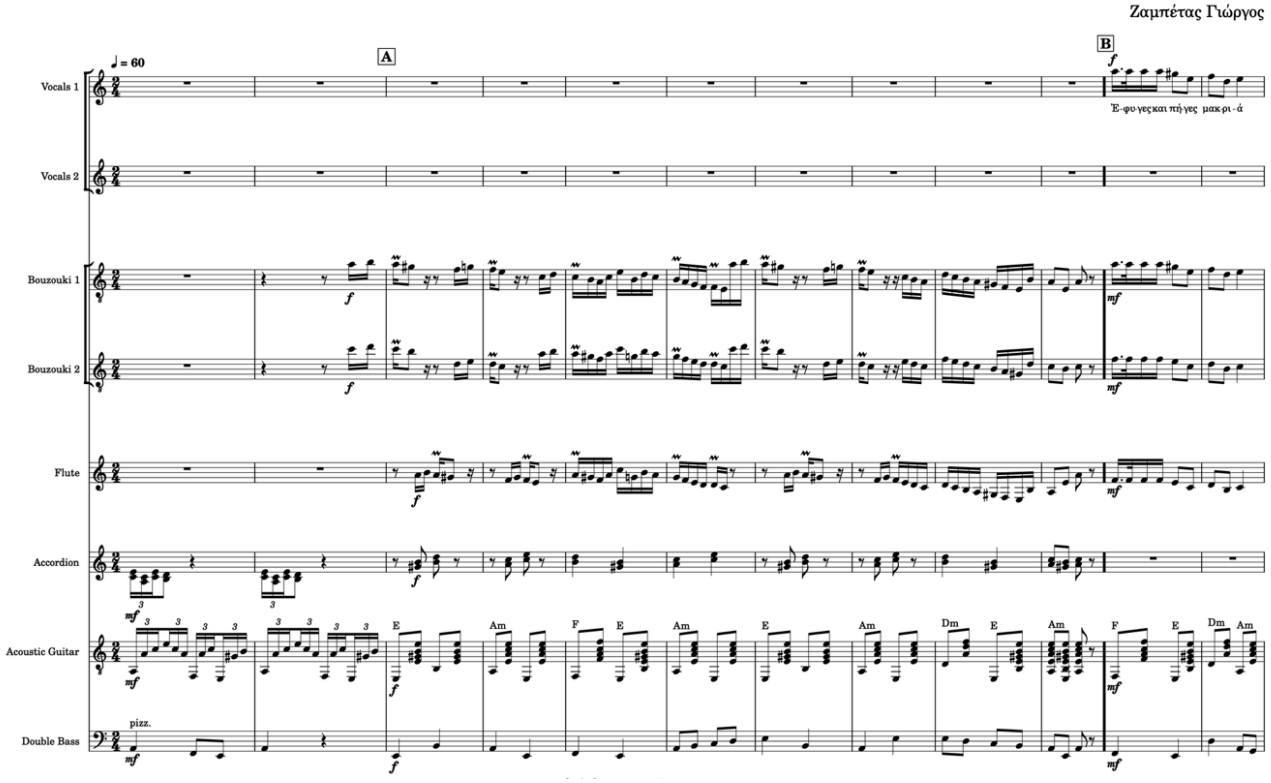
The implementation of the Action Plan yielded significant results, which were analyzed through the qualitive methods described. The findings are grouped into key themes that emerged from the data.

Development of technical and aural skills

Observations and student feedback indicate a clear and steady progression in technical proficiency. Students who initially had no experience with recording software are now able to independently set up a recording chain, operate the basic functions of the DAW, and apply fundamental editing techniques. A particularly notable development was the enhancement of their aural skills. As one student remarked during a focus group, "Before, I just listened to music. Now, I *hear* the different instruments, how the voice is placed, how the reverb makes it sound bigger." This shift from passive

listening to active, analytical hearing is a key outcome, suggesting that the hands-on production process fosters a deeper engagement with the sonic texture of music.

Image 1
Example of a digitally notated score



Enhancement of creativity and engagement

The project-based approach has proven to be a powerful motivator. Student engagement is consistently high, particularly during the collaborative production phases. The immediate feedback loop provided by the technology—the ability to record an idea, listen back instantly, and modify it—appears to significantly fuel the creative process. This was especially evident in their willingness to experiment. For instance, one group spent a considerable time recording sounds from around the school and integrating them into their traditional music arrangement, a creative leap they stated would have been "unimaginable" without the tools to capture and manipulate sound easily.

Understanding the professional dimension of music

A significant shift has been observed in students' perception of music creation. Initially, many viewed music production as a mysterious process confined to professional studios. Through hands-on experience, they have begun to appreciate the complexity, skill, and decision-making involved. This demystification also connected their school activities to the professional music world, providing a clearer view of potential career paths in sound engineering, production, and composition.

Synergies with the broader school culture

The Action Plan has not operated in a vacuum. It has become a resource for the entire school community, particularly in supporting other cultural activities. The skills and equipment of the project were utilized to record the school's annual Christmas concert, providing a high-quality audio document for the school archive. Furthermore, the group collaborated with the theatre club to produce the sound design and original music for the end-of-year play. This demonstrated the project's capacity to act as a central hub of creativity and technical support, enriching the school's cultural life.

Image 2
Example of a DAW project session



Table 1
Examples of Musical Works Produced

Project Title	Student Group	Music Genre	Tools Used
Arrangement of "Ta Deilina" (by G. Zampetas)	Group A (Greek Traditional Music Club)	Laïkó	**Software:** Cubase, Dorico, MuseScore **Hardware:** Microphones, Audio Interface, Mixing Console
Original Composition "Karaindrou Voiyage"	Group B	Cinematic Film Scoring	**Software:** Cubase, Sampled sounds
School Choir Recording	Group C	Choral	**Software:** Audacity **Hardware:** Multiple Microphones, Audio Interface, Mixing Console

CHALLENGES AND COPING STRATEGIES

The implementation of the action was not without challenges, which largely reflect the broader issues of technology integration in schools (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2017).

Management of technological resources

The primary challenge was the limited availability of high-specification equipment. With only a few workstations powerful enough to run professional DAWs smoothly and a limited number of audio interfaces, scheduling and access became critical issues.

- **Coping strategy:** A rotation system was implemented, where small groups of students work on different tasks simultaneously. While one group is recording in the main workstation, another might be editing MIDI parts on a less powerful computer, and a third could be working on score notation or planning the next session. This parallel workflow maximized the use of available resources.

Ensuring stable and equitable student engagement

Maintaining consistent engagement from all students, especially when they encounter technical hurdles or creative blocks, was a persistent challenge. There was a risk that students with more prior experience might dominate the process.

- **Coping strategy:** The project incorporated principles of differentiated instruction. Tasks were structured with varying levels of complexity. For instance, within a group, one student might focus on the complex task of editing vocal pitch, while another might work on the more straightforward task of organizing and labeling audio files. The emphasis was on contribution to the collective goal, valuing all roles in the production process.

Need for continuous teacher support and development

The rapid evolution of music technology means that educators must be lifelong learners. Staying current with new software versions, hardware, and production techniques requires a significant investment of time and effort.

- **Coping Strategy:** A key strategy was to foster a small "community of practice" among the interested teachers within the school. Regular, informal meetings to share discoveries, solve technical problems, and discuss pedagogical approaches proved invaluable. This peer-to-peer support system was crucial for building collective capacity and confidence.

CONCLUSIONS AND PROSPECTS

The implementation of the Action Plan "Music Technology in the Educational Process" at the Music School of Amfissa “Eleni Karaindrou” provided a rich case study on the dynamics and challenges of integrating innovative digital tools into music education. The initial findings strongly indicate a positive impact on the development of students' technical skills, the enhancement of their creativity, and their overall engagement in the learning process. The project successfully demonstrated that modern technology can not only coexist with but also enrich the teaching of traditional music, creating a fertile ground for new forms of expression.

The challenges faced underscore the need for systemic support for schools in terms of infrastructure, as well as ongoing pedagogical and technical training for teachers. For the sustainable use of digital technologies in Greek Music Schools and the wider educational reality, the following directions are proposed:

1. **Curriculum integration:** Advocate for the formal integration of music technology into the curriculum, either as a standalone subject or through a cross-curricular approach, to ensure all students have access to these vital 21st-century skills.
2. **Creation of networks:** Foster the development of networks and communities of practice among Music Schools. Such networks would facilitate the sharing of best practices, curriculum materials, and technical expertise, creating a supportive ecosystem for innovation.
3. **Emphasis on open-source tools:** While professional software is valuable, promoting the use of high-quality open-source alternatives (like Audacity and MuseScore) can broaden access and ensure that learning is not contingent on expensive software licenses.
4. **Strategic professional development:** Design teacher training programs that are ongoing, collaborative, and grounded in pedagogical frameworks like TPACK and DigCompEdu, moving beyond one-off technical training seminars.

Ultimately, the pedagogically-driven use of technology has the potential to transform music education, making it a more dynamic, creative, and relevant experience that resonates with the lives of contemporary students and prepares them for a future where art and technology are inextricably linked.

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THE FLORENTINE RENAISSANCE AND THE GREEK SCHOLARS: A CONNECTION THROUGH DIGITAL MEDIA

Gaki Vasiliki
Chemist, PE04.02 & Computer Science PE86
Evening Vocational High School Of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

Giannouli Sofia
Philologist, PE02
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

Ntentes Ilias
Economist, PE80 & Electronic, PE84
1st High School of Preveza
Preveza, Greece
e-mail: iliasde@hotmail.com

ABSTRACT

This study examines the influence of Greek scholars from the Byzantine and Post-Byzantine periods, such as Chalkokondyles, Chrysoloras, and Laskaris, on the Florentine Renaissance, utilizing digital media and information and communication technologies (ICT). The aim was to highlight the pivotal contribution of these significant figures to the shaping of the intellectual landscape of the Renaissance and to explore how the transmission of Greek philosophy and ancient Greek texts influenced the development of Western thought and art. The project employed modern digital tools, including PowerPoint presentations, images, videos, and audio recordings, to create a multidimensional presentation offering a comprehensive understanding of the topic.

Guided by their teachers, the students used digital tools to develop a presentation that emphasized the connections between the classical Greek heritage and the artistic and philosophical developments of the Renaissance. Furthermore, they composed and set to music an original poem about the period, thereby deepening their engagement with the artistic and cultural dimensions of the subject and combining textual analysis with musical expression. This process helped students understand how Greek scholars, through the revival of ancient Greek texts, influenced Italian Renaissance intellectuals and artists, fostering a cultural dialogue that shaped the trajectory of Western civilization.

The students' work was presented at a student conference, where the use of digital media was combined with live student presentations. PowerPoint served as the primary presentation tool, while the students provided live explanations and interacted with the audience, elaborating on the findings of their research. This live presentation allowed the students to clarify key aspects of their work and enhance engagement with participants.

The results of our study were highly positive. Students gained a deep understanding of the Florentine Renaissance and the contribution of Greek scholars to the intellectual and cultural flourishing of the era. Additionally, they developed digital skills alongside their ability to create multidimensional presentations. The integration of music and video significantly enriched the learning process, fostering a more dynamic and impactful educational experience. The combination of theoretical analysis with modern technology offered students the opportunity to develop a cross-cultural approach to the topic, enhancing their creativity and communication skills.The abstract should include the focus of your paper, i.e., what your paper is about, a brief description of the steps or methodology used, the main findings of the paper, and its results.

Keywords: Florence, Renaissance, Byzantine Scholars, Digital and Technological Media.

INTRODUCTION

The Florentine Renaissance, which flourished during the 14th and 15th centuries in northern Italy, and particularly in the city of Florence, constitutes one of the most decisive periods in the history of Western civilization. This era is characterized by a profound transformation of cultural, philosophical, and scientific values, marking the transition from the medieval worldview to a new anthropocentric orientation. At the core of this cultural rebirth lay the rediscovery and revival of ancient Greek and Roman ideas, which formed the foundation for the development of humanistic spirit, rational thought, and artistic creation.

As Anthoulias (2023) notes, the Renaissance was shaped through the fusion of past achievements with a new desire for progress and intellectual independence. In this context, ancient Greek philosophy and art served not only as a source of inspiration but also as a cornerstone for building this new era. The Greek scholars of the late Byzantine period, many of whom sought refuge in the West after the Fall of Constantinople, played a pivotal role in this process.

Notable examples include figures such as Demetrios Chalkokondyles, Manuel Chrysoloras, and Ianos Lascaris, who contributed decisively to the cultural exchange between Greek and Italian intellectual traditions. Through their work in copying, translating, and teaching Greek philosophical and literary texts, they made Greek wisdom accessible to the educated public of Italy and fostered interest in the study of the classics (Cammeli, 2004; Cammeli, 2006; Staikos, 2012). Their efforts bolstered the humanist movement, which emphasized the centrality of the individual and their intellectual capacities.

According to Stafylakis (2015), these scholars were not merely bearers of knowledge but mediators between two worlds: the Eastern Byzantine and the Western Renaissance. Their work contributed to the formation of a common European intellectual space grounded in classical Greek education.

Within the framework of the present research and educational activity, students were tasked with investigating the contribution of these Greek scholars to the cultural renaissance of Florence and Italy more broadly, utilizing contemporary Information and Communication Technologies (ICT). This methodological choice was deliberate, aiming to strengthen the interdisciplinary approach to history and culture through active student participation, thereby enhancing research, collaboration, and digital expression skills.

By employing interactive applications, multimedia, and digital presentations, the student research team created a project that combines meticulous historical documentation with modern technological interpretation. Their work went beyond mere reproduction of information, seeking to craft a living narrative that connects the past with the present and makes classical heritage accessible and engaging to today's audience.

This presentation, specifically prepared for the student conference, represents a comprehensive effort to clearly and originally convey the contribution of Greek scholars to the Florentine Renaissance. Simultaneously, it aims to highlight how contemporary educational processes can benefit from interdisciplinarity and the use of digital tools, offering students the opportunity to develop a deeper, experiential relationship with historical knowledge and culture. Through this project, students not only understood the role of scholars in the revival of European intellectual life but also actively participated in a process of cultural production, integrating their own voice into the modern educational and cultural dialogue.

SOURCE ANALYSIS AND HISTORICAL INTEPRETATION

A crucial part of the research process was the in-depth analysis of primary and secondary sources, as well as the historical interpretation of the findings through the lens of Renaissance epistemology and the historical comparative method. The students approached the material not as passive recipients of knowledge but as active researchers, attempting to interpret events based on well-documented historical data and critically evaluated scholarly references. This process allowed for the unveiling of deeper cultural, ideological, and philosophical mechanisms that shaped the era of the Florentine Renaissance.

The theoretical foundation centered on the works of Jacob Burckhardt and Paul Oskar Kristeller, who highlighted the connection between the Renaissance and the turn toward humanism and the reevaluation of antiquity. Specifically, the students discovered that humanism was not merely a return to the ancient past but a reframing of ancient values within the context of a new era, marked by a strong need for intellectual autonomy and individual expression.

In this framework, the contribution of the Greek scholars was analyzed as a cultural bridge between the Hellenistic tradition and European humanism. Manuel Chrysoloras, for example, was interpreted not simply as a teacher of the Greek language but as a pioneer of cultural transmission, whose translations and pedagogical methods profoundly influenced philologists such as Leonardo Bruni and, through them, the intellectual climate of Florence.

The contribution of Demetrios Chalkokondyles was examined in the context of the University of Florence, where through his interpretative readings of Homer and Plato, he revived classical literature in a way that combined historical understanding with the contemporary issues of the era. His emphasis on the logical analysis of ancient texts and their connection to the political and social realities of the Renaissance was innovative and deeply influential.

Ianos Lascaris was approached not only as a scholar but as a synthesizer of knowledge. His translations of Aristotle's works, as well as his collection and preservation of Greek manuscripts, made him a fundamental figure in the transmission of the Greek philosophical tradition. Furthermore, his involvement in European diplomatic and intellectual missions highlighted the international dimension of Greek humanism.

Special attention was given by the students to the comparative study of the literary tradition, focusing on the interpretation of commentaries, prefaces, and translation strategies employed by the Greek scholars. From this perspective, the Greek scholarly presence was understood not only as a linguistic or philosophical intervention but as a cultural phenomenon that shaped Western intellectual life at its core.

Thus, this research unit constituted a fertile exercise in historical interpretation, combining primary documentation with the theoretical approach of Renaissance science and philosophy. The students acquired valuable skills in the critical reading of historical sources, comparative thinking, and the interpretative approach to cultural transformations—key elements for cultivating historical consciousness within modern education.

CREATION OF A POWERPOINT PRESENTATION

In the second phase of the research project, a primary concern was the transfer of the historical findings into a visual and interactive environment through the creation of a presentation using Microsoft PowerPoint. The choice of this particular tool was not accidental. On the contrary, it responds to modern pedagogical and technological requirements, enhancing the multimodal construction of knowledge and the emotional engagement of the audience by utilizing image, speech, and motion.

The design process of the presentation followed structured steps of content and narrative planning, aiming for clarity of meaning and aesthetic completeness. The students, in close collaboration with their supervising teacher, dedicated themselves to the careful selection and interpretation of visual material, including photographs of Florence, maps of Renaissance Italy, portraits of notable figures, as well as representations of characteristic works of painting and architecture. The selected works did not function merely as decorative elements but served as commented evidence integrated into the historical narrative.

Special emphasis was placed on highlighting the relationship between Renaissance artists and thinkers and Greek literature and philosophy, aiming to understand how the Greek spirit acted as fertile ground for the flourishing of Renaissance art and thought. The inclusion of references to selected paintings, such as those by Botticelli and Michelangelo, was accompanied by an analysis of the philosophical background permeating them, particularly through the influence of Plato and Aristotle.

Particular emphasis was placed on presenting the Greek scholars who, through their presence and activity, shaped the ideological and philosophical foundation of the Florentine Renaissance. Through carefully crafted slides, the biographical and intellectual journeys of Manuel Chrysoloras, Demetrios Chalkokondyles, and Ianos Lascaris were analyzed. The students highlighted not only their educational works and translations but also their fundamental contribution to the dissemination of the Greek cultural paradigm in 15th-century Italy (McManus, 2011; Miller, 2009).

This endeavor was not limited to merely listing information. On the contrary, it made full use of PowerPoint's capabilities for interactive navigation, incorporating hyperlinks to videos, digital libraries, and concept maps, thereby promoting the active participation of the audience. The students delivered the presentation with rhetorically well-founded speech, presenting their historical findings in a convincing, enriched, and accessible manner.

In summary, this presentation served as a canvas where historical narration meets modern technology. The combination of historical accuracy and visual representation not only offered a better understanding of the subject but also functioned as a tool for educational empowerment, enhancing the students' communicative confidence, digital literacy, and interpretative skills. The final result not only documented but also visually, culturally, and emotionally captured the spirit of the Florentine Renaissance, illuminating the contribution of Greek scholars to the rebirth of Europe.

CREATION OF AN INTERACTIVE MAP

The third phase of the research process focused on the geospatial representation of historical reality, using the digital tool Google My Maps. This choice aligns with the contemporary trend of digital cartography in education, which combines elements of historical research with technological skills and critical spatial analysis.

Organized in groups, the students identified and recorded key locations in Florence directly connected to the presence and activities of Greek scholars during the Renaissance period. Among the highlighted sites were:

1.The Palazzo Vecchio, seat of political power and a gathering place for scholars,
2.The Florentine School, where figures such as Manuel Chrysoloras taught,
3.The Monastery of San Marco, linked to the philosophical dialogues of the era,
4.The Laurentian Library, a center for the collection of Greek manuscripts, translations, and commentaries.

Each location was accompanied by historical information, visual material, brief analyses, and links to the biographical details of the Greek scholars. Through this process, the students did not limit themselves to simple geographic recording but moved towards a meaningful interpretation of space, demonstrating its symbolic and intellectual significance during the Renaissance.

This mapping enhanced spatial awareness and highlighted the interdependence of place and spirit, emphasizing how specific geographic hubs served as centers of intellectual fermentation and transmission of Greek literature. Simultaneously, the project provided an innovative tool for presenting historical knowledge, useful both for educational purposes and for further research use by the academic community.

MUSICAL SETTINGS OF A POEM AND USE OF MUSIC

The fourth phase of the project marked a culturally bold and creatively innovative approach: the artistic representation of historical content through the musical setting of a poem. This choice aimed not only at the aesthetic enhancement of the presentation but also at approaching the past through the experience of art and sound.

The students composed original music using modern digital music production tools such as GarageBand and FL Studio. The composition was designed to convey the emotional and spiritual atmosphere of the Florentine Renaissance, blending elements of early period music with contemporary sounds.

The selected poem, inspired by the ideals of Humanism and the cultural fusion of East and West, served as the lyrical canvas upon which the students expressed the knowledge, impressions, and sensations they gathered from their research. The musical composition was accompanied by audiovisual material, including:

1.Renaissance artworks,
2.Landscapes of Florence,
3.Portraits of the Greek scholars,
4.And videos featuring excerpts from the interactive map presentation.

The final product took on the character of a symphony of historical memory, transporting the audience along a spatiotemporal axis that combined past and present, knowledge and emotion, historical interpretation and artistic expression.

From a pedagogical perspective, this activity served multiple goals: fostering creativity, developing aesthetic judgment, interdisciplinary integration of History, Music, and Informatics, as well as collaborative artistic cooperation. The students were given the opportunity to experience the Renaissance not as a distant, static historical event but as a living cultural experience, which they were called upon to reconstruct and represent through their own creative lens.

PREPARATION FOR THE CONFERENCE

The final phase of the research project focused on the systematic preparation of the final presentation at the student conference, held before a live audience in a setting simulating an academic environment. This process marked the culmination of a series of interdisciplinary and pedagogical activities through which the students were called to transform historical knowledge and creative production into communicable and scientifically structured content.

The presentation was organized thematically by areas of responsibility: each student took charge of a specific section of the research unit, whether it concerned the historical documentation of the Greek scholars and their influence on the Florentine Renaissance, the analysis of philosophical and linguistic currents, or even the musical and artistic depiction of the era.

During the presentation, special emphasis was placed on:

-The argumentative substantiation, based on the bibliography (e.g., Burckhardt, Kristeller, Cavallo, McManus, etc.),

-The use of audiovisual material, such as maps, artworks, videos, and slides, aimed at enhancing vividness,

-The integration of modern technologies (PowerPoint, Google My Maps, digital music), which qualitatively upgraded the presentation and enabled the creation of a multisensory experience.

The final structure of the presentation followed academic standards, introducing the audience to the historical context of 15th-century Florence and then proceeding to analyze the figures, ideas, and cultural interaction between Greece and Italy. The highlight of the presentation was the musical performance through the setting of a poem, which gave the final product artistic coherence and emotional depth.

Notably, the entire process strengthened collaboration, autonomy, public speaking, and the scientific attitude of the students. The oral and digital presentation of the findings aimed not merely at reproducing knowledge but at active participation in public discourse, under conditions that simulate real academic or scientific practices.

Finally, the conference itself functioned as a space for disseminating good practices in educational innovation, showcasing a model school that integrates an interdisciplinary approach, digital technologies, and creative expression, supporting a deeper understanding of the past through the challenges of the present.

CONCLUSIONS

This research and educational activity systematically and methodologically highlighted the potential offered by an interdisciplinary approach and the utilization of Information and Communication Technologies (ICT) in the study of historical phenomena. Integrating the Florentine Renaissance into the school context not only enriched the students' cognitive horizon but also contributed to the formation of new forms of understanding, expression, and presentation of knowledge.

1.Combination of Tradition and Technology

The project demonstrated the effectiveness of combining traditional historical research with the use of innovative digital tools. Students did not limit themselves to passive information retrieval but actively engaged in digital creation and processing activities, such as producing interactive maps and composing music. This contributed to the development of a new dynamic in history teaching, transforming narrative historical knowledge into a multimodal experience with visual, auditory, and experiential features.

2.Enhancement of the Learning Experience

The use of digital media expanded the pedagogical nature of the experience, enhancing active student participation and fostering both cognitive and metacognitive skills. Students developed abilities in critical source analysis, information management, and digital expression, while deepening their understanding of themes related to the synthesis of art, philosophy, and culture. Through experiential learning, they gained a fuller comprehension of the role of the Florentine Renaissance as a transitional stage toward modern European civilization.

3.Highlighting Cultural Heritage

One of the central aims of the project—the highlighting of the contribution of Greek scholars to Renaissance thought and the revival of antiquity—was achieved with scientific accuracy and documentation. Students understood that figures like Chalkokondyles, Chrysoloras, and Laskaris were not merely translators or teachers but bearers of values,

meanings, and cognitive traditions that profoundly influenced the intellectual character of the Renaissance. Thus, the project functioned as a means of conscious re-engagement with cultural heritage, illuminating the role of the Greek spirit in Europe's historical trajectory.

4.Interactive Presentation and Audience Engagement

The presentation of the results at the conference demonstrated the impact that a multimedia, interactive, and emotionally charged approach can have on knowledge transmission. The use of digital maps, visual media, and musical composition created a multisensory discourse that enhanced the audience's experience and brought immediacy to the educational process. Through this approach, scientific content was effectively communicated to a non-specialist audience without compromising validity and quality.

5.Development of Collaboration and Creativity

Finally, special significance lies in fostering collaborative and creative skills as an outcome of teamwork. Students shared roles, collaborated in documentation, jointly designed the presentation, and collectively supported the final execution of their work. The rotation of roles, co-creation, and taking responsibility for the presentation provided valuable experiences in developing personal and social skills that transcend the narrow confines of the course and align with 21st-century education principles.

GENERAL CONCLUSION

This particular research activity proves that the integration of ICT, combined with interdisciplinary and experiential practices, constitutes a fully functional and effective model for teaching history. The study of the Florentine Renaissance was not merely an object of cognitive processing but was transformed into a cultural event within the school community, highlighting the school's role as an agent of interpreting and disseminating historical memory through contemporary means.

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RICHARD MAYER'S MULTIMEDIA LEARNING AND THE CREATION OF EDUCATIONAL VIDEO IN CONTEMPORARY TEACHING MODELS

Zachariadi Vasiliki
Teacher of Applied Arts (8901), MSc in Public Discourse and Digital Media
4th Vocational High School
Larissa, Greece-
email: baso1010@yahoo.gr

ABSTRACT

The rapid advancement of technology has rendered educational video a key tool in teaching, enhancing learning through a variety of stimuli. According to Richard Mayer's Multimedia Learning Theory, learning becomes more effective when information is presented through audiovisual means, engaging both the visual channel (images, videos, diagrams) and the auditory channel (speech, sounds, music). This theory is based on three fundamental principles: dual processing of information, the limited capacity of working memory, and the active processing of cognitive load.
Educational video is dynamically integrated into all modern learning models, reinforcing understanding and the assimilation of knowledge. In the Flipped Classroom model, students engage with educational videos before the lesson, allowing in-person instruction to be enriched with collaborative and experiential activities. In the Blended Learning model, videos serve as a bridge between traditional and online learning, offering flexibility and personalization.

Furthermore, educational video plays a central role in Differentiated Instruction, as it can be adapted to various difficulty levels, learning preferences, and learning paces. In Inclusive Education, multimedia elements support access for students with learning difficulties, using subtitles, narration, and interactive tools. Educational videos contribute to improved comprehension and more effective lesson organization. Similarly, in Tiered Instruction, teachers create multiple versions of the same video, tailored to students' abilities.

The effective creation of educational videos requires the application of Mayer's principles, including spatial and temporal alignment of text and image, elimination of extraneous information (minimizing cognitive load), and active student engagement through questions and interactive components.

In conclusion, the use of educational video—when grounded in the principles of multimedia learning—can transform the teaching process, making it more adaptable, personalized, interactive, and effective, while enhancing students' comprehension and engagement in today's classroom.

Keywords: Multimedia Learning, educational video

INTRODUCTION

This presentation is based on a literature review and outlines the theoretical foundations of Mayer's principles of multimedia learning, as well as their practical application to the development of educational videos. These principles are fundamental for the effective presentation of information in multimedia environments. The paper examines the influence of various multimedia components on cognitive processing and memory.

It presents findings from studies that have evaluated the effectiveness of educational videos developed according to Mayer's multimedia learning principles.

The purpose of this presentation is to offer practical and applicable solutions for enhancing learning through multimedia. It provides a framework for creating instructional videos that align with students' needs and capabilities, thereby improving the educational experience and encouraging active student participation in the learning process.

Cognitive Subject Learning Theory – Principles of Mayer's Multimedia Theory

A multimedia lesson is the presentation of an instructional unit through the use of multiple technological applications. A key factor is the interaction between the user and the system, which activates the learner within the educational process. The underlying principle is that the learner interacts within this enriched environment, making learning more effective (Toomey & Ketterer, 1995).

The challenge in multimedia teaching—as in any learning program—is to construct lessons in ways that align with how human learning functions. For this to be effective, instructional strategies must support the learning process. They must foster the psychological factors necessary for learning. The construction of knowledge should be based on three foundations of cognitive theory (Mayer & Clark, 2008). The central challenge of instructional design is how to encourage learners to engage in appropriate cognitive processing during learning, without overloading the capacity of either the verbal or visual channel (Mohamed Ibrahim, 2012). Human sensory processing comprises two distinct channels: one for visual or pictorial information and another for auditory or verbal information (Mohamed Ibrahim, 2012):

- Dual Channel: People have separate channels for processing visual/pictorial material and auditory/verbal material (Figure 1).
- Limited Capacity: Individuals can process only a limited amount of information in each channel at any given time.
- Active Processing: Learning occurs when people actively engage in appropriate cognitive processes, such as focusing on relevant content, organizing it meaningfully, and integrating it with prior knowledge (Figure 2)

Figure 1
Dual-channel processing of visual/pictorial and auditory/verbal information (Mayer, 2001)

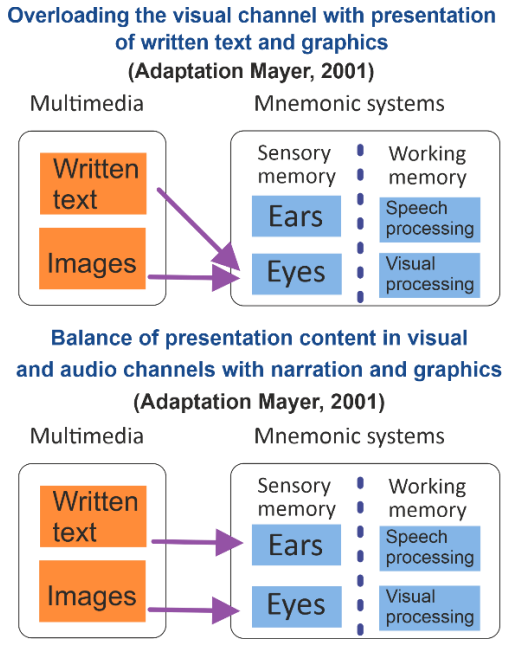
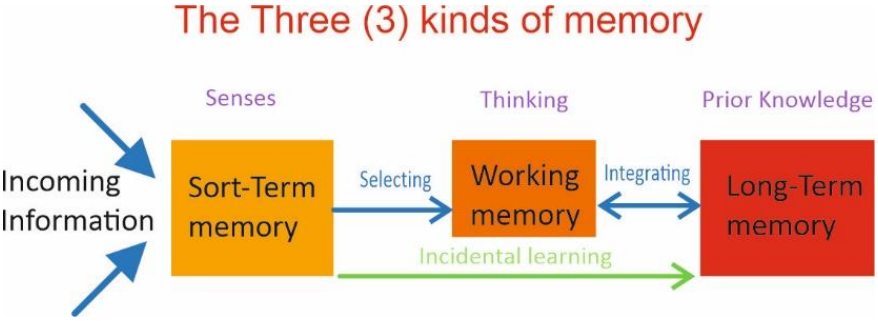


Figure 2
Active Processing. Adapted from Mayer (2003), Marois (2005), Miyake (1999)



- Multimedia Features That Lead to Positive Outcomes
- **Dual coding** of verbal and non-verbal (visual) information in memory
- **Learner control,** whereby the student takes responsibility for their own learning
- **Constructivist multimedia learning,** which supports environments where learners build their own mental models by integrating multiple cognitive representations (Mayer & Moreno, 1999)

MULTIMEDIA LEARNING THEORIES

Take-Home Message

"People learn better when multimedia messages are designed in ways that are consistent with how the human mind works and with research-based principles."— *Richard Mayer*

The Multimedia Principle

The multimedia principle states that people learn better when content is presented using both words and graphics rather than words alone. Moreover, words should be presented as spoken narration rather than as text on the screen (Clark & Mayer, 2016; Mayer, 2009, 2014).

Multimedia lesson presentations encourage learners to process information and the connections between elements.

Encouraging active engagement in learning leads to better outcomes.

The Coherence Principle

The coherence principle states that people learn better when messages include only the information that is necessary. Texts and visuals should be in simple form and directly relevant to the subject matter (Water Bear Learning, 2020). Extraneous material competes for cognitive resources in working memory and can divert attention away from important content, leading the learner to integrate it with unrelated topics (Cambridge University Press, n.d.).

The addition of visual and auditory enhancements—such as music, background videos, or soundtracks—designed to make multimedia content more attractive and engaging is based on **arousal theory**. The core idea of arousal theory (Dewey, 1913; Renninger, Hidi & Krapp, 1992) is that students enjoy learning when they are emotionally stimulated. In contrast, **cognitive multimedia theory** suggests that interesting but irrelevant elements may interfere with the learning process by causing d**istraction,** by interrupting attention, d**isruption**, by interfering with the sequence of thoughts, and d**iversion**, by incorporating secondary elements that lead away from the core learning message.(Mayer, *The Psychology of Learning and Motivation*, 2002)

The Signaling Principle

The signaling principle states that people learn more easily when they are guided as to where to focus their attention on the screen (Water Bear Learning, 2020). Signals do not introduce new text but help emphasize a rationale for how ideas can be organized in a presentation. Signaling reinforces the semantic links between core ideas and their interrelations (Mayer, *The Psychology of Learning and Motivation*, 2002).

In the study “Eye Tracking Research in Multimedia Design” (l.b. dr.iastate.edu), words with signaling took less time to identify than plain text words. Eye fixation time in highlighted text places a greater load on cognitive processing (Mayer, 2002).

Highlighting essential information in a lesson can take different forms—for example including a summary sentence at the beginning of a narration that previews key ideas, adding headings that match the structure of the narration (Mohamed Ibrahim, 2012).

Signaling in audiovisual content can also involve: increasing the brightness of specific visual objects, boldening keywords in the text, adding borders or headings (Mayer, 2005; Mohamed Ibrahim, 2012). (Figure 3, Figure 4)

Figure 3
Adding borders in different colors and handwritten headings using the “whiteboard” technique in video (Khan Academy)

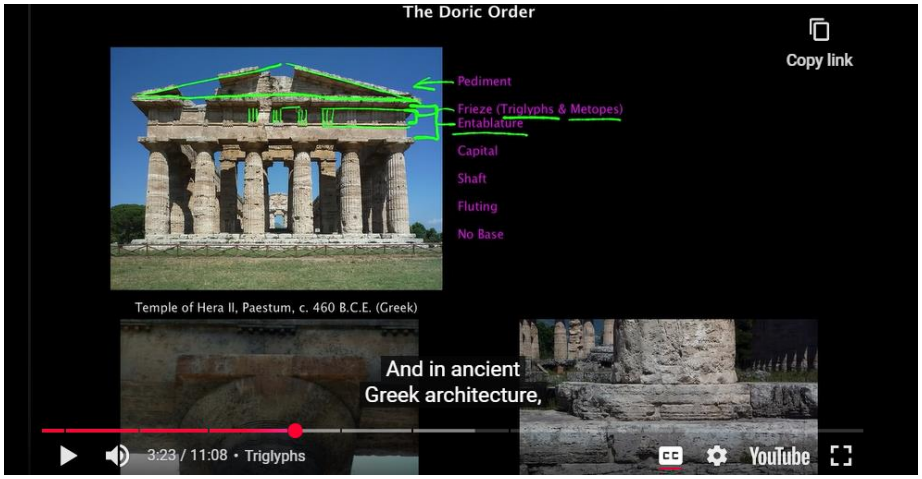
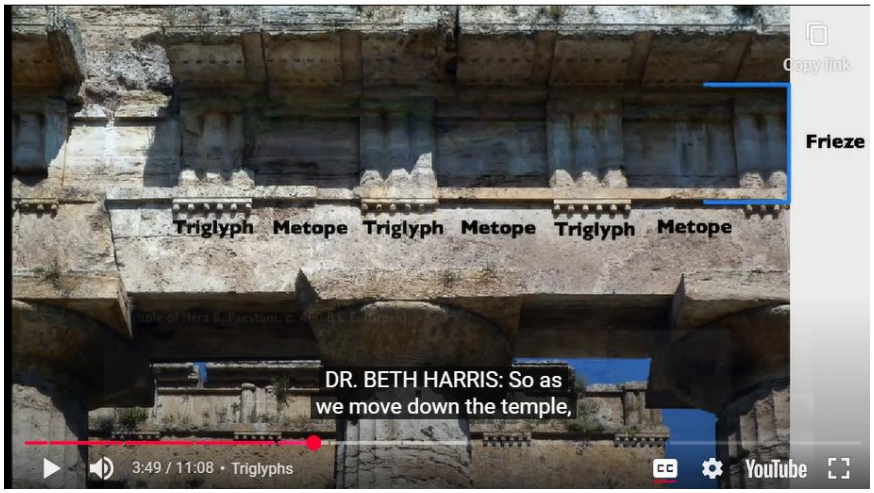


Figure 4
Adding headings (Khan Academy)



The Modality Principle

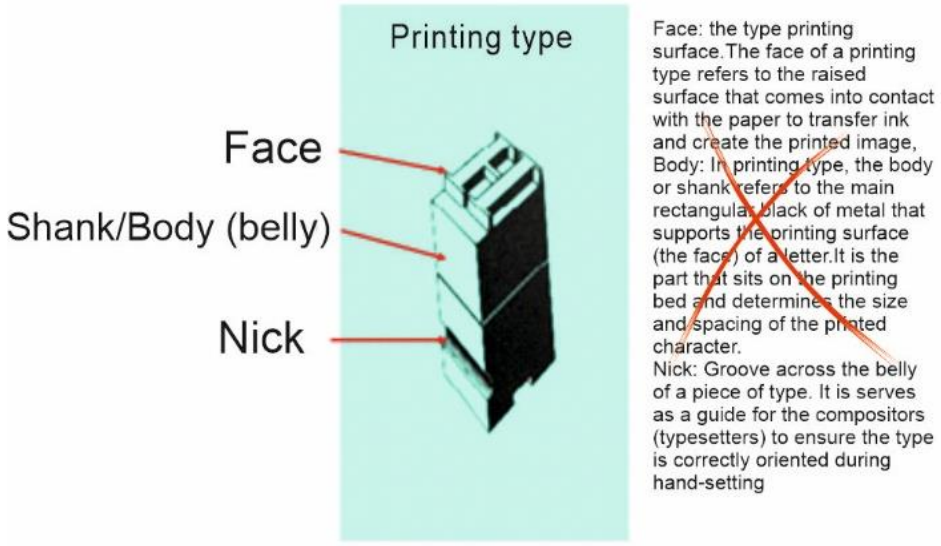
According to Mayer, the modality principle (Mayer & Clark, 2008) defines the appropriate use of audio narration by learners and designers of multimedia lessons. The psychological evaluation of this matter relates to how the human mind processes information. In educational videos, this principle suggests that presenting information through spoken

narration rather than written text on the screen can improve learning outcomes by reducing cognitive load. The principle is based on the idea that auditory and visual information are processed through separate channels, allowing for more efficient use of working memory (WM). Research has shown that the effectiveness of this method may vary depending on several factors, such as the learner's level of experience, the complexity of the content and the learning environment.

The Redundancy Principle

Very often, a presentation includes both written text on the screen and spoken narration, where the narration repeats the exact same content as the text. This technique is called redundancy, because the printed text on the screen becomes redundant when paired with spoken narration. In practice, it has been shown that people learn better from a combination of images and narration, rather than from images accompanied by both narration and on-screen text simultaneously. In general, printed text should not be added to a graphic that is already accompanied by narration. The psychological advantage of using only audio narration is that it avoids overloading the visual channel of working memory.

Figure 5
Redundancy – Presence of written explanatory text on the screen while also being narrated (Zachariadi, 2022)



The Spatial Contiguity Principle

This principle states that people learn better when images and their corresponding explanatory text are placed close together. To apply this principle correctly, the following should be taken into account:

Avoid separating text and images when scrolling through the screen.

Keywords that are numbered in a graphic should not appear elsewhere on the screen.

Feedback on questions or answers should be displayed together on the screen.

When presenting animation or moving graphics, the explanatory text should not appear separately on half of the screen.

(Mayer, The Psychology of Learning and Motivation, 2002; Mayer & Clark, 2008; Cambridge University Press, n.d.)

The Temporal Contiguity Principle

To apply this principle correctly, the flow of the image should be synchronized with the audio narration.

The spoken text should coincide in time with the graphics or video, rather than being presented in sequence. According to the cognitive theory of multimedia learning, effective learning occurs when the spoken and visual messages

are processed simultaneously in working memory (Mayer, The Psychology of Learning and Motivation, 2002; Mayer & Clark, 2008; Cambridge University Press, n.d.).

Humans understand information by seeking the mental connection between words and images. However, when these elements are presented asynchronously on the screen, additional cognitive processing is required. This increases the cognitive load and reduces the available capacity for learning (Mayer & Clark, 2008).

The Segmenting Principle

The segmenting principle focuses on situations in which learners are required to absorb a large amount of information—so much that the cognitive system becomes overloaded and breaks down, even if the redundancy principle has been applied, meaning that only the essential cognitive material is retained. The result is an overload of the cognitive learning system and the loss of new knowledge. In a lesson or instructional unit, we do not eliminate concepts, definitions, or procedural steps, because doing so compromises the accuracy and integrity of the lesson (Mayer & Clark, 2008). In such cases, dividing the lesson into sub-units helps the learner manage the complexity of the subject matter. Learning is enhanced even further when these short segments are delivered at different points in time, rather than continuously, allowing the learner to decide how much content they can assimilate. This provides learners with control over their learning process by using a "next" button or adjusting the video playback speed.

A learner who watches a narrated video on a complex subject with interactive elements and a fast-paced presentation may lose track of essential content. When this happens, the sequence of knowledge becomes meaningless. This is especially likely if the subject is unfamiliar or the learner needs more time to reflect. The solution lies in segmentation and connecting the thematic units with a "next" function, allowing learners to balance their cognitive ability with the cognitive load (Mayer & Clark, 2008).

In video, segments are defined as portions of dynamic visualizations that have a recognizable starting and ending point and are distinguished by the inclusion of pauses between segments. The purpose of this method is to allow learners to mentally process manageable units of instructional content before moving on to the next portion (Mohamed Ibrahim, 2012).

The Personalization Principle

Mayer's previous principles are derived from the cognitive theory of multimedia learning and support the use of concise narrative animations. Research has been conducted to examine the manner of speech used in narration. The recommendation is that narration should not be in formal or academic language but in simple, everyday language (Mayer, The Psychology of Learning and Motivation, 2002).

Additionally, research findings indicate that showing the instructor's face on screen is not considered an effective practice in educational videos (Ou, Chaohua; Joyner, David A.; Goel, Ashok K., 2019).

The Pre-training Principle

By applying the pre-training principle, key words and core concepts are introduced before the lesson, contributing to the understanding of the material. The learner is prepared to grasp the deeper meaning of the topic and to comprehend the concepts, thereby distributing the cognitive load more evenly throughout the multimedia lesson. This principle is of great importance when teaching complex material to beginners, as it reduces the amount of essential processing by spreading the information across the lesson (Turso, 2017).

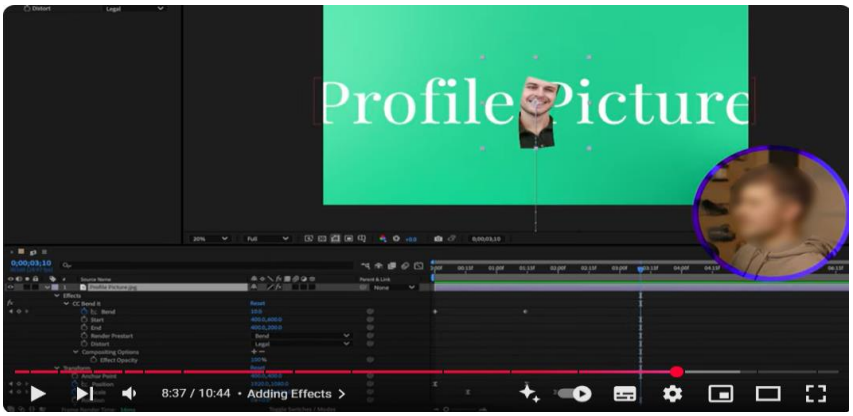
The Voice Principle

The voice principle states that people learn more effectively when the narration in a video uses a human-like voice rather than a mechanical or robotic one (Water Bear Learning, 2020).

The Image Principle

The image principle, although still in an early stage of research—like the voice principle—suggests that people learn better from videos that include only spoken narration. Videos that feature only explanatory speech by a narrator are widely used in multimedia learning environments (Water Bear Learning, 2020).

Figure 6
The presence of the speaker in video narration (talking heads) (Gavin Herman, 2025)



MULTIMEDIA TEACHING METHODS – VIDEO IN EDUCATION

Video has become an important component of education. It is integrated into traditional classroom instruction, serves as a cornerstone of many blended learning models, and is often the primary method for delivering information in online courses (Brame, 2016).

The design of instructional videos through the lens of multimedia learning significantly influences modern teaching models by increasing student engagement and interest. This approach emphasizes the importance of video duration, segmentation, and coherence, all of which collectively enhance student comprehension and retention.

Weeding, or the removal of interesting but irrelevant information that does not contribute to the learning objective, can also provide additional benefits (Coherence Principle). For instance, background music, complex scenery, or extra features in an animation require the learner to judge whether to pay attention to them. This increases extraneous cognitive load and can reduce learning. It is important that educators consider their students' level when designing educational videos and determine which information is necessary for processing. At the same time, they must remove elements that do not serve the learning goal and that may overload the learners' working memory (Brame, 2016).

Another perspective on the use of educational video is student engagement. The recommended video duration is four (4) minutes. When a lesson plan requires a longer presentation, it should be divided into smaller parts, applying segmentation (Ou, Chaohua; Joyner, David A.; Goel, Ashok K., 2019). Keeping videos short is particularly important for capturing and maintaining students' attention during instruction (Brame, 2016).

Another technique for maintaining student engagement is the use of a conversational tone. This is known as the personalization principle, as defined by Mayer. The use of informal, conversational language in multimedia instruction has been shown to positively impact learning outcomes. This may be because a conversational style encourages learners to develop a sense of social partnership with the narrator, leading to greater engagement and motivation (Mayer, Multimedia Learning, 2002)(Mayer, 2008). When creating or selecting videos, it is important to consider whether they were designed for the specific educational level in which they will be used. The adaptability of a video can be improved during reuse. Instructors can tailor it to a specific classroom by using off-screen narration or on-screen text to establish relevance for that particular audience and topic.

Videos can be used to demonstrate specific manual skills or physical processes—at normal speed, in slow motion, or to highlight relationships, principles, or procedures. They can provide visual access to situations or experiments that would otherwise be too dangerous or expensive for students to experience in person. Videos can simplify complex ideas through media-specific techniques such as animation, computer graphics, or clay models. They can reveal entire "worlds" through photomicrography, astrophotography, night photography, conventional photography, and time-lapse.

Videos can also be used to promote positive behavior and motivate learners. They are particularly effective for introducing new topics or reviewing previously covered material, especially when motivation is crucial for student participation in a learning sequence. According to summaries of current research and teacher surveys, video enhances reading and lecture material, improves student comprehension and discussion, supports a wider range of learning styles,

increases motivation and enthusiasm, and contributes to teacher effectiveness (J. António Moreira, Fouad Nejmeddine, 2015).

Video is a medium of primary importance in both current and future education, even within the context of the growing interest in interactive multimedia. With careful design, video instruction can promote interactive learning. Videos can stimulate students' curiosity, encourage speculation, and foster intellectual engagement. They can initiate discussions and collaborative learning activities, allowing students to apply their existing knowledge and develop the higher-order thinking skills needed to expand it (J. António Moreira, Fouad Nejmeddine, 2015).

CONCLUSIONS – DISCUSSION

Video can serve as a significant medium for improving student learning and increasing their engagement with lessons. Maximizing this benefit comes down to a few key recommendations:

- Keep videos short and focused on learning objectives.
- Use audio and visual elements to convey the appropriate parts of an explanation. Consider how to make these elements complementary rather than redundant.
- Use signaling to highlight important ideas or concepts.
- Use a conversational, enthusiastic tone to enhance students' attention and focus on the lesson.
- Enrich the video with active learning strategies, such as guiding questions, interactive components, or related homework assignments (Brame, 2016).

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MODEL FOR MONITORING DIETARY INTAKE, LIFESTYLE, AND PHYSICAL ACTIVITY OF PATIENTS USING INFORMATION AND COMMUNICATION TECHNOLOGIES

Biskanaki Fani,
PhD, MSc, Director of Secondary Education Administration of Preveza
Preveza,Greece
email: fani.biskan@gmail.com

Giannakou Anastasia,
PhD, MSc, Director of the 4th General Lyceum of Ioannina «AKADIMIA»
Ioannina, Greece
email: giannakougeorgiou@gmail.com

ABSTRACT

This study investigates the use of information and communication technologies (ICT) in the daily practice of nutrition-dietetics and physical education professionals, focusing on the monitoring of dietary intake and physical activity. The literature indicates that mobile applications, particularly when combined with wearable devices, constitute effective tools for promoting healthy dietary habits and enhancing individuals' adherence to recommended practices. Within this study, the most suitable application was selected from thirty available on the Play Store and App Store and implemented in an experimental procedure involving two patients, in order to evaluate its practical utility and contribution to health management. The results highlight the effectiveness of m-Health tools in monitoring and guiding individuals, while also emphasizing the need for further research with more diverse samples to investigate the long-term benefits and potential risks associated with the sustained use of these technologies. Overall, ICT provides significant opportunities for both health professionals and patients, facilitating personalized monitoring and support, improving adherence to healthy lifestyle behaviors, and enhancing overall health outcomes.

Keywords: ICT, m-Health, nutrition applications, physical activity applications

INTRODUCTION

The rapid evolution of information and communication technologies (ICT) has significantly transformed people's daily lives, affecting almost every aspect of their activities. The use of mobile phones, online applications, and digital tools for task management, education, and communication has established ICT as an integral element of modern citizens' daily life (Røpke & Christensen, 2012). At the same time, the health sector has benefited substantially from the integration of ICT, as these technologies offer new possibilities for monitoring, preventing, and managing individuals' health.

According to the World Health Organization, e-Health is defined as the cost-effective and secure use of ICT to support health services, including care, health monitoring, education, and research (World Health Organization, 2024). Similarly, the European Commission describes e-Health as a superset of distinct categories, such as telemedicine, home-care systems, clinical information systems, integrated health information networks, and secondary non-clinical systems supporting education and research (European Commission, 2024; Sávvas, 2016). These tools—from applications for monitoring diet and physical activity to electronic health records and telemedicine—enable personalized patient support and enhance individuals' active participation in managing their health (Sarwar et al., 2018).

Particularly important is the application of ICT in monitoring dietary intake and physical activity through m-Health tools and wearable devices that allow real-time data recording. These applications provide capabilities such as food logging, calorie counting, activity tracking, and personalized feedback, contributing to the adoption of healthy dietary habits and the promotion of physical fitness (Sim, 2019; Vrhovec, 2016). The integration of ICT into health management allows health professionals, such as dietitians and nutritionists, to monitor patients remotely, providing timely interventions and personalized guidance.

Despite the significant benefits, the use of health applications by older individuals faces challenges due to digital illiteracy, highlighting the need for awareness and training programs for this population group (Fox & Connolly, 2018). Overall, m-Health technology provides tools that can improve individuals' quality of life and the efficiency of health systems, although further research with diverse samples is required to assess long-term benefits and risks.

The present study focuses on evaluating the usability of mobile health applications for monitoring diet and physical activity through an experimental procedure with two patients, connecting the literature review with practical application and highlighting the importance of ICT in the daily professional practice of dietitians and nutritionists.

LITERATURE REVIEW

Use of ICT in Dietary Intake

The utilization of ICT in dietary intake has emerged as a powerful tool for monitoring and improving dietary habits. Studies indicate that the use of mobile phone applications for recording dietary consumption increases compliance with dietary guidelines and improves dietary habits (Paramastri et al., 2020). Wearable devices for monitoring dietary intake have also proven effective at an individual level (Sempionatto et al., 2021). Additionally, the development of portable chemical sensors offers new possibilities for molecular-level monitoring, enhancing precision nutrition tailored to individual needs, metabolic profiles, and environmental factors (Hingle & Patrick, 2016).

Nutrition applications for wearable devices and smartphones make self-monitoring more accessible, with positive results in intake recording and changes in dietary habits and anthropometry (Lieffers & Hanning, 2012). However, the effectiveness of applications may vary depending on the recording method, requiring proper user education for accurate interpretation of energy and nutrient intake (Evenson & Berens, 2021). Overall, ICT provides significant capabilities for supporting healthy dietary habits and integrating them into professional healthcare practice, promoting personalized monitoring and enhancing compliance with dietary programs

Use of ICT in Physical Activity

The continuous decrease in physical activity and the adoption of sedentary lifestyles contribute to the emergence of cardiovascular diseases, neurodegenerative diseases, and obesity (Sarikavazis, 2021). International organizations recommend at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity weekly for adults to maintain cardiovascular health (Lichtenstein et al., 2016).

ICT has been integrated into physical activity management through applications that record daily steps, heart rate, oxygen intake, and distance using GPS, accelerometers, and other sensors (Molina & Sundar, 2018). These

applications analyze data, provide personalized guidance, set goals, offer incentives, and incorporate social-sharing capabilities (Higgins, 2016). They also facilitate monitoring of diet, weight, sleep, and stress, enhancing communication between patients and health professionals. Their effectiveness is further strengthened by gamification and data visualization features (Paramastri et al., 2020; Napolitano et al., 2022).

Future research should investigate design characteristics that contribute to long-term behavioral change, independent of continuous app use.

Available Applications

Numerous mobile health applications (MHAs) have been developed to improve quality of life and support users' health management (Sarwar et al., 2018). These applications can be installed on mobile or portable devices, offering an easy way to monitor daily habits such as calorie intake and physical activity, while some provide guidance for healthy choices. Many applications also offer support functions such as forums, barcode scanners, and synchronization with wearable devices, promoting user motivation toward achieving goals such as weight loss.

Self-monitoring has been associated with improved awareness of habits and the promotion of a healthy lifestyle. Table 1 summarizes the available applications, including user ratings and download numbers.

Table14
Summary table of applications

	SUMMARY TABLE OF APPLICATIONS		
No.	Application	User rating	Downloads
1	LooseIt	4,2	10M. +
2	Running App - GPS Run Tracker	4,8	10M. +
3	My Fitness Pal	4,1	100 M. +
4	Fitbit	3,8	50 M. +
5	FatSecret	4,6	50 M. +
6	YAZIO	4,1	50 M. +
7	Google Fit	3,9	100 M.+
8	Nutracheck	4,3	1 M. +
9	Noom	4,0	10 M. +
10	Calorie Counter	4,7	1 M. +
11	Diabetes:M - Blood Sugar Diary	4,6	500 K +
12	Calorie Counter & Food tracker	4,1	1 M. +
13	Lifesum Food Tracker & Fasting	4,2	10 M. +
14	Calorie Counter – MyNetDiary	4,7	5 M. +
15	StepsApp – Step Counter	4,6	5 M. +
16	Pedometer -- Step Counter	4,8	10 M. +
17	Calowise, Easy Calorie Counter	4,3	50K.+
18	Carbon - Macro Coach & Tracker	4,7	100K.+
19	Fitbod Workout & Fitness Plans	4,6	1 M. +
20	Step Counter - Pedometer & Map	4,7	5 M. +
21	Pacer Pedometer & Step Tracker	4,1	10 M. +
22	My Dash Diet: Low Sodium Track	4,7	10K.+
23	adidas Running: Run Tracker	4,5	50 M. +
24	Calorie Tracker & Food Tracker	4,3	500K.+
25	Nike Run Club - Running Coach	3,07	10 M. +
26	Strava: Run, Bike, Hike	4,6	50 M. +
27	FITAPP running, pedometer	4,1	1 M. +
28	Lifesum Food Tracker & Fasting	4,3	10 M. +
29	Zepp Life	4,2	100 M. +
30	Mi Fitness	4,5	10 M. +

Despite the existence of numerous studies regarding the use of Information and Communication Technologies (ICT) for monitoring dietary intake and physical activity, further long-term research is required to estimate the long-term benefits and potential risks from their continuous use. The available data indicate that applications contribute to achieving personal goals; however, sufficient information is not provided on maintaining new habits after the completion of usage programs. Regarding nutrition applications, limited reliability is observed, due to incomplete or locally restricted food databases, which limits the accuracy in recording energy and nutrient intake. Conversely, physical activity applications seem to yield positive results in the short term, although they present limitations, such as limited exercise variety and lack of an engaging environment or automatic step recording. Overall, M-Health applications appear promising but need further improvement and evolution to be complete and reliable. It is emphasized that they do not replace the guidance of a specialized nutritionist or health professional but function as complementary tools for enhancing self-monitoring and the adoption of healthy habits. The available applications, as presented in Table N, offer an overview of their capabilities, popularity, and limitations, highlighting the need for careful selection by users.

METHOD -- SELECTION AND USE OF NUTRITION AND EXERCISE APPLICATIONS

Within the framework of the present study, from the thirty available mobile health applications, Calorie Counter -- MyNetDiary was selected as the most suitable for monitoring the dietary intake and physical activity of the participants. The application was utilized for recording daily food intake, calories, and nutrients, as well as for monitoring physical activity through step counting, exercise, and calories burned during exercise. Furthermore, the application allows the creation of personalized diet and exercise programs by the health professional, with the entry of participants' basic physical characteristics, such as weight, height, and age. The use of the application supports the evaluation of participants' compliance and achievement of goals, while its data allows for continuous monitoring and feedback. It is noted that the application has reached over five million users globally, indicating its widespread acceptance and reliability within the M-health application community.

RESULTS

In the present study, two participants were selected for the initial investigation of their dietary habits and physical activity through the **MyNetDiary** application. Due to the limited number of participants, the results cannot be considered representative of broader conditions and dietary or exercise practices. The use of a small sample, characteristic of **pilot or exploratory studies**, allows for the trial evaluation of the application's functionality and preparation for future, larger-scale research.

Dietary intake was recorded for six days, including two weekends, to account for potential differences in dietary behavior during rest days. The dietary data were analyzed for energy and macronutrient intake and compared with the application's personalized recommendations, taking into account factors such as gender, age, height, and weight goal.

Physical activity was recorded for two consecutive weeks for each participant and evaluated in relation to international recommendations for adults. The target step range (7,500--10,500/day) was based on the guidelines of international health organizations for promoting physical health. According to the recorded data, the participants achieved the goal of 7,500 steps at a rate of 50% (Participant 1) and 61% (Participant 2). The results are presented in Table 2 and Graph 1.

Table 2
Average daily steps of participants

Participant	Avg. Daily Steps	TargetAchievementRate(%)
1	7.200	50%
2	8.050	61%

The second phase of the study focused on evaluating the energy and macronutrient intake for each participant, adjusted to individual needs based on height, weight, and age. The participants logged all their meals for six days via the MyNetDiary application. After completing the logging (Table 3), the data were compared with the application's personalized recommendations (Table 4) for weight maintenance or slight reduction.

Graph 8
Average daily steps of the patients

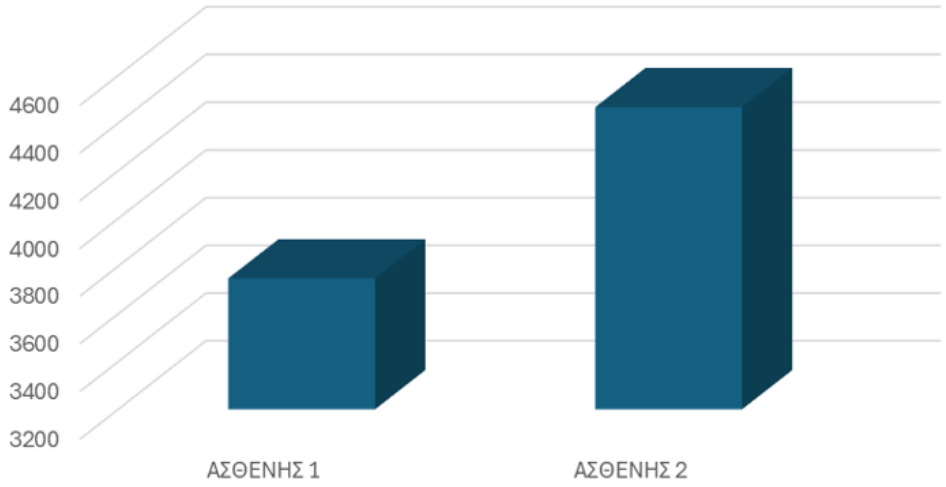


Table 3
Average intake of energy and nutrients for each patient per day

Intake of energy and nutrients				
	Calories-Energy	Carbohydrates	Proteins	Fat
Patient 1	1520	143	69	55
Patient 2	1504	181	93	61

Table 4
MyNetDiary application recommendations for each patient

MyNetDiary application recommendations for intake of energy and nutrients				
	Calories-Energy	Carbohydrates	Proteins	Fat
Patient 1	1747	196	88	78
Patient 2	1243	252	112	87

From the data analysis, it emerges that the participants were not able to fully follow the application's recommendations regarding energy and macronutrient intake for weight maintenance or slight reduction. Specifically, patient 1 covered 87% of her daily energy needs and 78% of the recommended protein intake, while carbohydrate and fat intake were lower, 73% and 71% respectively. Patient 2 achieved 67% coverage of energy needs, 83% of protein, 72% of carbohydrates, and 70% of lipid content.

These results indicate that the participants did not adequately follow the suggested guidelines, which may limit the reliability of conclusions regarding dietary habits and physical activity. The limited observation duration (one week) and the very small sample size constitute significant limitations for the generalization of the findings. For the development of sound interventions, the collection of a larger volume of data is recommended, including dietary intake histories, always with the explicit consent of the participants.

CONCLUSIONS

With the continuous evolution of ICT, the applications available for monitoring physical activity and dietary intake are constantly being developed, making the selection of the most appropriate tool increasingly challenging for health professionals (Chen et al., 2015).

Regarding physical activity, most applications do not provide automatic exercise tracking, but mainly step counting and running logs. Newer applications, however, offer recording capabilities for additional activities such as cycling (Michie et al., 2011).

Many dietary intake monitoring applications contain unreliable data because they are not based on validated food databases. For Greek users, this problem is more pronounced due to the absence of foods commonly found in the Greek market. A major issue is that most nutrition applications are not based on established behavioral change models, resulting in temporary rather than long-term improvements in dietary habits (Michie et al., 2011).

Accurate recording of dietary intake and physical activity is essential for effective nutritional counseling. Incorrect data may lead to inappropriate recommendations, posing risks to patient health. To improve accuracy, dietary intake should ideally be recorded immediately after each meal rather than retrospectively. Applications should therefore include continuous reminders, a feature already present in several tools (Chen et al., 2015).

Health professionals must provide clear instructions regarding daily energy, macronutrient, and micronutrient targets, as well as guidance on how to use the application effectively. The reliability of the data provided by mobile applications must be verified by professionals before being used in clinical decision-making. Incorrect data extraction can be dangerous, potentially leading to overconsumption or underconsumption of essential nutrients.

Patients should not select applications without professional guidance. For individuals with limited digital literacy or limited knowledge of English, a simpler method—such as photographing meals and sending them to the health professional—may be more appropriate. Many modern applications also support barcode scanning, which facilitates food logging (Higgins, 2016).

Physical activity recording should ideally be automatic, requiring minimal user effort. Applications with automatic tracking should include at least exercise duration, energy expenditure, intensity, and heart rate. Automatic monitoring can be enhanced through wearable devices such as smartwatches, smart glasses, or AR/VR headsets, which provide more accurate data synchronized with mobile applications (Thayananthan, 2019).

Equally important is the development of applications based on validated behavioral change models to improve long-term adherence (Michie et al., 2011).

In conclusion, mobile applications can serve as valuable tools for delivering health advice and interventions to both the general population and patients. However, research on their effectiveness remains limited. Existing applications have not been thoroughly evaluated through large-scale experimental studies, and therefore the full extent of their benefits and risks remains unclear. More research is needed to assess their usefulness, reduce risks, and improve their design (Chen et al., 2015; Michie et al., 2011).

Future research should identify factors that enhance user engagement, examine the relationship between user participation and intervention effectiveness, and consider social, economic, and psychological factors. Studies comparing standalone app-based interventions with combined intervention strategies would also be particularly valuable (Michie et al., 2011).

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THE APPLICATION OF SENTIMENT ANALYSIS IN HISTORY SCHOOL TEXTBOOKS: THE CASE OF ASIA MINOR

Bitzenis Aristidis
Professor, University of Macedonia
Thessaloniki, Greece
bitzenis@uom.edu.gr

Nosios Marios
PhD Candidate, University of Macedonia
Thessaloniki, Greece
mnosios@uom.edu.gr

Koutsoupias Nikos
Professor, University of Macedonia
Thessaloniki, Greece
nk@uom.edu.gr

Kokkoris Christos
PhD Candidate, University of Macedonia
Thessaloniki, Greece
ckokkoris@uom.edu.gr

ABSTRACT

This study examines the affective framing of the Asia Minor Catastrophe (1922) in official Greek secondary-school history textbooks through a lexicon-based sentiment analysis. A corpus of all textbook excerpts explicitly referencing Asia Minor was compiled, from which passages reflecting both political and socio-cultural dimensions were manually selected. Preprocessing was conducted in R, including lowercase conversion, tokenization, and removal of stop words. Using a Greek sentiment lexicon, polarity scores were assigned to individual tokens; raw valence sums were aggregated and normalized by passage length to facilitate robust inter-excerpt comparisons. Results indicate that textbook narratives are overwhelmingly neutral (84.2% of labels), suggesting an objective, fact-driven pedagogical approach. Negative sentiment accounts for 14.1% of labels, clustering around descriptions of conflict, displacement, and loss, thereby underscoring the catastrophic nature of these events. Positive sentiment is minimal (1.6%), appearing only in brief references to communal solidarity or reconstruction efforts. Lexicographic profiling further reveals frequent usage of terms such as *ελλάδα* (Greece), *αθήνα* (Athens), and the inclusive pronoun *μάς* (our), reflecting a collective national perspective, alongside temporal markers (*αιώνα*, *χρόνια*) that reinforce chronological structuring. These findings demonstrate that Greek history textbooks maintain scholarly neutrality, punctuated by intensified negativity in trauma-focused sections, with scant positive counterpoints. Furthermore, this study exemplifies the value of computational methods for empirically mapping affective dimensions within educational narratives and lays the groundwork for the development of culturally sensitive, domain-specific sentiment models in historical scholarship.

Keywords: Sentiment Analysis, Asia Minor, Natural Language Processing, History

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INTRODUCTION

Sentiment analysis (SA) has evolved from early dictionary-based approaches to sophisticated deep learning architectures, offering tools for assessing emotional tone in textual material (Zhang, 2025; Jim et al., 2024). The initial efforts in this discipline were based on sentiment dictionaries, aggregated lists of positive and negative terms, to determine the polarity of documents. Although efficient, these models often proved to be inadequate in accounting for idiomatic expressions, polysemy, and syntactic nuances (Esuli & Sebastiani, 2006; Turney & Littman, 2003). The subsequent emergence of Supervised Machine Learning (SML) techniques, such as support vector machines and Naïve Bayes classifiers, marked a significant improvement, as these models could be trained on annotated corpora of user-generated content, including product reviews and social media posts (Pang & Lee, 2008). The emergence of recurrent and convolutional neural networks has enabled more detailed emotion detection, capturing syntactic and semantic dependencies (Socher et al., 2013). More recently, transformer-based architectures, particularly BERT and its derivatives (Gatti & Huesler, 2025; Tzimiris et al., 2025; Vaswani et al., 2017), have set new benchmarks by learning deep contextual embeddings, thereby improving accuracy in various classification tasks (Prottasha et al., 2022; Devlin et al., 2019). These models, which are available through platforms such as Hugging Face, can be fine-tuned for domain-specific datasets, including those in languages other than English (He et al., 2025). However, despite these advances, SA on historical and educational texts remains a unique challenge, primarily due to archaic lexicons, specialized disciplinary terminology, and the scarcity of annotated datasets in these domains (Bakagianni et al., 2025; Tsakalidis et al., 2018). Consequently, hybrid approaches that integrate dictionary-based features with Machine Learning (ML) models are increasingly used to balance interpretability with computational rigor (Cambria et al., 2017).

The implementation of SA in history textbooks has opened up new avenues for quantifying emotional formation and ideological bias, dimensions that have traditionally been investigated using qualitative methods. As repositories of national memory and identity, history textbooks serve as key tools for shaping students' perceptions of the past (Grever & Van Der Vlies, 2017). Computational techniques can enhance manual content analysis, enabling the processing of entire corpora of textbooks and revealing emotional patterns that human readers may overlook. For instance, Lucy et al. (2020) applied sentiment dictionaries and word embedding to a corpus of US history textbooks used in Texas, revealing a notable underrepresentation of marginalized groups whose appearances were often associated with low energy and adverse effects. Similarly, Hernández-Pérez et al. (2024) conducted sentence-level SA using VADER on English literary texts, identifying emotional self-similarity and tracing tonal trajectories that reflect shifts in narrative affect and thematic emphasis over time. These studies demonstrate that SA can expose not only the presence or absence of a particular group or event, but also the evaluative and affective lens through which it is portrayed. Nevertheless, much of this research has focused on contemporary, English-language textbooks, leaving a significant gap in our understanding of affective framing across historical periods and national contexts (Esfahani, 2024).

The case of Asia Minor in Greek educational discourse is an example of how emotion contributes to the construction of collective memory and national identity. The Asia Minor Catastrophe of 1922, a defining trauma of modern Greek history, is usually depicted in textbooks through a narrative of Turkish aggression and Greek victimization. In their study, Repoussi and Kouseri (2024) demonstrate that high school students overwhelmingly interpreted these textbooks as assigning exclusive blame to the Turkish side, with limited recognition of Greek military actions or broader geopolitical complexities. This reductive framing not only simplifies historical causality but also reinforces a transgenerational memory of grief. Interdisciplinary research increasingly emphasizes that emotion in educational texts operates at the intersection of historical education, political memory, and national discourse (Repoussi & Kouseri, 2024). Scholars of memory studies have long emphasized that narratives of collective trauma, such as the Asia Minor Catastrophe, are preserved and transmitted through the institutions of education, media, and memory (Hirsch, 2012; Assmann, 2011).

Employing SA enables the empirical detection of the emotional valence and intensity that underlie these narratives, thereby informing and refining theoretical models of cultural trauma and *selected trauma* (Caruth, 2010). As Grever and Van Der Vlies (2017) observe, national historical narratives persist in part because they mobilize shared identities and collective loyalties. Computational tools can help reveal the extent to which such narratives are embedded at the linguistic level. However, both historians and digital humanists caution that general models of sentiment, particularly those trained on commercial or contemporary data, may misclassify rhetorical tropes, figurative language, or culturally specific idioms. These limitations underscore the need for collaborative approaches that bring together Natural Language Processing (NLP) experts and historians to develop validated, context-sensitive lexical and interpretive frameworks (Underwood, 2019).

In conclusion, SA is a methodological field for investigating the affective architecture of historical narratives in textbooks. The Greek case of Asia Minor offers an opportunity to apply these tools in a context where national identity,

historical trauma, and pedagogical discourse are closely intertwined. Drawing on memory studies, political theory, and computational linguistics, future scholarship can devise culturally and historically appropriate models that capture the affective dynamics of educational texts.

METHODOLOGY

This study employs a quantitative content analysis framework, including SA, to investigate the representation of Asia Minor in official Greek secondary school history textbooks, adopting a lexicon-based SA methodology to ensure transparency and replicability (Thomos et al., 2023; Zourna et al., 2021). The corpus comprises every Greek secondary-education history textbook featuring explicit references to Asia Minor (Bitzenis et al., 2025D). Relevant passages were manually identified and extracted to achieve balanced coverage of both the political events and the socio-cultural dimensions of the Asia Minor Catastrophe (Koutsoupias & Nosios, 2025).

In the preprocessing phase, all excerpts were converted to lowercase and tokenized in R, followed by the removal of stop-words. No further morphological processing (e.g., stemming or lemmatization) was applied, thereby preserving original word forms and reducing the risk of introducing bias. This concise pipeline ensures that subsequent sentiment evaluations are based solely on the texts' authentic lexical content. For sentiment quantification, a Greek lexicon was employed, which assigns empirically validated polarity scores to individual terms (Rokkou et al., 2022; Chantavaridou & Kapidakis, 2021). Within R, each token's valence score was retrieved from the lexicon and aggregated across each excerpt to produce a composite sentiment index. To adjust for variation in excerpt length, a normalized sentiment score was also computed by dividing this composite index by the total token count (Bitzenis & Koutsoupias, 2024A; Bitzenis & Koutsoupias, 2024B). By reporting both raw and length-adjusted indices, this dual-metric approach facilitates robust comparisons across passages of differing lengths without requiring manual label-to-value conversions (Bitzenis et al., 2025B; Bitzenis et al., 2025C).

Finally, the data were presented through graphs and summary frequency tables, where each extract is captured as a number of positive, negative, and neutral labels. The combined use of visual representations and statistical tables promotes clarity in reading the emotional patterns and ensures the transparency of the methodology (Bitzenis et al., 2025A; Bitzenis & Koutsoupias, 2023A; Bitzenis & Koutsoupias, 2023B). Considering that the analysis was based solely on a Greek lexicon, without further morphological treatments or complex algorithms, potential sources of bias are minimized, thereby preserving the validity of the results (Rokkou et al., 2022). In this way, the emotional tone of the texts on Asia Minor is accurately conveyed, while the data and the analysis code are fully reproducible (Bitzenis et al., 2023). Nevertheless, the inherent cultural and linguistic particularities of historical Greek texts present a challenge for purely lexicon-driven approaches, which may fail to capture context-dependent nuances in sentiment. This limitation underscores the potential value of domain-specific resources or hybrid methodological frameworks in subsequent research endeavors (Michailidis, 2024; Stamatis et al., 2020).

RESULTS

This section presents the quantitative and lexicographic findings of SA in the textbook texts. The data illustrate both the distribution of emotion categories and the contribution of the most frequent lexical items in shaping the narrative tone.

Table 1.
Frequency of appearance by emotion category

Category of Emotion	Frequency of Appearance
Neutral	13.700
Negative	2.299
Positive	268

The lexicographic analysis of emotion, as shown in Table 1, revealed a tripartite distribution, with 13,700 (84.2%) neutral, 2,299 (14.1%) negative, and only 268 (1.6%) positive labels. The predominance of neutrality underscores the vastly informative character of the text, which emphasizes the presentation of facts, dates, and descriptions without any obvious emotional charge. In contrast, the significant proportion of negative passages reflects the emphasis on the traumatic elements of the Asia Minor Catastrophe, reinforcing the dramatic weight of the narrative. The extremely low presence of positive fragments (1.6%) demonstrates the scarcity of references to moments of relief, solidarity, or reconstruction, which reinforces the positive connotation in very few instances.

Overall, the distribution indicates that an informative and predominantly neutral tone characterizes the textbooks, reflecting an underlying emphasis on accurate documentation and factual reporting of historical events. Instances of negative sentiment occur with notable frequency, highlighting themes such as conflict, displacement, and loss, whereas positive expressions appear more sporadically and are typically confined to brief and context-specific segments. This pattern suggests a narrative structure in which neutrality serves as the dominant register, with negative sentiment accentuating critical episodes and positive elements offering measured counterpoints (see Table 1).

Figure 1
Most frequently occurring words

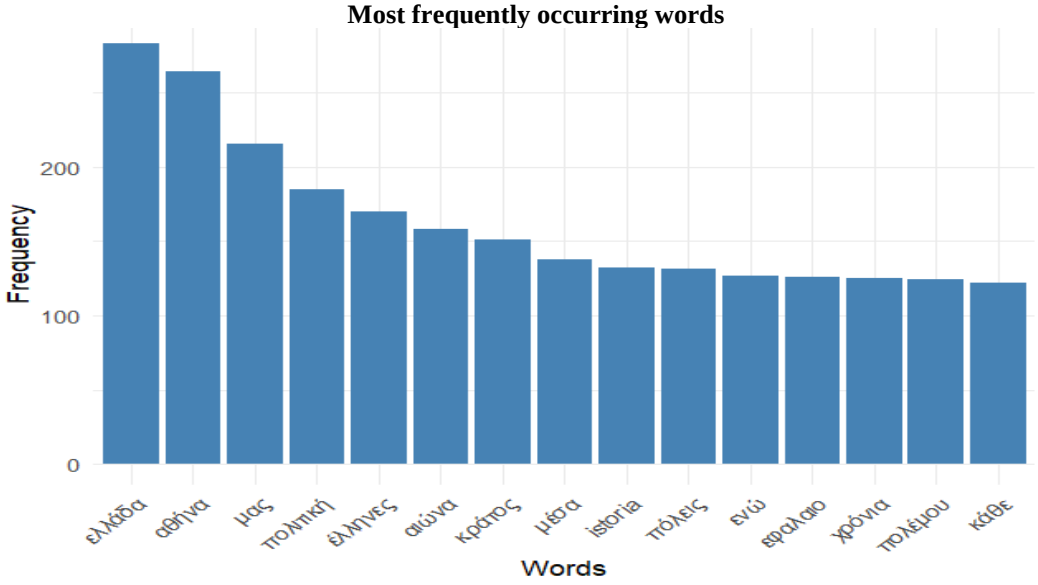


Table 2
Most frequently occurring words and their frequencies

Word	Translated word in English	Frequency of appearance
ελλάδα	greece	283
αθήνα	athens	264
μας	us	215
πολιτική	politics	185
έλληνες	greeks	170
αιώνα	century	158
κράτος	state	151
μέσα	inside	138
istoria	history	132
πόλεις	cities	131
ενώ	while	127
κεφάλαιο	capital	126
χρόνια	years	125
πολέμου	war	124
κάθε	every	122
κράτους	of the state	121
μεγάλη	big	120
εποχή	age	117
μουσείο	museum	117
ιστορία	history	116

Figure 1 and Table 2 illustrate the frequency of the twenty-five most prevalent entries in the body of the texts, revealing the thematic directions and priorities adopted by the history textbook. First, the frequent appearance of the words *ελλάδα* (283 instances) and *αθήνα* (264 cases), which mean Greece and Athens, respectively, indicates a clear emphasis on ethnic and urban references. The primacy of the term *ελλάδα* highlights the text's interest in the Greek nation-state, both as a subject and as the object of the historical narrative. At the same time, the high position of *αθήνα* reflects its symbolic and administrative importance, making it a privileged site of political power and cultural memory. Overall,

the dominance of these toponyms suggests a spatial logic in which the national and urban dimensions are closely intertwined in the context of historical interpretation.

The pervasive recurrence of the possessive pronoun *μας* (215 instances) fosters an inclusive narrative voice, inviting readers to adopt a collective *we* perspective that aligns students with the historical actors and frames events through a shared national lens. Equally salient are political themes: *πολιτική* (185) and *έλληνες* (170) interweave governance processes with the agency of the Greek people, presenting politics not as abstract theory but as lived, communal experience.

Temporal and historiographical preoccupations emerge through high-frequency terms such as *αιώνα* (158), *χρόνια* (125), and *εποχή* (117), which structure the narrative into centuries, years, and distinct epochs, thereby reinforcing a strictly chronological progression. The dual orthographic forms of history, *istoria* (132) and *ιστορία* (116), signal a reflexive engagement with historiography, underscoring the textbook's concern not only with recounting events but also with exploring the theoretical frameworks and narrative strategies underlying historical writing.

Spatial and urban dimensions are equally prominent: *πόλεις* (131), *πόλη* (112), *κράτος* (151), and *κράτους* (121) foreground cities and state structures as loci of demographic change, administrative evolution, and cultural interaction. The term *μέσα* (138) highlights the importance of media and mechanisms that shape public discourse, while connective lemmas such as *ενώ* (127), *κάθε* (122), and *κυρίως* (113) provide syntactic cohesion and underscore thematic priorities. Collectively, these lemmata reveal a carefully constructed narrative architecture, chronologically ordered, nationally centered, and pedagogically oriented to engage students as active participants within a shared historical community (see Figure 1 and Table 2).

CONCLUSIONS

The findings of the present SA study indicate that a neutral narrative tone primarily characterizes the school textbook text. This neutrality is expressed through the systematic emphasis on presenting facts, the clear organization of the historical narrative, and the use of sources, without a strong subjective or emotional charge. This choice is not accidental, as it reflects the pursuit of an objective approach to the historical material and serves the pedagogical context, which requires precision and clarity in presenting historical data to students (Grever & Van Der Vlies, 2017). This methodological neutrality ensures that the narrative remains oriented towards the transmission of knowledge, avoiding possible value judgements that could influence the perception of the facts.

However, the analysis revealed that this neutrality is not absolute and is interrupted when the text refers to traumatic historical periods or catastrophic experiences, such as the Asia Minor Catastrophe. There is a systematic reinforcement of the negative emotional tone, with the authors focusing on the trials, losses, and violent aspects of the events. This negative tone is primarily concentrated in descriptions of refugee flows, warfare, and social consequences, resulting in a narrative that assumes a gravitas and drama, particularly in chapters that address issues of catastrophe and national trauma (Brigham & Elkins, 2024). This choice appears to serve the didactic objective of highlighting the significance of the hardships faced by the Greek populations, making the passions and consequences of historical developments central to the teaching process (Åhsberg, 2024; Repoussi & Kouseri, 2024). Conversely, positive or hopeful references are minimal to brief remarks, such as moments of solidarity, collective recovery, or the prospect of reconstruction. This imbalance between the negative and positive emotional tone suggests that the manual primarily focuses on highlighting the tragic or challenging aspects of historical reality, leaving the reinforcement of optimistic narratives or constructive experiences in the background.

On a lexicographical level, the text is structured around terms that project the ethnic, political, and temporal dimensions of the narrative. The frequent use of toponyms, collective pronouns, and words related to the state, cities, and historical periods reveals a narrative that seeks to integrate the student into a collective national experience and to emphasize the interdependence of history with the evolution of national identity and political institutions (De Cillia et al., 1999). In addition, the chronological organization of the chapters and the emphasis on theoretical frameworks underline the commitment to a systematic and scholarly presentation of the material (Von Münchow, 2020).

In summary, the textbook maintains a predominantly neutral linguistic and narrative approach, which, however, is interrupted by a strong negative tone in sections dealing with traumatic historical events. The limited space for a positive or hopeful tone reflects the authors' choice to present mainly trials and tribulations as central elements of the historical narrative, thus reinforcing the textbook's character as a means of transmitting national memory and collective experience by highlighting the difficulties of the historical journey.

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DEVELOPING ORIGINAL TEACHING MATERIAL FOR GERMAN AS A FOREIGN LANGUAGE USING ARTIFICIAL INTELLIGENCE SOFTWARE AND DIGITAL TOOLS

Dr. Rizopoulou Aikaterini
Substitute Teacher of German as a Foreign Language
50th Middle School of Athens
Athens, Greece
e-mail: krizopoulou@gmail.com

ABSTRACT

School textbooks for teaching and learning the German language as a foreign language in Greek public secondary schools are devoid of any accompanying audio material. This presents a particular challenge for German as a foreign language (GFL) teachers and pupils, especially in the first grade of middle school, where the language proficiency level is defined as A1- (Pre-A1), that is below the first basic language level as described in the Common European Framework of Reference for Languages (CEFR).

Although in recent years some efforts have been made by the Institute of Educational Policy (IEP) or by individual educators to create some GFL audio materials and this material is digitally available on the *Photodentro* platform of the National Repository of Educational Material, the number of audios specifically for the Pre-A1 language level remains extremely limited. In many cases, the available material either significantly exceeds the target language level or does not align with the topics covered in the school textbook.

Finding or adapting GFL listening materials and creating suitable listening activities to develop pupils' listening comprehension skills proves to be a challenging task for GFL-teachers. This paper examines whether recent advancements in Artificial Intelligence, particularly the development of Text-To-Speech and Voice-Transformation software, can help bridge this gap in teaching and learning German as a foreign language in Greek public middle schools.

Research over the past decade has shown that various Text-To-Speech software tools can support second language vocabulary learning, while also improving learners' reading skills by functioning as 'out loud readers' of individual words, phrases, or even entire texts. Additionally, empirical evidence suggests that beginner-level foreign language learners, particularly in English classes, seem to remain unaffected by the potentially unnatural prosody of audio files generated by such software.

However, the question arises as to whether Artificial Intelligence can advance foreign language listening skills beyond the phonetic reproduction of isolated written words or sentences. Specifically, this paper focuses on the question, whether such software (in this case, Murf.AI) can be used to generate GFL audio material that sounds as 'natural' as possible and exhibits human-like characteristics. Furthermore, it explores how the final audios can be made available for use — either as audio files in an online classroom (e-Class), or as audio files accompanying a video created with holistic digital and print media creation platforms (such as Canva), or, further, as audio files integrated into a gamification platform (such as Genial.ly).

As a general conclusion, it can be said that current developments in Artificial Intelligence enable the autonomous creation of fairly realistic and adaptable audio material, tailored to the linguistic and learning profile of each classroom, to support and enhance the development of listening skills in foreign language teaching and learning.

Keywords: German as a foreign language, secondary education, listening comprehension, oral comprehension, text-to-speech, foreign languages, artificial intelligence, software.

THE SIGNIFICANCE OF LISTENING COMPREHENSION IN THE CONTEXT OF SECOND LANGUAGE ACQUISITION

In communicative and learner-centered second language (L2) teaching and learning, significant importance is attributed to the ontogenetically primary skills of listening and speaking (see the detailed descriptors for reception and production activities and strategies in the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2020). Research on the field of first language acquisition has already shown the importance of listening comprehension in everyday communication. As reported by Hedge (2000: 228): "of the time an individual is engaged in communication, approximately 9 per cent is devoted to writing, 16 per cent to reading, 30 per cent to speaking, and 45 per cent to listening" (see also Aguado, 2021: 253; Solmecke, 2010: 969). As far as second language learning is concerned, it is imperative to acknowledge the main role of listening in the development of oral proficiency, and particularly in cultivating an L2 intelligible pronunciation and prosody. It goes without saying, that the production of phonetically and phonologically accurate utterances in a second language is contingent on prior receptive perception of these utterances in L2-speech (Aguado, 2021: 264; Morf, 2022: 66).

The British psycholinguist and L2 listening comprehension didactician John Field (2019: 302) posits: "speech encounters leave long-term memory traces in a listener's mind. The ability to trace phoneme values and word forms in connected speech is linked to the ability to recognize familiar voices, and results from the listener constantly finding analogies between new input and what was heard previously." And he also states that the acquisition of "word frequencies and formulaic chunks" can also be explained in a similar way (ibid.). So, according to Field "[t]he auditory acquisition of phoneme values [and also of word frequencies and formulaic speech, A.R.] seem to depend not upon repetition exercises but upon exposure over time to multiple variants of phonemes and words spoken in **a range of different voices**." (Field, 2019: 302, emphasis added). Consequently, it can be concluded, that listening comprehension in a second language plays a central role in the development of a good L2 pronunciation as well as in the acquisition of L2 vocabulary and syntax.

LISTENING COMPREHENSION IN THE GREEK GERMAN-AS-A-FOREIGN-LANGUAGE (GFL) TEXTBOOKS

The government-issued series of textbooks, which has been used for over two decades for teaching and learning German as a foreign language in public middle and high schools (secondary education), is devoid of any accompanying audio material. Although the individual textbooks – one for each grade – do contain listening comprehension tasks and exercises, which suggests that the teaching textbook series was designed to include listening activities, there are however no audio files for which these activities were originally intended.

Some – numerically very limited – audios for GFL-teaching can be found on the National Repository of Educational Material *Photodentro* (https://photodentro.edu.gr). These audio files are freely accessible and can be downloaded at no cost. In accordance with the teaching guidelines for foreign languages of the Greek Ministry of Education, the utilisation of these files in the GFL-classroom is recommended. However, the majority of this material is either thematically loosely connected to the respective units of the textbooks or linguistically too demanding for the target pupils.

In particular, for the very low Pre-A1 language learning level – the focus of this paper – which, according to the teaching guidelines for GFL-language instruction, should be achieved in the first grade of middle school, I was able to find only five audio recordings that can be linked to the topics covered in the textbook units. These audios are titled 'My Family', 'Professions' (Parts 1 and 2), 'In the school newspaper', 'This is me' and 'Music'. Irrespective of the listening activities in which the individual audio files can be employed in class (see CEFR, 2020: 50-54), the following section briefly discusses their thematic relevance to the textbook units as well as their linguistic difficulty.

THE THEMATIC RELEVANCE OF GFL-AUDIOS AVAILABLE ON *PHOTODENTRO* TO THE UNITS OF THE GFL-TEXTBOOK IN THE FIRST GRADE OF MIDDLE SCHOOL

Of the five available audio files, only two are closely linked to thematic aspects of the textbook units (namely 'Professions' Parts 1 and 2, and 'Music'). The remaining audios were created according to the principle 'one audio for all textbook chapters', as they contain text passages that are thematically aligned with different textbook units. Consequently, it is up to the GFL-teachers to edit the audio files themselves and divide them into multiple sub-files relevant to the topics of each unit, should they wish to use them in the classroom.

THE LINGUISTIC DIFFICULTY OF THE GFL-AUDIOS AVAILABLE ON *PHOTODENTRO*

If one were to place the audio files available on *Photodentro* on a continuum ranging from a) pattern-drill-shaped and strongly computerized, over b) scripted and performed by (near-)native speakers to c) improvised (?) and performed by native speakers, then the audio files 'My family' and 'Professions' (Part 1) are strongly computerized. In all likelihood, they were created using an older generation text-to-speech synthesiser. The language employed in both of these files is straightforward and should theoretically be familiar to learners when engaging with the corresponding textbook units. However, both texts demonstrate a pronounced pattern-drill form, employing the same syntactic structure throughout the listening texts (e.g. "This is my father. He is a computer scientist. This is my mother. She is a medical practitioner", and so forth for the audio 'My family'. Or: "This is Luis. Luis is a reporter. This is Max. Max is a footballer.", etc. for the audio file 'Professions', Part 1). It may also be worth pointing out, that the name *Max* appears in three of the total eight items of the audio text 'Professions' (Part 1), making the creation of at least one mismatching task impossible. Furthermore, it could also be noted, that the audio entitled 'Professions' (Part 1) exclusively features male job titles, despite the fact that the textbook is also incorporating female forms of job titles.

The audio 'In the school newspaper' is a didactically constructed (scripted) interview with a (near-) native young female pupil. With the exception of the fact that the interview is presented at a relatively high speaking speed for the Pre-A1 language level (see CEFR, 2020: 48), the language in this audio is also simple and already familiar to the learners. Furthermore, it does not exhibit any characteristics of natural (authentic) speech, which could raise its difficulty.

In the audio file 'Professions' (Part 2), a middle-aged female native German speaker, who – according to the script – is a school teacher by profession, introduces herself in a monologue. She briefly talks about her place of residence and her family and mentions the school subjects she teaches. The short scripted monologue is spoken at a slow pace and, apart from two unfilled pauses for thought, has no other features of authentic speech, whereas only two new words, not yet introduced in the schoolbook, appear in the text. However, in the pre-listening phase, the teacher has to introduce some information to the pupils about the neighborhood of *Berlin Rudow* and the school subject of *ethics*, which appear in the audio text, in order to support learners' understanding of the text content.

In the audio file 'Das bin ich', a female teenager, native speaker of German, introduces herself. Although being delivered in a slow pace, the scripted monologue exceeds the language learning level to be achieved, as many L2 forms, that have not yet been introduced in the school textbook, appear in the text (such as adjectives in the comparative, modal verb *möchte* + infinitive, several phrases like *ich bin geboren*, *in der Zukunft*, *in einer kleinen Stadt*, *an der Ostsee*). There is also a need for explanation with regard to regional information (the city of *Wismar* in the federal state of *Mecklenburg-Vorpommern* on the Baltic Sea). Furthermore, the audio is characterised by many features of authentic speech, such as filled and unfilled pauses, delays and hesitations, assimilations, elisions and sound variations (Aguado, 2021: 255, 256).

In my opinion, the most 'authentic' sounding audio file is the one entitled 'Music'. This is another monologic text in which an adult musician talks about his music preferences, his band and the musical instruments he can play, among other things. The speech rate differs greatly within the audio (sometimes the 'musician' speaks faster, sometimes slower) and the audio recording contains in several places pauses, assimilations, elisions and modal particles, which make it difficult to understand at the Pre-A1 language level. The biggest problem, however, seems to be the language of the monologue, because there are far too many difficult L2 forms in the text that do not correspond to the CEFR's Can-Do descriptors at the Pre-A1 level (such as the superlative, temporal subordinate clauses with *if*, the progressive with *am*, the temporal preposition *bei* + dative, adverbs of frequency). Technical editing to cut out the linguistic challending parts is recommended, if GFL-teachers want to use this audio in class.

To summarise, it can be said that the audio files available on *Photodentro* for the Pre-A1 language level are firstly far too few and secondly not always well calibrated thematically and/or linguistically, which means that GFL-teachers have to carry out the technical text editing themselves, if they wish to use these audios in class. This raises the question of what other alternatives are available to GFL-teachers to promote listening comprehension in their GFL-classes on this early language level.

In my mind, GFL-teachers in Greek public middle schools are left with the following options: They can either omit listening activities all together, or they can use listening material from GFL-textbooks that are available commercially (see also Morf, 2022, who reports similar findings). The use of already existing listening materials from GFL-textbooks available on the market has the advantage that the audios meet the linguistic requirements of the Pre-A1 language level, but at the same time the linguistic progression of many of these audios does not always match that of the

school textbook. From personal experience, I can also say that it is usually difficult for pupils to follow the plot in many of these audios due to the changing protagonists in the various commercially available textbooks.

Another possible alternative would be to use authentic audio (or audio-visual) material, like TikTok-Videos, Youtube-Videos, German songs, advertisements, scenes from soap operas, etc.. The authentic material of this kind has the advantage of being more interesting for the pupils, but at the same time it is linguistically too demanding for the lower language levels and therefore not easy to understand, since it is created for native (or at least very competent) language users.

Therefore, I decided to use AI and, more precisely, Text-To-Speech technology to create suitable listening comprehension audios for my classes at the Pre-A1 language level. In the following, I will first explain what Text-To-Speech (TTS) technology is and then summarise the most important empirical findings of second language acquisition research on the use of this technology in – mainly – English as a foreign language classes.

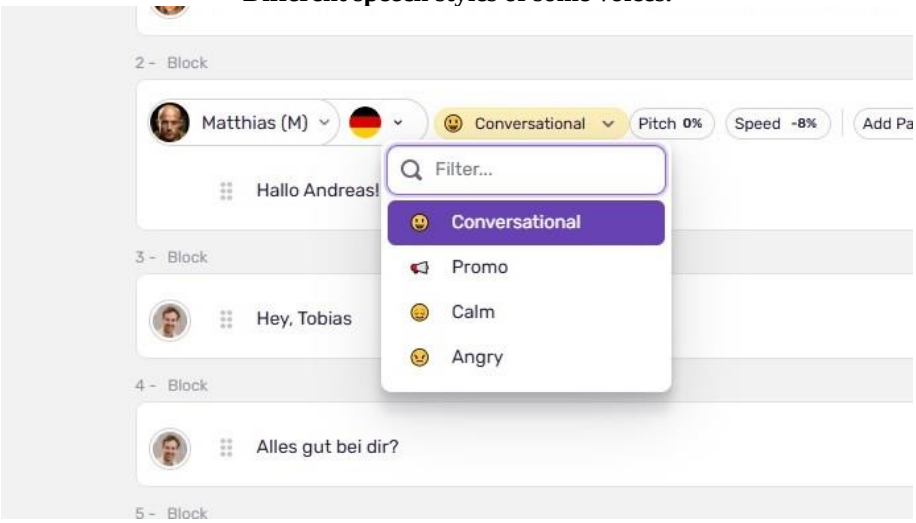
TEXT-TO-SPEECH (TTS)

TTS technology "is a type of assistive technology that reads a digital text aloud" (Al-Jarf, 2022: 19). According to Moon (2012: 121), TTS technology "was originally developed to help visually impaired people read text on the computers". The first TTS synthesizers provided low quality speech output with a highly computerised voice, but this has changed over the years with advances in technology. Nowadays, there is a plethora of free or paid TTS software programmes (apps and platforms) available.

Empirical studies on the use of TTS software in English as a foreign language classes have shown that L2 learners who read a text and have it simultaneously read to them by a TTS programme, can learn the correct morpheme-grapheme associations of L2 words more effectively. This has an impact on both their writing and reading skills (i.e., fewer spelling errors, correct L2 pronunciation, developed reading fluency, accuracy, rate and prosody) and on their L2 vocabulary knowledge (see for example Al-Jarf, 2022; Amin, 2022; Rodrigues-Bonces, 2019). Empirical evidence also suggests that the sometimes unnatural prosody of audios generated by TTS software (e.g., lacking emotions or native rhythm in phrasal stress, intonation and pauses) does not seem to affect learners' understanding of the audios, especially for beginner-level foreign language learners of English (Cardoso et al., 2015; Mulyono and Vebriyanti, 2016; Rodrigues-Bonces, 2019; but see also Bione et al., 2016).

After a short internet research, I decided for the following reasons to use the paid platform Murf.AI (https://murf.ai) in its Standard pricing plan: Firstly, it is one of the few TTS platforms that has many female and male German-speaking voices. Secondly, the style of speech of some voices can be altered (see Image 1).

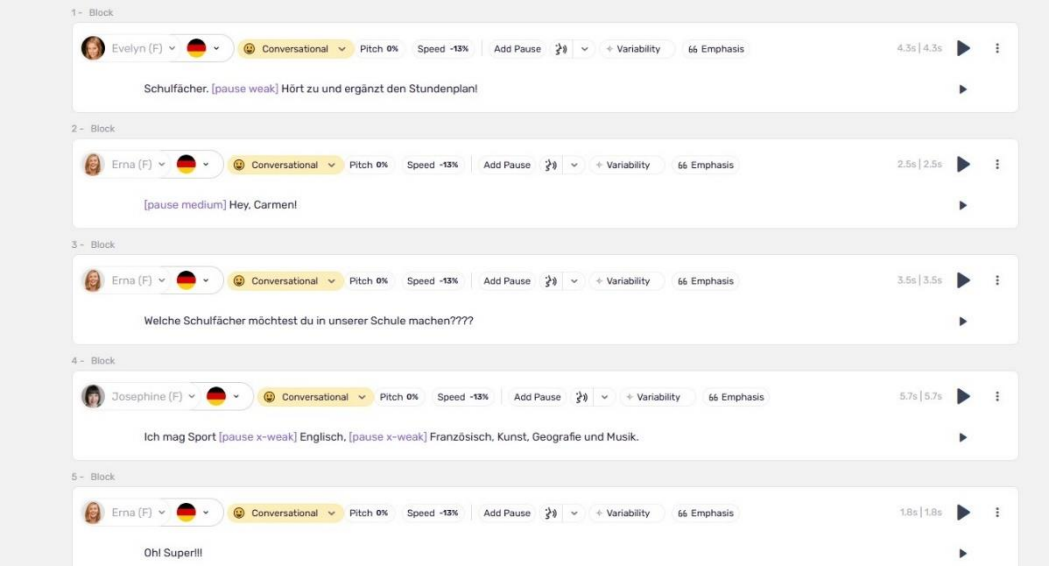
Image 1
Different speech styles of some voices.



Thirdly, Murf.AI is characterised by a very user-friendly studio-editor (see Image 2), that enables the creation of multi-actant audios by inserting a separate track for each 'speaker' or voice. Fourthly, the studio-editor also allows the

segmentation of utterances or units of meaning. Fifthly, pauses of different length can be inserted into and between utterances, while the speed of speech can also be adjusted.

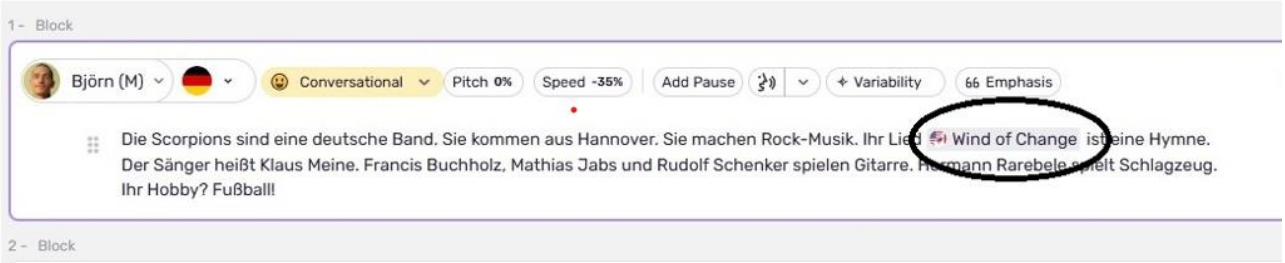
Image 2
The studio-editor of Murf.AI



Sixthly, the platform allows code-switching by adapting the pronunciation of selected words or utterances to the phonetic-phonological conventions of other languages apart from German (Image 3).

Lastly, the audio files created with Murf.AI can be downloaded in MP3 or WAV format and so they can easily be used in the foreign language classroom.

Image 3
Code-Switching on Murf.AI studio-editor



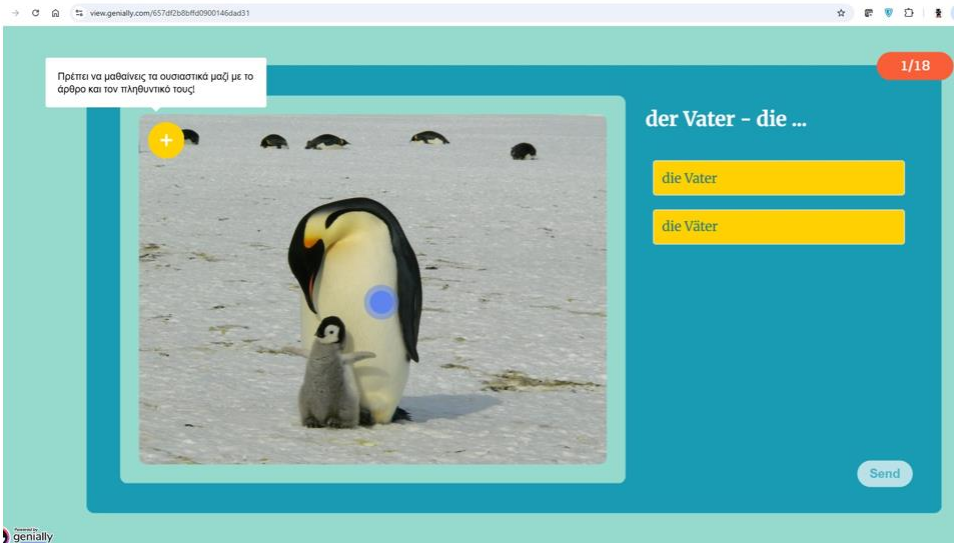
Using this TTS platform, I was able to create audio files for typical L2 listening comprehension activities (what Field 2019 calls the *Comprehension Approach*) as well as numerous audios that were used to develop smaller listening exercises. Some examples of the creation of such audio files at the Pre-A1 language level and of their use in GFL teaching and learning are presented in more detail below.

CREATING GFL-LISTENING COMPREHENSION MATERIAL FOR THE PRE-A1 LANGUAGE LEVEL

Research in L2 listening comprehension has shown that foreign language listeners do not always succeed in recognising an L2 word, that they already know in its written form, as a sound form in a stream of speech. Grotjahn (2005: 122) calls this "insufficiently developed listening vocabulary" [translation from German, A.R.]. To deal with this, audio files of individual L2 words were created to familiarise GFL-pupils with the phonetic form of newly introduced L2 vocabulary. This is what Cauldwell (2018: 18) metaphorically refers to as the "Greenhouse speech style": "It is the form given in the pronunciation key of a dictionary. The word is preceded and followed by a pause and every segment and syllable is carefully articulated".

These ‘greenhouse’ audio files were used in two ways: Firstly, they were uploaded to the e-Class (https://eclass.sch.gr) and thus made available to the pupils for autonomous learning and consolidation of the newly introduced L2 vocabulary at home. Secondly, they were integrated into interactive exercises on the gamification platform Genial.ly (https://genially.com), so that the pupils could get better familiarized with the phonetic *and* written form of the new L2 vocabulary while solving those interactive exercises (Image 4).

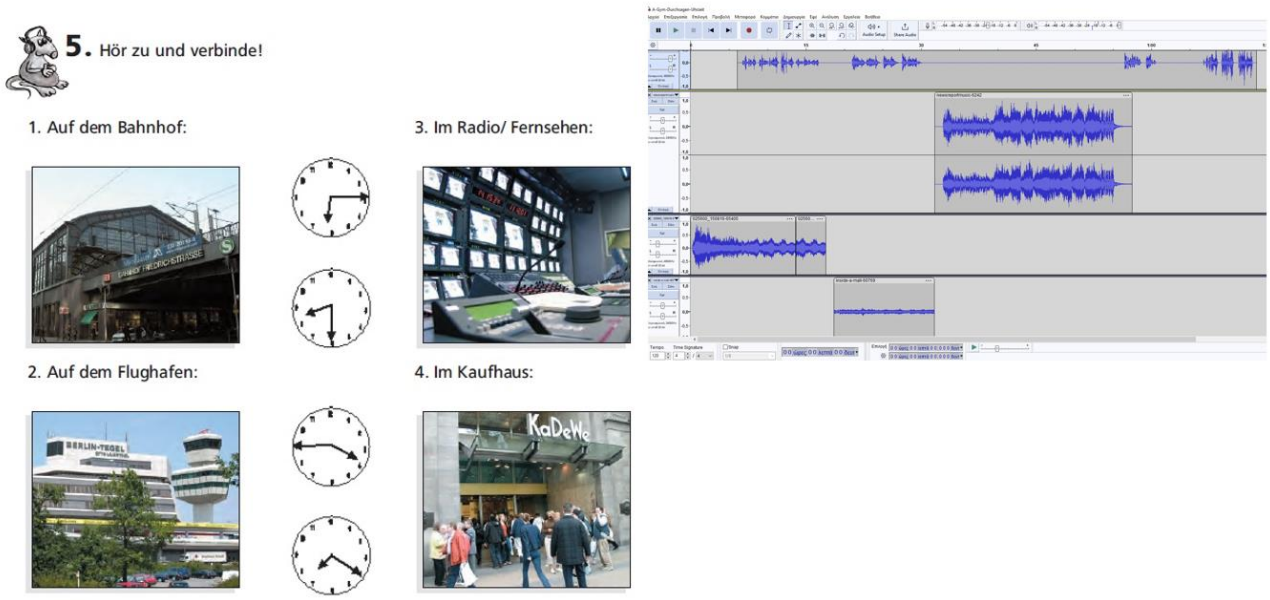
Image 4.
Example of interactive exercise on Genial.ly with integrated audios.



Furthermore, I used the TTS platform as a reading device for longer monologues or dialogues of the textbook. The audio files created in this way were used both in the classroom and also uploaded to the Genial.ly platform, which was then used to create true-false listening activities based on the content of the texts.

With Murf.AI, I was also able to create audios for many of the listening comprehension tasks in the school textbook. To make the communication situations in which the listening tasks were embedded sound even more natural, I enriched the audios with natural (and license-free) sounds from the Pixabay digital library (https://pixabay.com). And in order to cut and edit the audio files, I used the freeware programme Audacity (https://audacityteam.org) (Image 5).

Image 5.
Creating audios for listening comprehension tasks in the textbook.



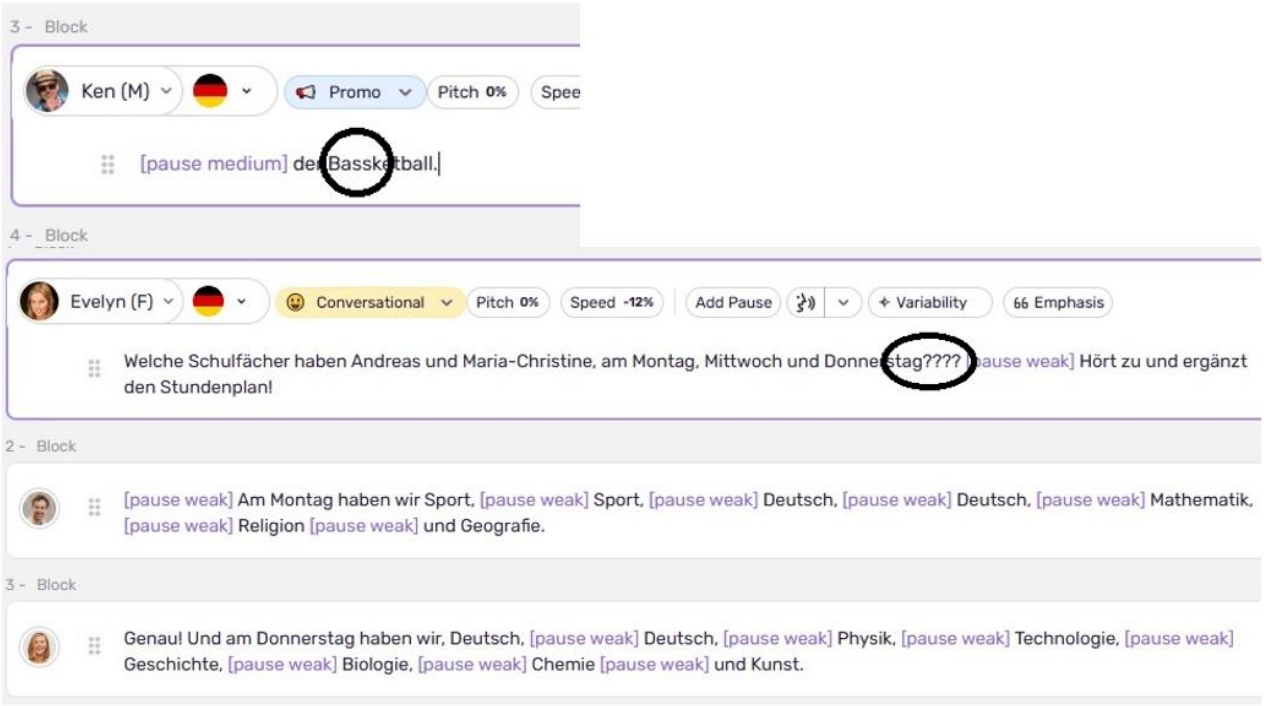
Because many of the listening texts in the school textbook (which only appear as transcripts in the school book), were considered linguistically too demanding for the intended learner audience, I rewrote (re-scripted) the listening comprehension texts, created audios of them by using Murf.AI and developed new listening comprehension tasks. The new work sheets were created using the graphic design platform Canva (https://www.canva.com).

Last but not least, I also created short videos for some of the listening texts using Canva by integrating the created audio files into videos. It is important to note that these videos only contain still images of the protagonists and a few keywords relating to the respective topic of the audio files (see Image 6), since studies have empirically shown that L2 comprehension of audio recordings with still pictures or of audio recordings alone is much better than that of videos (Field, 2019: 299).

Image 6.
Video with integrated audio using Canva.



Image 7.
Efforts to improve the speech output.



CONCLUSION

The first and most important conclusion that can be drawn from using the TTS platform Murf.AI to create audio material for my Pre-A1 classes in Greek middle schools, is that it has helped me address the lack of listening

comprehension material in the government-issued textbook. This made, thus, the inclusion of listening comprehension activities related to the textbook possible.

I also noticed that my pupils' motivation was boosted, because the audio files created were tailored to their linguistic needs and abilities. To this contributed the clear and comprehensible standard pronunciation and prosody of the German-language voices of Murf.AI, as did the simplified language of the listening texts, which was adapted to the requirements of the CEFR (see also the didactic-methodological principle of Success Orientation of L2 Tasks and Exercises explained in Funk et al., 2014: 18).

It is undisputed that the selected TTS platform has some of the typical shortcomings of any TTS technology, that are well documented in the relevant literature (see, for example, Bione et al., 2016; Cardoso et al., 2015; Sha, 2010). However developed such new-generation TTS software may be, the suprasegmental language level (e.g. sentence intonation, native rhythm in phrasal stress and pauses, lack of emotions) has suffered in many cases, despite my efforts to compensate for it with the use of additional punctuation marks, extra pauses, or even changes of the spelling of individual words, in order to improve the speech output (Image 7).

Nevertheless, I remain confident, that with the further development of AI, TTS technology will also improve, making it a valuable tool in the hands of L2 teachers.

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ADOLESCENTS' PERSPECTIVES ON ELECTRONIC GAMES

Elpida Christoforidou
PhD of the Department of Fine Arts and Sciences of Arts, University of Ioannina
Larissa, Greece
e-mail: mauve2310@yahoo.gr

ABSTRACT

"There are some games that teach you how to become a better person." This was the statement of a thirteen-year-old participant in of a study conducted between 2021 and 2022, which aimed to research the cultural and socio-political dimensions of engagement with electronic games within adolescent culture. One of the research objectives was to explore adolescents' views on the value of electronic games, while another question that arose was whether and to what extent electronic games shape models of action and thinking in young people.

The research, which involved adolescents aged 12-17 from the Municipality of Thessaly, was divided into two parts. In the first stage, 485 questionnaires were collected from secondary schools in the region of Thessaly, which were analyzed using SPSS. In the second stage, 42 semi-structured interviews were conducted, for which thematic analysis was carried out.

According to the results of the research, electronic games represent a modern form of entertainment for children, a space for socializing with friends, an anxiety-relieving setting, a place for learning and raising awareness about various socio-political issues, and a means of self-improvement. Additionally, for some teenagers, electronic games were evaluated as artistic creations of equal value to a film, a music piece, or even a painting. In their view, a videogame has value for various reasons, such as its aesthetic properties (graphics, story, music), the intensive work involved in its creation, its ability to fulfill various needs (entertainment, relaxation, learning, challenges, creativity, social interaction, etc.), its connection to reality, and its mentoring, such as giving lessons of survival. The element of 'survival' fascinates adolescents, and one reason for this attraction lies in the opportunity to create a society from scratch.

McGonigal (2010), a video game designer, argues that electronic games are an inventive platform for changing the world and that within the game, children become the best version of themselves, developing a social network, building confidence, and engaging in meaningful activities that bring them pleasure. Indeed, these thoughts are reinforced by the results of the present research. The world of videogames forms a second parallel world, where adolescents, as members of a group, solve problems, create and/or try to improve things and situations – something that gives meaning to their actions – and have, consciously or not, various gaming socio-political experiences that encourage them to change things for the better.

Keywords: electronic games, adolescents, value, representations.

INTRODUCTION

In recent years, education has increasingly embraced interactive and experiential methodologies. One prominent tool employed across various fields of knowledge is the electronic game, designed to engage students, foster emotional involvement, and promote active participation in the learning process (Anskima and Vakimento, 2015). Game designer Jane McGonigal (2010) contends that electronic games represent an innovative platform with the potential to bring about transformative change. Within this parallel world, McGonigal notes, young people build social networks, develop self-confidence, engage in meaningful and enjoyable activities, and strive to become the best version of themselves. She argues that appropriately designed games cultivate individuals who believe in their capacity to effect change—at the very least, within digital environments.

These arguments are supported by findings from a research study conducted between 2021 and 2023, as part of my doctoral dissertation at the Department of Fine Arts and Art Sciences at the University of Ioannina, under the supervision of Professor Christos Dermentzopoulos. The title of the dissertation was: *Adolescent Culture, Electronic Games, and Socio-Political Education*.

RESEARCH METHODOLOGY

The primary of this research was to study popular culture within the context of adolescent culture, focusing specifically on the cultural and socio-political dimensions of engagement with electronic games[1], as articulated by adolescents in the Municipality of Thessaly. The participants were adolescents aged 12 to 17 living in the Thessaly region.

One of the central research aims was to explore adolescents' perceptions of the value of electronic games. A key question that emerged was whether, and to what extent, video games contribute to shaping adolescents' models of thought and behavior.

A mixed-methods explanatory research design was employed, comprising two phases. In the first phase, data were collected through a questionnaire, which demonstrated high reliability, with most Cronbach's alpha values ranging from 0.7 to 0.9—indicating that the instrument effectively captured a broad spectrum of perspectives (Skordoulis, 2020; Taber, 2018). The sample was selected via cluster sampling. Initially, 12 secondary schools in the Thessaly region were randomly selected (subject to their consent), followed by random selection of classes within these schools. A total of 485 valid questionnaires were collected, enhancing the study's validity and minimizing sampling error (Creswell, 2011). The data were analyzed using SPSS statistical software.

The second phase consisted of 42 semi-structured interviews conducted with adolescent gamers to investigate specific themes in greater depth. This included 29 individual interviews and two focus group discussions involving 6 and 7 participants, respectively. Participants were selected using purposive sampling based on key criteria: age (12–17 years), gender (ensuring balanced representation), geographical distribution (with participants drawn from various areas within the Larissa Prefecture), and social background (to ensure diversity). The interview data were analyzed using thematic analysis to derive meaningful insights.

ADOLESCENTS' REPRESENANTIONS OF ELECTRONIC GAMES

Regarding the demographic profile of the participants in the first phase of the study, the sample consisted of 233 girls and 252 boys. Approximately half of the participants (49.5%) were enrolled in general public schools, while 26% attended experimental public schools. Additionally, 13% were students at vocational technical high schools, and 11.3% attended private schools. A majority of the participants (63.1%) resided in urban areas, while 36.9% came from rural regions. The sample also included 228 lower secondary school (gymnasium) students and 252 upper secondary school (lyceum) students (see Figure 1).

The majority of the adolescents identified as electronic game players – 418 out of 485 participants. Among them, 36.9% were girls (179 out of 418) and 49.3% were boys (239 out of 418) (see Figure 2).

[1] The terms *'electronic game'* and *'videogame'* have been deliberately chosen to be used interchangeably and as synonymous, referring to any type of interactive entertainment software (on computer, console, mobile device, or the internet.

Figure 1
Profile of the participants

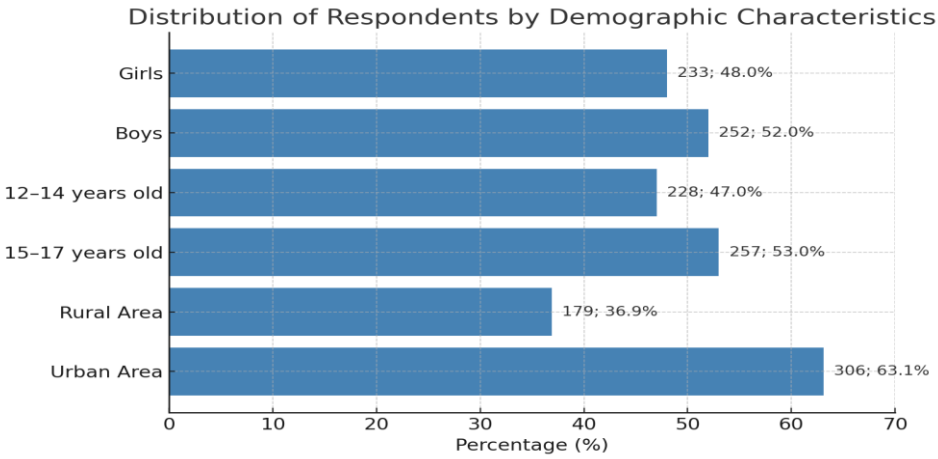
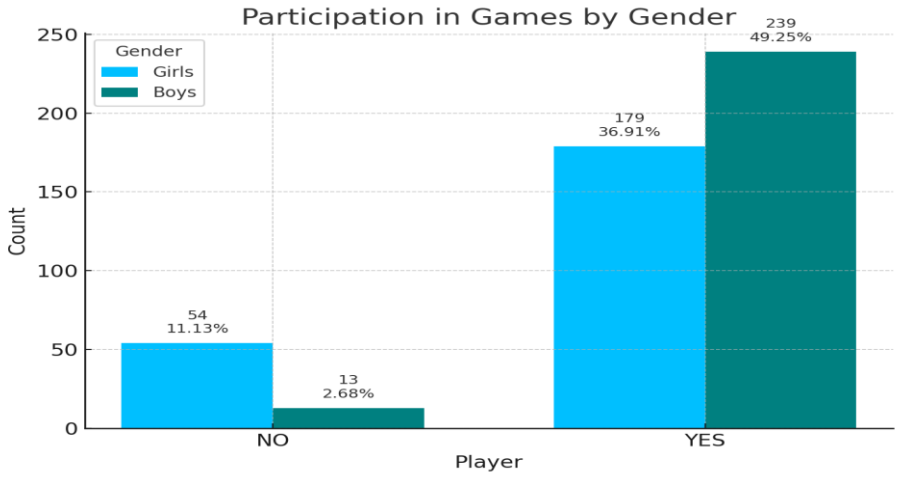


Figure 2
Numbers of players by gender



As evidenced by the findings of this study, electronic games function as a form of "third place" – a concept originally introduced by Oldenburg (1989, p. 16) to describe informal, pleasurable spaces characterized by playfulness and equality among participants. Adolescents perceive videogames as such a space: a source of enjoyment and social interaction with friends, an opportunity for relaxation and escape from the stressors of daily life, a means of self-improvement – as one 13-year-old participant stated, “There are some games that teach you how to become a better person” –, and a platform for learning and raising awareness about various sociopolitical issues. Even through violent video games such as *Grand Theft Auto*, adolescents reported gaining knowledge or developing critical reflections on issues such as social inequality and racism.

Building on this perspective, adolescents are captivated by a range of features within videogames, including graphics and visual effects, characters, music, stories, challenges, expansive worlds to explore, and opportunities for social interaction. They also value the potential of games to inform them about sociopolitical issues, as well as their intertextual connections with films, television series, or/and comics. A particularly appreciated element is the ability to intervene in the plot development, with videogames often serving as immersive experiences in which players feel empowered to shape the progression of events.

In line with these preferences, adolescents’ perceptions of a videogame’s value were often associated with its aesthetic and narrative qualities, including impressive graphics, emotionally evocative music, dynamic and non-static characters, and a compelling, often multi-layered narrative, particularly when conveying meaningful messages, as

exemplified by titles like *The Last of Us.* In addition, a videogame's value was linked to its popularity, encompassing factors such as positive critical reception, a large player base, sustained relevance, and potential for transmedia storytelling. Some adolescents also referenced economic factors: the game's price (with the assumption that a higher cost may indicate higher quality), the potential for financial gain through competitive gaming, the intensive labor involved in game development, and its connections to other art forms or literary works (for instance, those inspired by *The Odyssey*).

Electronic games were also evaluated based on the needs they fulfill, a correlation which aligns with the *Uses and Gratifications Theory*. This approach, which began gaining traction in the 1960s, conceptualizes how individuals use media, viewing users as active agents who select, control, reject, and often resist media content (Maletzke, 1991). Central to this approach is the idea that audiences selectively expose themselves to media and content that satisfy specific psychological and social needs within the context of their lived experiences (Serafetinidou, 1999). Adolescents identified a range of needs met through videogames, including stress relief, relaxation, emotional safety, entertainment, social interaction, the pursuit of achievement, self-validation, creative expression, and opportunities for learning. In this context, learning was not limited to formal knowledge acquisition but extended across multiple domains, encompassing the development of critical thinking, problem-solving abilities, and creativity. These elements collectively contribute to adolescents' sense of self-worth and personal growth (Winnicott, 2019). For instance, in *Cities: Skylines*, players are tasked with developing a city according to their own standards and imagination, while taking into account the needs of citizens, environmental factors, and other indicators, all of which the player must consult (Georgiadis, 2015).

Additionally, the value of videogames was also tied to their realistic or historically grounded content. *Assassin's Creed Valhalla*, for example, immerses the player in the year 873 AD, delving into the history of the Vikings and their violent expansion into England (Moshonas, 2020). Similarly, *Life is Strange* features two female protagonists and addresses socially relevant issues such as gender-based violence and homosexuality.

A particularly compelling theme that emerged was *survival*, which resonated strongly with adolescents and fostered a sense of empowerment and self-confidence. This theme manifested in two primary forms: *collective survival*, which emphasized cooperation, and *individual survival*, where players independently faced uncertainty and complexity. In *Frostpunk*, for example, players lead a community in post-apocalyptic 1886 North America, confronting harsh climatic conditions and making ethically significant decisions (Moshonas, 2018).

Electronic games reflect societal values, concerns, and anxieties, with the survival element acting as a cultural byproduct of contemporary existential challenges. Within the fantasy of survival, players are often confronted with various representations of death (such as pandemics that transform people into zombies) and are compelled to endure. In this context, survival becomes a symbolic value, functioning as a springboard for envisioning improved living conditions, restoring purpose, and resisting the despair that can overwhelm the human condition (Konstantopoulou, 2020).

This issue was examined in greater detail during the second phase of the research through qualitative interviews, which led to the emergence of four thematic categories explaining the appeal of survival elements to adolescents. The first category concerns *emotional intensity and adrenaline*. While playing, adolescents remain in a constant state of alertness. As one participant noted:

"The *Ghost of Tsushima* is exciting because it has Viking graphics, and, you know, you crawl through grass, hide, fight… you get passionate, get addicted, and say, 'I need to win, I need to finish this game!' And when a game has a good story, you want to continue to see what happens in the end. Otherwise, you get frustrated!" (Aphrodite, 15 years old).

The second category involves *experimentation*. Adolescents test themselves in various situations, think of solutions, and explore what they can do on their own:

"The fear of losing makes you want to play and worry, thinking about the best ways to succeed and survive", (Achilles, 16 years old).

The third category relates to the *life lessons* drawn from the fantastical scenarios presented in videogames. These experiences function as hypothetical simulations in which players consider "what if?" scenarios. Successfully overcoming adversity in virtual worlds beyond the bounds of civilization allows adolescents to believe they are better equipped to face problems in the real world:

"From survival games like *Minecraft*, which is my favorite game, I went with my cousins and brothers to a mountain in my village, and I believe I could survive alone there because of what I learned from the survival games" (Christos, 13 years old).

The fourth category focuses on the *creation of a new society*. These videogames are often set in dystopian environments that require players to rebuild, collaborate, and innovate. A prominent example is *Minecraft Survival*, an open-world game that encourages creative problem-solving and community building. The ultimate goal is to defeat the Ender Dragon, the dominant force in the virtual world known as "The End." In doing so, players lay the foundation for a new, safe society:

"I believe the real goal in *Minecraft*, apart from freeing this town I mentioned, is to create your own society in a way. That is, to build an entire world" (Stefanos, 13 years old).

The research also revealed that adolescents often experience various socio-political situations during gameplay, such as decision-making, organizing/managing teams, collaborating, exploring social issues, guiding other players, obtaining information about a social problem, and reflecting on ethical matters. Moreover, one of the key findings was a statistically significant relationship between adolescents' engagement with socio-political elements in gameplay and the manifestation of corresponding attitudes and behaviors in real life. These results suggest that gameplay experiences of a socio-political nature may contribute to real-world civic awareness and participation. As Dewey (2016) argues, repeated educational experiences lead to learning, which in turn fosters the development of responsible and engaged global citizens.

CONCLUSION

Electronic games represent one of the most popular – yet simultaneously controversial – forms of entertainment for children and adolescents today. Traditionally associated with negative stereotypes such as social isolation and the promotion of violence, videogames have, in recent years, been reevaluated for their potential to foster education, social development, and emotional intelligence in young people.

Adolescents who engage with videogames often inhabit a *liminal space* between reality and fantasy (Winnicott, 2019), where they experiment with identities, confront personal and societal concerns, and engage critically with real-world issues. Within this "artificial paradise" – a term coined by McLuhan (1990) to describe the immersive and transformative potential of game – players encounter complex socio-political themes that contribute to their emotional and cognitive maturation. This space allows adolescents to imagine alternative futures, challenge dominate narratives, and explore new worlds, both *imagined* (those constructed by game designers or co-created through player interaction) and *imaginary* (which exist solely within the individual's imagination and remain unrealized within the game environment) (Godelier, 2020).

Videogames that incorporate moral dilemmas and high-stakes scenarios, such as *The Last of Us* or *Minecraft Survival*, offer players opportunities to navigate difficult decisions, while simultaneously developing emotional intelligence and ethical reasoning. In these post-apocalyptic digital environments, players are often called upon to reconstruct political communities, economic systems, and moral frameworks – in essence, to *reimagine society*. As Farca (2018) observes, dystopia in videogames is inherently utopian, as it invites players to reflect, question, and experiment with alternative social models. Notably, when adolescents who engage with such videogames were asked to define "society," many expressed visions of a more just and inclusive world, where diversity, harmony, and cooperation are central values.

Adolescents dream of a better world, and videogames provide a meaningful space in which to explore what is truly important for humanity. Through play, they learn, reflect, and evolve – provided that this engagement occurs under specific and supportive conditions. The interactive nature of videogames promotes enjoyment and immersion. As Harari (2022) suggests, pleasure – particularly when embodied – contributes to human happiness at a biological level. In parallel, the deep focus and *flow* (Banks & Wasserman, 2019; Markey, Ferguson & Hopkins, 2020) fostered by gameplay distinguish videogames from more passive media forms such as film or television.

As Jenkins (2006) compellingly argues, videogames may well be laying the groundwork for a more engaged and participatory political culture ; one that begins not only in the streets or classrooms, but also in the virtual worlds where today's youth are already imagining, experimenting, and striving for change. In this light, electronic games are not merely tools of distraction – they are platforms for exploration, transformation, and ultimately, hope.

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TA4: The digital divide and emerging inequalities

TA5: Digital and visual literacy

SCHOOL LIBRARY AS A LEARNING HUB: ACTION PLAN FOR DIGITAL UPGRADING

Giannakou Anastasia
PhD, MSc, Director of the 4th General Lyceum of Ioannina «AKADIMIA»
Ioannina Greece

Voulgari Ioanna
Teacher of Religious Studies of the 4th General Lyceum of Ioannina «AKADIMIA»
Ioannina, Greece

ABSTRACT

This paper presents the implementation of a comprehensive action plan for the modernization of the school library, aiming to foster learning, creativity, and both digital and traditional reading literacy. The initiative went beyond the renovation of the physical space, focusing instead on the creation of a multifaceted and functional learning environment that integrates digital and traditional infrastructures, advanced technological tools, and collaborative teaching practices. The project was carried out with the active participation of students, teachers, and external partners, with the overarching goal of transforming the library into a dynamic hub of knowledge, innovation, and social interaction.

The main outcomes include the development of original educational and audiovisual material, the design of interactive reading promotion programs, the establishment of partnerships with cultural and academic institutions, and the integration of the library into national and international networks for the exchange of good practices. Evaluation was conducted using a combination of quantitative and qualitative criteria, such as community participation, quality of collaboration, completion of activities, use of digital resources, and user satisfaction. The results highlighted the potential of school libraries as multidimensional learning spaces that meet the demands of the 21st century, enhance digital literacy, and function as hubs of social participation and innovation.

Keywords: Digital literacy , Information literacy, Educational digital tools, Hybrid libraries, Knowledge dissemination, Technological innovation, Sustainability of practices.

INTRODUCTION

The school library is today a multidimensional and dynamic learning space, which goes far beyond the traditional role of collecting printed material. In modern educational environments, the library integrates digital technologies and creates opportunities for new forms of interaction, accessibility and collaboration. Through this process, information skills, autonomy in learning, critical thinking and digital literacy are promoted (Hasibuan, Fadhli , & Igiriza , 2023).

The concept of a "hybrid library" allows for the coexistence of traditional and digital collections, while simultaneously providing access to digital resources online. Literature demonstrates that well-staffed and equipped school libraries are associated with improved student performance in language arts, science, history, and mathematics (Lance & Kachel, 2018; Center for American Progress, 2020; Teravainen & Clark , 2017). In addition, libraries function as a "third space" of learning, where students can develop skills beyond the conventional classroom context and engage in creative activities (McDougal, Garcia, & Evans, 2023).

Reading for pleasure and active participation in library activities are directly linked to students' psychosocial development, enhancing their self-confidence and well-being (Cremin & Coles , 2023). At the same time, digital transition is a critical factor for the sustainability and effectiveness of school libraries, as digital tools facilitate immediate access to resources, recording and managing material, as well as the development of digital skills of staff (Vrana , 2017; Oliveira Ramos, Costa, & Silva , 2022).

The aim of this article is to present the implementation of a comprehensive action plan for the organization and modernization of the school library, with an emphasis on learning, reading and the dissemination of knowledge, highlighting its multidimensional function as a space for creativity and collaboration.

ACTION PLANNING

The need to modernize the school library arose from the desire to create a space that meets modern educational requirements, promotes reading and enhances access to various types of material. The action plan included the detailed design of the space, the classification of the material according to the Dewey system , electronic recording in the biblionet.gr database and the creation of an electronic archive in the Panhellenic School Network. At the same time, a lending system with membership cards and electronic book management was organized, while the placement of the books was based on thematic categories and classification number, in order to facilitate access and search.

One of the most important innovations was the creation of a Digital Library, with access to various digital resources and connection to the myLib.gr network, expanding the reach and exchange of good practices with other school units. At the same time, internal operating regulations were drawn up with the participation of students and teachers, in order to strengthen the sense of responsibility and participation in the library.

The objectives of the action plan included the development of original educational materials through collaborations, the promotion of reading through digital tools, the dissemination of knowledge and innovation to the wider community, and the connection with library networks for the exchange of good practices (Hasibuan et al ., 2023; Amin & Rahman, 2023). The school library was approached as a dynamic learning organization, where tradition is combined with modern technology and pedagogical innovation.

ACTION IMPLEMENTATION SCHEDULE

The action for the digital and functional upgrade of the school library was implemented throughout the school year and was organized in phases with a clear chronological sequence.

Months 1–2: Planning and recording needs of the school community. Conducting questionnaires and interviews with students and teachers to record their preferences and needs.

Months 3–6: Organization and recording of the existing library, classification of the material based on the Dewey system and creation of digital infrastructure, including an electronic catalog and a digital database.

Months 7–8: Production of multi-format material and development of digital reading programs , such as videos, podcasts and audiobooks , as well as creation of educational activities for students.

Months 9–12**:** Dissemination of the material to schools, cultural and academic institutions, evaluation of the action, improvement of processes, and preparation of final reports and presentations for the school community and external partners.

The timeline ensured a gradual, organized and sustainable transition from the traditional to the modern digital library, enhancing both learning and social interaction of students.

IMPLEMENTATION OF THE ACTION

The implementation of the action was organized in two phases with the aim of a smooth transition from the traditional to the digital nature of the library. In the first phase, emphasis was placed on strategic planning, recording the needs of the school community and creating basic infrastructure, such as the development of a blog in the Panhellenic School Network. At the same time, data was collected through questionnaires and interviews from students and teachers to identify their needs and preferences regarding digital and traditional services. In this phase, collaborations were also initiated with organizations for participation in educational and cultural programs, such as short film competitions, interactive workshops and reading activities .

In the second phase, the action focused on strengthening the library's connection with national and international networks, on the production of original audiovisual and digital material, such as short films, audiobooks and podcasts , and on posting the creations on the blog and on digital platforms. At the same time, the dissemination of the material to other school units, cultural and academic institutions was strengthened, so that the library functions as a dynamic hub of knowledge and innovation. The implementation utilized human resources, such as teachers and students, and material resources, such as computers, cameras, microphones and multimedia processing software, for the creation and dissemination of educational and audiovisual material.

The action schedule covered a full school year. The first two months were dedicated to planning and recording needs. The next four months focused on organizing and recording libraries, classifying material, and creating digital infrastructure. The next two months were dedicated to creating multi-format material and developing digital reading programs . The last four months were used to disseminate the material, evaluate the action, improve processes, and write final reports and presentations for the school community and external stakeholders.

MATERIAL PRODUCED OR UTILIZED

During the action, a multitude of multi-format materials were produced and utilized in order to enhance learning, reading and knowledge dissemination. Email archives were created for communication management, action monitoring diaries and a digital book catalog with detailed information, brief summary and availability information. At the same time, original articles by students and teachers, videos and short films promoting reading themes , podcasts with educational and cultural content, as well as audio books accompanied by audiovisual material were developed.

The produced material was posted on a blog and digital platforms, while dissemination was done through connections to networks such as myLib.gr and the National Library, allowing access to schools and institutions across the country. At the same time, existing digital resources, educational applications and multimedia management software were utilized to enhance the participation of students and teachers in the creation, revision and publication of the material. The synthesis of traditional and digital material contributed to the creation of a fully functional and multidimensional learning environment, which incorporates modern technologies and pedagogical practices (Ross et al ., 2018; Oliveira et al., 2022).

EVALUATION OF THE ACTION

The evaluation of the action was carried out using a combination of quantitative and qualitative methods, in order to accurately capture the effectiveness of the action plan and its impact on the school community. The quantitative criteria included recording the participation of students and teachers in library activities, the traffic of digital resources and the use of lending services, both physical and digital books. These measurements were carried out through electronic recording systems and monitoring diaries.

The qualitative criteria were based on the evaluation of the quality of collaboration, user satisfaction, creativity and interaction developed between students, teachers and external partners. Data were collected from interviews, questionnaires, action diaries and analytical observations, providing valuable information on the educational needs and preferences of the school community (Kuhlthau, Maniotes, & Caspari, 2007; Ross et al ., 2006).

The evaluation revealed that the library activities promoted the active participation of students and the development of digital literacy skills , while the production of multi-modal material significantly improved the quality of learning and reading . The dissemination of content in school library networks and the connection with external bodies strengthened collaboration and the exchange of good practices, contributing to the national and international dissemination of knowledge (UNESCO, 2022b; Amin & Rahman , 2023).

The use of a blog and digital archives became particularly important, as it allowed for continuous monitoring of activities and assessment of student participation in real time. Feedback from students and teachers demonstrated that the library now functions not only as a place of access to information, but also as a hub of creativity, social interaction and innovation. Systematic recording and production of multi-format materials were crucial factors for the sustainable development of the school library, confirming the importance of the digital transition strategy (Krashen , 2004; Partnership for 21st Century Learning , 2019).

CONCLUSIONS

The implementation of a comprehensive action plan for the digital and functional upgrade of the school library has revealed multidimensional benefits for both students and teaching staff. The transformation of traditional libraries into spaces that combine physical and digital learning environments is now a necessary condition for 21st century education (Hasibuan and al ., 2023). The action demonstrated that the combined use of digital tools and traditional resources enhances digital literacy , critical thinking and student autonomy, while promoting creativity and social interaction (McDougal and et al ., 2023; Cremin & Coles , 2023).

The production of multi-format materials, such as short films, podcasts , audiobooks and interactive educational tools, contributed to the active participation of students, allowing them to develop collaboration and teamwork skills. At the same time, the dissemination of the materials in national and international library networks promoted the exchange of knowledge and best practices, strengthening the culture of lifelong learning (Ross and al ., 2018; UNESCO, 2022a).

The evaluation revealed that the library now functions as a “third space” of learning, where students can develop skills beyond the conventional classroom context and engage in creative and psychosocially empowering activities. The digital transition is supported by staff training and strategic planning, allowing for continuous adaptation to the needs of students and the school community (Vrana , 2017; Oliveira Ramos et al ., 2022).

This experience demonstrates that digital upgrading is not only about technological modernization, but also incorporates pedagogical innovation, a social dimension and strategic planning, making the library a center of learning, creation and innovation. Overall, the action demonstrated that the sustainable integration of digital tools and the utilization of multi-modal material enhance both the educational role of the library and the psychosocial development of students, creating a model of a modern school library (Konlan et al ., 2025; Lankes , 2011).

This experience highlights the importance of collaborating with external bodies and networks of good practices, which enhance the social dimension of learning and offer opportunities for innovation, creativity and continuous feedback. Furthermore, the holistic approach of the school library, which combines physical presence, digital tools and pedagogical guidance, is a model for other school units and promotes 21st century education in a sustainable and effective way.

In conclusion, the action demonstrated that the school library can function as a center of learning, creation, social interaction and innovation, enhancing students' skills, participation and autonomy, while promoting reading , digital literacy and lifelong learning.

PROPOSAL FOR IMPROVING DIGITAL SERVICES IN SCHOOL LIBRARIES

The development and strengthening of digital infrastructure is a crucial factor in promoting learning, reading and digital literacy . The proposal is based on seven axes of action, which cover technological and pedagogical needs, so that the library functions as a modern hub of learning and creation.

The first axis concerns the strengthening of digital infrastructures and systems, by upgrading digital platforms , integrating information management tools and ensuring digital security, while the connection to national and international databases broadens the range of educational resources (Lankes , 2011; Borgman , 2015).

The second axis focuses on the systematic training of staff and students in digital skills, information search and multimedia content creation, in order to enhance active participation and knowledge production (Ala-Mutka , 2011; OECD, 2019).

The third axis concerns the development of creative and educational materials, such as podcasts , videos, e-books and educational games, promoting active learning and collaborative digital projects (Neuman & Celano , 2012; Johnson et al ., 2016).

The fourth axis includes strengthening collaborations with cultural, academic and social actors to exchange knowledge and good practices, contributing to social innovation and the development of transdisciplinary skills (UNESCO, 2022a).

The fifth axis concerns the creation of evaluation and feedback systems, in order to ensure the continuous improvement of digital services and their adaptation to the needs of the school community (Krashen , 2004; Partnership for 21st Century Learning , 2019).

The sixth axis includes the integration of innovative technologies, such as interactive whiteboards, virtual reality and digital learning platforms, to enhance the learning experience and creativity of students (Johnson et al ., 2016).

The seventh axis concerns the promotion of the sustainability of digital practices through continuous staff training, strategic planning and collaborations with networks of good practices, ensuring the long-term impact of actions on education and society (Hasibuan and al ., 2023; Konlan and al ., 2025).

Overall, the proposal aims to create a school library that functions as a dynamic, multidimensional learning hub, integrating technological and pedagogical innovation, while promoting collaboration, creativity and lifelong learning.

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VISUALIZING LEARNING: DESIGN PRINCIPLES, IMPLEMENTATION, AND BENEFITS OF INFOGRAPHICS IN THE EDUCATIONAL LEARNING PROCESS

Ioannis N. Dimitrakopoulos,
MSc, Educator, PE82 Sector
DDE Preveza – 2nd Gymnasium of Preveza
Preveza, Greece
email: jndimit@gmail.com

ABSTRACT

This scientific article explores the contribution of infographics to the learning process by examining their design principles, pedagogical applications, and effects on students' cognitive development. Infographics combine visual and linguistic elements, offering an efficient way to organize and present complex information. In recent years, their use has significantly increased as they have proven to be particularly effective in facilitating the understanding and assimilation of both fundamental and complex concepts through structured visual data representation. According to literature, cognitive learning theory integrating multiple information channels enhances memory recall and promotes a deeper understanding of concepts.

Following a primary methodological approach of literature review, the article analyzes their usage in education as well as the challenges arising from their use. Through systematic analysis of research data and theoretical perspectives, the article highlights their contribution to the learning process. Alongside, it notes potential difficulties that emerge from their use, underscoring that an overly large amount of information without necessary guidance may cause cognitive overload, adversely affecting information processing and assimilation.

Particular emphasis in the publication is placed on the use of infographics across interdisciplinary fields (natural sciences, language education, social sciences, etc.) and their significance as a tool for development, creation, and application through the use of specialized methodological tools such as Napkin and Venngage platforms. The case studies developed provide specific and measurable data on how visual graphics can support teaching, enhance understanding of concepts, and improve the learning experience.

The immediate goal of the research is to highlight the educational significance of infographics in both informal and formal educational environments. Their ability to transform complex information into comprehensible visual formats enhances cognitive engagement, inclusive learning, and reflective thinking through visual and digital literacy. Students' participation in their creation strengthens skills such as data analysis, communication, and collaboration.

The paper is directed towards the entire educational community and also challenges educators to develop imagination and creativity, aiming for a modern, structured, and technologically informed practice

Keywords: Infographics, Digital and Visual Literacy, Charts, Learning

INTRODUCTION

As modern education evolves in the digital era, it must adapt to meet new learning demands. The continually increasing flow of information has made knowledge transmission more challenging. In today's environment dominated by visual stimuli, infographics have emerged as a valuable tool that enhances understanding and memory, making learning more accessible to students.

This study examines the relationship between the use of infographics and learning outcomes, focusing on the characteristics that make them effective in the teaching process. Their importance is indisputable, as students live in a visually rich environment (Mayer, 2009, pp. 1-19). Utilizing them enhances information retention, understanding, and active student engagement. Research indicates that students who use them achieve higher performance compared to those taught with traditional methods (Eisenberg, 2008, pp. 9-17, 19-37, 48). Therefore, integrating them into teaching practice significantly contributes to improving learning outcomes and developing digital skills.

Katsarounis (2020) argues that infographics enhance interactivity and facilitate understanding by providing simplified visual representations of information. Students who use them demonstrate greater retention and comprehension abilities.

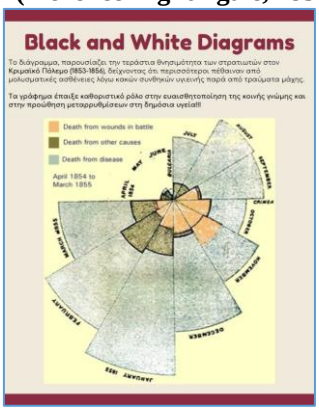
This paper focuses on three key questions. The first concerns what design elements affect the effectiveness of infographics. The second explores the benefits of their use in teaching, and the third analyzes what challenges may arise during their implementation in the learning process.

The paper is divided into four sections. The first describes the theoretical background of infographics. The second presents the basic design principles. The third focuses on their application in teaching, and the fourth analyzes the benefits of using infographics in the educational process.

THEORETICAL BACKGROUND ON THE USE OF INFOGRAPHICS IN EDUCATION

Infographics, or informational graphics, are visual tools that combine information and graphics to convey data, ideas, or processes in a clear and appealing manner. According to the C.E.E.C. (2013), they are "visual representations of information, allowing complex ideas to be represented simply" (C.E.E.C., 2013). They include graphs, maps, diagrams, and icons and are used in education, advertising, and journalism.

Figure 1
Black and White Charts" (Florence Nightingale, 1858–Public Domain Image)



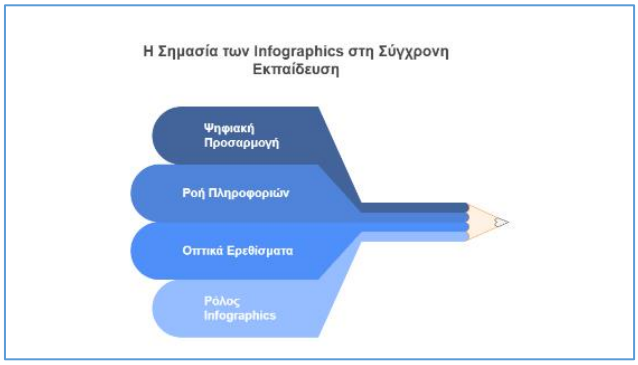
Their history dates back to the 19th century, when statistical analysts like Florence Nightingale (Figure 1) used diagrams for data representation. In the modern era, technological advancements and platforms like Canva and Piktochart facilitate their creation (Griffin, 2020). New trends in their design and use in education are emerging in the literature (Venngage, 2024), while challenges in their application in the educational field are also being examined (IEEE, 2023).

Infographics are a valuable tool because they facilitate the understanding of complex information and enhance student engagement (Damyanov & Tsankov, 2018, pp. 82-92). Thus, information becomes more accessible and interesting, fostering greater student participation.

Learning outcomes reflect the knowledge and skills that students acquire, capturing the abilities they should demonstrate at the end of an instructional period (Bloom, 1956). The use of infographics improves information retention and enhances understanding of topics (Ainsworth, 2006). Students who use them comprehend information more quickly and achieve better test performances (Dunleavy & Dede, 2014).

The psychology of learning highlights the importance of visual tools (Figure 2), such as infographics. According to the Dual Coding Theory (Paivio, 1986), comprehension is enhanced when information is presented both verbally and visually.

Figure 2
Cognitive Principles and Psychology of Learning (Created using Napkin AI)



Simultaneously, Constructivist Learning (Piaget, 1976) emphasizes active student involvement. Infographics promote interaction with data, enhancing learning through visual stimuli (Schnotz & Kürschner, 2007). As an educational tool, they facilitate the understanding and connection of theory with practice.

BASIC DESIGN PRINCIPLES OF INFOGRAPHICS

a. Design and Presentation

Colors: The design and presentation of infographics affect the communication of information. A fundamental principle is the correct choice of colors, as they shape visual perception. Using a limited color palette maintains consistency and enhances clarity (Ware, 2012). Overly bright combinations that distract the viewer should be avoided. A practical rule is to use three primary colors with varying shades (Figure 3): the main color for titles, a secondary color for subtitles, and an accent color for highlighting important data.

Figure 3
Color Selection Strategy for Infographics (Created using Napkin AI)



Fonts: The choice of fonts affects readability. Titles require bold fonts, while the main text should be simple and clear (Kostelnick & Roberts, 2011).

Layout: The arrangement of elements in an infographic should be logical and structured, guiding the reader from the most to the least important information (Tufte, 2006). White space, or "negative space" (Figure 4), plays a crucial role in improving readability, comprehension, and aesthetics.

Proper use of white space contributes to:

i. Improved Readability
ii. Focus on Information
iii. Creation of Balance
iv. Increased Aesthetic Value
v. Enhanced Comprehension

The strategic placement of white space helps readers more easily perceive relationships between elements, especially in infographics with complex concepts or data.

Figure 4:
The Importance of White Space in Infographic Design (Created with Napkin AI)



Clarity and usability are critical success factors. A well-designed infographic (Figure 5) should be immediately understandable without additional explanations (Duarte, 2010).

Figure 5
Basic Design Principles (Created using Napkin AI)



The customization of infographics is essential for their effectiveness. Educators need to be aware of their audience and learning objectives before creating them. This includes understanding the recipients' preferences, knowledge level, and interests (Berk, 2016, pp. 44(3), 301-314).

The presentation format also plays a significant role. Digital infographics can include interactive elements, while print ones need to be attractive without them (Griffin, 2020, pp. 4(2), 95-111).

b. Analysis of Examples

The analysis of infographics in educational settings reveals effective design elements. "The Importance of Reading (Raymond Geddes)" (Figure 6a) uses simple language and an accessible visual presentation to depict statistical

data about reading (Heinrich, 2018, pp. 66(1), 1-19). The evaluation of the infographic shows the correct use of colors to highlight key points, clear fonts, and a natural layout. The visual elements are balanced, facilitating understanding without information overload.

Figure 6a
The Importance of Reading Infographic

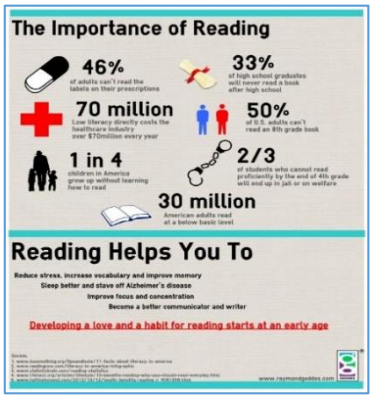


Figure 6b
How to Learn Effectively



Another successful example is "How to Learn Effectively," which includes learning strategies. The linear layout facilitates easy tracking, while the icons and charts enhance understanding and credibility (Bork, 2018, pp. 15(2), 45-56).

APPLICATION OF INFOGRAPHICS IN TEACHING

a. Education Strategies

The utilization of infographics in education can be achieved through strategies tailored to the teaching subject. Effective practices include:

- Creating infographics by students, which enhances engagement and understanding.
- Visually depicting complex concepts, facilitating the understanding of relationships and processes.
- Analyzing and synthesizing texts to help compare and visualize key ideas.
- Using them as educational tools by integrating them into lectures to improve attention.

Active student participation in creating infographics is organized into seven (07) stages:

i. Topic selection and objective setting, enhancing autonomy.
ii. Data collection and analysis for better information organization.
iii. Designing and composing using tools like Canva or Piktochart.
iv. Presentation and discussion, encouraging critical thinking.
v. Feedback and improvement based on peer comments.
vi. Using technological tools for collaborative editing.
vii. Evaluation and reflection, developing critical thinking.

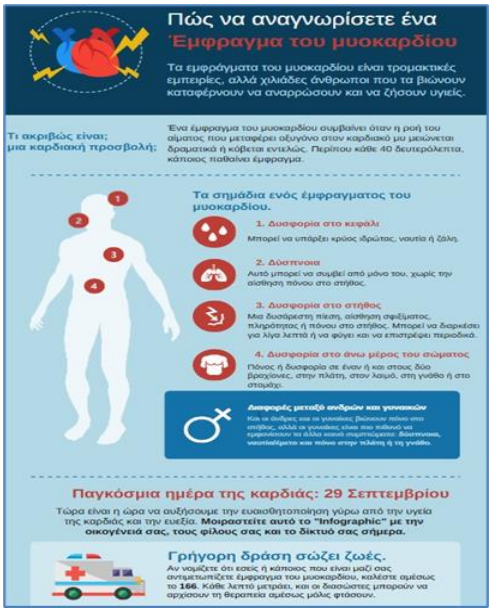
Benefits of student participation include:

- Autonomy in learning.
- Collaboration through teamwork.
- Critical thinking and data evaluation.
- Creativity in visualizing information.

Based on the above, an activity involving the creation of an infographic on the symptoms of a heart attack (Figure 7) is presented. It follows a step-by-step structure, ensuring it is concise, direct, and easy to read..

Topic: Designing an Infographic – Symptoms of a Heart Attack
i. Students select the topic and define the goal of the infographic.
ii. They collect and analyze relevant data, such as statistics.
iii. They create the infographic using Venngage or similar tools.
iv. They present their work to the class.
v. They receive feedback and make improvements.

Figure 7
Designing an Infographic: Signs of a Heart Attack (Created with Venngage)



b. Tools and Platforms

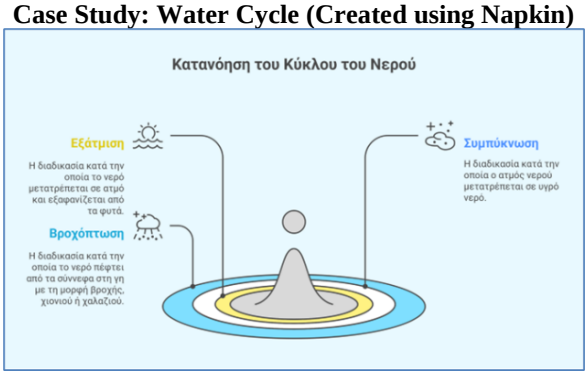
There is a wide variety of infographic design tools that can be utilized in education to create visual representations. Some of the most popular include:

1. **Canva**: An online tool (https://www.canva.com) with ready-made templates and collaborative features, facilitating the creation of infographics (Griffin, 2020).
2. **Piktochart** A platform (https://piktochart.com) for presenting data through charts and tables, useful for topics involving statistics (Chen, 2018).
3. **Visme**: A tool (https://www.visme.co) that allows for creating interactive infographics with multimedia, enhancing the learning experience (Berk, 2016).
4. **Napkin**: An AI platform (https://www.napkin.ai) that converts text into charts and diagrams, useful for presentations and reports.
5. **Venngage**: An online application (https://venngage.com) that creates infographics through artificial intelligence.
6. For optimal use, educators must guide students on the basic principles of visual communication and design, ensuring the effectiveness of the infographics (Duarte, 2010).

c. Case Studies

Case studies provide tangible examples of how infographics can be used and integrated into teaching to positively influence the learning process for both educators and students.

Figure 8
Case Study: Water Cycle (Created using Napkin)



1. Science Lesson: In this activity, students create an infographic that depicts the phases of the water cycle (Figure 8), such as evaporation, condensation, and precipitation. Through this process, they research, organize, and present the information in an understandable and engaging manner. A comparison of learning outcomes before and after the activity shows a significant improvement in understanding the topic, as students can now clearly explain the related processes (Carlson, 2016).

2. Language Teaching Lesson: The activity aims to guide educators in creating an infographic that will help students understand and summarize key grammar concepts in a visually appealing and comprehensible way (Figure 9). By using this tool, educators can simplify complex concepts, organize information more effectively, and enhance student engagement.

Figure 9
Case Study: Basic Verb Tenses (Created using Napkin)



This particular example demonstrates how an infographic can aid students in language learning in the following ways:

i. Visual Representation of Tenses
ii. Concise Presentation
iii. Memory Enhancement
iv. Multiple Information Sources:
v. Practical Application

3. Chemistry Lesson: The following example can support student learning in Chemistry (Figure 10) by focusing on five key areas. The visual representation, concise presentation, multiple sources of information, memory enhancement, and understanding of relationships significantly contribute to facilitating learning and improving the comprehension of atomic structures.

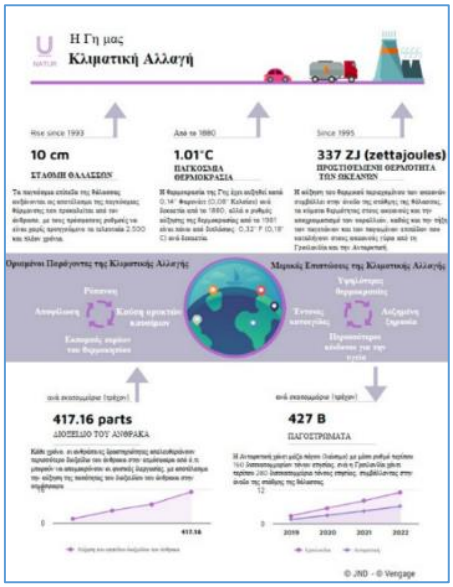
Figure 10
Case Study: Structure and Composition of the Atom (Created using Napkin)



4. Environmental Studies - Climate Change

Using an infographic for climate change (Figure 11) offers significant benefits in understanding, raising awareness, and educating students.

Figure 11.
Environmental Studies: Climate Change (Created using Venngage)



In all the presented examples, educators assess the impact of infographics on student learning and engagement. Students are actively involved, gaining a clear understanding and experiencing learning as a creative process (Dunleavy & Dede, 2014).

BENEFITS AND CHALLENGES

a. Benefits of Using Infographics

The utilization of infographics in education enhances teaching and learning.

- **Enhancement of Understanding and Memory**: Infographics convert information into visual elements, facilitating perception and memorization. Research shows that students exposed to visual representations understand and retain knowledge better (Mayer, 2009). Additionally, the combined use of images and text allows for more effective assimilation of information (Panagiotou, 2023).
- **Increase in Engagement and Interaction:** They capture students' attention and enhance collaboration (Berk, 2016; Dunleavy & Dede, 2014). Research by Neophytou and Karadima (2021) indicates that they contribute to the development of critical thinking through the analysis of visual data.
- **Development of Critical Thinking**: Creating infographics requires data analysis, enhancing critical thinking. Choosing and depicting significant information improves analytical and creative thinking (Bork, 2018).
- **Integration of Information from Various Sources:** They allow the combination of data from diverse sources, facilitating interdisciplinary learning and the connection of knowledge (Griffin, 2020, pp. 4(2), 95-111).

b. Challenges and Limitations

- **Difficulty in Design**: Educators may struggle with selecting tools and creating high-quality results, as effective visual communication requires specialized knowledge (Kostelnick & Roberts, 2011). Additionally, creating effective infographics demands time and effort.
- **Challenges in Presentation**: Information overload can lead to confusion (Tufte, 2006). It is important to maintain simplicity and focus on key points.
- **Varying Levels of Knowledge**: Students do not have the same familiarity with design tools, creating inequalities in the quality of their work (Heinrich, 2018). Educators need to provide support.
- **Need for Teacher Training**: The lack of training limits the integration of infographics into teaching (Berk, 2016). Panagiotou (2023) emphasizes the importance of training for optimal utilization.
- In conclusion, while infographics enrich teaching, their implementation requires careful planning, training, and support for educators.

CONCLUSIONS AND FUTURE DIRECTIONS

This study focuses on the importance and utility of infographics as an educational tool, along with their role in enhancing the learning process. By analyzing their basic design principles and application in teaching practice, significant conclusions are drawn.

Infographics substantially contribute to the understanding and retention of information, allowing students to organize and assimilate knowledge more effectively, especially in subjects like the natural sciences, mathematics, and languages (Aivazoglou, 2020, pp. 18(2), 55-67; Tufte, 2006). Additionally, when students create infographics themselves, it enhances their active participation and develops their critical thinking, as they creatively present their knowledge (Baltzis, 2017, pp. 12(1), 32-47; Farkas, 2019).

However, challenges such as information overload and varying student skill levels may limit this technique's effectiveness. This necessitates appropriate training and guidance for educators to make the best use of infographics (Katsoula, 2018, pp. 8(2), 45-59; Bresciani, 2021).

Future research can focus on comparing the use of infographics across different educational systems and cultural environments, highlighting best practices and new strategies (Sideris, 2021, pp. 17(1), 102-116; Li, 2018, p.21). Furthermore, developing modern tools that simplify infographic creation could enhance the learning experience. Moreover, integrating interactive elements, such as information or embedded videos, may offer students a more engaging and dynamic experience (Kontopidis, 2022, pp. 19(3), 78-90; Smiciklas, 2012). Finally, continuous teacher training in new digital technologies and tools is crucial for maximizing these means (Vamvakas, 2020, pp. 6(2), 88-101; Mayer, 2014).

To summarize, infographics are a versatile and powerful tool in teaching, facilitating the comprehension of complex concepts and enhancing student interaction and creativity. Visual media aid in managing the abundance of information and can provide an innovative approach to learning (Aivazoglou, 2020, pp. 18(2), 55-67; Tufte, 2006). Therefore, their proper use and ongoing research in this area will strengthen the learning process, contributing to the formation of a modern educational environment.

Based on the publication's findings, further research is suggested on topics such as the effectiveness of infographics in knowledge retention, the development of best design practices, and their integration into broader differentiated teaching techniques (use in distance education, various educational levels, intercultural approach). This work will be beneficial for anyone interested in the design, preparation, and application of graphic information in education. Integrating modern technological tools, such as AI for personalized infographic creation and the use of interactive or animated graphics, can offer new perspectives in teaching and learning.

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TA6: Digital ethics

TA7: Digital citizenship

SCIENCE AND THE DIGITAL CITIZEN: AN EDUCATIONAL SCENARIO APPLIED TO CHEMISTRY

Malamou Konstantina
Chemistry teacher, Directorate of Secondary Education of Ioannina
Ioannina, Greece
e-mail: nmalamou@gmail.com

Malamou Sevasti
Physics teacher, Directorate of Secondary Education of Ioannina
Ioannina, Greece
e-mail: smalamou@gmail.com

ABSTRACT

The article has to do with a teaching scenario in Chemistry, aiming to mobilize and reflect on issues of pseudoscience or misleading the public, on scientific issues in a digital world full of information overload, challenges and deceptions. Based on the discovery-investigation and collaborative group method, using modern digital tools, the teaching scenario has its main goal the education of active and concerned students-digital citizens on issues of science and scientific deception. It can serve as a guide to be adapted to other Science subjects such as Biology and Physics, serving corresponding teaching objectives for students in the 3rd year of middle school and high school classes.

Keywords: science, scientific deception, natural sciences, pseudoscience, digital citizen

INTRODUCTION

In a constantly evolving world, where science and technology are rapidly advancing, communication and information increasingly revolve around the internet and its applications, educating young people about digital citizenship is more essential than ever. The use of new technologies serves as a crucial tool for supporting and encouraging students to engage in learning activities that add value to the implementation of more student-centered teaching models (Da Ponte et al., 2002; Polly et al., 2010).

Information and Communication Technologies (ICT) currently affect every aspect of human life. They play prominent roles in workplaces, businesses, education, and entertainment. Moreover, many recognize ICT as a catalyst for change in working conditions, the handling and exchange of information, teaching methods, learning approaches, and scientific research. In this digital era, the integration of ICT in the classroom is vital for providing students the skills necessary for the 21st century (Ratheeswari, 2018).

Today's digital learning tools span a wide range—from e-learning platforms and virtual simulations to online labs, teacher-student communities, educational videos, digital journals, and blogs (Bruntha et al., 2024). In an ever-increasing number of such tools, students must learn to identify useful and valid resources while rejecting those lacking scientific validity or aiming primarily at profit, deception, or misinformation.

Considering the rise of pseudoscientific content and the spread of false scientific information—often designed to mislead and deceive citizens with real-world consequences—educating students in how to identify reliable scientific news becomes critical. Trust in science is a key element of contemporary education and can foster the development of scientific thinking (Hendriks et al., 2016). In this context, the teaching scenario "Truth or Lie? What Should I Believe?" was developed, combining digital citizenship education (Richardson & Milovidov, 2019) with critical thinking in scientific contexts. Though implemented within the framework of Chemistry, it can be easily adapted to other science subjects, such as Physics or Biology.

DESCRIPTION OF THE TEACHING SCENARIO

The purpose of this teaching scenario is to promote students' active engagement in learning scientific content, to develop their critical thinking regarding the use of digital media on the internet, to familiarize them with reliable educational resources and tools, and to help them identify fake news. Through inquiry and reflection, students should be able to use the internet and digital tools safely and appropriately—initially in the context of science and then across broader subjects—thus protecting themselves from pseudoscientific ideas.

In this teaching scenario, educational software and ICT tools are utilized to help students realize their usefulness in understanding Chemistry, while simultaneously recognizing the importance of digital citizenship. For instance, students are encouraged to navigate and search for information on the Web, manage digital content, and generally develop essential digital skills. The ultimate aim is to raise awareness that being a digital citizen is a modern necessity, as the internet and digital tools are now embedded in everyday life.

The cognitive areas covered by this teaching scenario are targeted toward 9th to 12th grade of Chemistry classes. More specifically, the scenario focuses on ionic compounds, salts, pH, the periodic table, and general Chemistry-related topics. Prior knowledge in these concepts is not necessary; in fact, one of the goals is to introduce or reinforce these topics. Many students struggle with understanding these concepts, and this approach can offer both an introduction and a deeper grasp of the material (Hafeez, 2021). The contribution of ICT tools is particularly significant for students with special educational needs and learning difficulties (Adam & Tatnall, 2017).

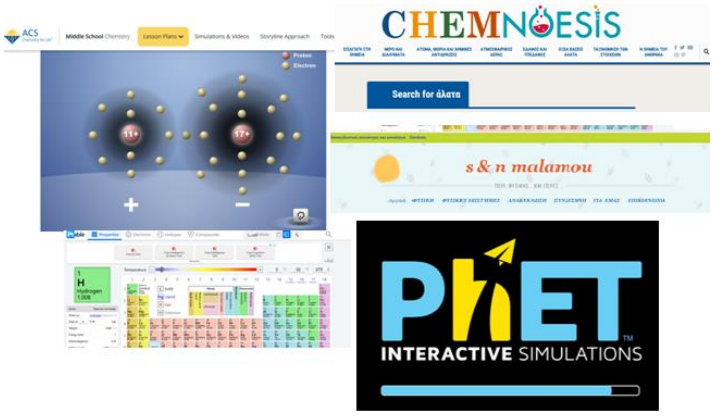
METHODOLOGY

This teaching scenario has been designed to be implemented within a teaching hour, during which students are divided into groups of 2-3 individuals, with each group using a computer in the computer lab. Alternatively, the lesson can be conducted in a regular classroom with a single computer and a projector. The digital tools and websites used in this scenario are as follows: American Chemical Society (Worksheets on Ionic Bonding), NOESIS - Department of Chemistry, Aristotle University of Thessaloniki (Digital Learning Objects), University of Colorado (Simulations), Educational Website – Useful Educational Material – Scientific News, Periodic Table (Interactive Digital Tool), Educational Videos (University of Nottingham), Educational Videos (TedEd Educational Non-Profit Community), Science in School (European Science Journal for Educators), Commonsense (Non-Profit Organization for Digital

Citizenship), Canva (Design Digital Tool), Google Docs (Collaborative Documents), Linoit (Digital Tool for Shared Interaction).

The worksheet for implementing this teaching scenario was designed based on the "Prediction - Experimental Control - Explanation" framework. It utilizes the potential of various digital tools and emphasizes research and critical thinking in scientific subjects.

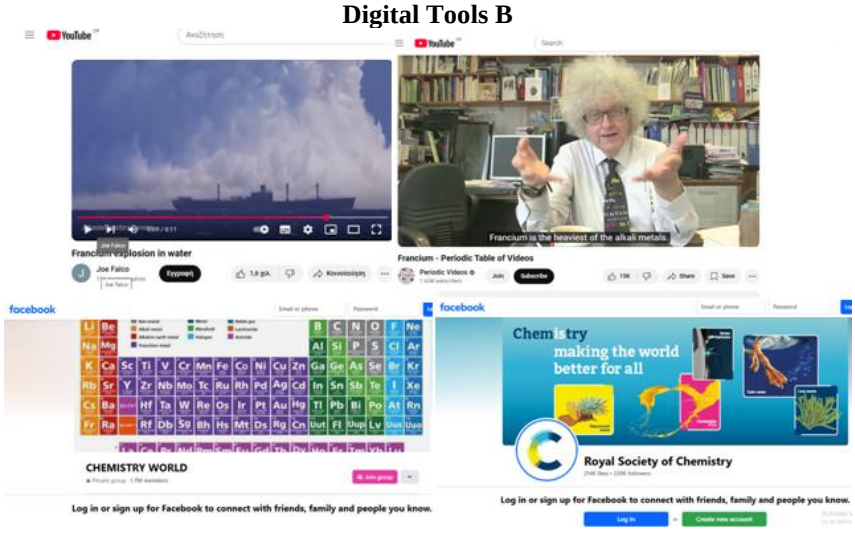
Image 1
Digital Tools A



In the first phase of the worksheet, students are asked to predict the answers to four questions related to chemistry, digital citizenship, and the use of digital tools. They answer based on their existing perceptions and personal experiences. At this stage, no discussion is held on the accuracy of the predictions. Students will verify the correctness of their answers at the end of the lesson, comparing them with their final responses after completing the investigation phase.

In the second phase of the worksheet, the investigation phase, students conduct their research by following a set of instructions and completing a series of seven activities. In the first activity, students are asked to visit a website that demonstrates ionic bonding using various digital tools such as educational videos, interactive visualizations, and digital representations. They are tasked with identifying the types of digital tools used, their creators, evaluating the site's reliability, and determining whether they would trust the website for future use.

Image 2.
Digital Tools B



For activities 2 to 5, students are asked to answer the same questions as in the first activity, but this time for different digital tools: educational content websites, simulations, teachers' blogs, and the digital interactive periodic table. These tools were selected so that students can interact with valid scientific tools that they can evaluate, trust, and use in the future to enhance their scientific knowledge and deepen their understanding of scientific concepts (Image 1).

In activities 5 and 6, students are asked to watch two different videos online about the same chemical element, one of which contains false information and uses science to attract large viewership for profit. They are also tasked with visiting two different groups on a social media platform, one of which is from a reliable scientific organization and the other with questionable motives and content (Image 2).

At this point, students are encouraged to critically compare the two digital tools and reflect on the concept of reliable versus unreliable sources, considering the consequences of using unreliable digital tools. This goal is also addressed in Activity 7, where students first watch a video about fake news from a trusted educational website, then visit a website discussing the supposed health benefits of Himalayan salt. They are asked to search for the creator of the website, examine whether it has a commercial purpose, and understand its overall objective. Following this, they compare the website's content with reliable sources about Himalayan salt, from a scientific article published in a peer-reviewed journal. This enables students to confront reliable and unreliable online sources, distinguishing between scientific and non-scientific opinions on everyday issues, guided by their teacher (Image 3).

Image 3.
Digital Tools C



In the third phase of the worksheet, the evaluation phase, students are asked to revisit the questions from Phase 1 and compare their new answers with their initial responses. Through class discussion, students are guided to the final conclusions, which are shared with the entire group. In this phase, Activities 1, 2, and 6 are specifically designed to introduce students to user-friendly, reliable, and freely accessible digital tools through which they can present their conclusions from the worksheet. If time is limited, some of these activities can be assigned as homework.

The worksheet, presented in the Appendix, has been designed to meet the initial objectives of this lesson. The selection of websites and digital tools was primarily based on criteria such as reliability, scientific validity, and recognition by the international educational community. Another key factor was the free availability of these tools, ensuring equal access to knowledge for all students. Additionally, the reliability of the tools, their continuous updates, ease of access, and connection to the educational content and curriculum further influenced the selection from a wide array of digital tools. The hyperlinks for the websites and digital tools used (last accessed 24/06/2025) are as follows:

https://www.acs.org/ - American Chemical Society – Worksheets on Ionic Bonding

https://chem.noesis.edu.gr/- NOESIS – Department of Chemistry, Aristotle University of Thessaloniki – Digital Learning Objects

https://phet.colorado.edu/ - Colorado Phet – University of Colorado – Simulations

https://blogs.sch.gr/smalamou - Educational Website – Useful Educational Material – Scientific News

https://ptable.com/ - Periodic Table – Digital Tool -Periodic Videos - YouTube – Educational Videos – University of Nottingham

https://www.youtube.com/@TEDEd – Educational Videos – TedEd Educational Non-Profit Community

https://www.scienceinschool.org/ - Science in School – European Scientific Journal for Educators
https://www.commonsense.org/ - Commonsense – Non-Profit Organization for Digital Citizenship
https://www.canva.com/ - Canva – Design Digital Tool
https://docs.google.com/document/u/0/ - Google Docs – Collaborative Documents
https://en.linoit.com/- Linoit – Digital Tool for Shared Interaction

CONCLUSION

After the implementation of this teaching scenario, students will be able to: recognize valid digital tools, enabling them to use them in future research and applications; realize the value of reliable digital tools and their contribution to knowledge acquisition; observe and identify the elements that make a website trustworthy or unreliable, and consequently avoid or reject unreliable sources, including fake news; recognize digital tools that offer free, scientifically credible applications and avoid those that may require payment or lack scientific design; and finally, understand the importance of digital citizenship and its strong connection to various educational subjects, particularly in the natural sciences, where fake news can endanger public health and safety.

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APPENDIX

STUDENT WORKSHEET: "CHEMISTRY AND THE DIGITAL CITIZEN"
A. PREDICTION – STUDENT INTEREST ACTIVATION

Activity 1. Do you believe that using digital tools helps you understand scientific phenomena in chemistry, stimulates your interest, and makes the lesson more enjoyable? Yes or No

Activity 2. Are there cases where you can't decide which digital tools or websites to use online or you don't know which ones are scientifically reliable? Yes or No

Activity 3. Do you believe that there is false information about scientific issues aiming to mislead readers and influence their decisions negatively? Yes or No

Activity 4. What can someone do to avoid the "pitfalls" of the internet? Provide 2–3 useful tips.

B. INVESTIGATION

Activity 1. Visit the link about sodium chloride and the ionic bond, then answer the following:
- Which digital tools appear on the website? (e.g., video, simulation, quiz, educational community, virtual lab, digital visualization, office tools like ppt)
- Who are the site creators? Do you consider it a trustworthy source? Why or why not?
- Do you trust the information to use the site in future searches? Why or why not?
Activity 2. Visit the link about salts and answer the same questions as in Activity 1.

- Which digital tools appear on the website? (e.g., video, simulation, quiz, educational community, virtual lab, digital visualization, office tools like ppt)
- Who are the site creators? Do you consider it a trustworthy source? Why or why not?
- Do you trust the information to use the site in future searches? Why or why not?
Activity 3. Visit the link about pH and answer the same questions as in Activity 1.

- Which digital tools appear on the website? (e.g., video, simulation, quiz, educational community, virtual lab, digital visualization, office tools like ppt)
- Who are the site creators? Do you consider it a trustworthy source? Why or why not?
- Do you trust the information to use the site in future searches? Why or why not?
Activity 4. Visit the educational blog link and answer the same questions as in Activity 1.

- Which digital tools appear on the website? (e.g., video, simulation, quiz, educational community, virtual lab, digital visualization, office tools like ppt)
- Who are the site creators? Do you consider it a trustworthy source? Why or why not?
- Do you trust the information to use the site in future searches? Why or why not?
Activity 5. Visit the interactive periodic table link and answer the same questions as in Activity 1.
(Figure 2. Interactive Periodic Table as a reliable educational digital resource.)

Watch the two videos: "Francium – video 1" and "Francium – official", and think about how not everything you see online is necessarily true.

Activity 6. Visit the two Facebook group links (facebook1 and facebook2) and compare them:
- Identify: the creator, presence of ads, author, target audience, purpose, sponsorship.
- Which group do you trust and which do you reject? Why?

Activity 7. After watching the videos about fake news, visit both the Himalayan salt website and the Science in School website:
- Identify: the creator, presence of ads, author, audience, purpose, sponsorship.
- Which source do you trust and which do you reject? Why?
C. CONCLUSIONS / EVALUATION

Activity 1. Visit the Commonsense website and create a list of scientifically valid digital tools for chemistry suggested by the organization. Use Google Docs to collaboratively describe what type of digital tool each is (e.g., video, simulation).

Activity 2. Revisit the Science in School website and identify strategies to avoid falling for fake news. Use Canva to design a poster showing guidelines for recognizing fake news (can be homework if time is limited).

Activity 3. Do you believe that using digital tools helps you understand scientific phenomena in chemistry and makes the lesson more enjoyable? Yes, as long as... / No, because...

Activity 4. Are there cases where you can't decide which digital tools or websites to use online or you don't know which ones are reliable? Yes, because... / No, because...

Activity 5. Do you think there is false scientific information aiming to mislead readers? Yes, because... / No, because...

Compare your answers in Activities 3, 4, and 5 with those from Section A.

Activity 6. Do you believe that digital citizenship is related to chemistry? Briefly explain your thoughts using the Linoit application

TA8: Inclusive digital education

DIGITAL HIVES ON E-ME FOR TEACHING GREEK TO REFUGEE CHILDREN: ENHANCING INCLUSIVE EDUCATION THROUGH CONNECTIVISM AND GAMIFICATION

Despina Zeka-Paschou
Educator, Primary Education (PE 70),
Ministry of Education, Religious Affairs and Sports (YPAITHA)
Principal of Nea Kerasounta Primary School
Preveza, Greece
e-mail: despozeka@yahoo.gr

ABSTRACT

The integration of refugee children into the Greek educational system requires flexible and innovative approaches that incorporate digital tools and interactive learning methods. While attending face-to-face lessons remains our primary goal, students' frequent absences due to social and family factors create learning gaps. To address these challenges and leverage the digital tools provided by the Panhellenic School Network, a digital Hive was created on the e-me platform, based on Connectivism and Gamification theories as means to enhance inclusive education.

In the e-me Hive, refugee students can access educational material continuously, participate in interactive activities, communicate with their teachers, and collaborate with their classmates. At the same time, the platform facilitates parental involvement in the learning process, creating a digital educational ecosystem that transcends the boundaries of the physical classroom. Gamification is utilized through interactive quizzes, games, and challenges, which increase student engagement and motivation. These activities, tailored to the linguistic needs of refugee children, enable them to learn Greek in an enjoyable manner. Additionally, continuous feedback and self-assessment opportunities within the platform enhance students' active participation and autonomy.

Through interactive vocabulary and grammar exercises tailored to students' language proficiency levels, audiovisual materials, available digital dictionaries in languages such as Farsi and Arabic, and gamification-based activities such as quizzes and games, the platform serves as a communication tool that facilitates interaction between students, educators, and parents. Furthermore, it may also function as a language learning tool for the parents of refugee students.

The initial results indicate increased student engagement, as the digital and gamified environment makes learning more attractive. There is also an improvement in linguistic development, thanks to the multimodal approach and access to personalized learning materials. Additionally, the platform enhances students' exposure to the Greek language, even outside of school settings.

This presentation showcases how the e-me platform, through the creation of specialized Hives, functions as a dynamic tool for digital and inclusive education. The integration of Connectivism and Gamification creates an engaging, interactive, and participatory learning environment, enhancing the linguistic and social inclusion of refugee children, making learning more flexible, accessible, and interactive.

Keywords: Inclusive education, Greek language learning, refugees, Reception Classes (ZEP), digital tools, e-me, Connectivism, Gamification

INTRODUCTION

The inclusion of refugee children in the national educational systems of host countries represents a critical challenge and a moral imperative for modern democratic societies. In Greece, Reception Classes (ZEP) have been established as a key institutional response to this need, aiming to support the integration of refugee and migrant children into the school community. However, the social and familial conditions of these students — often characterized by instability, frequent relocations, and limited access to linguistic and cultural resources — create significant barriers to learning and participation.

Traditional teaching methods, which rely primarily on face-to-face instruction and a fixed curriculum, often prove insufficient in addressing the dynamic needs of refugee learners. Especially in remote areas or in schools that host children from refugee accommodation structures, student absenteeism is a recurring issue, mainly due to bureaucratic procedures, medical obligations, and a lack of supportive infrastructure. These conditions undermine both the continuity of learning and the acquisition of basic Greek language skills, which are fundamental for social inclusion and educational success.

In response to these challenges, digital educational tools offer new possibilities for inclusive and flexible learning environments. The "e-me" platform, developed by the Greek Ministry of Education through the Panhellenic School Network, provides a virtual space for collaboration, communication, and personalized learning. This article presents a case study of a specialized "Hive" (Kypseli) created on the e-me platform, designed specifically for the linguistic support of refugee students attending a Reception Class in a rural primary school.

The intervention draws on the learning theory of Connectivism, which emphasizes the importance of networks and digital interaction in knowledge construction, and the pedagogical approach of Gamification, which enhances motivation and engagement through game-like elements. The objective of this study is to explore how such a digital environment can function not only as a supplementary educational tool, but as a dynamic ecosystem that fosters linguistic development, active participation, and inclusion for refugee students.

The inclusion of children with refugee biographies in the educational system is not merely a pedagogical challenge, but fundamentally an ethical and political imperative for democratic education systems. As UNESCO (2009) emphasizes, inclusive education is "a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures and communities, and reducing exclusion within and from education."

In the Greek context, Reception Classes (ZEP) often operate under conditions of structural deficiencies—such as the absence of interpreters, instability in student attendance due to frequent relocations, and a lack of tailored teaching material for students' linguistic and cultural needs. Teachers, frequently without institutional support, are called upon to develop flexible and inventive pedagogical practices to meet the needs of an exceptionally vulnerable student population.

Within this framework, digital learning platforms can act as vehicles of participation, safety, and continuity in the learning experience—provided they are designed not only for access but for active engagement and meaningful connection with the learning environment (European Agency for Special Needs and Inclusive Education, 2022, p. 11). The e-me platform, developed by the Greek Ministry of Education and hosted on the National School Network, offers a safe and exclusively educational digital space. Unlike commercial apps, e-me ensures that students operate within their school's digital community, maintaining their educational identity and interpersonal connections.

The structure of e-me—with personal workspaces, interactive "Hives," and feedback tools—mirrors key features of the physical classroom: routine, predictability, and a sense of community. Thus, it contributes significantly to both educational restoration and the psychosocial stability of refugee students

THEORETICAL FRAMEWORK

This approach is grounded in the theory of Connectivism, as articulated by George Siemens (2005). Siemens argues that traditional learning theories—behaviorism, cognitivism, and constructivism—fail to fully capture the nature of learning in a digitally networked world. Learning, in the connectivist view, is primarily the process of creating and navigating networks. As Siemens states: "Learning is the act of forming and navigating a network of connections" (Siemens, 2005).

In this model, nodes may represent thoughts, emotions, digital tools, or pieces of information, while connections are the cognitive and social relationships that form among them. The strength and quality of these connections determine

the efficiency of information flow, the transition from knowledge to meaning, and ultimately, active learning. The e-me platform supports this process by offering a flexible yet structured environment in which students can self-regulate their learning, access information, construct knowledge, and engage with others.

As Siemens points out: “Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information on it.” In today’s digital learning landscape, the ability to master both the “know-how” and the “know-where” is vital—and e-me nurtures this dual competence by situating knowledge within a safe, familiar, and guided space.

Connectivism is further complemented by the pedagogy of gamification, which enriches instructional design with elements drawn from digital games: missions, challenges, rewards, engaging aesthetics, and interactivity. According to Kapp (2012), gamification significantly enhances student motivation and engagement, making learning more accessible and attractive, particularly for learners struggling with traditional instruction.

For refugee children, gamification reduces anxiety, fosters a positive emotional connection with language, and facilitates the gradual development of vocabulary and self-confidence. As Gee (2003) observes, learning through games involves “situated meaning-making through action and context”—a vital dimension for students unfamiliar with the school language.

In summary, the combination of connectivism and gamification transforms digital platforms from passive information spaces into ecosystems of active learning, where children with refugee backgrounds can build language skills, join communities of learning, and experience school as a space of participation and meaning

DESCRIPTION OF THE INTERVENTION

The educational intervention was designed and implemented in the Reception Class (ZEP) of the Primary School of Nea Kerasounta, aiming to support the linguistic and social inclusion of refugee students through a digital environment tailored to their needs. The central tool of this intervention was a structured Hive (Kypseli) within the e-me platform, which served both as a repository and a dynamic learning space.

Image 1.
e-me Hive of the Reception Class



The e-me Hive created a safe and exclusive digital environment where students could access learning materials asynchronously and maintain a sense of belonging to the classroom—even during periods of absence. This continuity proved particularly significant, given the irregular attendance of many students due to family obligations and bureaucratic appointments. The digital space thus helped ensure that the school remained a familiar and stable point of reference in the students' daily lives.

A dedicated blog was developed within the Hive and regul arly updated with structured vocabulary posts and reflections on classroom life. Importantly, it also served as a bilingual archive of student participation, including greeting cards for Bayram, student drawings, and contributions to initiatives like the 2024 student competition “Family Means

Together", organized by the United Nations High Commissioner for Refugees (UNHCR). These posts highlighted not only the students' emerging language skills but also their emotional

Image 2
Flashcard activity



A key feature of the intervention was the use of interactive flashcards, which were posted directly on the Hive's main wall. Organized thematically (vegetables, fruits, clothes, furniture, school supplies), each flashcard displayed a clear image along with the Greek word and an audio pronunciation. This approach was inclusive of all literacy levels, allowing students to engage visually and aurally with the target vocabulary. The cards were scrollable and accessible both at school and from home, supporting repetition, autonomy, and multimodal learning.

In addition to the flashcards, the class engaged with digital learning games created using the Wordwall platform. These included matching tasks, memory challenges, and word–image associations, all designed to consolidate basic vocabulary in a fun and motivating way. Wordwall was selected intentionally due to its user-friendly interface, cost-free tools, and compatibility with low-tech settings. The activities were crafted using the means already available to the teaching team, demonstrating that meaningful digital engagement does not depend on advanced infrastructure but on pedagogical intention and creativity.

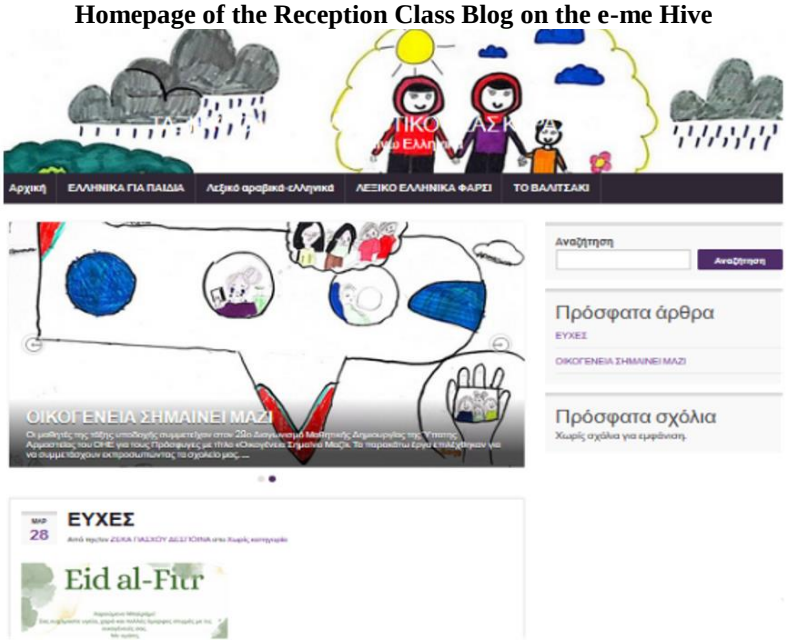
EDUCATIONAL IMPACT AND OBSERVED BENEFITS

Through this digital Hive, students experienced a continuity of learning, a recognition of their multilingual identity, and equitable access to tailored resources. The intervention demonstrated how digital inclusion, even in contexts with limited resources, can foster a dynamic, child-centered learning environment grounded in interaction, visibility, and care.

The implementation of the digital Hive led to tangible benefits both within and beyond the physical classroom. One of the most significant outcomes was the increased engagement and active participation of students during in-person lessons. The playful structure of the activities and the accessible digital environment acted as motivational triggers, offering students a sense of continuity and progress regardless of their attendance consistency. At the same time, the intervention succeeded in encouraging families to become indirectly involved in the learning process, despite having minimal—if any—knowledge of the Greek language. Through the shared use of digital tools at home, parents became witnesses to their children's progress and gradually began to identify the school as a meaningful space of inclusion and support.

This intervention aimed, above all, to offer students a sense of belonging. Refugee children arrive at school often deprived of fundamental goods that their peers take for granted. They carry with them heavy emotional burdens—trauma, separation, anxiety, and profound disappointment. What we observed during our work with them is that one of the most heartbreaking causes of school disengagement is not external but internal: the absence of motivation. For many of these children, Greece is merely another stop in a long and uncertain journey. Places and people change constantly, and nothing in their lives seems stable or lasting. Often, they experience a painful sense of invisibility.

Image 3
Homepage of the Reception Class Blog on the e-me Hive



Despite the positive outcomes of the intervention, certain structural limitations remain evident. One of the main challenges lies in the absence of student books in digital form for Reception Classes (ZEP), which significantly hinders remote learning and limits the possibility of autonomous study outside the classroom. Moreover, there is a general lack of pedagogically sound and developmentally appropriate materials designed specifically for learners with zero proficiency in the Greek language. This gap places a considerable burden on teachers, who must often create or adapt materials on their own to meet the needs of their students.

FUTURE PERSPECTIVES AND CHALLENGES

Looking ahead, the success of this intervention points to the potential for broader implementation. A network of interconnected Hives across ZEP classes nationwide could foster the exchange of best practices, shared resources, and collaborative innovation. Such a decentralized but coordinated digital infrastructure would not only support individual teachers, but also contribute to the emergence of a more inclusive, responsive, and culturally sensitive educational framework for refugee and migrant students.

The experience from the Nea Kerasounta Reception Class highlights how even modest digital initiatives, when rooted in care and pedagogical intention, can help overcome barriers of invisibility, instability, and marginalization. Expanding such efforts through institutional support and resource development would be a meaningful step toward educational equity and social inclusion.

The goal of our digital initiative was thus a quiet yet firm declaration on behalf of the school: “I know you may leave—but while you are here, this is your school, these are your teachers and classmates. This space was created for you. It will remain here for you, even in your absence.” The Hive became more than just a digital repository; it functioned as a symbolic act of recognition and care, affirming to each student their place within the educational community, no matter how temporary their circumstances might be.

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TEACHING GREEK IN THE INTERCULTURAL CLASSROOM USING THE DIGITAL LANGUAGE LEARNING TOOL "AKELIUS LANGUAGES"

Stavroula Kalaitzidou
Primary school teacher
32nd Athens primary school
Athens, Greece
e-mail: sk8720@windowslive.com

ABSTRACT

The non-profit organization Akelius was founded in 2007 by Roger Akelius, a Swede businessman interested in mathematics, programming and engineering. Apart from charity, helping children in need and providing refuges with medical treatment, the foundation also deals with educational issues through the digital platform "Akelius languages", which was launched in 2018. The platform is being developed by sixty programmers in Berlin, Germany and Nicosia, Cyprus, with the cooperation of UNICEF foundation. "Akelius Languages" is an app that provides an effective method to learn foreign languages, focusing in oral and reading comprehension. With this digital tool, students between 6-18 years old are given the opportunity to learn the Greek language in a faster and more playful way, while they also gain confidence and adapt more easily to the school environment. So far, the platform is available in English, French, German, Greek, Italian, Portugese, Russian, Spanish and Swedish, while it is being used in twelve countries, Albania, Greece, Italy, Poland, Mexico, Bhutan, Bosnia and Herzegovina, Lebanon, Kazakhstan, Mauritania, Cape Verde and Sao Tome/ Principe. It contains language exercises and quiz, songs, crosswords and bingo games, grammar theory, while, as it is still in the process of developing, it is gradually being enriched with mathematics, art and history activities.

According to UNICEF data, it is already used by more than 10,500 refugee children in Greece. To date, approximately 1,600 teachers in public schools and non-formal education centers have been trained in the use of the platform. In particular, in Greek public schools it has been integrated into reception classes (ZEP) but also into general classes, in primary and secondary education, when the student population consists mainly of students with an immigrant and refugee background. The way in which the platform activities will be combined with teaching is the responsibility of the teacher, as there are no ready-made lesson plans. Lesson design is left to the flexibility and creativity of the teacher. Students enter the platform using their personal tablets and headphones, and engage in the activity assigned to them, depending on the content of the day's lesson. The hardware equipment is provided by the Akelius program and is kept in each classroom, as well as provision for internet connection and printed teaching materials. The use of the Akelius application is free, there is no subscription or advertising messages. The platform works both offline and online, but an internet connection is preferable, as students can create their own personal account and monitor their progress.

The benefits of using such a platform are multiple, as the lesson becomes interactive and personalized, as students progress at their own pace, while the teacher can give more selective attention to specific students. Regarding learning outcomes, research conducted by UNICEF in Akelius classes compared to classes with the same student population, but without the use of the platform, demonstrates that there was an 8% improvement in listening comprehension, 9% in reading ability, 25% in oral expression and 34% in written language. Qualitative research has shown that by using the platform, students gained self-confidence, motivation for learning, collaboration and consistency in their presence at school. At the same time, there are benefits for teachers as well, in an era where the use of digital media and new technologies in teaching is now required. This type of blended teaching develops teachers' digital skills, contributing to a more organized and structured lesson. I have personally joined the program and am using the Akelius platform in teaching my class during the school years 2023-2024 (1st grade of elementary school) and 2024-2025 (2nd grade) with students who are entirely foreign speakers. The school is located in the center of Athens and the student population is largely refugee/immigrant. This school, along with the Athens Intercultural Education High School, are the only schools in Greece that piloted the online program for the first time during the 2023-2024 school year.

Keywords: Akelius languages electronic platform, teaching of Greek, students with a refugee/immigrant background

INTRODUCTION

In recent years, the contribution of new information technologies to education, and particularly to intercultural education, has attracted the interest of researchers. The spread of ICT use in the educational field has been increasing rapidly in recent years**.** However, with the spread of ICT, various needs increase, such as teacher training and the renewal of technological equipment in schools, in order to achieve a complete and smooth integration of ICT into the educational system. At the same time, teachers face additional challenges in intercultural classrooms. The exploitation of the possibilities of new technologies emerges as the most appropriate cognitive development tool for the creation of a fruitful and advanced learning environment for students with different cultural characteristics. The intercultural approach presupposes the cooperation and interaction of individuals from different cultural groups and aims to overcome cultural differences, as well as to highlight common cultural elements. The role of the teacher in this intercultural effort of multicultural management of diversity is undoubtedly decisive and dominant.

The use of new technologies is considered an essential tool for modifying, reshaping and enhancing teaching content, curriculum objectives and textbooks. The introduction of digital technologies into an educational environment has the potential to improve student outcomes through various ways. The software can be designed to encourage personalized learning that is usually difficult to achieve in group teaching. In this paper, we will examine the learning benefits that the digital language course “Akelius languages” provides to students with a refugee/immigrant background, during the process of learning the Greek language.

THE BENEFITS OF USING DIGITAL TOOLS IN EDUCATION

Digital tools are defined as tools that include programs, websites, applications or other software available on digital devices (laptops, smartphones, tablets). In recent years, digital tools have been used in the teaching of various subjects, as the effective use of ICT in the educational process is a requirement of modern educational reality (Chatzimarinaki, 2022). The integration of new technologies and digital tools in education is considered to have occurred for two main reasons, due to the belief that education must follow technological developments and adapt to them, and because new technologies can offer benefits to both teachers and students. Some of these advantages are the promotion of social learning and collaboration, the increase in student motivation, the reduction of frustration and greater tolerance for error, the development of vocabulary in the target language (Giannoutsou, 2021). Digital tools allow for the personalization of the lesson, i.e. the adaptation of the lesson to the needs, interests and level of each student. The lesson is enriched with educational resources beyond the textbook, such as educational videos, e-books and interactive applications, expanding learning possibilities. The use of digital media helps students develop important digital skills that are essential in the modern world, such as using software, searching for information on the internet, and critically evaluating online sources. They also provide a way to cultivate the soft skills of critical thinking, problem solving, creativity, communication, and collaboration with peers and teachers. The integration of digital media in education makes teaching more enjoyable and playful, and therefore more creative for both participants in the educational process. Through digital tools, teachers can provide immediate feedback to students, helping them understand and correct their mistakes immediately. Digital learning can reduce costs for educational materials and books, as many digital tools and resources are either free or available at a lower cost than traditional educational materials. Therefore, we understand that the use of digital media can contribute to the creation of a more flexible, collaborative and personalized learning environment, preparing students for the challenges of the 21st century. (https://teacherwise.gr/i-chrisi-psifiakon-meson-stin-ekpaidefsi/). The use of digital tools responds to students' need for learning by doing and not so much by focusing on grammatical forms and rules (Giannoutsou, 2021). Compared to traditional teaching methods, where the role of students is passive, the integration of new technologies and multimedia enables interaction with native speakers and provides access to the most up-to-date information from around the world. This is a more student-centered pedagogical approach. Students have the opportunity to come into contact with authentic language, pronunciation and intonation and to imitate this way of speaking (Giannoutsou, 2021). In other words, authentic learning environments are created, connected to the experience and real life of the learners. In summary, modern digital technologies are shaping new ways and methodologies by which educators and learners search, gather, analyze, create, present and communicate information. At the same time, they provide new ways of distributing educational material, new tools for communicating ideas and new possibilities for collaboration among learners.

Despite all the benefits, teachers often face various challenges when trying to integrate digital media into their teaching. Some of these inhibiting factors for the use of ICT in teaching may be the school's inadequate logistical equipment, the teachers' own insecurity due to insufficient training in the use of ICT, the difficulty in identifying the appropriate educational software, the belief that they will need to devote a lot of their personal time to preparing teaching with ICT, the time pressure to cover the curriculum (Chatzimarinaki, 2022). At the same time, it must be acknowledged that the role of the teacher has changed with the integration of ICT in education. Teachers are called upon to acquire new

skills in order to cope with the demands of teaching with ICT. In particular, the teacher must now learn not only to handle various new electronic media, but also to act more as a guide to students, encouraging their autonomy and creativity (Chatzimarinaki, 2022).

THE USE OF DIGITAL MEDIA IN TEACHING THE INTERCULTURAL CLASSROOM

The term "interculturality" refers to a dialectical relationship, a dynamic process of interaction and mutual recognition and cooperation between individuals of different national immigrant groups. It is a means for social integration and the achievement of equality of educational opportunities. It is influenced by the children's own experience in the host countries and revises ethnocentric school criteria. In a multicultural and multiethnic society, intercultural education is considered the only solution, as it concerns an education of solidarity and empathy. Basic principles of the intercultural education model are respect for cultural diversity, teamwork, the elimination of nationalistic thinking and freedom from national stereotypes and prejudices, and the provision of equal opportunities (Pavlidou, 2019). The use of ICT in classes consisting of students with a refugee/immigrant background can contribute to implementation of the goals of intercultural education and to constitute a modern and effective means of supporting efforts to combat school failure and social exclusion experienced by foreign students, bringing about various positive results: cultivating communication and interaction between culturally diverse students, promoting collaborative learning, twinning of remote schools, opening the school to society through the use of the communication capabilities of ICT and the internet. In other words, new technologies assist the learning process, especially with regard to mastering the mechanisms of reading and writing the second or foreign language, developing oral skills and reducing hesitation in face-to-face conversation. New technologies are communication tools that provide multiple ways of accessing information sources, and their rational use can constitute an alternative perspective in teaching practice, especially in an intercultural classroom. At the same time, teachers are given the opportunity to plan their teaching by adopting new tools to create a more favorable learning environment for foreign language students (Pavlidou, 2019).

THE DIGITAL TOOL “AKELIUS LANGUAGES” IN INTERCULTURAL EDUCATION

Specifically in Greece, the Akelius program has been implemented in public schools and non-formal education units since June 2021 until today by the NGO "METAdrasi", in collaboration with and with funding from UNICEF. It is a digital language learning platform aimed primarily at refugee and immigrant students, but also more generally at those who want to learn one of the nine languages offered. It is a hybrid or web application, as it does not require installation on the device in question in order to be used. There is full access to the platform's content directly from the device's browser. It is also fully functional without requiring an internet connection, if it has been previously installed on the device. Based on the data so far, it appears that teachers consider the platform a very important tool for managing student heterogeneity, attracting interest, and evaluating.

In Greek schools, in areas where there is a majority of foreign-speaking students and the Akelius program is implemented, the difficulties that teachers most often face are related to time management, covering the curriculum, the connection of the platform's content with school textbooks, the existence of multiple levels of language acquisition within a class, school dropout and the handling of equipment(https://www.unicef.org/innocenti/reports/making-digital-learning-work). In the case of the 32nd Primary School of Athens, where the student population comes primarily from a refugee/immigrant background, the Akelius program was piloted during the school years 2023-2024 and 2024-2025, in four classes of the school. The platform was used by students online and each had an account on their personal tablet. There is also provision for a tablet for each teacher, which operates in teacher’s mode via special codes, so that the teacher can monitor the progress of the students. The care for the internet connection and satisfactory operating speed was one of the benefits of the program. The participating teachers were trained before the implementation of the program began, remotely and in person, both on technical issues of equipment management and on pedagogical and teaching issues. However, collaboration and guidance from the program managers continued throughout the school years, with monthly visits to schools, lesson supervision, and online meetings afterwards to discuss all possible challenges and difficulties. In this way, UNICEF and METAdrasi receive direct feedback from teachers on how to integrate the digital course into teaching, in order to provide advice, suggestions and solutions to potential problems. At the end of the year, participating students completed a program evaluation questionnaire so that the responsible bodies could record the results and make the necessary improvements. In this way, during its pilot operation, the program was co-shaped by both the teachers and the students who participated.

The content of the Akelius digital course does not follow the Detailed Curricula and school textbooks, but the language proficiency levels (A1, A2, etc.) and so far ends at level B2 (good knowledge, i.e. the student can speak and write with relative fluency, participate in discussions on a variety of topics and express themselves with more detail and spontaneity). The course material is structured around a number of thematic units related to various areas of daily life.

Each level is divided into 10 sub-units, each of which includes grammar and vocabulary activities, songs, games and quizzes. Depending on the score of each activity, students collect virtual "coins" and exchange them for equipment for their personal avatar, which motivates them, especially the younger ages (Images 1-3).

Image 1
Akelius platform internal structure

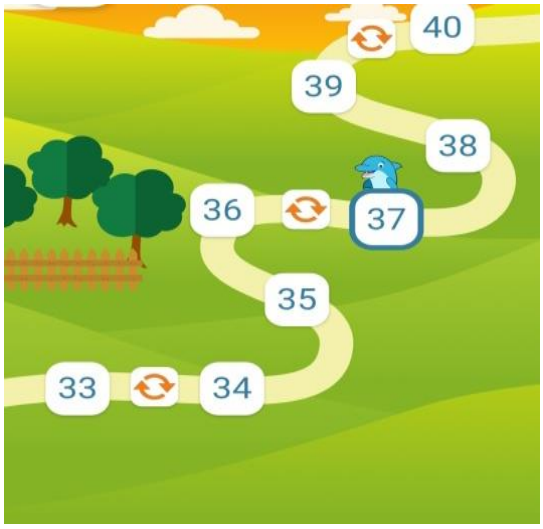


Image 2
Akelius platform home page image

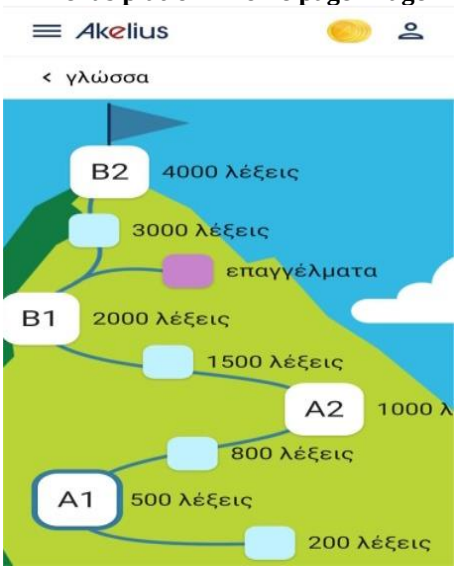


Image 3
Indicative sub-unit activities



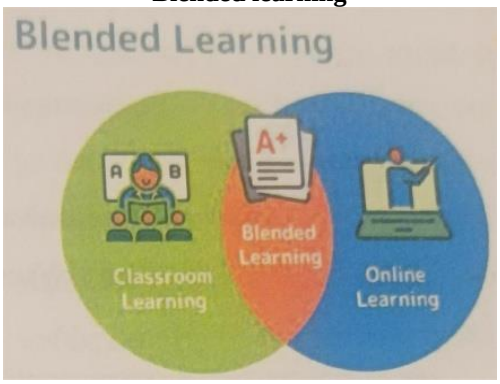
Image 4
Classroom storage and tablet charging station



Teachers are responsible not only for the planning and course of the lesson, but also for the management of the equipment. Students access the Akelius platform using their personal tablets and headphones, which have been provided by the program's responsible bodies and are kept in a locked cabinet in the classroom, which also serves as a charging station (image 4). The classroom teacher is responsible for charging the devices, storing them safely, and performing the necessary device and app updates. However, it is essential to teach students a routine regarding the proper use of the tablets, the cleanliness of the space, their safe transportation to and from their desks, and their safekeeping. Rules and routines create a positive blended learning environment, ensuring that equipment is protected, students are safe, and instructional time is managed properly. They also contribute to the development of digital skills, autonomy, and self-regulation for students (https://www.unicef.org/innocenti/reports/making-digital-learning-work).

With the use of Akelius, blended learning is applied to teaching, meaning that students follow at least partially some elements of the new knowledge online, in the classroom and not from home, so that they have some degree of control over the course and pace of teaching (image 5). In blended learning, online teaching and face-to-face teaching are interconnected in such a way that one continues from where the other left off (Anastasiou, 2023). The benefits that arise for students and teachers from blended learning are multiple and are related to the interactivity of the lesson, the personalized support of students, the personal pace of learning, autonomy, learning motivation and the playful and entertaining nature of the lesson. In other words, teaching becomes more student-centered, having its roots in constructivism, where each student is responsible for constructing new knowledge, which is based on their previous experiences, rather than teacher-centered (Hatziagapiou, 2020).

Image 5
Blended learning



The program is in line with the requirements of intercultural education, meaning that teaching is addressed to all students and their needs and incorporates the cultural background, existing knowledge and the daily experiences of children in the learning process in a way that allows students to understand themselves and others. (Anastasiou, 2023). However, as the content of the digital course does not follow the Ministry of Education's curricula, the teachers must plan on their own how to integrate Akelius into their lesson and which specific module and activity they will use each time.

Image 6
Students collaborating



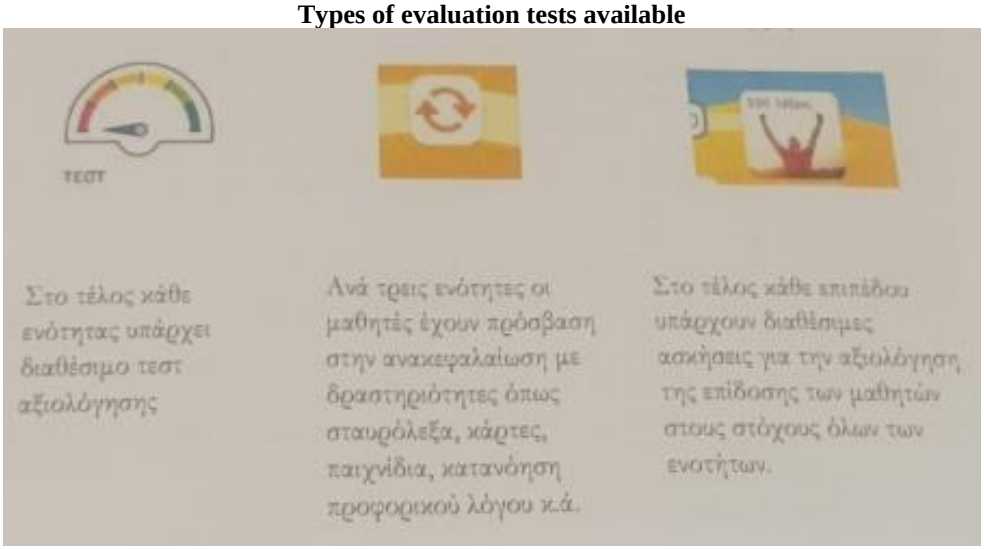
Image 7
Students collaborating



When teaching using the Akelius platform, it is preferable to arrange the classroom desks in groups (up to six people), in order to facilitate collaboration and interaction between students (images 6-7). The assigned activities may be collaborative or individual, but in any case discussion and mutual assistance are encouraged. After all, student interaction is the desired outcome of the intercultural educational model (Pavlidou, 2019).

Through the Akelius digital language course, students and teachers can choose among a variety of available tests and quizzes for the evaluation or self-evaluation of their progress, either at the end of each unit, or per three units, or overall at the end of each level (Image 8).

Image 8
Types of evaluation tests available



CONCLUSION

Rapid social changes have shaped the challenges and demands that education is called upon to respond to in recent years. Both the entry into a digital era and the population changes due to refugee and migration flows have brought about the necessity of readjusting Greek language teaching methods and integrating blended learning practices, intercultural education and the use of new digital tools. There is a need for a more student-centered teaching approach, where the teacher will have a guiding role. In this context, UNICEF, in collaboration with the NGO METAdrasi, have developed the Akelius program in public schools and non-formal education centers, since 2021. Positive features of the Akelius digital course include the attractiveness of the tool, its ease of use, the possibility of collaboration between students and the personalization of the teaching content, as well as the social aspect of the tool itself.

The use of the application, according to quantitative and qualitative research, has been associated with visible improvement in various areas of Greek language learning. Specifically, in a sample of 949 students, there was an 8% improvement in listening comprehension, 25% in speaking, 9% in reading and 34% in writing, compared to students who have not used the application, while there was no significant difference between the performance of boys and girls. Beyond the obvious and measurable benefits in learning the Greek language, students become familiar with the use of technological equipment, as the ability to autonomously use the devices within the context of the lesson is one of the requirements of the program. The difference therefore of this tool compared to other digital media used in the classroom is the interactive nature and the commitment required from students, who do not have a passive role, but actively participate in the process. At the same time, significant benefits have also been noted for teachers, which include better classroom management when using ICT, mastery of blended learning techniques and differentiation of teaching, better management of curricula and integration of Akelius into them, development of ICT skills and better guidance of students in their use.

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IMPLEMENTATION OF WEBQUESTS ALIGNED WITH THE PRINCIPLES OF INCLUSIVE DIGITAL EDUCATION WITHIN THE FRAMEWORK OF THE ERASMUS+ KA210 PROJECT "MEDITERRANEAN DIET FOR OVERALL HEALTH"

Mylona Aspasia
Teacher PE88.04
1st EPAL Nafpaktou
Nafpaktos, Greece
e-mail: milonaaspasia@gmail.com

Soukou Anthi
Teacher PE88.01
2o Esperino EPAL Acharnon
Acharnes, Greece
e-mail: anthiegeop@gmail.com

Schizas Aristeidis
Teacher PE86
2o Esperino EPAL Acharnon
Acharnes, Greece
e-mail: arschizas@gmail.com

ABSTRACT

This paper aims to highlight the effectiveness of the use of WebQuests as an Inquiry-Based teaching approach aligned with the principles of Inclusive Digital Education. The exploration and implementation of this method took place within the framework of the Erasmus+ project "Mediterranean Diet for Overall Health" (MedDiet4Health), which is an approved Erasmus+ KA210 initiative involving two Vocational schools in Greece (in the field of Agriculture, Food and Environment), one General Secondary School in Slovakia and a non-governmental organization (NGO) in Turkey.

This 18-month project aimed at designing a three-modules digital course that integrates the Mediterranean Diet into daily teaching practice. The course supports the Sustainable Development Goals (SDGs), with a particular emphasis on target 4.7 and the goals 2, 12, 14, 15 and 17, contributing to the development of learners' knowledge and skills for the promotion of sustainable development and lifestyles, cultural diversity awareness and the role of culture in sustainability.

Within this context, 60 WebQuests were developed, implemented by pilot students and redesigned in alignment with the principles of Inclusive Digital Education. These WebQuests explore the Mediterranean Diet both as an element of cultural heritage and as a sustainable, healthy dietary model, encouraging commitment to its values. Additionally, 20 more WebQuests were created to support the celebration of international awareness days connected to the project themes.

The paper presents the theoretical framework, the stages of development and implementation and the assessment tools used. It also offers a reflective analysis of the teaching practices applied during the project and presents the outcomes achieved.

Keywords: WebQuests, Mediterranean Diet, Inclusive Digital Education

INTRODUCTION

In the era of digital transition, education is called upon to meet the challenge of integrating Technology in ways that promote equity and inclusion, ensuring that no student is left behind regardless of his identity, background or ability (Mairal-Llebot et al.,2024). While digital transformation comes with its challenges, it also offers a valuable opportunity to modernize teaching practices by expanding access and enhancing student participation.

Within this context, Information and Communication Technologies (ICT) have become a key pillar in shaping an educational environment that fosters equity and inclusion. According to the European Union's "Digital Education Action Plan" the use of ICT in teaching can overcome geographical and cultural barriers, contributing to the creation of a more inclusive learning environment (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2023). At the same time, digital learning tools respond to students' individual needs by enabling personalized feedback and supporting the development of self-regulation skills that are critical to their educational journey (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2023; D'Elia et al., 2025).

Inclusive Digital Education emerges as a crucial approach that leverages the potential of digital tools to ensure equal and meaningful access to quality education for all learners (European Commission et al., 2021; UNESCO, 2021). It is based on theoretical models such as Universal Design for Learning (UDL), Multimodal Learning Theory and Vygotsky's Sociocultural Theory, which promote flexibility, variety in teaching tools and dynamic interaction between learners and their educational environment. Its principles are organized around four core pillars: a) accessibility and digital equity, b) differentiated and personalized learning, c) collaborative and participatory learning and d) digital empowerment and critical literacy (Helsper, 2012; Park, 2017).

Multimodal Learning Theory is particularly significant for differentiated instruction, positing that learning becomes more effective when information is presented through various formats, such as text, visuals, audio, video and interactive tools (Johler & Krumsvik, 2024). Its application is essential in Inclusive Digital Education, as it enables instructional adaptation to diverse students' needs, including learners with special educational needs (SEN). Digital technologies provide multimodal tools (e.g., audiovisual materials, interactive simulations, multimedia platforms) that allow students to choose the format that best supports their reception, processing and expression of knowledge (McIlroy, 2025). This approach is closely linked to the principles of UDL, which promotes equal access to learning through differentiated presentation, engagement and expression (CAST, 2018).

Universal Design for Learning (UDL) encourages the development of flexible learning environments that accommodate diverse learning needs. With the use of multiple media and forms of interaction, UDL ensures that all students, including those with learning difficulties, have equal opportunities to participate in the learning process (CAST, 2018). Within Inclusive Digital Education, UDL principles help adapt tools to each student's needs, enhancing inclusivity and personalization (Meyer et al., 2014).

Additionally, Vygotsky's Sociocultural Theory views learning as a dynamic process of social interaction, where the learner is not a passive recipient of information but an active participant in knowledge construction through engagement and guided support (Morcom, V., 2014). Central concepts such as mediation, scaffolding, internalization and inner speech are essential to inclusive education, facilitating students- especially those with special educational needs- to succeed with the right support (Goodman & Goodman, 2014; Mishra, 2013; Radford et al., 2015; Stasinos, 2013). These support processes enable students to overcome obstacles and develop their abilities, contributing to their social and psychological growth (Bickhard, M.A., 2013; Shabani, K., 2016). Vygotsky's theory has significant implications for educational practice. First, it encourages collaborative learning among students of varying ability levels, fostering rich learning environments where knowledge is built collectively. Second, it introduces the principle of gradually withdrawing support, allowing students to take increasing responsibility for their learning (Dlamini, R. (2023). When applied to computer-supported collaborative learning environments, this theory emphasizes the importance of support and personalization through technology. Mediation plays a critical role in Inclusive Digital Education, as technologies serve as tools that enhance learning, personalize instruction and help students overcome barriers (Fadeev, 2019; Morcom, 2014). Scaffolding is implemented through digital tools that allow educators to tailor instruction, supporting students' potential (Coleman & Rourke, 2010; Goodman & Goodman, 2014). Internalization is facilitated by interaction with digital tools, transforming social learning into individual knowledge and strengthening problem-solving skills (Dhingra et al., 2024; Shabani, 2016). Finally, inner speech is enhanced through digital tools that promote reflection, self-regulation and critical thinking (Shabani, 2016; Vladimirovna et al., 2020).

In this context, the present paper explores the potential of WebQuest as an innovative and effective teaching method aligned with the principles of Inclusive Digital Education and Universal Design for Learning (UDL). As an Inquiry-based learning strategy, WebQuest enables students to search, analyze and evaluate information from online sources while developing critical thinking, collaboration and digital literacy skills (Shaposhnikova et al., 2022). It is a student-centered approach that encourages learning in online environments, where teachers guide students through curated lists of relevant sources (Wang, 2021). Based on constructivism, the WebQuest model offers structured learning support (scaffolding), allowing students to draw on prior and current experiences to organize information and solve problems (Wang, 2021). WebQuests typically consist of five phases: (a) the introduction, which presents the topic and activates student interest, (b) the task, which defines the challenge, (c) the process, outlining activity steps with selected online resources (links, articles, videos, interactive material), (d) the evaluation, which sets assessment criteria and (e) the conclusion, offering opportunities for reflection and feedback (AlShamsi, 2024; Shaposhnikova et al.,2022). Through WebQuests, students engage in analytical and synthetic thinking while enhancing their logical reasoning skills (Cigrik & Ergul, 2010; Dodge, 2001).

This paper presents in detail the design, implementation and evaluation of WebQuests created within the Erasmus+ project "Mediterranean Diet for Overall Health" (MedDiet4Health) (Pr. numb.: 2023-2-EL01-KA210-VET-000183592). These WebQuests were applied in real educational settings to showcase the practical value and effectiveness of the method with a special emphasis on how the integration of Inclusive Digital Education principles and UDL enhanced the functionality and accessibility of the learning environment, contributing meaningfully to the equal participation of all learners. Based on data collected from classroom implementation, this work provides a well-grounded evaluation of outcomes and offers insight into how WebQuests can serve as a powerful tool for inclusive education, empowering teachers to design and deliver digital learning experiences that meet diverse learner needs.

METHODOLOGY

In the Erasmus+/eTwinning project *"Mediterranean Diet for Overall Health"* (MedDiet4Health), teacher from 3 countries, taking into account that: a) sustainable food systems have emerged as a global priority, since food production is directly linked to environmental degradation, including deforestation, water scarcity and carbon emissions; b) the growing global movement for sustainable food systems has made it essential for educational institutions to integrate this awareness into their curricula; c) schools are increasingly adopting interdisciplinary approaches that connect environmental science with students' everyday actions and choices (i.e. their dietary habits and routines), a fact that strengthens students' awareness and knowledge of the environmental impact of their actions, highlighting the critical role of nutrition in achieving a sustainable future; d) by linking nutrition, health and environmental education, schools can equip students with the necessary skills and knowledge to address these challenges, integrated these principles by combining cultural and environmental education with practical vocational training and digital education technologies, aiming to develop a comprehensive digital course utilizing the eTwinning/ESEP European School Education Platform.

MedDiet4Health is a KA210 VET Erasmus+/eTwinning project that aims to explore: a) the role of food as a foundation of cultural identity and community continuity, through the values of hospitality, neighbourliness, intercultural dialogue and creativity, b) the role of greater adherence to the Mediterranean Diet in promoting environmental sustainability, c) a set of skills, competences, knowledge and practices required for job placement in the food system. The project's international partnership, which includes two Vocational Education schools from Greece, a General Education Secondary school from Slovakia and an NGO from Turkey, provides a culturally diverse platform for collaborative learning. Through the systematic use of digital educational tools and the implementation of the innovative STE(A)M methodology, the project aims to promote interdisciplinary learning and the development of sustainable life practices. This approach encourages students to think critically and creatively, integrating knowledge from various fields such as science, technology, engineering, arts and mathematics.

A digital course, structured in three modules, was collaboratively created by the partners, making use of WebQuests and applying the STEM (Science, Technology, Engineering and Mathematics), CLIL (Content and Language Integrated Learning) and IBSE (Inquiry-Based Science Education) methodologies. These methodologies not only enhance learning but also offer clear benefits for environmental education (Dillon & Herman). In total, 60 WebQuests were created, with 20 additional ones under development, focusing on themes related to the celebration of global awareness days connected to the project's topics. More specifically:

Module 1, entitled "Addressing Climate Change and Environmental Behavior with an Emphasis on the Environmental Dimensions of Food Production and Processing", consists of 15 WebQuests. It explores the complex and critical issue of climate change, investigating its causes, effects and profound impact on both human and planetary health.

Special emphasis is placed on the environmental dimensions of food production and processing, aiming to help students understand the complexity of this global challenge and explore sustainable solutions that promote both environmental and human well-being.

Module 2, entitled "General Health and Nutrition through the Lens of Sustainability, with an Emphasis on the Mediterranean Diet" consists of 18 WebQuests. This module revolves around key concepts and principles related to health, nutrition, and sustainability. Students will have the opportunity to deeply explore the rich cultural heritage of the Mediterranean Diet, along with its significant health benefits and its contribution to environmental sustainability.

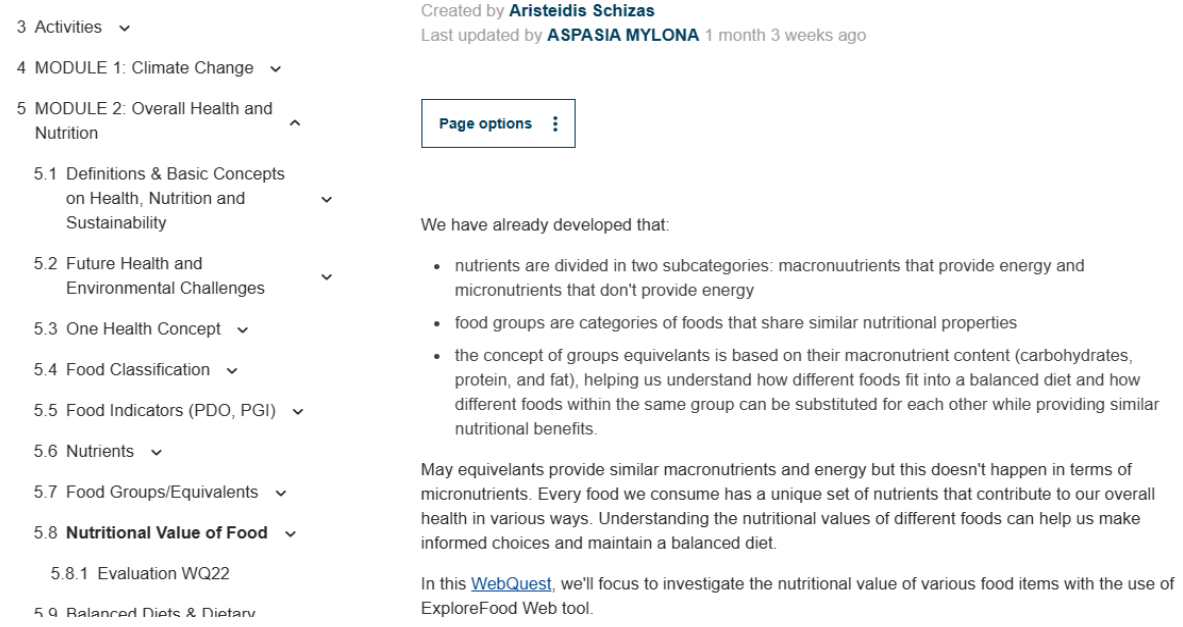
Module 3, entitled "The Mediterranean Diet as a Healthy Model for People and the Planet" consists of 27 WebQuests. Through an interdisciplinary approach, this module guides students to explore the cultural heritage, health benefits, and environmental sustainability associated with the Mediterranean Diet. The aim is to foster a holistic understanding of how dietary choices affect personal health and the environment, while promoting a deeper appreciation for the Mediterranean Diet as a model for overall health (One Health approach).

The digital course was implemented by pilot students and evaluated using Google Forms during the summer and up to the first in-person learning activity held from October 1st to 4th in Samsun, Türkiye, by students from the participating organizations. Based on their feedback, the course was adapted to reflect how and what students want to learn, considering the specificities of Vocational Education and Training (VET) as well as the special educational needs that some students may have. For this reason, the pilot group included students with special educational needs, among whom one with a hearing impairment.

INTERVENTION

This intervention, entitled "Nutritional Value of Food," was implemented within the framework of the Erasmus+/eTwinning project MedDiet4Health, as one of the collaborative activities hosted on the TwinSpace platform (Image 1).

Image 1.
The intervention "Nutritional Value of Food" on the TwinSpace platform

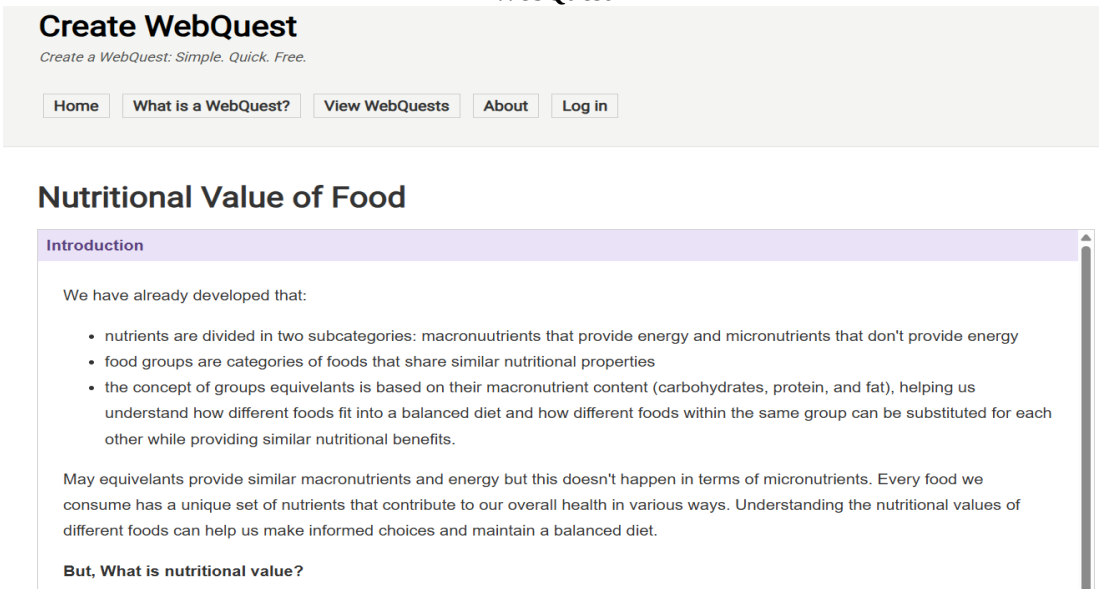


This specific WebQuest was created in the free 'Create WebQuest' platform and offers an innovative learning scenario that combines Inquiry- based learning, collaboration and the use of digital tools, aiming to promote nutritional awareness and foster critical thinking skills (Image 2).

It is addressed both to General and Vocational Secondary Education students and aims to explore the nutritional value of various foods, diets and recipes using the ExploreFOOD tool, as well as to create a nutrition label for a food item of their choice using the NutritionValue tool. This activity is suitable for multimodal and collaborative learning and can

be flexibly adapted to various educational contexts, giving students the opportunity to connect knowledge with their everyday life.

Image 2
WebQuest



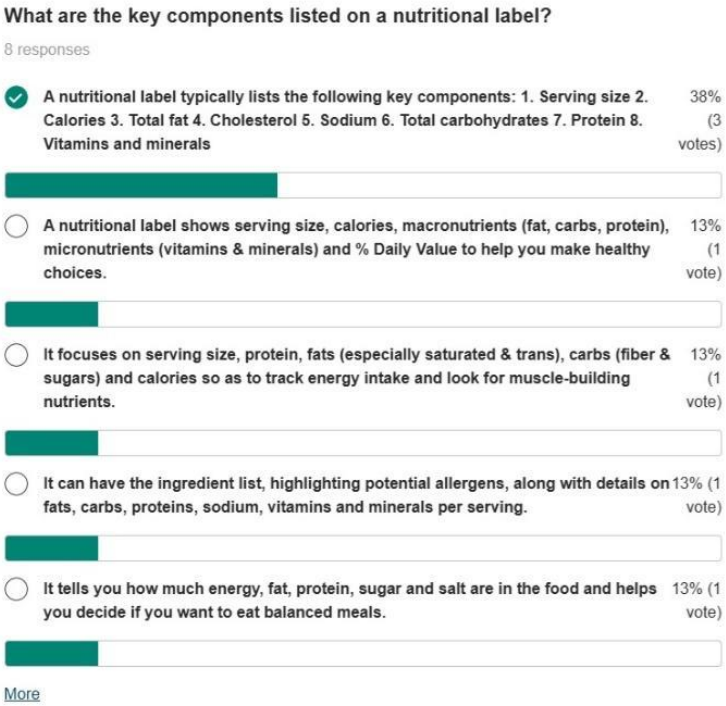
Students begin by watching a short presentation (Image 3) so as to get informed about the nutritional value of food and the factors affecting it. For the presentation, web2.0 tool Genial.ly was chosen for its ability to provide flexible and interactive learning environments, stimulating student engagement regardless of individual skills. It is considered a powerful tool in Inclusive Digital Education, offering accessibility, differentiation, and collaboration. The presentation includes audio narration for students with reading difficulties and offers quizzes and alternative assessment methods through gamification.

Image 3
Interactive Genial.ly presentation



A brainstorming session followed, using a TwinSpace poll (Image 4) regarding the key information typically found on food packaging concerning nutritional value. The use of the poll was intentional, as research shows it: a) encourages active student participation, b) promotes inclusion, c) provides a student-friendly assessment process, d) supports collaborative learning through class-wide discussion of the results.

Image 4
TwinSpace poll



After the whole-class discussion, a follow-up conversation on food labelling was held. Students were given: a) a link to an interactive presentation on food labels using multimodal materials and simplified language (https://www.accessdata.fda.gov/scripts/interactivenutritionfactslabel/default.cfm) and b) a selection of relevant scientific articles, so that they have options for receiving the information and can be better prepared before designing a food label for a product of their choice.

During the knowledge construction and application phase, students were asked to: a) select and research the nutritional value of the foods of their choice using the tool at https://www.nutritionvalue.org/; b) design a nutrition label using either the same tool https://www.nutritionvalue.org/ or the platform https://explorefood.foodafactoflife.org.uk/; c) analyze a daily diet plan they had collaboratively designed using Google Docs, again making use of the Explore Food tool.

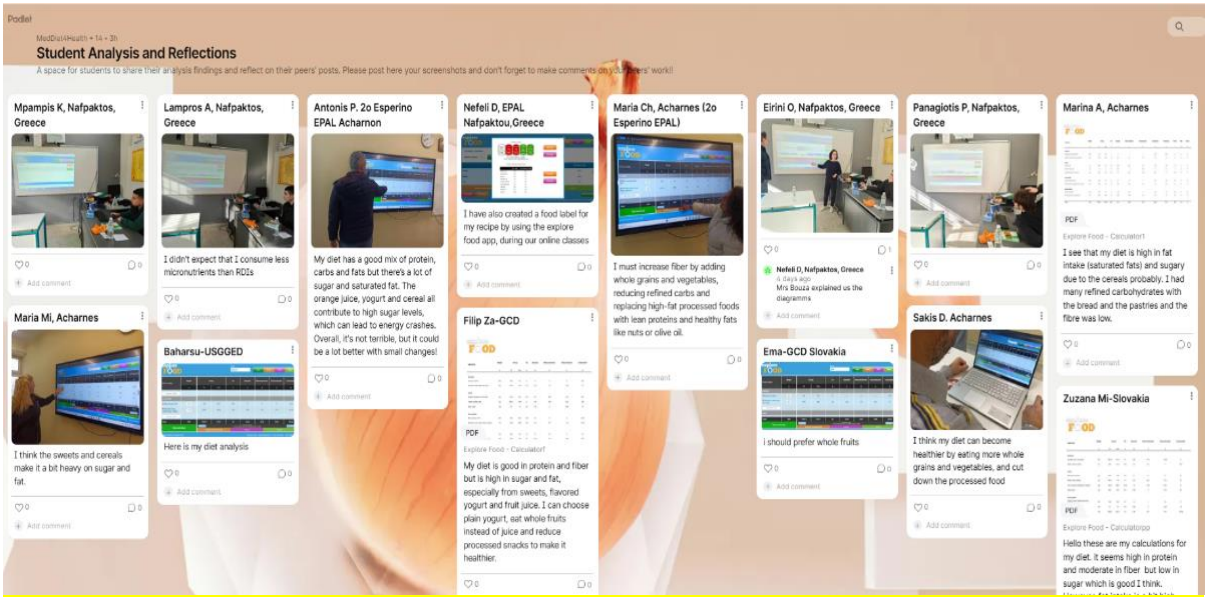
The instructions in the worksheets were detailed and clear and at the same time, students were given the option to listen to the instructions as audio (Image 5).

Image 5
QR code in the worksheet for audio instructions



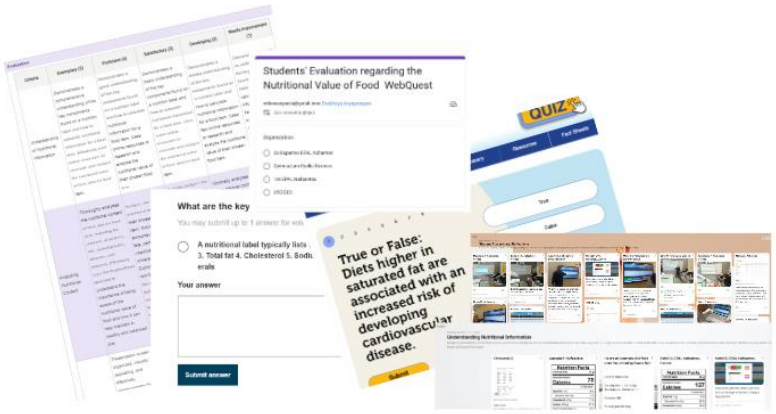
Students worked individually and collaboratively in heterogeneous groups. Finally, they were given the opportunity to upload their final projects on collaborative platforms such as Padlet (Image 6), in different formats, encouraging them to read and comment on their classmates' posts.

Image 6
Collaborative Padlet



Regarding the evaluation, in addition to an initial assessment conducted by 11 students from all participating organizations, who piloted the activity to suggest possible design improvements, the following methods were used self-assessment/assessment with a rubric, which was included in the WebQuest and co-designed with the students prior to the activity, formative assessment using differentiated tools (e.g., observations, student reflections) and evaluation of the activity by the students via a Google Form. The multiple forms of assessment enhances student reflection, as learners are encouraged to think about their learning journey, identify their difficulties and plan their next steps. Ongoing feedback contributed to improving the overall learning experience, amplifying students' voices and fostering a culture of inclusion and active participation within the digital environment. Special attention was given to flexibility in response and evaluation options (Image 7), aiming to create valuable opportunities for the continuous monitoring of all students' progress, while considering their diverse needs and modes of expression.

Image 7
Evaluation options for students



DISCUSSION AND CONCLUSIONS

This paper has highlighted, in a well-documented and multidimensional way, the contribution of the WebQuest methodology to the advancement of Inclusive Digital Education, through its implementation in the European

Erasmus+/eTwinning project *"Mediterranean Diet for Overall Health" (MedDiet4Health)*. The use of WebQuests, as a learner-centered, inquiry-based and collaborative learning approach, in combination with the principles of Universal Design for Learning (UDL) and the application of multimodal digital tools, enabled the creation of a flexible, participatory and accessible learning environment for all students.

The implementation of WebQuests within the project demonstrated high functionality and effectiveness, both in terms of developing digital and metacognitive skills and in cultivating critical thinking and collaboration among students from diverse cultural and educational contexts.

The integration of differentiated and multimodal assessment tools (such as rubrics, recorded instructions, digital platforms, quizzes, collaborative documents, and commenting tools) showcased the potential of technology to support the diversity of learning profiles, enhancing the participation of students with special educational needs and/or lower language and digital skills.

Special emphasis was placed on reflection and feedback, which formed an integral part of the process, empowering students to become more self-aware learners. Self-assessment, open expression of personal thoughts, and flexibility in the presentation of final projects highlighted the importance of the student voice in contemporary digital education, reinforcing democracy and inclusion in the school environment.

The use of WebQuest as an instructional strategy within the *MedDiet4Health* project can serve as a model of good practice, especially in the field of Vocational Education and Training (VET), where the connection between theory and practice, digital innovation, and cultural awareness is of central importance.

FINAL REFLECTIONS

The integration of WebQuests in inclusive education comes with certain challenges that require continuous adaptation and improvement. A major issue concerns linguistic accessibility, as activities must be formulated in simple and comprehensible language, while translation tools or text-to-speech features are also considered valuable for students with language or reading difficulties. At the same time, managing technological resources remains a challenge, particularly in ensuring equitable access to the internet and the permitted use of mobile devices within school settings. Finally, the personalization of activities continues to be a critical success factor, demanding flexibility in learning options and differentiated opportunities tailored to the interests and needs of each student.

The practical implementation of the project demonstrates that inclusive digital education is not a utopian or abstract concept, but a realistic and meaningful pedagogical approach that can offer all students equal opportunities for learning, growth, and personal empowerment. When WebQuests are well-designed, they can effectively serve the principles of Inclusive Digital Education, provided they are developed with a focus on accessibility, diverse learning needs, and the use of multimodal content.

The continued use of methods such as WebQuest, especially when combined with collaborative and intercultural frameworks like Erasmus+, can pave the way for a more inclusive, sustainable, and innovative educational future.

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TA9: The sustainable digital school

TA10: Best practices in the pedagogical use of digital technologies

A NEW APPROACH TO TEACHING NEW TECHNOLOGIES BASED ON FI AND FD COGNITIVE STYLES

Maria Chatzikyrkou
International Hellenic University
Thessaloniki, Greece
e-mail: maria.chatzikyrkou@gmail.com

Apostolos Tsagaris
International Hellenic University
Thessaloniki, Greece
e-mail: tsagaris@gmail.com

ABSTRACT

This proposal aims to highlight a new approach for the effective teaching of Robotics and New Technologies. To ensure a successful process, it is proposed to diagnose the learning styles of the learners and then to provide differentiated teaching that will achieve the intended inclusion and maximize learning outcomes. For this reason, the most well-known bipolar contrast regarding cognitive learning styles will be used, the one proposed by Witkin and his colleagues (1977) and distinguishes learners into two bipolar categories, namely those who learn without depending on their environment (Field-Independent Learners = FI) and those who make learning directly dependent on their environment (Field-Dependent Learners = FD).

Witkin and his colleagues' research led to the creation of a diagnostic tool, the Group Embedded Figures Test (GEFT), which measures the presence of the bipolar FI/FD characteristics in learners, and defines which of them tend towards the first and which towards the second category. Related research has shown that FI learners prefer to learn better by utilizing traditional means compared to learners belonging to the FD category. The latter are more influenced by their social environment than by their personal motivations, as well as by praise and criticism compared to FIs, who are more productive and egocentric, solve problems through intuition and utilize "true-false" testing strategies.

The different Cognitive Learning Style that each student possesses is part of the fundamental assumption that each child is unique, which means in simple words, various differences in cognitive and social development between children. Given that these characteristics affect learning, the field of Differentiated Teaching is considered one of the most appropriate educational approaches to manage all forms of diversity in the modern classroom, which aims to offer learning for each child individually, taking into account their particularities in the construction of knowledge and teaching. Therefore, Differentiated Teaching is a modern, child-centered and promising approach that includes many innovative approaches and at the same time a challenge for researchers and educators.

Teaching new technologies on the other hand is essential to prepare students for the future, develop their skills and create a digitally literate and innovative society. Living in a digital age, where technology permeates every aspect of life, students need digital skills to succeed in education, work and society and to equip themselves with the necessary knowledge and skills to meet the demands of the 21st century. After all, new technologies offer tools and platforms that encourage critical thinking, analysis and problem solving so that students learn to evaluate information, make decisions and create innovative solutions. Finally, teaching new technologies helps students develop digital literacy, that is, the ability to use technology responsibly, safely and ethically and to protect their privacy, recognize misinformation and avoid the dangers of the internet. In summary, this proposal analyzes the components of two learning styles, those who learn dependently on their environment and those who learn independently. Then, the method of planning activities based on differentiated teaching is explained so that the learning process is effective.

Keywords: Field-Independent Learners, Field-Dependent Learners, Cognitive Learning Style

INTRODUCTION

In recent years, research in the field of education — and specifically in the area of language development- has focused on students' learning styles as one of the key factors contributing to effective teaching and learning (Lin, 2023).

The most prominent experimental study was conducted by Witkin (1971), aiming to examine students' perceptual skills in relation to their personality, as a result of different ways of adapting to the world. According to Witkin (1977), cognitive style is a form of mental functioning that appears in an individual's intellectual and perceptual activities. In short, cognitive learning styles are related to the internal cognitive characteristics of the learner in processing information and are linked to the learners' responses to the broader environment (Witkin et al., 1971; Witkin et al., 1977).

An important classification of cognitive learning style, which includes an intuitive and analytical dimension of learning, is the Field Dependent and Field Independent learning style introduced by Witkin and Fellows (1977). These represent two fundamental domains of cognitive learning, which reflect the way in which pattern recognition is processed and retained in memory. According to Witkin's scientific interpretation of field dependence and independence, a person's ability to identify a simple figure within a more complex one is considered a field-independent trait, while individuals who struggle to detect such details are characterized as field-dependent (Grigorenko & Sternberg, 1995). More specifically, in field-dependent pattern recognition, the parts of a whole are perceived as "fused together," while in field-independent processing, the individual is more likely to perceive the parts as distinct from the organized background (Witkin et al., 1971).

Messick, in turn, found that field dependence occurs when a student's perception is strongly influenced by the surrounding environment, whereas field independence arises when a student perceives more or less regardless of the environment (Messick, 1984).

Extensive research conducted on these two cognitive learning types has shown that the learning style to which each student belongs significantly influences their academic performance, particularly in problem solving. Problem solving can be defined as the generation of new problems and mathematical questions, and the reformulation of those problems may effectively lead to their solution. However, most study results indicated that field-dependent individuals performed worse in problem-solving tasks compared to field-independent individuals. This is mainly due to the latter's ability to break down a problem into smaller parts and their particular skill in noticing problem details.

Silver and Cai (1993) found a strong relationship between mathematical ability and the capacity to solve and pose problems, indicating that mathematically capable students can also generate problems. Additionally, in terms of personality development within each group, field-dependent individuals tend to rely more on others, and their interpersonal and communication skills are more developed compared to field-independent individuals. This type of personality suggests a more systematic learning style. On the contrary, field-independent individuals are more competitive and self-reliant, showing individual interests and more advanced skills in problem-solving and hypothesis testing.

In conclusion, Witkin and Goodenough (1981) found that child-rearing practices are influenced by whether an individual has a field-dependent or field-independent cognitive style, as family environments shape this orientation early in life, and parental authority encourages more or less dependency accordingly.

STATE OF THE ART

Research interest in cognitive functioning and cognitive learning style has emerged as a result of efforts by cognitive and developmental psychologists to clarify the processes underlying the individual differences in learning styles(Kozhevnikov et al., 2014). According to Habieb-Mammer et al. (2001), cognitive styles act as strong variables that influence students' academic performance, such as professional preferences, continuous academic development, teaching methods, and the interaction between students and teachers within the classroom. Cognitive style is described by many scholars as an aspect of personality that influences attitudes, values, and social interactions (Davis, 2006).

The most well-known and dominant approach to cognitive style is the Field Dependent / Field Independent learning style. As previously mentioned, these are two opposing learning styles, referring to the individual's ability to perform perceptual tasks (Riding & Cheema, 1991). Witkin's research showed that field-dependent individuals perceive the environment more holistically—students dependent on their surroundings "see the forest", whereas field-independent individuals are able to distinguish elements as separate from the field—they "see the tree within the forest" (Hasanah & Masduki, 2024).

Witkin and his collaborators developed several tests over time to assess each student's cognitive learning style. In fact, Witkin dedicated much of his academic career to developing various measures of learning style. The Group Embedded Figures Test (GEFT) is the most widely used version for measuring cognitive style. It was created by Witkin, Oltman, Raskin, and Karp, aiming to offer a more adaptable version of the Embedded Figures Test (EFT) for group administration. The GEFT places the individual on a continuum between field dependence and field independence (Witkin et al., 1971).

The test has a covert evaluation structure, in which a series of simple figures is embedded within a more complex pattern. It includes three parts: the first part, considered introductory, consists of seven tasks. The other two parts are scored and include nine tasks each. In total, it contains 18 complex figures, where the participant must identify a simpler shape within 20 minutes. It can be administered individually or in groups to children and adolescents. Participants are given instructions to describe the shapes they identify. Scores range from 0 (lowest) to 18 (highest).

Because the scores from the field dependence/independence test form a continuous distribution, they reflect a tendency toward one perceptual orientation or the other. Therefore, lower scores indicate difficulty in locating simple figures and lower restructuring ability, characteristic of field-dependent learners. Higher scores belong to field-independent learners, reflecting greater ability to detect simple figures and stronger restructuring skills.

Finally, Boyd, Westfall, and Stasch (1985) argue that this is a preferred method for assessing cognitive learning style, as students are unaware of the test's subject matter and therefore are not biased in their responses by prior knowledge.

METHODOLOGY

The purpose of the present study is to investigate the impact of Field Dependent / Field Independent (FD/FI) cognitive learning styles on the teaching of educational robotics to preschool children, using the GEFT educational tool and through the design of an appropriate educational scenario.

The usability of the methodology will be examined based on five key usability dimensions:

- Effectiveness,
- Efficiency,
- Satisfaction,
- Ease of Use, and
- Ease of Learning,both from the perspective of the learner and the instructor.

The research is guided by the following research questions:

- Is usability influenced by gender (boys/girls)?
- Is usability influenced by learning style (Field Independent / Field Dependent)?

The sample consisted of 40 preschool children, including 16 girls and 24 boys, aged 4 to 6 years. The questionnaire was completed by the children with the help of their teacher. Sampling was conducted using the simple random sampling method, and the sampling frame was the list of enrolled children in kindergartens. The children who participated had no prior experience with the Bee-bot robot.

It is important to note that anonymity of the participants was maintained to ensure ethical integrity and data privacy. The research was based on the standardized "Mechatronic System Usability Evaluation" questionnaire, designed and developed by Apostolos Tsagaris (Tsagaris, 2023). This tool assesses the usability of educational robotics systems used by educators, in order to collect the opinions and experiences of participating teachers. The data was then statistically processed, leading to the formulation of conclusions, while the researcher also conducted observations, using a pre-designed observation form based on the same framework.

EXPERIMENTAL RESULTS

Out of the 40 students, 26 were introverted and belonged to the Field Dependent (FD) learning style, while 14 were extroverted and belonged to the Field Independent (FI) learning style. Therefore, the majority of students in the sample tend to be field dependent (FD) rather than field independent (FI).

Furthermore, regarding learning style by gender, 15 boys were identified as FD and 9 as FI, whereas among the girls, 10 were FD and 6 were FI. We can conclude that more boys tend to exhibit an FD learning style compared to girls.

Research Question 1: Is usability influenced by gender (boys/girls)?

It was observed that girls showed slightly higher response scores across all usability categories, with the greatest differences appearing in effectiveness and satisfaction. Additionally, ease of use and learning was found to be nearly identical between genders; however, boys showed greater variability in learning scores compared to girls.

The mean values for each group were found to be very close, indicating that usability may not be influenced by gender—a finding that was further examined through statistical analysis.

Normality Test

A normality check was first performed for the mean usability responses of each gender group. In both tests, the p-values were greater than 0.05, indicating that the null hypothesis of normality is not rejected—that is, the data follows a normal distribution for both groups.

T-Test for Equality of Means

To determine whether there is a statistically significant difference between the mean usability scores of boys and girls, a hypothesis test was conducted using the t-test, as follows:

H_0 (null hypothesis): The mean values are equal ($\mu_1 = \mu_2$)

H_1 (alternative hypothesis): The mean values differ ($\mu_1 \neq \mu_2$)

The test results showed that the variances of the two samples (boys, girls) are equal, and the p-value for the equality of means was 0.125, which is greater than 0.05. Therefore, we do not reject the null hypothesis at the 5% significance level, meaning that the means do not differ significantly—with at least 95% confidence, we conclude that usability is not influenced by gender.

Research Question 2: Is usability influenced by learning style (FI/FD)?

It was observed that field-independent learners (FI) showed slightly higher response scores across all usability categories, with the largest differences appearing in satisfaction and ease of use. Additionally, effectiveness, efficiency, and ease of learning were nearly the same across both learning styles. However, among field-dependent learners (FD), greater variability was found across all categories except for effectiveness, where the variability was lower.

The mean values for both groups were close, suggesting that usability may not be influenced by learning style, though this observation was further tested statistically.

Normality Test

A normality test was first conducted on the mean usability scores for each learning style group. The p-values were greater than 0.05, indicating that the null hypothesis of normality is not rejected—thus, the data can be assumed to follow a normal distribution in both groups.

T-Test for Equality of Means

To determine whether the mean scores differ significantly between learning styles, a hypothesis test was conducted using the t-test, as follows:

H_0 (null hypothesis): The mean values are equal ($\mu_1 = \mu_2$)

H_1 (alternative hypothesis): The mean values differ ($\mu_1 \neq \mu_2$)

The test results showed that the variances of the two samples (FD and FI) are equal, and the p-value for the equality of means was 0.055, which is slightly above 0.05. Therefore, the null hypothesis is not rejected at the 5% significance level, meaning that the mean scores do not differ significantly.

Thus, we conclude that usability is not influenced by learning style.

DISCUSSION

Research Question 1: Is usability influenced by gender (boys/girls)?

By comparing the usability levels of girls and boys after collecting and analyzing their observation data, it was found that the mean scores of the observations were 3.77/5 for girls and 3.69/5 for boys, which appear to be nearly identical. The variance analysis showed that the learning rate among boys varied more from individual to individual, while girls demonstrated greater consistency. The distributions of the two observation samples were found to be normal, and the test for equality of means was statistically significant, providing at least 95% certainty that usability is independent of gender.

Research Question 2: Is usability influenced by learning style (FI/FD)?

By comparing the usability levels of field-independent and field-dependent learners, the mean observation scores were found to be 3.78/5 and 3.68/5, respectively—again showing very little difference. The variance analysis indicated that usability among field-dependent learners varied more from person to person, while field-independent learners showed greater consistency in observations. The distributions of both samples were normal, and the equality of means test was statistically significant, providing at least 95% confidence that usability is independent of learning style.

Overall, the study concludes that educational robotics tools, such as the Bee-bot, are highly usable by children and can be effectively used regardless of gender or cognitive learning style. For future research, a factor that could play a more central role is the child's prior experience with educational robotics systems, as levels of familiarity with technology may vary significantly.

Additionally, the subject of educational robotics is progressing rapidly at the preschool level, demonstrating that its usability is being successfully embraced by educators. Therefore, it is clear that this research has multiple implications and can contribute to the improvement and wider adoption of educational robotics in early childhood education.

CONCLUSION

In the present study, an attempt was made to evaluate the usability of a proposed educational methodology related to the teaching of educational robotics to preschool children, utilizing the different FI/FD learning styles. The central figures in this usability evaluation were both the learners (children) and the instructors (educators).

More specifically, the methodology was based on an educational scenario using the Bee-bot robotic tool. The research was conducted in a two-class public kindergarten, and the sample consisted of 40 children, both boys and girls. With the help of the GEFT educational tool, this sample was divided based on cognitive learning style into Field Dependent (FD) and Field Independent (FI) learners. From the total of 40 children, 32 were randomly selected to participate in the usability evaluation of the specific methodology in relation to gender and learning style.

In more detail, based on the answers of the 40 children to the introversion–extroversion questionnaire and the use of the GEFT tool, the study's findings showed that most students tend to be field-dependent (FD) rather than field-independent (FI). This leads to the conclusion that most children learn through their environment, relying more on others, and exhibiting stronger interpersonal and communication skills. Regarding gender, the majority of field-dependent learners were boys, which was expected given that there were more boys than girls in the sample.

Before comparing usability scores across different groups, it was generally observed that the children demonstrated high ease of use and ease of learning with the system, compared to lower levels of efficiency in completing tasks.

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THE USE OF THE INTERNET IN LANGUAGE EDUCATION IN THE 3RD GRADE OF THE GREEK SENIOR HIGH SCHOOL (LYCEUM)

Gkaravelas Konstantinos
Assistant Professor, Department of Philosophy,
University of Ioannina
Ioannina, Greece
e-mail: kgkaravelas@uoi.gr

Christou Theophano
Postdoctoral Researcher, Linguistics Division, Department of Philology,
University of Ioannina
Ioannina, Greece
e-mail: t.christou@uoi.gr

ABSTRACT

This paper presents a teaching proposal developed in the context of language education for third grade students in the Greek senior high school (Lyceum) on the topic of gender-based violence, considering the requirements of the new curriculum for language education in the Greek senior high school (Lyceum). The project is based on the use of Information and Communication Technologies (ICT) in language education and is implemented through a WebQuest structured according to the model proposed by Dodge (1995). The purpose of WebQuest is to familiarize students with authentic language material and to work collaboratively and creatively on a topic that is familiar to them and sparks their interest. The first section provides a theoretical introduction to the use of the Internet in language teaching, followed by a brief explanation of the term "WebQuests" and a presentation of the six phases of this teaching proposal.

Keywords: Language Education, Internet, Critical Literacy, WebQuests

INTRODUCTION

In recent years, the integration of digital technologies into educational practice has transformed the landscape of language teaching and learning. The increasing accessibility of the internet has not only enriched the variety of authentic language materials available to teachers but has also opened up new opportunities for student engagement, critical thinking and collaborative learning.

In the context of secondary Greek education, especially in the third year of senior high school (Lyceum), there is an increasing need to align language teaching with real-world issues and the evolving literacy of the digital age. The revised curriculum (2021) for language teaching encourages the development of critical reading and writing skills and emphasizes students' ability to interpret, evaluate and respond to complex social texts and phenomena.

In this context, the definition of literacy has expanded significantly, as it is now viewed as a socially situated practice rather than a purely technical skill. Text is placed at the center of language education, not merely as a vehicle for communication, but as a construct shaped by social purpose and discourse conventions. As Cope and Kalantzis (1993) point out, Genre can be understood as a category that links the social purpose of a text to its linguistic structure. Consequently, effective literacy education requires students to critically examine the various social purposes underlying recurring patterns in language — essentially, to understand both the reasons for and the mechanisms behind textual conventions. The pursuit of this goal is understood as a socially oriented process aimed not only at the effective use (production and comprehension) of discourse, but also at the formation of a critical attitude towards any text structure. This is also the context of the Modern Greek Language curriculum for grades A, B and C of the Greek senior high school (Lyceum) (Institute for Education Policy, 2021), which typically states that "The subject of Modern Greek Language contributes decisively to the preparation for active participation in social and political life, the formation of social empathy and the status of an academic citizen and/or a future professional".

The development of technology has expanded the concept of literacy, namely the effective use of technological means. This has led to an expanded concept of literacy that includes the ability to use technological media. Therefore, the use of technological media in language education is considered essential in a course based on the principles of critical literacy.

One of the most widespread technological tools is the internet, which in recent decades has entered most areas of human activity, including education. It offers enormous potential in the fields of information, work, entertainment and science (Gkaravelas and Christou, 2012). By providing easy access to information from anywhere in the world, given the necessary technical conditions, it has reduced the distances between people and helped more people to share common experiences. This is an important fact for those involved in the design and implementation of educational programs today, because, until a few decades ago, geographical isolation was an extremely important differentiator that significantly influenced the academic development of students. For example, a study by Danassis-Afentakis (1988) found that the highest percentage of high-achieving students were born in Athens and in the capital cities of prefectures and provinces, while in a study conducted by Tzani (1988), it was found that in schools in underprivileged areas — where the environment is less supportive compared to public model experimental schools and schools in more developed urban areas — the number of high-achieving students is significantly lower, while the number of low-achieving students is significantly higher. Of course, this does not mean that the differences between students from urban and remote or non-urban areas have been eliminated. On the contrary, according to recent research, it seems that they still exist (Gkaravelas, 2019; OECD, 2024). However, we believe that this gap has narrowed to a certain extent, mainly due to the opportunities offered by the internet. However, the vast amount of information can easily tempt students into incessant and pointless searching (Gkaravelas and Christou, 2012). WebQuests offer a way out, as they are complex teaching/learning contexts that promote students' self-activity and activation through targeted and guided use of the internet (Dubs, 1996).

The advantages of WebQuests as a teaching tool are manifold and mainly related to the working context it provides. Even if the topic is not of great interest to the students, the working context (internet) is something that most students are familiar with, which makes the process even more interesting. Furthermore, WebQuests offer the possibility for students of different levels and heterogeneous groups to work, as there is the possibility to choose different activities even within one topic (Nárosy and Riedler, 2003). At the same time, as a group and participatory learning process, WebQuests offer students the opportunity to take on roles within the group, which acts as a learning stimulus (Vakaloudi, 2014). Finally, WebQuests offer students the opportunity to work on issues that are relevant to their lives through the authentic material they work with and the relevant real-life problems they are asked to deal with (Gkaravelas and Sevi, 2018).

This paper presents a teaching proposal that utilizes the WebQuest model to address the socially pressing issue of gender-based violence, within the framework of language education for the third grade of Greek senior high school (Lyceum). The proposed web-based activity, entitled "Gender-Based Violence", reflects the increasing concern over the recent rise in such crimes, which often escalate into femicides. Grounded in the principles of critical literacy and the integration of Information and Communication Technologies (ICT) in education, the intervention aims to enhance students' language skills, critical thinking, and social awareness through structured, technology-enhanced inquiry. By engaging with authentic online resources and working collaboratively, students are invited to investigate and justify the causes, forms, and consequences of gender-based violence and to propose viable, well-informed solutions. This project serves as an illustrative example of how the Internet can be meaningfully integrated into language education to promote both learn about an important social issue and think critically about it.

THE TEACHING PROPOSAL

Compatibility of the teaching proposal with the new modern Greek curriculum of the senior high school (Lyceum)

This teaching proposal has been designed to comply with the principles of the new upper secondary school curriculum (2021). This curriculum emphasizes learning in contexts where students can develop their independence and creativity and work in a differentiated way (Institute for Education Policy, 2021:15). Significantly, one principle of the school curriculum is stated as the student-centered approach, with an emphasis on discovery, cooperative, and action-based learning through the creation of situational environments to ensure student participation in educational practice (Institute for Education Policy, 2021:6).

The instructional proposal is also consistent with the overall goal of language instruction in high school. Significantly, the curriculum states that texts and the processes associated with them (reading and comprehension, analysis, interpretation, response, transformation and creation) are central to the aim of Modern Greek language education in the senior high school (Lyceum) (Institute for Education Policy, 2001:9). The proposed activities should always be placed in a communicative context with the aim of understanding, interpreting, analyzing and creating authentic discourse, and the texts should correspond to the students' interests and be accompanied by audiovisual material (Institute for Education Policy, 2019).

DESCRIPTION OF THE WEBQUEST

The proposed WebQuest, posted on a relevant platform (https://www.createwebquest.com/emfyli-bia), is a multimodal text, as the messages are conveyed in different semiotic ways (text, image, photo). This teaching proposal was designed based on the six phases of WebQuests proposed by Dodge (1995) and is presented below:

1. The first phase is the introduction, in which the topic to be covered is presented briefly and engagingly. The following wording was chosen for the proposed WebQuest:

Incidents of violence and crime, in whatever form - physical or psychological abuse, murder, rape, domestic violence, bullying, cyberbullying, theft, vandalism, arson, kidnapping, hooliganism, organized crime - are understandably all part of it. They undermine the possibility of harmonious social coexistence and have a significant psychological impact on those confronted with their various manifestations or the consequences thereof, as the use of violence against one person also has an impact on those in their immediate environment. (https://latistor.blogspot.com/2017/01/blog-post_30.html). One form of violence is gender-based violence, which has been on the rise in recent years.

2. Below you will find a report on the individual activities. This stage is about clearly formulating the individual questions that students should work on in their own way. These questions should target specific outcomes. The specific activities can include interactive, open or closed exercises to support the process. The following wording was chosen for this WebQuest in this second step:

Unfortunately, in recent years there has been an increase in gender-based violence crimes, often even resulting in homicide. At a conference organized by your municipality on the International Day for the Elimination of Violence against Women on 25.11., you have to analyze your positions on the following topics (300-350 words):

- the factors leading to the rise of the phenomenon
- the forms and consequences of the specific problem
- the proposed solutions to this important problem (words).

3. The next step is to define the process, which includes, among other things, the selection of the individual steps by the participants, the distribution of tasks among the members of the groups and the definition of a timetable for the completion of the process. In this WebQuest, the steps are described as follows:

Step 1: You will be divided into three groups of three people each. Each group chooses one of the three topics! (causes/forms and consequences/solutions).
Step 2: Each group will collect information on their topic. You have 20 minutes for this phase.
Step 3: Groups will discuss the results and prepare their presentation based on the material collected. You have 30 minutes for this phase.
Step 4: The groups will present the collected material to the rest of the class. Each group has 7 minutes to present their work to the rest of the group.
Step 5: Evaluation - discussion of the presentations (details can be found in the evaluation phase).
Step 6: Each student will write a text (essay) of (approximately) 350 words, depending on the group in which they participated.

4. The fourth stage of the teaching proposal is the presentation of the resources available to the students. These can be specific predefined websites but also pages from the textbook or anything else that can be used as teaching material. Students can find their own resources but should describe them in the presentation. The platform hosting the proposed invention does not have a predefined area for the resources. However, as they are an essential part of a WebQuest they have been listed at the end on the teacher's page of the used platform. We have used the following sources:

CAUSES:

https://www.psychology.gr/violence-abuse/2038-endooikogeneiaki-via-aiti...
https://www.eetaa.gr/via/symb_kentra/xios/eishghsh_2.ppt
https://www.gazzetta.gr/specials/2041034/giati-einai-se-exarsi-oi-gynai...
https://www.testpap.com/via-kata-gynaikon/

FORMS/NEGATIVE CONSEQUENCES:

https://www.psychology.gr/violence-abuse/2038-endooikogeneiaki-via-aiti...
https://www.philenews.com/f-me-apopsi/paremvaseis-ston-f/article/1151132
https://www.eetaa.gr/via/symb_kentra/xios/eishghsh_2.ppt
https://www.huffingtonpost.gr/entry/kakopoiese-yenaikon-tepoi-vias-kai-senepeies_gr_60053f73c5b697df1a070d2c

SOLUTIONS:

https://www.eliamep.gr/publication/%CE%B1%CE%BD%CF%84%CE%B9%CE%BC%CE%B5...
https://www.psychology.gr/violence-abuse/2038-endooikogeneiaki-via-aiti...
https://www.philenews.com/f-me-apopsi/paremvaseis-ston-f/article/1151132
https://womensos.gr/afises/
https://diotima.org.gr/services/via-kata-ton-gynaikon/

5. In the penultimate step, the students are informed about how and according to which specific criteria the evaluation/assessment of the process should take place. There are different ways to evaluate a WebQuest. In some cases, assessment grids combining qualitative and quantitative assessment are suggested, while in other cases a simple discussion on a specific topic is suggested. Based on the published examples, most WebQuests have their own way of evaluation, while others have none (WebQuests.ch, WebQuests.de). In the case of assessment, we believe that the method should be determined either by the teacher alone or in collaboration with the students and that it is very important that the students know in advance the criteria on which the assessment will be based (Gkaravelas and Sevi, 2018). For this teaching intervention, a discussion with qualitative features on two axes was chosen:

A. Content (e.g. suggestions for deficits)
B. In relation to the process (e.g. problems, suggestions, etc.)

The most interesting thing is that students think critically and discuss the work they have already done. In this way they will highlight their effort and improve possible weaknesses.

6. The conclusion of the process: The final step includes a report on the positive consequences of the students' research work in class. A summary report of what the students have learned follows at the end of the presentations. Preliminary formulations along these lines are as follows:

In the process we have just completed:
- You were informed about the dimensions of gender-based violence
- You have worked in a focused and organized way, individually and in groups.
- You found, selected, organized and presented your material.
I hope you found the process interesting!

To assess the effectiveness of the WebQuest-based learning activity, we employed a structured evaluation rubric with a quantitative approach (Table 1). The rubric includes three evaluation criteria: Organization, Content Understanding, and Orthography/Grammar/Syntax. Each criterion is rated on a scale from 1 to 4, with 1 representing the lowest level of performance and 4 the highest. The total score provides an overall indication of the students' performance during the webquest. Each criterion is assigned a score between 1 and 4. The final score is the sum of the three individual scores, allowing for a maximum of 12 points. This quantitative assessment offers a reliable method to evaluate student engagement, comprehension, and expression during webquest activities.

Table 1
Evaluation Rubric for WebQuests

Criteria	1	2	3	4	Scores
Organization	The students cannot understand the information presented.	The students make a great effort to understand the information.	The students understand the information.	The students understand the information very well.	
Content	The student has not understood the content and cannot answer questions on the topic.	The student has difficulties with the content and can only answer basic questions.	The student understood the content but cannot make connections to the topic.	The student has understood the content, can make connections and explain them.	
Orthography / Grammar / Syntax	The text contains many orthography, grammatical and syntax errors.	The text contains several orthography, grammatical and syntax errors.	The text contains only a few orthography, grammatical and syntactical errors.	The text contains no orthography, grammatical or syntax errors.	

CONCLUSION

In conclusion, we argue that WebQuests should become an integral part of any lesson aiming to develop students' critical literacy, initiative, and creativity. The primary reason is that, beyond exposing students to authentic communication contexts and genuine language material (Gkaravelas and Sevi, 2018), WebQuests create a differentiated learning environment. Within this environment, students are encouraged to evaluate, compare, make decisions, and synthesize information—skills that prepare them more effectively to assume the role of active and engaged citizens.

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DECIDING BASED ON DATA: AN INNOVATIVE INSTRUCTIONAL SCENARIO USING THE PROJECT METHOD IN A SECOND CHANCE SCHOOL

Apostolou Georgios
Mathematician (PE03)
International Hellenic University
Ioannina, Greece
e-mail: apgeorge2004@yahoo.com

Panagiotou Alexandra
English Language and Literature Teacher (PE06)
Secondary Education
Arta, Greece
e-mail: apanagiotou10@hotmail.com

Mari Maria
Computer Science Teacher (PE86)
Secondary Education
Filippiada, Greece
e-mail: mari.maria2@yahoo.gr

ABSTRACT

Second Chance Schools (SCS) constitute a significant educational institution aimed at adult learners, offering them a renewed opportunity to complete basic education and develop the knowledge and skills necessary for effective integration into the labor market and society. Within this context, an instructional scenario was designed and implemented using the project-based learning (PBL) method. The aim was to foster understanding of the importance of data and its role in informed decision-making.

Learners engaged with a contemporary and practical issue: how to make informed decisions based on data rather than subjective assumptions or misleading information. In an era where information is abundant yet often unreliable, the ability to analyze and interpret data is critical. Participants were trained to utilize tools such as online statistical resources, brainstorming, ChatGPT, SWOT analysis, descriptive statistics, Pareto diagrams, control charts, and Excel to process and evaluate information from various sources. The learning process began with an exploration of the importance of data and the scientific approach to truth-seeking and decision-making. Building on prior instruction in mathematics, computer literacy, and social sciences, learners acquired basic statistical skills and applied analytical practices to everyday situations. They then selected topics of personal or professional interest, collected and organized data, and used the available tools to analyze it. Through this process, they learned to distinguish reliable from unreliable sources, identify patterns and trends, and draw conclusions based on objective evidence.

Participation in the project significantly enhanced learners' self-confidence, as they witnessed firsthand the utility of data analysis and methodical thinking in decision-making. Furthermore, through collaboration and discussion, they developed skills in teamwork, reasoning, and reflective thinking. This pedagogical approach transcended the classroom, equipping learners with the competencies needed to become more active and informed citizens. The results of the implementation demonstrated strong engagement, as learners recognized the value of evidence-based thinking in both professional and personal contexts. This project can serve as a model for instructional practice that promotes critical thinking and scientific reasoning in decision-making, offering a meaningful learning experience tailored to the needs of adult learners.

Keywords: Second Chance Schools, Decision-Making, Instructional Scenario, Project Learning Method, Data.

A HISTORICAL OVERVIEW OF DECISION MAKING FRON ANTIQUITY TO THE PRESENT

The human capacity to make decisions did not suddenly emerge in the era of algorithms. Rather, it constitutes a primordial mechanism that has evolved in parallel with philosophy, science, and democracy. From antiquity to the present day, philosophers, thinkers, and scientists have pondered how correct decisions are made and what processes lead to truth. Plato was among the first to link knowledge with proper choice, which leads to truth and virtue. He believed that the Idea of the Good was the goal of knowledge, and that reason must govern emotions and desires (Goldin, 2020). His famous allegory of the chariot—in which reason reins in the horses of anger and desire—foreshadowed modern dual-process theories of thought: the emotional, fast system and the analytical, slow system of decision-making (Kahneman, 2011). Even at that time, it was clear that the internal conflict between logic and emotion posed a challenge to sound decision-making. The allegory of the cave, with its shadows, illustrates the limitations imposed by human nature and the environment on our pursuit of truth.

Aristotle took a more empirical approach. He introduced logical thinking through syllogisms, laying the groundwork for analytical reasoning (Irwin, 1999). In his Nicomachean Ethics, he developed the concept of phronesis—practical wisdom—as the capacity to choose the mean, that is, the balanced decision that promotes prosperity (Kraut, 2018). For Aristotle, knowledge was not merely theoretical but practical, enabling individuals to learn how to live better.

After the Middle Ages, during the Renaissance, modern philosophy focused on dismantling prejudice and challenging authority. René Descartes proposed methodological skepticism as the foundation of all rational processes. His famous assertion, *cogito ergo sum* ("I think, therefore I am"), placed the individual and their reason at the center of decision-making (Descartes, 1998). He advocated breaking down complex problems into simpler components and solving them gradually—a method still used today in problem-solving strategies. Around the same time, Francis Bacon recognized that the human mind is subject to systematic errors, which he called "idols." These idols—of the tribe, the cave, the marketplace, and the theater—distort thinking and must be eliminated to approach truth (Bacon, 2000). He promoted empirical observation and the inductive method, laying the foundation for scientific methodology and, by extension, evidence-based decision-making (Gaukroger, 2001).

Later, Thomas Hobbes and John Locke situated decision-making within the social and political realm. Hobbes asserted that humans act based on self-interest and survival (Hobbes, 1953), whereas Locke introduced the notion of freedom of choice through the concept of the social contract (Locke, 1821). In the 19th century, Karl Marx added a new dimension to decision-making, emphasizing that human choices are never neutral but are mediated by material conditions and social relations (Marx, 1867). According to Marx, ideological control influences how people think, and therefore, how they decide.

These philosophical traditions—from Cartesian rationalism and Baconian empiricism to Aristotelian ethical praxis and Marxist social critique—form the foundation upon which modern decision-making theories are built. Today, psychology, data science, ethics, and technology converge in a unified effort to understand how we make decisions—and how we might make better ones.

CONTEMPORARY METHODOLOGIES IN DECISION MAKING

Decision-making has evolved into a complex yet fascinating process that integrates science, technology, and human judgment. During the 20th and 21st centuries, it has become a subject of systematic study across multiple scientific fields: mathematics, psychology, computer science, economics, and sociology. All these disciplines converge on a common objective: to assist individuals in making more rational, evidence-based, and effective decisions, minimizing errors and leveraging available data. Statistics was humanity's first "ally" in decision-making under uncertainty. Since the 18th century, with the development of probability theory (Bayes, Laplace, Gauss), mathematical tools such as expected value and utility theory were introduced to guide the selection of optimal alternatives (Von Neumann & Morgenstern, 1944). Classical rational choice theory assumes a "rational" individual who seeks to maximize benefit. However, in the 1950s, Herbert Simon challenged this view and developed the concept of bounded rationality, explaining that humans cannot process all information and often settle for what is "good enough" (Simon, 1957). Later, Daniel Kahneman and Amos Tversky demonstrated that human judgment contains systematic biases—such as overconfidence and anchoring—and that we frequently employ cognitive shortcuts (heuristics) to make decisions (Tversky & Kahneman, 1974). In his influential work *Thinking, Fast and Slow* (2011), Kahneman distinguished between two "thinking systems" of the brain: the fast, emotional System 1 and the slow, analytical System 2, which modern decision methodologies aim to activate.

Data technologies have transformed how decisions are made. Data analytics enables the processing of vast volumes of information—from sales data to demographic profiles. Tools such as confidence intervals, correlation

matrices, and trend forecasting are now used daily in business and public administration (Provost & Fawcett, 2013). Research has shown that organizations embracing a data-driven decision-making (DDDM) culture perform significantly better. Brynjolfsson et al. (2011) found that such organizations are 5–6% more productive than average. However, data alone is not sufficient—interpretation, critical judgment, and the integration of empirical knowledge remains essential. Artificial Intelligence (AI) has introduced a new paradigm. Machine learning algorithms detect patterns in complex data, predict outcomes, and suggest choices—from medical diagnosis to automated investment management (Russell & Norvig, 2020). What matters today is the synergy between humans and machines. Studies such as that of Dietvorst et al. (2015) show that when humans have input in how AI is used, the outcomes improve. In other words, AI does not replace human judgment—it complements it. Humans remain responsible for ethics and final decisions.

Decision engineering has emerged as an interdisciplinary field combining cognitive science, management, and systems design to make decision processes more evidence-based and transparent (Buede & Miller, 2016). Tools such as decision trees, influence diagrams, and criteria matrices help deconstruct complex problems and assess alternative options. Though technical, this approach respects the human dimension—it anticipates teamwork, communication needs, and the avoidance of cognitive traps. No matter how advanced the tools are, they cannot replace critical thinking. Modern citizens must assess complex information, identify biases, and combine data with values. Second Chance Schools (SCS) can offer decision-making education in a grounded, accessible, and practical manner—helping learners recognize when a decision is emotional, when it is evidence-based, and when it is truly sound.

THE FUNCTION AND ROLE OF SECOND CHANCE SCHOOLS (SCS) IN ENCHANCING CRITICAL THINKING AND DECISION-MAKING SKILLS

Second Chance Schools (SCS) in Greece are not merely educational institutions; they are transformative spaces designed to offer adults who did not complete their basic education a renewed opportunity—not only for knowledge acquisition but also for recognition, empowerment, and active participation in society. Established in the late 1990s, SCS have integrated the principles of lifelong learning and social inclusion. Their focus extends beyond academic instruction to the development of personality and self-esteem, fostering learners' ability to think and act autonomously. This is achieved through an innovative, flexible curriculum that emphasizes the practical application of knowledge. The program structure encompasses thematic areas such as "Language and Communication," "Mathematics in Daily Life," and "Information Technology," all of which incorporate principles of experiential and active literacy. However, the distinctive impact of SCS is most evident through Counseling Support and Project-Based Learning. Counseling serves as a catalyst for personal development and goal setting, enhancing the decision-making process. Psychologists collaborate with educators to guide students in evaluating their options and organizing their thoughts. Project-Based Learning, on the other hand, connects knowledge with real-life applications. These projects, whether individual or collaborative and often interdisciplinary, encourage learners to identify problems, collect data, design solutions, and present their findings. This process effectively functions as a laboratory for critical thinking, where learners, through collaboration and problem-solving, learn to weigh alternatives and make informed decisions.

Moreover, SCS education is grounded in adult learning principles, recognizing that learners bring with them a wealth of experiences, knowledge, and perspectives. Through active methods such as discussions, brainstorming, and case studies, adult learners are encouraged to reflect, compare, and reassess their viewpoints. This approach enhances their ability to evaluate information critically and avoid cognitive biases—a fundamental aspect of critical thinking. A significant and innovative element is the use of digital media and multiliteracies, which bolster visual literacy and digital expression. Tools such as images, videos, and presentations empower learners to engage in social issues creatively, making technology a means of amplifying their voices.

The contribution of SCS to enhancing decision-making skills is corroborated by educators' testimonies. In a nationwide study, educators acknowledged the importance of projects, counseling, and re-engagement with learning as critical factors for the social and professional integration of learners. The educational philosophy of SCS aligns with the principles of critical pedagogy, particularly the work of Paulo Freire, who advocated for the development of "critical consciousness" through education. The formation of active, conscious citizens is a fundamental goal of SCS. However, as noted by Katsarou and Tsafos (2009), achieving this goal depends on the commitment and pedagogical approach of each school. The coexistence of individuals of different ages, nationalities, and experiences within the same educational environment creates a unique field of informal learning. Learners develop collaboration skills, respect for diversity, and collective decision-making abilities. These competencies transcend academic learning; they are life skills essential for modern citizens.

TEACHING SENARIO: DATA-DRIVEN DECISION MAKING

To link all the above in practice, we present a specific teaching scenario designed for a Second Chance School (SCS), aiming to cultivate data-driven decision-making skills. It leverages accessible technological tools such as Microsoft Excel, Word, PowerPoint, and ChatGPT. The scenario is built on a "learning by doing" approach, encouraging learners to tackle real-world problems from their personal or professional lives using the tools.

Target Group Adults aged 40+, primary school graduates, employed in positions of responsibility as farmers, livestock breeders, freelancers, and private sector employees.

Objective To enable learners to understand the importance of evidence-based decision making and to practice basic data analysis and decision-making techniques with the support of modern tools.

Lesson Plan Overview (5 sessions of 3 hours each)

Table 1
Lesson 1 Objectives

Lesson Objective	Importance for the Target Group	Sample Assessment Criteria
Understand the difference between logic and emotion in decision making	Adults often rely on instinct or experience. Understanding this distinction helps regulate impulses and foster critical thinking.	Identifies (orally or in writing) one decision made based on emotion and one based on logic. Participates in the discussion “Logic or Emotion?” presenting a viewpoint.
Reflect on past decisions and identify potential biases or thinking errors	Self-observation enables adults to learn from mistakes. Recognizing biases (e.g., confirmation bias) is essential for making responsible choices.	Describes a personal or professional dilemma. Identifies a bias or obstacle that influences the decision. Reflects on what could have been done differently.
Understand what "data-driven decision making" means and identify examples from real life	Most learners in this age group are unfamiliar with data use in decision making. Understanding the concept of "justification" can transform how they think about work, finance, and family.	Explains in their own words what “evidence-based decision” means. Provides at least one example of how data can support a decision (e.g., when to sell crops, which price to set).

Table 2
Lesson 2 Objectives

Lesson Objective	Importance for the Target Group	Sample Assessment Criteria
Learn the basic elements and structure of the SWOT technique	Most adult learners have not encountered strategic tools. Understanding internal vs. external factors is foundational for sound analysis.	Explain what SWOT stands for. Correctly categorizes examples into strengths, weaknesses, opportunities, and threats.
Apply SWOT to a real or hypothetical scenario from professional life	Applying a strategic tool to one's work context (e.g., farming, employee role) shows how analysis can inform everyday decisions.	Completes a SWOT matrix for a personal/professional issue. Justifies at least one item per SWOT quadrant.
Recognize how SWOT supports evidence-based decision making	Visualizing a situation reduces reliance on instinct and encourages structured thinking. This boosts confidence in risk management.	Identifies the most critical SWOT category in their case and explains why. Proposes a decision based on strengths/weaknesses and external factors.

Lesson 1: The Search for Truth and Rational Decision-Making Participants are frequently called upon to make decisions about farming, purchases, investments, hiring, or family budgeting. Realizing that tools such as Excel, ChatGPT, and statistics can support these decisions is a powerful motivator for learning. The first session includes a historical overview of humanity's search for truth (Plato, Aristotle, Descartes, Bacon, Skinner), a distinction between logic and emotion, and a clarification of what "data-driven decision making" means today.

Activities: Discussion: "What is the most difficult professional/personal dilemma you have faced?" Brainstorming: "How do we make decisions? With logic or emotion?" Mini case study: Decision under pressure (e.g., adverse weather for farmers). Tools: Images of philosophers, PowerPoint slides summarizing ideas, guided discussion questions.

Lesson 2: Decision Support Techniques – The SWOT Tool In this session, students learn about the SWOT technique (Strengths – Weaknesses / Opportunities – Threats) with applications from their professional context.

Activities: Example SWOT: "Should I open a new store or not?" Group activity: learners fill out a SWOT analysis for their own business. Tools: Handwritten tables or Excel, ChatGPT for ideas, SWOT diagram design.

Table 3
Lesson 3 Objectives

Lesson Objective	Importance for the Target Group	Sample Assessment Criteria
Become familiar with basic descriptive statistics (percentages, mean, frequency)	Adult learners rarely use statistical terms, yet encounter them daily (prices, expenses, problem frequency). Understanding these supports real-life data analysis.	Can explain terms like "average" or "percentage" in their own words. Calculates values in a simple data table.
Understand the Pareto Principle (80/20) and its practical application	Pareto is a powerful prioritization tool: learners often miss the forest for the trees. Understanding the impact of few causes simplifies decision making.	Identifies most frequent data points and their impact. Interprets a Pareto chart and pinpoints major causes.
Use Excel to visualize data and support decisions	Practicing data entry and visualization in Excel builds confidence and practical work skills. Feeling capable of technology is a key motivational factor.	Build a data table in Excel. Create a Pareto chart with guidance or support.

Table 4
Lesson 4 Objectives

Lesson Objective	**Importance for the Target Group**	**Sample Assessment Criteria**
Understand "monitoring a process" via data recording and analysis	Learners have process experience (e.g., production, budgets) but lack monitoring tools. Learning that decisions require follow-up helps improve outcomes.	Explains what "monitoring a process" means. Gives a personal example (e.g., tracking expenses).
Become familiar with concepts of "normal range" and "intervention thresholds"	Learners often don't know when to worry or act. Understanding control limits helps distinguish normal variation from problems.	Correctly interprets changes inside/outside thresholds. Identifies when a deviation signals concern.
Apply control chart creation in Excel and detect anomalies	Using Excel boosts digital confidence. Visuals enhance critical judgment and help spot when something "goes wrong."	Completes a simple control chart with guidance. Highlights values beyond control limits.

Lesson 3: Introduction to Descriptive Statistics – Pareto Principle This session introduces descriptive statistics, measures of central tendency and dispersion, and their application using ChatGPT and Excel. Visualizations and the Pareto 80/20 rule are presented.

Activities: Excel data entry exercise using professional examples (e.g., causes of delays, customer complaints, types of expenses). Create Pareto chart. Prioritization discussion: "What should I deal with first?" Tools: Excel, ChatGPT for generating examples.

Lesson 4: Control Charts – Monitoring a Process In the fourth session, learners are introduced to the concept of monitoring processes through control charts—a practical tool for both business and household decisions.

Activities: Apply to business or household expense tracking. Create control chart in Excel. Identify anomalies and deviations from target. Tools: Excel, ChatGPT for explanation of terms, examples.

Lesson 5: Project Work – Presentation – Reflection The final session culminates the learning process, offering space for application, presentation, and reflection. Learners work on real or simulated problems from their professional experience and present their solutions using PowerPoint or a diagram.

Table 5
Lesson 5 Objectives

Lesson Objective	Importance for the Target Group	Sample Assessment Criteria
Apply tools and concepts in a real or realistic scenario	Adult learners need to "see the purpose." Applying tools to personal problems helps internalize knowledge.	Uses at least two techniques (e.g., SWOT, Pareto) to analyze a problem. Develop a comprehensive proposal or action plan.
Present their work clearly, orally and with supporting tools (PowerPoint, table, Word)	Presentation builds confidence, improves communication skills, and makes learning visible. Adults "regain their voice."	Organizes a clear presentation with introduction, analysis, and conclusion. Use a tool (slide or document) to support delivery.
Reflect on the process, identifying what was learned and what would be done differently	Reflection is key in adult learning, it boosts self-awareness and knowledge transfer (Mezirow, 2000).	Completes a reflection sheet or responds to questions like "What did I learn?" and "What would I do differently next time?" Expresses personal growth or insight.

Activities: Complete case study: problem analysis, table/chart creation, write a decision proposal. Learners select a realistic problem (e.g., "how to reduce business expenses" or "is it worth entering a new market?") and apply learned tools:

- SWOT analysis to assess the situation
- Pareto to prioritize causes/issues
- Control chart to monitor data trends
- Summarize decision using Word/PowerPoint

Student Presentations – Feedback – Discussion: In small groups or plenary, each learner presents their work. Peers ask questions and provide feedback. The instructor facilitates a positive and constructive experience.

Reflection and Debrief: "What did we learn – Where will I apply this knowledge? – What will I do differently in the future?" Tools: Word/Excel/PowerPoint, reflection sheet, ChatGPT for ideas

CONCLUSIONS AND RECOMMENTATIONS FOR IMPROVEMENT

Teaching data-driven decision-making within the framework of Second Chance Schools (SCS) brings about significant changes in the knowledge, attitudes, and skills of adult learners. Participants become aware of the distinction between instinctive and evidence-based choices and learn to utilize practical tools such as Excel and ChatGPT for information analysis. Thus, decision-making is no longer experienced as an instantaneous act, but as a methodical and reflective process, enhancing their metacognitive abilities (Halpern, 1998). Participation in such activities reinforces learners' sense of self-efficacy (Bandura, 1997) and contributes to cultivating a more responsible, reflective, and active attitude toward both learning and life. Learners enhance their problem-solving, collaboration, and argumentation skills while also developing critical thinking through engagement with authentic, everyday problems (Brookfield, 2012).

Explicit instruction in critical thinking for adults has been shown to be effective, significantly improving related skills, especially when combined with practical application (Abrami et al., 2015). In this context, SCS provides fertile ground where knowledge is directly linked to action, offering experiences that are transferable to family and professional life (Mezirow, 2000). Additionally, programs like this foster a sense of active citizenship. Cultivating the ability to make evidence-based decisions reduces susceptibility to misinformation and fosters a culture of dialogue and truth-seeking—elements that are fundamental to democratic participation (Freire, 1970; Kahneman, 2011). Furthermore, participants are encouraged to pursue continued learning, recognizing knowledge as a tool for autonomy and growth. This enhances lifelong learning and motivates learners to further their education in more specialized fields or vocational training.

To improve future iterations of the program, the following are recommended: the integration of short explanatory videos for key tools such as Excel, ChatGPT, and data visualization, allowing learners to benefit from visual learning and self-paced review. Additionally, the use of scenarios with flawed decision-making processes can enhance learners' reflective capacity and critical analysis skills, by encouraging the identification of errors and the development of alternative strategies. Providing guided worksheets for each stage of decision-making will support the structured documentation, analysis, and presentation of proposals—particularly beneficial for learners with less experience in formal education. Finally, organizing a follow-up review session two months after program completion will reinforce the sustainability of learning. This allows participants to reflect on what they have implemented, observe any changes, and further integrate evidence-based decision-making into their everyday lives. Monitoring and evaluating the impact of these measures through short questionnaires or focus groups can contribute to the ongoing redesign and improvement of the educational process.

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INNOVATIVE TEACHING APPROACHES: ENHANCING INDEPENDENT LEARNING THROUGH ARTIFICIAL INTELLIGENCE AND MUSIC

Zoi, Sofia
Electronics Teacher
1st Vocational High School of Ioannina
Ioannina, Greece
email: sofzoi7@sch.gr

ABSTRACT

The experience of teaching fundamental concepts of electrotechnology to high school students has highlighted the significant difficulties faced in understanding electricity related problems. Many students exhibit gaps in prerequisite knowledge, they are unfamiliar with the methodology of Physics and struggle to develop independent learning skills through textbook study. Additionally, phone use for social media, music and games distracts them from the learning process. These observations underline the need for an alternative teaching approach that combines digital technology and the students' interests within the learning process.

Taking above factors into account, a teaching scenario was developed and implemented, leveraging modern artificial intelligence and music tools. The primary objective of this scenario is to encourage students to engage with their textbooks, familiarize themselves with the laws and theories of their study of interest in order to establish a foundation for independent comprehension without the need for auxiliary methods. This approach does not focus solely on understanding physical phenomena but primarily on developing autonomy in studying and the students' ability to seek out and interpret textbook information.

The teaching methodology is based on Lev Vygotsky's theory, which emphasizes the importance of social interaction in learning. The implementation involves the use of the SUNO application, supplemented by the Audacity and Openshot software.

The teacher (or a group of teachers) creates a music piece incorporating lyrics related to science concepts and contemporary sounds without requiring musical knowledge. Students listen to the song and watch the accompanying video. Then, they identify corresponding information in their textbooks and link it to the scientific terminology. Additionally, they complete conceptual charts, which serve as knowledge organization tools. This process evolves into students creating their own music pieces. They are divided into groups and after they study the theoretical terms of a new chapter, they compose their own lyrics and song. This activity aims to primarily strengthen students' ability to comprehend scientific concepts independently as presented in the school textbook and secondarily enhance creativity and collaboration.

This scenario was applied in teaching the units "Basic concepts of direct current" initially, followed by "Electromagnetism" to sophomore students. Findings from the implementation suggest that artificial intelligence and music can serve as learning motivators increasing student engagement and enhancing memory recall of scientific concepts.

This study highlights the importance of utilizing innovative tools in science education and proposes further exploration of similar approaches in the future. It's a dynamic scenario, that with minimal adjustments, can be easily applied on other subjects. Additionally, for younger students, it offers flexibility for an intersectional approach involving subjects such as Literature, Technology, Informatics and Music. The integration of multimedia technologies and creative activities can be an effective strategy to enhance students' learning experience and autonomy in the educational process.

Keywords: innovative teaching approaches, artificial intelligence, music, educational tools, independent learning, learning experience.

INTRODUCTION

Electrical engineering is a scientific field that falls under the broad umbrella of the Physical Sciences. As such, its teaching can be considered to follow similar principles, conclusions, and methods. The need to develop this teaching scenario emerged from insights and observations derived primarily through empirical means, based on many years of classroom experience. The problem it aims to address, which is the contribution of digital media to enhancing the overall quality of learning outcomes is analyzed in the following scenario.

THEORETICAL FRAMEWORK

One of the key skills that learners in the natural sciences are expected to develop is the memorization of general theorems, definitions, and terminology (Liolios, 2019). The use of clear and precise scientific terms serves as a foundation for understanding more complex concepts and for developing advanced reasoning skills (Toraki, Katerina – ELETO). Students must not only comprehend but also memorize definitions and theorems as they are presented in the school textbook. Acquiring these tools enables them to organize their thinking and shape their behavior (Vygotsky, 1997). At the same time, the use of diverse stimuli during instruction not only enhances their existing abilities but also stimulates the internal cognitive processes necessary for their development (Vygotsky, 1997).

According to Vygotsky, it is unrealistic to expect all children of the same age to have mastered the same skills or to be able to achieve the same outcomes independently. Even if they have completed the developmental cycle appropriate for their age, each child possesses a unique capacity to acquire the next set of skills. However, with the support of a teacher or more experienced peers, they can achieve more and develop new skills. Vygotsky defined the distance between what a student can accomplish alone and what they can achieve with guidance as the "Zone of Proximal Development" (ZPD) (Vygotsky, 1997:146–155).

This particular initiative is primarily based on the creation of student work through digital media, which aims to activate their internal cognitive processes and guide them toward self-regulation.

PURPOSE – OBJECTIVES

The purpose of this educational scenario is for students to study their school textbook, become familiar with the laws and theories related to the phenomenon under investigation, and lay the groundwork for independently comprehending these concepts, without relying on auxiliary methods—through the use of a music piece generated by AI.

Intermediate objectives:

- Associate physical quantities with their respective symbols and representations, and connect them with one another (Products: Categories–classes (Kassiotakis & Flouris, 2013)).
- Transform the description of physical quantities from everyday language into the terminology of the scientific field and the specific phenomenon being studied (Contents: Semantic (Kassiotakis & Flouris, 2013)).
- Memorize the physical quantities and the relationships that govern them (Function: memory (Kassiotakis & Flouris, 2013)).

STUDENTS' COGNITIVE LEVEL AND THE NECESSITY OF THE SCENARIO

At the beginning of each school year, a recurring question arises: "What is the cognitive level of the students?" The core subjects forming the foundation for understanding electricity are Mathematics, Physics, and Modern Greek Language.

After investigating, it was found that students' performance in these subjects is generally "good." Naturally, there are always exceptions—students with significantly lower or exceptionally high grades—but these are isolated cases. According to Vygotsky's theory, however, such generalizations are insufficient; deeper exploration is required to fully understand students' capabilities and what they can achieve independently.

Moreover, classroom observation revealed that students do not utilize the textbook effectively to assimilate scientific theorems and terminology. Instead, they rely almost entirely on what they comprehend during the teacher's explanation and on the empirical knowledge they gain through lab activities. While they may understand the phenomena during the lesson, they struggle to recall and apply this knowledge later in exercises or real-life problems.

The conclusion drawn is that a teaching scenario focused on fostering autonomous learning through textbook engagement is essential for students' academic advancement.

PEDAGOGICAL VALUE OF THE "MUSIC PIECE" AND THE VIDEO

Music is an integral part of adolescents' daily lives, as demonstrated by the nationwide study conducted by Kokkevi, Fotiou, Xanthaki, and Kanavou (2010). A significant portion of their free time is spent listening to music (Kokkevi et al., 2010:2), highlighting their deep connection to this form of art. Given this reality, it is reasonable to assume that a song aligned with their musical preferences may exert greater influence and be far more engaging than the one-dimensional and often impersonal language of traditional teaching. Music serves as a powerful means of expression and communication, offering students a familiar and meaningful way to assimilate knowledge and values. Through this art piece they can also acquire the necessary "signs" and "tools" (as defined by Vygotsky, 1997) for mastering scientific semiotics.

The widespread use of smartphones further facilitates this process, allowing teens to listen to music almost anywhere. Thus, even when they need to recall a scientific theory, they can access an educational audio resource—using technology as a learning tool.

At the same time, imagery plays a complementary and crucial role alongside sound, a concept widely supported by the literature. According to neuroscience, about half of the neurons in the human brain are involved in visual processing, making visualization a powerful tool for cognitive activation (Pang, 1995, as cited in Mikropoulos, 2002).

In this scenario, the proposed activities are built around contemporary cultural stimuli—specifically, elements of youth-generated culture. The teacher explores students' preferences, identifying popular music genres and songs by asking them to suggest representative examples. Concurrently, the teacher investigates the slang and idiomatic expressions commonly used by students. Using these cultural "tools," the teacher creates a song and accompanying music video that serve as the "artificial stimulus" (Vygotsky, 1997), which will act as the trigger for learning progress.

Consequently, sound, lyrics, and video work together synergistically in the memorization of scientific symbols. When students later revisit the textbook, they are more likely to feel familiar with the content—rather than viewing formulas as obscure, foreign symbols.

THE SUNO WEB APPLICATION

SUNO is an online Artificial Intelligence tool designed for song generation and composition. Its interface is user-friendly: the user inputs lyrics into a designated field, selects a preferred music genre, and the application transforms the text into a song. For each "create" command, SUNO produces two different song versions, allowing the user to choose the one that best fits their needs. This process can be repeated up to ten times in the free version.

In this context, SUNO is an innovative tool that allows educators to generate musical content for instructional purposes quickly and easily. It requires no prior musical training, making it accessible to all teachers, regardless of their background in music. By leveraging AI, traditional teaching instruction can be enriched—or even replaced—by a more engaging, interactive, and experiential form of knowledge transmission that aligns with students' interests and learning styles.

For students, using SUNO becomes part of a learning process that closely resembles recreational play, thereby making education more attractive and experiential. Learning occurs through active engagement with the environment and the use of appropriate tools. SUNO acts as a mediating instrument, enabling students to interact with knowledge in a natural and effortless way. As a result, they remain continuously connected to the textbook content and scientific terminology, embedding information within a context that feels both familiar and appealing.

"AUDACITY" AND "OPENSHOT"

These two software programs are used to create the music video that accompanies the song. Both are freely available online and relatively easy to use, sharing a similar editing philosophy:

- "Audacity" is used for audio editing. In the context of this scenario, it is primarily used for mixing different musical elements and ensuring smooth transitions between segments (e.g., fade-in, fade-out).

- "OpenShot" is used for video editing. It allows for the precise placement of images to synchronize with the lyrics and visuals. Transitions between images are managed using various filters to ensure fluid continuity.

THE ROLE OF THE TEACHER AND STUDENTS

The teacher's role unfolds along three main dimensions: guiding, monitoring, and collaborating with students. As the most experienced figure in the learning environment, the teacher serves as a role model. As Vygotsky (1997) states, "what children cannot do today, they can do tomorrow with the help of a more experienced adult." The teacher's role gradually evolves from directive to guiding, involving observation and orchestration of the learning process.

The teacher begins by exploring students' linguistic codes and musical preferences. Based on these findings, a song is created, ensuring adherence to educational standards and appropriateness.

In the second part of the scenario, students work in groups of mixed abilities to foster collaborative interaction. No specific roles are assigned within the groups; instead, students work together step-by-step, participating equally in all decisions.

THE SCENARIO

Duration of the Scenario: 4 teaching hours.-
Part 1: Synchronous session
Part 2: Combination of synchronous and asynchronous sessions
Location: Computer lab.
Digital Materials:

- Software: SUNO, Audacity, OpenShot, Word, media players.
- Hardware: School lab computers, speakers, projectors or large screens, students' personal devices

PREPARATION: SONG & VIDEO PRODUCTION

The music piece and video are created according to the following guidelines:

1. Select the topic (e.g., Chapter 2: Electricity).
2. Begin with a strong introduction referring to the main theme.
3. Choose a music style and vocal tone that emotionally resonates with students (Parlambas, 2013).
4. Use contemporary idioms and slang (e.g., "slay," "φλεξάρω") for relatability.
5. Avoid exaggeration to prevent ridicule or disengagement.
6. Ensure the lyrics follow the scientific logic and sequence of the textbook.

TYPED FORMS AND ASSESSMENT SHEETS

Students will be given a typology table to complete during the activities. The reference sheet includes closed-ended questions to assess independent recall and understanding of symbols and concepts.

Assessment Sheet 1: Given after activities. It includes fill-in-the-blank, table completion, and theorem combination problems. Students can use textbooks while the teacher observes.

Assessment Sheet 2: Given in the next session. Students complete it with books closed to measure long-term retention.

BEGINNING OF ACTIVITIES

First Part:

A) Distribute reference sheet.
B) Show video clip. Replay if needed and discuss.
C) Encourage frame-by-frame analysis with open textbooks.
D) For each concept: "Show screenshots - Reference textbook pages - Ask guiding questions - Fill in typology table."

For example: The students listen to a song that sounds similar to "Trap" music and its characteristics and the lyrics are about Ohm's law. At the same time the students have the opportunity to the following Figure with the same

reference. After this, they read from their book the scientific rendering of the Ohm's law. Last but not least, they write the type on their typology table.

Figure 2
Snapshot from the video referring to Ohm's law



E) Student autonomy is increased by gradually removing direct page references.
F) Introduce critical thinking exercises. Pose open-ended questions (e.g., “What does power represent?”).
G) Evaluate using assessment sheets.

Second Part
Teacher acts as facilitator and prepares textbook materials. Worksheet includes:

- Reading textbook excerpts
- Writing original lyrics
- Selecting music styles
- Using SUNO

Teacher reviews lyrics for scientific and linguistic accuracy.

Two assessments:
1. Solve textbook exercises using excerpts (including topics not in the song).
2. Closed-book sheet with fill-in-the-blank and formula/unit table.

OBSERVATIONS – RESULTS

The scenario was tested in a real classroom. Students fell into four categories:

- ✓ No effort
- ✓ Random answers
- ✓ Tried with moderate success
- ✓ Fully met expectations

Initially, students were curious about the song's popularity. They engaged more on second listening, especially due to slang use. Many opened their books to follow Ohm’s Law and completed tables with guidance.

Over time, more students attempted the exercises. The main obstacle was mathematical background. In part two, they hesitated at first to compose lyrics, eventually copying textbook content into SUNO. Chosen music genres varied widely.

When solving exercises, students showed relief when allowed to use textbooks, indicating both their dependence and increasing comfort with using them. About 50% accuracy in terminology recall was observed. Formula table completion had nearly perfect results.

CONCLUSIONS

Considering students’ initial levels, progress was universal. Achieved intermediate goals:

- All improved in identifying symbols and representations.
- Most used scientific terminology correctly.
- Nearly all memorized physical quantities and their relationships.
- All used the textbook as a resource when needed.

Although not all students comprehended material at the same depth, the foundation for autonomous learning was established.

SUGGESTIONS FOR EXTENSION – CONCLUSION

This scenario represents a flexible and dynamic teaching method applicable to all subject areas with minimal modifications. It can be used in middle and primary school as well.

For younger students, the scenario can be enriched through interdisciplinary collaboration with language, technology, and music specialists.

One major advantage is that no prior musical expertise is needed, making the method accessible to all educators.

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ART AND DIGITAL MEDIA IN EDUCATION: A CASE STUDY AT THE EVENING VOCATIONAL HIGH SCHOOL OF PREVEZA

Thanasara Evangelia
Economics–Tourism, PE80 & Italian Philology, PE34
1st Vocational High School of Karpathos
Karpathos, Greece
e-mail: gonzalitsa@gmail.com

Gaki Vasiliki
Chemist, PE04.02 & Computer Science PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

ABSTRACT

This case study was conducted within the framework of the Research Project course of the first grade curriculum at the Evening Vocational High School of Preveza and addresses the use of art combined with digital media in the educational learning process. Students' engagement with art began with an introduction to world-famous painters through digital presentations and videos. Then, students recreated characteristic works of these artists as murals on a classroom's blank walls, which were previously undecorated. The reproduction of the artworks on the walls utilized a projection screen, computer, and digital applications for image editing. The activity mainly involved adult students, who constitute the majority of the school's population.

The aesthetic experience is particularly interesting, as it represents an innovative educational method that can contribute to Transformative Learning and has been applied not only in adult education but across all educational levels in recent years.

Observing a work of art during an educational process stimulates impulses and activates the learners' critical thinking. For this reason, the purpose of this action was to evaluate the implementation of learning through art, the aesthetic transformation of a school classroom with artworks, and the familiarization with basic digital tools. Aiming to highlight an alternative teaching method for adult students at the Evening Vocational High School, the study investigated students' attitudes during the activity and the contribution of art to their active participation, enhancement of critical thinking, and the potential redefinition of stereotypical views and assumptions.

The goal was to explore the extent to which learners utilize all their senses, use their imagination, draw on existing knowledge and experiences, and develop the ability to think critically during the educational intervention through the use of artworks combined with basic digital media.

Thirteen students aged between 18 and 61 participated, and observation was chosen as the methodological tool, providing an opportunity to collect data emerging from real situations through learners' statements, gaining more personal information.

The educational intervention contributed both to learners' familiarization with art and digital media. Additionally, it fostered collaboration and exchange of personal experiences. Participants managed to process their prior perceptions, think critically about them, and in some cases revise them, developing reflective dialogue. The involvement of emotions and the liberation of thought and expression led to a change in attitude towards this novel learning experience, initially met with reservation but gradually with pleasure and enthusiasm. The positive impressions gained and new knowledge acquired motivated further engagement with art, which contributes to the ability to perceive things from different perspectives and the possible redefinition of assumptions.

Keywords: Adult Education, Transformative Learning, Art, Digital Media, Critical Thinking.

EFFECTIVE LEARNING AND ADULT LEARNERS

There are different interpretations regarding the definition of adulthood. By the term "adult," we refer to socially recognized adults who have completed their studies, work, are autonomous, and independent in decision-making (Balboni, 1994). According to Rogers (1999), the learning process requires the active participation of learners. Effective learning in adults is achieved when education is directly related to their daily lives, when they act and engage, and when they feel integrated into a group within a climate that encourages participation (Courau, 2000). Adult learners are characterized by five distinct features related to the goals they set, their life experiences, their preferences regarding learning methods, their desire for active participation in the learning process, and the way they face obstacles to ensure learning effectiveness (Kokkos, 2005a).

CRITICAL REFLECTION IN ADULT EDUCATION

Many definitions of critical thinking have been proposed, and there is no single universally accepted one. According to Dewey (cited in Zarifis, 2009, p.50), "reflection as a concept concerns solving a confusing or problematic situation". Critical thinking is a mental and emotional process through which individuals process data based on logic and, unaffected by prejudices, manage to reach sound conclusions and select appropriate courses of action (Matsaggouras, 1999).

John Dewey, one of the first educational theorists to use reflection, places particular emphasis on experiences, each of which contributes to preparing a person to acquire new experiences, leading to their development and adjustment (Dewey, 1980). Paulo Freire was the founder of a humanistic theoretical approach and educational practice focused on developing critical consciousness with the goal of achieving social change (Kokkos, 2005a). For Freire, the educational process is a cultural action that shows the path to freedom through the power of knowledge, which is transformed into action. Through awareness of their situations and the reasons for their formation, individuals seek appropriate ways to overcome them (Vasilou-Papageorgiou, 2004).

JACKMEZIROW'S TRANSFORMATIVE LEARNING

One of the theorists who laid the foundation for critical theory in adult education is Jack Mezirow, who developed the theory of Transformative Learning, building on the ideas of Dewey and Freire (Mezirow, 1991). For Mezirow (2007, 2009), learning is not merely acquiring new knowledge, but is achieved through critical reflection on personal assumptions and mental habits in which the individual is trapped within the broader social system. Learning, according to Mezirow, begins in childhood, where it is formative, and continues into adulthood, where it becomes transformative (Koulaouzidis, 2008). Each person perceives reality based on perceptions that shape their personality (Kokkos, 2005c).

Transformative Learning is the process by which a problematic frame of reference is identified with the purpose of revising erroneous perceptions created by external factors and society (Kokkos, 2005a). Achieving this goal requires critical reflection, through which mental habits are revised and action is taken aimed at change (Mezirow, 2009). The completion of the Transformative Learning theory involves ten different phases, which are not strictly followed in every case but have been formulated according to the theory's practical application (Lintzeris, 2007). "The theory of Transformative Learning constitutes the most structured, scientifically substantiated, and particularly timely approach in adult education" (Kokkos, 2010, p. 76).

THE CONTRIBUTION OF ART IN ADULT EDUCATION

The concept of art has been defined in various ways. According to Davis (cited in Kokkos, 2011b), art includes all works that express the experiences and views of artists about the world and life. Small (1983) considers it a way to explore the internal and external environment, while Gombrich (1994) states that a work of art represents reality as perceived by the artist. The timelessness and emotions evoked by art give it special value, as it cultivates divergent thinking and triggers diverse reactions. Moreover, art is considered a universal language that connects cultures and people (Zdanski, 2011). In education, art is used as a tool to achieve pedagogical goals and develop cognitive skills, while images and colors give observers the opportunity to express their feelings (Kanellopoulos & Tsaptaridis, 2010). Through systematic observation of artworks, reflection and imagination are developed, which strengthen critical and creative thinking (Kokkos, 2011b; Mega, 2011c). Understanding is achieved through dialogue, while the aesthetic experience improves communication and promotes collaboration (Shor, 1992; Tsaptaridis, 2011). A work of art functions as a code of communication that sparks interest and strengthens dialogue and mutual respect (Kokkos & Mega, 2007; Clover, 2006). According to Dewey (1980), the observation of artworks stimulates imagination, which is a fundamental part of the learning process and develops through aesthetic experience (Kokkos, 2011b). In Freire's educational method, processing

codifications—often artworks connected with learners' experiences—promotes critical consciousness (Freire, 1978; Manthou, 2007). Finally, Kastoriadis (2008) refers to the "Abyss" of every society as the space of hidden desires and perceptions, often concealed, while important works of art and literature express the invisible and create new elements of social existence (Kokkos, 2011b).

PERKINS' MODEL FOR ART OBSERVATION

For the processing of artworks, Perkins (1994) proposes an approach developed in four successive phases of observation aimed at activating learners' critical thinking. In the first phase, participants are given time to observe the artwork gradually and silently, so they can focus their attention on visual elements without immediate interventions or prejudices (Perkins, 1994). In the second phase, known as the broad observation phase, observers are encouraged to approach the work based on logic, avoiding premature conclusions, which enhances creative thinking and openness to the polysemy of artworks (Kokkos, 2011b). The third phase concerns in-depth analytical observation, where learners examine the work more closely, searching for symbols, techniques, and compositions that reveal the content and possible intentions of the creator (Perkins, 1994). Finally, in the fourth phase, participants, having acquired a comprehensive view of the artwork, are invited to formulate their own interpretation and highlight the messages emerging from their personal and experiential approach (Perkins, 1994). Perkins refers to this approach sometimes as a strategy and sometimes as a process, without labeling it explicitly as a model (Kokkos, 2011b).

TRANSFORMATIVE LEARNING THROUGH AESTHETIC EXPERIENCE ACTION PLANNING

The idea to carry out the present action arose during the research project, which is one of the courses in the first grade of the Evening Vocational High School of Preveza. The effort to interpret images and shapes activates participation and promotes teamwork, dialogue, and exchange of opinions with others (Polemí-Todoulou, 2007). Considering that observing a work of art stimulates and activates the learners' critical thinking, the proposal was made to the first-grade students, aged 17 to 61, to engage with art combined with digital media as part of the research project course.

The criterion for choosing this particular topic was the interest presented by using art as an innovative method in the educational process and the way it can be utilized through digital media. Transformative Learning through Aesthetic Experience has increasingly been applied in research across all educational levels in recent years. This fact motivated the choice of this specific action to determine whether this educational intervention could enhance student participation.

The main goal was the aesthetic transformation of a classroom with murals and the evaluation of the learning method applied through art and the use of digital media. Observing the participants' attitudes during the implementation of the action aims to draw conclusions regarding their active participation, enhancement of critical thinking, and possible transformation of their perceptions. Observation is a data collection tool suitable for any kind of methodological approach (Vamvoukas, 2010). Through observation, there is the opportunity to collect data arising from real situations, allowing the researcher-observer to follow the learners' spoken words, collect them verbatim, and obtain more personal information (Cohen et al., 2008).

The goal of the action is to investigate the extent to which learners use all their senses, employ their imagination, recall existing knowledge and experiences, and develop the ability to think critically during the educational intervention. Specifically, the action aims to explore the contribution of art to cultivating critical thinking, recognizing the value of art in education, and familiarizing learners with basic digital tools. The teaching activity was designed to develop communication skills through art, as learners often feel uneasy when asked to use digital tools to understand and interpret artworks, activating their imagination and senses.

From the first lessons, it was observed that students had certain perceptions about the benefits they gain from school. Due to current demands, where professional employment is linked to certification of increasingly more qualifications, a one-dimensional view prevails that a high school diploma serves only as a formal qualification. Through discussions, it was revealed that learners saw learning more superficially rather than substantially. When the proposal was made to the students to paint murals using basic digital tools, there was a perception that painting is for small children and that their age and professional and family responsibilities do not particularly support participation in the project.

Given these conditions, the intention arose to encourage them to think critically and process their views on art and the use of digital tools, aiming to create deeper motivation for engaging with new challenges. When the idea was to examine their opinions by observing some artworks and selecting some to decorate a "blank" classroom, hesitation

appeared due to unfamiliarity with the subject. Although their initial reaction was not very favorable, they eventually agreed to carry out the process. After a presentation of artworks by different painters, it was jointly decided with the students to work on the art of the Spanish painter Joan Miró.

The selection of appropriate artworks aims to awaken learners' interest in art. The process and method of the lesson depend on the proper choice of artworks, which must be made with correct planning and study (Macaire & Hosch, 1996).

The selection of artworks was based on criteria that enhance the learning process. High-quality works were preferred to maintain learners' interest and strengthen their desire for deeper engagement (Macaire & Hosch, 1996). The aesthetics of the works were considered important for evoking emotions and connecting with learners (Macaire & Hosch, 1996). The content was also examined in terms of its ability to provoke critical thinking and emotional involvement (Kokkos, 2011b), and works with strange or unfamiliar elements were chosen to enhance curiosity and imagination (Brandi, Dommel & Helmling, 1988). Finally, the possibility of linking to learners' existing knowledge and the multidimensional reading of images was taken into account (Macaire & Hosch, 1996; Brandi, Dommel & Helmling, 1988).

In the first phase of the activity, learners were given time to gradually and carefully observe each artwork, answering the question: "What do you observe?" Their responses highlighted elements such as strange figures, stars with unusual shapes, eyes of various sizes, geometric shapes, uneven circles, and the presence of animals and birds.

In the second phase of broad observation, students were asked to identify elements in the works, express their impressions, wonder about the symbols, and share their feelings. They noted the presence of star-like symbols, that the symbols resembled children's drawings, bright colors improved their mood, even the eyes had unnaturally vivid colors, and they noticed many irregular lines and shapes.

In the third phase of detailed observation, after receiving information about the artist, learners tried to analyze the work and express their opinions. The works evoked feelings such as curiosity about what lies behind the image, concern about the artist's message, admiration, the need to understand the painter's thinking, puzzlement, liveliness, optimism, a sense of freedom, euphoria, hope, a tendency to daydream, and reminiscence of childhood. They also identified elements that give strength to the works, such as the formation of bodies without faces, the intense eyes of various sizes and shapes, the irregular circles, the harmonious combination of colors, and the star-like shapes.

In the fourth and final phase of Perkins' technique, learners re-examined the works as a whole and answered the question of what connects them. They recognized common symbols, intense colors, a sense of childlikeness and innocence, distorted figures, and strange geometric constructions. Simplicity and austerity were emphasized, with colors such as blue, red, yellow, green, and black standing out. The works resembled children's drawings, included many objects floating irregularly in space, elements of nature, and emphasized eyes. Finally, the students felt that the works "speak," although it is not always clear exactly what they want to say.

With the completion of the four phases of observation, it appeared that students focused on key elements, gradually all participated, and positive emotions prevailed. Notable was everyone's effort to convey some message and express admiration and curiosity. At the same time, the intense colors caused positive impressions and feelings of calm and serenity. Most agreed that learning the style of a painter reveals interesting elements of artistic culture and showed interest in searching online for more details about Joan Miró's life and works.

The action began with the gradual design of each artwork on the wall using a projector for projection and then painting, mixing colors to achieve the desired shade according to the model. Upon completing the first mural, satisfaction with the process and excellent collaboration among students was observed, who expressed opinions and ideas and were enthusiastic about their participation and the result. This gave them motivation to continue with greater zeal and determination with the remaining works, paying attention to details and trying to perfect them. Gradually, they improved in using the projector and painting technique, shared personal experiences, and discovered capabilities they did not believe they had. A notable case was a student who expressed the desire to create his own works, considering that through the action a talent he had never utilized came to the surface. For some, painting proved to be a pleasant means of expression, for others a way to escape daily life, and for others a way to contribute in any way possible, enhancing teamwork and mutual assistance. Necessary interventions were made in the classroom to better highlight the works, and the final result fully satisfied the students, boosting their self-esteem and pride.

THE USE OF DIGITAL MEDIA IN ADULT EDUCATION THROUGH ART

During the implementation of the educational program, various digital media were utilized, significantly contributing to the enhancement of participation, creativity, and critical thinking among the learners. The connection of art with technology proved particularly effective in activating the participants and facilitating transformative learning.

Specifically, applications such as PowerPoint and Canva were used to present artistic works, aiming to visualize concepts and create an emotional connection with the content. At the same time, through the Google Arts & Culture platform, learners took virtual tours of museums and galleries, which broadened their aesthetic experience and provided stimuli for reflection.

Learners were invited to create their own artworks using digital tools, while with applications like Moovly and Powtoon they presented personal narratives and reflective statements in the form of short videos. This enhanced personal expression and allowed the connection of personal experience with the educational process.

The use of interactive tools such as Padlet and Miro facilitated collaboration and the exchange of ideas. Participants worked on digital canvases, commented on each other's creations, and developed a sense of collectivity and active participation. Additionally, digital portfolios were created in which learners recorded their progress, thus reinforcing the process of reflection.

The experience showed that digital media did not simply function as auxiliary tools but became an essential part of the learning experience. They contributed to the development of creative thinking, self-expression, and active participation, promoting a pedagogical approach that connects technology, art, and adult education in a experiential and transformative way.

CONCLUSIONS

Overall, the data gathered from observation showed that the learners participated with interest in the educational process and used digital tools comfortably. The creation of a positive atmosphere and encouraging comments helped even the more hesitant individuals to adapt and increase their enthusiasm for something new they gradually discovered.

Although most initially reacted negatively to the implementation of the method, their activation and participation in the discussion gradually increased, expressing their opinions in response to questions posed. All learners shared their personal views, and their participation grew as the dialogue became more meaningful and the process advanced. Equal participation time and respect for others' opinions contribute to the development of reflective dialogue (Mezirow, 1991).

Regarding the use of imagination during the observation of artworks, it was noted that learners listened attentively to the questions and used their imagination to provide answers. Their imagination evolved from one observation phase to the next, especially when they tried to connect the symbols they identified with the messages the paintings might conceal. The more they focused on the subject of each work, the more they attempted to transport themselves imaginatively to the space and time related to it—a process confirmed by Perkins (1994).

Concerning the emotions that arose, many shifts were observed from the beginning to the end of the process. In all works, feelings of curiosity, surprise, admiration, and reflection were characteristic. This confirms Dirkx's (2004) finding that learners experience unprecedented emotions when deeply observing and attempting to analyze a work of art. The approach to the artworks was made through discussion and dialogue, generating feelings of pleasure and satisfaction. As Shor (1992) points out, dialogue not only helps in understanding a subject but also promotes creative learning combined with entertainment.

Regarding learners' views on art and digital tools before the method's application and those formed upon its completion, noticeable differences emerged. Initially, most participants approached the process with caution and hesitation, seeing it as something new and unfamiliar. According to Raikou (2013), this is a common reaction due to unfamiliarity with such methods and fear of difficulty. In isolated cases, indifference and reluctance were noted, considering it a waste of time to engage in something unnecessary and outside the usual curriculum. However, there was also a case of a learner who enthusiastically accepted participating in an original process different from previous experiences and even encouraged others to try it.

By the end of the process, learners managed to form a new perspective on art. Comparing it to their initial views, it became apparent that approaching things from different viewpoints changes the way they perceive them. This observation is supported by Dewey's (1980) view that contact with art enhances the ability to perceive things differently. The redefinition of learners' opinions and their willingness to reconsider their perceptions in general demonstrates that art is an appropriate medium for transformation, as also argued by Mezirow (2007).

In conclusion, the acquisition of positive impressions and new knowledge provided the learners with new motivation to engage with art and digital tools. They were led to critical reflection, reexamining their entrenched beliefs and revising the idea that painting is only for children and not suitable for their age.

The involvement of emotions and the liberation of thought and expression led to a change in attitude towards a learning experience through art, which was initially met with reservations but eventually with pleasure and enthusiasm. The gradual transformation of the classroom into a pleasant space led to a change in their willingness to remain there, and satisfaction with the results boosted self-esteem and mutual respect.

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THE USE OF PODCASTS IN LITERATURE COURSES – A QUALITATIVE APPROACH

Botsari Lamprini
Filologist, PE02
Zosimaia model high school of Ioannina
Ioannina, Greece
e-mail: lmpotsari@gmail.com

Azeli Erasmia
Filologist, PE02
Zosimaia model high school of Ioannina
Ioannina, Greece
e-mail: erasmiazeli@gmail.com

ABSTRACT

This research paper examines the use of podcasts as a modern educational tool in the teaching of literature courses. The aim of the study is to investigate the pedagogical value of podcasts, to understand how they shape the learning experience of students, as well as to evaluate their effectiveness in improving understanding and critical approach to literature, language and history. The methodology of this specific research is based on qualitative methods, including semi-structured interviews with philologists and secondary school students, as well as content analysis of selected educational podcasts. Particular emphasis is placed on evaluating interactivity, narrative approach and the degree of student engagement in the learning process through the audio experience. At the same time, factors that influence the acceptance of podcasts as a learning medium are explored, such as thematic content, quality of production, linguistic adaptation and relevance to school curricula. The findings of the research reveal that the use of podcasts in teaching can offer multiple benefits. Specifically, it enhances learning flexibility, allowing students to acquire knowledge at any time and from any environment. In addition, the narrative format and the use of audio create a more vivid and enriched learning experience, which can increase students' attention, concentration and engagement. However, challenges are also recorded, such as the absence of visual stimuli, which are critical for some teaching units, as well as the need for carefully selected and quality-controlled content. In conclusion, the research highlights the potential of podcasts as a complementary teaching tool for literature courses, highlighting the need for their integration into organized educational strategies. The creation of specialized educational content, adapted to the needs of students, is proposed, as well as the training of teachers in their effective use. With appropriate pedagogical guidance, podcasts can contribute substantially to the cultivation of critical thinking, creativity and active participation of students in the learning process

Keywords: podcasts, literature education, philology, multimodal learning, qualitative research, student engagement

INTRODUCTION

The evolution of technology and digital media has brought significant changes to the way the educational process is organized and implemented. The integration of Information and Communication Technologies (ICT) into education has opened new horizons in learning, offering opportunities for flexibility, personalization, and enhancement of students' initiative. Within this context, podcasts are emerging as an innovative tool with a dynamic role in shaping modern learning experiences. The use of podcasts in education combines the ease of listening with the power of storytelling, enabling students to actively engage, develop listening skills, oral expression, and critical thinking, while also supporting multimodal learning. Although podcasts are often associated with entertainment or news, they acquire important pedagogical dimensions when used for educational purposes.

CONCEPTUAL DEFINITION

The term podcast is a combination of the words iPod (Apple's audio playback device) and broadcast (radio transmission). It refers to recorded shows or audio files that can be downloaded or streamed online and played at any time by the user. In the educational context, podcasts are defined as "digital recordings created with the aim of supporting learning and distributed via the internet" (Hew, 2009). They are asynchronous learning tools that allow students to interact with the content at their own time and pace. Podcasts are an authentic listening resource, offering users the opportunity to benefit from them individually (Fernando, 2015). Moreover, they combine the power of spoken language with the convenience of auditory access and listening anytime, anywhere. Modern platforms such as Spotify host thousands of podcasts on a wide range of topics.

THEORETICAL FRAMEWORK

The pedagogical utilization of podcasts can be interpreted through various learning theories. Their integration into education aligns with broader frameworks such as social constructivism and engaged learning. According to Vygotsky (1978), learning is an active process of acquiring knowledge, which is enhanced through initiative, reflective listening, and multimodal understanding. Podcasts, as a form of spoken discourse, provide an authentic communicative context that supports collaborative and dialogical learning.Additionally, the multiliteracies theory (New London Group, 1996) highlights the need to develop skills for understanding and producing messages across multiple forms and media. Podcasts respond directly to this challenge by combining speech, sound, music, and storytelling techniques, thus promoting multimodal literacy.

The differentiated instruction approach (Tomlinson, 2001) also recognizes students' diverse learning needs and paces. The flexibility of listening to podcasts at different times and speeds offers a personalized learning experience. According to social learning theory (Bandura, 1986), both creating and listening to podcasts enhance learning through observation, identification, and social interaction. Furthermore, based on multimodal learning theory (Mayer, 2009), podcasts support learning through multiple stimuli (sound, emotion, rhythm). Podcasts foster learning autonomy (Lee, McLoughlin & Chan, 2008), and encourage collaborative learning when students are involved in producing their own audio narratives or participate as critical listeners of podcast content.

LITERATURE REVIEW

Podcasts represent a modern medium of communication and education that utilizes auditory information to transmit knowledge and skills. As a form of audio content that can be played anytime and anywhere, they offer significant advantages over traditional teaching methods (McGarr, 2009). The international literature has highlighted the multiple benefits of using podcasts in education:

- They enhance comprehension and information retention: Students can listen to the content repeatedly, which facilitates deeper processing and understanding (Fernandez, Simo & Sallan, 2009).
- They support the connection between prior knowledge and new information (Popova et al., 2014).
- They improve concentration, active participation, and student engagement (FeHennig, 2017).
- They promote active learning: Student-created podcasts enhance metacognitive skills, critical thinking, and creativity (Kay, 2012).
- They adapt to different learning styles, offering accessibility, flexibility, and variety in teaching methods. Auditory learners or students with learning difficulties benefit especially from audio-based content (Evans, 2008).
- They increase motivation and involvement: Podcasts are perceived as appealing and widely accepted by students (McKinney, Dyck & Luber, 2009).

- By offering an authentic learning context, they foster empathy—especially when the podcast content is based on personal experiences or social issues (Nikolaidou, 2021).
- They cultivate verbal expression and oral skills (Fernando & Marikar, 2017).

EDUCATIONAL APPLICATIONS

In the Greek educational context, the use of podcasts is still at an early but promising stage. Especially during the period of remote learning due to the COVID-19 pandemic, the importance of asynchronous learning tools, including podcasts, came to the forefront. Primary and secondary school teachers began experimenting with the creation of audio narratives, teaching episodes, or interviews as part of cross-curricular approaches. In addition, the Digital School by the Institute of Educational Policy (IEP) has integrated podcasts into its digital repositories to enrich teaching, while educational radio platforms such as the European School Radio offer opportunities for school units to create and broadcast their own podcasts, promoting creativity, collaboration, and multimodal expression (Pantelidou, 2021).

Furthermore, within the framework of skills workshops and project-based programs, podcast creation can be linked to the enhancement of creativity and critical thinking, the cultivation of digital literacy skills, the development of collaboration and communication abilities, and the promotion of student initiative. Douvlis (2022) notes that primary school students who engaged in podcast creation showed increased interest in both written and oral expression. Especially in multicultural classrooms or environments with students from diverse linguistic backgrounds, podcasts can act as bridges of inclusion, providing an alternative and more accessible means of expression.

Particularly in filological subjects such as Literature, Language, History, and Ancient Greek, podcasts offer a unique opportunity to utilize storytelling as a tool for deeper engagement with content. The narrative form of podcasts facilitates both the transmission of abstract or complex ideas and the emotional connection to the topic, aiding in better understanding and retention (Robin, 2008). Through audio narrations of literary works, dramatizations of historical events, or listening-based language games, students become actively involved in a learning experience that blends knowledge, imagination, and creativity. Specifically, podcasts can be used for literary analysis, discussions of historical events, language exercises, oral speech production, and the development of argumentation.

However, integrating them into teaching practice requires the appropriate teacher training, adequate technical infrastructure, and careful selection of topics and language style, tailored to the students' age and learning needs (Salmon & Edirisingha, 2008). When these conditions are met, podcasts can become a valuable tool for enhancing multiliteracy and creative expression in the modern classroom.

RESEARCH

The use of podcasts in the educational process has attracted considerable attention in educational research over the past decade, mainly due to their ability to offer a more personalized and flexible learning environment (Rosell-Aguilar, 2015). In the context of teaching literature-related subjects, this study aims to investigate the effectiveness of podcasts as a tool for understanding, reflection, and critical engagement with knowledge, focusing on the perspectives of both teachers and students.

The central research questions were:

- Does the use of podcasts contribute to a deeper understanding of the content in literature-related subjects (such as Literature, Language, History)?
- How does the audio experience affect students' motivation, concentration, and active participation?
- What are the perceived benefits and difficulties of integrating podcasts into teaching?

The specific research objectives were to:

- Investigate the effectiveness of podcasts in enhancing learning and critical thinking among students.
- Evaluate their contribution specifically to the understanding of literature, language, and history.
- Analyze student engagement in the learning process through the audio experience.
- Compare traditional and digital methods of learning.

The research approach draws on the theoretical foundations of sociocultural learning as proposed by Vygotsky (1978), according to which learning is enhanced through tools provided by the cultural environment—in this case, the audio medium of the podcast. It also incorporates elements from blended learning and self-regulated learning theories (Zimmerman, 2002), since podcasts provide asynchronous access that promotes autonomy and learner control. This research aspires to contribute to existing literature by expanding knowledge about the application of podcasts in

humanities education, a field that has so far been primarily explored in relation to science or language instruction (Fernandez, Simo & Sallan, 2009).

METHODOLOGY

The methodological approach of this research is qualitative, as the aim is not quantitative measurement but an in-depth understanding of the experiences, attitudes, and perceptions of the participants (Creswell & Poth, 2018). Three research techniques were applied to collect data, ensuring the completeness and reliability of the findings through triangulation:

- Semi-structured interviews with 10 philology teachers who have integrated podcasts into their classrooms. The interview guide included questions about the context of use, student and teacher reactions, the advantages of using podcasts in their teaching, and the challenges they encountered.
- Focus group discussions with 30 students who had experience listening to or producing educational podcasts. Students shared their opinions and preferences, whether they felt they benefited, and offered suggestions for improving the medium.
- Educational material analysis: Existing podcasts used or created in literature-related courses were examined. Evaluation was based on pedagogical criteria (e.g., clarity, language appropriateness, cognitive objectives).

The sampling was purposive, focusing on individuals with relevant experience on the topic (Patton, 2015). Data analysis was based on the thematic analysis technique (Braun & Clarke, 2006), which allowed grouping the participants' views into thematic categories such as: benefits, challenges, emotional engagement, technical issues, etc. The research was conducted in accordance with the principles of research ethics: anonymity and confidentiality of participants were ensured, participation was voluntary, and informed consent was obtained.

RESULTS

BENEFITS

The findings of the research highlighted a range of benefits arising from the integration of podcasts in the teaching of philological subjects:

Increased Interest and Engagement

The majority of students reported that the use of podcasts facilitated enhanced focus and a more active connection with the lesson content. According to educators, students demonstrate increased activity and participation when podcasts are employed in instruction, while auditory learning particularly supports students who are less responsive to traditional teaching methods. Specifically, a first-year high school student noted: "Listening to the podcast feels like hearing a story; unlike the textbook, it does not bore me." Another female student remarked: "Podcasts enabled me to continue the lesson outside the classroom, for example, during my commute to tutoring." Educators also concurred that podcasts provided a more immediate and personalized engagement with the material: "Students responded with greater enthusiasm when they listened to excerpts of literary works in podcast format. The audio 'captivated' them. They exhibited increased concentration" (Educator PE02).

Enhancement of Comprehension and Critical Thinking

Students develop critical faculties through listening to and analyzing podcasts, thereby facilitating comprehension, particularly in Literature and History. This medium contributed to a better understanding of complex concepts and situations, especially in the aforementioned subjects: "It helped me to better visualize the setting and grasp the emotional tone of the short story" (Student, 1st Grade High School). Concurrently, podcasts supported educators' pedagogical efforts and classroom interaction: "Podcasts served as a catalyst for highly engaging classroom discussions... they activated students' critical thinking" (Educator PE02).

Flexibility and Autonomy

Students have the autonomy to listen to podcasts at their convenience (asynchronous learning), which notably benefits those with varying learning paces. They can pause, replay, and annotate podcast segments, thereby enhancing knowledge assimilation. Students particularly emphasized the ease of access and the possibility of asynchronous listening, which allows them to engage with the material at any time or place: "I listened on my phone and could stop and replay as many times as needed if I did not understand something" (Student). Educators also recognized that this flexibility

reinforced self-regulation of learning: "The capacity for repetition aided students who typically lose focus and become distracted during class" (Educator).

Development of Creativity and Oral Expression

Philology teachers who incorporated podcast creation activities observed a marked increase in student participation. Educators reported enhanced creativity among students engaged in content production. Moreover, students involved in podcast creation practice essential research, writing, and oral communication skills. As expressed by students and educators: "Through producing our own podcast about a historical figure, I gained deeper understanding and felt empowered in the learning process" (Student); "Students learned to research, organize information, and articulate clearly—skills rarely cultivated through textbooks alone" (Educator).

CHALLENGES AND ISSUES

Despite the considerable benefits, several challenges were identified:

Technical Difficulties and Inequities

A primary challenge emerging from the research is the lack of appropriate equipment or digital literacy, which impedes access for some students: "At home, I have poor internet and struggle to download the files" (Student). Similarly, educators noted deficiencies in their own technical skills: "Initially, I did not know how to record or edit audio. I had to learn independently..." (Educator).

Limited Interaction

Although podcasts support learning, they do not substitute the direct interpersonal interaction achieved through classroom discussion, according to participants. Some students may feel alienated due to the absence of personal communication with the instructor. Despite engagement, many participants underscored the lack of immediate interaction: "I missed being able to ask questions directly. Listening to the podcast felt like a one-way communication without anyone to talk to" (Student). "The auditory experience cannot, under any circumstances, replace live discussion" (Educator).

Difficulty Integrating into the Curriculum

Educators predominantly expressed concerns regarding the effective and coherent incorporation of podcasts within the curriculum: "It is challenging to allocate time or integrate such tools within orientation classes under syllabus constraints" (Educator). "Institutional support is imperative; reliance solely on teachers' goodwill and dedication is insufficient" (Educator). Furthermore, some students prefer traditional learning methods and find adaptation difficult.

CONCLUSIONS AND RECOMMENDATIONS

The integration of podcasts in the teaching of philological subjects can impart new dynamism to the educational experience, provided it is implemented with targeted pedagogical planning and supported by appropriate training and technological infrastructure (Nikolaou & Koutsogiannis, 2020; Kara & Sevim, 2013). The present study's findings underscore that podcasts contribute to the establishment of a flexible and multimodal learning environment that enhances comprehension, expression, and collaboration. Based on these findings, the following key recommendations are proposed:

- Professional development for philology educators on the foundational principles of podcast creation, editing, and pedagogical integration (Tolisano, 2011; Danis & Mylonas, 2023).
- Development of targeted audio content functionally aligned with curriculum objectives and the requirements of nationally examined subjects.
- Encouragement of student podcast production as a form of creative writing, oral expression, and student voice empowerment (Middleton, 2010).
- Adoption of a hybrid teaching approach: integrating podcasts with traditional instructional methods to maintain direct interaction and avoid passive content reception (Chatzisavvidis, 2019).

DISCUSSION

The incorporation of podcasts into the teaching of language and literature subjects can offer a renewed dynamic to the learning experience, provided it is implemented through targeted pedagogical planning and supported by appropriate training and technological infrastructure (Nikolaou & Koutsogiannis, 2020; Kara & Sevim, 2013). The

findings of the present study highlight that podcasts contribute to the creation of a flexible and multimodal learning environment that enhances comprehension, expression, and collaboration. Based on these findings, the following key recommendations are proposed:

- Professional development for language and literature teachers on the fundamentals of podcast creation, editing, and pedagogical integration (Tolisano, 2011; Danis & Mylona, 2023).
- Development of targeted audio content that is functionally aligned with the objectives of the national curriculum and the requirements of standardized examinations.
- Encouragement of student-produced podcasts as a form of creative writing, oral expression, and amplification of student voice (Middleton, 2010).
- Hybrid teaching approaches that combine podcasts with traditional instructional methods, in order to maintain direct interaction and avoid passive content reception (Chatzisavvidis, 2019).

The results of this research are consistent with both international and national literature regarding the contribution of podcasts to the enhancement of students' cognitive and emotional engagement in language and literature education (McGarr, 2009; Lee & Chan, 2007; Passa & Tsakanika, 2021). Audio storytelling, in particular, can serve as a powerful tool for cultivating empathy, strengthening attention, and promoting active listening—especially in the context of literary and historical texts, where imagination and representation play a central role (Robin, 2008).

Despite the acknowledged benefits, the effective use of podcasts is contingent upon several external factors. These include: the technological infrastructure of schools and students (Adamopoulos, 2021), the adequacy of teacher training in both technical and instructional skills (Kalogiannidis & Papadimitriou, 2022), and the availability of supportive materials—such as ready-made or adaptable podcast resources tailored to classroom needs.

The lack of institutional recognition of audio tools as official teaching resources—and the reliance on individual educators' initiative—significantly limits their systematic application (Xochellis, 2018). Consequently, it is recommended that podcasts be formally integrated into educational policy as recognized digital learning tools, accompanied by consistent support for educators in utilizing them across all subject areas within the language and literature curriculum.

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BEST PRACTICES FOR INTEGRATING DIGITAL TECHNOLOGIES IN TEACHING: A HOLISTIC APPROACH

Anastasia Paliatsou
Greek Philology Teacher, M.Ed.
Principal of 1st General Lyceum of Filippiada
Directorate of Secondary Education of Preveza
Preveza, Greece
email: natassapal@gmail.com

Costas Assimakopoulos
Professor
Department of Organization Management, Marketing and Tourism
International Hellenic University
Thessaloniki, Greece
email: casim@ihu.gr

ABSTRACT

The present study focuses on best practices for integrating digital technologies into teaching through a holistic approach. Its aim is to present contemporary pedagogical strategies that leverage digital tools, highlight their advantages and inherent challenges, and propose specific applications in both the Greek and international contexts. Through the literature review, the exploration of innovative practices and the analysis of relevant policies and recommendations, the study aspires to provide a comprehensive resource for educators, researchers and educational institutions.

The methodological approach relied on an extensive review of recent research and case studies, aiming to identify current trends and innovative pedagogical practices using digital tools in education. The analysis was thematically organized, examining the implementation of technologies in blended and hybrid learning, the pedagogical potential of multimedia and interactive tools, the utilization of Virtual Learning Environments (VLEs) in teaching, as well as assessment and feedback practices through Learning Management Systems (LMS) and the role of Artificial Intelligence (AI) in enhancing personalization and optimizing the learning process.

The findings indicate that the purposeful, targeted and pedagogically informed use of digital technologies can significantly enhance active engagement, collaboration and self-regulation among learners, while also improving teaching quality and enabling real-time personalized assessment and feedback. In conclusion, it is argued that the systematic integration of digital tools within a holistic strategy framework fosters flexible, adaptive and effective learning environments.

Keywords: Digital learning tools, innovative pedagogical practices, VLEs, Artificial Intelligence, personalized learning, digital assessment systems.

INTRODUCTION

Digital technology has radically transformed education globally, creating new opportunities for learning, teaching and assessment. The integration of digital tools into educational processes is not merely a technological innovation but has emerged as a critical factor for improving learning quality, enhancing access to education and developing 21st-century skills (Selwyn, 2016; Bond et al., 2021). The digital transition –that is, the incorporation of digital media and tools into schools, universities and lifelong learning organizations– has become a key component of education policies worldwide, aiming to strengthen innovation, creativity, the learning experience, accessibility and student engagement (UNESCO, 2020; OECD, 2022).

In Greece, the digital transition in education has accelerated significantly in recent years, especially following the challenges posed by the COVID-19 pandemic. Through initiatives, such as the Digital Citizens Academy (Ministry of Digital Governance, 2020a), Lifelong Learning programs and collaboration with international platforms like Coursera for Greece, students and educators have been provided access to digital skills and high-quality educational content (Ministry of Digital Governance, 2020b). At the same time, investment in infrastructure and technological equipment is a necessary condition for ensuring equitable participation of all students, regardless of socio-economic background (Liebenberg, Chetty & Prinsloo, 2012).

This introduction establishes the framework for the following chapter, the Theoretical Framework, in which the key concepts, definitions, advantages and challenges of digital education will be examined, while also linking them to innovative pedagogical approaches that have already been successfully implemented at both international and national level.

THEORITICAL FRAMEWORK

Digital Education, Learning and Assessment

Definitions and Key Concepts

Digital education refers to the use of technological tools and digital platforms to enhance learning and teaching, as well as to prepare students for the contemporary digital world. It encompasses various forms, such as face-to-face teaching integrated with digital media, distance education, blended learning and hybrid learning (Halverson et al., 2014; Daskan & Yildiz, 2020). Digital technologies include educational LMS platforms (e.g., Moodle, Canvas, Google Classroom), multimedia, artificial intelligence applications, online collaboration tools, virtual simulation laboratories, interactive whiteboards, digital textbooks and online courses, through which students gain access to rich educational content that they can process at their own pace (Bond et al., 2021). These technologies enhance the educational experience, making learning more interactive, adaptive and engaging for students of all ages (UNESCO, 2020).

The pedagogical use of these tools requires their targeted integration into learning objectives, with emphasis on student engagement, personalized learning and the development of 21st-century skills (Becker et al., 2019; Ginting et al., 2024). Technology is not an end in itself but a tool that supports effective learning and must align with the goals of each curriculum and educational strategy.

Digital education offers multiple advantages, such as*:*

- **Flexibility and personalization:** Students can follow their own learning pace, repeat content, and access rich educational resources (Hrastinski, 2019). Personalization is further enhanced through artificial intelligence and data analytics systems that adapt teaching to each student's needs (Capuano & Caballé, 2020).
- **Collaborative learning:** Digital tools, such as forums, collaboration platforms and virtual classrooms, facilitate teamwork and interaction between students and educators (White, 2020; Bond et al., 2021).
- **Interactivity and active engagement:** The use of multimedia, gamification and interactive simulations transforms learning into an active process, promoting creativity and critical thinking (Krismanto, 2023; Ginting et al., 2024).
- **Immediate assessment and feedback:** LMS and digital assessment tools facilitate both the design and evaluation of teaching. They also allow the adaptation of teaching methods to students' needs and abilities, continuous monitoring of student progress, early detection of difficulties and provision of targeted feedback (Sanusi et al., 2023; Yahaya et al., 2024).
- **Development of digital skills:** Continuous use of digital tools prepares students for the demands of the digital labor market and strengthens their participation in social and political life (Samaila et al., 2024).

- Despite these advantages, digital education also faces challenges:
- **Digital divide:** Inequalities in access to technological equipment and reliable internet connection may lead to social and educational exclusion (Liebenberg, Chetty & Prinsloo, 2012).
- **Insufficient teacher training:** A lack of appropriate training reduces the effectiveness of technology in teaching and limits educational innovation (Krismanto, 2023; Selwyn, 2016).
- **Information overload:** The abundance of digital tools and content can cause confusion and reduce students' focus if there is no clear pedagogical design (Becker et al., 2019).
- **Data security and privacy:** The use of digital tools requires careful management of personal data and training in digital security (Rahman et al., 2020).

Innovative Teaching Approaches

Blended and Hybrid Learning

Blended and hybrid learning are contemporary pedagogical approaches that combine face-to-face teaching with distance education. Through this model, students have the opportunity to leverage the advantages of both forms of learning: direct interaction with the teacher and peers, combined with the flexibility of online learning (Garrison & Vaughan, 2008). Specifically:

Blended learning combines traditional face-to-face teaching with the use of digital tools, offering flexibility, personalization and an enriched learning experience. It does not replace the teacher's role; rather, enhances it, allowing educators to differentiate instruction, personalize student support and encourage collaborative learning. Educational technologies also enable continuous assessment of the learning process and the adaptation of instructional content to each student's needs (Halverson et al., 2014).

In the contemporary era of digital technology and educational innovation, blended learning emerges as an effective and flexible teaching model that can be applied across all education levels, from primary to higher education, as well as lifelong learning. By combining the benefits of traditional face-to-face teaching with the possibilities of online learning, blended learning provides students access to a broader range of educational content, greater autonomy and a personalized learning experience, as they can study digital content, participate in asynchronous activities and interact with teachers and peers in real time. Particularly in the aftermath of the pandemic, it has emerged as an effective strategy to ensure continuity in education, while promoting digital literacy and student autonomy (Daskan & Yildiz, 2020).

Blended learning constitutes a modern educational design that allows students to develop self-regulation, responsibility and time management skills, as they study at their own pace using diverse digital resources, such as educational platforms, interactive videos, self-assessment tests and discussion forums, while teachers can implement differentiated assessment and support methods (Hrastinski, 2019).

Hybrid learning represents a synthesis of distance and face-to-face education, where the digital component is integrated more organically into the teaching process, with part of the course conducted remotely and the remainder face-to-face. Rather than merely adding technological elements to a traditional classroom, hybrid learning fundamentally restructures how instruction is organized. Students attend part of the lessons remotely–either synchronously or asynchronously–and meet in person for targeted, experiential, or reflective activities. Hybrid learning emphasizes flexibility, differentiation, the use of digital technologies and active student participation. Additionally, it contributes to the development of self-regulation, responsibility and digital literacy skills (Almusaed, Almssad & Cortez, 2023).

The most common models of blended and hybrid learning include the flipped classroom, where theoretical content is studied at home and classroom time is devoted to collaborative activities and the station rotation model, in which students rotate between different learning stations with digital and analog tools (Horn & Staker, 2015).

These models have gained popularity because they enhance active engagement, critical thinking and collaboration, challenging conventional teaching approaches and allowing instructors to act more as guides and facilitators of knowledge rather than mere transmitters of information (Samaila et al., 2024). In the flipped classroom, students process educational material at home through videos, presentations or online resources, while class time is dedicated to applied activities, discussions and problem-solving.

The station rotation model is successfully implemented in higher education institutions where differentiated instruction is needed. Students are divided into groups and rotate between different learning stations, combining traditional and digital activities, such as online platforms, practical exercises, or collaborative discussions. This model

allows individualized support while promoting participation and interaction among students and instructors. Particularly for courses with laboratory or applied components, station rotation enables better utilization of time and available resources (Christina, Rusijono & Bachtiar, 2019).

Within this framework, Virtual Learning Environments (VLEs) such as Moodle, Blackboard, or e-Class play a significant role. VLEs are a core component of blended learning in higher education, as they allow students to attend courses remotely, interact with content, communicate with instructors and peers, and be assessed. They also promote continuous and asynchronous access to knowledge, enabling learning at one's own pace. Additionally, they offer the integration of multimedia, self-assessment tests, discussion forums and assignments, making the learning process more engaging and interactive (Dayag & Faramarzi, 2024).

Multimedia and Interactive Tools

The use of multimedia–sound, images, video, animations and interactive applications–has become an integral part of contemporary educational practice, as it significantly contributes to improving teaching and learning and enhances comprehension and retention by providing multiple sensory experiences (Krismanto, 2023). Interactive tools, such as educational games, simulations, digital maps and self-assessment platforms, allow students to actively participate in the learning process, transforming them from passive recipients into active explorers of knowledge (Ginting et al., 2024).

The use of multimedia applications, such as PowerPoint presentations, educational videos, simulation software, interactive maps and digital learning platforms, enables the personalization of teaching and its adaptation to the needs and learning styles of each student. Moreover, multimedia enhances creativity and critical thinking, offering opportunities for experimentation, problem-solving and the development of 21st-century skills, such as digital literacy and collaboration in online environments. At the same time, educators have new means to enrich their teaching and stimulate student interest, while multimedia can also be used for assessment and feedback in innovative ways. However, appropriate teacher training is required for the effective integration of these tools, along with careful instructional design to ensure that technology functions supportively rather than distractingly (Becker et al., 2019).

Artificial Intelligence and Personalization

Applications of Artificial Intelligence (AI) in education offer new possibilities for personalized learning. AI platforms can monitor students' performance in real time and recommend individualized content or exercises to address learning gaps (Capuano & Caballé, 2020).

AI also enables facilitates feedback by analyzing learning data to identify learning patterns and support students through targeted interventions. Simultaneously, educators can leverage these insights to improve lesson design and adapt instructional strategies to the needs of the class (Sanusi et al., 2023; Yahaya et al., 2024).

Combined with multimedia and digital platforms, AI creates a dynamic learning environment that supports differentiated instruction, active engagement and personalized learning, while enhancing students' digital skills, which are essential for the knowledge society (Samaila et al., 2024).

Digital Assessment Systems

Modern technologies have revolutionized the way assessment and feedback are conducted in education. Traditional assessment, which mainly relied on written exams at the end of a teaching unit, has increasingly been complemented by more interactive, immediate and personalized processes. Through the widespread use of Learning Management Systems (LMS) (e.g., Moodle, Canvas, Google Classroom), assessment can take place in real time, offering continuous feedback to both educators and students (Sanusi et al., 2023; Yahaya et al., 2024).

Data collected through LMS allow for long-term monitoring of student progress across activities, quizzes and tests, the identification of learning difficulties, the adaptation of content and the design of targeted interventions. At the same time, students gain clearer insight into their progress and are encouraged to adopt a more active role in learning process. The integration of analytical tools produces reports and visualizations that improve data understanding, enhance student self-awareness, and facilitate collaboration with parents and school administration (Yahaya et al., 2024).

The use of these tools is closely connected to AI applications and personalized learning. AI platforms can monitor performance in real time and recommend personalized content or exercises to address weaknesses, supporting

differentiated instruction and enabling educators to design individualized learning pathways (Capuano & Caballé, 2020; Sanusi et al., 2023; Yahaya et al., 2024).

Overall, the combined use of multimedia, interactive tools, VLEs and AI, fosters a comprehensive learning environment that enhances active participation, personalizes learning, supports student self-regulation and enables real-time assessment. This holistic approach cultivates the development of essential 21st-century skills, including collaboration, critical thinking and digital literacy (Becker et al., 2019; Samaila et al., 2024).

LEVERAGING DIGITAL TECHNOLOGIES IN EDUCATION: INTERNATIONAL AND GREEK BEST PRACTICES

In educational process, best practices for utilizing digital technologies include multiple strategies that enhance learning:

- Technology should support learning objectives rather than define them, as the alignment of digital tools with the curriculum and teaching strategies is a key prerequisite for effectiveness (Becker et al., 2019).
- Simultaneously, the use of digital forums, collaboration platforms and virtual classrooms promotes active participation, communication and problem-solving (White, 2020).
- Artificial intelligence allows personalized instruction based on each student's performance, enhancing support for those facing difficulties (Capuano & Caballé, 2020).
- Additionally, LMS and multimedia tools enable continuous assessment and immediate feedback, enhancing students' self-regulation (Simon & Zeng, 2024).
- Finally, education in safe internet use and responsible social media usage is a critical component for ensuring digital responsibility (Rahman et al., 2020).

The integration of digital technologies in education has also been adopted internationally through various examples and initiatives, aiming to enhance the learning process, adapt to each student's needs and improve educational quality (Bond et al., 2021) in:

➢ *United States and Canada*

Schools and universities use LMS platforms such as Moodle and Canvas for course organization, assessment and real-time feedback. The implementation of the flipped classroom has improved student engagement and academic performance, enabling educators to focus more on guidance and individualized support (Samaila et al., 2024). Furthermore, the integration of multimedia, interactive tools and AI has enhanced personalized learning and facilitated long-term progress monitoring (Capuano & Caballé, 2020).

➢ *Europe*

In Scandinavia and the Netherlands, digital education is systematically embedded in the curriculum. The use of multimedia, collaborative platforms and gamification has resulted in higher levels of engagement, deeper understanding and greater student autonomy (Ginting et al., 2024). In the United Kingdom, schools foster the development of digital skills through targeted programs combining asynchronous and synchronous learning.

➢ *Asia and Australia*

In Asia, countries such as Singapore and South Korea invest in comprehensive digital learning ecosystems that support personalized instruction and continuous data-driven analytics. Australia emphasizes lifelong learning and the development of digital skills through programs spanning all education levels (Liebenberg, Chetty & Prinsloo, 2012).

In **Greece**, in line with international trends, significant progress has been achieved in recent years in the integration of digital technologies into education, aiming to enhance the learning experience, address individual student needs and improve overall educational quality. In particular:

- Through public and private initiatives, such as the Digital Citizens Academy (Ministry of Digital Governance, 2020a), the Lifelong Learning program and the Coursera for Greece platform, students and citizens have access to high-quality digital courses, either free of charge or at low cost (Ministry of Digital Governance, 2020b).
- Universities have adopted blended learning models supported by VLE platforms such as Moodle, Blackboard and e-Class, providing access to remote content, collaboration opportunities and asynchronous learning (Dayag & Faramarzi, 2024). The flipped classroom and station rotation models are applied in laboratory courses, fostering active participation and the practical application of knowledge (Christina, Rusijono & Bachtiar, 2019).

- Teachers' digital competence has been strengthened through professional development programs and ongoing training, covering the use of LMS, multimedia and AI tools. At the same time, equity- oriented policies ensure that all students, regardless of socioeconomic background, have access to digital resources and reliable internet connectivity (Krismanto, 2023; Liebenberg, Chetty & Prinsloo, 2012).

STRATEGIC DIRECTIONS FOR DIGITAL EDUCATION IN GREECE

The integration of digital technologies in education requires strategic planning and supportive policies to ensure equal learning opportunities for all students and the effective utilization of new technologies. Greece, like other European Union countries, is called upon to adapt to the rapid digital transition and to develop holistic strategies that enhance digital literacy and citizens' participation in the knowledge society (Ministry of Digital Governance, 2020a).

Strengthening digital infrastructure is a critical factor for equitable access to learning. This includes upgrading school laboratories and technological equipment, such as computers, interactive whiteboards and high-speed network infrastructures (Selwyn, 2016), as well as ensuring reliable internet access for all schools, regardless of geographic location or socioeconomic background (Liebenberg, Chetty & Prinsloo, 2012).

At the same time, continuous professional development for educators is fundamental for the effective integration of digital tools. In this context, educational programs should cover the use of LMS, multimedia, collaboration platforms, artificial intelligence tools and the integration of pedagogical strategies for blended and hybrid learning, as well as the creation of mentoring and peer-learning mechanisms to support teachers (Krismanto, 2023).

Furthermore, developing students' digital skills contributes to their autonomy and effective participation in learning, through the integration of digital literacy programs at all educational levels, strengthening critical thinking and responsible internet use and promoting collaboration and creativity through multimedia tools and gamification technologies (Samaila et al., 2024; Rahman et al., 2020).

Blended and hybrid learning should also be central to educational policy, with the creation of supportive frameworks for digital content, adaptation of curricula, and the use of real-time assessment tools to monitor student progress (Halverson et al., 2014; Yahaya et al., 2024).

Finally, the digital transition must reinforce social cohesion and reduce digital exclusion by providing assistive technologies for students with special needs, facilitating access to digital resources for students from low-income backgrounds and regularly evaluating policies to identify and address inequalities (Carmen et al., 2024).

Effective digital policy requires a holistic approach, combining legislative frameworks for data security and the use of digital media, collaboration between the public and private sectors for the development of high-quality digital content and continuous monitoring and feedback on policies (Krismanto, 2023; Carmen et al., 2024).

The implementation of these strategies ensures that Greece can follow international best practices, enhance the quality of learning and prepare students for a digital and innovative future.

CONCLUSION AND FUTURE DIRECTIONS

The integration of digital technologies in education is no longer merely a technological innovation but a strategic investment in human capital development and social progress. The use of digital tools offers significant advantages, such as personalized learning, enhanced collaboration, development of digital skills and increased student engagement.

Blended and hybrid learning approaches, supported by educational technologies, have emerged as highly effective models for developing flexible and personalized learning pathways. They create a dynamic and interactive learning environment where traditional and digital education coexist and complement each other, while simultaneously enhancing the quality and accessibility of learning. These approaches provide opportunities to combine traditional teaching with digital applications, such as virtual laboratories, simulations and LMS platforms, fostering active participation and critical thinking. They also support educators in their role as guides and mentors to students.

Blended learning models in higher education respond to the increased demands of modern students and the academic environment. They offer high-quality learning experiences, enhance student autonomy and active engagement and encourage instructor adaptability. Successful implementation requires appropriate teacher training, technological infrastructure and pedagogical design focused on student needs.

Moreover, multimedia tools and interactive applications provide new opportunities for creating a more engaging, flexible and effective learning environment adapted to the demands of the digital era. Through the integration of audio, visuals, video and digital simulations, students become active explorers of knowledge, while educators gain new tools for assessment, feedback and adapting instruction to each student's needs.

The application of Artificial Intelligence (AI) in education further expands the possibilities for personalized learning, enabling customized learning pathways and timely interventions for learning difficulties.

At the same time, real-time assessment and feedback through digital technologies and the utilization of data via LMS contribute to personalized instruction, enhance student self-regulation and promote the development of critical thinking skills.

Finally, the development of digital skills is a necessary prerequisite for students' and citizens' active participation in the knowledge society. Initiatives ensuring equitable access to digital resources strengthen social cohesion and help address the digital divide, ensuring that all students can fully benefit from the advantages of digital education.

The future evolution of digital education in Greece should focus on three main axes to enhance learning quality and fully exploit the possibilities of the digital era:

- **Technological Innovation:** Continuous integration of new technologies, such as AI, augmented and virtual reality, combined with multimedia and interactive tools, to create personalized and engaging learning experiences.
- **Professional Development:** Extensive training programs for educators in the use of pedagogical strategies with technology, enhancing digital literacy and familiarization with LMS, AI tools and multimedia environments.
- **Innovation and Social Cohesion Policies:** Establishing a national strategic framework, utilizing data to improve policies and ensuring equitable access for all students.

Overall, when adopted holistically, digital education offers the opportunity to transform teaching practice, enhancing learning quality, student engagement and teacher professional development. With targeted policies, appropriate infrastructure and continuous training, Greece can fully harness the potential of the digital era while simultaneously strengthening competitiveness and social cohesion.

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eTwinning: BUILDING A STRONG COMMUNITY OF INNOVATIVE TEACHERS

Paraskevas Michael
Professor of the University of Peloponnese, Vice President of CTI "Diophantus",
Head of National Support Organization for eTwinning
Patras, Greece
email: mparask@cti.gr

ABSTRACT

eTwinning has been designated a flagship action by the European Commission with the objective of fostering educational innovation, promoting collaborative learning, developing digital skills and encouraging intercultural understanding. Since 2005, Greece has cultivated a dynamic community of teachers, schools and pedagogical students who have implemented thousands of collaborative projects, many of which have received high distinctions. The eTwinning National Support Organization cultivates competences related to ICT, AI and modern teaching methodologies through a variety of means, including its Open Online Courses, STEM activities, the Initial Teacher Education initiative and other actions. The network of ambassadors and institutional partners facilitate the dissemination of good practices and participation in international competitions, while publications and digital repositories support the dissemination of knowledge. The Greek experience corroborates the function of eTwinning as a catalyst for the transformation of educational culture and the establishment of robust learning communities at both the national and European levels.

Keywords: eTwinning, Teacher training, Professional development, MOOCs, STEM education, AI in education

INTRODUCTION

The rapid development of Information and Communication Technologies (ICT) and the need to cultivate 21st-century skills have made educational innovation a key policy priority at both the national and international levels. eTwinning is a flagship initiative of the European Commission, launched in 2005 and integrated into the Erasmus+ programme. It has now developed into a wide-ranging transnational network for the creation of collaborative projects, the exchange of good practice, and the professional development of teachers. The utilization of digital tools has been instrumental in fostering open learning methodologies and facilitating cross-border collaboration between educators and students. This has led to its emergence as one of the most prominent networks on the global stage, undoubtedly marking a historic milestone in the evolution of education.

In Greece, the profound impact of eTwinning is exemplified by the over 40,000 active teachers from 14,000 school units, with a plethora of collaborative projects, many of which have been recognized with prestigious accolades. The action in Greece is supported by the National eTwinning Support Organization (NSO), which operates under the responsibility of CTI "Diophantus" in close cooperation with the Ministry of Education. The NSO provides training, professional development of teachers, networking, technical and pedagogical support, and promotes the integration of the programme into national education policies.

A well-organized series of actions, including open online courses, MOOCs, Initial Teacher Education, the ambassador network, quality labels, national and European competitions, actions for the integration of STEM and AI in collaborative projects, synergies with national education policy bodies and others, constitute a multidimensional framework. Within this framework, educational innovation and modern digital skills are fostered, collaborative culture is developed, professional development is enhanced, and European identity and intercultural understanding is promoted. The role of the Greek NSO is pivotal for the sustainable dissemination of results, contributing to a strategic mechanism for educational upgrading and fostering innovation in the national education system.

The following sections will present the actions of the Greek NSO of eTwinning, which contribute to the growth and development of the Greek eTwinners community of teachers. Firstly, the following discussion will present the main research findings on the impact of eTwinning on digital competence and teaching practices. This is followed by the section "Training Actions" with quantitative and qualitative data on participation and evaluation; then the "Networking and Professional Development Actions" are examined, followed by the presentation of the "Recognition and Reward" mechanisms. The section entitled "Partnerships with Education Policy Bodies" documents the link with universities, national bodies and other actions, while the section "Specific Actions" focuses on targeted programmes (STEM, AI). The paper concludes with an Executive Summary, which synthesizes the key findings and draws conclusions and policy recommendations, and a Bibliography to support the references.

LITERATURE REVIEW

The eTwinning programme is a European educational initiative that facilitates collaboration between teachers and students from different countries through the use of Information and Communication Technologies (ICT). It is widely regarded as one of the most influential educational initiatives in Europe. A substantial body of research has demonstrated that there has been a considerable enhancement in teachers' digital competence, which has also been observed to be transferred to their students. Seklou (2023) has highlighted an increase in teachers' confidence in the utilization of digital tools, while Arabatzis (2020) has noted the adoption of novel teaching methods and the enhancement of technological skills in secondary schools. In a similar vein, Boukla (2018) and Voutyra (2008) have drawn parallels between the utilization of digital media in primary education and the provision of personalized lessons. Concurrently, eTwinning has been shown to enhance collaborative and communication skills (Kyriakidou, 2021). Furthermore, Kollitidou (2018) has emphasized its contribution to a culture of teamwork, and its role in improving communication and team coordination through e-learning has also been highlighted (Kollitidou, 2018). Gouvetzou (2018) emphasizes the pedagogical value of teleconferencing, while Ioannidou (2020) and Mastori (2017) document the importance of training activities in professional development and networking. Alexiou (2019) examines collaborative platforms for teaching mathematics, finding improvements in understanding and interdisciplinary thinking, while Tzilou (2018) highlights the contribution of digital art to creativity and autonomy. In the domain of preschool education, Spitsa (2017) posits that digital games have the potential to enhance group learning and social development. Finally, Drakontaidis (2015) highlights the contribution of eTwinning to intercultural exchange, tolerance, and European awareness. A comprehensive review of the extant literature confirms that eTwinning is a multidimensional tool for educational innovation, offering measurable benefits in terms of skills, collaboration, teaching practices, and intercultural awareness.

TRAINING ACTIONS

The Greek NSO of eTwinning provides a comprehensive framework of training, collaboration and support services for the educational community, promoting the integration of modern ICT in eTwinning projects and in educational practice, through activities such as Open Online Courses, MOOCs, and eTwinning Ambassadors' training workshops. Let's look at them in detail.

Open Online Courses & MOOCs

Since 2017, the Greek NSO of eTwinning has been offering the Open Online Courses service[2]. These educational cycles are organized on an annual basis, with each cycle comprising 160-200 teaching hours. The thematic focus of these cycles encompasses the pedagogical utilization of ICT, Web 2.0 tools, Educational Robotics, STEM and Artificial Intelligence, with a view to facilitating collaborative activities and their integration within the context of classroom teaching. Since 2021 to date, the programme has trained over 70,000 teachers and students, and for the 2025-26 academic year, enrolment has reached 25,500. In the autumn of 2024, two new pilot courses were introduced: one focused on the use of interactive whiteboards, and the other on robotics kits. These additions brought the total number of courses offered related to educational robotics and STEM to eight. Approximately 1,500 trainers provide support to trainees, who are granted full access to the training material. Trainees are also tasked with developing assignments and practical exercises, and are subject to assessment before being awarded a certificate of successful completion. A central team of the NSO is responsible for the maintenance of the technical infrastructure, the creation of training material, and the supervision and coordination of the training process. To elaborate further, during the academic years 2021-22 to 2024-25, the courses delineated in the table were made available, with a total of 72,540 teacher registrations recorded.

Table 1
Enrolment of teachers in open online courses

Online course \ School year	2021-22	2022-23	2023-24	2024-25
E-learning platforms - Tools for the production of educational material - Communication tools	2.192	1.807	2.188	2.716
Multimedia editing tools - Tools for the production of educational material	2.293	2.767	2.940	2.505
Website creation tools - Collaborative and support tools	1.470	2.119	2.392	2.269
Online learning communities and use of learning objects	779	987	1.249	1.506
Creative and safe Internet - Evaluation and development of critical thinking about digital content	876	919	1.009	1.240
Arduino Basic: Introduction to educational robotics using Arduino	614	813	632	416
Arduino Intermediate. Instructional Robotics using Arduino	-	291	253	111
Educational robotics with Edison	174	174	105	72
Educational robotics with Micro:bit	-	376	340	358
Educational robotics with Thymio	224	216	153	-
Educational robotics in kindergarten - Beebot	877	1.200	1.044	752
Scratch programming and educational robotics	1.412	1.383	1.211	595
Mobile devices 1 (Tablets and mobile phones) - Basic use	912	1.434	1.078	541
Mobile devices 2 (Tablets and mobile phones) - Use in teaching courses	1.491	2.071	2.461	1.214
Pedagogical use of AI in eTwinning projects and in course teaching	-	-	2.685	4.459
Use of interactive systems in teaching	-	-	-	3.245
Educational robotics with the new S1 robotics kit	-	-	-	715
TOTAL	13.529	16.557	19.740	22.714

[2] https://seminars.etwinning.gr

Two of the aforementioned courses are also offered in English for teachers from European Schools (Brussels) and for teachers from Tunisia, Lebanon, Jordan, Georgia and Armenia, which the Greek NSO has undertaken to support. In relation to the qualitative strand, the evaluation of the courses using the official methodology, Selfie4Teachers, of the European Commission demonstrated a 17% increase in digital skills among the trainees (54% post-course in comparison to 37% pre-course) and a 15% increase among the trainers (75% in comparison to 60% pre-course). This finding serves to confirm the effectiveness of the combined theoretical and experiential training methodology. As the new school year, 2025-26, approaches, it is reported that a total of 18 courses will be offered, with enrolment having reached 25,496 and 1,528 trainers scheduled to support the learning process. These figures represent the highest recorded since the inception of the initiative in 2017.

Massive Open Online Courses - MOOCs

From 2022, the Greek NSO of eTwinning will offer training services in the form of Massive Open Online Courses (MOOCs[3]) on:

- The eTwinning community, the educational material provided by eTwinning, European School Education Platform (ESEP) and EU Academy for their professional development, networking and for the implementation of collaborative eTwinning projects.
- The use of the Community, actions and educational material provided by eTwinning for the implementation of Skills Workshops as collaborative projects.
- The introduction to the Community, the actions and the educational material provided by eTwinning and the European School Education Platform (ESEP) to students of Greek Universities, for their professional development and for the implementation of collaborative eTwinning projects.

More specifically, since 2022 to date, the MOOCs listed in Table 2 have been offered.

Table 2
Massive Open Online Courses (MOOCs)

MOOC title	Offered	Participated
eTwinning & Skills Workshops: collaborative activities for the cultivation of knowledge, skills and competences	2022 and 2023	7,728 teachers
Introduction to eTwinning, the European action for education	2023, 2025	6,411 teachers
Designing a Quality, Collaborative eTwinning project	2024	1,908 teachers
European eTwinning in Higher Education	2024	195 students and university teachers
European eTwinning in Higher Education (self-paced)	2024, 2025	
Use of AI in Education and eTwinning projects	2025	• > 5,000 registrations

Ambassador Training Workshops

The volunteer body of eTwinning Ambassadors performs a pivotal function, providing guidance to educators in their respective domains to facilitate the implementation of eTwinning projects. In addition to other activities, they facilitate training workshops, either as webinars or face-to-face training, on a range of topics, including "Awareness-raising for people not registered for eTwinning", "Presentation of the eTwinning platform", "Twinspace", "Enhancing the quality of eTwinning projects", "eTwinning Schools", "Digital Tools and eTwinning", "eTwinning and Skills Workshops" and "eTwinning and Initial Teacher Education". During the academic years 2022-23, 2023-24 and 2024-25, a total of 450 online workshops were delivered by ambassadors, reaching an estimated 30,000 teachers.

NETWORKING & PROFESSIONAL DEVELOPMENT ACTIONS

The Contact Seminars / Multilateral Seminars (CS/MS) and the Professional Development Workshops (PDW) represent two pan-European eTwinning actions which have been designed with the objective of promoting the professional development of teachers and expanding cooperation between schools in Europe. It is evident that both forms of action have a substantial impact on the eTwinning community. CS/MS contribute to the expansion of the European

[3] https://mooc.etwinning.gr/

network of teachers, the establishment of communication channels and the promotion of intercultural understanding. The integration of PDWs into scientific and pedagogical training has been demonstrated to enhance both these fields. Furthermore, the integration of ICT in teaching has been shown to foster a culture of innovation. The outcomes of these initiatives are twofold: firstly, the development of collaborative projects with a demonstrable impact on students; secondly, the active involvement of students in international learning experiences. These experiences are critical for professional development and networking, and serve to strengthen the eTwinning community as a European community of learning and innovation.

Contact Seminars / Multilateral Seminars

Contact Seminars / Multilateral Seminars (CS/MS)[4] are characterised by their strong cross-border nature, with the objective of establishing new partnerships between teachers from diverse international backgrounds. These events offer a distinctive networking opportunity, as they facilitate the convergence of teachers who share common interests and are seeking collaborators to execute European-based projects. The thematic focus of these initiatives aligns with European educational priorities, encompassing digital innovation, environmental education, social inclusion, STEM education, and even AI. In the course of the workshops, participants are required to present their ideas, work in small groups, design collaborative projects and lay the foundations for joint actions through eTwinning. The Greek eTwinning Network has been responsible for the organisation of specialised Communication Seminars, with a recent focus on STEM and Artificial Intelligence (AI). A paradigmatic example is the seminar entitled "Applications, Tools and Perspectives of AI in Education", which was held from 10-12 May 2024 at the CTI "Diophantus" in Patras. The seminar was designed for secondary school teachers with either basic or intermediate experience of eTwinning, with the aim of enhancing their skills in integrating AI in European collaborative projects. A recent example of this is the seminar entitled "Ancient Greece's STEM resources for eTwinning", which was held from 2-5 April 2025 in Pylos, Messinia. The aim of the seminar was to assist teachers in the organisation of European eTwinning projects with STEM themes, by examining the development of the skills that are considered to be fundamental to mathematics, technology, science and engineering in modern society, as they were in Ancient Greece. In both seminars, the programme comprised theoretical presentations, practical workshops, networking activities and the establishment of new collaborative eTwinning projects.

Professional Development Workshops

The nature of PDW[5] events is such that they are intensive training exercises. It is asserted that the programme proffers eTwinners the opportunity to achieve a more profound comprehension of contemporary pedagogical issues and to acquire knowledge of innovative teaching methodologies that they can apply in the classroom. The subjects addressed are diverse, encompassing themes such as project-based learning, the cultivation of fundamental skills (language, mathematics, digital literacy), cultural heritage, ecology, and the utilisation of digital tools, among others. Teacher participation is by selection, based on a set of criteria. These include active presence in the eTwinning community, foreign language proficiency and the ability to use ICT in teaching. Participants will acquire practical experience, exchange good practice and develop skills that will enhance their effectiveness and innovation in their work through presentations, hands-on workshops and group activities.

RECOGNITION & REWARD ACTIONS

eTwinning has established and is implementing a comprehensive recognition and reward framework with the aim of promoting educational innovation and the professional development of teachers. This framework encompasses national award competitions, wherein educational institutions that have demonstrated excellence in various competitions are recognized with technological equipment, thereby further enhancing their pedagogical practices. At the European level, the European eTwinning Awards represent the highest form of recognition for projects that embody educational value and innovation. It is evident that participation by Greek teachers has consistently yielded notable achievements in all European competitions. The annual national eTwinning conferences have been demonstrated to strengthen the Community by acting as a forum for knowledge dissemination, networking and training. It has been demonstrated that quality control procedures (i.e. the national and European quality labels) and international teacher missions, function in a complementary manner, thereby ensuring that recognition is translated into synergies, professional development and the implementation of educational innovations in the classroom.

[4] https://etwinning.gr/professionaldevelopment/cs
[5] https://etwinning.gr/professionaldevelopment/pdw

National Competitions & Awards

It is evident that the annual national competitions within the context of Greek eTwinning play a pivotal role in the recognition and rewarding of participants. The Greek NSO is responsible for the organization of these events, and by 2024, 19 national competitions had been held. Eligible participants are those collaborative projects that have been awarded a National Quality Label (NQL). The evaluation is conducted by a panel of expert evaluators who employ specific criteria that are applicable in all 46 countries where eTwinning is implemented. The national competitions have been conceived with the objective of recognizing projects that incorporate high pedagogical value, highlighting good practice and strengthening the implementation of projects in the classroom. The awards are presented in a public forum at special ceremonies, which are often held as part of the annual national eTwinning conference. The projects which are selected as winners are subject to public dissemination, and are included in publications such as the Pedagogical Guides. The winning schools are awarded prizes, which may take the form of tablets or 3D printers, among other items. For instance, in the 17th national competition (2022), 32 schools were awarded 3D printers and tablets; in the 18th national competition (2023), 20 schools were awarded 3D printers and tablets; and in the 19th national competition (2024), 17 schools and two university departments were awarded tablets.

European Competitions & Awards

Alongside the national competitions, a pan-European competition is held every year, in which collaborative projects that have been awarded the European Quality Label (EQL) can participate. The European eTwinning Awards are the highest recognition at European level for collaborative projects in terms of innovation and pedagogical impact. Nominations are evaluated by international panels on the basis of clearly defined criteria (pedagogical evidence, collaboration, innovation, impact). The distinctions for collaborative projects at European level enhance the dissemination and replication of collaborative practices, provide a platform for networking and encourage the documentation of learning outcomes in an international context. The winners are awarded at the annual European eTwinning Conference. The eTwinning projects involving Greek teachers are always distinguished in the European competitions and ranked in the highest positions. Specifically, in 2022, 6 Greek schools and 8 Greek teachers participating in 5 winning projects[6] were awarded, in 2023, 5 Greek schools and 8 Greek teachers participating in 5 winning projects[7] were awarded, in 2024, 9 Greek schools and 15 Greek teachers participating in 4 award-winning projects[8] and in 2025, 8 Greek schools and 12 Greek teachers participating in 2 award-winning projects[9] . The systematic presence of Greek teachers in this highest distinction proves the high quality fulfilled by the collaborative projects founded or participated in by Greek schools and the awards document the quality and innovation of these projects.

National eTwinning Conference

The annual national conference is another well-established action of Greek eTwinning with a clear scientific character. It has been held continuously since 2014, in cities such as Patras, Athens, Ioannina, Syros and Thessaloniki. During the covid-19 pandemic it was conducted online, and from 2021 until today it is conducted in a hybrid format. The main purpose of the conference is to encourage creative dialogue between teachers around the implementation of innovative teaching methods using eTwinning. One of the characteristics of the conference is the very high participation of teachers and the presentation of a variety of scientific papers. For example, the 9th conference[10] (2023, Syros) featured 167 papers, 21 workshops, 7 keynote speeches and a round table on educational innovation, while the 10th conference[11] (Athens, 2024) featured 105 papers, 15 workshops, 16 keynote speeches and a round table on AI in Education and eTwinning collaborative projects. The impact of the national eTwinning conference on the educational community is manifold: it fosters the dissemination of innovative teaching practices, enhances teacher networking, promotes collaborative actions, and fosters modern digital skills.

International Missions of Greek Teachers

Another action that acknowledges and rewards eTwinners is their involvement in international professional development workshops (PDW) and partner search seminars (CS/MS). These missions are intended for both distinguished teachers and novices, with the objective of establishing transnational partnerships and scaling up successful classroom

[6] https://www.etwinning.gr/awards/eawards/1114-etwinning-2022-4-6-8-etwprizes22
[7] https://www.etwinning.gr/awards/eawards/1260-etwinning-2023-5-5-8-etwprizes23
[8] https://www.etwinning.gr/awards/eawards/1571-etwinning-2024-5-9-15-etwprizes24
[9] https://www.etwinning.gr/awards/eawards/1583-etwinning-2025-5-9-13-etwprizes25
[10] https://etwinning.gr/conf2023
[11] https://www.etwinning.gr/conf2024

practices. Participation in PDW/CS facilitates direct knowledge transfer and enhancement of the participants' professional identity. The Greek eTwinning organization is responsible for the coordination of international missions for Greek teachers, with a yearly average of more than 50 teachers being sent to various countries for this purpose.

COOPERATION WITH EDUCATION POLICY BODIES

The establishment of collaborative relationships between the Greek NSO of eTwinning and national education policy bodies is a pivotal element in both the promotion of innovation in education and the consolidation of the eTwinners' community. These partnerships entail the establishment of connections between the school community and institutions of higher education, as well as national education policy bodies and European mobility programmes. The Initial Teacher Education action is intended to inform pedagogical students about eTwinning and its services, while the collaboration with the Institute for Education Policy creates a framework for the use of Skills Workshops through collaborative projects. The synergy with the State Scholarship Foundation serves to strengthen the link between eTwinning and the Erasmus+ programme, while the cooperation with the National Centre for Public Administration and Local Government ensures the provision of extensive (free) training of teachers on eTwinning.

Cooperation with Universities - Action: Initial Teacher Education

The eTwinning's Initial Teacher Education[12] (ITE) action has been designed to enhance the initial training of prospective teachers, with the objective of cultivating collaborative, pedagogical and digital competencies from their university years onwards. In Greece, the NSO is collaborating with academic institutions to propose two primary directions for integration: firstly, the incorporation of a designated module, entitled "Introduction to eTwinning", within existing curricula; and secondly, the advancement of small-scale collaborative eTwinning initiatives, encompassing both teacher-student and student-student interactions, with a particular emphasis on student placements. It is evident that the vast majority of Greek universities are engaged in this initiative, with twenty (20) pedagogical departments incorporating pertinent activities. During the 2024-2025 academic year, sixteen lecturers integrated eTwinning into the curriculum, training more than 400 students. Concurrently, 24 national and European projects were designed and implemented, as well as two collaborative projects with kindergarten students in the context of student internships. In order to provide support for this endeavor, the "eTwinning ITE MOOC 2024" course has been developed. This course is offered in a self-paced format. In the 2024-25 academic year, enrolment exceeded 600, indicating its considerable potential. The programme's continuation has already been scheduled for the 2025-26 academic year. It is evident that the accreditation of Greek university departments is being augmented by the conferral of the National ITE Label. In the 2024 academic year, three departments are scheduled to be recognized, with this figure increasing to six in the subsequent 2025 academic year. In 2024, Greece participated for the first time in the European competition for the ITE Award, and in 2025 it will again be represented by a university department, thereby confirming the country's substantial contribution to the European academic and educational community.

Cooperation with the Institute of Education Policy

The present collaboration between the Greek NSO of eTwinning and the Institute for Educational Policy (IEP) has been initiated with the objective of implementing the Skills Labs in a collaborative manner through the eTwinning platform[13]. The programme is founded upon a programmatic agreement between the CTI "Diophantus" and IEP, and is administratively documented by circulars of the Ministry of Education and Science, which provide guidelines to schools. In order to facilitate the training of teachers, a MOOC has been developed under the title of "eTwinning & Skills Labs: Collaborative Actions for the Cultivation of Knowledge, Skills and Competencies". The primary objectives of the course are twofold: firstly, to emphasize the utilization of the eTwinning community, activities and educational material for the implementation of Skills Labs; and secondly, to present the steps for transforming activities from the eTwinning digital repository into collaborative eTwinning actions implemented by groups of students and teachers from two or more schools. The course was offered on two occasions, in 2022 and 2023, and a total of 7,728 teachers were trained, indicating the substantial reach of the initiative at national level. Simultaneously, the Community was presented with an "e-book of good practices for skills workshops in eTwinning"[14], which was made available for their use. This development was instrumental in ensuring the sustainability of the action.

[12] https://www.etwinning.gr/ite
[13] https://etwinning.gr/actions/skillslabs
[14] https://www.etwinning.gr/etwinning/publications/1368-ergastiria-deksiotiton-synergarikes-draseis-gia-tin-kalliergeia-gnoseon-deksiotiton-kai-ikanotiton

Cooperation with the State Scholarship Foundation

The collaboration between the NSO of eTwinning and the State Scholarships Foundation (IKY) serves as a paradigmatic illustration of the integration of two institutional frameworks that are pursuing complementary objectives. On the one hand, the development of a network of professional learning for teachers (through eTwinning) is promoted, and on the other hand, the internationalization of school education is strengthened through the Erasmus+ KA1 and KA2 actions. The training workshops, organized in conjunction with other institutions, fulfilled a dual function. Firstly, they provided a theoretical framework and interpretative tools for understanding Erasmus+. Secondly, they offered practical guidance on application, accreditation procedures and the use of electronic tools such as SELFIE. The involvement of IKY staff in the National eTwinning Conferences has been instrumental in establishing institutional recognition for the cooperation, thereby fostering the dissemination of a culture of transnational collaboration within the school environment.

Cooperation with the National Centre for Public Administration and Local Government

The nationwide distribution of the eTwinning course for teachers by the Training Institute (IN.EP.) of the National Centre for Public Administration and Local Government (NCPA)[15] represents a significant intervention in the professional development of teaching staff, with an emphasis on the utilization of digital tools and collaborative practices promoted by the eTwinning network. The course is offered free of charge and aims to broaden the knowledge and skills of teachers across the country. This approach functions as a multiplier, as it equips teachers with the requisite tools to develop collaborative projects, thereby reinforcing pedagogical innovation and the utilization of teaching methods that incorporate new technologies.

ACTIONS for STEM & AI Integration in Education

This section will analyze the NSO actions for integrating STEM and artificial intelligence in education as tools for strengthening the teaching community. The document will delineate the structure of these actions and the procedures for selecting and supporting schools. The presentation will comprise quantitative data pertaining to participation, alongside qualitative assessments, exemplars of teaching materials, and mechanisms for dissemination.

The STEM Action in Teacher Community Empowerment through eTwinning

The STEM eTwinning action[16] has been identified as a prime exemplar within the domain of Greek education, demonstrating remarkable levels of organization and efficacy. Its core objective is to facilitate the integration of STEM (Science, Technology, Engineering and Mathematics) technologies across all levels of school education, operating within a structured and supported framework. In Greece, the number of schools participating in the initiative stands at approximately 1,000. The core of the initiative lies in the provision of robotics equipment that has been adapted to the educational level of each school, in conjunction with an integrated ecosystem of professional development and pedagogical innovation services. The selection of schools is based on eTwinning criteria, such as teachers' distinction in national or European eTwinning competitions or their active participation in the Community. Training is implemented through open online courses and MOOCs, which focus on both technical skills and pedagogical applications of STEM education. The efficacy of the initiative is substantiated by the generation of superior educational resources. An illustrative example is the guide "Educational robotics in kindergarten with Beebot" (Foti, Tzimopoulos & Bratitsis, 2023), which presents lesson plans developed by trained teachers. Furthermore, Greek teachers have been recognized with prestigious European awards for their contributions to STEM projects, thereby affirming the global acclaim of their endeavors. The dissemination of results is enhanced through the National eTwinning Competitions, where winning schools are rewarded with technological equipment (e.g. 3D printers, tablets), as well as through the annual National eTwinning Conferences, which act as hubs for the exchange of good practice and professional networking. Furthermore, articles and studies produced by the action are published in scientific and educational journals, such as eTwinning WELCOME and Learning with Technologies, thereby reinforcing the scientific character of the intervention.

The integration of AI in educational practice through eTwinning

The European Commission has identified the development of emerging technologies, including artificial intelligence (AI), as a strategic priority in the field of education. This domain of innovation is of paramount importance within the field of education, representing a substantial technological advancement. In this context, eTwinning provides online training programmes and specialized in-person events that cultivate digital competencies and advocate for the

[15] https://www.etwinning.gr/news/general/997-etwinning-2
[16] https://etwinning.gr/news/stem

judicious and ethical utilization of AI in pedagogical practice. For instance, the open online course 'The pedagogical use of AI in eTwinning projects and teaching courses' is scheduled to be offered from October 2023 onwards. This 200-hour course, which is delivered over a period of 24 weeks, is designed for teachers of all levels and disciplines. It offers insights into the potential, limitations and ethical considerations of AI in education. The pedagogical approach integrates theoretical instruction with practical application, encompassing subjects such as the creation and management of educational materials, learning assessment, administrative support, and the organization of the teaching process. The course has seen a surge in popularity, with enrolment figures increasing from 2,685 in the 2023–24 academic year to 4,459 in the subsequent 2024–25 academic year. The programme evaluation, which received 1,521 responses, demonstrated a high level of satisfaction. It is noteworthy that 64.4% of teachers assigned the highest rating of "10", while 23.4% allocated a "9". The trainers were held in high esteem with regard to their expertise, guidance and communication skills, and the training material was evaluated as clear, complete and up to date. The activities were found to be appropriate for facilitating understanding of the subject matter, fostering a sense of belonging to a community of practice, and enhancing teaching preparation. Moreover, a significant proportion of the participants reported that their expectations were largely met (Angelopoulos, Paraskevas & Tzimopoulos, 2025).

In response to the mounting interest, eTwinning has made available from May 2025 a new, innovative Massive Open Online Course (MOOC) entitled "Harnessing AI in Education and eTwinning Programmes". The programme encompasses four training cycles, encompassing fundamental concepts, ethical considerations and data protection, the utilization of chatbots and prompt engineering, multimedia applications and content creation with AI, and evaluation, instructional design and ethical issues in practice. The programme places particular emphasis on experiential learning, hands-on activities and the functioning of an active learning community.

In addition to the online activities, the NSO also organizes thematic face-to-face events, such as the multidisciplinary seminar "Applications, Tools and Perspectives of AI in Education", which took place in Patras in May 2024. The seminar, which combined theoretical presentations, workshops and networking activities, provided secondary school teachers with practical skills for integrating AI in collaborative eTwinning projects.

The above-described framework examines the contribution of eTwinning in Greece to the development of a renewed framework for educational practice, grounded in transnational collaboration, experiential training, and the pedagogical integration of emerging technologies. Within this framework, the introduction of Artificial Intelligence (AI) is not conceived as an objective in itself, but rather as a catalyst for the reconfiguration of roles, practices, and learning relationships across the educational community. The eTwinning training activities have been meticulously designed to reflect a balanced integration of theoretical instruction, practical application, and the cultivation of professional identity. The activities under discussion are informed by a number of established theoretical perspectives, most notably those of Wenger (1998) on "communities of practice" and Mezirow (1997) on "transformative learning." The establishment of such a foundation is conducive to the development of a shared pedagogical discourse, thereby enabling educators to transition from the passive utilization of digital tools to an active and reflective engagement with educational innovation. In this respect, eTwinning functions as a dynamic learning ecosystem that interlinks educators, institutions, and technological infrastructures. This ecosystem fosters collective autonomy, professional agency, and adaptability, thereby enhancing the capacity of the teaching community to address the multifaceted challenges of the digital era.

PUBLICATIONS

The enhancement of teachers' professional competencies through eTwinning is bolstered by a variety of dissemination and collaboration initiatives that facilitate the sharing of knowledge, the exchange of best practices, and the cultivation of a collaborative professional culture. Since July 2023, the eTwinning NSO has been publishing an online periodical, WELCOME (etWinning ELeCtrOnic MagazinE) [17], which is issued biannually. This open-access publication functions as a repository of educational practices, empirical findings, and scholarly discourse, intended to reach a diverse readership that includes teachers, researchers, students, pupils, and education professionals. WELCOME functions as a living archive of innovative classroom experiences and research results, facilitating ongoing dialogue and cross-border professional learning.

Furthermore, the eTwinning NSO disseminates Pedagogical Guides and eBooks [18] that compile targeted methodologies and concrete examples drawn from real-world projects. The objective of these publications is to provide teachers with practical guidance and strategies that can be readily implemented in classroom settings. This support is intended to facilitate the translation of digital innovation into everyday instructional practice. Notable exemplars include

[17] https://welcome.etwinning.gr/
[18] https://www.etwinning.gr/etwinning/publications

guides on "Educational robotics in kindergarten with the Bee-Bot," which outline age-appropriate robotics activities, assessment considerations, and classroom management guidelines; compendia such as "e-books of good practice for Skills Workshops," which synthesize effective approaches for developing essential 21st-century competences; and curated collections featuring exemplars from national eTwinning competitions, which showcase innovative pedagogical approaches and project-based learning models.

CONCLUSIONS

The present article examines the transformative role of eTwinning within the Greek educational system, focusing on its impact on teacher professional development and the dissemination of innovative teaching practices. Anchored in a national framework that integrates policy, training, and institutional support, eTwinning has contributed substantially to strengthening teachers' digital and collaborative competencies while fostering a culture of pedagogical innovation.

At the systemic level, the network has expanded its reach to a significant number of active teachers and educational institutions, facilitating the implementation of a large body of collaborative projects. Training programmes constitute a central component of this transformation, combining theoretical concepts with practical application through Open Online Courses and Massive Open Online Courses (MOOCs). Evidence derived from systematic evaluation reveals both quantifiable improvement in digital skills and a consistently high level of participant satisfaction with the quality and effectiveness of the learning interventions. The integration of STEM education, supported by the provision of equipment, training manuals, and practical teaching scenarios, has led to the establishment of a coherent ecosystem that connects technological resources with innovative pedagogical approaches.

The incorporation of Artificial Intelligence (AI) into the educational agenda further illustrates the system's adaptability to emerging technological needs. Specialized courses, thematic MOOCs, and face-to-face seminars provide teachers with both theoretical insights and practical skills for the responsible application of AI in the classroom. However, this integration is not without challenges. Disparities between educational institutions - particularly in remote or under-resourced areas- highlight persistent inequalities in access to equipment and reliable digital infrastructure. The Panhellenic School Network has played a critical role in addressing these gaps, providing technical support and promoting infrastructure enhancement in order to mitigate the digital divide. Beyond technical constraints, the development of teacher competencies remains paramount. Many educators employ ICT tools in a limited or instrumental fashion, a tendency linked to gaps in initial and continuous professional training. In addition, concerns regarding data protection, ethical use, and the potential for technological substitution contribute to a degree of skepticism among practitioners. To counter these challenges, eTwinning and related initiatives of the Ministry of Education implement an integrated training model that combines open online courses, experiential workshops, and learning communities. This model not only equips educators with critical competencies but also fosters confidence, thereby reframing ICT and AI from perceived threats into catalysts for pedagogical enhancement.

A further dimension of the strategy is the systematic recognition of innovative practices through national and European competitions, quality labels, and dissemination platforms. These mechanisms incentivize excellence while fostering a culture of sharing and replication of good practices. Strategic partnerships with the Greek Universities, the Institute of Educational Policy (IEP), the State Scholarships Foundation (IKY), and other public training structures extend the impact of eTwinning by establishing strong linkages between national policy, higher education, and European programmes.

In conclusion, the Greek eTwinning framework represents a robust model of synergy between policy, institutional structures, and professional development initiatives. It demonstrates the capacity to promote innovation in educational practice while equipping educators with the competencies necessary for the 21st century. To ensure sustainability and further scalability, the following measures are proposed: (a) the consolidation and expansion of resources for training and digital infrastructure, (b) the systematic integration of eTwinning into both initial teacher education and in-service training standards, (c) the implementation of longitudinal evaluation studies to assess its impact on student learning outcomes, and (d) the reinforcement of thematic interventions in STEM and AI with particular emphasis on ethics, credibility, and classroom applicability. Collectively, these measures will consolidate eTwinning's transformative role in Greek education and strengthen its contribution to European educational policy and practice.

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THE USE OF DIGITAL TOOLS IN THE ASSEEEMENT OF THE HUMAN RIGHTS CLIMATE IN THE SCHOOL ENVIROMENT

Roussa Maria
Nursing, PE87.02
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: roussaki2@gmail.com

Giannouli Sofia
Philologist, PE02
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

Chasanis Vasileios
Electrical Engineer, PE83 & Computer Scientist, PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: vasileioschasanis@gmail.com

Ntentes Ilias
Economist, PE80 & Electronic, PE84
1st High School of Preveza
Preveza, Greece
e-mail: iliasde@hotmail.com

Gaki Vasiliki
Chemist, PE04.02 & Computer Science PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

Thanasara Evangelia
Economics–Tourism, PE80 & Italian Philology, PE34
1st Vocational High School of Karpathos
Karpathos, Greece
e-mail: gonzalitsa@gmail.com

ABSTRACT

This study focuses on assessing the "temperature" of Human Rights within the educational community, aiming to evaluate the climate in relation to human rights and the implementation of the principles outlined in the Universal Declaration of Human Rights. The objective is to highlight the importance of equality, safety, and the protection of students' rights. The methodology used involves a Google Forms questionnaire based on 25 critical statements directly related to human rights, such as safety, equal access to education, participation in democratic processes, and freedom of expression. The questions evaluate the application of these rights in everyday school life, using a scale from 1 to 4 to provide a quantitative estimate of the state of human rights. The questionnaire was distributed via participants' emails and school websites, ensuring broad accessibility.

A total of 235 students from four schools participated in the evaluation: the 1st General High School of Preveza, the Evening Vocational High School of Preveza, the 1st Vocational High School of Karpathos, and the 1st Vocational High School of Heraklion, Crete. The goal was to conduct a comprehensive review of the perceptions and experiences within the school community. Excel was used to process the responses, extract statistical conclusions, and create charts to visualize the results. The evaluation process aimed to document the prevailing climate and analyze areas that may require improvement. Particular emphasis was placed on identifying areas of discrimination based on gender, race, physical and intellectual ability, as well as on issues related to student and school community participation in decision-making processes. A significant goal was to ensure equal access to education for all members of the community and to combat inequality and discrimination.

The assessment of the Human Rights "Temperature" was combined with the use of modern digital tools, which enhanced participation and collaboration among students, teachers, and others. The digital tools used included computers, tablets, mobile phones, projectors, and the internet. Online meetings were organized via Zoom to discuss the results and exchange views. Challenges related to the use of digital media in the educational process were also acknowledged. The study highlighted the need for measures to protect personal data and privacy within the educational community. The findings suggest that the "Temperature" of Human Rights can be improved through continued education and the implementation of strategies that promote equality and acceptance of diversity. At the same time, the integration of digital tools into the educational process not only increased student participation but also strengthened communication and transparency within the community. Google Docs was used to draft a digital report of the research findings, ensuring immediate access for all participants from the four schools. PowerPoint was also used to create an interactive presentation of the report's key points.

In conclusion, the study demonstrates the need for a comprehensive approach that combines the evaluation of human rights with the application of strategies and digital tools. It emphasizes the importance of ongoing efforts to promote social justice, solidarity, and respect for human rights within the educational community.

Keywords: Human rights, educational community, digital media.

INTRODUCTION: THEORITICAL FOUNDATIONS AND THE IMPORTANCE OF HUMAN RIGHTS EDUCATION

Human rights education constitutes a fundamental pillar of modern society and democratic values, as it integrates principles such as equality, dignity, and freedom (Tibbitts, 2017). Its significance goes beyond the transmission of knowledge, as it highlights the human being as an end in themselves, with inalienable rights and responsibilities. The concept of the social contract reminds us that society is based on mutual agreements that promote peace, cooperation, and mutual respect (Banks, 2015). On a pedagogical level, the program is based on constructivism, emphasizing interactive learning, active student participation, and the formation of knowledge through social interaction (Dewey, 1938). Learning becomes a dynamic process of meaning-making, grounded in experience and critical thinking (Freire, 1970). Thus, human rights education takes on an experiential character, cultivating cognitive, social, and moral skills essential for the development of responsible citizens (UNESCO, 2015). The school, as a microcosm of society, is an ideal space for applying these principles. Students are not limited to a theoretical understanding of concepts such as freedom or equality, but experience them in their daily school life. The school becomes a safe environment where these values are discussed, creatively questioned, and established as life-long attitudes (Council of Europe, 2010). The collaboration of schools from different geographical and cultural regions—such as Preveza, Karpathos, and Heraklion—enhances the intercultural dimension of the program and fosters the acceptance of diversity (Banks, 2015). In summary, human rights education in schools, through modern theoretical and pedagogical approaches, constitutes an essential institution for cultivating a society founded on respect, equality, and freedom, shaping active and responsible citizens (Tibbitts, 2017).

DESIGN AND PEDAGOGICAL METHODOLOGY

SCIENTIFIC JUSTIFICATION OF THE DESIGN

Effective human rights education requires a carefully designed and well-documented framework, grounded in scientific data and methodologies. The methodological mapping of students' and educators' knowledge, attitudes, and practices is the first and essential step, as it allows for an accurate assessment of the initial state regarding the understanding and application of human rights principles within the school environment. To achieve this goal, a 25-question survey was used, designed based on internationally recognized research standards and adapted to the specific needs of the educational context (Tibbitts, 2017). The questions cover key thematic areas, such as students' and teachers' understanding of human rights concepts, assessing their level of awareness and sensitivity toward human rights and their significance (UNESCO, 2015). Additionally, perceptions of school bullying are examined—an important social issue directly related to human rights, particularly the right to safety and dignity (Council of Europe, 2010). The survey also explores participation in social actions, reflecting the degree of active citizenship and the willingness to engage in collective efforts to promote social justice (Banks, 2015). Finally, attitudes toward diversity are assessed, focusing on the acceptance and respect of cultural, religious, and individual differences (Freire, 1970). Furthermore, the data collection method combines both quantitative and qualitative techniques, thereby ensuring a comprehensive and multidimensional understanding of the school climate. Specifically: a) Quantitative approach: Through the use of Google Forms questionnaires, data were collected from a large number of participants, allowing for statistical processing. This method enables the rapid and accurate identification of trends and patterns, and also allows for comparisons between different groups or schools b) Qualitative approach: Discussions conducted via video conferencing platforms (such as Zoom) allowed for a deeper analysis of participants' attitudes and perceptions through open dialogue and the exchange of experiences. In addition, the creation of YouTube videos offered a creative and experiential means of expression, enhancing students' active participation and empathy, while also developing multimedia communication skills.

USE OF DIGITAL TOOLS

Access to information through digital media is immediate and wide-reaching. Students are able to gather data from a variety of sources, compare different perspectives, and stay informed about current human rights issues on a global scale (Livingstone, 2018). Connecting school knowledge with social reality and current phenomena makes the learning process more relevant and experiential. At the same time, digital technology facilitates multimedia learning. Through videos, podcasts, interactive games, and virtual tours, students engage with human rights concepts via diverse forms of information tailored to different learning styles. This multimodal approach enhances understanding and deepens knowledge, as students participate actively and experience learning in a dynamic, rich environment (Duke, 2019).

Moreover, the use of digital tools enhances networking and interaction among students from different geographical areas, as seen in the collaboration between schools in Preveza, Karpathos, and Heraklion. Through video conferencing platforms, online forums, and joint digital projects, students learn to communicate, collaborate, and exchange ideas with peers from different cultural backgrounds (Council of Europe, 2018). This intercultural interaction

fosters empathy, openness, and respect for diversity—fundamental values for the promotion of human rights (Kerr & Cermak, 2020).

In summary, the integration of digital media into human rights education—when carried out strategically and coherently—strengthens access to information, supports multimedia learning, and promotes intercultural collaboration. However, in order for technology to function as a bridge rather than a barrier, constant vigilance and action are required to address digital inequality, ensuring educational equity and social justice (Livingstone, 2018).

HUMAN RIGHTS AND COLLABORATIVE LEARNING IN THE CONTEMPORARY SCHOOL

STATISTICAL ANALYSIS AND EDUCATIONAL OBSERVATIONS

The analysis of the statistical data gathered from the questionnaire provides important insights into the school climate and students' attitudes toward human rights, highlighting both the successes and limitations of the educational program. The average class "temperature" of 76–80/100 clearly indicates a positive climate. Students generally demonstrate a favorable attitude toward human rights issues, suggesting that the program and related educational activities have succeeded in raising a significant level of awareness. However, the failure to reach the highest possible score reveals that full engagement or integration of these principles into students' daily experiences has not yet been achieved.

The variation in responses between the participating schools underscores the significant influence of the local sociocultural context in shaping attitudes and perceptions. Cultural particularities, economic conditions, and the broader social environment act as key factors that affect awareness and acceptance of human rights values. For instance, schools located in more open and diverse social environments show greater acceptance and active involvement in human rights activities, while those in more homogeneous or insular communities demonstrate hesitation or limited engagement.

One of the most critical findings from the data is the gap between theoretical knowledge and practical application of human rights. Although students understand what human rights are and recognize their importance, this knowledge has not yet been sufficiently translated into daily attitudes and actions. This phenomenon is typical in many educational efforts where theory remains disconnected from students' lived experiences.

The causes of this gap are complex and multifaceted. They may include a lack of opportunities for genuine implementation and student involvement in practical initiatives and social engagement, as well as an educational context that often emphasizes memorization over critical thinking and active participation. Additionally, the lack of consistent support and reinforcement from the surrounding community—such as families and local social structures—limits the internalization of these rights.

The results suggest the need to strengthen the practical dimension of human rights education through experiential activities, social participation programs, and the promotion of critical thinking. Only through active engagement and involvement in real-life situations can students transform knowledge into a life stance and responsible behavior. Finally, the statistical analysis points to the importance of developing targeted educational interventions that take into account local specificities and needs, as well as promoting partnerships between schools and civil society organizations.

PEDAGOGICAL INTERPRETATIONS: THE SCHOOL AS A MICRO-SOCIETY AND THE THREE DIMENSIONS OF HUMAN RIGHTS EDUCATION

The school represents a microcosm of broader society. As such, it is not merely a space for the transmission of knowledge but also a vital environment for social learning and engagement (Banks, 2015). Educational reality shows that issues such as school bullying, managing diversity (cultural, racial, religious, or ability-related), and students' active participation are not just theoretical concepts—they are daily challenges that demand immediate and experiential responses (UNESCO, 2015). Often, a disconnect is observed between the knowledge students acquire in class and their ability to apply it in practice. This gap confirms that human rights education cannot be confined to the simple transmission of information (Tibbitts, 2017).

Students do not simply seek to be informed about their rights; they primarily aim to gain the motivation and tools necessary to claim and defend them (Kerr & Cermak, 2020). Empowerment is a key element, involving the development of self-confidence, autonomy, and responsibility (Livingstone, 2018).

To achieve this, human rights education must incorporate and balance three interconnected dimensions:

a) Cognitive Dimension

This dimension includes knowledge about what human rights are, their history, the institutions that protect them, and the concepts of equality, freedom, and justice. The cognitive aspect provides the theoretical foundation students need to understand the value and importance of these rights (Council of Europe, 2018). However, this knowledge is neither static nor detached from social reality. It must be shaped through dialogue, critical thinking, and reflection, so that students do not merely memorize rules but grasp the complex and sometimes contested aspects of human rights in practice (Duke, 2019).

b) Emotional Dimension

Acquiring knowledge alone is not enough unless it is accompanied by internalization of the values underpinning human rights: respect for dignity, solidarity, tolerance, and justice (Banks, 2015). This emotional dimension cultivates empathy and awareness of the impact our actions have on others. Education must serve as a space where students experience these values through interactions, discussions, and collaborative processes, helping them develop attitudes that lead to active and responsible social participation (UNESCO, 2015).

c) Practical Dimension

The third—and perhaps most critical—dimension involves the development of skills that allow the practical application of human rights. These include communication and dialogue skills, critical thinking and analysis, conflict resolution and diversity management abilities, active participation in initiatives, collaboration, and teamwork (Tibbitts, 2017). Acquiring these skills equips students to move from being passive recipients of information to becoming active agents of change, both within the school and in the broader society (Kerr & Cermak, 2020).

In conclusion, human rights education must be approached as a holistic process that integrates these three levels, which are mutually reinforcing. Recognizing the school as a micro-society calls for the creation of an environment in which students can live, question, reflect upon, and act upon the values and principles of human rights—thus nurturing not only knowledge but also consciousness and action. This requires shifts both in educational culture and in everyday school practices, where the teacher acts more as a facilitator and motivator than merely a transmitter of information.

COLLABORATION BETWEEN TEACHERS AND STUDENTS: ROLE, APPROACH AND OUTCOMES

The success of any educational initiative related to human rights depends significantly on the dynamic collaboration between teachers and students. In this context, teachers go beyond the traditional role of instructors and actively take on the roles of facilitators, motivators, and co-learners in the educational process.

THE ROLE OF TEACHERS AS FACILITATORS AND MOTIVATORS

Teachers play a critical mediating role between students and the complex content of human rights education. Through targeted questions, guiding interventions, and the encouragement of dialogue, they create a safe and inclusive environment where each student can express their views, share experiences, and voice concerns. This approach allows stereotypes to be deconstructed, multiple perspectives to emerge, and critical thinking to be strengthened. The teacher acts as a catalyst, stimulating inquiry and engagement rather than simply delivering ready-made answers.

INVOLVEMENT IN CHARITABLE AND SOCIAL ACTIONS: THE PARTICIPAL APPLICATION OF SOLIDARITITY

Student participation in practical initiatives, such as charitable activities or social campaigns, highlights education as a living act of social responsibility and solidarity. Through these experiences, students understand human rights not merely as individual entitlements, but as shared responsibilities and collective action.

Participation in such initiatives enhances:
A sense of belonging and community,
An understanding of the connection between individual rights and the common good,
A willingness to take active steps in defending the rights of others.

This collective responsibility nurtures the active citizen—someone who sees themselves as part of a broader social network, with interdependent rights and obligations.

In conclusion the collaboration between teachers and students—through the adoption of the facilitator role by educators, interdisciplinary approaches, and practical engagement in social action—highlights a pedagogy that fosters not only knowledge but also awareness, values, and agency. This holistic cooperation lays the groundwork for a human rights education that is vibrant, meaningful, and transformative for both the school and society at large.

EDUCATIONAL BENEFITS

Human rights education, as implemented through this program, highlighted significant pedagogical values and yielded positive outcomes both in terms of knowledge acquisition and the development of attitudes and skills.

- **Fostering a Democratic Culture and Critical Thinking**

The experiential and interdisciplinary approach contributed to the development of a democratic culture within the school community. Students were encouraged to freely express their opinions, listen to diverse perspectives, and develop critical thinking regarding social issues, moving away from rote memorization.

- **Enhancing Autonomy and Social Responsibility**

Through social initiatives and collaborative efforts, students took an active role in defending and promoting human rights, strengthening their sense of personal and collective responsibility. This participatory educational process promotes autonomy and cultivates the active citizen identity.

- **Opportunity for Intercultural Learning and Acceptance of Diversity**

The collaboration between schools from different geographic and cultural areas (Preveza, Karpathos, Heraklion) sparked meaningful dialogue among cultures and perspectives, fostering mutual understanding, respect, and the acceptance of cultural diversity.

CHALLENGES AND LIMITATIONS

Despite the notable benefits, several challenges emerged that need to be addressed to further improve the program.

- **Digital Inequality**

While the use of digital tools offers multidimensional opportunities for learning and collaboration, significant barriers arise due to digital inequality. The lack of adequate equipment (e.g., computers, tablets) and limited or non-existent internet access in some regions reduces equal access to educational resources. This exclusion hinders the effectiveness of instruction and risks deepening existing social inequalities.

- **Time Constraints in the Curriculum**

Integrating human rights education into an already overloaded curriculum presents problems regarding available instructional time. Additional content and experiential activities require time that is often unavailable, making it difficult to explore topics in depth. As a result, education may remain superficial and fail to achieve its full pedagogical potential.

- **Need for Teacher Training and Support**

Teachers involved in human rights education require continuous professional development and support. The multifaceted nature of the topic, the need for pedagogical skills in handling sensitive issues, and the integration of digital tools demand specialized training, which is not always adequately or systematically provided. Moreover, psychological support and networking opportunities with fellow educators can enhance the quality and effectiveness of teaching.

FUTURE PROPOSALS

Based on the above findings, a series of targeted interventions are proposed:

1. Strengthening Digital Infrastructure

Promote policies that ensure equal access to digital tools for all students through funding programs and technical support. Additionally, develop user-friendly and low-cost digital applications tailored to the needs of schools with limited resources.

2. Curriculum Revision

Integrate human rights education as a cross-curricular and continuous action throughout the school year, with flexible planning that allows for in-depth exploration of topics without overburdening the timetable.

3. Systematic Training and Support for Teachers

Organize seminars, workshops, and networking events focusing both on pedagogical approaches and psychological support for educators. At the same time, create platforms for the exchange of best practices and innovative teaching methods.

4. Promotion of Multicultural and Collaborative Activities

Strengthen intercultural collaboration and active participation through joint projects among schools, social organizations, and local institutions, fostering a meaningful culture of solidarity and collective responsibility.

RECOMMEDATION FOR ENHANCING HUMAN RIGHTS EDUCATION

The establishment of a permanent, organized network of schools collaborating on human rights issues could serve as a hub of innovation, experience-sharing, and good practices. Such a network would enable ongoing dialogue and knowledge exchange through regular meetings and collaborative activities, while also encouraging inter-school events and awareness campaigns that promote collective responsibility (UNESCO, 2015). Furthermore, the intercultural cooperation that arises from the involvement of schools from different regions enriches the educational process and advances the acceptance of diversity (Council of Europe, 2018).

Integrating human rights education into the official curriculum is a fundamental requirement for the sustainability and serious implementation of this subject. Systematic teaching and an interdisciplinary approach through subjects such as History and Social Studies facilitate holistic understanding and ensure the necessary resources and time for effective implementation (Tibbitts, 2017).

Cooperation with NGOs and other institutions offers opportunities for experiential learning, allowing students to engage directly with social issues and enhance their social awareness and active participation (Duke, 2019). Additionally, the development of professional development programs for teachers is crucial for the quality delivery of human rights education, promoting both theoretical understanding and pedagogical skills (Kerr & Cermak, 2020).

Lastly, the use of technological tools supports communication, progress monitoring, and cross-disciplinary collaboration, making learning more engaging and effective through multimedia content and digital platforms (Livingstone, 2018).

CONCLUSIONS

Human rights education is not merely an additional educational activity or a theoretical subject, but a fundamental component in shaping contemporary society. Through innovative, interdisciplinary, and technology-supported approaches, the program "The Climate of Human Rights" highlights the need for a holistic educational experience—one that goes beyond knowledge transmission and focuses on active participation, critical thinking, and the development of responsible citizens.

The use of technology as a tool for learning and collaboration offers the potential to overcome geographical, cultural, and social boundaries, creating a truly intercultural and polyphonic framework. This contributes to fostering solidarity and acceptance of diversity, which are essential pillars of democratic coexistence. At the same time, the interdisciplinary approach—bringing together educators from diverse academic fields (Chemistry, Economics, Electrical Engineering, Nursing, Philology, etc.)—enhances students' understanding of human rights from multiple perspectives. It broadens their horizons and highlights the complex nature of social issues.

However, to achieve the high aims of such education, the active support of all stakeholders is essential: educators, school administrations, families, and the state. The official integration of the program into school curricula, continuous teacher training, provision of necessary infrastructure, and the creation of permanent networks of collaboration are prerequisites not only for its survival but for the meaningful establishment of human rights education.

Finally, the program's ongoing feedback and evaluation—with the participation of all involved—will ensure its adaptation to evolving social needs and will enhance its effectiveness. This form of education is not simply an investment in the future of students but in the future of society as a whole—a society in which equality, freedom, and dignity play a central role in daily life and in our collective choices.

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TA11: Dynamic learning environments and digital educational tools

THE ESEP PLATFORM (EUROPEAN SCHOOL EDUCATION PLATFORM) AS A MEANS OF DEVELOPING DIGITAL SKILLS FOR EDUCATORS & STUDENTS – ETWINNING & ERASMUS+

Zantraveli Varvara
English Teacher - Principal - MED - eTwinning NSO Member
4th Gymnasio Prevezas
Preveza, Greece
e-mail: barbarazadraveli@yahoo.gr

ABSTRACT

The present study will focus on how the recently unified platform, ESEP (European School Education Platform), can serve as a means for promoting, developing, and cultivating the digital skills of members of the educational community.

The European School Education Platform (ESEP) is the meeting point for the educational community across Europe, including school staff, students, researchers, and policymakers. The platform also hosts eTwinning, the online community for schools in Europe. The benefits for educators are numerous. It aims at their professional development by providing access to a variety of continuous professional development courses, both online and in person, allowing teachers to enhance their skills and stay informed about the latest educational practices. It offers networking opportunities through the eTwinning community, where educators can connect, collaborate, and share ideas with colleagues from all over Europe, fostering a culture of shared learning and innovation. Lastly, it contributes to resource sharing, as it provides a rich repository of teaching materials and resources, enabling educators to access and contribute content that supports effective teaching strategies.

Similarly, the platform fosters collaborative learning among students. Through their participation in eTwinning projects, ESEP allows students to engage in joint projects with peers from different countries, promoting cultural exchange and teamwork. Additionally, it enhances digital literacy by involving students in activities that help them develop essential digital skills through the use of various online tools and platforms for learning and collaboration. Students can also obtain certificates recognizing their participation and achievements, boosting their motivation and enriching their educational profiles.

The ESEP platform has a significant impact on the educational community, strengthening the connections and collaboration between educators and students at the European level. By participating in programs such as eTwinning, teachers gain access to innovative teaching practices, while students familiarize themselves with modern technological tools, simultaneously developing communication and teamwork skills. Moreover, the platform facilitates the exchange of educational materials and best practices, supporting the continuous professional development of educators and promoting lifelong learning. Through these capabilities, ESEP plays a crucial role in shaping a unified and dynamic European educational space, where knowledge and innovation are shared and utilized for the benefit of all community members.

Despite its advantages, the use of the ESEP platform also comes with challenges. One of the main issues users face is the need to become familiar with the platform's environment, as time and training are required for its full utilization. Additionally, unequal access to technology and digital skills may pose a barrier for some educators and students, limiting their participation in available activities. Language differences can also create challenges, as communication and collaboration among users from different countries require sufficient language proficiency. Despite these difficulties, the continuous development and adaptation of the platform, along with the support provided to users, can help address these challenges, ensuring that ESEP remains a valuable resource for the European educational community.

This study will emphasize on the cultivation of digital skills, particularly through the description of specific projects in which teachers and students from the 4th Junior High School of Preveza participate during the implementation of eTwinning and Erasmus+ projects.

Keywords: ESEP, digital skills, educators, students, eTwinning, Erasmus+

INTRODUCTION

In an increasingly digital world, education systems are challenged to adapt and integrate technology in meaningful ways. The European School Education Platform (ESEP), developed by the European Commission, represents a significant step toward the modernization of European education by providing tools, resources, and networks that empower both educators and learners. This paper explores the potential of ESEP to cultivate digital skills through professional development, collaborative projects, and student-centered learning activities. It also presents concrete examples from the 4o Gymnasio Prevezas, which has implemented successful Erasmus+ and eTwinning projects that exemplify the platform's transformative impact. eTwinning is an action within the Erasmus+ program, through which European schools collaborate using ICT (Information and Communication Technologies) in order to gain pedagogical, social, and cultural benefits.

To participate in this action, a school must be registered on the ESEP platform (https://school-education.ec.europa.eu/en). It provides opportunities to create or join an eTwinning project and offers free online training for teachers on pedagogical topics or ICT-related issues. It also promotes participation in working groups with similar or related specialties and awards quality labels that reflect the high standard of a project's activities. The goal is full and systematic collaboration between schools at all levels (students, teachers, classrooms, and school leadership). The initiative seeks educational partnerships in which a large number of teachers, principals, and support staff are involved in a multi-level activity. The aim is for educational staff and students to collaborate on a wide range of topics, such as curriculum subjects or issues related to the professional development of teachers. The main objectives of the action are summarized as follows:1. To develop a common European identity through collaborative activities using ICT. 2. To experiment with new technologies and innovative teaching methods in order to improve the academic and psychosocial development of students. 3. To provide online teacher training that promotes both formal and informal learning. This is implemented through a series of online seminars (Learning Events - L.E.) aimed at integrating innovative pedagogical approaches and fostering professional development (Greek Support Service, Central Support Service, 2016). Common educational management practices are thus identified, including topics such as: a) the benefits of conducting a collaborative European project for students and teachers, b) the use of ICT in the classroom with analyses of shared ideas and methods c) outcomes of collaboration, d) influence of collaborative projects on curricula, and e) practical issues arising in eTwinning projects (Crawley et al., 2010). Pedagogical issues are explored with the ultimate goal of helping educators integrate eTwinning into their daily classroom practice. Educators also find a source of informal learning, search for partners for collaboration through the Partner Finding Forum, or attend events that offer a wide range of opportunities for online professional development at the European level for all community members (Gilleran & Kearney, 2014).

Erasmus+ on the other hand is the EU Programme addressing the fields of education, training, youth, and sport. Its main pillars are high-quality and inclusive education and training, as well as informal and non-formal learning. Essentially, it equips young people and participants of all ages with the qualifications and skills needed for meaningful participation in democratic society, intercultural understanding, and successful transition to the labor market. It strengthens its efforts to increase the opportunities available to more participants and a broader range of organizations, focusing on qualitative impact and contributing to more cohesive societies that are more environmentally oriented and better digitally prepared. European citizens must increasingly possess the knowledge, skills, and competences required in a rapidly evolving society that is becoming more mobile, multicultural, and digital. The programme can significantly contribute to fostering innovation and bridging the gap in knowledge, skills, and competences that Europe faces. It does so by investing in those very attributes, benefitting individuals, institutions, organizations, and society as a whole—supporting sustainable development and ensuring equality, prosperity, and social inclusion (Erasmus+ Programme Guide, 2025).

Since one of its core objectives is to promote learning mobility of individuals and groups, as well as cooperation, quality, inclusion, and equity in the field of education and training, it funds teacher mobility and the creation of partnerships among educational institutions across all levels.
Mobility aims to strengthen the European dimension and improve the quality of teaching and learning, contributing to the creation of a European Education Area through the development of schools' capacity to participate in cross-border exchanges and collaboration, and to implement high-quality mobility projects.

THE EUROPEAN SCHOOL EDUCATION PLATFORM (ESEP): VISION AND COMPONENT

The ESEP acts as a centralized portal for school education stakeholders across Europe. It provides access to Erasmus+ tools, professional development courses, eTwinning projects, and a repository of teaching resources. By promoting digital transformation, inclusion, and sustainability, ESEP aligns with key European Union priorities such as the Digital Education Action Plan 2021–2027 (European Commission, 2020). Teachers benefit from professional

development opportunities, while students engage in authentic, cross-cultural learning experiences. It facilitates the digital competence of educators by offering webinars, MOOCs, and collaborative project tools. The eTwinning component, in particular, enhances professional growth through peer-to-peer collaboration and access to innovative digital pedagogies (Redecker, 2017; Vuorikari et al., 2015). The DigCompEdu framework further supports educators in self-assessing and advancing their digital teaching practices (Redecker, 2017).

Student Empowerment is promoted and enhanced through Collaborative Projects as students participating in ESEP projects develop digital literacy, communication, and problem-solving skills. The platform supports the integration of project-based learning with real-world challenges, fostering engagement and motivation. eTwinning and Erasmus+ projects, when combined, offer a rich context for students to apply digital tools, collaborate internationally, and understand the cultural and societal aspects of European identity (Kampylis et al., 2015).

OBJECTIVES AND PRIORITIES IN ERASMUS+- SYNERGIES WITH ETWINNING

The goal for the 2021–2027 period is to fund ten million mobility projects.
Most of the funding will be directed toward schools that demonstrate a clear intention to develop their international capabilities and participate continuously in European projects. The Four Horizontal Priorities of Erasmus+ programme are:

- Inclusion and diversity
- Digital transformation
- Environment and combating climate change
- Participation in democratic life, shared values, and civic engagement

In School Education and Erasmus+ the Key **Action 1 –** promotes Individual Mobility. This funding opportunity was created for individual schools or organizations. Schools can also form a consortium to share project management efforts and create new synergies.Key Action 1 (KA1) offers training opportunities for school education staff at the European level (IKY, 2023). Through mobility, educators have the chance to receive professional training either by teaching at a partner school abroad, attending training seminars abroad, or participating in job shadowing experiences.Each project may last 1 or 2 years. The project's duration and activities must be clearly defined in the project approval submission.

To be approved, a project is evaluated based on its relevance to the action's objectives, the needs it seeks to meet, the learning outcomes it aims to provide, and the international dimension it adds to the organization. All of these must be clearly articulated, including the means and methods for assessing impact and disseminating results. **Key Action 1 Includes: KA121 projects**, which are accredited mobility projects for students and staff and **KA122 projects**, which are short-term mobility projects for students and staff

The Erasmus+ Accreditation is a certification tool for School Education organizations that, through their application, demonstrate their intention to participate in quality cross-border mobilities under Key Action 1 of the Erasmus+ Programme (2021–2027).

Erasmus+ Accreditation allows organizations and schools to regularly receive funding for mobility activities throughout the entire 2021–2027 programming period. Although accredited Erasmus+ organizations must apply for funding each year, their accreditation for quality-related matters ensures guaranteed funding and more simplified application procedures. It is important to note that an organization or school is **not required to have prior experience** with the Erasmus+ programme to apply for accreditation.

There are two types of Erasmus+ Accreditation application, individual accreditation for organizations, or for accreditation as a Mobility Consortium Coordinator.. A school only needs to receive accreditation **once every seven years**. This is sufficient for the National Agency to recognize the school as an organization regularly engaged in international mobility. Therefore, a school that obtains accreditation does not need to apply for it again within the 2021–2027 Programme period.

There is also **Key Action 2 (KA2)**, the cooperation Partnerships. These are collaboration projects between organizations aimed at: a) Gaining experience in international and transnational cooperation, b) Internationalizing the activities of the participating organizations, c) Developing and strengthening networks, d) Enhancing the capacities of the participating organizations, e) Exchanging practices, methods, ideas, and experiences at the European level, f) Implementing joint actions and initiatives, g) Producing high-quality and innovative results, h) Developing, transferring, and applying innovative practices. In this action there are Forms of Cooperation. More specifically, there are two distinct

forms of Cooperation Partnerships: a) Cooperation Partnerships (KA220) and b) Small-Scale Partnerships (KA210). Each project must contribute — through its results — to achieving at least one horizontal European priority from the following:- Inclusion and diversity in the fields of education, training, youth, and sport, Environment and combating climate change, Digital transformation, through the development of digital readiness/resilience/skills, Common values, civic engagement, and participation. One sector-specific priority, relevant to the field under which the application is submitted and in which the greatest impact is expected.

eTwinning serves as a privileged environment for implementing an Erasmus+ project, as it is a key quality assessment criterion for Erasmus+ Key Action 1 and 2 projects. Schools and teachers are encouraged to participate in the eTwinning platform, as proposed partnership projects under Erasmus+ are evaluated positively if they incorporate digital tools—especially eTwinning (Erasmus+ Programme Guide, 2025). The Case study of the projects implanted by the 4o Gymasio Prevezas that follows is going to show how the 2 programs correlate and promote in enhancing the digital skills of pupils and teachers.

CASE STUDY: ETWINNING AND ERASMUS+ PROJECTS AT THE 4O GYMNASIO PREVEZAS

The 4o Gymnasio Prevezas (Junior High School, age range: 12-15) has implemented two key Erasmus+ projects that align with ESEP's vision: **S.T.I.C.K Together Project (STEM, Technology, Inclusion, Cooperation, Kindness) and Citizens Without Borders (C.W.B.) Project,** which have started both being implemented in October 2025 and throughout the current School Year 2025-26.

The S.T.I.C.K. is a KA1 Erasmus Accredited Project, in collaboration with a partner school in Zagreb, Croatia and emphasized on the integration of STEM education with inclusive values. Teachers and students engaged in workshops and training that focued on digital tools, inclusive education strategies, and cooperative learning. The project enhanced both the technological and interpersonal skills of participants, demonstrating how Erasmus+ mobility can lead to holistic educational development.

For that programme an eTwinning homonymous project was created and published on the ESEP platform(https://school-education.ec.europa.eu/en/etwinning/projects/stick-together-stem-technology-inclusion-cooperation-kindness/twinspace). Therefore, the twinspace of this etwinning project was the space to develop all the activities, to register all teacher and pupils as members and start collaborating on the commonly planned parts and missions of the two partner schools. The use of web 2.0 tools were the key element to safeguard the interdependent character of the activities and the shared vision as far as the goals of the project was concerned. The project focused on using technology to foster inclusion, cooperation, and kindness, encouraging participants to work together to solve real-world problems. By embracing diversity and developing digital skills, the project aimed to create a supportive and innovative learning environment for all students. The wide range of activities included among others: 1. school presentations and member introductions in terms of personal details and get to know each other activities, as well as descriptions of school and local surroundings with the aid of digital tools and AI tools, 2. Logo Competition, 3. The creation of Virtual Escape Rooms, 4. STEM Quizzes, 5. The creation of S.T.I.C.K. Together Advent Christmas Calendar, celebrating International days or weeks such, Code week and Europe/eTwinning Day and of course many on the field person to person activities during the mobilities.

Image 1
The project Logo

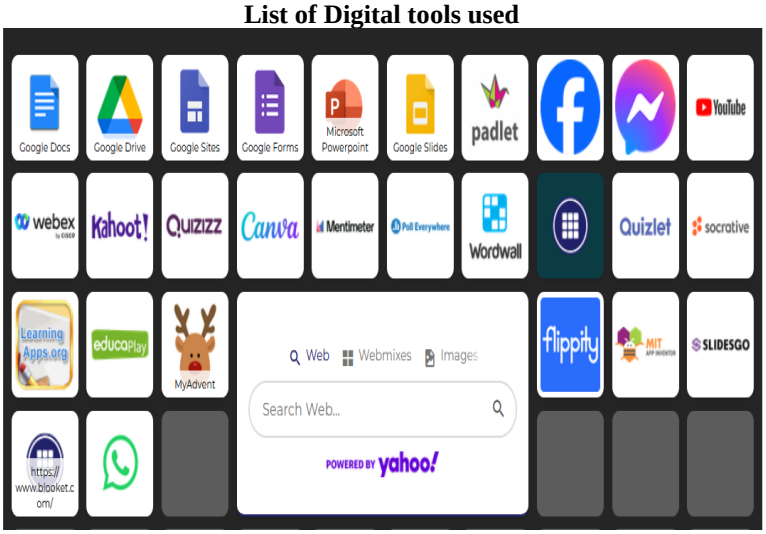


The objectives were met through well-structured and varied activities designed to build empathy, teamwork, and digital skills. The combination of online collaboration and in-person exchanges provided both continuity and impact. Students were actively involved in all stages of the project, from planning to presentation. Evaluation included student feedback (pre survey, post survey), reflection activities, teacher observations, and analysis of the quality of collaborative work. Feedback from students after mobility experiences showed high levels of motivation, personal growth, and enthusiasm for future international cooperation.

The project was shared with the wider school community through presentations, the school website, noticeboards, and local events. TwinSpace served as the central hub for documentation and dissemination, allowing students, teachers, and external visitors to access the outcomes. Articles about the project were published in both Greek and Croatian educational portals. It was presented at parental meetings and in front of the school boards. It was continuously documented on school websites and social media.

The final products apart of all digital PPTs and videos that were uploaded on the twinspace also included a cultural collaborative online board game using everything the Students had learned during the project and the mobilities about each other's country. Each team of students made action cards on the board game and students tested their knowledge by playing it . Very important were also the creation of digital applications via STEM during the workshops and the waypupils wre trained not only to use but also to create their own digital Content .

Image 2
List of Digital tools used



Pupils participated in various interactive activities such as coding, digital creativity, environmental awareness tasks, and anti-bullying campaigns. A highlight of the project was the implementation of two short-term mobilities: one hosted in Zagreb, Croatia, and another in Preveza, Greece, where students and teachers engaged in joint workshops, school visits, and cultural exchanges, fostering deeper international friendships and collaboration. The project significantly enhanced students' technological, linguistic, and interpersonal skills in a real-world context. Outcomes included the creation of collaborative digital content, increased student motivation and confidence, development of digital literacy and English language skills, and participation in mobility programmes. Students were empowered to work in teams, express their ideas, and share their cultural identity with their peers from another coutnry.

Collaboration between partner schools took place both virtually and in person. Online meetings, collaborative digital tools (such as Padlet, Canva, and Google tools), and TwinSpace forums were used to plan and carry out activities. Students worked together to solve problems, create multimedia content, and participate in shared challenges. ESEP platform was the greatest facilitator towards that direction as all the virtual part of the project implementation was safegurded by the most secure space for teachrs and pupils in Europe to comminicate and collaborate. The in-person mobilities in Zagreb and Preveza further strengthened this cooperation, allowing students to engage face-to-face in interdisciplinary workshops, STEM experiments, cultural activities, and school visits.

The C.W.B. (Citizens without Borders) is on the other hand **a KA2 Erasmus+ partnership** involving schools from Cyprus (Limassol), Italy (Latina), Sweden (Stockholm), and Greece (Preveza). It consists of four mobility packages, each addressing key themes of digital transformation, environmental sustainability, and European citizenship. It

emphasizes the need to prepare future generations for rapid global changes by promoting awareness of technological, social, cultural, and environmental issues. The main goals are: 1. Citizenship & Inclusion: Helping students to become responsible European and global citizens by understanding European values, cultural diversity, inclusion, and sustainability through collaboration with peers from diverse backgrounds. 2. Digital Competence: Enhance students' digital skills by engaging them in using digital tools and platforms for communication, collaboration, and cultural exploration, aligning with the priority of digitalisation. And 3. Environmental Sustainability: Raise awareness about climate change, sustainable tourism, and eco-friendly practices to foster responsible behavior and equip students with problem-solving and critical thinking skills for green job opportunities. All three goals align with the general plan of the School, the 4ο Gymnasio Prevezas, as expressed in the long – term planning and organization so as it to be a modern, European –oriented, Sustainable democratic School aiming at enhancing life skills of teachers and pupils but at the same time taking care of their welfare and respecting the local – regional – National-European- global environment.

For that purpose, when the project was finally accepted to be granted with the Cypriot School as Coordinator the first school year 2025-26 included 2 packages /mobilities to be enforced and the corresponding etwinning Project with the same name to be created on the ESEP platform (https://school-education.ec.europa.eu/en/etwinning/projects/cwb-citizens-without-borders/twinspace). Each school at the beginning of the school year formed an Erasmus Club, including a pedagogical team of teachers in different disciplines related to the objectives of our project. Some of the criteria for the selection of the teachers were:-Interest in the project topic "EU citizen – Global citizen" -Linguistic competence in English (to be able to communicate with other participants) -Active interest and involvement in school events -Basic computer skills -Digital skills -Gender equality -Teachers with special difficulties, such as Health problems were encouraged to take part and not excluded. The packages/ Activities were planned before the final granting, during the previous years so all the school members had to be organized according to that.

The first one had to be carried by the Coordinating Institution, the Tsireio Gymansio of Limassol, with the general title 'EU+ Digitalization' aiming at the first horizontal priority of the project which is the digital transformation. Therefore, we started our journey as EU-Global citizens by learning through workshops and lectures about digitalizations, what digital tools will be used for the project and how. At the same time we needed to ensure our EU-Global citizens understand the meaning of European citizenship and the importance of sustainability in environment and culture. So the first meeting in Limassol, was to learn basic skills for the completion of the project. The activities were divided in two categories a) digitalisation and cultural heritage and the following set of activities was followed:

- Ice breaking activities
- Revision of tasks and responsibilities
- Logo contest results

Image 3
The winning Logo of the Project



- Workshops on eTwinning, digital tools for dissemination, cultural heritage digitalization, and inclusion.
- Visits to local historical sites such as the ancient city of Kourion providing practical experiences with QR codes and other digital means of preserving culture.
- Students workshop: "connect the dots" - Explore Europe's diversity and discover differences and similarities between their cultures in order to find the common link
- A meeting with a Eurodesk official to talk about the opportunities EU provides to young people
- Visiting CUT to attend lectures and workshops on digitalisation in cultural heritage
- Experiencing first-hand sustainability in culture by a guided tour at the archaeological museum in Nicosia
- Workshop on inclusion and diversity at the Ledra street checkpoint "Unite the divided capital of Europe with words of kindness and peace"
- Meeting Evaluation by teacher and pupils

The Outcomes of the set of implemented activities were that students developed foundational digital skills, cultural awareness, and an understanding of European citizenship and sustainability focusing the SDGs 10, 11, 16.

The second package/ mobility took place in Latina, Italy and was coordinated by the Italian partner School, Liceo Scientifico Statale "E.Majorana" under the general title " Eco-Cultural Herit@ge + Climate Change". The Activity mainly focused on the project's priority: Environment, protection and Climate Change, and Training, and spesifically on the SDGs 3, 11, 12, 13, 14, 15, 17, aligning with the institution's goals of environmental sustainability awareness. All activities aimed at showcasing the natural beauty of the places we visited while emphasizing the impacts of climate change on both land and water life. They included:

- Lab workshops related to 'Algae Biotec 2030', fostering interdisciplinary connections.
- Teachers' CLIL workshops focusing on lesson plan creation, facilitated by experts from our Education Department.
- Study visit of the Lake of Fogliano, being trained how environmental protection is adopted by presentations, visits to the museum, and a tour of the hospital to observe the care of injured animals. Participants delved into exploring sustainable solutions to preserve the ecosystem amidst the challenges of climate change.
- Study visit to the Garden of Ninfa to observe firsthand the effects of climate change on plants, highlighting the diverse impacts of climate change.
- Exploring local agriculture to identify sustainable food sources and connect them to global sustainability efforts.
- Reflecting on their experiences the participants will contribute to reports to be published on the project blog.
- Rome's cultural sites exploration, setting the Coliseum, as a study case, delving into historical preservation methods against the backdrop of climate change Evaluation of the work done.

The Outcomes of the whole package was for Students to gain hands-on experience in climate science and sustainability, improving digital storytelling through blog posts, and being engaged in interdisciplinary learning (SDGs 3, 11, 12, 13, 14, 15, 17).

DEVELOPING DIGITAL SKILLS VIA THE ESEP

As it has already been stated and presented the virtual space that the platform of ESEP is offering to not only the above but also all Erasmus/eTwinning projects is of unquestioned importance and value. All teachers and pupils learn how to use the etwinning platform and start working in a project collaborating and making use of all its tools needed for presentations, or dissemination, understanding the importance of digitalisation in our times and gaining knowledge of how digitalisation can contribute to a sustainable cultural heritage. They will also gain a grasp idea of their European identity, learn the values of EU in order to become a European citizen exchanging cultural elements, learning about the differences and similarities of European countries and finding their common link and understanding the importance of inclusion and acceptance, peace and freedom.

As technology was essential in both projects the students used digital platforms such as the Twinspace, and different digital tools like Canva, Padlet, Genially and Google slides to co-create content. During mobilities, they explored educational technologies such as micro:bit and 3D modeling tools and robotics in joint workshops. Online meetings and forums enabled real-time communication and planning among schools. E-Safety was also a consistent priority throughout the project. All participating students had parental permission for online participation and the use of photographs and videos for dissemination purposes. Teachers guided students on using copyright-free materials and citing sources appropriately. TwinSpace and ESEP consequently provided a safe, password-protected environment where all shared

content was monitored and secure. Also, the issues was further explored on the occasion of the Safer Internet Day where students created a collaborative poster about internet safety.

CHALLENGES IN UTILIZING THE PLATFORM

Despite its benefits, ESEP usage is not without challenges. Educators must invest time to become proficient with the platform's interface and tools. Unequal access to technology and the digital divisions among schools can limit participation. Language barriers and differing curricular systems across countries may also impede collaboration (Bocconi et al., 2016). Nevertheless, continuous platform improvements and institutional support have mitigated many of these challenges.

Despite its pivotal role in fostering cross-border collaboration, the ESEP platform presents certain challenges that can hinder its full potential. One of the main obstacles lies in the platform's navigation and technical complexity, especially for educators or students with limited prior experience in digital tools. For instance, during the implementation of both the S.T.I.C.K. Together and Citizens Without Borders projects, teachers had to dedicate considerable time to registering participants, managing multiple tools within TwinSpace, and ensuring digital safety compliance—all tasks that required significant technical fluency and coordination. Moreover, the integration of diverse digital tools (e.g., Padlet, Canva, Google Suite) outside the platform itself often required additional training and troubleshooting. Language limitations and uneven digital literacy among partner schools further complicated consistent communication and content sharing. These technical and logistical barriers highlight the need for ongoing training, improved user support, and greater platform flexibility to ensure equitable participation for all schools across Europe.

CONCLUSION

The European School Education Platform is a pivotal instrument in the digital transformation of education in Europe. It empowers educators and students alike by offering tools for professional growth, collaborative projects, and intercultural understanding. The 4o Gymnasio Prevezas participation in the "S.T.I.C.K Together" and "Citizens Without Borders" projects illustrates the platform's real-world impact on digital skill development. By fostering inclusive, innovative, and sustainable educational practices, ESEP significantly contributes to a unified and forward-looking European educational space. Despite its challenges, the ESEP platform has proven to be an invaluable tool for enhancing the digital competencies of both teachers and students. Through the eTwinning projects linked to S.T.I.C.K. Together and Citizens Without Borders, the platform offered a secure, collaborative environment where educational communities could interact, co-create, and innovate. Pupils developed essential digital skills by designing multimedia content, engaging in virtual meetings, creating online board games, and even building their own digital applications during STEM workshops. Teachers, on the other hand, strengthened their capacity to integrate digital pedagogy, manage international project coordination, and use collaborative tools effectively. The structured yet adaptable format of TwinSpace encouraged active participation, creativity, and cultural exchange, turning digital literacy into a real-life experience. As a result, the ESEP platform not only supported the technical execution of Erasmus+ projects but also played a key role in transforming the digital culture of the school community—empowering educators and learners alike to thrive in a connected, globalised world.

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MAPPING CULTURE AND ENVIRONMENT: A DIGITAL EDUCATIONAL ODYSSEY

Laskari Lemonia
Teacher, PE04.02, MSc
1st Model High School "Manolis Andronikos", Thessaloniki
e-mail: lemilaskari@yahoo.gr

Tsioupli Evgenia
Teacher, PE02, PhD
1st Model High School "Manolis Andronikos", Thessaloniki
e-mail: evtsioupli@gmail.com

ABSTRACT

This paper presents an innovative educational project that integrates digital tools to promote multiliteracies and experiential learning. Focusing on the cultural and environmental connections between Thessaloniki and Constantinople, the project centers around the Sustainable Development Goals 14 (Life Below Water), 15 (Life on Land), and 17 (Partnerships for the Goals). Using ArcGIS software, students created an interactive map that traces a land-and-sea route highlighting key cultural, historical, and ecological sites. Through this process, they developed digital literacy, environmental awareness, and cultural sensitivity. The program enhanced students' critical thinking and collaborative skills while fostering active citizenship and interdisciplinary understanding. ArcGIS enabled the combination of geospatial data processing with creative expression, supporting an integrated approach to education. Ultimately, the project demonstrates how the synergy of technology, culture, and environmental education can foster sustainability and cooperation. The student-created digital map serves as both a learning artifact and a public invitation to explore the shared heritage and future of these two historic cities.

Keywords: digital media, multiliteracies, ArcGIS, interactive map, critical thinking.

INTRODUCTION

In an era defined by global connectivity and digital transformation, education is increasingly called upon to reimagine learning through new literacies and technologies. This paper presents an educational initiative titled *Mapping Culture and Environment: A Digital Educational Odyssey,* which integrates digital mapping, environmental and cultural literacy, and student-led inquiry using the ArcGIS platform. Rooted in the principles of multiliteracies and experiential learning, the program connects the cities of Thessaloniki and Constantinople through an interactive digital journey—bridging land, sea, history, and sustainability.

The transition to a post-industrial, information-based society marked by digital communication has brought to the forefront new forms of literacy that go beyond traditional reading and writing. Within this context, the concept of multiliteracies, first introduced by the New London Group (1996), reflects the complex and multimodal communication needs of today's youth and society at large. Multiliteracies encompass the understanding and creation of meaning through various semiotic modes—linguistic, visual, auditory, and digital—and are closely tied to the development of critical thinking, creativity, and active participation (Kalantzis & Cope, 2023).

Educational practice today is called to respond to these shifts by bridging theoretical knowledge with experiential, collaborative, and authentic learning experiences (Hallström, 2023). At the same time, contemporary education faces the challenge of cultivating 21st-century skills (Partnership for 21st Century Skills – P21, 2011), such as communication, collaboration, problem-solving, digital fluency, and information management. The development of such skills requires the integration of multiliteracies into the curriculum, not merely to acquire knowledge, but to foster the ability to apply it in complex, real-world learning environments (P21, 2011; Larson & Miller, 2011). As Laurillard (2008) emphasizes, technology is transforming both the content and process of learning. This transformation demands that students develop the capacity to search, organize, evaluate, and communicate information in a critical and creative manner. Within this framework, multiliteracies serve not only as a gateway to knowledge but also as a tool for empowering learners—enhancing their learning identity, self-expression, and social awareness.

The educational program presented in this paper applies these concepts in practice, offering a model for how digital media and geographic information systems can cultivate interdisciplinary learning across environmental, historical, and cultural domains. It demonstrates how students, by mapping a symbolic journey between Thessaloniki and Constantinople, can engage critically and creatively with their world while acquiring the skills to shape a sustainable future.

METHODOLOGY

At the core of this educational program was the use of ArcGIS, a geographic information system (GIS) software, which enabled students to design and construct an interactive digital map. Maps have long served as powerful storytelling tools, capturing the imagination and transmitting knowledge about the world. Historically, they documented the journeys of missionaries, diplomats, and merchants, blending factual geography with elements of wonder and myth. From medieval maps that intertwined cosmology and theology to narrative accounts of leaders' travels, cartography has always been a medium for both information and interpretation. In the digital age, mapping has evolved through technologies such as Geographic Information Systems (GIS), web-based platforms, and mobile applications. These tools enable users to visualize complex data, trace patterns and routes, illustrate change over time, and support decision-making processes. Today, maps do more than describe the world—they interpret it, offering dynamic ways to understand spatial relationships, cultural contexts, and global phenomena (Marta & Osso, 2015; Param, 2024). This map visualized a symbolic route across land and sea, connecting Thessaloniki and Constantinople—two cities with deep historical, cultural, and geographical ties. The mapping process functioned as a digital narrative that integrated multiple forms of data and perspectives, facilitating a rich, interdisciplinary learning experience.

The methodology was grounded in principles of experiential, inquiry-based, and collaborative learning, combining research, fieldwork, digital cartography, and storytelling (for details about digital narratives see: Koenitz et al., 2015). Students were actively engaged in collecting, organizing, and analyzing information; identifying and mapping key historical, environmental, and cultural landmarks; and narrating the interwoven connections between the two cities. The pedagogical approach deliberately transcended traditional subject boundaries, blending geography, history, environmental education, digital media, and cultural heritage studies.

The project was developed within the framework of the Environmental Education Program titled *"Sea, Land, and People... That Unite Us!"* during the 2024–25 academic year at the Gymnasium. Aimed to:

1. Highlight the connection between Thessaloniki and Constantinople, emphasizing historical, cultural, and geographical continuity across time and space.
2. Foster experiential and creative approaches to learning, encouraging students to construct knowledge through direct engagement and creative production.
3. Develop a range of essential 21st-century competencies. including critical thinking, communication, digital fluency, collaboration, and multimodal expression.

Specific Objectives and expected learner's outcomes:

- Promotion of Multiliteracies: the project supported diverse forms of literacy—linguistic, digital, cultural, and environmental—by integrating multiple modes of meaning-making and representation.
- Experiential Learning: students engaged in active inquiry, learning through real-world tasks such as mapping, interviewing, and narrative design, rather than passive content absorption.
- Digital Education: using ArcGIS, students developed technical and conceptual skills in digital mapping, data visualization, and geospatial analysis, bridging theoretical learning with applied practice.
- Environmental and Cultural Awareness: the mapping route served as a lens for exploring the relationship between human societies, cultural identity, and natural ecosystems, highlighting local and regional environmental concerns along with tangible and intangible cultural heritage.
- Interdisciplinary Approach: knowledge from multiple academic domains—History, Geography, Information Technology, and Modern Greek Language—was synthesized into a cohesive educational experience, reinforcing the value of cross-curricular connections.
- Collaborative Learning: students worked in teams, enhancing their abilities to communicate, negotiate, delegate, and co-create content in a shared digital environment.
- Cultivation of Presentation Skills: emphasis was placed on the structured communication of research outcomes, using both oral presentation techniques and multimodal tools, notably the digital map - as platforms for public engagement and reflection.

THEORETICAL FRAMEWORK

The educational project presented in this paper is grounded in two interrelated conceptual foundations: the theory of multiliteracies and the framework of sustainable development as articulated by the United Nations' Sustainable Development Goals (SDGs). Sustainable development refers to the capacity of societies to grow economically, socially, and environmentally in a way that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. At its core lies a balanced integration of the three pillars of sustainability: the economy, the environment, and society. These dimensions must be addressed holistically to ensure long-term well-being and resilience. The United Nations' 2030 Agenda for Sustainable Development, adopted in 2015, defines 17 Sustainable Development Goals (SDGs) that aim to create a more just, inclusive, and sustainable world. These goals emphasize the importance of global cooperation, environmental protection, and social justice, particularly by prioritizing the needs of the most vulnerable populations. The SDGs include targets that address poverty reduction, gender equality, climate action, access to quality education, and ecosystem preservation, among others (United Nations, 2015).

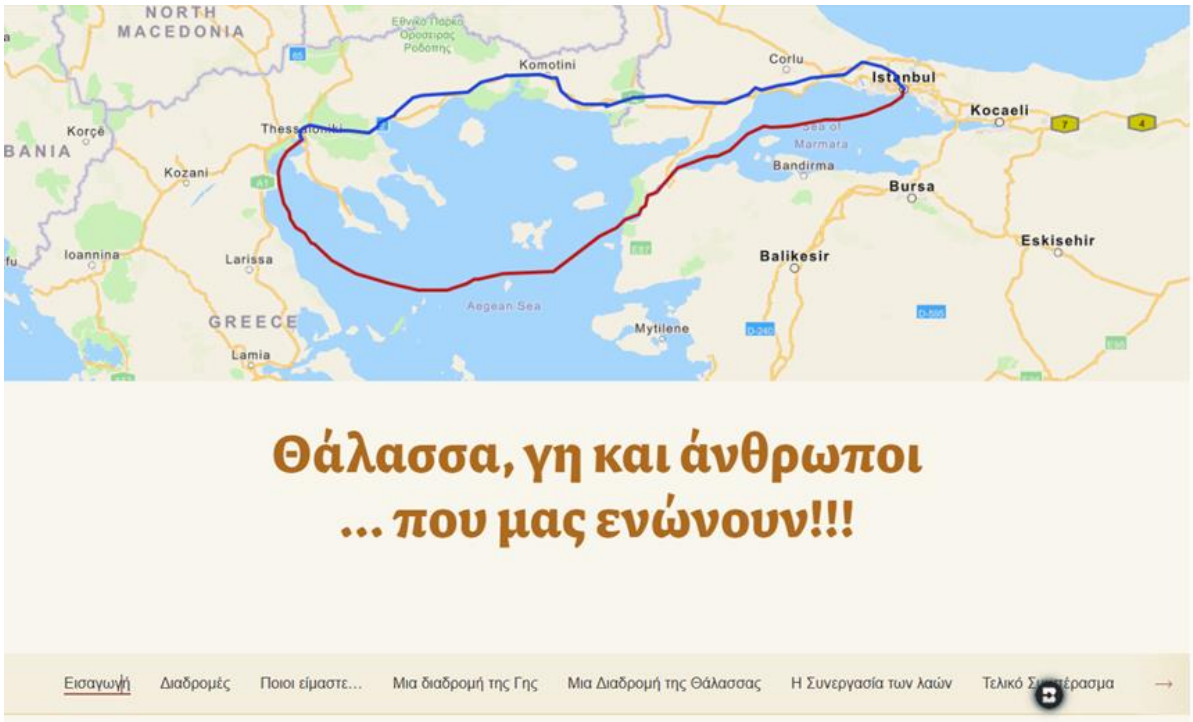
Within this context, education is viewed as a critical enabler of sustainability. It not only imparts knowledge but also fosters the values, skills, and behaviors necessary for responsible global citizenship. The SDGs explicitly highlight the role of education in Goal 4: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Furthermore, Goals 14 (Life Below Water), 15 (Life on Land), and 17 (Partnerships for the Goals) are particularly relevant to the educational program discussed in this paper, which explores environmental and cultural connections between Thessaloniki and Constantinople through a digitally mapped learning journey.

This pedagogical approach is further enriched by the lens of multiliteracies, which expands traditional notions of literacy to include diverse forms of meaning-making across linguistic, visual, digital, spatial, and cultural modes (New London Group, 1996). Multiliteracies promote active student engagement with real-world issues, fostering critical thinking, collaboration, and creativity—all of which are essential for addressing the complex challenges of sustainability in the 21st century (Cope & Kalantzis, 2009).

As a practical application of these frameworks, the storymap "Sea, land and people... that unite us!!!" (Image 1) presented in this paper was developed as a project for a school-based Environmental Education Program conducted at the 1st Model Lyceum "Manolis Andronikos", in Thessaloniki, during the academic year 2024–25. This project represents an innovative educational initiative that harnesses digital media to promote multiliteracies and experiential learning. Centred on the connection between Thessaloniki and Constantinople—two cities with profound historical, cultural, and geographical ties—the project engages students in exploring and reflecting upon the SDGs 14 (Life Below Water), 15

(Life on Land), and 17 (Partnerships for the Goals). Through this educational journey, students actively engaged with issues of sustainability, cultural heritage, and cross-border cooperation, creating a meaningful learning experience rooted in real-world contexts.

Image 1
Conference Website Graphic The storymap: Sea, land and people... that unite us!!! (in Greek)



The implementation of multiliteracies in educational settings gains substantial pedagogical value when linked to authentic, experiential, and technology-enhanced practices (Kaufman, 2013). In this project, the creation of a digital storymap served as a dynamic platform for applying the principles of multiliteracies while simultaneously cultivating key competencies as outlined by the Partnership for 21st Century Skills (P21, 2011). The activity did not merely involve content acquisition but encouraged students to act as researchers, storytellers, cartographers, and digital creators, roles that mirror real-world demands in a knowledge-based, multimodal society (Alm, 2024).

Central keys to the mapping process were critical thinking and problem solving (Voogt & Roblin, 2010). Students were required to gather information from diverse sources—historical texts, environmental data, multimedia content, and local narratives—and evaluate its relevance and reliability. They had to synthesize complex inputs into cohesive and meaningful digital narratives, critically selecting what to include and how to represent it within the broader framework of the Sustainable Development Goals (SDGs). The thematic integration of Goals 14, 15, and 17—related to life below water, life on land, and partnerships—further encouraged them to examine environmental and cultural issues through a critical, interdisciplinary lens.

Communication, as emphasized in multiliteracies theory, involves not just linguistic proficiency but the ability to express ideas through multiple semiotic modes. The storymap required students to design a layered narrative combining text, visuals, geographic data, and digital media (Marta & Osso, 2015). This multimodal literacy was essential in enabling students to articulate their understanding of the cultural and ecological connections between Thessaloniki and Constantinople. The interactive nature of the platform promoted clarity, audience awareness, and aesthetic judgment in communication—core elements of effective 21st century messaging. Collaboration also featured prominently in the learning process (Rotherham & Willingham, 2010). The project was structured as a team-based activity, requiring students to coordinate tasks, negotiate content, and co-construct meaning. They worked together to research locations, design the visual layout, edit narrative sections, and resolve design or data challenges. This cooperative engagement fostered mutual respect, responsibility sharing, and the development of interpersonal communication skills—elements that mirror the collaborative dynamics of contemporary professional environments.

The development of Digital Literacy was both a means and an outcome of the project. Using ArcGIS storymap technology, students learned to navigate digital platforms, manage online resources, and integrate geographic and multimedia data into an interactive interface. They not only consumed digital content but became producers of it, gaining insights into both the opportunities and limitations of digital tools. Their work reflected an increasing awareness of issues such as information credibility, data ethics, and digital citizenship—core components of critical digital literacy. Through the synthesis of multiliteracies and the P21 framework, the storymap became more than a digital artifact—it functioned as a multilayered educational experience. It provided students with the tools to understand, interpret, and reshape their world through active, creative, and critical engagement. The project illustrates how the intersection of multimodal expression, collaborative inquiry, and purposeful technology use can enrich the educational process and prepare learners for the complexities of the 21st century.

IMPLEMENTATION OF THE PROGRAM

The practical implementation of the educational program centered on the use of ArcGIS technology as a tool for fostering both technical proficiency and creative expression. Students engaged in digital cartography to visualize a symbolic journey connecting Thessaloniki and Constantinople, integrating diverse data sources, narratives, and multimedia elements. This process encouraged metacognitive engagement, as students were required to critically analyze, organize, and communicate complex information through multimodal platforms (Kalantzis & Cope, 2025).

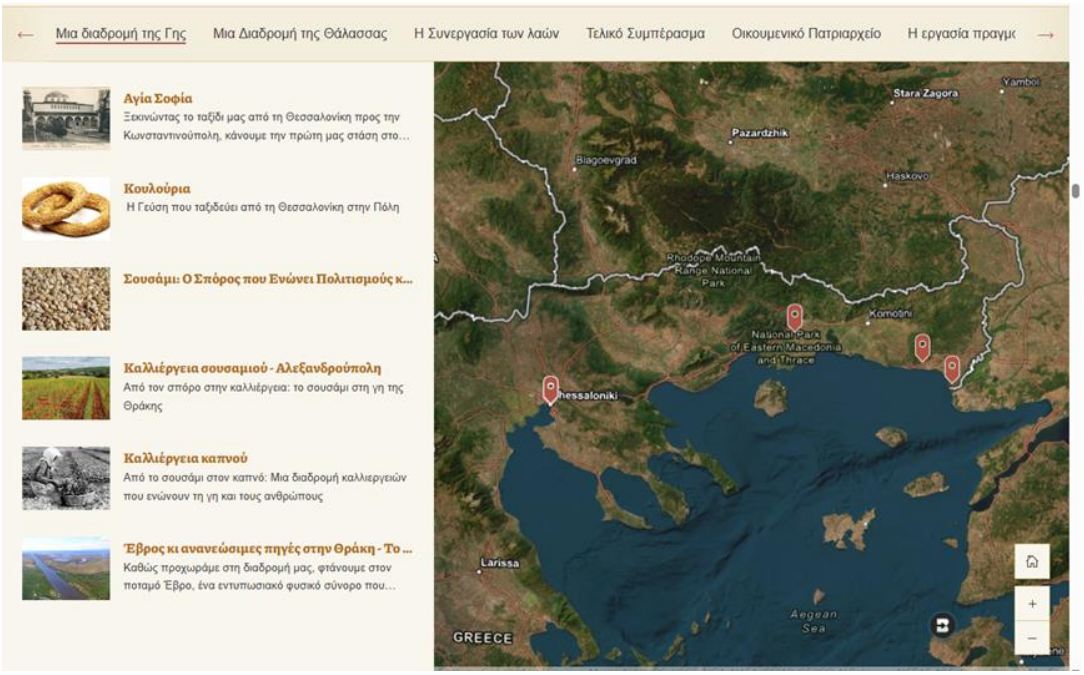
ArcGIS served as a catalyst for interdisciplinary exploration, enabling the synthesis of cultural and environmental themes across different geographical points. The program began in Thessaloniki, with a focus on the Church of Hagia Sophia - a monument that resonates with its namesake in Constantinople, symbolizing spiritual and cultural continuity. Students examined both tangible and intangible heritage, identifying shared symbols, traditions, and practices that connect the two cities. One such example was the investigation into the koulouri (traditional sesame bread) and sesame cultivation, a culinary and agricultural link illustrating the intertwined histories of the regions. The journey then proceeded through Thrace, with educational stops at the Evros River and local renewable energy sites. These locations provided opportunities for students to explore contemporary environmental issues such as biodiversity, climate resilience, and sustainable resource management. By interacting with these real-world contexts, students gained insight into the balance between cultural preservation and ecological responsibility. The destination of the digital narrative was Constantinople, where the Hagia Sophia emerged not only as a historical and religious landmark but also as a powerful metaphor for coexistence and intercultural collaboration. The mapping project thus culminated in a cohesive, student-constructed storyline that bridged the past and present—highlighting the dynamic relationship between cultural identity and environmental stewardship.

Through this process, learners became cartographers of meaning, connecting places, histories, and ecosystems into a shared narrative. The implementation of the program exemplified how digital tools can facilitate meaningful, place-based, and collaborative learning experiences aligned with the goals of sustainable development and 21st-century education.

The thematic route titled *Earth's Path* was designed to explore the intersection of cultural heritage, sustainable agriculture, and gastronomy, with particular reference to Sustainable Development Goal 15: Life on Land. This part of the program focused on how land-based resources, traditional practices, and cultural expressions inform sustainable living and connect communities across borders.

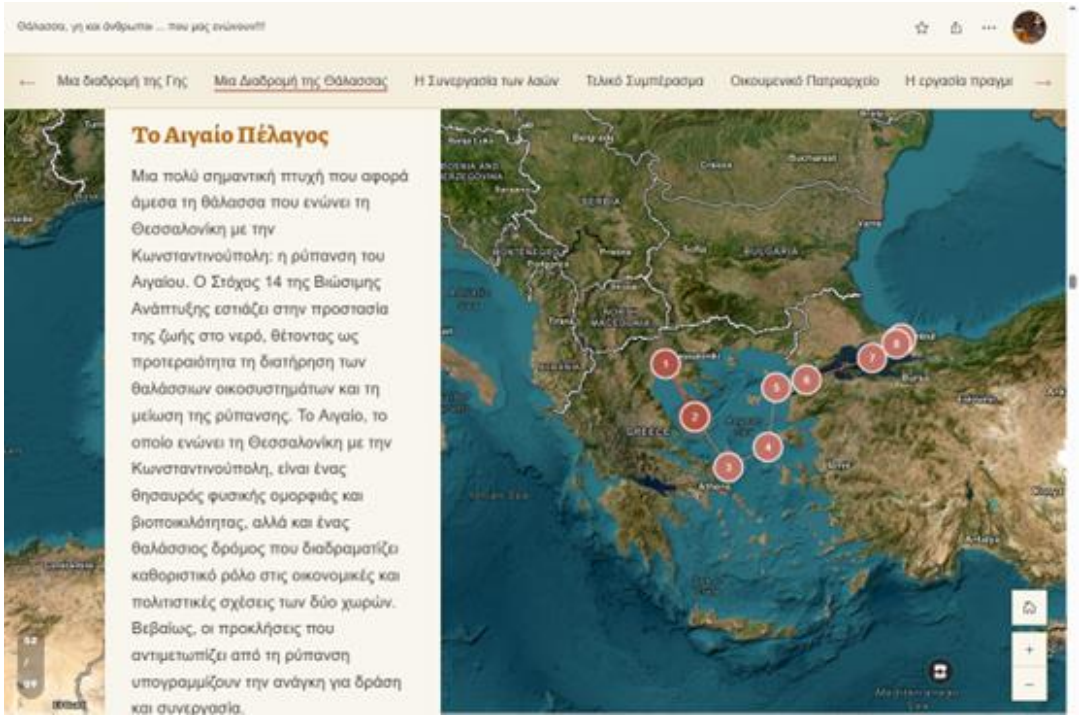
The journey began at the Hagia Sophia of Thessaloniki, a monument of significant cultural and historical importance. As a UNESCO World Heritage Site, it represents the city's Byzantine heritage and spiritual identity. Symbolically, it served as a cultural bridge to its counterpart, the Hagia Sophia in Constantinople, inviting students to reflect on the shared religious, architectural, and historical narratives that unite the two urban centers. This connection emphasized the role of cultural monuments in promoting a sense of continuity, intercultural understanding, and common heritage. Following this, students examined the gastronomic link between Thessaloniki and Constantinople through the iconic koulouri—a circular sesame bread deeply embedded in the culinary traditions of both cities. The exploration highlighted not only the food item's historical evolution and symbolic value but also the agricultural significance of sesame, which is traditionally cultivated in Thrace. Students investigated the socioeconomic and environmental dimensions of sesame production, its role in local ecosystems, and its integration into daily diets across generations. In doing so, they gained an appreciation for how food culture is interwoven with sustainable agricultural practices, biodiversity, and regional identity. These connections also allowed students to reflect on SDG 15 in practical terms, by considering how the protection of natural resources and local food systems supports both cultural preservation and ecological health.

Image 2
Earth's Path: Cultural Heritage and Gastronomy in the Context of SDG 15 (in Greek)



The *Sea Route* (Image 2) of the educational journey was designed to engage students with key environmental and ecological issues aligned with Sustainable Development Goal 14: Life Below Water, focusing on the protection of aquatic ecosystems, the promotion of sustainable practices, and the appreciation of natural resources that transcend national borders. Through this section, students explored how interconnected land and marine environments are vital to biodiversity, regional cooperation, and long-term sustainability.

Εικόνα 3
Sea Route: Sustainable Development Goal 14: Life Below Water (in Greek)

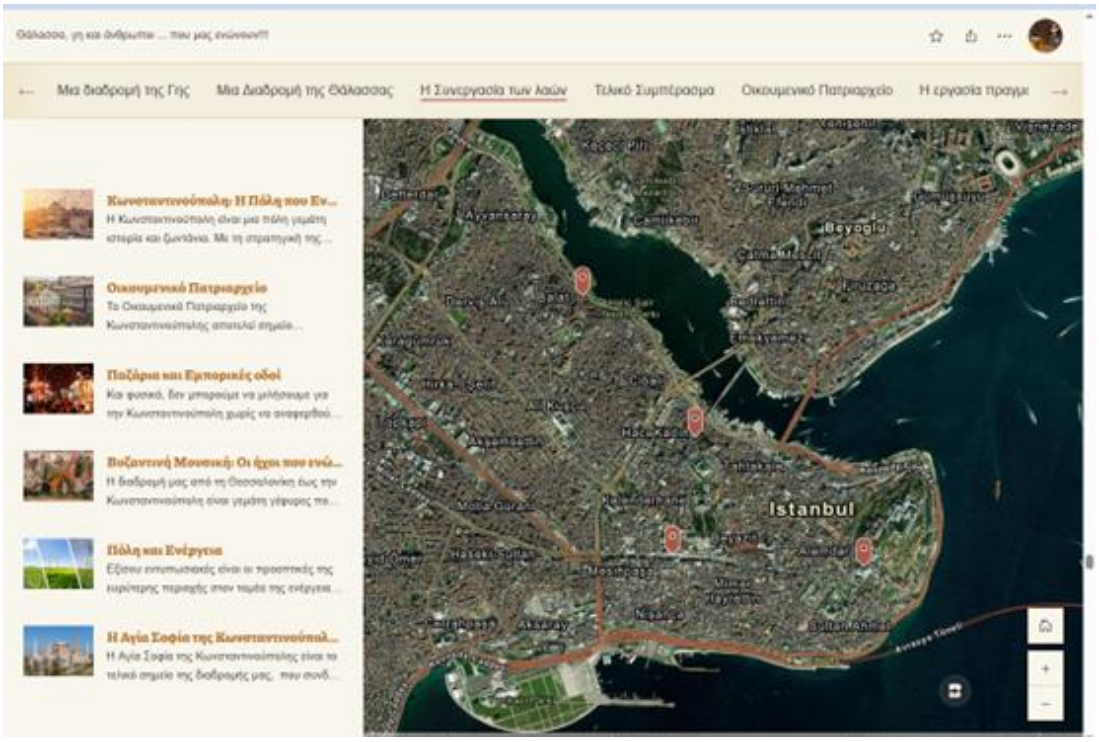


The Evros River, a critical natural boundary between Greece and Turkey, served as a focal point for examining biodiversity in riparian ecosystems. Students studied the river's role as a habitat for numerous plant and animal species, as well as its importance for migratory birds and endemic wildlife. Discussions included threats to freshwater biodiversity, such as pollution, over-extraction of water, and habitat disruption, alongside conservation strategies and cross-border environmental cooperation. This investigation deepened students' understanding of the interdependence between terrestrial and aquatic systems and the need for international collaboration in ecosystem preservation. In the region of Thrace, students explored local installations of wind and solar energy, reflecting on the role of renewable energy sources in addressing environmental challenges. They examined how sustainable energy initiatives contribute to reducing carbon emissions, mitigating climate change, and promoting energy independence at a regional level. Through this analysis, students linked the transition to clean energy with responsible environmental stewardship, thereby integrating the technological and ecological dimensions of sustainability.

The final marine-related focus was on the Aegean and Marmara Seas, where students engaged with issues of marine biodiversity, examining native flora and fauna, food chains, and ecosystem health. Attention was also given to human impacts on marine environments, such as overfishing, plastic pollution, and climate change-induced disruptions. Students reflected on marine conservation strategies, including protected areas and sustainable fishing practices, and discussed the importance of raising awareness about the fragile balance of marine ecosystems. These activities fostered a holistic view of environmental interconnectivity and the urgency of safeguarding marine life in both local and global contexts.

The final stage of the program—both thematically and symbolically—was devoted to Sustainable Development Goal 17: Partnerships for the Goals, emphasizing the importance of cross-border cooperation and collective action in addressing global environmental challenges. By focusing on the cultural and ecological ties between Greece and Turkey, the educational journey encouraged students to reflect on the transformative power of partnerships, dialogue, and shared responsibility.

Image 4
Sustainable Development Goal 17: Partnerships for the Goals (in Greek)



Despite historical and political differences, Greece and Turkey share common environmental concerns, particularly in relation to climate change, marine and air pollution, and urban sustainability. Students explored how these transboundary issues necessitate coordinated responses at both the local and international level. The program fostered an understanding of the interconnectedness of ecosystems and the need for bilateral and multilateral cooperation in ensuring

environmental resilience. To contextualize these challenges, the program introduced students to key international environmental agreements:

- Agenda 21: A comprehensive action plan adopted at the UN Conference on Environment and Development (1992), which promotes sustainable urban development and community participation in decision-making.
- Kyoto Protocol (1997): A binding international treaty obligating participating countries to reduce greenhouse gas emissions, recognizing the disproportionate role of industrialized nations in global warming.
- Paris Agreement (2015): A global commitment to limit the rise in average global temperatures to below 2°C, emphasizing national contributions and collaborative efforts toward climate neutrality.

These agreements were not presented merely as abstract policies, but as living frameworks with direct implications for everyday life and regional cooperation. Students were invited to reflect on how such global initiatives can inspire local engagement, especially among youth.

One of the guiding principles of the program was the idea that informed citizens are empowered citizens. By investigating the causes and consequences of environmental degradation, students developed a nuanced understanding of the ecological crisis and the societal shifts needed to address it. In this light, the educational process became an act of civic empowerment, equipping students with the knowledge, skills, and motivation to participate in sustainable development efforts. The culminating stop is in Constantinople—a city symbolizing historical convergence and modern complexity—served as a metaphorical and educational space for contemplating the potential of intercultural dialogue and collective environmental stewardship. Through this final leg of the journey, students were encouraged to envision a shared ecological future, rooted in mutual respect, cooperation, and sustainable practices.

The culmination of the project involved a series of public presentations and participations in student-centered events that highlighted both the process and the outcomes of the work. These dissemination activities served not only to showcase the students' achievements but also to strengthen their communication, collaboration, and digital presentation skills. The program was presented at the 2nd Student Environmental Conference of the National Educational Action Network *"Constantinople–Thessaloniki: An Educational Coexistence – Citizens of the City, Greeks of the World"* (March 27, 2025). For this presentation, students were actively involved in organizing the content, developing structured arguments, and designing audiovisual materials. Emphasis was placed on the development of public speaking skills, including expressiveness, clarity, and audience engagement.

An important feature of the presentation phase was the rotation of students through different roles, such as presenters, researchers, and technical coordinators. This inclusive approach ensured that all participants had the opportunity to actively engage, fostering social-emotional growth, self-confidence, and equitable development of presentation skills. The preparation process was collaborative, promoting peer interaction, responsibility sharing, and feedback exchange, thus enhancing team cohesion and metacognitive awareness. In addition to the main conference, the project was disseminated through multiple public events and competitions:

- Participation with the poster project "Click to protect what unites us" at the exhibition organized by the regional Environmental Education Network *"Click, Protect it!"* (May 5–15, 2025), where the project received a commendation for Artistic Photography.
- Presentation at the Student Festival of Environmental Education Programs 2024–25, where students shared their work with wider school communities.
- Participation in the 14th Student Festival of Digital Creativity, showcasing the StoryMap and its multimodal features.
- Entry into the national Bravo Schools Competition for Primary and Secondary Education.

Through these diverse forms of dissemination, the students not only communicated their research and creative outputs but also embodied the values of collaboration, cultural awareness, and sustainability, which were at the core of the program.

EDUCATIONAL OUTCOMES

Participation in the program yielded significant educational benefits, equipping students with a wide range of cognitive, digital, interpersonal, and socio-environmental competencies. The design and implementation of the digital storymap offered a rich, interdisciplinary learning experience that aligned with the principles of multiliteracies, experiential learning, and the Sustainable Development Goals (SDGs). Using ArcGIS, students cultivated advanced digital literacy, learning to manage geospatial data and visualize complex ideas through interactive storytelling. This process enhanced their ability to synthesize information from diverse sources, structure digital narratives, and communicate meaning through multimodal formats.

At the same time, the thematic focus on marine and terrestrial ecosystems, cultural heritage, and sustainable development contributed to a deeper understanding of environmental and cultural literacy. Students explored the symbolic and material connections between Thessaloniki and Constantinople, gaining insight into shared traditions, local biodiversity, and the interdependence of human and natural systems. The project fostered essential skills as identified by the Partnership for 21st Century Skills (P21) framework:

- Critical thinking and problem-solving: Students engaged in analytical and creative thinking to structure their map, assess information quality, and make informed content choices.
- Communication: The presentation of their work in diverse formats (oral, visual, digital) enhanced clarity of expression and audience awareness.
- Collaboration: Team-based activities encouraged mutual support, role-sharing, and cooperative problem-solving.
- Digital literacy: Competence with mapping software and online tools empowered students to become confident users and creators in the digital environment.

Additionally, the experiential nature of the project contributed to the development of social-emotional learning and global citizenship. Students practiced peer learning and self-reflection, while the emphasis on cultural contact and environmental responsibility nurtured a sense of identity, empathy, and awareness of global interdependence. Engagement with global frameworks such as the Paris Agreement and the Kyoto Protocol further contextualized their learning within international efforts toward sustainability and cooperation. In sum, the project functioned not only as a platform for content knowledge acquisition, but as a transformative educational experience—one that empowered students to connect knowledge with action, voice with responsibility, and local narratives with global challenges.

CONCLUSION

This project demonstrated the transformative potential of experiential learning when combined with digital technology and sustainability education. By addressing real-world challenges—such as climate change, heritage preservation, and intercultural understanding, the program encouraged students to reflect on their roles as active participants in a globally interconnected society. The final product, an interactive digital map, served not only as a medium for showcasing student research and creativity, but also as a tool for engaging broader audiences. It offered a narrative journey that intertwined historical memory, environmental awareness, and cultural continuity, making visible the symbolic and practical ties between Thessaloniki and Constantinople. The project's interdisciplinary nature—merging history, geography, environmental studies, and digital media—provided a dynamic, learner-centered model of education. It empowered students to move beyond passive reception of information, enabling them to construct, interpret, and present knowledge in meaningful, multimodal ways. Through place-based investigation and digital storytelling, students developed essential 21st-century skills, strengthened their multiliteracies, and deepened their awareness of global interdependence.

In summary, the educational initiative underscores the power of digital media and experiential learning in shaping multidimensional educational experiences. By connecting land, sea, and people, the program bridged historical heritage with contemporary sustainability goals. Students emerged from the process not only with enriched cognitive and technical competencies but also with a renewed sense of personal and collective responsibility toward cultural and environmental stewardship. The Thessaloniki–Constantinople digital mapping project thus stands as a best-practice model for how schools can integrate multiliteracies, sustainability, and digital innovation to foster empathy, cooperation, and critical awareness. Ultimately, it invites educators and learners alike to envision education as a catalyst for connection, transformation, and collective action toward a more just and sustainable future.

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TA12: The Internet of Things and education.

THE INTERNET OF THINGS IN EDUCATION: TECHNOLOGICAL APPLICATIONS, PEDAGOGICAL PERSPECTIVES AND ADOPTION CHALLENGES

Giourgas Angelos
University of Ioannina, Department of Informatics and Telecommunications
Postgraduate Student
Preveza, Greece
e-mail: pint00162@uoi.gr

ABSTRACT

This paper investigates the theoretical and technological foundations of the Internet of Things (IoT), as well as the challenges and prospects of its integration into the educational process.

Drawing on current research studies, theoretical frameworks, and empirical data, it examines the architecture and operation of IoT systems in education, and their convergence with emerging technologies such as Artificial Intelligence (AI), Cloud Computing, and Machine Learning (ML).

The study presents key IoT applications in educational settings, including smart classrooms, interactive whiteboards, wearable devices for tracking physiological and learning metrics, and automated platforms for learning analytics. It further discusses how IoT can enhance personalized learning, optimize resource management, and broaden access to educational tools.

A critical evaluation of the benefits and limitations of IoT in education is provided, with particular attention to issues such as data privacy and security, infrastructure costs, and the need for specialized technological training for educators.

Finally, the paper explores future developments in IoT adoption within the educational community, positioning it within a wider technological landscape. The transformative potential of IoT—especially when integrated with Augmented Reality (AR), Virtual Reality (VR), and blockchain—promises the emergence of more intelligent, adaptive, and secure educational environments. The systematic implementation of IoT requires the development of strategic policies, robust ethical and legal frameworks, and the establishment of sustainable technological infrastructures.

Keywords: Internet of things (IoT), smart education, artificial intelligent (AI), machine learning (ML), augmented and virtual reality (AR/VR), Blockchain.

INTRODUCTION

The rapid technological advancements of recent decades have positioned the Internet of Things (IoT) as a key driver in the transformation of social, economic, and educational structures. IoT constitutes a technological ecosystem in which people, sensors, software, and networks collaborate to collect, exchange, and analyze data in real time (Atzori, Iera, & Morabito, 2010). While its applications initially emerged in sectors such as industry and healthcare, IoT has increasingly permeated the field of education, offering new possibilities in teaching practices, assessment methodologies, and institutional management (Al-Fuqaha et al., 2015).

Contemporary educational systems face mounting challenges, including the personalization of learning, the integration of innovative teaching methods, the management of vast data volumes, and the upgrading of technological infrastructure. In this context, IoT emerges as an innovative solution capable of supporting intelligent, dynamically adaptive learning environments (Bandyopadhyay & Sen, 2011). Within a smart classroom, data generated by IoT devices and sensors enables educators to monitor students' learning trajectories, reflect on their pedagogical practices, and implement targeted and personalized instructional interventions (Mishra & Sharma, 2020).

The purpose of this paper is to explore the role and transformative potential of IoT in education by analyzing its technological, pedagogical, and organizational dimensions. Additionally, the study examines the intersection of IoT with cutting-edge technologies such as Artificial Intelligence (AI), Machine Learning (ML), and Cloud Computing (CC), emphasizing their synergistic role in enabling integrated digital learning ecosystems. The paper further presents contemporary applications combining IoT with Augmented Reality (AR) and Virtual Reality (VR) that reshape knowledge acquisition and instructional delivery. A critical review of the benefits and challenges of IoT in educational settings informs policy and practice recommendations for its strategic, pedagogically grounded, and technologically sustainable integration into the modern classroom.

THEORETICAL AND TECHNOLOGICAL FRAMEWORK OF THE INTERNET OF THINGS

The Internet of Things (IoT) is conceptualized as an interconnected technological ecosystem in which physical objects—such as sensors, wearable devices, computers, and other systems—are equipped with embedded circuits, software, and communication capabilities, enabling the autonomous collection and transmission of data without human intervention (Gubbi, Buyya, Marusic, & Palaniswami, 2013). These smart devices form the foundational components of an architecture grounded in constant interconnectivity and information flow, creating a dynamic interactive environment between the physical and digital worlds.

The technological infrastructure of IoT is generally structured across four key layers:

1. Perception Layer: This layer includes sensors and data-gathering devices capable of detecting physical phenomena such as temperature, voice, or motion.
2. Network Layer: Responsible for the transmission of collected data through wired or wireless communication protocols, including Wi-Fi, Zigbee, or 5G.
3. Processing Layer: Involves the storage, analysis, and modeling of the data, transforming raw information into meaningful insights.
4. Application Layer: Pertains to the final use of the processed data, which informs decision-making processes often executed via automation.

The integration of IoT with Artificial Intelligence (AI) and Machine Learning (ML) significantly enhances its functionality—not only enabling data collection but also fostering predictive analytics and autonomous action. The addition of Cloud Computing (CC) offers the required computational power and scalable storage necessary for the uninterrupted and flexible operation of IoT in educational environments (Hashem et al., 2015).

In educational contexts, Constructivism 2.0 and adaptive learning frameworks provide the pedagogical foundation for harnessing IoT technologies effectively. Learning environments supported by IoT promote participatory knowledge construction, real-time data interaction, and personalized instructional flow tailored to the individual needs of each learner (Kafyulilo, 2021). Such environments enable a shift from static to dynamic, data-informed, and student-centered learning models that respond fluidly to context and learner input.

APPLICATIONS OF IoT IN EDUCATION AND THE CLASSROOM

The integration of the Internet of Things (IoT) into the educational process is gradually transforming traditional classrooms into intelligent, interactive, and data-informed learning environments. IoT applications in education support personalized learning, enhance classroom interaction, and improve both instructional efficiency and school infrastructure management.

In smart classrooms, sensors, interactive whiteboards, and monitoring devices are installed to continuously track learning conditions. IoT systems can dynamically regulate lighting, temperature, air quality, and noise levels, adjusting the environment to optimize learning (Zhu et al., 2019). Additionally, solar panels installed on school buildings can power IoT devices and help reduce energy consumption, contributing to sustainable infrastructure. Network-connected tablets and interactive boards offer students customized learning pathways tailored to their individual pace and preferences.

Wearable technologies such as wristbands and smartwatches can collect biometric data—including heart rate, oxygen levels, and stress indicators—enabling real-time monitoring of students' physical and emotional states. This allows educators to intervene when signs of fatigue or learning difficulty emerge, supporting more targeted adaptive learning interventions. Furthermore, IoT-enabled educational platforms collect and analyze usage data from digital tools such as quizzes and learning apps. These data are then used to generate predictive analytics for individual and group performance, improving formative assessment strategies (Siemens & Long, 2011).

The convergence of IoT with Augmented Reality (AR) and Virtual Reality (VR) further enriches educational experiences. For instance, in a biology class, students can use tablets to scan 3D models of the human body embedded with IoT sensors, receiving real-time physiological data and interactive content. In geography, VR headsets combined with IoT-powered simulations allow students to virtually explore a volcano, while sensors simulate realistic seismic activity for immersive learning experiences.

IoT also enhances school safety and access control. With NFC-enabled ID cards, students and teachers can be automatically registered upon entry, allowing for real-time attendance tracking and movement monitoring within the school premises. Access permissions can be configured based on the profile of each user, limiting or granting access to specific areas. Building-integrated IoT sensors can also detect smoke, fire, or unusual movements, and trigger automated emergency responses, such as unlocking doors during evacuation scenarios.

ADVANTAGES OF IoT IN EDUCATION

The integration of the Internet of Things (IoT) into educational contexts introduces significant opportunities to enhance both the quality of teaching and the student learning experience. One of the main advantages is the promotion of personalized learning through the real-time collection of data related to learners' preferences, performance, and learning pace. These data enable the design of tailored learning models, enhancing the effectiveness and autonomy of individual learning pathways (Chen et al., 2020).

Interactive whiteboards, mobile devices, and monitoring software offer instant feedback to both students and teachers, encouraging self-regulated learning and allowing for immediate instructional intervention. IoT also supports collaborative learning by enabling shared use of connected devices and learning environments, promoting active engagement in exploratory and interdisciplinary activities. Furthermore, IoT facilitates the creation of universally accessible learning experiences, such as assistive devices for hearing or vision impairments, thereby supporting inclusive education.

For students with disabilities or those in remote areas, IoT-enabled technologies make it possible to participate in adaptive, remote learning environments that respond to individual needs and provide real-time instructional content. This contributes to equitable access to education for all learners.

Additionally, IoT aids in the efficient management of school infrastructure, including lighting, heating, and security systems. The use of automation and predictive maintenance improves resource optimization and reduces operational costs, contributing to both economic and ecological sustainability.

INTEGRATION OF IoT WITH ARTIFICIAL INTELLIGENCE (AI), MACHINE LEARNING (ML), AND CLOUD COMPUTING (CC) IN EDUCATION

The convergence of IoT with advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML), and Cloud Computing (CC) represents a strategic innovation with transformative potential for the educational sector (Yin et al., 2021). This integration fosters the development of intelligent, adaptive, and sustainable learning environments, enhancing both instructional quality and administrative efficiency.

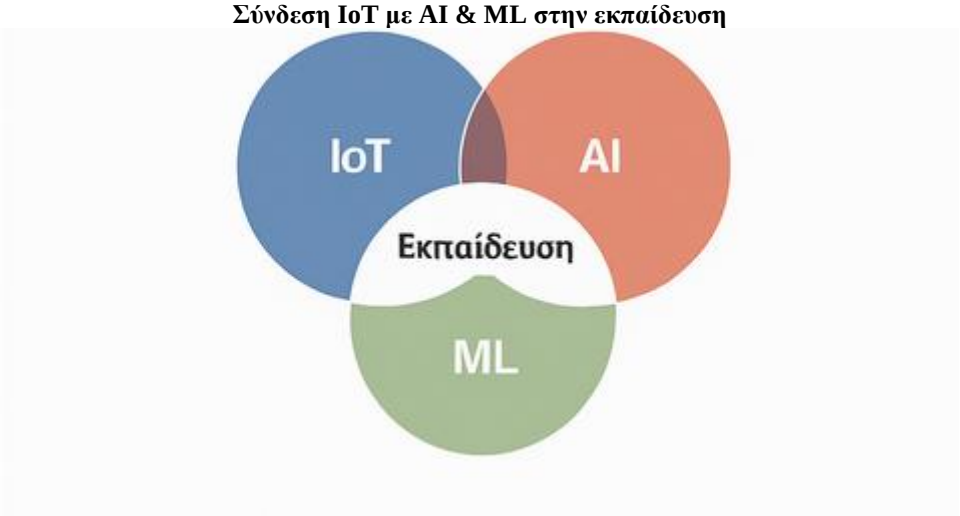
AI enhances IoT systems by enabling the processing and interpretation of data collected from sensors and educational platforms. Using machine learning algorithms, it is possible to detect emotional states, stress levels, and concentration patterns in students through biometric sensors (Zhou et al., 2020). AI also supports the development of intelligent digital assistants that facilitate formative assessment, personalized feedback, and automated monitoring of learning progress.

Machine Learning improves the predictive and self-optimizing capabilities of IoT systems. Through supervised and unsupervised learning techniques, it enables the identification of learning patterns, predicts potential academic failure, recognizes individual learning preferences, and helps adaptive systems self-correct and improve (Alenezi et al., 2021). This approach also strengthens the predictive capacity of assessment tools. Data collected from biometric devices can be used to compare with similar cases and guide real-time interventions Furthermore, ML enables the utilization of large datasets gathered from multiple sources such as LMS platforms, wearable devices, and interactive tools, enhancing data-driven decision-making in education.

The integration of cloud computing with IoT provides a scalable and flexible infrastructure for storing and managing data from sensors and educational apps. Cloud services allow centralized storage, remote access, and seamless integration of multiple devices and platforms (Gubbi et al., 2013). They also enhance collaborative learning, ensure interoperability, and support secure data handling—especially critical in hybrid or distance learning settings.

Together, AI, ML, and CC form a dynamic ecosystem that enables smart education. Their integration promotes data-driven personalization, supports informed decision-making at both instructional and administrative levels, and helps embed evidence-based pedagogical practices. Modern trends point toward combining these technologies with immersive environments (AR/VR), resulting in holistic learning scenarios that emphasize sustainability, adaptability, and inclusivity (Fathema et al., 2022).

Εικόνα 1
Σύνδεση IoT με AI & ML στην εκπαίδευση



INTEGRATION OF IoT WITH AR & VR TECHNOLOGIES IN EDUCATIONAL INSTITUTIONS

The convergence of the Internet of Things (IoT) with Augmented Reality (AR) and Virtual Reality (VR) technologies is transforming the educational landscape into a multimodal pedagogical environment that enhances experiential and interactive learning. These technologies, when used complementarily, allow students to be immersed in simulated or enriched learning scenarios, dynamically informed by real-time IoT data.

The incorporation of sensor data—such as from meteorological stations, temperature sensors, and pollution detectors—enables the real-time visualization of information through AR applications. For example, students can observe the development of climatic phenomena over time using AR tools, thereby strengthening the connection between theoretical knowledge and the physical environment (Elmqaddem, 2019). Similarly, VR combined with IoT allows for the creation of adaptive simulations, where environmental variables adjust based on data inputs. In biology classes, for instance, VR models of the human body can respond to the student's heart rate or breathing patterns, collected through wearable sensors, transforming the experience into an interactive learning process (Radianti et al., 2020).

Indicative Pedagogical Scenarios:

- AR + IoT in Environmental Education: Pollution sensors connected to tablets or smart glasses enable students to explore schoolyards or natural ecosystems while viewing augmented information on CO_2 levels, noise pollution, or temperature. AR provides visual overlays on physical objects, enhancing situated learning (Mikropoulos & Natsis, 2011).
- VR + IoT in Technical and Vocational Training: In disciplines such as engineering, students interact with VR simulations of machines or electrical circuits, whose behavior is influenced by real-time sensor data. For example, a virtual engine may alter its operation based on live readings from heat or pressure sensors (Garzón & Acevedo, 2019).

CHALLENGES IN IMPLEMENTING IoT IN EDUCATION

Despite the numerous benefits of integrating IoT into education, several technological, ethical, and organizational challenges must be addressed to ensure its sustainable and pedagogically meaningful application. Understanding these challenges is critical, as they involve both functional aspects of system operation and broader concerns related to ethics, equity, and digital literacy. A primary concern is data privacy and protection. The collection and management of sensitive personal information via smart devices raise ethical and legal questions regarding privacy and data security. IoT environments involve multiple data collection points—sensors, devices, networks—which increase vulnerability to cyberattacks and data breaches (Alsaadi et al., 2020). The absence of a unified regulatory framework further complicates consent, transparency, and accountability, particularly in learning environments involving minors (Zhou et al., 2019).

The deployment of IoT infrastructure requires significant investment in high-speed connectivity, sensors, smart devices, and data platforms. Educational institutions—especially those in rural areas—may face economic and technical limitations that hinder adoption (Avgerou, 2021). Furthermore, the combined use of IoT, AR, and VR calls for not only robust technical infrastructure but also alignment with pedagogical goals. Excessive technological mediation risks cognitive overload and distraction if not embedded in carefully designed instructional frameworks (Merchant et al., 2014).

Long-term sustainability also raises issues of maintenance, interoperability, and cost-effectiveness. The complexity and variety of devices demand ongoing support and integration, making cost amortization a central concern for institutional planning.

The successful integration of IoT requires a well-trained educational workforce capable of embedding technological tools into teaching practices. However, a considerable proportion of teachers show low digital fluency, which slows down the adoption process and undermines the pedagogical value of these technologies (Scherer et al., 2019). Structured professional development programs are essential—not only focusing on technical tool usage but also on aligning technology with learning theories and instructional design.

POLICY AND IMPLEMENTATION PROPOSALS FOR IOT IN EDUCATION

The integration of the Internet of Things (IoT) into education requires a systemic alignment of policy strategy, technological infrastructure, and pedagogical application. The following proposals are structured across macro (national policy), meso (educational institutions and authorities), and micro levels (classroom and teacher), to ensure a sustainable and equitable adoption of IoT in educational environments.

At the macro level, governmental bodies should incorporate IoT into broader digital transformation strategies for education. This includes setting clear objectives, monitoring indicators, and establishing institutional frameworks that promote innovation while safeguarding equity and data protection (European Commission, 2023). National or regional policies on "smart schools" must be backed by adequate funding and support mechanisms.

At the meso level, educational institutions require technical assistance to adopt IoT devices such as sensors, interactive tools, and educational wearables. Furthermore, interoperability across platforms is essential to integrate data from various sources into unified learning management systems (Alenezi, 2022). School administrations must be equipped with evaluation tools to assess these technologies based on pedagogical effectiveness.

The micro-level integration of IoT hinges on the continuous professional development of educators in the following areas:

- Designing pedagogical scenarios that leverage IoT,
- Basic device management and technical troubleshooting,
- Critically interpreting data for differentiated instruction.

Training programs should include experiential workshops and collaborative learning models (UNESCO, 2021).

Implementation policy must also address issues of privacy, consent, and security. The use of IoT in classrooms cannot be viewed as neutral or technocratic, it demands explicit safeguarding of students' personal data and informed engagement of teachers and parents in data practices (Pangrazio & Selwyn, 2019). Appointing a "digital ethics officer" in schools could be a step toward institutionalizing ethical governance.

The development and adoption of IoT solutions should arise from participatory processes, involving teachers, students, parents, and special educators. The focus must extend beyond technological affordances to include pedagogical relevance and educational outcomes (Laurillard, 2012). Educational IoT applications must be continuously evaluated for accessibility, inclusiveness, and alignment with 21st-century skills.

PROSPECTS OF IoT IN EDUCATION

As IoT enables the real-time collection of student performance, behavior, and needs, Artificial Intelligence (AI) technologies can process these data to generate personalized learning profiles. Such profiles enhance the capacity of systems to detect learning difficulties, recommend adaptive teaching scenarios, and support autonomous learning pathways (Chen et al., 2020).

Developments in educational transparency and learning traceability are leading to the integration of IoT with blockchain technologies, which offer secure, verifiable records of learning achievements (Sharples & Domingue, 2016). Simultaneously, the use of IoT data within advanced learning analytics frameworks is poised to transform curriculum design and assessment practices by increasing precision and responsiveness (Ifenthaler & Yau, 2020).

Strengthening partnerships between educational institutions, universities, and technology companies is essential for the sustainable integration of IoT. These cross-sectoral collaborations could include:

- Pilot implementation of IoT projects in schools with technical support from industry,
- Ongoing teacher training based on evidence-informed standards from research institutions,
- Joint innovation initiatives such as smart labs or open data-sharing platforms for educational use,
- Knowledge and best practice transfer from the private and higher education sectors to primary and secondary education (Manca & Ranieri, 2016).

Such initiatives can enhance schools' digital autonomy and ensure that technological innovation is embedded in a holistic strategy for educational reform rather than applied in a fragmented manner.

Future developments demand not only technological progress but also ethical and legal frameworks that guarantee privacy, informed consent, and fairness in data use. Moreover, there is a growing need to revisit pedagogical theories, integrating concepts such as "learning through augmented perception systems" and "dialogical interaction with intelligent environments" (Luckin, 2018).

CONCLUSIONS

Εικόνα 2
Το IoT δεν είναι το μέλλον της εκπαίδευσης. Είναι το παρόν.
Πηγή εικόνας: https://englishpluspodcast.com



This study highlights the critical role of IoT as a catalyst for educational innovation. The use of smart devices and sensors enhances teaching efficiency, facilitates personalized learning, and enables accurate tracking of student progress. IoT is not the future of education — it is the present. Many educators already incorporate advanced technologies in their daily practices, both to facilitate their instructional tasks and to foster interactive learning experiences for students.

In conclusion, the Internet of Things (IoT) emerges as a pivotal component in the evolving landscape of digital education, offering the potential for more personalized, adaptive, and data-informed teaching and learning practices. However, its effective integration extends beyond technological affordances; it necessitates coherent policy strategies, institutional support, pedagogical recontextualization, and ethically grounded design. The role of the educator remains central—not merely as a facilitator of learning, but as a custodian of values, ethics, and the social dimensions of education. Thus, the use of IoT in educational contexts should not be perceived as a replacement for human agency, but rather as a means of enhancing pedagogical practice within a cohesive and human-centered digital ecosystem.

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TA13: The use of Artificial Intelligence in education

TEACHING THE AGE OF THE EARTH USING CHATGPT

Kouzas Dimitrios
Science Teacher (04.05 Geologist, 86 Computer Science)
MSc, PhD Candidate TEAPI - NKUA
3rd Gymnasium of Preveza, Greece
e-mail: dkoyzas@yahoo.gr

Athanasiou Kyriakos
Emeritus Professor
Biology teaching and Health Education
TEAPI – NKUA, Athens
e-mail: kathanas@ecd.uoa.g r

ABSTRACT

The rapid advancement of artificial intelligence (AI) and its integration into education create new opportunities for teaching natural sciences, offering dynamic tools that enhance the learning process. This study explores the use of ChatGPT as a support tool for teaching the age of the Earth in secondary education. Specifically, it presents a teaching scenario that combines active inquiry, collaborative learning, and critical thinking, enabling students to interact with ChatGPT for searching, processing, and evaluating scientific information.

The methodology is based on a blended learning model, which combines traditional teaching with technology. In this approach, students formulate questions, analyze responses, and compare ChatGPT's information with established scientific sources. Additionally, the study investigates the challenges associated with AI use in education, such as the need for digital literacy, information reliability, and the role of teachers as mediators in the learning process. The proposed teaching scenario consists of three parts: 1. Introductory teaching, where fundamental concepts about the age of the Earth and scientific dating methods are presented. 2. Interaction with ChatGPT, where students organized into groups, pose questions, search for answers, and evaluate the information received. 3. Evaluation and feedback to compare learning progress and explore students' experience of using the tool.

The quantitative analysis of the research is based on the following data collection tools: Pre-test and post-test, measuring students' cognitive development before and after using ChatGPT. Likert-scale questionnaires to capture students' experience and their perception of the reliability and usefulness of such tools. Statistical data analysis, extracting conclusions about the effectiveness of integrating ChatGPT into teaching practices.

It was concluded that the use of ChatGPT enhanced learning engagement, encouraged an enquiry approach and the development of students' critical thinking. Through statistical analysis of the data, it was concluded that it improved the cognitive level and the degree of understanding of the concepts. However, it highlights the need for appropriate pedagogical guidance and educational policy to ensure the proper use of such AI tools in the educational process.

Keywords: Artificial Intelligence, Education 4.0, ChatGPT, Age of the Earth

INTRODUCTION

In 2001 in Germany, the term Industry 4.0 was coined to describe the context of the changes and transformations that occurred in industry in the mid-1990s and characterizes what we now call the 4th industrial revolution (Hermann et al., 2016).About a decade later, the first references to the concept of Education 4.0 as a process of transformation of education due to this technological development began (González, 2010). However, the first systematic researches started only in 2017 considering Education 4.0 as the tool to address the requirements set by Industry 4.0 i.e. the need to prepare the workforce for the new technological challenges arising from the use of digital technology and the new production methods of the now 'smart' factories (Ciolacu, Svasta, et al., 2017; Eichinger et al., 2017).

Although there is still no universally accepted framework for what exactly the term Education 4.0 includes (Akturk et al., 2022; Chakraborty et al., 2023), it usually refers to autonomous and person-oriented learning and is based on personalised, learner-centred and adaptive learning approaches. That is, it aims to tailor the learning experience to the individual needs and abilities of each learner (Ahmad et al., 2023, p. 6; Ortiz De Zárate et al., 2024; Sapan Adhikari, 2024, p. 121). Also, the learning process is characterized by great flexibility in time and space (Castañeda, Martínez-Gómez-Aldaraví, et al., 2024; Castañeda, Mercadé, et al., 2024) and aims to develop skills based on the use of new technologies brought to the foreground by the needs of Industry 4.0 (Chituc, 2022; Ciolacu, Tehrani, et al., 2017). Education 4.0 is the answer to the challenges posed by the 4th Industrial Revolution (Aziz Hussin, 2018, p. 92; Miah Shamim, 2021). It aims at aligning skills and digital competences with technological achievements (Fisk, 2017; Miah Shamim, 2021) thus offering citizens opportunities to build a better and sustainable future through education (Ortiz De Zárate et al., 2024, p. 3920). It also prepares students for the transition to employment and enhances skills that are relevant to the labour market (Miah Shamim, 2021; Sapan Adhikari, 2024) such as digital literacy, collaboration, communication, critical thinking, creativity and problem-solving skills (Ahmad et al., 2023, p. 6; Sapan Adhikari, 2024; Souza & Debs, 2024, p. 7).

It also emphasizes lifelong learning and the need to adapt to a constantly evolving world (Garg et al., 2024, p. 200). At the same time, however, the role of the teacher is also evolving. The focus is now shifting to the role of mentor - a guide who will point the way for students to master all these skills and competences (Aziz Hussin, 2018; Castañeda, Mercadé, et al., 2024; Castañeda, Mercadé, et al. Miah Shamim, 2021; Souza & Debs, 2024, p. 12). In the context of Education 4.0 many of the available cutting-edge technologies are therefore being tested as learning tools such as Virtual Reality (VR) (Paszkiewicz et al, 2021), Internet of Things (IoT) (Verma et al., 2021), Augmented Reality (AR) (Verma et al., 2021) and of course Artificial Intelligence (AI) (Dhivya et al., 2023) which is the main tool of this research.

Although the idea of using AI in education is very old, today technology has made it so accessible that it is now part of many people's everyday lives. The main representative of these systems is ChatGPT, an advanced AI system developed in 2018 by OpenAI (San Francisco, CA, USA), based on the GPT (Generative Pre-trained Transformer) architecture. The first version of GPT was introduced in 2018, and the technology has evolved rapidly with subsequent versions, such as GPT-3 and GPT-4 (14 March 2023), significantly improving the ability to understand and generate natural language (Jürgen et al., 2023). ChatGPT, which is based on these models, offers dynamic interaction with users, allowing content creation, answering queries and providing personalized assistance. With extensive training on vast amounts of data, ChatGPT has become a powerful tool in various domains, such as education, customer service, healthcare, and scientific research (Su & Yang, 2023). At the same time, however, its development has been accompanied by ethical challenges, such as information reliability and ethical use of AI, and has received harsh criticism (Chomsky et al., 2023).

ChatGPT can be used in education as a virtual teacher, answering students' questions and providing personalized learning. At the same time, it contributes to the development of artificial intelligence (AI) literacy, i.e. the understanding, use and critical evaluation of AI technologies and their social impact. This includes knowledge of key AI concepts, algorithms and ethical issues. As an easy-to-use tool, ChatGPT empowers teachers and students, helping them to adapt to the ever-evolving world of AI with confidence and critical thinking (Ng et al., 2021; Su et al., 2023)

Moreover, modern technological developments have diversified the ways in which learning is delivered, making education more flexible and accessible. In the context of Education 4.0, three main modes of learning can be distinguished. (ii) Online distance learning, which uses digital platforms and technologies for synchronous and asynchronous activities. (iii) Hybrid learning, which combines physical and online learning through techniques such as blended learning and flipped classroom, enhancing the student experience (Miranda et al., 2021).

A variety of teaching methods and digital tools are already being tested in the STEM field with remarkable results. Blended learning offers maximum flexibility in the learning experience and connects the digital world with

traditional classroom teaching (Boltsi et al., 2024; Jones & Sharma, 2017) and it is within this model that the teaching intervention designed and described below is embedded.

THE TEACHING INTERVENTION

The teaching intervention was designed in the context of a blended learning pedagogical approach that combines traditional classroom learning (Education 2.0) with student-centered, self-regulated cyber pedagogy (Education 4.0) (Miranda et al., 2021) and was implemented from the end of February to the beginning of March in the 1st grade of the 3rd Gymnasium of Preveza, in total of 57 students. The intervention was related to the lesson of Geology - Geography B4.1 Talking about the age of the Earth and a total of 3 teaching hours were devoted to it.

- In the first lesson, after being taught the basic concepts of the course in the traditional way, the students answered a questionnaire with closed and open questions to assess their knowledge and understanding of the subject.

- In the second lesson, with the guidance of the teacher, students interacted with ChatGPT to solve questions or explain some concepts in a simpler way. Students were also given instructions on how to formulate more effective questions. They were then tasked to look for answers and additional information on the topic and compose them at home as homework.

- In the third lesson the students, after presenting their assignments, followed a discussion and then answered the same questionnaire again to measure possible differences. They also completed another questionnaire to evaluate their learning experience using ChatGPT. Both questionnaires can be retrieved from the link below: https://dkouzas.sites.sch.gr/?attachment_id=498

RESEARCH QUESTIONS

This research attempts to evaluate the learning outcomes of using ChatGPT in teaching practice, following a quasi-experimental methodological approach (Kerlinger, 1973). Although there is not full control over sample selection or intervention timing, such studies can yield reliable results (Abbott, 2011, pp. 150-154; Creemers et al., 2010, pp. 102-114). Precisely because of these limitations in randomization, quasi-experimental research is preferred in educational research, as it is conducted in real-life settings. Although this method introduces risks to validity, the selection of equivalent comparison groups can minimize these risks (Creswell, 2012, pp. 309-310; Muijs, 2004, pp. 26-32). Research is therefore based on the relationship between the independent variable (interaction with ChatGPT) and the dependent variable (students' cognitive progress) (Cohen et al., 2000, pp. 211-212). The use of pre- and post-tests, through questionnaires, allows for a reliable comparison as long as systematic data collection with even conditions is done when conducting the assessment (Hein, 1998, pp. 121-122).

The formulation of the null hypothesis is the next step, and we consider the null hypothesis to be the most conservative working hypothesis in the study of a particular question (Best & Kahn, 2006, pp. 11-12; Litwin, 1995, p. 6). In each of the following tests, therefore, the null and alternative hypothesis are formulated as follows (Schreiber & Asner-Self, 2011, pp. 244-245):

Null hypothesis H_0: There are NO significant statistical differences between the tested means of the pre- and post-intervention test scores.

Correspondingly, **alternative hypothesis H_1**: There are significant statistical differences between the examined means of the scores of the groups to be compared.

The results of statistical tests concerning the total sample population, the effect of gender and the effect of previous experience or not with AI tools are presented below.

RESULTS

DESCRIPTIVE STATISTICS

Students' responses were scored for both pre-tests and students achieved a mean score of M=4.54. After the intervention there was an increase in the mean M=5.88 as shown in Table 1.

Table 1
Descriptive Statistics of the scores before and after the intervention

	N	Mean	Std. Deviation	Std. Error	Median	Variance	IQR (Q3-Q1)
Pre_test_TOTAL	51	**4,54**	1,798	0,259	4,50	3,232	3,00-6,00
Post_test_TOTAL	52	**5,88**	2,498	.361	5,50	6,239	4,00-8,75
Valid N (listwise)	48						

So, at a first reading we see an improvement in the score. It remains to be investigated whether this increase is statistically significant.

Normality Check

In order to select the appropriate comparison test, a normality check of the data was performed to decide whether parametric tests requiring a normal distribution can be used. If not, the corresponding non-parametric tests can be used. The Shapiro-Wilk criterion was chosen for this test (when N<50 it is used instead of the Kolmogorov-Smirnov criterion) (Dafermos, 2011, pp. 268-273).

Table 2
Normality check with the Shapiro-Wilk criterion

	Statistic	df	Sig.
Pre_test_TOTAL	,962	48	,117
Post_test_TOTAL	,917	48	,002

We see that the assumption of normality while satisfied for the scores before the intervention (sig.=0.117>0.05) is not satisfied for the scores after (sig.=0.002<0.05). Therefore, the respective non-parametric tests were chosen for comparison.

COMPARISON OF PRE- AND POST-INTERVENTION SCORES

Since the data does not satisfy the assumption of normal distribution, non-parametric tests will be used for the comparison, namely Wilcoxon Signed Ranks test for the two dependent variables (pre- and post-intervention scores).

Table 3
Comparison with Wilcoxon Signed Ranks test

Ranks		N	Mean Rank	Sum of Ranks
Post_test_TOTAL - Pre_test_TOTAL	Negative Ranks	14[a]	15,14	212,00
	Positive Ranks	28[b]	24,68	691,00
	Ties	6[c]		
	Total	48		

a. Post_test_TOTAL < Pre_test_TOTAL b. Post_test_TOTAL > Pre_test_TOTAL c. Post_test_TOTAL = Pre_test_TOTAL

Test Statistics[a,c]			POST_TOTAL_SCORE -
Z			-3,023[b]
Asymp. Sig. (2-tailed)			,003
Monte Carlo Sig. (2-tailed)	Sig.		,002
	99% Confidence Interval	Lower Bound	,001
		Upper Bound	,004

a. Wilcoxon Signed Ranks Test, b. Based on negative ranks.
c. Based on 10000 sampled tables with starting seed 334431365.

The test showed that the difference in scores before (Mdn = 4.50, IQR: 3.00-6.00) and after (Mdn = 5.50 IQR = 4.00-8.75) the intervention is statistically significant (Z = -3.023, p = .003), with a moderate to large effect size (r = .47),

a result confirmed by the Monte Carlo simulation. Thus, the null hypothesis is rejected and there are statistically significant differences in test scores before and after the intervention.

TESTING ADDITIONAL FACTORS

Gender control

Regarding gender, in Table 4 we see the descriptive statistics and observe that both boys and girls showed an increase in scores, and we will then determine whether these increases are statistically significant. The null hypothesis is respectively H0: There are NO significant statistical differences between the tested means of the pre- and post-intervention test scores between boys and girls.

Table 4
Descriptive statistics for the gender factor

1=Male 2=Female		N	Mean	Std. Deviation	Std. Error	Median	Variance	IQR
Male	Pre_test_TOTAL	31	4,35	1,992	.358	4.00	3,970	3-6
	Post_test_TOTAL	31	5,71	2,411	.433	6.00	6,317	4-7
	Valid N (listwise)	31						
Female	Pre_test_TOTAL	17	4,88	1,364	.331	5.00	1,860	4-6
	Post_test_TOTAL	17	6,18	2,698	.654	5.00	7,596	4-10
	Valid N (listwise)	17						

Table 5
Comparison of scores with the Wilcoxon Signed Ranks test for each gender

Ranks					
1=Male 2=Female			N	Mean Rank	Sum of Ranks
Male	Post_test_TOTAL - Pre_test_TOTAL	Negative Ranks	8[a]	7,19	57,50
		Positive Ranks	17[b]	15,74	267,50
		Ties	6[c]		
		Total	31		
Female	Post_test_TOTAL - Pre_test_TOTAL	Negative Ranks	6[a]	8,50	51,00
		Positive Ranks	11[b]	9,27	102,00
		Ties	0[c]		
		Total	17		
a. Post_test_TOTAL < Pre_test_TOTAL b. Post_test_TOTAL > Pre_test_TOTAL c. Post_test_TOTAL = Pre_test_TOTAL					

Test Statistics[a,c]				
1=Male 2=Female				Post_test_TOTAL - Pre_test_TOTAL
Male	Z			-2,848[b]
	Asymp. Sig. (2-tailed)			,004
	Monte Carlo Sig. (2-tailed)	Sig		,003
		99% Confidence Interval	Lower Bound	,001
			Upper Bound	,004
Female	Z			-1,220[b]
	Asymp. Sig. (2-tailed)			,223
	Monte Carlo Sig. (2-tailed)	Sig		,231
		99% Confidence Interval	Lower Bound	,220
			Upper Bound	,242
a. Wilcoxon Signed Ranks Test b. Based on negative ranks. c. Based on 10000 sampled tables with starting seed 2000000.				

To determine whether there are differences in terms of gender, the Wilcoxon Signed Ranks test was performed for the two dependent variables (pre and post scores) separately for each gender (independent variables) (table 5). The

results show that only in boys the difference before (Mdn = 4.00, IQR:3.00-6.00) and after (Mdn = 6.00, IQR:4.00-7.00) is statistically significant Z = -2.848, p = 0.004<.05, with a large effect r =.57 while in girls the difference (although larger on average) before (Mdn = 4.00, IQR: 4.00-6.00) and after (Mdn = 4.00, IQR:4.00-10.00) is not considered statistically significant Z =-1.220, p = .223>.05, with a low effect r = . 29.

Relevant experience

Regarding relevant experience with ChatGPT or equivalent engines, in Table 6 we see the descriptive statistics and observe that those who reported having relevant experience (N = 38) showed an increase in mean score before (M = 4.71, SD = 1.742) and after (M = 6.18, SD = 2.639) the intervention. Those who reported no experience (N=14) also showed an increase in scores before (M = 4.08, SD = 1.935) and after (M = 5.36, SD = 2.134) the intervention.

Table 6
Descriptive statistics for the previous experience factor
Have you used AI tools (e.g. ChatGPT, Google Assistant, Siri) before this course?

		N	Mean	Std. Deviation	Variance	Median	IQR
Yes	**Pre_test_TOTAL**	35	**4,71**	1,742	3,034	5.00	3-6
	Post_test_TOTAL	38	**6,18**	2,639	6,965	5,50	4-9
	Valid N (listwise)	35					
No	**Pre_test_TOTAL**	13	**4,08**	1,935	3,744	4.00	2-6
	Post_test_TOTAL	14	**5,36**	2,134	4,555	5.50	3.75-6
	Valid N (listwise)	13					

It will then be tested whether these increases are statistically significant. The null hypothesis is respectively H_0: There are NO significant statistical differences between the tested means of the pre- and post-intervention test scores for students with relevant experience.

Similarly, there are NO significant statistical differences between the tested means of the pre- and post-intervention test scores for students who had no relevant experience with AI tools. To ascertain differences, the Wilcoxon Signed Ranks test was performed for the two dependent variables (pre- and post-test scores) separately for each category of independent variable (relevant experience).

The results show that only the increase in the score before (Mdn=5.00, IQR: 3.00-6.00) and after (Mdn=5.50, IQR=4.00-9.00) of those who reported previous experience is statistically significant Z = -2.726, p=.006<.05, with a moderate to large effect r=.48 while for those who reported having no relevant experience the difference before (Mdn=4.00, IQR:2.00-6.00) and after (Mdn=5.50, IQR: 3.75-6.00) is not statistically significant Z =-1.287, p = .198>.05, with a moderate effect r = .40

Assessment of Learning Experience

To assess the learning experience of the intervention, students completed a second questionnaire where they were asked to answer questions using a 5-point Likert scale. From the distribution of responses, it was found that students positively evaluated the learning experience as very few (6%) did not find the tool useful for their study and only a small percentage (10%) believed that it did not help them in understanding the concepts. Also, over half of the students said that the tool encouraged them to look for more information beyond what ChatGPT provided. Finally, 2 out of 3 students found learning with ChatGPT more interesting than conventional teaching.

Regarding critical thinking and reliability of information, it was observed that the degree to which students trust ChatGPT's answers is very high as only 10% do not consider them scientifically correct. This is somewhat confirmed by the fact that only 1 in 4 students said that they cross-checked ChatGPT answers with other jumps. Also 3 out of 4 students consider teacher guidance necessary. Finally, there is a universal desire of students to use ChatGPT again in future courses.

Table 7
Comparison of scores using the Wilcoxon Signed Ranks test for each gender

Ranks

Have you used AI tools (e.g. ChatGPT, Google Assistant, Siri) before this			N	Mean Rank	Sum of Ranks
Yes	Post_test_TOTAL - Pre_test_TOTAL	Negative Ranks	10[a]	11,95	119,50
		Positive Ranks	22[b]	18,57	408,50
		Ties	3[c]		
		Total	35		
No	Post_test_TOTAL - Pre_test_TOTAL	Negative Ranks	4[a]	3,75	15,00
		Positive Ranks	6[b]	6,67	40,00
		Ties	3[c]		
		Total	13		

a. Post_test_TOTAL < Pre_test_TOTAL b. Post_test_TOTAL > Pre_test_TOTAL c. Post_test_TOTAL = Pre_test_TOTAL

Test Statistics[a,c]

Have you used AI tools (e.g. ChatGPT, Google Assistant, Siri) before this				Post_test_TOTAL -
Yes	Z			-2,726[b]
	Asymp. Sig. (2-tailed)			,006
	Monte Carlo Sig. (2-tailed)	Sig.		,006
		99% Confidence Interval	Lower Bound	,004
			Upper Bound	,008
No	Z			-1,287[b]
	Asymp. Sig. (2-tailed)			,198
	Monte Carlo Sig. (2-tailed)	Sig.		,222
		99% Confidence Interval	Lower Bound	,212
			Upper Bound	,233

a. Wilcoxon Signed Ranks Test b. Based on negative ranks

c. Based on 10000 sampled tables with starting seed 926214481.

DISCUSSION - CONCLUSIONS

This study examined the integration of ChatGPT into a blended learning intervention for teaching the age of the Earth in lower secondary education, combining direct instruction, guided group work, and structured student–ChatGPT interaction. The findings suggest that students perceived the approach positively, reporting that the tool supported understanding and made learning more engaging, while also indicating a strong preference for similar AI-supported activities in other subjects. At the same time, students' responses indicated that teacher mediation remains central, both to sustain productive inquiry and to mitigate risks associated with uncritical acceptance of AI-generated information (Ng et al., 2024).

Learning gains and alignment with prior research

A key outcome was the statistically significant improvement in cognitive test performance from pre-test to post-test, with a moderate-to-large effect size (Wilcoxon Signed Ranks, r≈.47). This pattern is consistent with recent K–12 evidence suggesting that, when pedagogically structured, generative AI can support conceptual learning in STEM domains. (Baroud et al., 2025). For example, a quasi-experimental study in high school biology reported higher achievement for students learning with ChatGPT compared with a control condition, supporting the view that AI-mediated dialogue can scaffold understanding when embedded in deliberate instructional design. (Baroud et al., 2025).

The results also resonate with research showing that ChatGPT-based systems can support students' self-regulated learning processes in science education, particularly when the chatbot is used as a structured learning companion rather than a mere answer generator. (Ng et al., 2024). In practice, this points to the importance of specifying roles for ChatGPT within the learning cycle (e.g., hypothesis generation, explanation refinement, question prompting), coupled with explicit criteria for evaluating response quality. (Ng et al., 2024).

At a broader level, meta-analytic evidence indicates that ChatGPT use is associated with improved academic performance and related learning outcomes, with substantial variability depending on context and intervention characteristics. (Deng, 2024; Wang & Fan, 2025). Notably, a systematic review and meta-analysis of experimental studies reported positive average effects for K–12 settings ($g+\approx0.55$) and smaller but still positive effects for science subject areas ($g+\approx0.35$), suggesting that subject matter and educational level may moderate expected gains. (Deng, 2024). Complementarily, a meta-analysis reported overall positive effects of ChatGPT on learning performance and higher-order thinking, reinforcing that effectiveness is not guaranteed by access to the tool itself, but by the pedagogical framing and learning tasks through which it is used. (Wang & Fan, 2025).

Gender and prior AI experience: cautious interpretation

The subgroup analyses indicated that both boys and girls improved on average; however, statistical significance emerged only for boys, while the girls' improvement—though present—did not reach significance. This pattern warrants cautious interpretation given the small and unequal subgroup sizes and the distribution of individual gains, which can influence non-parametric comparisons and limit generalizability. Accordingly, these results should be treated as exploratory signals that motivate further investigation rather than stable evidence of gender-based differences in the effectiveness of AI-supported instruction.

A similar logic applies to the role of prior experience with AI tools: learning gains were observed overall, but statistically significant improvement was found only among students who reported prior exposure to AI tools, while those without such experience did not show a significant change. One plausible interpretation is that prior experience reflects higher "readiness to use" generative AI, including skills in question formulation, iterative prompting, and critical evaluation of outputs. (Ng et al., 2024). This highlights the practical value of embedding short, explicit "AI literacy and prompting" micro-lessons within classroom interventions, especially to reduce inequities arising from differential out-of-school exposure. (Ng et al., 2024).

Trust, reliability, and the necessity of verification

A critical concern emerging from the findings is students' high level of trust in ChatGPT outputs coupled with limited cross-checking against external sources. This is particularly consequential in science education, where plausible-sounding explanations may still be inaccurate or inconsistent, potentially reinforcing misconceptions. (Deng, 2024). The classroom evidence that ChatGPT produced divergent answers to the same historical-scientific question (e.g., who first calculated the Earth's age) illustrates how epistemic uncertainty and "confident errors" can surface in student work when verification practices are weak.

Therefore, the pedagogical role of the teacher as mediator and epistemic guide remains non-negotiable in AI-supported science learning. (Kouzas & Athanasiou, 2025/2026; Ng et al., 2024). Effective integration requires that students be systematically taught to (a) triangulate AI outputs with authoritative sources, (b) demand evidence and references, (c) compare alternative explanations, and (d) treat the chatbot as a tool for inquiry support rather than an unquestioned authority. (Ng et al., 2024). In this sense, the value of ChatGPT lies less in replacing instruction and more in enabling structured, dialogic scaffolding—provided that AI literacy and source evaluation are explicitly taught and assessed. (Ng et al., 2024; Wang & Fan, 2025).

Limitations and directions for future work

Several limitations constrain interpretation of the findings, including the short duration of the intervention, the modest sample size, and unequal subgroup sizes (gender and prior AI experience), which restrict strong causal claims and generalization. Future research would benefit from larger quasi-experimental or controlled designs, delayed post-tests to examine retention, and richer measures of conceptual change and transfer, particularly in geoscience topics that remain underrepresented in the current ChatGPT-in-school literature. (Baroud et al., 2025; Deng, 2024). Additionally, incorporating explicit AI literacy scaffolds and measuring verification behaviors (e.g., source triangulation rates) could clarify whether improved learning gains can co-occur with stronger epistemic vigilance. (Ng et al., 2024).

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ARTIFICIAL INTELLIGENCE AND HYBRID TEACHING TOWARDS REVOLUTIONIZING TERTIARY EDUCATION

Peter J. Stavroulakis
Department of Maritime Studies, University of Piraeus
Piraeus, Greece
e-mail: pjstav@gmail.com

Periklis Prousaloglou
Senec.AI
Athens, Greece
e-mail: pprousaloglou@gmail.com

Maria-Christina Kyriakopoulou-Roussou
Freelance Researcher
Athens, Greece
e-mail: maritina.roussou@yahoo.gr

ABSTRACT

The COVID-19 pandemic provided (amongst its tragedy) a springboard of electronic existence for many aspects and functions of society. All possible constituents of operations, amidst lockdowns and social distancing, shifted their operations online. As such, education had to follow as well, with a high range of applicability and effectiveness, ranging from many best practices surfacing, but also many discrepancies, such as new ways to cheat, and laptops being logged into, yet unattended. The post-pandemic reality has left the world trying to mitigate and heal from many outcomes of the coronavirus, but at the same time, and especially with reference to the education sector, relinquishing a plethora of instruments that can be utilized in teaching, thus unravelling a novel range of possibilities, and opportunities, for education.

Many universities in the world where participation in class is not mandatory, are registering record-low numbers of attendance, to the point of creating two distinct segments of students and designating them as active and inactive. Simultaneously, the experience gathered from electronic means of learning can provide a readily available solution towards inclusiveness and boosting of participation, as well as continuity in teaching. Thereby the education sector has the potential to utilize tools for streaming lectures, recording them, and sharing them on privately and/or publicly accessible video/streaming platforms, yet the question surfaces as to how the issues arising may be mitigated, such as how personal data can be safeguarded, and at the same time attendance in class maximized, as distance and hybrid teaching technologies can be perceived as drawing students away from the classroom, thereby burdening the already problematic situation of low attendance.

In the plight for the utilization of technology in education, a plethora of instruments may be used, but at the same time the educational value that is carved in class must be upheld. This situation emerges as a dilemma since on the one hand technology may facilitate the streamlined delivery of the curriculum, enabling the attainment of the respective learning outcomes, yet it may be seen as a segue towards degradation of the class culture and interaction, thus maybe leading to an eventual drop in attendance. Herein lies the research gap and contribution of the present work. After the pandemic a reasonable question surfaces, as to the instruments that can be still usable to promote distance learning, hybrid classes, and the branding of education, that many educational institutions have been taking advantage of many years, even before the pandemic. Here, notable examples refer to, e.g., MIT OpenCourseWare (with 5.63 million subscribers and 7.5 thousand videos, where entire courses have been bundled in video lists and can be accessed free of charge), Harvard, Brown University, and many others, that are using technology as a means of promoting knowledge and their brand, while crucially, boosting attendance in class as well.

Insight as to the technologies that may revolutionize teaching hopefully will allow for higher engagement, but at the same time care must be given so that technology is not abused. With the help of artificial intelligence, this paper provides a framework of the most effective strategies that can boost attendance in the classroom in tandem with the use of distance learning, hybrid teaching, presenting, and collaborating, to create a toolkit for the utilization of technology in education that will abide by specific legislation governing synchronous and asynchronous learning, safeguard personal data, and at the same time boost in-class attendance. This research is important as it provides much needed focus and analysis for a topic requiring enrichment within its body of knowledge. The research focuses on tertiary education, but its results can be replicated in all arrays of teaching.

Keywords: tertiary education, hybrid teaching, education participation, e-learning, class attendance, inclusion in education.

INTRODUCTION

In the contemporary and ever-changing era, where humanity experiences dynamic growth and fast-paced circumstances, education is a notable tool for fostering prosperity and success. Higher education paves the way for creativity and innovation in an array of day-to-day and business-driven activities, enriching mankind with knowledge and skills for coping with challenges throughout their lives (Asim et al., 2021). In recent years, the field of education, among others, has been driven by the advancements of digitalization, where innovative technologies are integrated into traditional teaching methods to improve learning and introduce new ways of knowledge sharing (Edwards-Fapohunda & Adediji, 2024). The rise of Industry 4.0 has introduced new tools and technologies, establishing a newly developed human-machine interface that can be applied in a multidimensional setting (Javaid et al., 2022). This novelty became especially important during the recent COVID-19 pandemic when the subsequent lockdowns forced organizations and educational institutions to conduct operations via the internet. As such, the concept of online education arose, which describes a form of distance learning, altering conventional learning techniques during that period by adopting new delivery styles (Al-Mawee et al., 2021). The swift transition to online education has been a new challenge for students and academia to address diverse student needs while upholding high educational standards. While familiarization with digital transformation might be adverse at first, online teaching methods provide ample opportunities to academic institutions that, if properly managed, can offer a comprehensive and structured teaching tool.

The aftermath of the pandemic transformed the educational world by offering institutions a myriad of online instruments for lecture delivery (Akour & Alenezi, 2022). The current issue lies in the practicality of hybrid learning styles in fostering student engagement in class participation while avoiding the misuse of technological advancements in learning. Driven by the current challenge, this paper aims to address this gap in the effective utilization of hybrid teaching methods in fostering student engagement, especially focusing on the role of Artificial Intelligence (AI). The paper presents a systematic approach to hybrid teaching by proposing a framework of how advanced technologies can revolutionize conventional teaching styles based on compliance with regulations and inclusivity matters. This study can prove beneficial for tertiary education practitioners to comprehend the opportunities of hybrid education and how technology can increase student commitment and improve class delivery. The paper is organized as follows. After the present introductory sector, a brief literature review is presented that is succeeded by the methodology section that documents the utilization of AI tools in the formation of the results. After the methodology section the results are analysed, and the paper closes with a discussion of its relevance and impact.

LITERATURE REVIEW

There is abundant literature on the use of technology in educational settings and especially with reference to tertiary education. It seems that technology is indeed considered as an ally to education to achieve a competitive advantage, for many years now (de Pablos & Tennyson, 2013). In recent years many technologies have surfaced and are making their way into education since they may have been proven successful in other industries; one of these examples refers to blockchain (Rashid et al., 2020). At the same time, metaverse is making its appearance known (Joshi and Pramod, 2023), and the internet is utilized along with Android™ applications (Seralidou et al., 2019) and other mobile technologies (Andrews et al., 2010) for higher education. The web is indeed an avenue with much potential for education as it can provide opportunities to many people that may face a geographical disadvantage, through the option of massive open online courses (MOOCs, cf. Nguyen et al., 2014; Nguyen et al., 2016a; Nguyen et al., 2016b). E-learning and IT applications have made their way into the terrain of education and are there to provide a tool and a segue towards the resilience of education (Yun, 2007). Other examples include augmented reality (Majid and Salam, 2021), AI-augmented frameworks (Filippidi et al., 2023), and lecture capture through videos and multimedia technologies (Hakala et al., 2021; Lindsay & Evans, 2022).

The topic of attendance can be regarded as crucial especially with the emergence of new techniques in education. As such, blended learning has been regarded as a viable alternative (Wong & Kwok, 2022), along with on-line projects (Soares et al., 2019) and flipped classrooms (Volchenkova, 2019). Interactive teaching will always have its benefits in education (Pawar et al., 2021), yet the effect of technology especially concerning not only distance learning (Matzakos & Kalogiannakis, 2018), but also the use of a learning management system (Barua, 2019) remains a concern. Thereby, in this context, it would be interesting to investigate the potential of artificial intelligence to develop means and methods introducing novel tools and techniques that can be utilized within and outside of the classroom to facilitate the educational process. In this context, the present paper fills this specific research gap, providing a functional framework for the utilization of technology in higher education.

METHODOLOGY

The paper utilized a combination of research methods to formulate the proposed framework. As such, this research harnessed the capabilities of Artificial Intelligence, employing the GPT-4.5 language model created by OpenAI (ChatGPT) to assist the process. The deployment of ChatGPT merely assisted in formulating the framework by analysing and synthesizing information comprehensively (Grassini, 2023). Results were extracted via secondary research, i.e., a systematic literature review by academic journals and educational-oriented papers. Scientific databases such as ScienceDirect, Elsevier, ResearchGate, and Springer supplied peer-reviewed research to underpin the framework's foundation in evidence-based methodologies. Findings derived from research on higher education and distance learning practices in the post-COVID-19 era. It is essential to emphasize that although ChatGPT supported the synthesis of framework components, the critical assessment, selection, and interpretation of academic references and practical recommendations were still subject to human creation and oversight.

The research findings focus on digital platforms and technologies that have already been utilized by universities worldwide during the COVID-19 pandemic or, in some cases, for fostering commitment and engagement within classes. Thereafter, there is no concise feedback about the integration and effectiveness of those technologies as a primary curriculum delivery in combination with traditional teaching styles. Besides, some of these tools may soon become obsolete, or their application may need revision due to the rapid technological advancements that introduce newly developed technologies for hybrid teaching styles in tertiary education. The presence of primary data would benefit the study, as feedback from different universities across different nations could provide valuable information about the actual application of those technologies and their effect on student engagement.

RESULTS

The present framework proposes several distance learning opportunities and their contribution to student engagement in class participation. Results highlight the potential of a hybrid educational style, interactive digital platforms, AI-driven mentorship, and the concept of gamification in boosting student commitment to education while integrating digitalized tools in traditional teaching methods in higher education.

A. Hybrid Education. Hybrid education, sometimes referred to as hybrid or blended learning, integrates in-person classroom teaching with online learning elements in a cohesive manner. It developed as a method to enable both on-site and remote students to engage in the same courses concurrently, harmonizing in-person and virtual activities for a cohesive experience. By integrating synchronous (real-time) and asynchronous (self-paced) methodologies, institutions can deliver comprehensive educational experiences that serve the diverse student needs while at the same time enhancing their overall productivity (De Bruijn-Smolders & Prinsen, 2024). Hybrid learning experienced accelerated acceptance during and after the COVID-19 pandemic, as institutions across the world were necessitated to integrate online and offline instruction. Synchronous lectures on platforms such as Zoom and Microsoft Teams facilitate instantaneous interactions between educators and learners via features like live polling, breakout sessions, and real-time discussions. In a synchronous Zoom session, an instructor may present lecture materials, periodically pausing to utilize breakout rooms for small group discussions, allowing students to collaboratively analyse complex topics before reconvening for summary presentations[1]. Asynchronous resources offered via Learning Management Systems (LMS) such as Blackboard or Moodle allow students to access recorded lectures, readings, and assignment instructions at their own convenience. An exemplary case entails an instructor disseminating a weekly recorded lecture accompanied by supplementary readings, followed by structured online discussion forums that foster reflective engagement and peer interaction. Hybrid sessions effectively combine in-person and digital participation, suitable for contexts delineated by Greek legislation, including inter-institutional collaborations. A course across various campuses may hold in-person classes at the primary institution while simultaneously live-streaming sessions to remote students, guaranteeing equitable educational access.

B. Interactive Digital Platforms. Interactive digital platforms in education denote online settings, including learning management systems, virtual classrooms, and educational applications, that provide access to material, communication, and collaboration for students and instructors outside the traditional classroom setting. Advancements in technology and the pervasive availability of the internet have led to the emergence of several digital learning tools, offering extensive resources and interactive functionalities for the educational setting (Zhao, 2024). Research by Martín-Sómer, Casado, and Gómez-Pozuelo (2024) indicates that interactive digital platforms significantly improve student engagement through the promotion of dynamic and collaborative learning experiences. Certain interactive digital tools are particularly effective in promoting active student participation, facilitating real-time engagement, and fostering dynamic collaboration. The following digital platforms have been already exploited, showcasing their effectiveness in

[1] https://media.zoom.com/download/assets/Zoom-for-Higher-Education_Data-Sheet+%282%29+%281%29.pdf/6a5a26a6e44511ed9abba275a1b6838c

practical academic contexts. Padlet functions as a collaborative platform, allowing students to articulate their ideas, inquiries, or resources pertinent to current lectures or projects. This can be exemplified in an academic context through a history class. Students may collaborate to develop timelines or compile resource links on Padlet, fostering collective understanding and engagement[2]. Mentimeter facilitates immediate audience engagement through dynamic presentations, polls, and quizzes. This example illustrates the application of Mentimeter in a practical context, specifically for a biology teacher who can utilize the tool to assess students' comprehension of intricate biological processes through real-time quizzes. Facilitating prompt modifications in teaching methodologies informed by immediate feedback rather than solely relying on intuition[3]. Another interesting digital tool is Kahoot! This gamified tool enhances educational engagement by enabling educators to design interactive quizzes and games that effectively engage students. For instance, Kahoot! Quizzes may be employed in a finance class to enhance the learning experience of financial ratios, thereby increasing student motivation and engagement (Martín-Sómer, Casado & Gómez-Pozuelo, 2024). Additionally, it is essential to note that students can effectively collaborate on projects and engage in discussions using tools such as Slack, Notion, and Google Workspace, which offer various features that enhance online cooperation. Students in a business class may utilize Slack for rapid discussions regarding projects, Notion for collaborative assignment work and due date management, and Google Workspace for simultaneous sharing and editing of documents, thereby minimizing unnecessary feedback exchanges[4].

C. AI-Driven Mentorship. Another critical component of this study is AI driven mentorship, which refers not to fully automated tutoring but to the use of artificial intelligence as a facilitator that connects students with mentors based on real-time academic needs. The core innovation of this component lies in the creation of an application, conceptually similar to existing platforms such as the MentorCruise[5], which will utilize the power of AI to instantly connect students with mentors based on their specific academic concerns or challenges (Alam, 2021). Therefore, creating a space for concentrated and effective learning opportunities. The process will be straightforward for the students, as they just must enter a question or a difficulty, they may have into a single AI system and the machine learning algorithm will quickly link them with available suitable mentors, including professors, experienced students, or recent graduates. According to a present study by Kovari (2025), individualized learning routes, targeted feedback systems, and predictive analytics help to greatly increase academic performance. For example, a student who finds specific statistical methods difficult to grasp, may be quickly paired with a statistics graduate or mentor to quickly solve any of the questions he or she may have. After that encounter takes place, a digital mentoring repository will track past mentoring interactions and provide students with continuous access to issues that have been resolved as well as instructional resources, therefore supporting independent and lifetime learning. The inclination toward tailored and multimodal data-driven strategies has been observed to raise both general effectiveness of the mentoring experience as well as student participation (Bearman et al., 2022).

D. Gamification. Gamification in education is the process of incorporating aspects of game design, such as leaderboards, levels, challenges, badges, and points, into educational activities to increase student motivation and engagement (Wang et al., 2022; Cale et al., 2024). The fundamental concept is the use of the enjoyable and immersive elements of games to enhance educational experiences, making them more engaging and rewarding for students (Swacha, 2022). Incorporating elements of gamification into educational settings greatly enhances student motivation, attendance, and active participation (Antonopoulou et al., 2022). Institutions can adopt digital badges, certificates, and leaderboards to visually recognize and reward students for their regular attendance and active participation. As noted by Ratinho & Martins (2023), popular gamification elements such as points, leaderboards, competition, and digital badges have been shown to effectively boost the overall student motivation and engagement. For example, students who maintain perfect attendance throughout a semester might earn digital badges that are prominently showcased on their academic profiles, boosting their intrinsic motivation and improving their sense of competence (Ratinho & Martins, 2023). Learning strategies that focus on rewards offer organized incentives, like certificates or privileges, associated with educational achievements. Ratinho & Martins (2023) state that reward-based approaches positively affect students' sense of autonomy and relatedness, essential components of intrinsic motivation according to self-determination theory. For example, students consistently participating in interactive sessions might gain priority registration for elective courses, fostering a stronger connection to their educational environment and improving their motivational levels. Moreover, the existence of competitive elements in fun academic events and scoring systems motivates students to engage actively in their educational process. A realistic situation might be a monthly Kahoot! quiz challenge that promotes friendly competition and improves knowledge on specific topics. While gamification techniques may rapidly increase enthusiasm and involvement of the students, Ratinho & Martins (2023) cautions teachers about possibly declining returns over time due to the uniqueness factor. To keep students invested over an extended period, they stress the importance of constant innovation and diversity in the gamification aspects.

[2] https://padlet.com/site/education
[3] https://www.mentimeter.com/education/lectures
[4] https://www.conexed.com/post/why-use-a-student-engagement-platform
[5] https://mentorcruise.com/

E. Personal Data and Security Compliance. The framework's validity encompasses strict adherence to legal laws and legislations, including the General Data Protection Regulation (GDPR). Europe's strongest privacy and security law worldwide, adopted in 2016 and entered into force in 2018, describes the rights of individuals and the obligations of data processing when exploiting digital applications[6]. The rise of technological advancements is associated with various hidden risks affecting human rights and personal data. GDPR has become an integral part of the collection, processing, and storage of sensitive personal information that protects both parties' rights and obligations. As part of the hybrid teaching revolutionary approach, this framework obeys GDPR and obliges academic institutions to act ethically upon this transition. Utilizing hybrid teaching methods and digital platforms requires institutions to maintain transparency toward data management practices, such as collection, processing, and sharing of digital content. The terms and conditions of online class recordings and the uploading of digital content should be clearly communicated by the faculty to students, ensuring continuous compliance with data protection. A notable practice that institutions shall follow is the correct information about privacy rights and regulations while using digital tools through the distribution and signing of GDPR forms. That is an already existing practice that is being done for students to consent to the use of digital applications during classes, online class sharing, and class material uploading in educational digital platforms. The use of GDPR-compliant educational platforms will ensure secure user authentication processes and comprise a crucial step in maintaining trust and legal adherence within educational institutions. Adopting a safety culture of digitalization allows both faculty and students to feel confident with the integration of hybrid education methods in conventional teaching, harnessing their capabilities and taking advantage of them while adding value to the traditional teaching style. In Greece, the implementation of synchronous distance education and asynchronous distance learning platforms are governed by Articles 67 and 68, respectively, by the Greek Law 4967/2022. This law provides a list acknowledging all the conditions under which online education may be applied in the Greek educational setting, especially in tertiary education. To maintain institutional integrity, institutions shall conduct periodic reviews and audits of data-handling processes to ensure ongoing compliance with national regulations.

F. Accessibility and Inclusivity. A crucial dimension of this framework is to foster accessibility and inclusivity of tertiary education by providing equitable learning opportunities to everyone through hybrid teaching. As higher education enriches humanity with necessary knowledge and capabilities, nations should guarantee that nobody is deprived of the right to pursue a major in an educational institution. By adopting a hybrid teaching approach universities and academic institutions allow for a more comprehensive and holistic approach to learning, providing the opportunity for several groups of people to study. Accessibility is of utmost importance in the case of students with disabilities or special educational needs, students of all ages, teen parents, young workers, students with economic difficulties, and so on. Inclusivity is equally crucial in the educational world, with digitalization offering the appropriate tools to bridge the gap of a comprehensive teaching approach. For instance, online class presentations shall be enriched with automatic or manual captioning services for easier and more effective material sharing with all students. Similarly, course material may be shared in multiple formats, covering audio recordings, PDFs, and accessible documents catered to meet a wide range of learning styles and preferences. Other interesting tools are speech-to-text software and screen readers that can be integrated into institutional platforms, making class material more comprehensible, thus covering every educational need. Institutions should make sure that accessibility and inclusivity are integral parts of the educational setting and meet the demands of all groups of people.

Implementation and Scalability. Effective implementation of this framework necessitates an initial pilot phase emphasizing theoretical or non-practical courses. Pilot courses shall be selected strategically, considering manageable class sizes and instructor preparedness, to facilitate targeted assessment and reduce disruptions. Surveys and focus groups involving students, faculty, and administrative staff will provide structured feedback to identify strengths and areas requiring adjustment. After conducting pilot evaluations and making necessary adjustments, institutions ought to incrementally implement the program across comparable courses and extend it to other departments. Ongoing professional development and training for faculty will enhance consistency and confidence in the integration of the framework in higher education. Nevertheless, as student numbers grow, maintaining personalization and engagement becomes challenging. Effective strategies such as creating smaller discussion cohorts, integrating AI-based personalized feedback, and peer mentorship programs, where senior students or alumni support newer learners, have proven effective in preserving student connection and motivation on a scale.

DISCUSSION

[6] https://www.consilium.europa.eu/en/policies/data-protection-regulation/#:~:text=The%20EU%20general%20data%20protection,may%20be%20processed%20and%20transferred.

Tertiary education is a dynamic field that requires students to engage in deep learning and class interaction to progress and grow. The fierce impact of the COVID-19 pandemic, which led to a global lockdown for over six consecutive months, obliged educational institutions to restructure their teaching methods so that education can become remotely accessible (Sato et al., 2023). Online education and distance learning proved to be an innovative option at the time, transferring the entire in-class experience into e-classes via digital platforms (Maqsood et al., 2021). Online streaming via MS Teams, Zoom, or other similar platforms, has been a fascinating tool, allowing class participation, engagement, and interaction. Lectures were live-streamed, and presentations were shared and recorded so that students could keep the information for future reference (Masalimova et al., 2022). Exams were taking place online, using proctoring systems to avoid cheating, meetings were conducted online, and so on. The adaptation to the new delivery style offered the chance for students and faculty to further expand their horizons by familiarizing themselves with advanced e-learning methods (Anzaldo, 2021). The aftermath of the pandemic offered a new opportunity in the educational sector to integrate a hybrid teaching approach to the learning experience.

Hybrid education offers myriad opportunities to the educational world, offering a holistic and systematic approach to knowledge. While hybrid education is associated with several concerns of reducing class attendance, student engagement, or downgrading the quality of education, in fact, digital instruments can open new ways toward effective learning by keeping students motivated and always connected to the institutional world. As such, it shall be exploited, following the existing institutional aims without jeopardizing and/or replacing traditional in-class lecture delivery. The purpose of hybrid teaching is to offer an improved in-class experience by adopting digital platforms to further revolutionize the conventional style of teaching in higher education. In universities, where class attendance is not rigid and, thus, are registering low attendance records, technology can provide the solution by means of electronic participation and engagement. The latter can be also achieved by integrating gamification tools within classes, as playfulness enhances students' motivation to learn and the acquisition of new skills by actively participating in quizzes and competitive-driven games (Antonopoulou et al., 2022). This approach provides the opportunity to young professionals or special groups of people who, for whatever reason, wish but are unable to attend face-to-face classes to bridge the gap between education and special inconveniences. The same applies when students need to be absent from class due to an emergency but wish to participate online so that they do not take an absence or miss lecture delivery. That gives students the freedom and the critical capacity to decide when and whether they can exploit the benefits of hybrid teaching, instead of losing the whole lecture. Besides, hybrid teaching creates a sense of safety in the sense that no critical information shall be lost if someone cannot attend class. As many courses include demanding material, the use of video recordings or the uploading of the lecture on digital platforms ensures that students have the whole class presentation to look at, without feeling overwhelmed by any lost material.

Notably, tertiary education can benefit from the effects of digitalization by revolutionizing the conventional teaching style with new sophisticated class delivery opportunities worldwide. The proposed framework describes a series of alternatives that could pave the way toward hybrid education. The purpose of the framework is to boost instead of replacing in-class attendance by offering a more holistic approach to lecture delivery. Hybrid teaching can enhance student commitment and engagement in class while providing assistive technologies for easier material comprehension and two-way communication between faculty and students. As this new teaching style has not been recognized as a universal approach to education and is only applied in distinct cases and educational institutions, many things are to be considered, such as the ethical perspective of digital tool utilization or the purposes it satisfies. Obeying GDPR and national legislation is a critical step in the implementation process, securing the privacy rights of both parties while clearly defining the terms and conditions of technological applications as part of the traditional teaching method. All parties should be explicitly informed about the purpose of online education and consent to the use of digital class tools that may contain sensitive personal information. Transparency and communication are among the top priorities in such a digital transition, creating a sense of safety for the educational community to accept and encourage hybrid teaching, thus fostering educational prosperity and growth.

CONCLUSION

The effects of digital transformation are gradually becoming evident in tertiary education. Ever since the outbreak of the recent pandemic, online teaching has been an effective tool for sharing knowledge and prompt e-class participation, even in the most difficult times humanity may face. As education is an indispensable yet continuous procedure, it is essential to adopt an alternative approach to teaching to ensure it is widely accessible for everyone who wishes to participate in this experience. While digitalization became an extremely crucial tool to higher education during lockdown periods, e-learning methods have yet to be integrated into the universal educational approach. While ample opportunities for digital tools have flourished in the educational context during COVID-19, the current challenge lies in the utilization of technology in education while upholding the traditional class culture and attendance policy. In fact, there must be a harmonic combination of conventional and digital-driven teaching styles so that students and faculty can benefit from the

advantages of digitalization, improving the quality of communication and interpersonal relations in class. Through lesson recordings, online class sharing, AI tools, and gamification practices, students come closer to education, being able to access shared knowledge easily, thus increasing comprehension and continuous development. The appropriate use of digital instruments in education can increase engagement and commitment in class, boosting participation and attendance in lectures. Evidence from well-known universities worldwide paves the way toward adopting hybrid teaching techniques without disengaging students from institutional goals. As this transition is associated with several implications, such as human rights and GDPR, institutions must pay special attention to adopting such technologies ethically and responsibly.

This study has presented several digitalized methods that have the potential to boost a hybrid educational setting, highlighting their contribution to student engagement and inclusivity. The role of ChatGPT was instrumental in the formation of the results, proposing the most influential tools for this matter. This work pertains to a future direction of how hybrid teaching can be integrated as a universal technique in Greek universities, among others, and evaluate the effectiveness of those techniques in improving student participation while fostering traditional teaching methods.

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CREATIVE STUDENTS OR CREATIVE CHATGPT? SECONDARY EDUCATION STUDENTS' PERCEPTIONS OF THE IMPACT OF GENERATIVE ARTIFICIAL INTELLIGENCE ON CREATIVE THINKING.

Giotakou Konstantina
Teacher of Greek Literature
2nd Protypo Gymnasium of Volos
Email: nadia_giotakou@yahoo.gr

ABSTRACT

A fundamental characteristic of human personality is creative thinking. Although humans are inherently creative beings, the extent to which this capacity develops largely depends on the degree of support provided by the sociocultural environment, including education. Cultivating creativity has become a primary objective for most educational systems in the 21st century. Nevertheless, schools in Greece appear to struggle with fostering the conditions necessary for students to think "outside the box." Empirical evidence suggests that creativity is enhanced through student engagement in creative writing processes, particularly when generative artificial intelligence is incorporated (AI), which opens new avenues in the complex process of writing. However, the integration of AI technology has also raised significant concerns, with many arguing that it may lead to dependency and, ultimately, to a weakening of the human element.

The aim of the present study is to investigate lower secondary school students' perceptions of the impact of artificial intelligence on creative thinking. Specifically, the study seeks to address the following research questions: 1) How do students evaluate the influence of artificial intelligence on creativity? 2) How do students perceive the appropriate use of artificial intelligence in cultivating creative thinking?

The present research adopts an exploratory, qualitative design with a phenomenological approach, aiming to understand the expectations and significance that students themselves attribute to artificial intelligence. Moreover, it is situated within the theoretical framework of self-determined learning and Vygotsky's sociocultural theory of cognitive development. Twenty lower secondary school students engaged in creative writing activities using ChatGPT. Given the limited existing knowledge regarding how students engage in creative writing with the assistance of writing tools and how instruction should be structured when using such tools, the lesson was designed as a workshop. It included specific learning objectives and activities aimed at the development of the cognitive skills of recall, understanding, application, analysis, and reflection. Upon completing the activities, participants assessed the creativity in their work using a rubric based on the criteria of imagery, voice, characters, and narrative (Mozaffari, 2013; Zedelius et al., 2018). They also completed an open-ended questionnaire and participated in focus groups.

The descriptive data were analyzed thematically and revealed that participants used AI to overcome challenges encountered during the writing process. With its assistance, they gained access to alternative ideas that nurtured divergent thinking and problem-solving skills, while also supporting emotional development through the satisfaction of psychological needs. However, the findings also indicated that not all students possessed the ability to critically evaluate outputs, generate original ideas, or maintain an authentic personal voice. A deeper understanding of the emerging potentials and limitations of AI could help educators design instruction more thoughtfully and adopt more effective strategies for enhancing creativity.

Keywords: creative thinking, artificial intelligence, student perceptions, secondary education

INTRODUCTION

Creativity is regarded as a critical 21st-century skill, essential across diverse domains of knowledge, including science and technology, economic activity and cultural expression (Rawlings & Cutting, 2024; Vincent-Lancrin et al., 2019). It is not the exclusive privilege of gifted individuals, but rather a capacity that can be nurtured in all people, provided they are situated within a supportive environment (Kaufman & Beghetto, 2009). Given its association with self-actualization and overall well-being, fostering creativity constitutes a primary objective of educational systems, including the Greek educational system (Akpur, 2023; Rahimi & Shute, 2021; Rawlings & Cutting, 2024). However, a persistent pathology within the Greek educational context is its reliance on traditional teaching practices that favor rote memorization and the accumulation of factual knowledge. Findings from the 2022 PISA Program (Institute of Educational Policy, 2022) reveal that Greek students perform below the OECD average in creative thinking.

An effective approach to enhancing students' creative thinking may lie in the adoption of creative writing practices. Creative writing is widely recognized as a valuable pedagogical tool that supports the learning process by increasing intrinsic motivation and student self-confidence (Maley, 2012). Empirical evidence highlights that engaging in creative writing activities encourages students to actively experiment with novel ideas and, through continuous inquiry into the "why" and "how", develop cognitive flexibility (Maley, 2012; Fitria, 2024). Recent advances in generative artificial intelligence (AI) have further expanded the potential of the writing process. Writing assistants such as ChatGPT offer support at all stages of writing — ranging from idea generation and content organization to the refinement of the final text — through an iterative process of reflection. However, However, artificial intelligence technology has also generated significant concern. It has been argued that excessive reliance on such tools may ultimately diminish human cognitive engagement and deprive students of critical learning experiences (Kim et al., 2025; Maphoto et al., 2024; Wang, 2024).

To enable more meaningful interactions between students and generative AI tools in the realm of creativity, it is imperative to understand how students employ these technologies and how they evaluate the practices they adopt. Only a limited number of studies have investigated the integration of AI tools into creative writing processes, particularly at the lower secondary level, where students are still considered novice writers. Additionally, educators often lack the opportunity to observe the strategies students employ while composing their texts. This understanding becomes even more obscure when AI tools are involved. Considering the growing influence of artificial intelligence in the near future, insights into students' perspectives could inform the future design of curricula and teaching strategies aimed at achieving a balanced coexistence between human and artificial intelligence (Kim et al., 2025; Maphoto et al., 2024; Wang, 2024). The present study, therefore, aims to explore lower secondary school students' perceptions of the impact of artificial intelligence on creative thinking. Specifically, it seeks to address the following research questions: 1) How do students evaluate the impact of artificial intelligence on creativity? 2) How do students perceive the appropriate use of artificial intelligence in fostering creative thinking?

LITERATURE REVIEW

Creativity and Creative Writing

Creativity is a multifaceted and often ambiguously defined concept, a fact that continues to hinder its systematic development (Proctor, 2014). Over time, multiple theoretical approaches have been proposed to define it, including psychoanalytic, cognitive, socio-psychological and neurobiological perspectives (Batey, 2012). Although there is no universal consensus, most definitions converge on certain key dimensions such as originality, novelty, adaptability to changing conditions, cognitive flexibility and curiosity (Kharkhurin, 2014; D'Souza, 2021). According to Rhodes (as cited in Batey, 2012), creativity encompasses personality traits, the creative process itself, the final product and the surrounding sociocultural context. Creativity can be cultivated both individually and collectively (Akpur, 2023). Boden (1998) distinguishes between ideas that are creative solely from the perspective of the individual who conceived them and those that are considered original on a societal level. She further identifies three distinct types of creativity: combinational creativity (reconfiguring familiar ideas in new ways), exploratory creativity (deepening understanding of existing conceptual spaces) and transformational creativity (altering the structure or essence of existing ideas).

Until recently, creativity was considered a uniquely human trait — an assumption increasingly challenged by recent developments. Some scholars argue that with ongoing advances in technology, computers can now exhibit creativity and originality comparable to humans. Others contend, however, that the goal should not be to replicate human intelligence but to facilitate synergy between human and artificial intelligence (Epstein et al., 2023; Treglia & Tomassoni, 2024). According to Mollick and Mollick (2023), tools like ChatGPT augment human creative thinking, but human input remains indispensable, as the prompts provided by users directly shape the quality of AI-generated content.

Creativity plays a pivotal role in the process of written expression, as the two are interrelated in a dialectical relationship (Kim et al., 2025; Maphoto et al., 2024; Wang, 2024). Creative thinking often initiates the writing process, while sustained engagement with writing activities further activates students' imagination. Both processes are simultaneously cognitive, social and cultural in nature and are shaped by individual differences in linguistic competence, knowledge base and emotional involvement (Kim et al., 2025; Maphoto et al., 2024; Wang, 2024). Creative writing is recognized as an effective student-centered practice that fosters divergent thinking and helps make abstract concepts more tangible and comprehensible. It is a complex process that requires the orchestration of multiple skills. Far from being merely the act of composing a story, creative writing is a dynamic act that emphasizes elements such as imagery, character development, voice and narrative structure—all of which contribute to the cultivation of critical thinking. By enabling students to explore and gradually construct their cultural and personal identities, creative writing enhances student engagement, contributes to emotional well-being, increases motivation and gradually leads to a more meaningful learning experience (Mozaffari, 2013; Di Domenico & Ryan, 2017).

Generative Artificial Intelligence and Creative Writing

Users “interact” with generative artificial intelligence (GenAI) — which mimics human cognitive processes — to produce original content tailored to their needs. With appropriately crafted prompts, they can generate text, videos, or images within minutes. GenAI is thus capable of replicating, to varying degrees, all types of creativity, particularly exploratory creativity (Treglia & Tomassoni, 2024). The most recent developments in GenAI have the potential to transform how students approach writing as a fundamental literacy skill. Research in educational contexts indicates that ChatGPT and other AI writing assistants can support various stages of the writing process, such as organizing and refining narrative or argumentative texts (Guo et al., 2023), correcting grammatical and syntactic errors (Park, 2019), and encouraging reflective practices while simultaneously increasing students’ engagement and enthusiasm for writing (Wu, 2022). Additionally, GenAI can improve writing efficiency and productivity by reducing the time and effort required, and by helping learners find meaning in their tasks — factors that enhance intrinsic motivation and overall satisfaction (Noy & Zhang, 2023). It can also help students overcome the anxiety associated with the “blank page” and the fear of failure, by offering multiple starting points for their compositions (Doshi & Hauser, 2024).

However, it is important to acknowledge that GenAI has a dual nature: while it offers substantial benefits, it also entails certain risks. The provision of predefined ideas can constrain creative freedom, particularly for novice writers such as students, and may result in the generation of homogeneous narratives (Doshi & Hauser, 2024). Moreover, the reduction of effort may diminish students’ sense of ownership and the perceived value of their work. Consequently, their level of satisfaction with the writing process may decline (Rivera et al., 2025). Dependence on AI tools may also limit opportunities for social learning and feedback from teachers and peers —interactions that are critical for both cognitive and socio-emotional development (Zimmerman et al., 2023).

THEORETICAL FRAMEWORK

This study adopts both the Self-Determination Theory and Vygotsky’s Theory of Mediation. By integrating these two theoretical approaches into its methodology, the research embraces the connection between creativity and enhanced motivation, as well as the importance of creating a dynamic and supportive learning environment (Syrewicz, 2022). Such a framework is essential for addressing the cognitive and psychological needs of students in “uncharted” situations — such as the emerging practice of writing with the assistance of generative artificial intelligence. It contributes to increasing student engagement and, by extension, improving learning outcomes. Emphasis is placed on satisfying three fundamental needs, which are considered critical for fostering motivation: autonomy, which relates to freedom of choice; competence, which concerns achieving desired outcomes; and relatedness, which involves the sense of belonging to a community (Evans & Boucher, 2015; Syrewicz, 2022).

METHODOLOGY

The present study follows an exploratory, qualitative research design. Its goal is to gain an in-depth understanding of the processes underlying the interaction between students and artificial intelligence, to map individual responses, and to explore the meanings attributed to students’ choices and actions (Cohen et al., 2007; Creswell, 2011). A phenomenological approach was selected, allowing the research to focus on participants’ experiences before proceeding to theoretical assumptions. This approach is always applied in relation to the context within which individuals act (Cohen et al., 2007; Creswell, 2011). Given the limited existing understanding of students’ engagement with ChatGPT in the context of creative writing, a phenomenological lens is particularly useful in capturing the meanings and expectations students associate with artificial intelligence. Participants were selected through convenience sampling. The study

involved twenty first-grade lower secondary school students (Grade 7), chosen based on their accessibility and availability, as they all participated in the school's innovative Creative Writing Program. A common characteristic among participants was that they were novice writers, engaging in creative writing activities for the first time. In terms of cognitive performance, the group was heterogeneous; however, most students fall within the good or even high-grade range. Similarly, in terms of socio-emotional engagement, most students made efforts and participated actively during the activities. All participants had basic knowledge of how ChatGPT operates.

RESEARCH DESIGN

The study was conducted during the first semester. Given the limited existing knowledge about how students engage in creative writing with the support of writing assistants — and how creative writing should be taught using such tools — the course was structured as a workshop with clearly defined learning objectives and activities. The design of these activities aimed at developing the skills of recall, comprehension, application, analysis and reflection. In the first phase, through the comparison of fairy tales, the genre's characteristics were introduced. Students engaged with the concepts of setting, time, the protagonist, supporting characters as well as the development of the plot. They were then asked to write an original fairy tale without any technological assistance. Upon completion, they self-assessed their work using a creative writing rubric and reflected on the process by answering open-ended questions in a questionnaire. In the second phase, students were introduced to ChatGPT and trained in its use. They were then tasked with writing a second fairy tale, this time with the option to use AI assistance in any way they chose, without specific guidance. As in the first phase, they assessed their own work and responded to a second set of open-ended questions. Following the writing phases, semi-structured focus group interviews were conducted. Participants were divided into four groups of five and took part in in-person interviews, each lasting approximately 30 minutes, where they shared their views on the use of generative AI in creative writing.

DATA COLLECTION AND ANALYSIS

Aligned with the interpretive phenomenological design, the following data were collected: a) the two written texts (fairy tales) produced by each student, b) the results of their self-assessment using a rubric evaluating three criteria: adaptation/responsiveness, originality (inspiration, plot, language), and the final text's editing quality (Government Gazette 211/11-11-2016 vol. A), and c) responses to the open-ended questions from the two questionnaires and the focus group discussions. Open-ended questionnaires and focus groups were chosen as data collection methods to enable deep insight into participants' perceptions, experiences, and emotions regarding AI use. These tools highlighted how students interacted with AI, the changes made following ChatGPT's responses, and their decision-making processes during the different stages of writing. The integration of data from multiple sources for triangulation not only enriched understanding of participant experiences but also strengthened the study's reliability and validity, despite the small sample size (Cohen et al., 2007; Creswell, 2011). A thematic analysis approach was employed, a common practice in qualitative studies for identifying patterns and themes. The first step involved an initial reading of the data to gain a general overview of participants' perspectives. This was followed by initial coding guided by the research questions, during which all relevant insights were noted. The next step involved grouping the data to identify relationships and emerging patterns. The analysis concluded by linking these patterns to the existing literature (Cohen et al., 2007; Creswell, 2011).

FINDINGS

The findings related to the first research question indicate that students identified both benefits and challenges in using generative artificial intelligence for creative writing. Thematic analysis resulted in four benefit-related themes and five challenge-related themes. Regarding the second research question, the data were coded into two main themes.

Benefits of Using Generative AI in Creative Writing

Enhancement of Creative Thinking

The use of generative artificial intelligence enhanced convergent thinking. AI supported students in logically structuring their ideas into coherent narratives that met assignment criteria. ChatGPT provided scaffolding that helped students revise and improve their writing. At the same time, it also fostered divergent thinking. The AI relieved students from the stress of writing by offering multiple prompts that encouraged them to explore new and diverse ideas. This process supported originality as well. By entering well-constructed prompts, students were able to guide their stories toward unexpected developments, conflicts, twists, and surprise elements. Additionally, it enhanced flexibility and problem-solving abilities. Students overcame creative blocks, which are often more prominent among inexperienced

writers, and were able to find solutions to narrative problems — using various storytelling approaches, adding new adventures, and developing well-rounded characters.

Fostering Language and Literary Literacy

Creative writing with generative AI also supported the development of language literacy. Students came to understand the different stages of writing. They reported that working with ChatGPT made them appreciate the importance of planning and outlining, a stage often skipped when writing independently in class or at home. Through different prompts, students first outlined their stories and then proceeded to write them, enabling them to identify areas in need of clarification or revision — thus allowing them to add their personal touch. Furthermore, AI helped them identify and correct misconceptions. In traditional classroom settings, students often memorize literary theory elements for tests without fully understanding them. However, through their interaction with AI, they applied these concepts to stories of personal interest or relevance, making them more tangible and comprehensible. Finally, it enhanced students' linguistic awareness. Common issues in student writing—such as lack of clarity or weak expression—were addressed through AI-generated suggestions. AI support facilitated the identification and enhancement of weaknesses by suggesting alternative expressive tools to convey subtle semantic nuances and by correcting errors in grammar and syntax.

Enhancing Technological Literacy

Interaction with AI helped students become familiar with emerging technological tools and develop digital competencies vital in today's world. To generate their stories, students had to input prompts—many of which were initially ineffective. This prompted an iterative process of trial and refinement, gradually leading to the desired output.

Meeting Emotional Needs

Generative AI also addressed students' emotional needs, beginning with increasing engagement. Students reported that the learning process was more enjoyable compared to traditional instruction. Their personal involvement in crafting individualized stories aligned with their interests and experiences boosted focus, attention and curiosity regarding AI's possibilities. AI also enhanced students' sense of competence. Participants were required to apply prior knowledge and adapt strategies according to each stage of the writing process. Having a non-judgmental assistant who offered immediate feedback helped them overcome difficulties - enabling them to complete tasks they might have otherwise abandoned - and strengthened their self-confidence. Finally, the use of AI cultivated positive emotions toward writing. Writing is a complex process that demands the coordination of multiple skills. It is therefore not surprising that many students find it challenging, often expressing reluctance or even aversion toward participating in writing tasks — particularly those involving creative writing. AI reduced the cognitive load and effort required, making students more receptive and comfortable with written expression.

Challenges and Limitations of Using Generative AI in Creative Writing

Overreliance on AI

Students expressed concerns about becoming overly dependent on AI tools. The inability to complete a writing task without ChatGPT risks turning the tool from a supportive aid into a crutch. In the long term, this could hinder the development of writing skills and limit intrinsic motivation, as the need for autonomy in decision-making and expression is not adequately fulfilled.

Uncritical Acceptance of AI-Generated Content

Students admitted that in several cases, they accepted ChatGPT's suggestions without critical evaluation, dismissing their own ideas as incorrect or of lower quality. This behavior does not foster meaningful interaction with the tool and results in missed opportunities for knowledge construction.

Potential Loss of Originality, Creativity, and Authenticity

When comparing their stories, students noticed significant similarities, highlighting the importance of maintaining personal judgment during the writing process. While they appreciated the efficiency of ChatGPT in content creation, some felt that the plot did not always unfold as intended or lacked coherence with their envisioned outcome.

This led to feelings of having "lost their voice," as the writing assistant at times took control over the narrative, rather than supporting it.

Ethical Concerns

Ethical considerations also emerged. The students did not reach a consensus on whether the creation of part or all of a text using such means is ethically appropriate. Some viewed it as a form of cheating, believing the final product was not entirely their own work, while others felt unconcerned, citing that they had received permission to use the tool.

Lack of Human Support

Some students missed the encouragement typically provided by teachers during writing tasks. They reported that in certain situations, they needed help that ChatGPT was unable to offer—possibly due to poorly formulated prompts. In such moments, they longed for collaborative interaction with either their teacher or peers. The absence of this classroom-based dynamic was seen as a significant drawback of AI, raising doubts about the tool's continued appeal over time.

Students' Perceptions of Appropriate AI Use in Creative Writing

Students' Attitudes

Most students evaluated their experience of writing with AI positively. At the same time, they expressed concerns about the risks of becoming overly dependent on the tool. For this reason, they emphasized the need for balanced and critical use. They also stressed the importance of a responsible and ethical attitude. According to them, ChatGPT should not dominate the learning process or become a new authority figure; instead, it should act as a supporter, facilitator or organizer. Moreover, its role should gradually diminish, allowing students to rely increasingly on their own abilities.

School's Role

The effective integration of AI into the learning process also requires acceptance and support from educators. Students rejected the notion of demonizing or banning the use of AI, recognizing that these tools are highly popular among young people. To ensure meaningful incorporation of AI into education, they argued that teacher training, clear guidance and targeted activities are essential. Acknowledging that their own knowledge is limited, they requested school-led instruction to establish a code of proper use and ethical guidelines for AI in the classroom.

DISCUSSION AND CONCLUSIONS

Artificial intelligence, having become a significant tool in both every day and professional life, is now claiming its place in the learning process. The present study found that most students are aware of AI tools, although not all are sufficiently familiar with them. Overall, the participants positively evaluated their experience with the writing assistant ChatGPT but also expressed concerns about the new risks that are emerging. This study explored the impact of artificial intelligence on creative thinking across three domains: cognitive, emotional, and pedagogical.

In the cognitive domain, an enhancement of creativity, critical thinking and problem-solving skills was observed. This finding aligns with previous empirical data indicating that AI support significantly contributes to content development, originality and flexibility (Treglia and Tomassoni, 2024; Woo and Guo, 2023; Woo et al., 2024). Moreover, it is consistent with studies suggesting that AI helps students overcome writing anxiety and create more complex storylines and characters (Guo et al., 2023; Kabeer et al., 2025). This study also found a positive effect on promoting language and literary literacy. Similar conclusions are drawn in earlier research where AI tools encouraged students to experiment and offered opportunities to revise and develop their narrative skills (Kabeer et al., 2025). Additionally, in studies examining AI's influence on language handling, greater ease was observed, particularly in learning English, along with a reduction in grammatical and syntactic errors and an expansion of vocabulary and content (Park, 2019; Guo et al., 2023; Lee et al., 2024; Wang, 2024). The current study adds two key benefits: understanding the importance of creating an outline before writing and addressing misconceptions related to difficult narrative concepts. Furthermore, the findings highlight the development of technological literacy. Various studies emphasize that AI familiarizes students with technological capabilities (Kabeer et al., 2025). Finally, this research, based on the theory of Mediation, found that ChatGPT can serve as supportive guidance, enabling students to work independently through most stages of writing and acquire new skills, thus advancing in their zone of proximal development. Many studies have shown that AI tools adapt the creative process

to each student's strengths and weaknesses, and through immediate feedback, they play a vital role in reflection (Wu, 2022; Doshi and Hauser, 2024; Kabeer et al., 2025).

In the emotional domain, this study, adopting Self-Determination Theory, found that AI can intrinsically motivate students by satisfying the needs for autonomy and competence. Students managed to overcome difficulties by solving problems and completing assigned tasks. Previous studies have shown that AI encouraged students to take responsibility for their learning. ChatGPT functioned as the fuel that drives creativity (Noy and Zhang, 2023). With its help, students shook off the constraints of traditional writing activities and found the freedom to experiment, pushing the boundaries of their creativity (Kabeer et al., 2025). Nevertheless, the study revealed an underlying fear among students about reduced autonomy if reliance on AI turns into dependence. According to Woo & Guo (2023), AI does not assist all students equally. A high-performing student critically evaluates AI suggestions, while a lower-performing student struggling with writing exercises may resort to copying. Thus, issues of ethics and academic integrity arise, as highlighted in previous studies (Kabeer et al., 2025). Moreover, the need for competence may remain unmet if students a priori consider ChatGPT infallible and simultaneously underestimate their own abilities. According to Rivera et al. (2025), AI involvement in the creative process enhanced the sense of competence among high-performing students because they had clear goals and viewed AI as a tool to realize their vision. In contrast, competence and, consequently, satisfaction decreased in lower-performing students who felt they lacked control over their work. Generative AI tools can reduce overall enjoyment, perceived value and the sense of uniqueness because students did not feel they invested time and effort in their creative endeavor (Norton et al., 2012; Rivera et al., 2025). Additionally, barriers may arise in satisfying the need for relatedness. The present study showed that the interaction between students and ChatGPT can become a cold transaction, rather than a meaningful exchange of views, as typically occurs in the classroom—a finding consistent with existing literature (Zimmerman et al., 2023). Thus, the results of this and previous studies suggest that using AI in the creative process may leave some basic psychological needs unfulfilled, which students usually meet through original and demanding work (Rivera et al., 2025).

In the pedagogical domain, the findings provide valuable insights into educators' attitudes toward integrating AI into the educational process. Specifically, our study highlights the importance of guided use of AI tools, in which students are trained to use prompts correctly and, more importantly, to interact critically with ChatGPT. Otherwise, the help provided by AI is ineffective and may amplify the frustration and discomfort that many students already experience in writing activities. This brings forth the question of to what extent educators in Greece are equipped with the necessary knowledge to support this new learning process. The significance of responsible AI use has also been underscored by other studies, which stress the necessity of equipping students with foundational skills —critical thinking, creativity and problem-solving—prior to the full integration of generative AI tools, along with the cultivation of ethical literacy (Kabeer et al., 2025; Rivera et al., 2025).

The findings of this study should be interpreted with caution, as the research was based on a small sample of students from a single educational setting. Future research should evaluate the perceptions of students from diverse geographic regions and educational backgrounds to obtain a more comprehensive picture. Moreover, this study relied exclusively on qualitative data provided by the students themselves, who may have been influenced by social expectations or may have recalled their experiences with generative AI inaccurately. This reduces the reliability and validity of the study. Lastly, the current research did not consider variables that might influence the use of AI and students' perceptions. Future studies could examine: a) the possible impact of gender, age, performance level and familiarity with technology; b) changes in student perceptions over time as their exposure to AI tools increases and c) the long-term impact on student performance. In conclusion, further research is needed to understand how generative AI can be better integrated into secondary education while minimizing potential risks. By exploring these areas, we can ensure that these technologies are used responsibly and effectively. This conclusion is also echoed by AI itself, which, when asked, responded: "ChatGPT can be a great assistant for inspiration, structure and editing, but the final narrative and emotion always belong to the writer!".

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THE INTEGRATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION: ADVANTAGES AND DISADVANTAGES

Dr. Kottara Chara
Fulltime Lecturer
Department of Business Administration, University of West Attica
250 Thebes Str. 12241 Egaleo, Greece
email: hkottara@uniwa.gr

Dr. Lagou Maria
Economist – PhD Department of Accounting & Finance, University of West Attica
Adult educator at SAEK
email: la44mar@yahoo.gr

ABSTRACT

The integration and application of Artificial Intelligence in recent years has been on an upward trajectory, affecting key pillars of the global economy. Its dynamic course has not left education unaffected, on the contrary, today there is a strong interest in its exploration. This research is a bibliographic article through which existing studies are utilized, with the aim of examining artificial intelligence in the field of education and more specifically identifying both its advantages and disadvantages. It is considered important to explore the field under consideration through the presence of applications such as ChatGPT and Gemini, which are frequently used by trainees.

The research findings help members of the educational community and the respective bodies to assess the necessity of a smooth transition to a new normality, ensuring every ethical issue. The rational use of ChatGPT and Gemini is essential to maintaining the balance between the dual relationship of instructor and trainee.

For the needs of this scientific work, the researchers used secondary research through the literature, which refers to a systematic method of review and critique regarding the scientific field under consideration, helping to identify current knowledge, gaps and future research directions. A systematic search was carried out in reputable databases, libraries, electronic repositories and other scientific sources to collect research on artificial intelligence in education with the ultimate goal of evaluating its advantages and disadvantages.

Keywords: Artificial Intelligence, Education, ChatGPT, Gemini

INTRODUCTION

Educational technology significantly influences the way we teach, as its tools aid learning and skill acquisition. Today, artificial intelligence has been integrated into the educational process and teaching. It is used for the creation of educational content, interactive games, quizzes, automated grading and personalized teaching. It is observed through its presence, improvement in the quality and effectiveness of teaching and learning.

The educational process using artificial intelligence may be implemented either face-to-face or online in a virtual environment, in order to function individually and effectively (Sadiku et al., 2021). Additionally, artificial intelligence can even be utilized in administrative tasks within an educational unit, through the automation of grades, and the posting of results, as well as the grouping of large volumes of data (Lan, 2021). It is considered important to store data with fast, flexible and automated processes for the development of customized and personalized teaching.

However, there are strong concerns about the extent to which artificial intelligence can adhere to safeguards for various ethical issues. It is important to secure the personal data of the members involved in education. Another critical issue is whether artificial intelligence can replace the human trainer and what they offer (Fahimirad and Kotamjani, 2018). Moreover, another challenge is whether there can be impartiality by maintaining an attitude of respect for diversity and whether it refrains from prejudices when it is based on data with content that may contain prejudices (Latham et al., 2014).

The issue of artificial intelligence applications such as ChatGPT and Gemini in the educational process creates intense concerns, as there are learners who complete assignments or solve exercises without their own effort, as they literally rely on these applications. Their use is not prohibited and in the case that they use tools to seek additional information to understand more concepts and develop critical thinking and problem-solving skills, there is a positive impact.

However, in some cases, simple copying through keywords is observed, without the involvement of the learners to delve deeper into the educational content and the corresponding skills that can be acquired (Huttar and BrintzenhofeSzoc, 2020). Overall, all these issues of adopting artificial intelligence in education are worth examining, highlighting the impact of its application.

The purpose of this paper is to investigate artificial intelligence in the field of education and focus on its advantages and disadvantages. The second section presents the bibliography, the third the methodology, while the fourth presents the most important findings. The fifth section presents the conclusions, the sixth section presents the limitations and suggestions for further research, with the corresponding bibliographic references used in this scientific paper.

BIBLIOGRAPHICAL REVIEW

The integration of Artificial Intelligence in Education

Various definitions have been given for artificial intelligence, with most of them approaching artificial intelligence as a machine that thinks, understands languages and can solve problems. Artificial intelligence has the ability to perform tasks usually associated with intelligent beings (McArthur et al, 2005).

Early developers considered artificial intelligence to be a mechanical processing of logical statements, which defined human intelligence as the computation of various truth values (Hon, 2019). There is interdisciplinary nature in artificial intelligence as it is linked to philosophy, psychology, neurology, linguistics, computer science, and engineering science (Russell et al., 2022).

More specifically, Artificial Intelligence is the field of computer science that deals with the design and implementation of programs that mimic human cognitive abilities, displaying characteristics that are usually attributed to human behavior (Şeren and Özcan, 2021).

Artificial Intelligence is a mechanism to support face-to-face education, as instructors and learners are in the same space, while the Intelligent Educational System (IES) contributes to issues of teaching methods and techniques. However, the IES system itself can act as a support for the learner and suggest ways to enhance learning by assigning tasks to learners. A typical example of this application is the use of a supercomputer called Watson by a university in Australia (Zadrozny et al., 2015).

Artificial Intelligence is a means of delivering in-person education. Teaching is carried out by displaying animations on a screen or by an anthropomorphic robot or an IES with communication capabilities, where these actions may or may not be supervised by a human (Şeren and Özcan, 2021).

Artificial Intelligence as a means of simulating in-person education enables the instructor and the learner, when they are not in the same teaching space, to meet in a virtual environment (Şeren and Özcan, 2021).

The ChatGPT application

With the launch of OpenAI in 2015, ChatGPT began to emerge under its auspices (Sok and Heng, 2024). This venture was based on the assumption that the maturation of artificial intelligence into a more generalized intelligence depends on the development of sophisticated language models (Crawford, et al., 2023).

This application also had a great impact in the education sector, as many trainees used it as part of their daily duties in educational units. In particular, for the preparation of assignments and educational activities, ChatGPT was a point of reference that raised reasonable questions for teachers. More specifically, whether its use was rational and helped in understanding difficult concepts or whether it ultimately formed a framework that led learners to the easy solution without delving into the educational content and the educational process.

OpenAI in June 2018 marked a pivotal juncture, announcing the transformer architecture that used mechanisms to process human language with remarkable efficiency, thus laying the foundation for future developments (Adel, et al., 2024).

Following GPT-1 and GPT-2, GPT-3 was created in May 2020, marking a quantum leap in the series, combining advanced reinforcement learning with granularity methodologies to substantially improve performance, particularly through the emulation of sophisticated conversational interactions that closely mimic human speech (Adeshola and Adepoju, 2024).

ChatGPT, a derivative of these evolutionary models, has gained recognition in various fields for its human-like conversational capabilities. The culmination for ChatGPT was the public release of the API by OpenAI on March 2, 2023. GPT-4's capability has expanded beyond text analysis to advanced image recognition, allowing it to take on complex tasks, such as human analysis in complex legal analysis (Baidoo-Anu and Ansah, 2023). The most recent enhancement, GPT-4 Turbo, is designed to improve the user experience by enabling processing of up to 128,000 context tokens, facilitating the examination of voluminous documents, and the creation of exhaustive summaries (Memarian, B and Doleck, 2023).

ChatGPT, based on the GPT-4 architecture, is considered a central entity in the field of natural language processing. Her ability to interpret complex instructions and produce a wide range of creative results has solidified her position as an industry pioneer. With its proficiency in multiple programming languages and its ability to facilitate multilingual communication, ChatGPT is at the center of a significant leap in AI's ability to understand and reproduce human-like text (Opara et al., 2023).

However, today there are many challenges and concerns, as even scientific papers have been written with GPT-4 in which scholars cite this application as a source. It is understandable that some ethical issues are emerging in the educational and academic community that require thorough evaluation (Rahman and Watanobe, 2023).

The Gemini Application

Google DeepMind developed Gemini AI to perform complex tasks and produce high-quality code in a variety of programming languages. In the beginning its name was Bard and it provided the ability to simulate human conversation and communication through processing and machine learning.

Subsequently, it was developed, giving users the opportunity to understand and even recognize images or analyze complex graphs (Llerena-Izquierdo, 2024). The Gemini design is multimodal and over time its effectiveness has increased even further with additional multimodal data. Specifically, developers are able to use Gemini through API calls, or even through Google AI API, Vertex AI API. In its implementation, Gemini AI uses different data types which are merged with multiple algorithms in order to optimize performance.

One of its advantages is the ability for users to input images, audio, text, and other types of data, giving a result that is governed by more natural artificial intelligence interactions (Lee, et al., 2023). Gemini AI has been trained on a huge number of data, while having access to up-to-date information, providing accurate and reliable answers to the questions a user submits.

Additionally, due to its fast processing, it can and does perform many tasks and requests simultaneously (Imran and Almusharraf, 2024). However, in the field of education, it has been found that ChatGPT is more widely used. 4.

FINDINGS

The advantages of using artificial intelligence in education

Education is one of the areas in which artificial intelligence is used to improve the effectiveness of the educational process as it reduces the cost and time for the members involved.

Aligning education with technology is necessary to appreciate and recognize the value of using artificial intelligence and the capabilities it provides (Kamalov et al., 2023). Today, ChatGPT is one of the most popular artificial intelligence tools as it helps both the teacher and the learner depending on the respective level and goal setting.

Teachers can produce content for learners according to their preferences, desires, and class needs, either as text, video, quiz, or presentation (Li and Su, 2020). The range of possibilities is unlimited as teachers set the desired content as a command and ChatGPT then responds with the result, creating what was previously requested. The teacher then has the ability to optimize the result by setting parameters (Bahroun, 2023).

Moreover, there is the possibility of grading the difficulty level of the questions, or formatting the questions in open-ended, true-false or multiple choice. Interactive games, quizzes, assignments can also be produced and transform a lesson more fun and enjoyable. Learners can raise personal concerns in order to gain new knowledge (Misra et al., 2023).

It is noteworthy that the need for personalized learning can be met by artificial intelligence applications, as there is the possibility of customizing the needs of learners when creating content, making teaching more personalized with respect and adaptation to the profile of each learner (Nkambou, et al., 2018).

The automatic feedback provided enables immediate self-assessment by learners, strengthening their willingness to improve. Once their progress, preferences, the level of difficulty that suits them, and at the same time the teaching objectives are explored, the corresponding teaching content can be produced (Sharma et al., 2019). Consequently, the performance of learners improves, as they are provided with incentives to learn, resulting in them being more satisfied. Additionally, the participation of virtual assistants enhances the value of using artificial intelligence (Sollosy and McInerney, 2022).

Registration, scheduling, and course management, as well as data storage, are automated (Song and Shim, 2017). Employee errors that may have occurred due to repetitive tasks are now reduced, as is their implementation time. Consequently, the cost that would be attributed to the recruitment and employment of employees is also reduced.

Teachers save time in creating educational content, preparing teaching, and administrative tasks. In a broader context, the use of artificial intelligence can improve the effectiveness and efficiency of teachers and the educational process. Artificial intelligence also provides improved learning experiences by adapting and personalizing educational materials to individual needs (Chen et al., 2020).

At the same time, it reduces the time teachers spend preparing a lesson and carrying out necessary actions, reduces costs and encourages learners, while creating a sense of satisfaction from the lesson and improving learners' learning outcomes. Therefore, artificial intelligence has brought significant progress in education, while assisting the teacher in correction, material collection, lesson plan creation, personalization, and evaluation (Van der Vorst & Jelicic, 2019).

According to Zhang and Aslan, (2021) indicative advantages in education using artificial intelligence applications are the following (Table 1)

Table 1
Indicative Applications and Advantages of AI

Indicative Applications of AI	Advantages in Education
Chatbots	• Spark conversation • Increase learner interest and engagement
Specialized Systems	• Educational planning • Use of learning management systems • Improving the quality of interaction • Utilization of learning management systems
The intelligent teachers/agents	• Customized and timely learning materials, guidance and feedback • Personalized learning experience based on needs, preferences and prior knowledge-experience
Machine Learning	• Large-scale learner data analysis • Predictive models • Prevention and adaptation interventions
Personalized learning systems and environments	• Facilitating interaction • Improving distance learning • Personalized learning materials and resources for personalized learning
Visualizations and virtual learning environments	• Collaborative learning, engagement and visual feedback • Visualization of information • Learning environments that stimulate multiple senses

Source: The Benefits of AI, adapted from Zhang and Aslan, (2021)

The disadvantages of artificial intelligence in education

A critical issue regarding the use of artificial intelligence in education is the ethical framework, which should be fully consistent with the general principles governing education.

The main ethical concerns are data privacy, security and avoiding a potential misuse of personal information. Ensuring responsible and transparent practices is crucial, as users, even if they give consent for the use of their data, are not completely sure throughout the process (Şeren & Özcan, 2021). Ensuring human rights, respecting, protecting and accepting diversity and therefore inclusion are crucial. Prejudice should be kept out of artificial intelligence.

Artificial intelligence systems learn from historical data, so if the data used for education contains biases, AI can perpetuate them, or even exacerbate them. In education, this could lead to inequality of opportunity and outcomes, especially for marginalized groups. Transparency is a prerequisite for ensuring human rights are respected and protected. Additionally, AI systems rely on algorithms to provide personalized learning experiences, however, these algorithms may not fully understand the individual needs and learning styles of learners.

Humans, as social beings, learn by participating in a group of people, and despite the integration of technological advancements in education, it is doubtful that there is a need for balance in the level of its use, as what the teacher offers may not be able to be replaced by artificial intelligence tools (Edwards & Cheok, 2018).

The aspect of alienation is important, as human contact, the cultivation of emotional intelligence is reduced. However, the integration of artificial intelligence in education requires a significant level of technological infrastructure. The inability to access the necessary devices and high-speed internet can create a technological gap and lead to the marginalization of certain groups (Fahimirad & Kotamjani, 2018).

The implementation of artificial intelligence requires teachers and learners to acclimatize to new technologies and modern teaching methods. This transition can be a challenge for some, but the lack of the required know-how can be an obstacle to the efficient use of various applications of artificial intelligence (ChatGPT Gemini AI etc.). In some cases, the use of artificial intelligence in education also entails limitations on creativity and the development of critical thinking.

Specifically, artificial intelligence systems are characterized by repetitive and structured tasks, for this reason there is a risk that the enhancement of creativity and critical thinking will not be achieved (Grace et al., 2018).

CONCLUSIONS

Educational technology is developing, enriching and making education more qualitative and more effective. The tools that teachers have the opportunity to use are varied. In addition, the integration of artificial intelligence brings multiple benefits, both to the teacher and the learner.

The support of the teacher by automated tasks performed by artificial intelligence enhances teaching, as it enables the educational material to be adapted to the modern needs of the trainees. In this way, the educational process becomes more efficient and qualitative, offering an exciting learning experience. The time saved allows the teacher to enrich his teaching and reduce the cost of the educational unit.

The integration of artificial intelligence in education also improves teacher effectiveness and efficiency, while promoting personalized learning with the interactive content it provides. The results of the use of artificial intelligence in education are evident in administration, teaching, and learning outcomes.

Automated systems provide economic benefits and offer more quality time to the involved members of the educational process, in order to develop advanced digital skills. Human connection and empathy play an important role in education, however, it appears that artificial intelligence does not enhance this issue.

In a broader context, accepting and managing these limitations requires a considered and careful approach to integrating artificial intelligence into education, to ensure that the role of the teacher is supported, but not replaced, while enabling equitable and inclusive educational opportunities.

This research is secondary through the examination of other researchers' research, resulting in an extremely limited methodology. More specifically, the researchers propose conducting a more extensive study. This research in the future is likely to be of a primary quantitative, qualitative or mixed nature in order to triangulate the results.

The field of artificial intelligence provides the opportunity even for young researchers to conduct research in order to confirm or compare these results with corresponding studies and to draw more secure conclusions. Artificial intelligence on the educational map is evolving rapidly and the scientific investigation of critical issues raised through this research is vital, in order to examine its integration into the educational process more holistically for a more sustainable future.

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UTILIZATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION SYSTEM IN CYPRUS: GLOBAL TRENDS AND LOCAL INITIATIVES

Mella Maria
Mathematics Instructor
Private Sector of Education in Greece
MSc Student in Artificial Intelligence
European University Cyprus
Email: mm235312@students.euc.ac.cy

Appiou Nikiforou Marina
Assistant Professor of Mathematics
European University Cyprus
Email: M.Nikiforou@euc.ac.cy

Kyprianou Georgios
ICT Instructor
Public Sector of Education in Cyprus
Scientific Collaborator
European University Cyprus
Email: G.Kyprianou@external.euc.ac.cy

ABSTRACT

The rapid advancement of Artificial intelligence (AI) has brought significant changes to the use of digital media in everyday education, introducing numerous opportunities as well as challenges that require further exploration regarding AI's role in teaching and learning. AI-powered tools are reshaping pedagogical approaches by enabling personalized learning experiences, intelligent teaching systems, and adaptive assessments. However, these developments raise concerns about data privacy and ethical dilemmas.

In Cyprus, the integration of AI into the educational system remains at an early stage, despite the growing desire and strong interest in improving teaching methods. This research examines both the perspectives of the global educational community and the level of familiarity of Cypriot educators in primary, secondary, and higher education regarding the potential integration of AI into the educational landscape. The questionnaire, completed by the stakeholders, highlights perceptions regarding the concept of AI, the level of familiarity with AI tools, the emotions triggered by a possible integration, and the degree of willingness to adopt AI in educational environments. Additionally, it includes questions about the advantages and disadvantages of AI tools in education. It is worth noting that many educators are concerned about whether the appropriate infrastructure for integrating such tools into educational settings currently exists or how soon it could be developed. Moreover, most educators wish to have the right to accept or reject AI integration, as they are the direct transmitters of knowledge.

The adoption of AI tools requires the proper preparation of educators, which underscores the urgent need for seminars and conferences where educators can share their perspectives, experiences, and concerns. The insights obtained from this research contribute to the broader dialogue on digital transformation in education, outlining strategic directions for the responsible and effective integration of AI into the educational system.

Keywords: AI in education, adaptive learning, Cyprus education system, global educational community, AI integration benefits, AI anticipated challenges

INTRODUCTION

AI is increasingly becoming part of everyday life, including the field of education, where it holds the potential to transform teaching and learning. This research explores the significance of AI in the education system, with a specific focus on its potential integration in Cyprus' schools and universities. Education, defined as the transfer of knowledge, skills, and values, has evolved significantly over time, just as AI—defined as the simulation of human intelligence by machines—has advanced through innovations. As AI tools become more prevalent, they raise both opportunities and ethical concerns within educational contexts. This study investigates the perspectives of educators in Cyprus across all educational levels, examining their familiarity with AI, existing infrastructure, and attitudes toward its integration. It also compares global trends with Cyprus' current position and identifies key steps needed for effective and responsible implementation of AI in the local education system.

RESEARCH QUESTIONS

This research focuses on three main questions:

1) How is the educational community preparing for the use of AI tools in educational environments?
2) To what extent has AI been integrated into Cypriot education system across primary, secondary and tertiary education?
3) What are the anticipated impacts of AI integration on the overall educational environment?

LITERATURE REVIEW

The traditional "one size fits all" approach to education has come under increasing criticism for failing to address the diverse needs of individual students (Patrick, 2017). Many countries, like the United States and China, have adopted AI tools to enhance learning, increase student engagement and offer more personalized teaching. The concept of personalized education is inspired by "precision medicine," where treatment is tailored based on individual data. In education, this means analyzing learning behaviors and outcomes to predict student performance and offer timely feedback. The objective is to prevent learning gaps and optimize learning strategies for each student.

A prominent example of AI tools is *Knewton*, which was launched in 2008 and offered AI-powered adaptive learning platforms that create content based on individuals' needs. In 2016, the company also began developing courseware for higher education classes using content from educational companies and open educational resources. Knewton technology enables the company to perform sophisticated, real-time analysis of reams of student performance data. It uses adaptive learning technology to identify each student's particular strengths and weaknesses. Concepts are tagged at very specific levels, which allows the platform to make custom recommendations based on students' proficiency and needs.

Another typing assistant is *Grammarly*. Grammarly was founded in 2009, and the company initially offered a subscription-based product intended to help students improve their grammar and spelling. That product was subsequently developed into a writing assistant that checks the grammar, spelling, and tone of a piece of writing. In 2019, Grammarly added a tone detector to its writing assistant. This tool uses set rules and machine-learning to help users gauge the character of their writing and tailor it to a particular audience. In April 2023, it launched a product using generative AI built on the GPT-3 large language models. The software can generate, and rewrite content based on prompts. It can also generate topic ideas and outlines for written content such as blog posts and academic essays. It has been trained on an anonymized library of business writing and is capable of suggesting clarifying edits and additions to work communications such as emails and chat messages.

A famous application for students in China is *17zuoye*. It was founded in 2011 and is based in Beijing. It is an online platform focused on digital learning. The company offers digital educational resources and services, including a homework solution that aligns with textbook curricula and is enhanced by big data analytics. 17zuoye serves the education sector, providing tools and content for teachers, students, and parents to support learning progress. M-learning, a key subset of AI, is growing at a rapid pace in India as more and more institutions, teachers and students use online platforms for study. Indian teachers use both traditional and modern strategies for teaching. Blended learning which uses both conventional and modern strategies is gaining in popularity. The teachers of modern day are expected to have the technical know-how of using modern classroom technologies. Slowly but steadily, Indian classrooms are becoming smart. Students are trained in information technology right from the primary level. As the internet and allied technologies are getting cheaper and more widespread, more students can lay their hands on m-learning.

Byju's is one of the most important players in the Indian education system. Byju's, the Indian edtech company, was founded in 2011 by Byju Raveendran and Divya Gokulnath. The mobile application was launched in 2015. They provide a host of services like aid for competitive exam preparation, school-level study materials and home learning programs. Byju's, one of the most valued edtech companies in the world, has played a major role in transforming Indian education scenario. The company has raised investments from big players like Chan-Zuckerberg Initiative, Tencent, Lightspeed Venture and Sofina. The company is expected to grow more as it now caters to an international audience. Byju's App, one among the M-Learning apps, helps study difficult subjects by making concepts easily comprehensible. The app uses a host of modern techniques like web-based learning, visual graphics, video-based instruction, etc. to provide an immersive learning experience. These innovations are highly helpful for the students to understand basic concepts and enable them to prepare for exams.

Socratic is an education tech company that offers a mobile app for students. Socratic was first launched as a web product in 2013 by Chris Pedregal and Shreyans Bhansali, in New York City, United States. They launched their app under the same name in 2016. In March 2018, Socratic was acquired by Google for an undisclosed amount. The acquisition was made public in August 2019, when the Founder and CTO (now engineering manager) Shreyans Bhansali announced that the company had joined Google. The Socratic app utilizes AI to accurately predict which concepts will help a student to solve their questions. The app works by letting students take a photo of homework questions. Using Optical Character Recognition (OCR), the app is able to read the photo and classify it. Students receive various "cards" in the app with different learning resources such as definitions, YouTube videos, Questions & Answers. It covers subjects like math, chemistry, physics, biology, history, psychology, anatomy and astronomy. It provides step-by-step explanations and helps students to solve various exercises without the assistance or guidance of parents or teachers.

In China many AI-powered applications are transforming the educational landscape, one of the first commercial adaptive learning systems in mainland China being *Squirrel AI*. Squirrel AI is an international educational technology company that specializes in intelligent adaptive learning and was one of the first companies in the world that offered large-scale AI-powered adaptive education solutions. Squirrel AI was founded by Derek Haoyang Li in 2014. It became popular among schools in China and during the coronavirus period it was considered a powerful tool for students' learning, as students were required to stay at home and schools were closed in almost all provinces in China. Squirrel AI Learning works with teachers to identify the most fine-grained possible concepts ("knowledge points") for a course in order to precisely target learning gaps. For example, middle school mathematics is broken into over 10,000 points such as rational numbers, the properties of a triangle, and the Pythagorean theorem. Each point is linked to related items, forming a "knowledge graph" which is addressed by videos, examples and practice problems. Each student begins with a diagnostic test to identify where to begin their learning. The system continues to refine its graph as more students proceed. Learning is not student-directed. The system decides the order of topics. Squirrel AI delivers personalized learning and helps students with their weaknesses.

GoGuardian is an educational software company founded in 2015 and based in Los Angeles, California. GoGuardian is widely used in U.S. schools, particularly for monitoring and managing students' online activity. The platform is designed to help teachers and administrators ensure that students are staying focused on educational content during class, whether they are in a physical classroom or participating in remote learning. Teachers have the opportunity to guide students to safe and specific resources during their lessons, as GoGuardian blocks inappropriate or non-educational websites. It is worth noting that in August 2018 GoGuardian launched Beacon, a software system that analyses students' browsing behaviour and can alert teachers about students at risk of suicide or self-harm.

One of the most widespread conversational chatbots is *ChatGPT*. It is a generative AI chatbot developed by Open-AI and launched in 2022. ChatGPT uses natural language processing to generate human-like conversational responses and enables users to refine and steer a conversation towards a desired length, format, style, level of detail, and language. Since its maiden release into the public domain on November 30, 2022, it garnered more than one million subscribers within one week. By January 2023, it had become the fastest growing consumer software application in history, gaining 100 million users in 2 months (Lo, 2023). The website's design concept is quite simple. Users can create an account, log in and type their questions. Within seconds, the chatbot generates bodies of texts in response and users have the ability to instruct the chatbot to modify or regenerate the response. ChatGPT can provide writing assistance to students by suggesting ideas for academic papers. Explanations can be given to homework exercises as ChatGPT breaks down a complex problem into simpler terms and provides step-by-step guidance to students' questions. One of the most useful abilities is translating an assignment into a student's native language. This means that students from foreign countries can be integrated into classrooms more easily. Also, it is a powerful tool for coding, especially for computer science students. It can help debug code and explain programming concepts. It can serve as a virtual assistant to enhance students' performance. ChatGPT's ability to facilitate collaboration by generating different scenarios for students to work collaboratively in group activities is worth noting. It can provide a discussion structure, real-time feedback and

personalized guidance to facilitate group discussions and debates. It is a virtual tutor that gains more interest in its abilities from students. Moreover, it can be a powerful and useful tool for educators and teachers as it can generate exercises, quizzes and scenarios for students' assessments.

Khanmigo is a generative AI tool developed by Khan Academy and powered by OpenAI's GPT-4. Though it was not originally designed as a language learning tool, it has capabilities that support autonomous learning, including reading and writing in various subjects. Khanmigo's key features include structured tutoring interactions, writing support, debate simulations, and creative chat with fictional or historical characters (Shetye, 2024). The system guides students toward answers rather than giving them outright, aiming to simulate the role of a thoughtful tutor. In terms of language learning, Khanmigo provides opportunities for meaningful text-based interaction and contextualized output. However, the tool may not be suitable for all learners, particularly beginners, as the complexity of the language used can be a barrier. Furthermore, while it offers text-to-text interaction and vocabulary explanation, it currently lacks speech recognition or pronunciation practice features for languages, like French. Its strength lies in its ability to foster critical thinking and exploration across disciplines, but its application in structured language acquisition is limited by the absence of focused linguistic scaffolding and speech features.

Quizlet is a digital learning application designed to reinforce knowledge through flashcards, quizzes, and game-based learning (Anwar, 2025). Quizlet has been shown to significantly improve both students' critical thinking skills and their learning outcomes. A study conducted on students at a religious school in Indonesia found that using Quizlet led to notable gains in the students' abilities to analyze, evaluate, and synthesize sentence structures, especially when learning about grammatical components. Before using Quizlet, students struggled with grammar and exhibited low engagement due to traditional, lecture-based teaching methods. Quizlet changed this dynamic by making the learning process more interactive, visually engaging, and student-centered. The tool was particularly effective in boosting vocabulary retention and making grammar instruction more approachable. While Quizlet is not built specifically for in-depth language exploration or conversation practice, it excels in foundational skill-building and provides a strong platform for vocabulary acquisition and grammatical understanding.

Duolingo is a globally popular online language learning platform known for its innovative use of technology, gamification, and accessibility (Kazu, 2025). Offering courses in numerous languages including Spanish, French, German, and Italian, Duolingo appeals to a wide demographic through its engaging and user-friendly interface. The platform adopts a gamified approach to learning, incorporating features such as points, badges, and instant feedback to motivate users and enhance retention. Lessons are modular and compact, focusing on building proficiency in reading, writing, listening, and speaking. Its adaptive learning algorithm customizes lesson difficulty based on user performance, creating a personalized learning experience. Duolingo also supports interactive peer engagement, allowing users to track their progress, revisit completed courses, and participate in community-based learning. Although widely embraced for its convenience and inclusiveness, ongoing research is exploring its effectiveness for specific age groups, such as high school learners. Nevertheless, Duolingo remains a leading example of how educational technology can democratize and enhance language learning on a global scale.

In Cyprus, AI adoption remains limited and is at early stages. A private initiative called ***AInstein*** was introduced in 2023 (Reuters, 2023). The educational robot speaks in a North American accent, tells jokes, attempts to speak Greek and advises on how Albert Einstein's theory of relativity can be taught in class. Students seem to be enthusiastic about this robot and tutors declare that the ultimate purpose is to incorporate it into their teaching routine. To this direction, the Ministry of Education in Cyprus has recently announced plans for training and infrastructure development (Michaelidou, 2024). These examples highlight the global momentum of AI in education and Cyprus' early steps toward embracing this transformation.

THE QUESTIONNAIRE

The questionnaire used in this research was distributed to educators across Cyprus with the goal of assessing their awareness and understanding of AI and its possible application within the educational environment. It aims to identify the potential benefits and anticipated drawbacks of integrating AI tools into classrooms, as well as to evaluate the current level of infrastructure. The questionnaire involves demographic questions, as well as it contains questions focused on perceptions and personal experiences.

It is obvious that the majority of respondents are employed at the secondary and tertiary levels of education (Figure 1). The dominant age group falls between 31 and 42 years old, followed by those aged 43 to 54 (Figure 2). This demographic trend suggests that most participants belong to younger age and middle-aged groups, who are generally more accustomed to using technology.

Figure 1
Educational level of participants

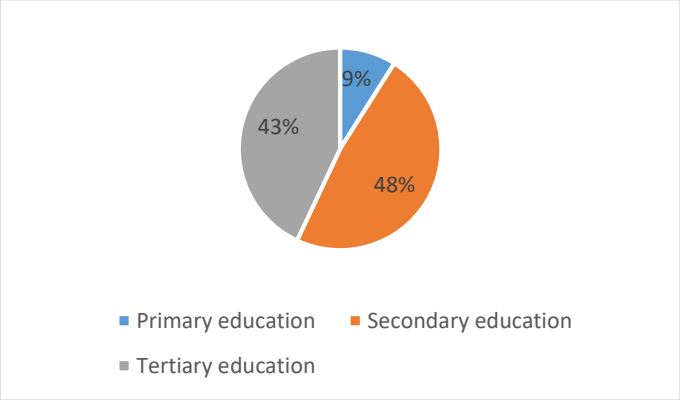
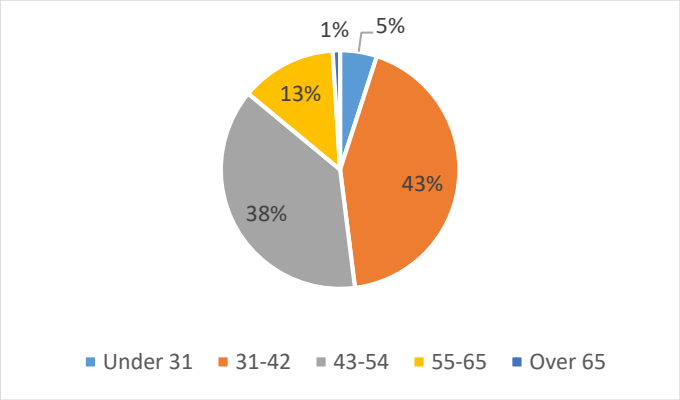


Figure 2.
Age of participants



The research explores how the educational community perceives the concept of AI within educational settings and examines participants' familiarity with it. According to Figure 3, more than half of educators report having a basic understanding of AI. Notably, 22% indicate they are very familiar with the concept, while only 1% specialize in the field. Meanwhile, 13% of educators state they are not familiar with AI at all. These findings suggest that although AI is a widely discussed topic, many educators have yet to engage with it meaningfully. This highlights potential barriers to AI adoption in education, primarily due to a limited depth of understanding, and underscores the need for targeted training programs and seminars to keep educators informed about current trends and developments in AI.

Figure3
Familiarity with the concept of AI

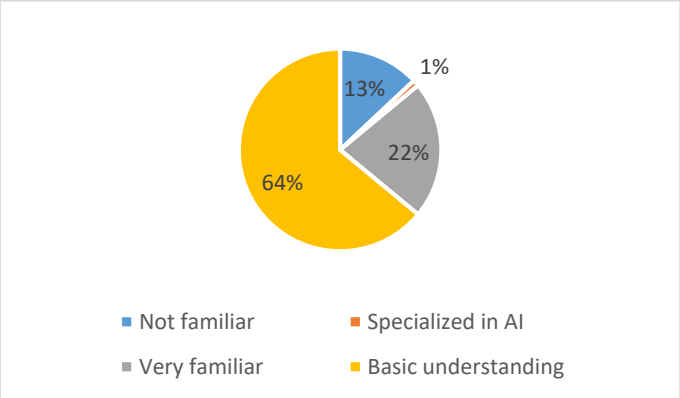


Figure 4 addresses responses to the question, “What is AI for you?”, revealing a range of perceptions among participants. Some respondents describe AI as powerful computing tools capable of processing large volumes of data and performing complex tasks efficiently. Others characterize AI as clever or intelligent machines that can mimic human reasoning or problem-solving abilities. A portion of the participants associate AI primarily with robotics, viewing it as the simulation of human-like behavior through machines. Meanwhile, another group sees AI as a set of automated procedures designed to perform tasks without human intervention. These varied interpretations highlight the diverse understandings of AI among educators, reflecting both technical and conceptual perspectives.

Figure 4
What is AI for you?

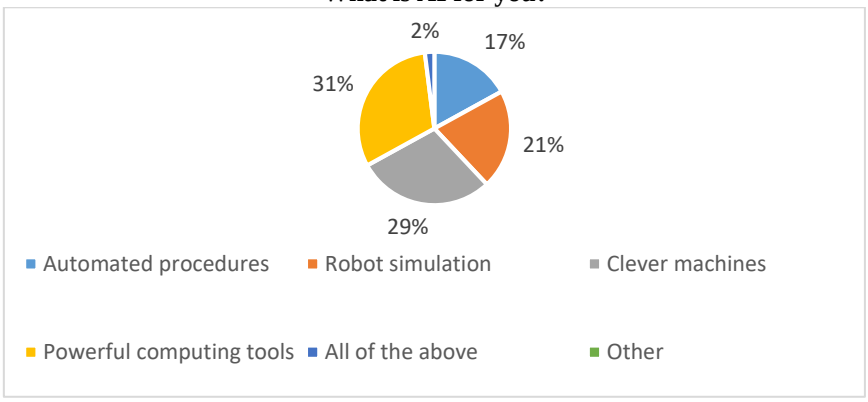


Figure 5 explores educators' feelings and emotional responses toward the use of AI tools in educational contexts. While most of participants express enthusiasm and optimism about the potential of AI enhancing teaching and learning, others report feelings of insecurity, uncertainty, and even anxiety. These mixed emotions are understandable, especially given the rapid pace at which AI technologies are evolving and being introduced into the educational landscape. For a large number of teachers, anxiety stems from a lack of sufficient knowledge or training on how to effectively utilize these tools within their specific teaching practices.

Figure 5
Feelings about AI tools.

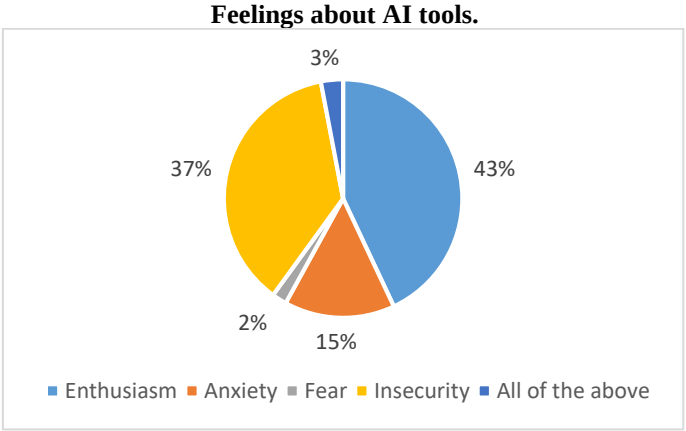


Figure 6 illustrates that educators recognize a range of significant benefits arising from the integration of AI into the educational process. Among the most widely acknowledged advantages is the potential for AI to enable more personalized learning experiences. Through adaptive learning systems, AI can tailor educational content to match individual students' pace, learning styles, and areas of difficulty. Educators also point to increased student motivation as a major outcome of AI-supported learning environments, particularly when interactive platforms are employed to stimulate interest and active participation. Another notable benefit is the early identification of at-risk students, which are considered more likely than their peers to experience academic failure. AI systems can monitor learning patterns, detect signs of struggle, and alert educators to intervene promptly with targeted support, potentially preventing long-term academic setbacks.

However, Figure 7 reveals a parallel set of concerns among educators, underscoring the complex and often ambivalent attitudes toward AI in educational contexts. A primary worry is that increased reliance on AI might lead to a decline in students' critical thinking skills. With easy access to AI-generated answers and solutions, there is a risk that students may become passive consumers of information, rather than active problem-solvers who engage in analysis, reflection, and independent thought. Moreover, educators are apprehensive about the potential for AI to obscure or diminish the teacher's role. While AI can support instructional delivery, it cannot replicate the human connection, mentorship, and emotional support that teachers provide. If students begin to perceive AI as the primary authority, there may be a failure to appreciate the expertise and importance of educators. Additionally, practical limitations such as budget constraints present significant barriers to equitable AI implementation. Schools and universities with limited financial resources may be unable to access, maintain, or effectively integrate AI technologies, potentially widening the digital divide and exacerbating educational inequalities.

Figure 6
Benefits of using AI tools

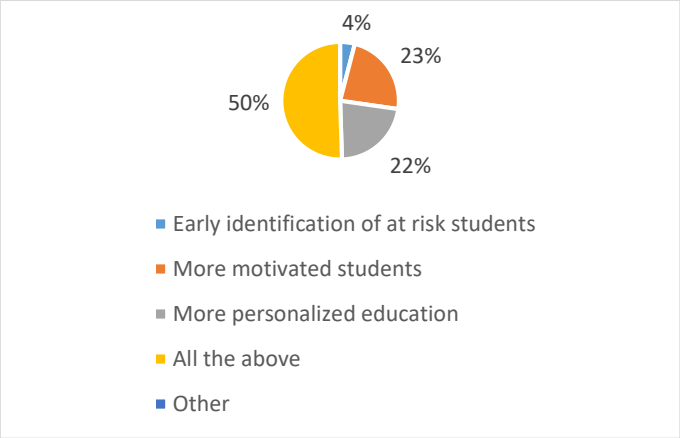
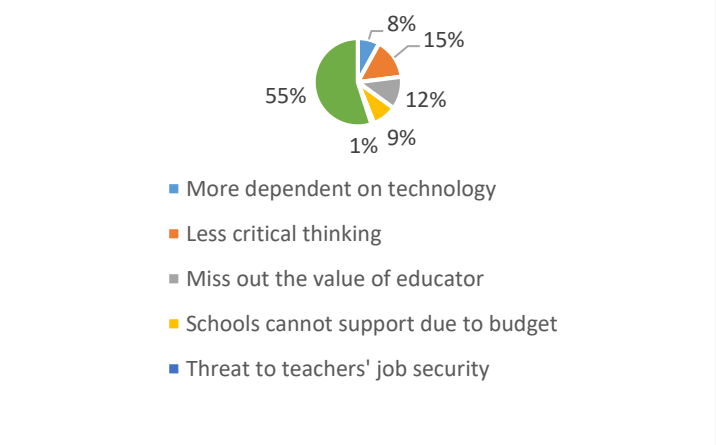


Figure 7
Side effects of using AI tools



Although nearly half of the educators have not been informed about AI tools and their possible use in the education system (Figure 8), most of them may seem willing to integrate AI tools and adjust their teaching method (Figure 9).

Figure 10 reveals that 83% of educators desire to have the right to accept or reject AI tools in their classrooms. Allowing them to have the right of acceptance or rejection respects their professional autonomy and judgement. Moreover, letting them use AI tools when they feel ready can lead to better learning outcomes.

Figure 8.
Have you ever been informed about AI tools and their possible use in education system?

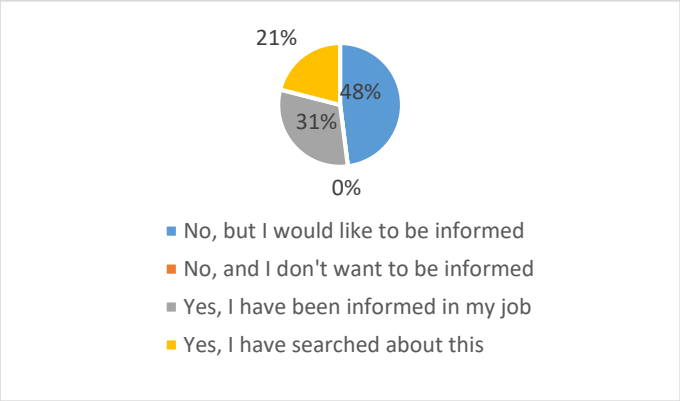


Figure 9
Willingness of adjusting teaching methods to integrate AI tools in classrooms

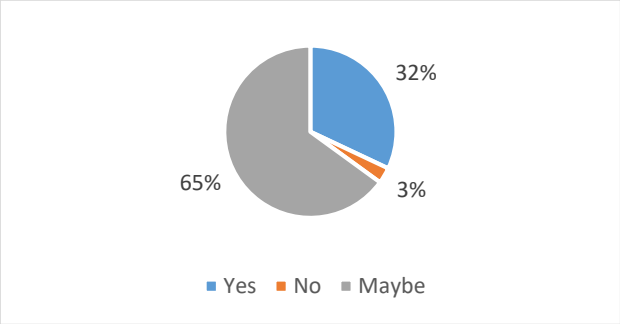


Figure 10
Do you want to have the right to accept or reject AI tools in education?

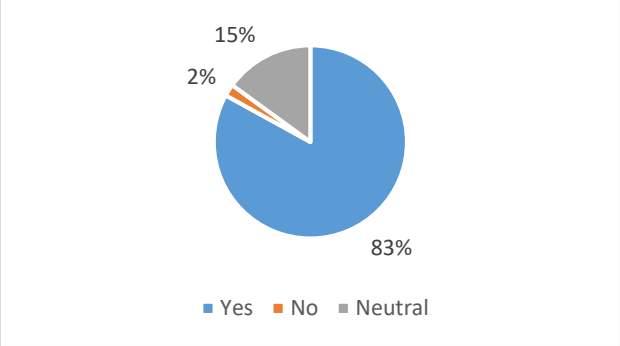


Figure 11
Appropriate infrastructure in Cyprus to integrate AI tools

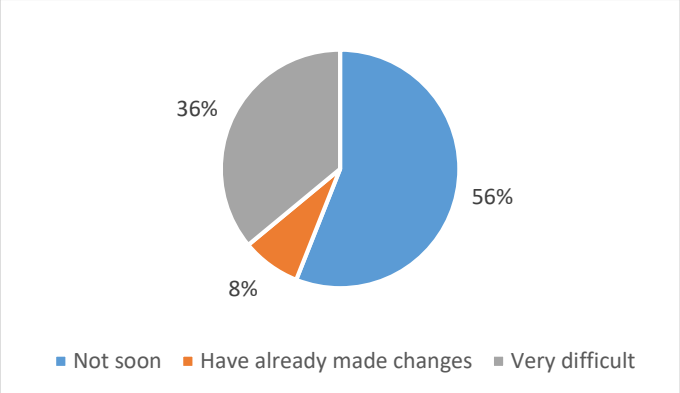


Figure 11 makes it clear that only a small percentage -specifically 8%- of educators supports that Cyprus has already made changes in its education system for a possible integration, while most of them state that it is quite difficult, or it will not happen soon enough. These findings highlight a prevailing sentiment of uncertainty and concern about the pace and feasibility of educational reform in Cyprus in relation to integration efforts.

CONCLUSIONS

This research aimed to assess educators' awareness, perceptions, and readiness for the integration of AI tools in the educational landscape of Cyprus. The findings reveal that while most educators possess a basic understanding of AI, only a small minority are highly familiar or specialized in this field. This aligns with the literature review, which indicates that Cyprus is still in the early stages of AI adoption in education, as demonstrated by the recent introduction of the AInstein initiative. In contrast, countries like the United States, China, and India have already incorporated advanced AI tools—such as Knewton, Squirrel AI, Byju's, and Socratic—into their education systems, leading to more personalized learning, improved student motivation, and timely identification of at-risk students.

The results of the questionnaire mirror global findings in the literature regarding the perceived benefits of AI, particularly its role in personalizing education, enhancing student engagement, and offering early intervention for students at risk of academic failure. This is consistent with the capabilities described in AI tools like Knewton and Squirrel AI, which analyze student performance to tailor learning paths. Similarly, educators in Cyprus recognize AI's potential to foster motivation through interactive and adaptive learning environments, a benefit also highlighted in studies of platforms like Byju's and Quizlet.

However, the research also uncovers concerns that echo the challenges discussed in literature. Teachers worry about the potential reduction of critical thinking skills among students and the possibility that AI might undermine their professional roles—concerns also raised in global discussions about AI in education. Additionally, practical barriers such as limited infrastructure and financial constraints are particularly pronounced in Cyprus, further slowing the adoption process compared to more technologically advanced countries.

Despite these concerns, most of the educators express openness to adopting AI tools, provided they have the autonomy to decide how and when to implement them in their classrooms. This willingness reflects a global trend where teachers see AI as a supportive tool rather than a replacement for their roles. Nonetheless, the findings strongly indicate that without targeted professional development, infrastructure investment, and supportive policies from the Ministry of Education, Cyprus will struggle to fully benefit from AI's transformative potential in education.

In conclusion, the study highlights a gap between the global advancement of AI in education and Cyprus's current readiness. Bridging this gap will require coordinated efforts to provide educators with training, resources, and autonomy, ensuring that AI serves as a complement to human teaching rather than a substitute.

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PERCEPTIONS OF FUTURE EDUCATORS REGARDING THE UTILIZATION OF ARTIFICIAL INTELLIGENCE IN EDUCATION

Bassounas Athanasios
Educational Consultant in Informatics
Directorate of Secondary Education of Ioannina
e-mail: basounas@sch.gr

ABSTRACT

The utilization of Artificial Intelligence (AI) is one of the main fields of interest in the recent years, for both educators and educational researchers. The present study explores the perceptions of future educators regarding the potential of AI for both teachers and students, the challenges and risks associated with its use and the conditions necessary for the effective and beneficial integration of AI into all aspects of the learning process. The research was conducted among students of the Annual Pedagogical Training Program (E.P.PAI.K) of the Higher School of Pedagogical and Technological Education (A.S.PAI.T.E.), representing various fields and with various levels of teaching experience. These students are potential future educators in Primary and Secondary school education. Data collection was carried out using an anonymous online questionnaire with both closed (Likert scale) and open-ended questions. The questionnaire gathered demographic data, information on the technological proficiency of the students, their familiarity with digital technology and AI and its applications, their opinion regarding the use of AI by teachers and students and the consequences it may have and, finally, the prerequisites for effective and safe utilization.

The research findings indicate that the future educators are highly familiar with digital technology and particularly AI and they often use AI applications. They believe that AI can support educators in lesson planning, development of instructional material and as a means to attract and engage their students' attention. They also acknowledge that AI can be beneficial for students (to a lesser extent compared to teachers), mainly in familiarization with technology and knowledge acquisition. However, the participants of the study recognize risks and challenges associated with AI integration in education. A significant proportion of the respondents expressed their concern about that fact that AI could hinder and diminish students' critical thinking skills, as well as fostering dependence on technology and isolation from authentic human interactions. Other risks are plagiarism and intellectual property violation. Moreover, most future educators fear that AI might diminish the role of the teacher. Finally, nearly all future teachers emphasized the necessity of establishing clear policies for the ethical and effective use of AI in education. They also strongly advocated for systematic training and ongoing support to equip educators with the skills required in this evolving technological environment.

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Keywords: Artificial intelligence, educators' perceptions, digital technology in education.

INTRODUCTION

The use of Artificial Intelligence (AI) in the learning process, in every level of education, is one of the most important topics of interest in educational research both in Greece and internationally (Forero-Corba and Bennasar, 2024; Yim and Su, 2024; Wang et al., 2024). A large number of seminars and training programs are organized by universities and other institutions, aiming to support educators in the use of AI applications and tools. Many teachers are exploring the potential of AI to facilitate and improve their tasks. At the same time, even those who are not positive to the use of AI, acknowledge that their students are already using AI in various ways and feel that they themselves cannot be distant from these developments. Nevertheless, even teachers who are positive and active with AI, still have concerns about the impacts and problems it may create and they consider both ongoing teacher training and implementation of good practice rules necessary for the use of AI tools in education. This study explores the perceptions of students of the Annual Pedagogical Training Program (E.P.PAI.K) of Higher School of Pedagogical and Technological Education (A.S.PAI.T.E.) regarding these issues, as the new reality created by the spread of AI in education is one of the major challenges they are expected to face in the future. Moreover, as future educators, they will be called to play a particularly significant role in relation to this new form of literacy, that is emerging globally in a very rapid pace.

THEORETICAL FRAMEWORK

Artificial Intelligence and specifically Machine Learning (ML) have experienced rapid development and expansion in the last few years and education is one of the fields with active involvement in adoption and utilization of its applications. Machine Learning is a branch of AI which focuses on systems that learn from data, while AI includes the creation of systems that can operate autonomously. In the context of educational research, the term Artificial Intelligence typically encompasses AI and ML, as both aim to create systems that can perform tasks in a "human-like" manner. They both rely on mathematical and statistical techniques for data processing and analysis (Forero-Corba and Bennasar). In the present study, the term Artificial Intelligence will be used inclusively to refer to both AI and ML.

Utilization of AI tools in Education

Various tool and applications of AI have been used in education (Stancovic et al., 2024), some of them being general-purpose and others specifically designed for the needs of education. Large Language Models (LLMs – also referred to as chatbots) such as ChatGPT, Gemini, DeepSeek and others are the most commonly-used and well-known general-purpose AI tools. These models are designed to interact with humans through conversation, providing answers to questions, performing tasks such as summarizing text, translation and generating multimodal content according to the user requirements. Another category includes tools that generate images and designs based on user text prompts (Midjourney, NightCafe, Leonardo.Ai, BlueWillow, Canva etc.). Many educators also use AI applications for video creation and editing (Pictory, Sora, Reed.io, Lumen5 etc.) and applications for music composition (Aiva, Suno AI, Voicemod, Soundful etc.). Apart from general-purpose applications, there are education-oriented platforms such as the MagicSchool AI suite (https://www.magicschool.ai/), which offers tools for lesson planning, tools to create quizzes, worksheets, rubrics, embed questions in educational videos and many more. Many teachers use tools to create tests and assignments, prepare student feedback, correct projects etc. Kwid, Sarty and Yang (2024) categorize educational AI tools into three types: instructional, administrative and analytical. Instructional tools are used to improve the quality of the education provided to students. They include resources for personalized and differentiated teaching, feedback tools, learning management applications etc. Administrative tools assist teachers to create lesson plans and assessments and they offer automatic correction and grading functions. There are tools for monitoring student behavior and performance, facilitate communication with parents and manage other time-consuming administrative tasks. Finally, analytical tools can process student data to predict students' learning paths and even suggest personalized interventions. Tools like MagicSchool may incorporate features form all three categories.

The research conducted by Daskalaki, Psaroudaki and Fragopoulou (2024) involving 1754 educators in Greece and four other countries showed that AI is mainly used to support teachers' work and to engage students actively. Teachers believe that AI could be valuable in personalized learning. ChatGPT, the most well-known AI tool was used by Athanassopoulos et al. (2023) to improve foreign language writing in multilingual and multicultural classrooms, specifically with students with refugee/migrant backgrounds who often face additional language difficulties. The study involved eight 15-years-old students of a Greek junior high-school. At first, students wrote a test, which was then improved by ChatGPT in terms of vocabulary and grammar. Next, the students produced a new text, according to the model's corrections. The ones who used ChatGPT showed improvement in vocabulary and grammar and produced written work of higher quality. Tsiotakis and Spanirriga (2023) explored the use of ChatGPT for peer assessment and feedback of student essays. They found that students were able to distinguish the model's evaluation and feedback from the one provided by their classmates and they believed that it was more comprehensive and well-reasoned, while also recognizing

AI's potential to deliver personalized and effective feedback. Educators of primary and secondary education primarily use AI to assist them in text production and also in the production of digital content such as images, audio and video (Galindo-Domínguez et al., 2024). A study by Xing et al. (2025) showed that AI tools and especially LLM's such as ChatGPT, are used for the analysis of student responses, as assistant of students of special needs, in the automated generation of educational content and for providing feedback. Alier, García-Peñalvo and Camba (2024) found that generative AI supports personalized teaching and learning, enabling adaptive content, quizzes, assignment and assessments and new ways of student evaluation, reducing the teachers' workload.

Issues and concerns arising from the use of AI in education

AI use in education may offer potentials and opportunities, but it is also accompanied by concerns and challenges regarding its effectiveness in improving education and also risks and dangers. A study in Greek foreign language teachers (Varsamidou, 2024) revealed their cautious attitude toward the use of AI, as they believe that it hinders the development of students' critical thinking and creativity, it makes students passive recipients of information and increases the risk of plagiarism in their assignments. Additionally, it poses threats for personal data privacy, while the very role of the teacher is under threat. On the other hand, particularly younger teachers, recognize the need for flexibility and adoption to technological developments. They also believe that saving of time is the main advantage of AI and they consider teacher training significantly essential. Concerns about hindering students' critical thinking and exposing then to biased data were expressed by educators participating in the study by Daskalaki et al. (2024). Xing et al. (2025) found that the main concerns related to AI are inaccuracy, lack of specialization, algorithm bias due to biased training data and risks concerning personal data protection. The work of Alier, García-Peñalvo and Camba (2024) identifies problems with authenticity and plagiarism, as students may use AI to create texts for assignments or answer tests, bias, as the training data of AI models may reinforce prejudices, and finally the protection of personal data. The use of AI could create or widen various types of divides (Dieterle, Dede and Walker, 2024): in terms of access to technology, algorithmic bias resulting from training data, the logic of algorithms reinforcing existing social and economic inequalities, the correct interpretation of AI-generated content by teachers and students and finally a social divide, as the accumulation of all these factors can affect students' educational and social development.

Conditions and prerequisites for utilizing AI in the educational process

Foreign language students, who participated in a study conducted by Varsamidou (2024) stated that systematic training in AI use is very important. Another study (Velli and Zafiropoulos, 2024) with the participation of 342 Greek primary and secondary school teachers showed that teacher training in AI is essential to enhance their acceptance and that policies for AI integration in education should focus on the reliability and usability of tools and, finally, that support from colleagues and the school environment can further reinforce their positive attitude toward AI. Gavriilidou (2024) introduces the term "AI literacy" and argues that it will soon become a necessary condition for a citizen's participation in social and economic activities. She emphasizes the importance of education in AI, starting with teacher professional development and the creation of appropriate curricula. The need to train future educators in AI has been noted in a number of studies (Katsantonis and Katsantonis, 2024). Uygun's research (2024), in addition to highlighting the need for education and support, identifies teacher involvement in the development and implementation of AI tools a key factor for successful integration in education. AI literacy, that is the development of skills that allow teachers to understand and critically use AI, is crucial for its integration into teaching (Velander et al., 2023). That is the result of the fact that most teachers learn about AI through incidental learning, which often leads to misconceptions. Moreover, there is lack of clear guidelines in educational programs and policies, Finally, pre-existing beliefs about AI significantly influence teachers' attitudes towards its integration in education.

Dialogic or Large Language Models (LLMs), such as Chat GPT, Gemini, DeepSeek etc., which are rapidly expanding globally, come along with challenges regarding privacy, data integrity, bias and ethical use (Kiortsi, 2024). This highlights the urgent need for strict legal frameworks and increased transparency. Nguyen et al. (2023) noted that, although AI can improve the quality of teaching and learning, it also raises ethical concerns, such as privacy, algorithmic bias and equitable access. Despite efforts by many international organizations such as UNESCO and the European Commission to establish general ethical principles for AI, there is still no broad consensus on a clear ethical framework for AI in education. Huang (2023) identifies several essential factors for the use of AI in education: the regulation of data usage, through legal and institutional frameworks, student education in data safety, protection of student privacy rights and self-regulation of AI industry to promote safe and ethical use.

Teachers' perceptions of AI in Education

The study by Velli and Zafiropoulos (2024) involving 342 Greek primary and secondary education teachers found that perceived usefulness is the most significant factor influencing teachers' intention to use AI tools. Additionally,

the desire for personal innovation and social influence also plays an important role. Teachers with student-centered beliefs tend to perceive AI as more useful and reliable compared to teachers with more "traditional" views. Galindo-Dominguez et al. (2024) studied teachers' attitudes toward AI and correlated them with their overall digital competence. They examined the teachers' perception on AI, their experience with it, their willingness to use AI in education and their expectations about the role of AI in their professional development. The study showed a clear link between digital competence and teachers' attitude towards AI. Uygun's study (2024) involving 74 Turkish teachers showed positive attitudes towards the use of AI in education, highlighting its potential to support personalized learning, improve teacher productivity and save time for teacher-student interaction.

Many studies investigate the attitude of future teachers (students of pedagogical university schools) towards the use of AI in education. Pre-service teachers answer questions about the way they use AI for their studies and, more generally, for their opinion about AI in education. Lavidas et al. (2024) studied the views of 197 students from humanities and social sciences of the University of Patras. The study showed that expected performance (usefulness), habit and enjoyment are the main factors influencing the students' intention to use AI tools. Moreover, intention to use, habit and facilitating conditions (e.g. technical support) were found to influence the actual use of such applications. A similar study by Katsantonis and Katsantonis (2024), involving 190 students from a Greek University's social sciences department, showed that most of them had a positive attitude towards AI. They believed that AI education is important, both for daily activities and for their career, in the future. Furthermore, the sense of digital security was found to enhance the acceptance of AI. The study emphasized the need to integrate AI into educational programs and to prepare students for using AI in their future professional roles. Karataş and Yüce (2024) investigates the use of ChatGPT in education among students in early childhood, elementary education and physical education schools at a Turkish university. The study was conducted after students had received relevant AI training. The results showed that AI facilitates personalized training, reduces teacher workload, enhances the learning experience and supports the creation of teaching material.

RESEARCH METHOD

The aim of this study was to record and analyze the views of future teachers regarding the use of Artificial Intelligence in the educational process. The research was conducted among students of the Annual Program of Pedagogical Training (E.P.PAI.K) of the Higher School of Pedagogical and Technological Education (A.S.PAI.T.E.) in Ioannina. These students come from various fields and have various levels of teaching experience. They are future educators in primary and secondary education. The research questions were:

1. How familiar are pre-service teachers with digital technology and with AI?
2. To what extent do they believe AI can assist teachers?
3. To what extent do they believe AI can support students?
4. How significant do they consider the problems and risks associated with the use of AI in education?
5. How important do they consider the establishment of a regulatory framework and the training of teachers?

The data collection instrument was a questionnaire created for the purposes of the current study. It was based on the results of literature review, the researcher's experience and questionaries from similar studies (Daskalaki et al., 2024; Uygun, 2024; Varsamidou, 2024). The questionary consists of closed-ended Likert scale questions, using a five-point scale (Not at all – 1, A little - 2, Fairly – 3, Much – 4, Very much – 5), capturing the respondent's level of agreement. A few open-ended questions were also included, but they were answered by only a small number of participants. The questionary was distributed to the students in electronic form (via an online form) in March 2025. The link of the form was available after a brief oral introduction by the researcher, during which the purpose of the study was explained, along with assurances of voluntary and anonymous participation. The researcher was not present while the students completed the questionnaire and no clarifying comments were provided during the process.

RESULTS

The presentation of the results includes the demographic and professional characteristics of the students who responded to the questionnaire and the descriptive statistics of their answers in each of the research questions. 81 students responded to the questionnaire (out of the approximately 100 students who attend in the program in Ioannina.) Table 1 presents the characteristics of the respondents.

The following tables present the results of the research. Each table presents the respondents' answers in each research question. The numbers are percentages, rounded to the nearest integer, for ease of reading. Comparisons are also made between answers of each question, by converting the Likert scale answers to numerical values, as follows: 1 – Not at all, 2 - A little, 3 – Fairly, 4 – Much, 5 – Very much. For example, if the average score of a particular question is 3.9,

this indicates that responses are concentrated around 'Much'. In the following, the abbreviation M denotes the mean value and SD denotes the standard deviation. Table 2 presents the responses regarding familiarity with digital technologies, and specifically Artificial Intelligence

Table 1.
Demographic and professional characteristics of the participants

Variable	Value	Count	Percentage
Gender	Man	20	24,7 %
	Woman	61	75,3 %
Age	Up to 25 years old	9	11,1 %
	26 to 35 years old	34	42,0 %
	Over 35 years old	38	46,9 %
Years of teaching experience	0	45	55,6 %
	1 to 5	21	25,9 %
	Over 5	15	18,5 %
Additional studies (the highest)	PHD	1	1,2 %
	Master's degree	46	56,8 %
	Second degree	2	2,5 %
	None	32	39,5 %
Field of basic degree	Humanities/Law/Social studies	10	12,3 %
	Science/Technology/Agricultural	26	32,1 %
	Health/Biology	20	24,7 %
	Economy	16	19,8 %
	Informatics	9	11,1 %

Table 2
Familiarity with digital technology and Artificial Intelligence

Digital technology and AI	Not at all	A little	Fairly	Much	Very much
a) How familiar are you with digital technology (internet, web 2.0, mobile devices etc.)?	0%	6%	20%	42%	32%
b) How secure do you consider digital transactions (payments, e-shops, etc.)?	1%	9%	48%	37%	5%
c) How regularly do you use social media?	2%	2%	14%	30%	52%
d) Are you familiar with digital applications suitable for education?	0%	9%	44%	30%	17%
e) Do you know what Artificial Intelligence (AI) is?	0%	4%	28%	35%	33%
f) How regularly do you use AI applications?	4%	20%	44%	26%	6%

The future teachers who participated in the study reported a high level of familiarity with digital technology (M=4.00, SD=0.88) but moderate familiarity with digital applications suitable for education (M=3.56, SD=0.88). They use social medial very frequently (M=4.26, SD=0.96). The majority stated good knowledge about AI (M=3.98, SD=0.88), although frequency of AI use is moderate (M=3.11, SD=0.92).

The second research question examined the participants' opinions on the extent to which AI can support teachers in any aspect of the educational task. Table 3 presents the responses.

Table 3
AI support for teacher's work

To what extent do you believe AI can support teachers in:	Not at all	A little	Fairly	Much	Very much
a) designing and preparing lessons	0%	5%	16%	57%	22%
b) creating assignments, test, etc.	0%	1%	19%	54%	26%
c) student engagement	0%	7%	28%	40%	25%
d) student assessment	6%	7%	33%	37%	16%
e) grading and correction students' work	4%	14%	37%	32%	14%
f) personalized teaching to meet individual student needs	9%	6%	35%	38%	12%
g) administrative/management tasks	4%	11%	32%	40%	14%

The participants consider that the area that AI can contribute the most is creation of assignments and tests (M=4,05, TA=0,71). Lesson planning and preparation (M=3,96, TA=0,77) and student engagement are two functions in which AI can provide significant support. The future teachers consider the remaining functions of Table 3, less suitable for AI support.

The third research question explored the future teachers' perceptions about the potential and suitability of AI to support students' work. Table 4 present specific areas AI could assist with, along with respondents' responses.

Table 4
AI support for students

To what extent do you believe AI can support students in:	Not at all	A little	Fairly	Much	Very much
a) production of written language	14%	16%	31%	36%	4%
b) brainstorming ideas for a topic	1%	12%	26%	52%	9%
c) knowledge acquisition	2%	9%	26%	46%	17%
d) becoming familiar with technology	0%	0%	15%	49%	36%

The participants of the research believe that AI can support students, but to a lesser extent compared to the support it can offer teachers. They stated that AI can significantly contribute to students' familiarity with technology (M=4,21, TA=0,68), whereas the other three functions can moderately by supported by AI.

Table 5 presents the participants' responses in six questions related to the fourth research question about problems and risks of use of AI in education.

Table 5
Risks and issues from the use of AI in education

To what extent do you believe the following are risks and issues of AI in education:	Not at all	A little	Fairly	Much	Very much
a) hindering student's critical thinking	0%	5%	20%	36%	40%
b) threat to personal data privacy	1%	9%	48%	26%	16%
c) exposing students to misleading or harmful content	2%	7%	51%	28%	11%
d) increased risk of plagiarism and copyright infringement	1%	9%	32%	36%	22%
e) undermining teacher's role	1%	11%	32%	31%	25%
f) increased risk of student dependency and isolation	1%	5%	20%	36%	38%

The study showed that the participants are aware of the potential challenges and risks associated with integration of AI in educational settings. They express concern that AI could impede the development of students' critical thinking skills (M=4.10, SD=0,89) and could also contribute to increased dependency and social isolation from authentic human interactions (M=4.05, SD=0.95). The other risks are regarded as somewhat less significant. It should be mentioned that a

considerable number of future teachers perceive AI as a factor that could diminish the traditional role of the teacher (M=3.37, SD=1.01).

Finally, the participants were asked how necessary they consider the establishment of rules and policies for the use of AI in education, as well as the need for systematic teacher training. International and Greek literature identifies these two factors as essential for the safe and effective integration of AI. Table 6 shows the related findings.

Table 6
Prerequisites for the safe and effective integration of AI

	Not at all	A little	Fairly	Much	Very much
How essential do you consider the establishment of rules and policies for the appropriate use of AI in education?	1%	1%	5%	46%	47%
How important do you consider systematic teacher training on AI use in educational settings?	1%	2%	10%	43%	43%

It is clear that future teachers consider both the establishment of rules and policies (M=4.36, SD=0.75) and systematic teacher training (M=4.25, SD=0.83) as crucial for integration of AI in education.

CONCLUSIONS

The results of the study revealed that the students of the Annual Pedagogical Training Program (E.P.PAI.K.) of A.S.PAI.T.E.) in Ioannina, who are prospective teachers from various academic disciplines, are familiar with digital technology and its applications in education. They reported knowledge of AI, although its use in practice remains moderate. It should be noted that he pedagogical integration of digital technology, including AI, is part pf the curriculum in the E.P.PAI.K. program. The participants recognize the value of AI in educational contexts, particularly in functions that contribute to time efficiency for teachers, such as the development of assignments and exams as well as lesson planning and preparation. Similar findings have been documented in the literature (Varsamidou, 2024; Velli and Zafiropoulos, 2024). With regard to use of AI by students, respondents perceived it as less beneficial for learners compared to its advantages for educators, giving greater emphasis on students becoming generally acquainted with technology. The importance of citizens being able to use AI effectively in both professional and everyday contexts (referred to as AI literacy) has been emphasized by numerous researchers (Gavriilidou, 2024; Velander, 2024).

The use of AI in education also raises concerns among future educators. A significant number of participants expressed the opinion that AI could hinder students' critical thinking and creativity and potentially lead to dependence and isolation from real social interaction. These concerns are consistent with findings in various recent studies (Daskalaki, Psaroudaki and Fragopoulou, 2024). Finally, the respondents highlighted the need for essential conditions to ensure the effective and safe use of AI in education. These include the formulation and enforcement of appropriate policies and ethical guidelines, systematic professional development for in-service teachers and the integration of relevant training in the education of pre-service teachers. Such needs are widely emphasized in current literature (Katsantonis and Katsantonis, 2024).

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COUNSELING GUIDANCE AND DIGITAL MEDIA: A SYSTEMATIC LITERATURE REVIEW (1998–2025)

Nosios Marios
PhD Candidate, University of Macedonia
Thessaloniki, Greece
email: mnosios@uom.edu.gr

Mpellos Dimitrios
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: jimmyakan@gmail.com

Venetsanos Antonis
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: myp25004@uom.edu.gr

Charmpa Dimitra
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: dimitracharmpa@hotmail.com

Katsaros Apostolos Charalampos
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: myp25009@uom.edu.gr

Bitzenis Aristidis
Professor, University of Macedonia
Thessaloniki, Greece
email: bitzenis@uom.edu.gr

Komporozou Maria
Postgraduate student, University of Macedonia
Thessaloniki, Greece
email: myp25007@uom.edu.gr

Koutsoupias Nikos
Professor, University of Macedonia
Thessaloniki, Greece
email: nk@uom.edu.gr

ABSTRACT

This study examines the scholarly output on digital career guidance and counselling through a quantitative bibliometric approach. A corpus of 167 publications from 1998 to early 2025 was analyzed using descriptive statistics, keyword co-occurrence, trend-topic methods, and thematic mapping to elucidate publication dynamics, author collaborations, and conceptual structures. Results show a stable annual publication rate, an average of 10.8 citations per document, and a mean of 3.7 authors per publication, with only 14.4% of papers involving international co-authorship. Journal articles emerged as the predominant dissemination venue, supplemented by conference proceedings and book chapters. Trend-topic analysis reveals an intellectual progression from institutional and infrastructure concerns (2001–2005), through e-learning and computer-assisted instruction (2005–2012), to sector-specific applications in medical education (2010–2014), culminating in recent interest in affective, motivational, and artificial-intelligence paradigms (2022–2023). Thematic mapping identifies *humans*, *mentoring*, and the *internet* as well-developed (motor) themes, while AI-related terms and chatbots emerge as new topics. These findings delineate a mature research domain with shifting thematic emphases. Future studies may advance global collaboration, examine the ethical dimensions of AI-mediated counseling tools, and address digital inequities within career guidance systems.

Keywords: Counseling, Digital Media, Systematic Review, Scientometrics

INTRODUCTION

The rapid integration of digital technologies in education and the labor market has brought about profound changes in the way counselling services are delivered. Particularly since the COVID-19 pandemic, the transition from exclusively face-to-face to digital or hybrid coaching environments has accelerated dramatically, highlighting the need for a systematic rethinking of the methods, tools, and ethical principles that underpin the coaching profession (Staunton, 2025; Sampson & Osborn, 2015).

The development of effective digital career guidance systems draws upon a combination of established theoretical models that offer complementary perspectives. Holland's RIASEC framework establishes a psychometric basis for aligning individual personality characteristics with vocational environments, thereby informing the construction of interest-based assessment instruments within online platforms (Leung, 2022). Concurrently, Savickas' Career Construction Theory offers a narrative paradigm that foregrounds adaptability, identity formation, and meaning making in career development, principles translated into interactive, reflective functionalities in digital interventions (Di Fabio & Maree, 2013; McIlveen & Patton, 2007). From a technological standpoint, the Technology Acceptance Model explicates determinants of user engagement in terms of perceived usefulness and ease of use, guiding the design of accessible, user-centered systems (Legris et al., 2002). Although these models originate in discrete disciplinary domains, psychometric assessment, narrative counseling, and technology adoption, they coalesce within digital contexts to underpin the development of career guidance tools that exhibit structural validity, pedagogical relevance, and responsiveness to individual psychological needs (Leung, 2022; Osborn & Sampson, 2015).

Computer-based Career Assessment and Guidance Systems (CACGS) play a dominant role in digital support. As Leung (2022) points out, modern CACGS, such as Infinity in Hong Kong, combine automated assessment processes, information support for career choices, and career planning tools, significantly reducing uncertainty in decision-making, especially among students. At the same time, the use of online personality and interest assessment tools offers immediate feedback and presents personalized career paths (Zainudin et al., 2020).

In the Greek context, platforms such as the e-stadiodromia of EOPPEP provide integrated guidance services, including information on educational programs, self-assessment tools, and the possibility of harmonization with European standards, e.g., Europass. Teleconsultation, either through video conferencing or written interaction, is becoming increasingly widespread, especially in times of limited physical access (Urdzina-Merca & Dislere, 2018). Recent scholarship has interrogated the attendant ethical dimensions within educational settings, notably issues of equity, accountability, and the risk of dehumanization (Morley et al., 2019). Additionally, the use of social networks, such as LinkedIn, for professional networking and mentoring introduces new opportunities while simultaneously requiring careful adherence to ethical standards and privacy considerations (Healy et al., 2023; Sampson & Osborn, 2015).

Among the key advantages of digital media are enhanced accessibility, greater flexibility in terms of service delivery time and location, tailored guidance based on individual profiles, and the ability to track progress systematically via e-portfolios. The integration of machine learning algorithms and chatbots is anticipated to enhance personalized guidance and support further (Wang & Li, 2024). However, Bankins et al. (2024) argue that the deployment of such systems must be underpinned by ethical transparency and firmly aligned with human-centered counselling values to engender trust and promote equity, an imperative echoed across contemporary AI ethics frameworks, which foreground fairness, accountability, and societal benefit (Floridi & Cowls, 2019; Jobin et al., 2019; Whittlestone et al., 2019). Nonetheless, the digital switchover also comes with significant challenges. First, the digital divide continues to exclude groups with limited access to technology or low digital skills (Lythreatis et al., 2021). Second, the abundance of information available often creates confusion, as users struggle to assess its validity (Eppler & Mengis, 2004). Finally, establishing and maintaining a trusting relationship between advisor and advisee has proven more difficult in the digital space, and the absence of a physical presence may reduce the depth and immediacy of communication (Staunton, 2025).

Ultimately, the incorporation of digital media into counseling practice heralds novel avenues for delivering innovative, individualized, and adaptable services. By leveraging robust digital infrastructures, the integration of educational and vocational guidance can facilitate individuals' seamless progression into lifelong learning and career trajectories. Nevertheless, the efficacy of these interventions hinges on rigorous, ongoing evaluation of technological tools, enhanced professional training, and sustained institutional support to ensure that digital systems augment, rather than displace, the human element, in accordance with human-centered AI principles advocating for safe, responsible, and user-aligned design (Shneiderman, 2020). Consequently, although digital guidance platforms hold considerable promise, their design and implementation should remain firmly rooted in transparent, evidence-based practices that acknowledge both their transformative potential and attendant systemic risks (Yazdani et al., 2023).

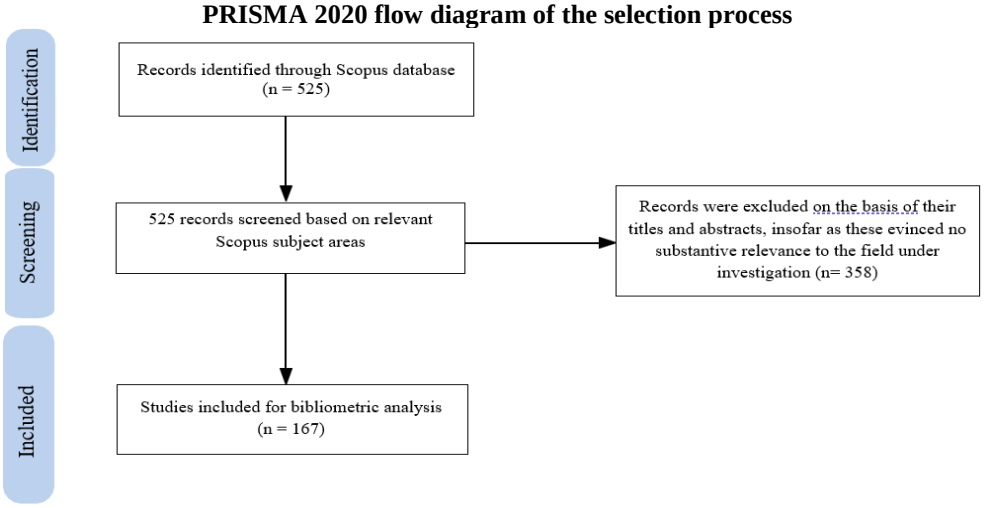
METHODOLOGY

This study adopts a quantitative, systematic bibliometric approach to analyze the structure and evolution of research within the discourse of counseling guidance and digital media (Bitzenis et al., 2025A; Bitzenis et al., 2023). The dataset was retrieved from the Scopus database (Nosios et al., 2025), using the following search query:

TITLE-ABS-KEY ((education OR training) AND mentoring AND (cti OR internet OR ai)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "MATH") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "AGRI") OR LIMIT-TO (SUBJAREA , "PHYS") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "DECI") OR LIMIT-TO (SUBJAREA , "ENER") OR LIMIT-TO (SUBJAREA , "MATE") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "CENG") OR LIMIT-TO (SUBJAREA , "CHEM"))

Furthermore, the processes of identification, screening, and selection of studies were conducted in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, thereby ensuring methodological rigor, transparency, and replicability, as depicted in Figure 1 (Page et al., 2021). Inclusion was restricted to English-language, peer-reviewed publications indexed in Scopus, thus ensuring methodological consistency, topical relevance, and a baseline level of scholarly quality, while non-English sources were excluded during the screening process.

Figure 1
PRISMA 2020 flow diagram of the selection process



Lastly, the finalized dataset was imported into the R statistical environment for comprehensive analysis (Bitzenis & Koutsoupias, 2023A; Bitzenis & Koutsoupias, 2023B). Utilizing the bibliometrix package, a suite of bibliometric tools and visualizations was employed to examine the data (Bitzenis & Koutsoupias, 2024A; Bitzenis & Koutsoupias, 2024B). Through this approach, key outputs, including descriptive tables, thematic maps, most frequent word graphs, and trend topic analyses, were systematically generated (Bitzenis et al., 2025B; Bitzenis et al., 2025C), enabling a robust exploration of publication trends, conceptual structures, and emerging research themes within the selected body of literature (Thomos et al., 2023; Zourna et al., 2021).

RESULTS

This section presents the main results of the bibliometric analysis, focusing on the scholarly output, collaboration patterns, and thematic orientations within digital career guidance and counselling.

The dataset under analysis, as depicted in Table 1, encompasses 167 documents published between 1998 and early 2025, drawn from 137 distinct outlets. Over the past 27 years, the annual growth rate in publication count has remained essentially stable rather than expanding or contracting. This plateau in volume suggests that, although the topic has attracted sustained interest, it has neither surged into a high-growth phase nor waned substantially over time.

Table 1
Descriptive statistics

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1998:2025
Sources (Journals, Books, etc.)	137
Documents	167
Annual Growth Rate %	0
Document Average Age	9.66
Average citations per doc	10.84
References REFERENCES	5010
DOCUMENT CONTENTS	
Keywords Plus (ID)	978
Author's Keywords (DE)	506
AUTHORS	
Authors	610
Authors of single-authored docs	23
AUTHORS COLLABORATION	
Single-authored docs	23
Co-Authors per Doc	3.71
International co-authorships %	14.37
DOCUMENT TYPES	
article	94
book chapter	16
conference paper	48
review	9

In terms of scholarly impact, the corpus achieves an average of 10.84 citations per document. With a total of 5,010 references cited across all papers, an average of roughly 30 references per document, authors routinely anchor their work in existing literature. The modest citation rate points to a research area characterized by steady engagement rather than a few outlier *blockbuster* studies; contributions typically receive a moderate level of attention without dominating citation indices.

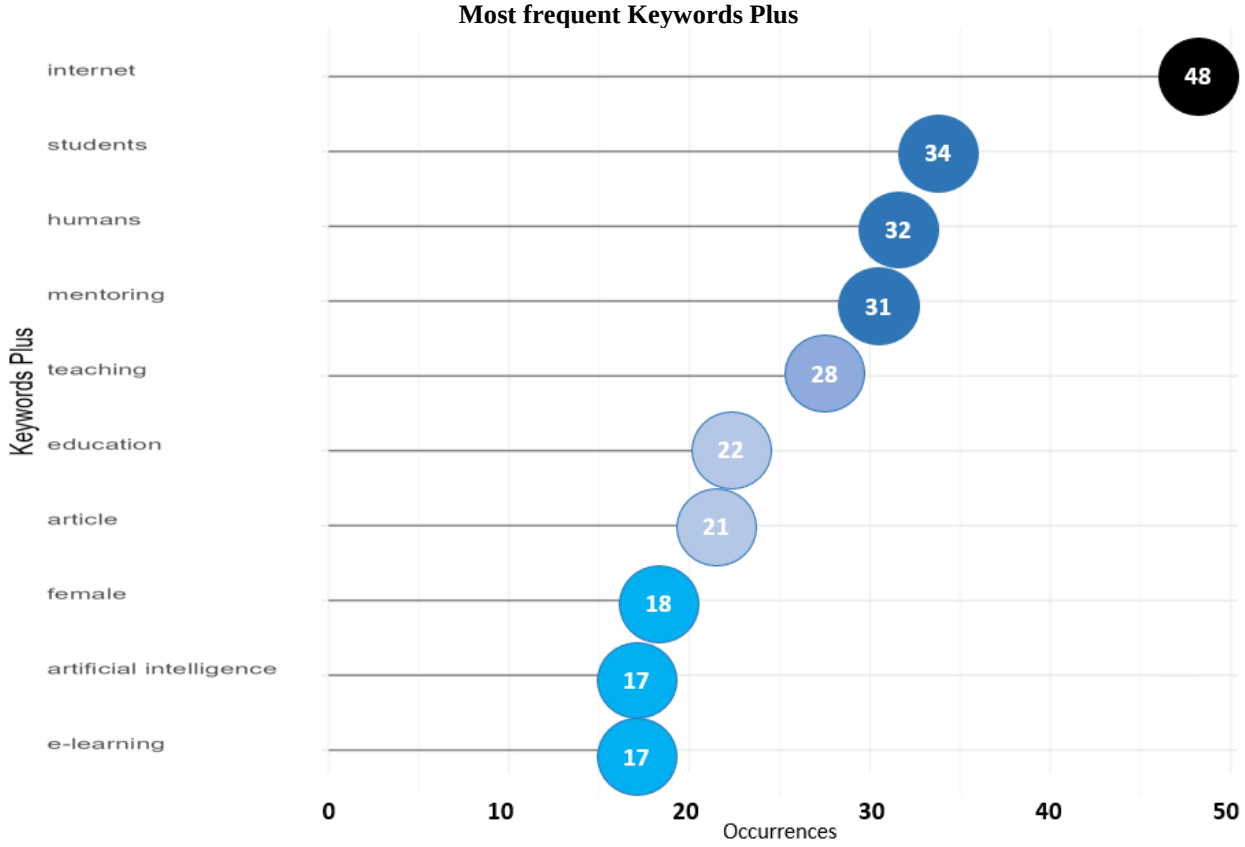
Authorship patterns reveal an intensely collaborative culture. Across 167 documents, 610 unique authors appear, yielding an average of approximately 3.7 co-authors per paper. Only 23 documents (13.8 percent) are single-authored, underscoring a clear preference for teamwork. International collaboration, however, accounts for just 14.4 percent of co-authored outputs, implying that most partnerships occur within the same country or region. While co-authorship is the norm, cross-border cooperation remains relatively limited.

Publication types further illustrate the field's communication channels: journal articles dominate with 94 entries, followed by conference papers at 48, book chapters at 16, and reviews at 9. This distribution highlights peer-reviewed articles as the principal medium for disseminating original findings, complemented by conferences as secondary venues and book chapters as occasional outlets for more in-depth or interdisciplinary perspectives. Reviews, though fewer in number, likely serve as periodic syntheses that consolidate prevailing knowledge.

Ultimately, these descriptive metrics portray a mature and stable research domain. The consistent document count, moderate citation impact, and predominance of multi-authored journal articles indicate an established community

that regularly engages with its literature and favors collaborative production. At the same time, the relatively low rate of international collaboration suggests potential for broader geographic integration, even as the balance of publication types confirms the enduring centrality of journal articles supplemented by conferences and edited volumes (see Table 1).

Figure 2
Most frequent Keywords Plus



An integrative overview of the principal thematic orientations identified within the reviewed corpus is presented in Figure 2. The term *internet,* with 48 occurrences, underscores the foundational role of web-based infrastructures in delivering contemporary guidance services. Its prominence signals a paradigmatic shift from traditional, face-to-face counselling toward virtual modalities, especially in educational contexts that demand both accessibility and scalability. Similarly, the frequent citation of *students* (34 mentions) identifies this cohort as the principal beneficiary of digital guidance interventions. The prevalence of teaching (28 occurrences) and *education* (22 occurrences) further corroborates the embedding of digital counselling tools within broader pedagogical frameworks, often through their integration with instructional technologies or curricular initiatives.

Conversely, the term *humans,* appearing 32 times, introduces an essential discourse on human agency in technology-mediated settings. Its recurrence reflects sustained scholarly interest in the cognitive and ethical dimensions of algorithmically filtered counselling, encompassing issues such as trust, autonomy, and the evolving character of interpersonal support. The adjacent prominence of *mentoring* (31 mentions) reinforces this human-centered perspective, indicating that researchers regard digital platforms not merely as repositories of information but as mechanisms for fostering relational guidance structures.

Although *artificial intelligence* surfaces less frequently (17 mentions), it remains integral to the field's intellectual trajectory. This lower index position likely reflects variations in keyword tagging rather than genuine marginality; AI-related discussions often appear under the guise of personalization, automation, or decision support without explicit labeling. Nonetheless, its presence affirms growing engagement with intelligent systems capable of processing user data, modeling learning pathways, and enhancing decision-making processes.

Finally, terms such as *e-learning* (17 mentions) and *female* (18 mentions) point to more specialized subdomains within the digital guidance landscape. The former situates the discourse firmly within virtual educational ecosystems, while the latter suggests a focus on demographic or gender-based analyses of user engagement and outcomes. Collectively,

this distribution of keywords delineates a research domain at the nexus of education, digital infrastructure, and personalized human support, an arena increasingly shaped by the incorporation of AI technologies (see Figure 2).

Figure 3
Trend topics graph

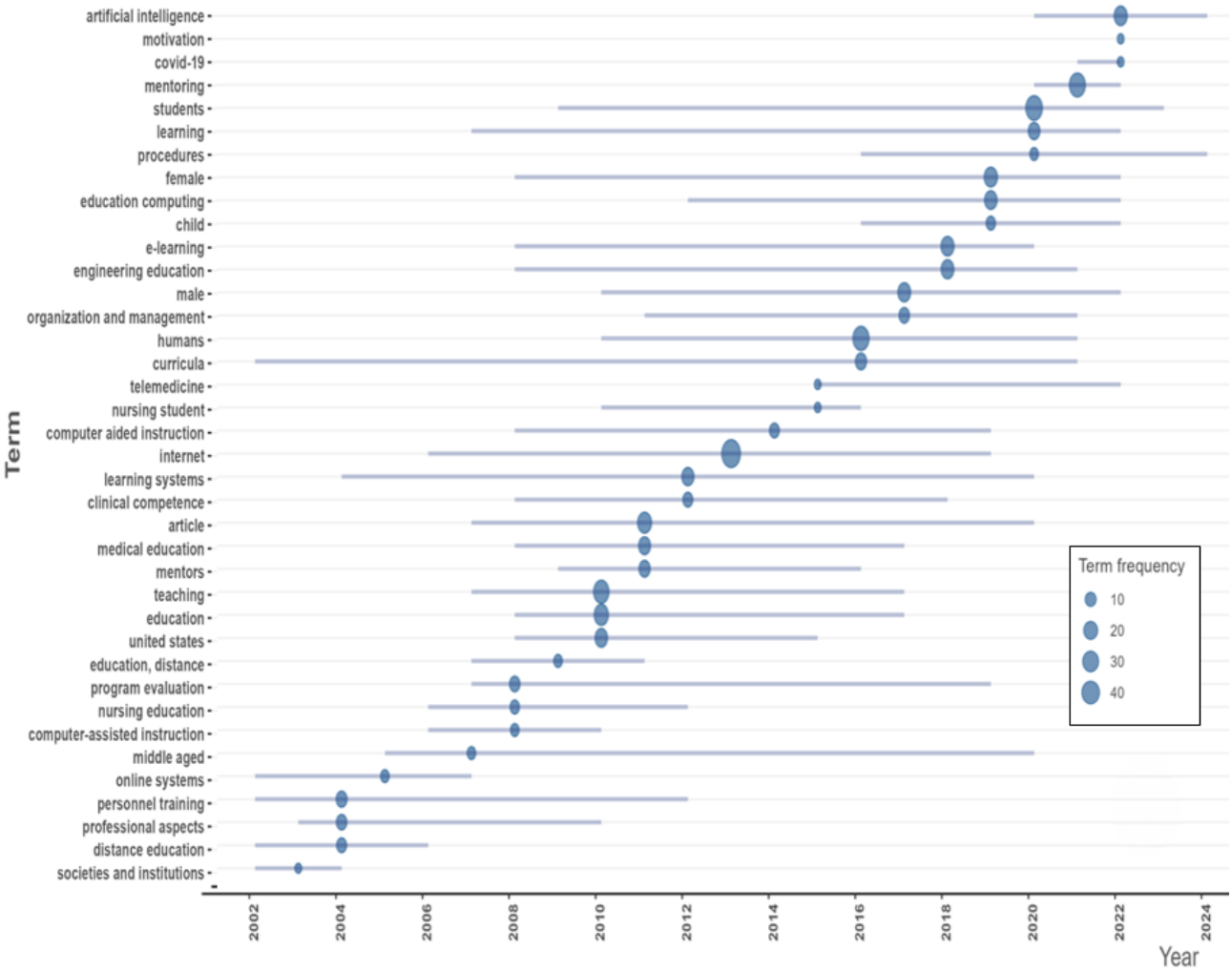


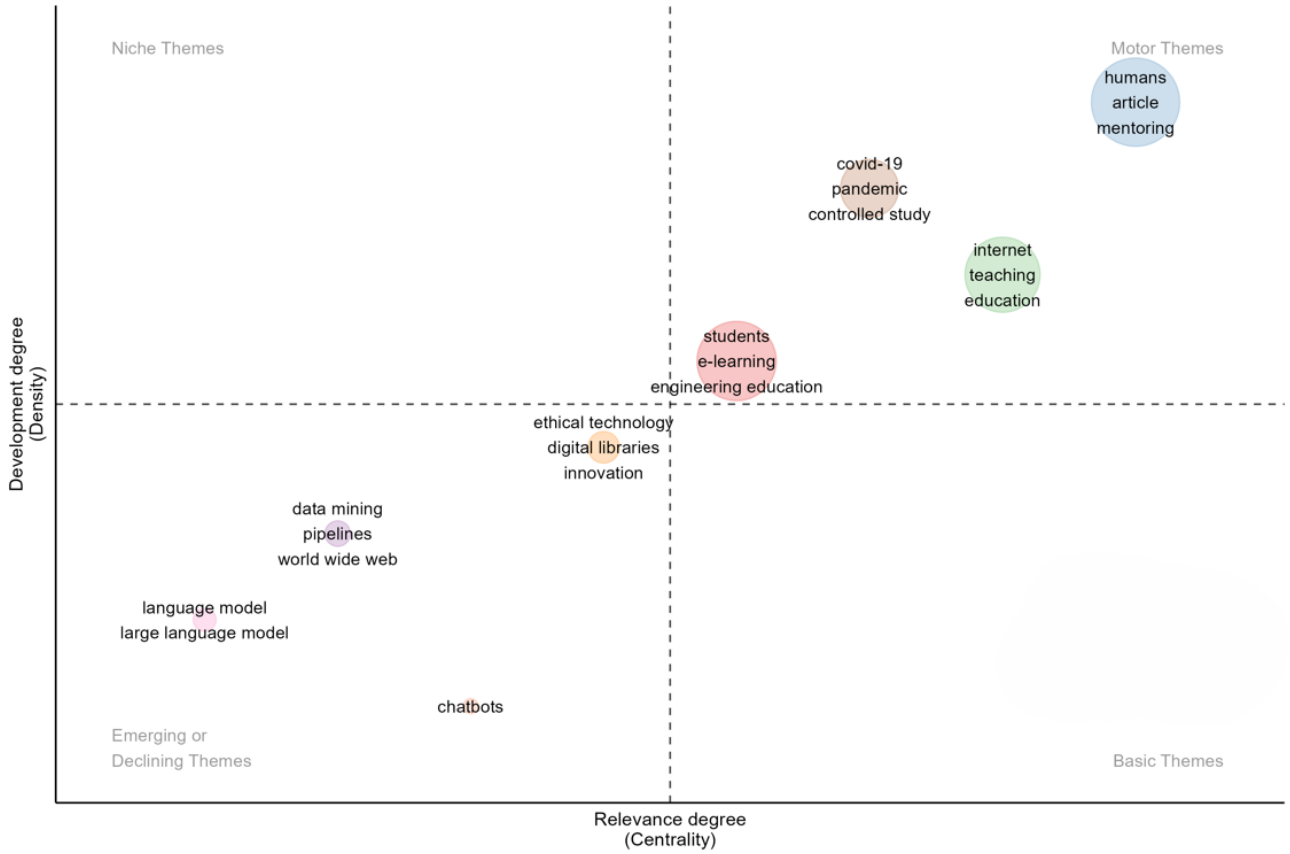
Figure 3 presents a bubble timeline visualization charting the temporal trajectories and relative prominence of thirty pivotal bibliometric terms from 2001 to 2023. Each horizontal bar delineates the lifespan of a term, while the area of its superimposed circle denotes that term's maximum annual frequency. In the initial phase (2001–2005), scholarly emphasis rested on educational infrastructure and organization. Transient descriptors, *societies and institutions, distance education,* and *personnel training* concluded by 2004, registering modest peaks of five to ten mentions, reflecting a nascent concern with institutional logistics and foundational delivery mechanisms.

The ensuing period, between 2005 and 2012, witnessed a decisive turn toward technology-enhanced pedagogy. Terms such as *computer-assisted instruction, online systems,* and *internet* persist across multiple years, peaking at approximately twenty to thirty citations between 2007 and 2009. Concurrently, *learning systems* and *e-learning* extend their presence beyond 2010, signaling an enduring investment in digital platforms and instructional software. The simultaneous rise of *program evaluation* and *education computing* further conveys an evaluative orientation, as scholars assessed the efficacy and infrastructure of these emergent modalities. Furthermore, between 2010 and 2014, a cohesive cluster of healthcare-oriented pedagogical themes emerged, including *medical education, clinical competence,* and *nursing student*, each maintaining visibility into the mid-2010s and achieving peaks of fifteen to twenty-five mentions between 2011 and 2013. The advent of *telemedicine* within this interval underscores the integration of remote healthcare delivery with educational research, marking a concentrated phase of inquiry into clinical training methodologies.

From around 2015 onwards, the research agenda expanded to encompass the affective dimensions of learning alongside sophisticated technological constructs. Terms such as *students, teaching, mentors,* and *motivation* recur prominently during 2015–2017 and again in 2020–2021, attesting to sustained interest in relational dynamics and learner engagement. The appearance of *covid-19* in 2021, albeit with a narrower temporal window, highlights a responsive shift to global exigencies. Most notably, the term *artificial intelligence* experienced a notable surge from 2016 to 2023, culminating in an unprecedented peak, with nearly forty mentions, in 2022–2023, which evidences the field's intensified focus on AI-driven educational paradigms.

Collectively, these diachronic patterns trace a coherent evolution: from early institutional and structural concerns through successive waves of digital adoption and sector-specific applications, to the current confluence of affective strategies and AI-infused innovations in digital counselling and educational research (see Figure 3).

Figure 4
Thematic map



The thematic map in Figure 4 arranges thirty bibliometric terms along two axes: *centrality* (relevance) on the x-axis and *density* (development) on the y-axis, with bubble size indicating term frequency. This configuration yields four distinct quadrants: *motor themes* (high centrality and high density), *basic themes* (high centrality and low density), *niche themes* (low centrality and high density), and *emerging* or *declining themes* (low centrality and low density). These groupings provide a structured overview of how concepts within the field vary in both their connectivity to the broader literature and the cohesiveness of their internal scholarship (Koutsoupias & Nosios, 2025).

In the top-right Motor Themes quadrant, four clusters emerge. Notably, the *humans, article,* and *mentoring* cluster boasts the highest amalgamation of centrality and density, signaling a vibrant, self-sustaining research stream that remains deeply interwoven with the broader scholarly landscape. Slightly below and to its left, the *internet, teaching,* and *education* cluster also resides firmly within the Motor domain but aligns closer to the mean density threshold, reflecting its widespread impact alongside comparatively dispersed internal cohesion. The *covid-19, pandemic,* and *controlled study* cluster, positioned just above the median on both axes, exemplifies a methodically organized body of pandemic-focused educational inquiry that maintains consistent engagement with the field's central nexus. The *students, e-learning,* and *engineering education* cluster, located just to the right of the centrality midpoint and marginally above the density

midpoint, likewise occupies the Motor quadrant; its proximity to the intersection denotes an emergent yet coherent theme that seamlessly bridges digital-learning research with engineering-specific pedagogical practice.

Lastly, the lower-left quadrant, designated for Emerging or Declining Themes, comprises three clusters distinguished by both low density and low centrality. Nearest the quadrant's midpoint, the *ethical technology, digital libraries,* and *innovation* cluster exhibits the most cohesive internal network, yet it remains largely insulated from adjacent thematic areas. Receding further toward the origin are the *data mining, pipelines,* and *world wide web* cluster, and the *language model, large language model,* and *chatbots* clusters, each occupying the disciplinary periphery. Their sparse interconnections and marginal positioning suggest that these topics either represent incipient lines of scholarly inquiry or have yet to coalesce into stable, conceptually unified research programs.

Overall, the thematic landscape is anchored by dynamic mentoring and pandemic research streams, undergirded by a foundational yet still-congealing body of Internet-based teaching literature, and enriched by both specialized and emerging clusters. This configuration delineates the discipline's current intellectual core while simultaneously pointing to clear opportunities for theoretical synthesis and methodological innovation at its periphery (see Figure 4).

CONCLUSIONS

The findings of the present bibliometric study, encompassing 167 publications from 1998 to 2025, highlight a sustained, systematic maturation of the research domain pertaining to career guidance mediated by digital tools. Quantitative analysis reveals consistent scholarly production, as evidenced by an average citation rate of 10.8 citations per publication, underscoring a steady academic influence with minimal deviations. Collaborative authorship prevails, with an average of 3.7 authors per publication, thereby emphasizing collective expertise as the primary mechanism for advancing knowledge. However, the relatively modest level of international collaboration, accounting for only 14.4% of the reviewed works, underscores a considerable margin for expanded global scholarly exchange and interdisciplinary cooperation.

Thematic progression within the field exhibits distinct evolutionary phases. Initially, research from 2001 to 2005 primarily focused on foundational aspects, such as institutional frameworks and digital infrastructure, necessary for delivering distance-based career guidance. Between 2005 and 2012, scholarly interest transitioned toward pedagogical dimensions, emphasizing computer-assisted instructional methodologies and e-learning environments, reflecting an enhanced recognition of digital media's educational potential. Subsequently, from 2010 to 2014, specialization became apparent in health-related guidance contexts, notably medical education and telemedicine, demonstrating sector-specific applicability and the domain's expanding scope. The most recent period (post-2015) has witnessed heightened engagement with the affective and motivational dimensions of career guidance, notably intensified through the integration of advanced technological tools, such as artificial intelligence, chatbots, and large language models. These topics reached peak prominence in scholarly discourse around 2022–2023.

Future research avenues emerging from this study emphasize several strategic directions. Firstly, enhancing international and interdisciplinary collaboration represents a critical pathway toward enriched innovation and greater global impact. Secondly, empirical investigations should explore the emotional, ethical, and relational implications associated with AI and automated guidance tools, particularly in relation to user autonomy, trust, and psychosocial well-being. Thirdly, targeted interventions aimed at diminishing digital disparities and fostering digital literacy should be systematically developed and evaluated. Additionally, longitudinal studies assessing real-life career outcomes linked to digital intervention utilization are crucial for substantiating evidence-based policy decisions and practical guidelines. Lastly, the field would significantly benefit from theoretical enrichment through frameworks such as Responsible AI and Human-Centered Design, ensuring alignment between technological innovation and fundamental humanistic and ethical principles.

In conclusion, this study demonstrates that career guidance mediated by digital technologies has evolved through stable, coherent trajectories characterized by adaptability and consistent human-centered orientations. While quantitative and thematic analyses reflect optimism concerning digital innovations, continuous scholarly vigilance regarding ethical integrity, interpersonal quality, and equitable access remains imperative. The ongoing relevance and effectiveness of digital career guidance depend on continuous empirical evaluation, careful ethical reflection, and a sustained commitment to preserving genuine human engagement within technological environments.

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ARTIFICIAL INTELLIGENCE IN EDUCATION POSSIBLE OBSTACLES AND RISKS

Petsiou Charikleia
Education Consultant for Mathematics
Secondary Education Directorate of Ioannina
Ioannina, Greece
e-mail: harapetsiou@yahoo.gr

ABSTRACT

When integrating Artificial Intelligence (AI) into the field of education, various challenges and potential threats are likely to arise. Despite the promising potential of AI, its reckless application carries significant risks. The main areas of concern include dilemmas such as algorithmic bias, lack of transparency, privacy, human communication and the development of critical thinking. In addition, there are practical obstacles related to the logistical infrastructure and teacher training.

The research approach of the paper is qualitative and is based on semi-structured interviews with 23 primary and secondary education teachers from various parts of Greece, of various specialties, who have experience with popular AI chatbots. Concerns related to misinformation, role distortion and student dependence on AI systems were highlighted. The research concludes that there is a need for a prudent and responsible approach to the adoption of AI, accompanied by the formulation of appropriate policies and guidelines, in order to maximize the benefits and minimize the negative impacts.

Keywords: Artificial Intelligence, AI chatbots, Education, risks-barriers, preventive measures, solution management

INTRODUCTION

The rapid development of technology is reshaping aspects of our daily lives, with the education sector being no exception (Russell & Norvig, 2010). AI promises to revolutionize the way students acquire knowledge and teachers teach. It promises more effective educational administration and expanded access to knowledge (Parra et al., 2024). The rapid development of language models has led to the emergence of sophisticated AI chatbots, such as ChatGPT, Gemini, Copilot, DeepSeek and others, which are computer programs designed to simulate conversations with humans via text or voice. They function as a digital assistant, capable of answering questions, performing actions, providing information and automating processes (SAP, 2024). AI chatbots use machine learning and natural language processing technologies to understand and answer users' questions more dynamically, and as they interact with users, they improve their responsiveness. However, along with these opportunities, there are also important questions and ethical challenges that need to be addressed responsibly, as they pose risks that affect both student privacy and the principles of equity and inclusion in access. The integration of AI into the educational context raises a number of concerns that require careful consideration to ensure its responsible and beneficial implementation.

The paper attempts an in-depth investigation of the challenges, difficulties and issues related to the application of AI in the field of education. A thorough understanding of these challenges is not just a desirable process, but is characterized as a fundamental and absolutely necessary prerequisite in order to fully understand both the obvious difficulties and limitations, as well as the possible hidden risks or reactions that may accompany the use of AI in education. The global perception will allow us to design and formulate effective strategies and policies to make full use of the enormous potential and opportunities offered by AI for the upgrading of education. At the same time, solutions will be proposed to minimize the undesirable side effects or negative consequences that may arise.

LITERATURE REVIEW

Artificial Intelligence (AI) is a transformative factor in the field of education, and the scientific literature is rapidly growing to record its multidimensional impacts. Applications of AI in education offer significant advantages, which concern both students and teachers. One of the most notable benefits is the possibility of personalized learning, where educational systems adapt the content and pace of teaching according to the needs of each student. This adaptability enhances the effectiveness of learning, providing immediate feedback and support (Chen et al., 2022). In addition, AI contributes to the automation of assessment, reducing the workload of teachers and allowing them to focus on more creative and pedagogical activities (Karpouzis, 2024). In addition, smart educational systems and learning data analysis tools are provided, which offer teachers information about the progress of their students (Avramidis, 2024). In the Greek context, the literature highlights the value of AI in adaptive learning and in enhancing interactivity in the educational process (Samara, 2021).

Despite the impressive benefits, the integration of AI in education comes with significant risks and ethical dilemmas (Pontikopoulos, 2023). One of the most pressing issues is algorithmic bias, which can reinforce existing social inequalities if the educational data that feeds AI systems is unrepresentative or biased (Bu, 2022). For example, the use of algorithms to assess students or allocate resources can lead to algorithmic bias if the data on which AI systems are trained reflects or reinforces existing social inequalities (Saputra et al., 2023). In addition, disinformation through AI is a growing risk, as systems can generate convincing but false content, which can be used for illegitimate purposes (Chen Kulesa, 2024). These challenges highlight the need for strict ethical rules and regulations that will ensure the fair and transparent use of AI in education.

An additional serious risk concerns the protection of personal data. AI systems collect and process huge volumes of sensitive information, such as data on student performance, behavior, and learning preferences. Inadequate management of this data can lead to privacy violations and information misuse, jeopardizing the fundamental rights of users (Kamalov et al., 2023). In Greece, the need for strict data security protocols has been highlighted as crucial for protecting students and avoiding discriminatory practices (Varmazi, 2022). The lack of appropriate protection measures can undermine trust in the education system and create new risks to academic integrity.

The pedagogical challenges arising from the use of AI are equally significant. One of the main concerns is the potential undermining of critical thinking and problem-solving skills. Overreliance on AI tools, such as AI chatbots, can lead to superficial learning, where students do not develop the capacity for analysis and autonomous thinking (Yuskovych-Zhukovska et al., 2022). Furthermore, the reduction of human interaction between students and teachers can negatively affect the development of social skills, such as collaboration and empathy (Flores-Viva & García-Peñalvo, 2023). These issues require a balanced approach, where AI is used as a complementary tool and not as a substitute for human activity.

Academic integrity is another critical issue that arises with the development of AI. The ability of systems to produce high-quality texts and solutions in real time raises concerns about the increase in cases of plagiarism and fraud. Educators face difficulties in detecting the use of AI by students, which requires the development of new assessment methods and detection tools (Kamalov et al., 2023). This issue highlights the need to inform and raise awareness of both students and educators about the ethical implications of the use of AI.

Many educational institutions face challenges due to a lack of technical resources or specialized staff. In order for the integration of AI in education to be effective, it is necessary to develop appropriate technical infrastructure and unhindered access for all members of the educational community. In this way, core values such as equality, inclusion and justice will be promoted. In addition, teachers may hesitate to adapt to new technologies for fear that AI will replace their roles and this may lead to resistance (Ghulam Ali, 2025), which is why continuous training of teachers in AI and digital skills is crucial for the successful integration of technology in education (Özer, 2024). With the new digital skills that teachers will acquire, they will use AI in a pedagogically effective way (Pedro et al., 2019).

Global and local discussions need to focus on both the benefits and risks to ensure that AI is used in a way that is aligned with educational values and the needs of students (Hesham et al., 2023). Only through a holistic and critical approach can a sustainable and equitable application of AI in education be achieved.

RESEARCH PURPOSE AND OBJECTIVES

The research aims to highlight the main concerns and challenges arising from the application of AI, and specifically AI chatbots, in the educational process. At the same time, it seeks to understand the potential risks and formulate proposals for the effective, safe and ethically responsible use of these tools.

The specific objectives of the paper are:

- To present the views of teachers and possible strategies for addressing the identified issues.
- To promote the dialogue on the responsible and effective integration of AI technology into the modern education system, through the interpretation of teachers' perceptions.

RESEARCH QUESTIONS

The research questions guiding this study are the following:

1. What are the main barriers and risks associated with the widespread use of AI chatbots in education?
2. What preventive actions and management strategies can be implemented to address these risks?

PARTICIPANTS

The qualitative research involved 23 teachers from various specialties, with different employment relationships (permanent, substitute) and employment in primary and secondary schools in Greece. All participants had previous experience with the use of various AI chatbots and were students of the postgraduate program "Digital and soft skills in educational sciences" at the International Hellenic University, which determines the geographical dispersion of the sample in various regions of the Greek territory. The interviews were conducted within the framework of the course "Critical Extensions of Digital Pedagogy".

MEASUREMENT INSTRUMENTS

Semi-structured interviews were used to collect data. This method was chosen due to its flexibility, which allows for in-depth exploration of the participants' views (Skouma & Mastrothanasis, 2024). The interviews included both closed and open-ended questions, with the possibility of modification depending on the course of the discussion. Closed-ended questions were used to collect specific, comparable information, ensuring a basic structure and consistency in the data. However, the real dynamic of the method emerged through the open-ended questions. These questions allowed participants to express themselves freely, develop their thoughts and offer detailed narratives, beyond the predefined frameworks.

The questions were organized into three main thematic sections. The first section addressed concerns about the negative impacts of AI chatbots and focused on issues such as the spread of misinformation, the risk of psychological dependence, the degradation of critical thinking, the impact on student-teacher interaction, the impact on mental health, ethical dilemmas and the reinforcement of social inequalities where unequal access to technologies can widen the gap between economic and social groups. The second section addressed preventive actions and solutions for managing risks, which were related to ensuring transparency, strengthening data protection, promoting collaboration and creating legal

frameworks. The third section of questions explored the roles and responsibilities of the various actors influencing the implementation of AI chatbots in education. Specifically, it explored the roles of teachers, parents, developers, and governments.

METHODOLOGY

The interviews were conducted on May 25, 2024, via an online videoconferencing platform, with the aim of collecting teachers' perceptions. Each interview lasted approximately 45 minutes. Participants were divided into small groups (three or four people) in virtual rooms. Discussions were recorded with OBS Studio.

After the interviews were conducted, the responses were transcribed and thematically coded, according to the data coding proposed by Isari and Pourkos (2015). The aim was to identify common themes and highlight the main perceptions and concerns of the teachers.

RESEARCH RESULTS

The analysis of the interview data revealed a wide range of perceptions among educators regarding the use of AI chatbots in education. While recognizing the significant potential they offer, serious concerns were also expressed about the potential risks and negative consequences of their careless or uncontrolled use.

The main concerns of teachers are related to inaccuracy and the possibility of misinformation. Concerns were expressed that the confusing or inaccurate information provided by these tools, due to the synthesis of various uncontrolled sources, may undermine the validity of the knowledge acquired by students *(... the confusion between real and imaginary with the violation of boundaries, that is, students and we do not ultimately know what is true, what is real, because information from various sources is combined, which has not been controlled ...*).

In addition, concerns were expressed about the possible depreciation of the role of teachers and their replacement by chatbots. Although the majority rejected the scenario of complete replacement, there was concern about shifting their role to that of "machine operator" *(... to overshadow people and take on another role... Regarding our position in schools, I am very afraid that we will take advantage of the situation and become machine animators... graduates may not find jobs later because AI can replace programmers and a bunch of professions that are being created in the field of Information Technology...*).

Particular emphasis was placed on the potential reduction in students' critical thinking due to over-reliance on chatbots (… I believe that some students do not realize that they may give incomplete answers or make mistakes or not answer in the appropriate way). Teachers expressed fears that immediate access to answers may inhibit the development of autonomous thinking, creativity and problem-solving skills, leading students to the "easy solution" (… it acts as a brake on creativity, in my opinion, and on critical thinking because the student does not think for himself, he simply waits for the machine to give him the answer …. while he should first train his own mind and then draw material based on Artificial Intelligence … It is the easy solution).

They also expressed ethical concerns, because the use of chatbots raises ethical issues, such as prejudice against certain social groups (*... I recently read somewhere that there can be what we call hidden prejudices in certain perspectives... that they are programmed with a specific algorithm to provide data*). Or bullying and violation of privacy (*a key ethical issue is the privacy aspect, in other words, the future use of the data that we very easily enter into these Chatbots, to put personal data, to put information about our students or anything else*) and copyright (*... the issue of copyright is a very big issue, I don't know, we discussed it when we were teaching whether there are copyrights in this, are there? I don't know*).

The negative impact on human interaction between students and teachers was also highlighted. The increased use of chatbots can limit personal communication and meaningful interaction, negatively affecting the learning process and the development of social and emotional skills. Other important concerns included mental health and addiction. That is, teachers were concerned about the potential for anxiety or even depression in students due to excessive use and dependence on technology. Ethical issues related to academic integrity, plagiarism and fraud, as well as the lack of transparency of algorithms were also mentioned. The risk of widening educational inequalities for students with limited access to technological infrastructure or appropriate education was highlighted (*at an AI conference, a prominent figure said that because the companies that produce this material are profit-oriented, there is a huge moral problem, that is, it will create huge moral problems and social inequalities*). Finally, the inadequacy of infrastructure and training was

mentioned and the necessity for appropriate technological support and continuous training of teachers for the effective use of AI was mentioned *(… we see it at older ages… Let alone a 68-year-old teacher having to keep up with all these tools in the classroom… We have a gap… Centrally… teachers need to be trained… technical equipment… special equipment is needed… insufficient access to media… this in itself creates inequalities*).

The teachers also suggested preventive measures and solutions, such as providing education to teachers, students and parents on the responsible and ethical use of AI (*I believe that parents should first be informed, educated, because most of them do not know many things … I think it is essential to involve parents, especially the younger the children are … It is a plan … it is in the Ministry's intentions to educate us on AI*). They pointed out that planning is needed with a focus on enhancing human interaction and not replacing it (*perhaps some teachers believe that they can be replaced by AI, but we will not get to that point*). They mentioned ensuring the transparency of algorithms, establishing strict data protection policies (*I believe that the state is responsible for the protection of personal data ... the one who will impose the framework is the state. The issue is legislative*), strengthening cooperation between all stakeholders (teachers, parents, programmers, governments) and forming a clear legal framework (*the Ministry needs to set a framework for how it can be used and whether it can be included in the educational process ... something institutionalized, that is, then training with specific demarcation, plan, goals, limitations ...*). The role of teachers as guides, instead of simple users of technology, was underlined.

CONCLUSIONS

Artificial intelligence (AI) has emerged as one of the most promising technologies in education, offering significant benefits and marking the beginning of a new era. Its presence will not be just a technological development, but it heralds a radical change in the way we learn and teach (Desyllas, 2022).. This research has shown that the path towards this change is a dual-nature development. It offers significant opportunities, but also entails various risks. The literature review, combined with empirical data from interviews with teachers, highlighted a wide range of challenges spanning pedagogical, ethical, legal, practical and technical issues.

Key concerns include the potential undermining of critical thinking, student dependency on technology, the threat of misinformation and algorithmic bias, which could exacerbate existing inequalities, negatively affecting vulnerable groups in terms of gender, ethnicity and socio-economic status. In addition, there are concerns about data privacy issues, as well as issues related to human interaction and the role of the teacher (Du Boulay, 2023). At the same time, the critical need for adequate technical infrastructure and continuous training of teachers was highlighted, so that they are able to effectively and responsibly utilize AI tools.

It is imperative to adopt a prudent and critical approach when introducing AI into education. The development of clear guidelines and policies is essential to ensure its responsible and beneficial use, with the aim of maximizing the advantages and minimizing the possible negative consequences. Cooperation between all stakeholders involved, namely teachers, parents, developers and government authorities, is crucial to the formation of a framework that will promote innovation while preserving the fundamental principles of pedagogy and ethics.

This study, by highlighting the perceptions of educators, contributes to enriching the dialogue on the responsible integration of AI in the modern educational environment. Continuous research and the implementation of best practices will allow the full potential of AI to be exploited for the benefit of students and the entire educational community.

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ARTIFICIAL INTELLIGENCE TO AUTOMATICALLY ASSESS STUDENT PERFORMANCE: THE CASE OF AISE PROJECT

Fani Biskanaki
Director
Diefthinsi Defterovathmias Ekpaidefsis Nomou
Prevezas, Greece

Athanasios Sypsas
Diefthinsi Defterovathmias Ekpaidefsis Nomou
Prevezas, Greece

Venediktos Hadjisavva
3rd Technical and Vocational School of Education and Training of
Lemessos, Cyprus

Andreas Paraskeva
3rd Technical and Vocational School of Education and Training of
Lemessos, Cyprus

Maria Evripidou
3rd Technical and Vocational School of Education and Training of
Lemessos, Cyprus

Achilleas Kostoulas
Doumag LTD
Cyprus

Ognjen Pavić
University of Kragujevac,
Serbia

Lazar Dašić
University of Kragujevac,
Serbia

Tijana Geroski
University of Kragujevac,
Serbia

Nenad Filipović
University of Kragujevac,
Serbia

Ana Orlović Kovačević
CARNET
Croatia

Themis Exarchos
Ionian University
Corfu, Greece

Costas Assimakopoulos
International Hellenic University
Greece

George Stalidis
International Hellenic University
Greece

Jelena Pavić
City of Kragujevac, University of Kragujevac
Serbia

Daniel Štifanić, Zlatan Car
Faculty of Engineering
University of Rijeka, Croatia

ABSTRACT

This paper presents the methodology, results, and ongoing work of the AISE project (Artificial Intelligent platform to support Students by assessing their performance skills through predictive models created from their writing skills), funded under the Erasmus+ program. The project aims to apply state-of-the-art AI methods, especially retrieval-augmented generation (RAG) combined with Large Language Models (LLMs), for the automatic evaluation of student essays across three dimensions: Content, Organization, and Language. Essays were collected from secondary education students in Greece, Cyprus, Serbia, and Croatia, processed, and assessed using a modular AI pipeline. The results demonstrate high alignment with human ratings, especially in the Content dimension, while highlighting challenges in assessing linguistic subtleties. The AISE project paves the way for scalable, transparent, and personalized feedback systems in educational environments.

Keywords: Artificial Intelligence, Erasmus+, Language processing, Automatic Essay Scoring, Secondary Education.

INTRODUCTION

The rapid advances in Natural Language Processing (NLP) and AI have enabled the automation of complex educational tasks, including essay scoring. The AISE project, code 2023-1-EL01-KA220-SCH-000157157, addresses this challenge by developing an AI platform capable of automatically assessing secondary students' writing performance using advanced language models and structured evaluation criteria.

The AISE project is a European Erasmus+ Cooperation Partnership in the field of school education. It has been approved and funded by the Hellenic National Agency Erasmus+ (State Scholarships Foundation - IKY). The project is coordinated by the Diefthinsi Defterovathmias Ekpaidefsis Nomou Prevezas, Greece, and its partners include:

- International Hellenic University (Greece)
- Ionian University (Greece)
- University of Kragujevac (Serbia)
- City of Kragujevac (Serbia)
- University of Rijeka (Croatia)
- Ministry of Science and Education of Croatia, replaced by CARNET, (Croatia)
- 3rd Technical and Vocational School of Education and Training of Limassol (Cyprus)
- DOUMAG LTD (Cyprus)

The deployment of artificial intelligence (AI) in educational assessment accelerates marking while enriching the depth, consistency, and timeliness of feedback, ultimately fostering student growth. Within this landscape, Automated Essay Scoring (AES) stands out as a flagship application (Shetty et al., 2022) serving a key role in meeting the objectives of the AISE project. Early AES research relied on hand-crafted linguistic rules. Burstein et al. (1998), for example, built e-rater around syntactic, rhetorical, and topical features; their work showed that combining computational-linguistic indicators with statistical modelling could match human graders closely, making the system a credible "second reader" for high-stakes tests.

Since then, scores of studies have tried to capture higher-order qualities such as cohesion, relevance, and coherence—still formidable challenges. Surveys by Ramesh & Sanampudi (2021) and González-Calatayud et al. (2021) reveal that most systems emphasize style-based cues, with fewer tackling deep content evaluation. The latter review distilled 454 papers down to 22 key studies, underscoring the momentum behind AES for formative assessment: AI systems can return immediate, multidimensional feedback that helps learners revise in real time—provided they are grounded in sound pedagogical principles, not just technical accuracy. Recent work drives beyond rule-based methods. Kumar & Boulanger (2020) trained an AES model on a large corpus and scored essays across four rubrics—ideas, organization, style, and conventions—using linguistic indices to generate pointed, standards-aligned feedback. Likewise, Grivokostopoulou et al. (2016) combined interactive visualizations with automatic marking for search-algorithm exercises, reporting high agreement with human graders and measurable learning gains.

AI is also reshaping broader learning environments. Goel & Joyner (2017) embedded "nanotutors" into an online Knowledge-Based AI course, where automated micro-feedback contributed to online students outperforming their on-campus peers. Choi & McClenen (2020) fused Computerized Adaptive Testing with Dynamic Bayesian Networks to deliver personalized, diagnostic feedback in e-learning, while Ouguengay et al. (2015) applied a neuro-fuzzy inference system to gauge literacy skills in Amazigh within a learning-management system.

Two dominant technical paradigms now define AES research:

Large Language Models (LLMs)

Studies using GPT-3 (Mizumoto & Eguchi 2023), GPT-4 (Kostić et al. 2024), PaLM 2, Claude 2, and others (Pack et al. 2024) demonstrate that powerful generative models can approximate, and sometimes surpass, human scoring—though stability over time and across contexts remains a concern. Song et al. (2024) showed that open-source LLMs, combined with zero-shot, few-shot, or parameter-efficient tuning, can offer cost-effective essay scoring and revision support.

Feature-extraction approaches

When annotated data are scarce, systems that leverage educator-defined indicators still perform competitively and offer greater interpretability. Yang et al. (2019), for instance, blended shallow and deep semantic attributes to grade Chinese essays and supply constructive feedback.

In short, while large, data-hungry LLMs excel when ample training material exists, feature-driven or hybrid models remain valuable for low-resource settings or languages. The literature also highlights the importance of integrating pedagogical design, ensuring that automated scores translate into actionable, learner-centered feedback. These insights directly inform the AISE project's choice of a Retrieval-Augmented Generation framework, which combines the adaptability of LLMs with curated, educator-vetted exemplars to produce transparent, reliable, and scalable essay assessments.

PROJECT GOALS AND CONTEXT

The aim of the project is to apply Artificial Intelligence (AI) methods to create a platform capable of supporting the assessment of students' language skills in secondary education across four EU countries, namely: Greece, Cyprus, Serbia, and Croatia. To achieve this, data mining models utilizing various artificial intelligence technologies will be designed and applied. A key objective is to create predictive models that effectively assess students' skills. The project includes a data collection phase, in which sets of annotated written texts will be collected from high-school students and will be used for training and evaluating the AI models. To facilitate the data collection process, a collaborative cloud-based software platform will be developed to systematically register and store all collected student data, ensuring efficient tracking and analysis. In the data processing aspect, various AI techniques will be applied to unstructured text, collected by educators from the participating countries, in order to identify patterns and extract valuable insights.

The main activities focus on scientific research studies involving secondary education students, conducted through essays at different time periods by educators from participating European schools. State-of-the-art AI methods will be utilized to develop, evaluate, and validate highly scalable models.

METHODOLOGY

The methodology of the AISE project is structured into a set of interlinked phases, combining educational research, computational linguistics, and system engineering. The project's core aim is the development of a scalable and explainable Automated Essay Scoring (AES) platform that leverages state-of-the-art AI techniques to assess student writing across three dimensions: Content, Organization, and Language.

Preliminary Analysis and Literature Review

The first phase involved a comprehensive review of existing AI methodologies for writing skill assessment. This included a comparative analysis between two primary technological paradigms: Feature-based approaches, which rely on predefined linguistic and stylistic indicators (e.g., syntactic variety, lexical richness, cohesion metrics). Neural network–based methods, primarily centered around Large Language Models (LLMs), which learn from data patterns without explicit rule encoding. This review informed the project's decision to adopt a Retrieval-Augmented Generation (RAG) strategy—a hybrid solution that enriches LLM prompts with relevant, high-quality examples from an external knowledge base. This approach was selected to address key challenges in AES, including generalization across multilingual inputs, explainability, and alignment with pedagogical standards.

Project Requirements and Infrastructure Development

Following the conceptual foundation, a requirement analysis was conducted to define the functional and non-functional specifications of the platform. This phase involved all project partners and led to the development of:

- A cloud-based platform for secure essay storage and processing.
- A modular system architecture, enabling the separation of the essay evaluation pipeline into distinct stages.
- Text curation and harmonization workflows using AI-powered tools to clean, normalize, and annotate the collected data.

The platform was designed to support multilingual input, data de-identification, educator dashboards, and API endpoints for real-time interaction with the essay assessment engine.

Data Collection and Pre-processing

A key component of the AISE project was the establishment of a cloud-based platform designed to support the secure, structured, and collaborative collection of student essays across four participating countries: Greece, Cyprus, Croatia, and Serbia. The platform was developed to:

- Enable educators to upload essays in standardized formats (.docx or .odt).
- Associate each submission with anonymized metadata, including school ID, student code, essay prompt, and evaluation scores.
- Facilitate real-time monitoring of submissions, version tracking, and grading completeness.
- Support multilingual data inputs, ensuring language-specific encoding and compatibility.

At the first stage, essays were collected from secondary school students across four European countries: Greece, Cyprus, Croatia, and Serbia. Each essay included:

- Prompt (topic/question).
- Body (student response).
- Grading metadata (human scores in three dimensions).

All texts underwent anonymization, language normalization, and structuring into a three-part schema to ensure consistency across countries and grading teams.

Grading Schema and Label Encoding

Teachers assigned scores to each essay in the following dimensions:

- Content (maximum 40 points).
- Organization (maximum 30 points).
- Language (maximum 30 points).

These numeric scores were converted into qualitative categories—Excellent, Very Good, Good, and Marginal—based on standardized thresholds, ensuring a harmonized evaluation framework. Each essay was tagged with a combined label (e.g., "Very Good–Good–Excellent") to facilitate stratified sampling in subsequent stages, as it can be seen in the table (Table 1) below.

Table 2
Grade categories and related score ranges for each evaluation dimension

Grade	Content (40 pts)	Organization (30 pts)	Language (30 pts)
Excellent	31 – 40	24 – 30	24 – 30
Very Good	21 – 30	18 – 23	18 – 23
Good	11 – 20	11 – 17	11 – 17
Marginal	1 – 10	1 – 10	1 – 10

Train/Test Split Strategy

To ensure statistical validity and prevent data leakage, a stratified train/test split was performed using the combined qualitative label as the stratification key. Essays with rare combinations (i.e., unique or very low-frequency grade triads) were excluded from model training. The test set was completely isolated and never used during training, embedding, or retrieval, ensuring strict generalization and fairness.

Construction of Knowledge Bases

Three dimension-specific knowledge bases (KBs) were constructed—one each for Content, Organization, and Language. For each essay in the training set, the relevant body text and its qualitative grade were embedded using the MiniLM-L6-v2 transformer model, a light-weight and performant sentence encoder. These embeddings were indexed using FAISS, an efficient vector similarity search engine.

This architecture enables fast semantic retrieval of the top-k most similar training examples during model inference. Crucially, each dimension's KB is completely isolated, avoiding cross-contamination between grading criteria.

Retrieval-Augmented Generation (RAG) Models

At the heart of the platform are three LLM-based essay assessment modules, each tailored to a specific evaluation dimension. These modules are built upon DeepSeek-V3 (671B parameters) and operate within a RAG framework: At inference time, a new essay is embedded and used to query the relevant KB. The most similar annotated examples are retrieved and passed—along with the essay—to the LLM. A dimension-specific prompt template guides the model to produce a grade and rationale based on aligned pedagogical expectations. This design enables the LLM to contextualize grading, reduce hallucination, and generate traceable reasoning backed by real student examples.

Educational Research Integration

Parallel to the system development, the project initiated on-site educational research in all participating countries. Secondary school students contributed essays across different time periods. Educators participated in grading calibration workshops, feedback studies, and system evaluations. This research component supports:

- Cross-country alignment of grading standards.
- Real-world validation of AI predictions.
- The collection of educator and student feedback for platform refinement.

Performance Evaluation and Metrics

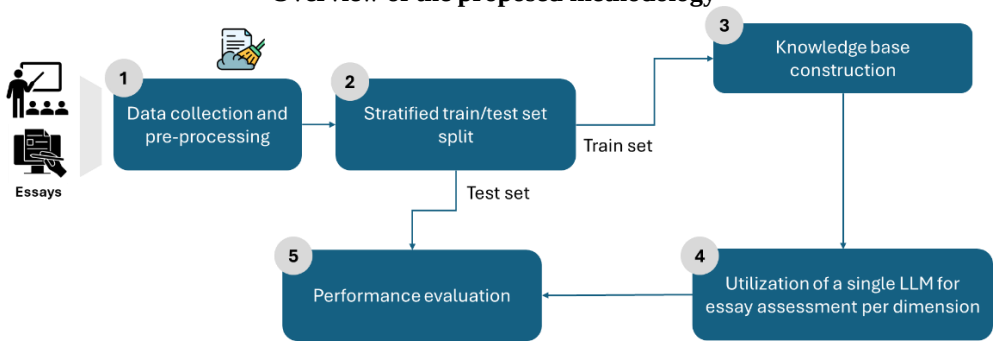
Each LLM was evaluated using the unified test set, with predicted grades compared against human-labeled ground truth. Metrics computed per dimension included:

1. Accuracy.
2. Macro Precision / Recall / F1-Score.
3. Balanced Accuracy.
4. Confusion Matrices to visualize prediction distributions.

Initial results revealed very high performance in the Content dimension (Accuracy: 0.976), strong performance in Organization, and more modest outcomes in Language—highlighting the complexity of capturing grammatical subtleties.

This multi-phase methodology ensures that the AISE system is transparent, modular, multilingual, and educationally grounded, capable of offering automated, yet interpretable, writing assessment aligned with European pedagogical standards. In the (Image 1), the overview of the proposed methodology is depicted.

Image 1
Overview of the proposed methodology



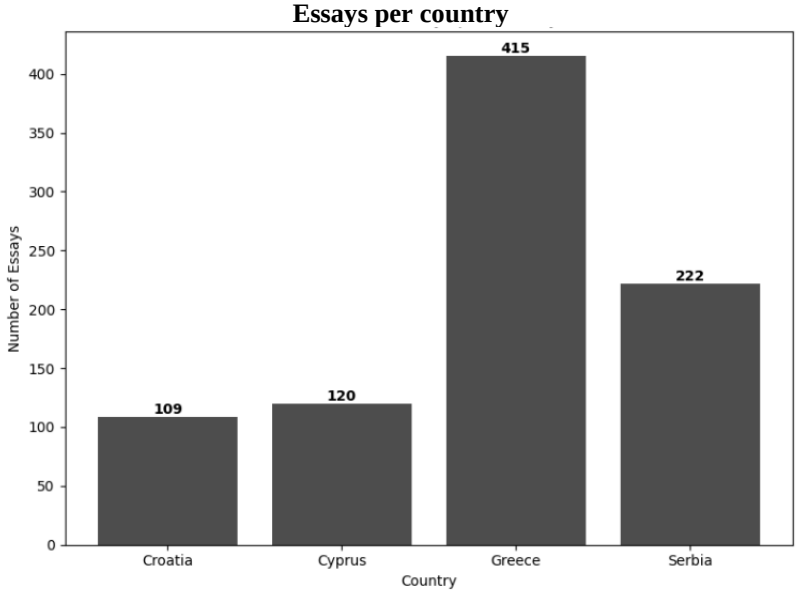
RESULTS

The first stage of essay collection resulted in a dataset of 866 student essays, gathered through coordinated efforts across the participating countries. Most submissions were received in .docx format, with a smaller number converted from .odt. Originally handwritten by students, the essays were later digitized by educators at the respective schools and uploaded to the project's cloud-based platform. Each essay was manually evaluated by teachers based on three standardized dimensions: Content (maximum 40 points), Organization (maximum 30 points), and Language (maximum 30 points). These numerical scores were subsequently mapped to four qualitative categories—Excellent, Very Good, Good, and Marginal—to facilitate interpretable, categorical classification by the AI models. All essays adhered to a consistent structural template, typically comprising an introduction, a main body, and a conclusion, which ensured

comparability across submissions and supported both human and automated analysis. This well-structured, annotated corpus serves as a representative and pedagogically grounded resource, reflecting writing diversity across countries while enabling reliable and scalable essay evaluation using retrieval-augmented large language models (LLMs).

The initial essay corpus assembled during the first stage of data collection reflects a broad geographical distribution, capturing student writing samples from four European countries participating in the AISE project. Of the 866 total essays, the majority—415 submissions—originated from Greece (specifically from DDE Prevezas), followed by 120 from Cyprus, 109 from Croatia, and the remainder from Serbia or mixed/unspecified contributors (Image 2). This cross-national diversity is essential for developing a generalizable and robust AI-based assessment framework, capable of handling variations in student writing styles, linguistic features, and educational practices. Notably, preliminary analysis revealed country-specific grading trends: for example, essays from Greece showed a higher proportion of Very Good ratings, while those from Cyprus received fewer Excellent scores across all evaluation dimensions. Such disparities underscore the importance of applying stratified sampling techniques during the train/test data split (as described in Stage 2), in order to prevent model bias and overfitting dominant patterns from a single region. Furthermore, this geographic breakdown provides a valuable foundation for future research on regional grading behaviors and opens possibilities for adapting AI-generated feedback to align with national curricula and localized writing norms.

Image 2
Essays per country



The distribution of qualitative grades across countries for the Content dimension is presented below (Image 3). The data indicate that Greece contributed the majority of essays rated as “Very Good,” with a substantial portion also falling into the “Excellent” category. Cyprus and Croatia displayed more conservative grading patterns, with fewer essays achieving the highest grade level. The relatively low number of “Marginal” grades across all countries may point to selection bias or generally high writing proficiency. These patterns highlight the need for grade-balanced sampling to ensure that the AI models do not inherit country-specific biases when learning how to assess idea relevance and development.

Each entry in the dimension-specific knowledge base (KB) consists of a student essay excerpt paired with its corresponding qualitative grade for one of the three evaluation dimensions (Content, Organization, and Language) (Image 4). This structure reflects the modular design of the proposed workflow, where a separate KB is constructed per dimension to ensure targeted retrieval during the RAG process. The example illustrates how labeled writing samples are stored in a vectorized format, allowing the system to semantically retrieve the most relevant examples during inference. These retrieved entries serve as contextual anchors, helping the LLM generate informed, transparent, and pedagogically aligned grade predictions. The AISE KB architecture supports dimension-level isolation, country-based indexing, and interpretability, making it a critical component of the pipeline's explainability and adaptability. During model inference, the test essay is embedded and compared against this vector store, retrieving the top-k most similar examples. These are then integrated into a custom prompt, specific to the evaluation dimension, and passed to the DeepSeek-V3 LLM to guide the grading process.

Image 3
Grade distribution by country and evaluation dimension

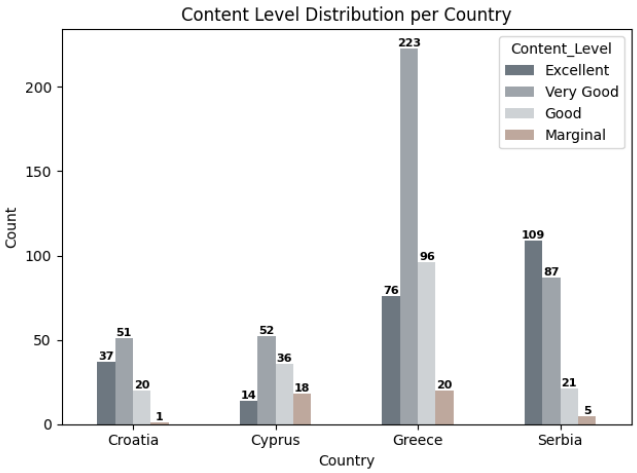
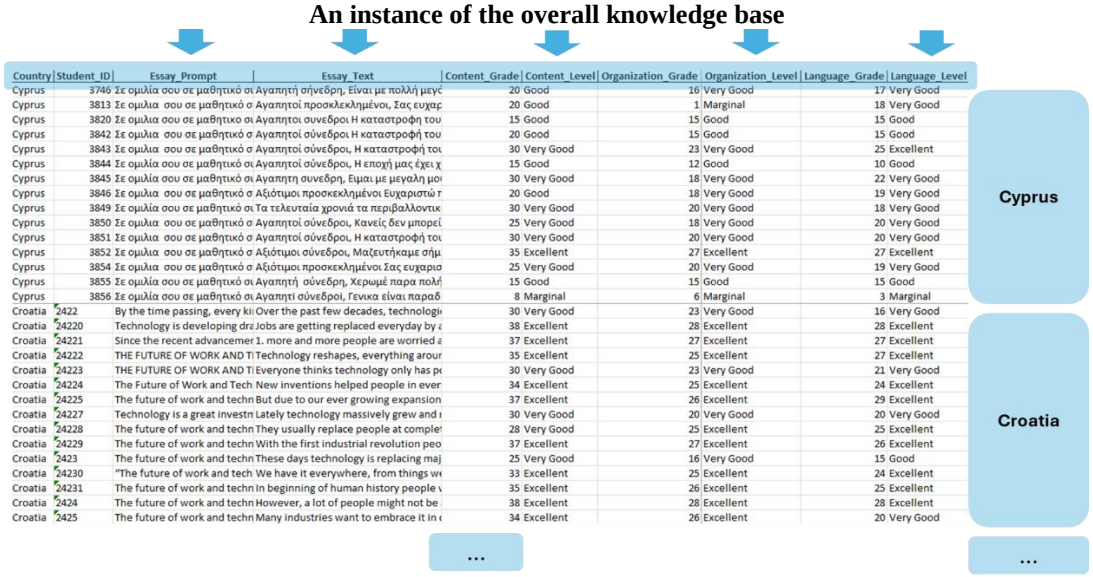


Image 4
An instance of the overall knowledge base



The evaluation of the RAG-based LLMs was conducted using a unified test set, in which each essay was independently assessed across the three evaluation dimensions—Content, Organization, and Language—by its respective dimension-specific model. Each model generated a prediction in the form of one of four qualitative grades: Excellent, Very Good, Good, or Marginal. These predictions were then compared against the grades assigned by human teachers to measure alignment.

As detailed in Table 2, the LLM assigned to the Content dimension demonstrated exceptional performance, achieving an accuracy of 0.976, macro precision of 0.988, and macro F1-score of 0.911. These results indicate a very high level of agreement with teacher evaluations. The model evaluating Organization also performed well, reaching an accuracy of 0.780 and showing strong macro recall (0.844), suggesting effective recognition of structural aspects such as coherence and logical flow.

In contrast, the model responsible for assessing Language achieved a slightly lower accuracy of 0.769, with macro recall at 0.587 and macro F1-score at 0.603. These figures reflect greater difficulty in consistently capturing nuanced linguistic features such as grammar, vocabulary precision, and stylistic variation. Such challenges may stem from increased variability across languages and countries, or from the need for more granular prompt engineering and enhanced retrieval mechanisms in this dimension.

Table 2
Performance metrics per evaluation dimension

Metric	Content	Organization	Language
Accuracy	0,976	0,780	0,769
Macro Precision	0,988	0,684	0,626
Macro Recall	0,875	0,844	0,587
Macro F1-score	0,911	0,709	0,603
Balanced Accuracy	0,875	0,844	0,587

CONLUSIONS AND FUTURE STEPS

The adopted methodology successfully integrates technical sophistication with educational applicability, ensuring that the AI-based assessment process remains both effective and pedagogically grounded. Its modular design enables targeted improvements, scalability, and future integration of more advanced or specialized language models without overhauling the entire application. While the application has demonstrated strong performance in Content evaluation, particularly in assessing idea development and relevance, the Language dimension remains more challenging. This highlights the need for ongoing enhancements in prompt design, as well as the incorporation of richer and more diverse linguistic datasets to better capture grammatical and stylistic nuances across languages. These insights will guide the next steps of development, including the refinement of the language assessment module and the continued expansion of the annotated essay corpus.

The parameter scales of several widely recognized Large Language Models (LLMs) that were evaluated during the development of the AISE pipeline, are outlined in Table 3 below. Among these, DeepSeek-V3 was selected for initial deployment due to its favorable trade-off between accuracy and computational efficiency. It offers competitive performance, fast inference times, and lower hardware requirements, making it well-suited for scalable educational applications. While more advanced models such as GPT-4 and GPT-4-Turbo have the potential to significantly enhance classification accuracy, their integration poses challenges related to increased computational costs and deployment complexity. As a result, their use is currently under consideration for future phases of the project.

Looking ahead, the project will focus on expanding the dataset, with particular emphasis on enriching the underrepresented “Marginal” category. This is expected to improve model generalization and ensure a more balanced classification across all performance levels. A critical development milestone involves the integration of the AISE essay evaluation engine into the cloud-based platform via API, enabling real-time grading and personalized feedback delivery directly to students and educators.

In parallel, further experimentation with next-generation LLMs—including GPT-4-Turbo—and parameter-efficient fine-tuning techniques is planned to improve scoring accuracy and feedback granularity. Early results already confirm the system’s capability to generate dimension-specific grade predictions and formative, pedagogically aligned suggestions, establishing a strong foundation for AI-driven personalized writing support in secondary education.

Table 3
An overview of Large Language Models (LLMs) considered for AISE essay evaluation (the selected model is shown in bold)

LLM type	Number of parameters
DeepSeek-LLM (67B)	67 billion
DeepSeek-V2	236 billion (21B activated/token)
DeepSeek-V3 (deepseek-chat)	671 billion (37B activated/token)
GPT-2	1.5 billion
GPT-3 (Davinci)	175 billion
GPT-3.5 Turbo	175 billion (optimized)
GPT-4	~1 trillion (estimated)

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AI-ASSISTED TASK ADAPTATION/CREATION (AIATAC): A FRAMEWORK FOR INTEGRATING ARTIFICIAL INTELLIGENCE IN THE TEACHING OF ENGLISH AS A FOREIGN LANGUAGE

Tagkas Periklis
Professor
Department of Accounting and Finance, University of Ioannina
Postgraduate Programme "The Teaching of English as a Foreign/International Language", Hellenic Open University
Preveza, Greece
e-mail: ptagkas@uoi.gr

Hadgopoulos Pericles-John
Specialized Technical Laboratory Staff
Department of Accounting and Finance, University of Ioannina
Preveza, Greece
e-mail: phadgop@uoi.gr

ABSTRACT

This paper focuses on the role of AI as a valuable tool in English language learning, assisting teachers in their multifaceted roles. Generative AI can assist in the creation of vocabulary/grammar/speaking exercises or dialogues (in an "open" curriculum), or the adaptation of existing ones (in "fixed" curricula), based on the teaching situation and learners' profiles. However, it is important to state that AI-assisted activities need to conform to methodological criteria. The AIATAC framework was inspired by the fact that trainee English teachers at Master's level at the Hellenic Open University reported using AI to design image-enhanced task sheets, as part of their lesson planning. Content analysis of such lesson plans was conducted, and the results were evaluated as positively correlated with increased student motivation and participation in class. Subsequently, the AIATAC framework was conceptualized as a result of the realistic need to extend and apply AI-assisted task adaptation or creation, in a principled manner, conforming to the methodology of the teaching of English as a Foreign Language. The AIATAC framework can also be applied to the teaching of English for Specific/Academic Purposes (ESP/EAP) or even EMI (English as a Medium of Instruction). This possibility is currently under consideration at the University of Ioannina, as part of teaching ESP at the Department of Accounting and Finance, which involves integrating AI into the synchronous (class/IT lab) and asynchronous (self-study/ecourse) components, using generic or more specific AI applications. The AIATAC framework can best be implemented in a laboratory with the required equipment, offering students access to applications and online tools. In the paper, it is analyzed how this pilot framework can be used in a methodologically appropriate way.

Keywords: English language teaching, generative AI, context-specific, task creation/adaptation, AIATAC framework.

INTRODUCTION

This paper is based on the premise that a course consists of "teaching experiences". This dimension of "experiential learning" cannot be provided by AI independently because it cannot take the initiative to create such synchronous reciprocal experiences as a human being can. Most importantly, it lacks something equivalent to "human agency" (Bandura, 2001) that can offer guidance or even self-guidance (also known as "self-regulation" in the field of educational psychology) without having to be "prompted" by someone else; this is what determines self-efficacy and makes things happen. AI should, therefore, be considered in its proper dimensions, as a medium in the Industry 4.0 era, or a valuable tool, assisting teachers in their multifaceted roles as pedagogues, instructors, mentors, facilitators, communicators, class managers, motivators, and more.

THE NEED FOR A FRAMEWORK

It is important to establish when, where, and how teachers (and/or learners) can work with AI, so as not to cross red lines that pose ethical issues (such as plagiarism), or compromise the necessary painstaking objectives that a cognitively demanding task that requires *hard focus* (Sifakis and Georgountzou, 2004/2018, p. 220), for instance, is intended to accomplish. This is an issue that pervades the human-AI framework of collaboration, and this is why a sound methodological approach would prove to be beneficial, especially in relation to foreign language teaching, which is the focus of this paper.

THE TEACHING CONTEXT

A curriculum can be either fixed ("core") or open (more learner-centred). Extremes can be too restrictive ("teacher proof") or too chaotic and labour intensive (Spinthourakis, 2004). In English language teaching, a fixed curriculum allows for adaptation of existing vocabulary/grammar/speaking exercises or dialogues, etc., while an open curriculum gives scope for the creation of new ones, based on the teaching situation and the class or learners' profile (Sifakis and Georgountzou, 2004/2018, pp. 39-52). Another way to describe such approaches is to refer to linear vs. non-linear learning; obviously, in the second case learners are given more scope for creativity, innovative thinking and challenging vistas.

METHODOLOGY FOR ORACY SKILLS DEVELOPMENT

Nation (1989) and Johnson (1982) propose applying certain criteria in order to enhance communicative interaction in class. In that respect, the teacher has more tools in order to adapt material or create new activities involving: information gap, information transfer, applying the jigsaw principle in order to promote cooperative learning, and also including procedures and challenges into a lesson plan more effectively and efficiently.

Given, also, that technology nowadays offers numerous opportunities for multimodal learning experiences, AI can help in that direction, too, by combining text with image/video and sound, as long as the teacher understands how - and intends to - use it creatively in his or her lessons. Examples include:

a. Creation of image-enhanced task sheets (by using DALL-E 3 in Copilot/Office 365 or Imagen in Gemini) that motivate students to engage more meaningfully in activities and provide enhanced comprehension of the instructions (Canva is also great for designing). Notably, the process of writing prompts for AI to generate an image corresponds to Johnson's principle of "information transfer" (from one means to another, i.e. from written form to image, in this particular case).

b. Condensing large texts in order to enhance students' comprehension and adapt more difficult or specialized passages for specific teaching contexts (or use "Grammarly" to edit text). This will help accelerated learning by turning longer texts into more "manageable" ones, in order to facilitate comprehension and promote meaningful interaction (possibly creating an "information gap" activity, as well), based on their content and specific information that students may be assigned to find (engaging, for instance, in a role play afterwards).

c. Blending teaching with "fictional" elements; for instance, by creating scripts of imaginary dialogues between teacher and student(s) or between learners (in ChatGPT, Copilot, or Gemini), and assigning targeted tasks for pair-work or group-work and, thus, providing "augmented" engagement experiences in class. Specific tasks may also involve:

-Listening to videos from YouTube (or podcasts) and creating communicative situations.

-Dramatization or simulation (Littlewood, 1981), bringing students closer to real-life situations, which is always intended in foreign language teaching.

The above approach follows closely the principles of communicative syllabus design and methodology and conforms to a progressivist, learner-centred approach (Clark, 1987).

THE AIATAC FRAMEWORK

The AIATAC framework was inspired by the fact that trainee English teachers at Master's level at the Hellenic Open University reported using AI to design image-enhanced task sheets, as part of their lesson planning. Content analysis of such lesson plans and task sheets from six past semesters has revealed that the applications mostly used were Canva and Dall-E 3, and the results are evaluated as positively correlated with increased student motivation and participation in class. Subsequently, the AIATAC framework was conceptualized as a result of the realistic need to extend and apply AI-assisted task adaptation or creation, in a principled manner, conforming to the methodology of the teaching of English as a Foreign Language.

SCOPE OF THE AIATAC FRAMEWORK

The AIATAC framework can also be applied to the teaching of English for Specific/Academic Purposes (ESP/EAP) or even EMI (English as a Medium of Instruction). This possibility is currently under consideration at the University of Ioannina, as part of teaching ESP at the Department of Accounting and Finance, which involves integrating AI into the synchronous (class/IT lab) and asynchronous (self-study/ecourse) components, using generic or more specific AI applications, such as: ChatGPT, Copilot, Canva, Dall-E 3, DeepL, Grammarly, RoadtoGrammar, Perchance, etc. The AIATAC framework, which ideally should involve collaboration with an IT expert, allows instructors to use their imagination in lesson planning and provide more focused and motivating, context-adapted activities, based on communicative syllabus design and methodology.

The use of technologies such as deep learning (Yuxiu, 2024) in AI translation, in particular, provides unparalleled benefits, given also that several researchers view translation as a useful "fifth skill" (Stibbard, 1998, p. 71, in Tagkas, 2024, p. 150), in addition to the four macro-skills (reading, writing, listening, speaking). In grammatical terms, it is important for EFL students to realize that the word order of their native language may differ from the English language (in English, the order is subject–verb–object) (see Maratsos, 1998). Thus, syntax allows them "to understand 'the cat ate the mouse' as a logical statement, and 'the mouse ate the cat' as unlikely" (Duchesne et al., 2022), as the words are ordered in such a way that meaning cannot possibly be confused. However, in Greek it would be possible to change the word order without changing the meaning, because in the Greek language the subject of the sentence is always in the nominative case, while the object is in the accusative case and can, therefore, be easily identified, even if it precedes the verb (in contrast, English relies on word order - not cases - to determine which noun is a subject or an object). AI applications such as DeepL or RoadtoGrammar, etc. can help students master the intricacies of contrastive analysis of the two language systems and enhance their awareness and ability to form grammatically correct sentences.

Image 1
The AIATAC Framework

	AIATAC FRAMEWORK	
TEACHING CONTEXT	**IMPLEMENTATION: EFL/ESP/EAP/EMI COURSE**	**METHODOLOGICAL PRINCIPLES**
FIXED CURRICULUM (E.G. PRIMARY/SECONDARY EDUCATION) =>	**AI-ASSISTED TASK ADAPTATION** => CONTENT (E.G., SUMMARIZED TEXT/ALTERED EXERCISES - TASK SHEETS)	APPLICATION OF **COMMUNICATIVE TASK** CRITERIA: EG INFORMATION TRANSFER (TEXT TO IMAGE: DALL-E 3, IMAGEN, PERCHANCE), ROLES (CHATGPT, COPILOT, GEMINI, CANVA), PROCEDURES, CHALLENGES, ETC. •THE ADAPTED/CREATED **TASK REQUIRES** VERBAL/NON-VERBAL INTERACTION TO ACHIEVE A SPECIFIC OBJECTIVE IN A GIVEN SITUATION. •INTEGRATION OF **MACROSKILLS** (READING, SPEAKING, LISTENING, WRITING) AND **MICRO-SKILLS** (E.G. PROBLEM-SOLVING, ANALYZING, SYNTHESIZING, SUMMARIZING, CLARIFYING, REQUESTING, NEGOTIATING, ETC.)
OPEN CURRICULUM (E.G. POST-SECONDARY/HIGHER EDUCATION) =>	**AI-ASSISTED TASK CREATION** => NEW CONTENT (E.G., GENERATED TEXT/IMAGES/ EXERCISES - TASK SHEETS)	
EVALUATION: STUDENTS' PERFORMANCE – TEACHER REFLECTING UPON PEDAGOGICAL VALUE	ACHIEVEMENT OF (MEASURABLE AND CONCRETE) **SYLLABUS OBJECTIVE(S)**: E.G., TEACHING ORACY/LITERACY/TERMINOLOGY	

STRUCTURE OF THE AIATAC FRAMEWORK

AI can be a great tool, as long as properly engineered prompts are used. However, the content created by AI often lacks "authenticity" and should be checked and post-edited by a human "editor", so as to ensure credibility and compatibility.

The AIATAC framework can best be implemented in a laboratory with the required equipment, offering students access to applications and online tools, or specialized software, which would enhance their literacy and help them to engage more meaningfully in a (mediated or not) student-teacher interaction.

DRAWBACKS OF ARTIFICIAL INTELLIGENCE

Undoubtedly, the fact that this form of intelligence is "artificial" implies that it cannot protect itself from some dangerous practices that are regarded as sub-standard in terms of academically accepted "specifications". Some drawbacks of AI, as Straubhaar et al. (2024) indicate, are that it cannot nuance writing and tone/context (although, we believe, this is rapidly changing); it cannot replace human judgment and independent thinking; it can get facts wrong and may be biased, based on what it can access on the internet; in addition, it may commit plagiarism, while it also fails to tell the difference between fact and fiction (which entails the risk of misinformation). In fact, as McCloud (2023) supports, AI does not actually cite or attribute its information and, when asked, it often provides invalid or inaccurate sources. All of the above-mentioned drawbacks can be potentially dangerous. This implies that AI can be helpful in drafting documents which, however, need to be checked by an expert human practitioner who will be able to approach them from different angles and examine their correctness, validity, credibility, and so on.

Therefore, the theoretical approach to the use of AI should involve its treatment as a versatile "tool"- but without abusing its capabilities or attributing to it any supreme powers that it may not possess, or even treating it as a reliable "partner" (at least not without double-checking its findings or diverse creations).

BENEFITS OF THE AIATAC FRAMEWORK

Adding structure is essential in order to avoid circumstantial (or "disoriented") initiatives that may prove to be less fruitful than their intended outcome. The AIATAC framework is suitable for small scale or large scale use, depending on the context and level of students (an AI tool for checking the CEFR level of a text is available at: http://www.roadtogrammar.com/textanalysis/).

The benefits of the AIATAC framework are that it is:

Practical: it can be easily used and can offer an array of available AI tools, depending on the context/lesson objectives.

Reflective: it gives teachers the opportunity to reflect on their teaching practices and make the necessary adjustments.

Flexible: It can adapt to different contexts - from general EFL to ESP/EAP/EMI, etc.

Effective: It can have a considerable impact on the class dynamics by accelerating the learning process and facilitating the teacher's role, while enabling learners to engage in activities in more meaningful ways.

Dynamic: It can be further developed, as new applications and tools can be added to the list of available options, depending on the context/level/criteria, as outlined in the framework.

By applying the AIATAC framework, EFL teachers and/or ESP/EAP instructors have a basis for a more focused and meaningful integration of (and interaction with) AI. Finally, it should be noted that the framework is also compatible with "self-regulated learning" practices (Kitsantas et al., 2013), which means that self-study can acquire a more empowered and entertaining character, as learners can be guided on how to use AI applications effectively in order to improve their knowledge and build their macro- and micro-skills.

PROSPECTS FOR DEVELOPMENT OF THE AIATAC FRAMEWORK

Ideally, the AIATAC framework could be further developed into a Web based "matching tool", pairing skills development criteria with available AI applications in order to guide EFL/ESP/EAP instructors in regard to designing their lessons and adapting or creating context specific tasks, according to students' level or profile and curriculum/syllabus objectives. We believe that this possibility would be best implemented as part of an Erasmus+ project, for example, or other suitable projects related to education and/or information technology.

CONCLUSIONS

Taking into consideration the prospects of "upskilling" or "reskilling" (as opposed to "deskilling"), which are necessary steps in order to adjust to the new requirements of the 21st century and Industry 4.0, the AIATAC framework provides an opportunity to join forces with IT/AI specialists (who could also offer students more specialized knowledge about how to use AI tools and applications) and, thus, turn EFL into a more meaningful, as well as effective and efficient process, either in class (face-to-face) or in distance-learning contexts.

In other words, educators need to start thinking "outside the box", in the sense that they should also take advantage of (or create) opportunities for collaboration and synergies with IT specialists and other instructors; together, empowered also by AI applications, they will be able to contribute to the advancement of teaching and learning (English language learning, in our case) by means of the new technological possibilities that are available to members of the educational community in the Industry 4.0 era.

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TA14: Pedagogical applications of educational robotics

COMPARATIVE USABILITY EVALUATION OF MECHATRONIC SYSTEMS

Apostolos Tsagaris
International Hellenic University
Thessaloniki, Greece
e-mail: tsagaris@gmail.com

Maria Chatzikyrkou
International Hellenic University
Thessaloniki, Greece
e-mail: maria.chatzikyrkou@gmail.com

ABSTRACT

This paper studies the interaction of children aged 5-12 years with a modern mechatronic system by comparing the results obtained from three usability assessment tools. The mechatronic system is an autonomous robotic vehicle that was built with the help of the Lego Mindstorms EV3 Education educational package. The construction is used by 100 children aged 5-12 years in three scenarios of different difficulty and then each of these children answers three questionnaires. The first questionnaire that assesses usability is the SUS (System Usability Scale) and consists of 10 questions, the second is the USE (Usefulness, Satisfaction, Ease of Use) which consists of 30 questions which are divided into four sections and assess usefulness, ease of use, ease of learning and satisfaction respectively. The third questionnaire was created and adopted from previous research (Tsagaris, 2023) and consists of 20 questions divided into four sections assessing effectiveness, efficiency, satisfaction and ease of use.

The survey included a sample of 100 children, aged 5-12 years (5-6 48%, 7-8 26%, 9-10 16%, 11-12 10%), of whom 84% were boys and 16% were girls, of whom 48% reside in western Thessaloniki and 52% reside outside Thessaloniki. From the results of the first questionnaire (SUS), one concludes that the use of the mechatronics system creates the will for frequent use (94% Agree), is not complicated (80% Agree), exudes confidence during use (98% Agree) is easy to learn (70% Agree), and that for the younger ages of 5-6 years, unlike children 11-12 years, the assistance of a technician is required to use it.

According to the results of the second questionnaire (USE), in its first section assessing Usability, 92% agree that it helps them be more efficient, 98% agree that it is useful and 98% also agree that it does everything they expected it to do. In its second section assessing Ease of Use, 92% say that it is easy to use, 94% agree that it is user-friendly, 96% state that it is flexible and that they can recover from mistakes quickly and easily. In its third section assessing Ease of Learning, 90% easily remember how to use it and 80% state that it is easy to learn and use. The fourth and final section of the second questionnaire assesses Satisfaction, with 100% stating that they are happy with the interface, 96% saying they would recommend it to a friend and 98% saying it is great.

As for the third questionnaire, in the first five questions assessing Effectiveness, 96% disagree that mistakes are made during interaction, while 100% agree that the interface works as expected. In its second section, which concerns Efficiency, 100% agree that interaction is easy and 92% agree that there is freedom of movement for the user. Satisfaction is what is assessed in the third section of the questionnaire, with 100% agreeing that operating the system is not tiring and that changing the command is easy, while in the fourth section, which assesses Ease of Use, 96% state that it is flexible in selecting movements, 100% that the commands are memorable, and that training is easy.

Keywords: Educational Robotics, Mechatronics Systems, Usability Assessment

INTRODUCTION

The field of robotics has transitioned from simple educational tools to complex mechatronic systems that significantly impact various industries. This evolution is not merely technological; it reflects changes in educational paradigms, societal needs, and the integration of interdisciplinary approaches. Understanding this progression provides insight into how robotics has become an essential component of modern education and industry. Educational robotics began in the late 20th century, aimed primarily at introducing students to the principles of programming and engineering. Early systems, such as LEGO Mindstorms, allowed students to build simple robots and program them to perform basic tasks. These tools were designed to enhance problem-solving skills, creativity, and teamwork among students (Kalogeras and Papadopoulos, 2017).

The primary goal was to make learning engaging and interactive. As educational robotics gained popularity, educators recognized its potential to bridge the gap between theoretical knowledge and practical application. Students could see the results of their programming in real-time, fostering a deeper understanding of concepts such as algorithms and mechanical design. As technology advanced, so did educational robotics. The introduction of sensors, actuators, and more sophisticated programming environments transformed how students interacted with robotic systems. Robots began to incorporate features such as vision systems, touch sensors, and even artificial intelligence, allowing for more complex interactions and behaviors. These advancements meant that educational robotics could be used to teach more than just basic programming. Topics such as data analysis, machine learning, and systems engineering became integrated into robotics curricula. Consequently, students were not only learning how to build and program robots but also how to analyze data and make informed decisions based on their findings.

The transition from educational robotics to mechatronic systems represents a significant shift in focus. Mechatronics combines mechanical engineering, electronics, computer science, and control engineering. This interdisciplinary approach allows for the development of systems that are not only automated but also intelligent. In this context, mechatronic systems are used in various applications, including manufacturing, healthcare, and transportation. For example, robotic arms used in assembly lines are mechatronic systems that enhance efficiency and precision. In healthcare, robotic surgical systems provide surgeons with enhanced capabilities, improving patient outcomes (Tsagaris, 2019).

The term "mechatronics" was first adopted by Tetsuro Mori, an engineer at the Japanese company Yaskawa Electric Company Ltd., in the late 1960s. The word mechatronics is formed from the letters of the English words "MECHAnical Systems and elecTRONICS." Japanese engineers quickly realized that flexible and intelligent systems would dominate all sectors of economic and social life, such as industrial production, national defense, aerospace, transportation and networks, smart home and consumer devices, and more. The rapid development of industrial products and technological systems by Japanese industry—which combined various technologies (electromechanical, electronic, and hydraulic components with information processing elements like microcontrollers)—first compelled the Americans and then the Europeans to accept and adopt the term mechatronics themselves (Auslander and Kempf, 1998). As previously mentioned, mechatronics is the merging of the disciplines of Mechanical Engineering, Electrical Engineering, Electronics, and Computer Science, with the goal of creating "smart" systems. At present, various definitions of mechatronics exist depending on the field of interest. According to Yaskawa Electric (1969), mechatronics refers to devices and systems that combine mechanical and electronic parts. The reputable scientific journal IEEE / ASME Transactions on Mechatronics defines mechatronics as the synergistic integration of mechanical engineering with electronics and intelligent control in the design and manufacturing of industrial products and processes. A similar definition was formulated by the Industrial R & D Advisory Committee (IRDAC) of the European Commission, according to which mechatronics refers to the synergistic combination of precision engineering with electronics and intelligent systems for the design of products and industrial processes (Billingsley, 2006).

The evolution from educational robotics to mechatronic systems has had a profound impact on education. The integration of mechatronics into educational settings encourages students to think critically and creatively. They are challenged to design solutions for complex problems, often working in teams to brainstorm and prototype ideas. This collaborative environment mirrors the modern workplace, where interdisciplinary teams tackle multifaceted challenges.

The question that remains, however, is how effective the use of educational robotics and mechatronics systems in education is. To answer this question, the concept of usability must first be defined. Usability has been a fundamental parameter in information technology and computing systems for many years. Even before it was formally established as a concept, it had already concerned experts, who used the phrase “user-friendliness” in reference to information systems (Nielsen, 1993). This phrase was later replaced by various concepts with a human-centered focus, such as HCI (Human-Computer Interaction), HMI (Human-Machine Interface), etc. (Nielsen, 1993). In 1981, Shackel was the first to use the

term "usability" for systems, thus replacing all the previous prevailing terms (Bevan, Kirakowski & Maissel, 1991). This occurred because it had become widely accepted that users do not need machines that are merely friendly to them, but rather machines that do not hinder them in accomplishing their tasks (Nielsen, 1993).

It also became necessary to consider that each user has different needs. Each user is more or less familiar with technology use. This implies the need for ease of use by all, without discrimination or exceptions.

Numerous definitions of usability have been proposed to this day. The International Organization for Standardization (ISO-9241-11) defines usability as a quality that provides effectiveness, efficiency, and satisfaction. However, it emphasizes that usability depends on specific users, with specific goals, under a specific usage context (Ergonomics of Human-System Interaction, 2008). This definition clearly highlights that usability largely depends on identifying the users, their intended goals, and the conditions or context in which the system is used.

Another definition argues that the role of system design in computing is its usability—i.e., "to function according to user expectations, satisfying their requirements" (Dix et al., 2004, p. 319). Many factors contribute to usability and determine whether something is usable or not. From a human-centered perspective, for a product or service to be considered usable, it must meet certain criteria, such as usefulness, performance, effectiveness, user satisfaction, ease of learning, and accessibility (Rubin & Chisnell, 2008). In general, "what makes something usable is the absence of frustration during its use" (Rubin & Chisnell, 2008, p. 4).

This research examines the usability of a mechatronic system in terms of usefulness, ease of use, ease of learning, and satisfaction (Lund, 2001).

STATE OF THE ART

Programming was later combined with educational robotics, in the development of which a dominant role is played by the emergence of specialized kits that combine the constructional foundation of objects (e.g., Lego-type bricks) with sensors, processing units, actuators (e.g., motors), and user-friendly (visual) software. These elements work harmoniously together to build a robotic structure. Within this context, it becomes clear that programming becomes tangible for students, as they can immediately observe the result of their programming and make corrective interventions if necessary (Tsagaris, 2023).

In the modern educational community, the appeal of robotics lies in the opportunity it offers learners to create an object (e.g., a wheeled vehicle) and then control it, taking into account environmental parameters, using a programming environment that is particularly intuitive and enjoyable for students. Naturally, the role of the teacher is almost irreplaceable, as they must organize and guide the entire process, having planned the lesson in advance. Unfortunately, there are often obstacles for the teacher, such as the lack of appropriate training and technical support (laboratories, computers, robotics kits, lesson plans, etc.) (Alimisis, 2009). As for students, especially beginners, what seems to intimidate and challenge them is programming, which is an integral part of robotics as a teaching subject. According to Kyriakou & Fachantidis (2012), the main reasons for these difficulties are the traditional approaches to teaching the principles of programming, as they were taught in the past.

In recent years (2016), a new educational model has been proposed by Atmatzidou & Dimitriadis (2016): the "CPGC+" model, an acronym for the words Collaboration, Problem, Game, and Competition, with the "+" symbol referring to the development of skills such as problem-solving, metacognition, computational thinking, collaboration, communication, and more, through additional supportive interventions by the teacher. This model serves as a learning tool aiming to cultivate both general and specialized skills in students, yielding optimal results through the teaching of educational robotics. Similar conclusions are drawn by Avramidou (2016), who emphasizes that educational robotics activities contribute to the development of computational thinking skills. Bakas (2011) investigated to what extent students' involvement in a robotics project could contribute to achieving part of the learning objectives of the course "Elements of Programming in a Graphical Environment" in the third grade of Greek vocational high schools (EPAL), and more broadly, to the teaching of programming in both high school and junior high school. The results were positive in terms of the effectiveness of educational robotics.

An approach that utilizes educational robotics in combination with visual programming is proposed by Kyriakou & Fachantidis (2012). In a problem-solving project inspired by play, the Lego Mindstorms for Schools robotics kit was used to teach basic programming principles—particularly selection and repetition structures. These concepts were found to be difficult for beginner students to understand during programming lessons in the third grade of junior high school. Thus, the study examined the contribution of educational robotics and visual programming to overcoming these

difficulties. It was ultimately found that Lego Mindstorms robotic constructions can substantially support programming education. By using sequential structures along with selection and repetition, students were able to implement a wide range of behaviors and scenarios, having mastered the logic behind them (Tsagaris and Chatzikyrkou, 2020).

In another case, Ranganathan et al. (2019) analyzed children's interaction through gestures, showing a high level of acceptance for this new communication method. The children were highly motivated to participate, and the ease of interaction was evaluated very positively (Pons & Jaen, 2019). The study by Nacher, Garcia-Sanjuan, and Jaen showed that young children around the age of six found it difficult to interact with mechatronic systems. In fact, most of them failed to achieve the final task. Furthermore, the time required to complete tasks was found to be strongly correlated with age: the older the children, the more successfully they met the timing goal. In the same study, regarding whether children could guide a robot through a predetermined path, statistical analysis revealed that children aged three and above could complete the tasks with nearly 100% success (Nacher et al., 2016).

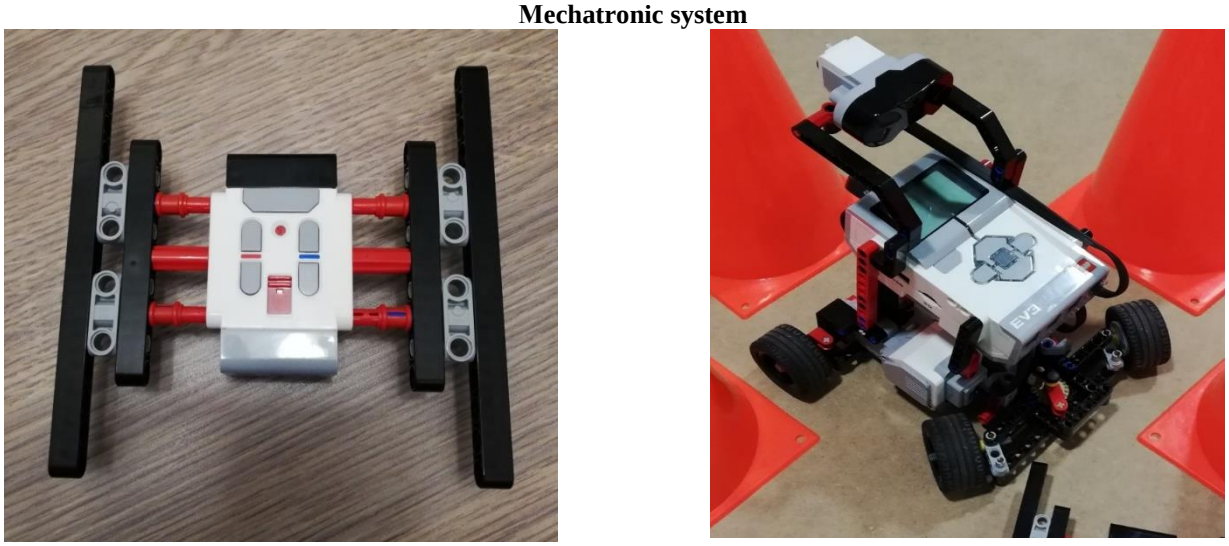
Vasey et al. compared the usability of an Android-based app with a remote control for operating a mechatronic system (Aldebaran Nao robot). The results were positive, highlighting the app's ease of use and the well-organized interface (Vasey et al., 2017). Ranganathan et al. also studied children's interaction with a robotic arm, focusing on how easily children aged 9–12 could control it. The results showed a striking effect of age on motor learning: 9-year-olds struggled significantly, with only ~40% able to complete the task. Although 12-year-olds showed some improvement, they still had difficulty controlling the robotic arm, with low task completion rates, longer movement times, and longer path lengths (Ranganathan et al., 2019).

METHODOLOGY

The purpose of this study is for a sample of students to handle and evaluate the usability of the interaction between a remote control and an autonomous robotic vehicle across three scenarios of varying difficulty, each corresponding to a specific questionnaire.

Taking into account that the subject of the research is the evaluation of interaction usability with an autonomous robotic vehicle, the collection of relevant information is conducted through a standardized tool (questionnaire). Given that the data collected is quantitative, that the students can be approached through the pilot programs being implemented, that it is possible to gather data from a sufficient number of them (a sample), and that the time available for conducting the research and processing the results is relatively limited, the chosen methodology for this research is descriptive, quantitative, and sample-based. It is fundamental in nature, with a view to applying the results, and is carried out using questionnaire tools. A pilot implementation of the tool was used in all three questionnaires applied.

Figure 1
Mechatronic system



In order to timely identify any potential flaws in the wording of the questions that could lead to misinterpretation by the respondents, a pilot test of the questionnaire was conducted with five trainees. Based on their feedback, minor adjustments of limited scope and significance were made, and the average time required to complete the questionnaire

was calculated. The most significant issues arose from the fact that some questions were not clearly understood, as they included specialized terminology that was not easily comprehensible to this particular group of individuals.

The main challenge encountered was that the researcher, who was also the trainer of the specific group, could not record all his observations at the same time due to time constraints. The sample was formed using purposive sampling. The questionnaire was completed by trainees who participated in an educational robotics program for primary school children. A total of 100 participants took part in the study, attending the training in groups of 4–6 individuals. The questionnaires were distributed and completed during the course sessions (Tsagaris & Chatzikyrkou, 2019).

For the construction of the remote control, a Lego Mindstorms EV3 Infrared Beacon from the home edition was used, along with some additional bricks to ensure more stable handling (Figure 1).

Figure 2
First scenario



The Lego Mindstorms EV3 Infrared Beacon remote control communicates with the infrared sensor of the Lego Mindstorms EV3 home edition via infrared radiation. The sensor, in turn, sends commands to one of the inputs of the microcontroller, which are then translated into motion. This is achieved through two Large motors connected to the outputs of the microcontroller, which drive the rear wheels. Additionally, a Medium motor is connected to another output and is responsible for steering the vehicle by turning the front wheels either left or right. All of this is, of course, controlled through appropriate programming stored in the microcontroller's memory, created within the Lego Mindstorms EV3 programming environment.

In the first scenario, which is the easiest, students are asked to use the robotic vehicle to navigate around a square path (Figure 2). After completing the task, they are required to complete the System Usability Scale (SUS) questionnaire, where they first fill in their age, gender, and place of residence.

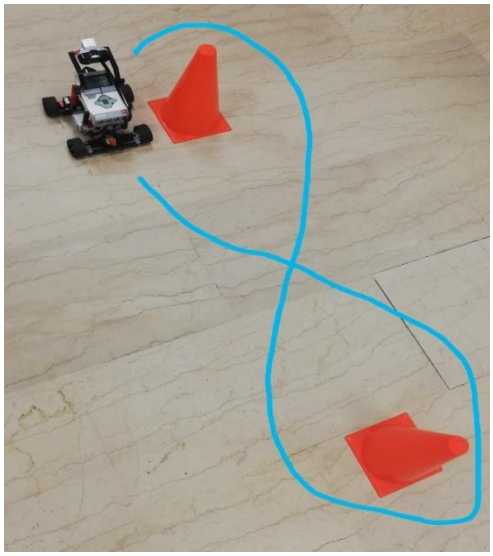
The System Usability Scale (SUS) was developed in 1986 by John Brooke and consists of only 10 questions/statements, which are rated by respondents on a 5-point scale, ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). All questions must be answered, and if a participant is unsure, they are instructed to choose 3 (neutral response). From the scoring of the statements, a final usability score is calculated.

The SUS questionnaire has several features that make it stand out. Perhaps its most important characteristic is that it can be used to evaluate the usability of any system, software, or service, making it technology-agnostic. In addition, it can be easily and quickly completed by respondents, and just as easily and quickly analyzed by researchers who use it. The single final score it provides can be understood even by individuals who are not specialists or experts in the field of usability evaluation.

In the second scenario, which is more difficult than the first, students are asked to use the robotic vehicle to perform a figure-eight maneuver between two cones, following the path marked in blue in the image below (Figure 3).

After completing the task, students are asked to fill out the USE questionnaire, where they first provide their age, gender, and place of residence. The structured USE questionnaire (Usefulness, Satisfaction, Ease of Use), proposed by Lund (2001), is a tool designed to categorize user responses across the dimensions of usefulness, ease of use, satisfaction, and ease of learning.

Figure 3
Second scenario



It includes 30 questions using a seven-point Likert scale, where users can select from the following levels of agreement:

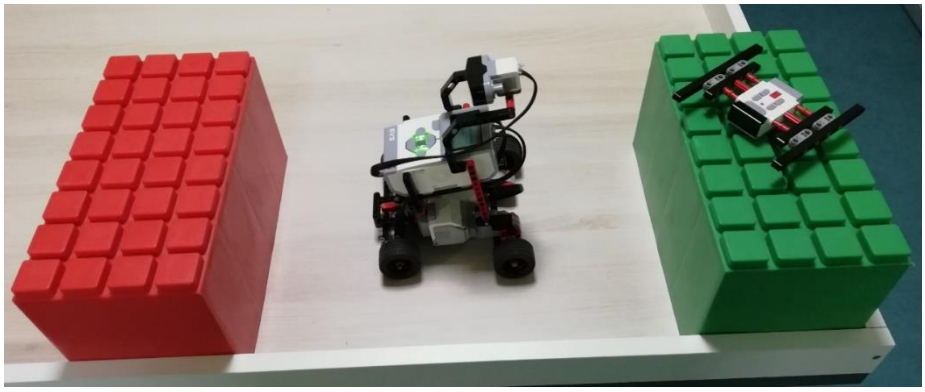
- "Strongly Disagree"
- "Disagree Somewhat"
- "Neutral"
- "Agree "
- "Strongly Agree"

These levels are mapped to numerical values from 1 to 5, where "1" corresponds to "Strongly Disagree" and "5" to "Strongly Agree", allowing for the quantification of the response variable. The 30 questions are grouped into the following four categories:

(A) Usefulness
(B) Ease of Use
(C) Ease of Learning
(D) Satisfaction

The usability of the interface is assessed based on these four categories by calculating the average of users' responses for each group of related questions.

Figure 4
Third scenario



In the third scenario, which is the most difficult, students are asked to park the robotic vehicle between two objects, as shown in the image below (Figure 4).

After completing the fields for gender, age, educational level, and place of residence, participants are asked to answer the questions in the third questionnaire, called Tsagaris, which is a tested and standardized questionnaire consisting of twenty questions using a five-point Likert scale. In these questions, users can select one of the following levels of agreement, corresponding to the scale used in the USE questionnaire. The third questionnaire is used to assess effectiveness, efficiency, satisfaction, and ease of use. Each of these four sections consists of five questions

RESULTS

Following the completion of the study on usability evaluation of interaction with an autonomous robotic vehicle, and based on the responses of the sample of 100 children aged 5–12 years (5–6: 48%, 7–8: 26%, 9–10: 16%, 11–12: 10%), of whom 84% were boys and 16% girls, and 48% lived in western Thessaloniki while 52% lived outside Thessaloniki, several useful conclusions can be drawn regarding the usability of the widely used educational robotic system Lego Mindstorms EV3 Infrared Beacon, included in the Lego Mindstorms EV3 home edition package.

From the results of the first questionnaire (SUS), we conclude that the Lego Mindstorms EV3 Infrared Beacon:

- Encourages repeated use (94% AGREE),
- Is not complex (80% AGREE),
- Instills a sense of confidence during use (98% AGREE),
- Is easy to learn (70% AGREE),

and that younger children aged 5–6 require technical assistance to use it, in contrast to children aged 11–12.

According to the results of the second questionnaire (USE):

- In the first section (Usefulness):
  - 92% agree that it helps them be more effective,
  - 98% agree it is useful,
  - 98% agree it does everything they expected it to do.
- In the second section (Ease of Use):
  - 92% say it is easy to use,
  - 94% agree it is user-friendly,
  - 96% state that it is flexible and can recover from errors quickly and easily.
- In the third section (Ease of Learning):
  - 90% remember easily how to use it,
  - 80% state it is easy to learn and use.
- In the fourth and final section (Satisfaction):
  - 100% say they are satisfied with the interface,
  - 96% would recommend it to a friend,
  - 98% consider it excellent.

In the third questionnaire (Tsagaris), in the first five questions, which assess Effectiveness, 96% disagreed that errors occur during interaction, while 100% agreed that the interface functions as expected. In the second section, which concerns Efficiency, 100% agreed that interaction is easy and 92% agreed that the user has freedom of movement.

Satisfaction is evaluated in the third section of the questionnaire, with 100% agreeing that operating the system is not tiring and that commands can be easily changed. In the fourth section, which assesses Ease of Use, 96% stated that the system is flexible in selecting movements, and 100% agreed that the commands are easy to remember and that the training is easy.

CONCLUSION

This study highlighted the high usability and educational value of the Lego Mindstorms EV3 Infrared Beacon system as a means of interaction with an autonomous robotic vehicle for students aged 5–12 years. From the analysis of data collected through the three questionnaires (SUS, USE, and Tsagaris), the following key conclusions emerged:

- The system encourages frequent use and is characterized by user-friendliness, without requiring a high level of prior knowledge. This makes it suitable even for younger children, with only minimal need for technical support.
- In terms of usefulness and effectiveness, participants felt that the robotic vehicle fully met their expectations and facilitated the achievement of assigned tasks.

- Ease of use and learning indicators showed high values, with children quickly learning how to operate the system and easily recognizing the commands required for its control.
- User satisfaction with the system was universal, with the majority of children stating that they would recommend it to a friend and describing the experience as both positive and enjoyable.
- The Tsagaris questionnaire further confirmed the system's reliability and functional stability, indicating that the interface operates without errors, offers freedom of movement, and that training for its use is simple and understandable.

In summary, the Lego Mindstorms EV3 Infrared Beacon proves to be a fully functional, flexible, and pedagogically effective educational robotics tool that combines technical quality, usability, and a positive learning experience. Its use in educational settings appears to enhance students' creativity, autonomy, and problem-solving skills.

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INTEGRATING ALGORITHMIC THINKING AND PROGRAMMING INTO SECONDARY EDUCATION THROUGH EDUCATIONAL ROBOTICS: A CASE STUDY BASED ON THE NEW GREEK CURRICULUM OF IEP

Angelos Rondogiannis
Computer Science & Music Educator (PE86 – TE16)
Department of Computer Science Education,
2nd Experimental General Lyceum of Lefkada, Greece
email: arondo@sch.gr

ABSTRACT

This article presents a case study exploring the integration of algorithmic thinking and programming in upper secondary education through educational robotics. The intervention is grounded in the new national Informatics curriculum developed by the Greek Institute of Educational Policy (IEP), focusing on the thematic area "Algorithmic Thinking – Programming of Computing Systems" and specifically the sub-topic "Programming of Robots and Hardware."

Through a scenario based on the use of Arduino microcontrollers and simulation platforms such as Tinkercad, students were guided in constructing and programming automated systems. The approach blends simulation with physical computing, fostering students' engagement with real-world technological applications. Emphasis was placed on constructivist and experiential learning, collaborative project work, and the cultivation of core digital skills.

The study was implemented during the 2023–2024 academic year with 11th-grade students, highlighting increased engagement, improved programming literacy, and enhanced problem-solving and collaborative abilities. Findings suggest that educational robotics serves as a powerful medium for delivering key computing concepts while promoting creative and critical thinking.

Keywords: Educational Robotics, Algorithmic Thinking, Physical Computing, Secondary Education, Arduino

INTRODUCTION

The accelerating pace of technological development necessitates a paradigm shift in computer science education. Beyond acquiring operational familiarity with digital tools, students must be equipped with algorithmic thinking and problem-solving abilities that transcend disciplines. Educational robotics, as a pedagogical tool, offers a unique opportunity to connect theoretical knowledge with authentic practices.

This study presents a teaching scenario aligned with the new curriculum introduced by the IEP for the subject "Introduction to Computer Science" in the 11th grade. The focus is on applying algorithmic and programming knowledge to the construction and control of physical computing systems using microcontrollers (Arduino) and sensors, both virtually (via Tinkercad) and in real-world contexts.

Through collaborative project work, students design and implement automation systems, simulating smart environments. The process involves interpreting programming logic, assembling circuits, and iteratively debugging and optimizing their artifacts. The scenario also aligns with the broader pedagogical goals of the IEP: the cultivation of creativity, innovation, and digital competency in line with 21st-century educational frameworks.

THEORETICAL FRAMEWORK

Algorithmic Thinking and Programming

Algorithmic thinking refers to the structured formulation of step-by-step procedures to solve problems efficiently. Programming, as the expressive language of algorithms, enables the practical implementation of such procedures through code. The IEP curriculum prioritizes the development of algorithmic literacy as a core competency in digital education.

Epistemological Foundations

The scenario is grounded in constructivist and socio-constructivist learning theories, advocating for active student participation and discovery-based learning. Students are encouraged to explore, experiment, and reflect upon their actions, thereby internalizing computational concepts through hands-on activities.

Prior exposure to block-based (e.g., Tinkercad) and visual programming (e.g., App Inventor) environments serves as a scaffold for transitioning to text-based programming via the Arduino IDE. The pedagogical approach adopts a "black-box" exploration model, where students initially analyze system outputs without direct code access and subsequently investigate the corresponding code structure.

Methodological Approach

The instructional design emphasizes collaborative learning and active engagement. Students work in teams, dividing responsibilities between programming and hardware assembly. This structure encourages mutual support, peer instruction, and role rotation, fostering autonomy and collective accountability.

Curriculum Alignment

The scenario is consistent with the Cross-Thematic Curriculum Framework (DEPPS) for Informatics and the revised IEP guidelines for upper secondary education. It supports competencies outlined in national and European digital literacy frameworks, such as critical thinking, computational problem-solving, and collaborative learning.

Integration of ICT

The scenario utilizes digital tools such as the Arduino IDE and Tinkercad's simulation platform to facilitate a hybrid learning environment. The integration of ICT serves not merely as a medium of instruction but as an epistemological tool for constructing knowledge and enhancing technological fluency.

Proposed Teaching Scenario – Feasibility and Design

The scenario is intended for the computer lab using suitable educational software and hardware. A projector is used for introductory demos. Students work in teams of four, in sub-groups of two, each with a computer (with Tinkercad

and Arduino IDE), worksheets, and robotics materials. They communicate, interact, and take predefined roles (programming, worksheet handling), collaboratively solving progressively harder tasks.

An introductory psychological and cognitive warm-up is implemented to prepare students mentally and emotionally. No significant issues are expected regarding lab equipment or software. Worksheets are structured to be accessible and engaging.

SCENARIO DESIGN

Title

"Design and Programming of an Automated System Using the Tinkercad Simulator and Arduino Hardware"

Duration

Two teaching sessions (45–50 minutes each), supplemented by preparatory student engagement and optional extension activities.

Target Group

11th-grade students enrolled in the course "Introduction to the Principles of Computer Science."

Learning Objectives

Cognitive Objectives

- Identify the structure and functions of the Arduino microcontroller
- Understand the use of control structures (if/else, loops) and logical conditions
- Distinguish between simulation and physical implementation
- Apply algorithmic reasoning in the development of automation systems

Technical Objectives

- Utilize Tinkercad for virtual circuit design and block-based programming
- Transition from block-based to text-based programming using the Arduino IDE
- Assemble circuits using breadboards, resistors, LEDs, buzzers, and sensors
- Troubleshoot hardware and software errors effectively

Socio-affective Objectives

- Develop teamwork and communication skills
- Engage in reflective and iterative learning practices
- Cultivate creativity and technological confidence

IMPLEMENTATION AND INFRASTRUCTURE

Instructional Environment

Students work in teams of four, divided into subgroups (programming/simulation and physical assembly). Each group utilizes a computer with internet access, Tinkercad, and the Arduino IDE installed. A projector is used for whole-class demonstrations.

Lesson 1: Introduction to automation systems and circuit simulation using Tinkercad. Students begin building their projects.

Lesson 2: Transition from simulation to real hardware implementation. Students complete and refine their artifacts, reflecting on encountered challenges.

Resources and Equipment

- Arduino Uno boards
- Breadboards, jumper wires, LEDs, resistors, piezo buzzers, PIR sensors
- Computers with Tinkercad and Arduino IDE
- Instructional worksheets and teacher support materials

Proposed Activities

- Students are given robotics and automation programming projects to build and implement.

EVALUATION, CONCLUSIONS, AND CHALLENGES

Outcomes

The implementation demonstrated that students acquired a deeper understanding of programming logic and algorithmic structures. Their engagement levels and motivation increased significantly due to the tangible and interactive nature of the activity. Group collaboration fostered peer learning, and the iterative development cycle promoted a scientific approach to problem-solving.

Conclusions

Educational robotics represents a powerful pedagogical strategy for integrating STEAM principles and fostering transversal competencies. By bridging theoretical learning with physical interaction, it aligns with constructivist models and supports lifelong learning habits. Students emerge not only as consumers but as creators of technology, capable of addressing complex challenges through innovation.

Recommendations

Future implementations should consider expanding access to robotics kits, offering teacher training in physical computing, and incorporating robotics into broader cross-curricular projects. Institutional support and infrastructure investment remain critical for sustained success.

This case study affirms the pedagogical value of educational robotics as a vehicle for teaching programming and algorithmic thinking in secondary education.

Future implementations should:

- Extend project duration to allow deeper exploration and creativity
- Include interdisciplinary connections (e.g., environmental science, smart cities)
- Provide continuous professional development for educators in physical computing

Institutional support, resource allocation, and curriculum flexibility are essential for scaling such initiatives.

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ANNEXES

Φύλλο Εργασίας
1ης Διδακτικής Ώρας

Αλγοριθμική – Προγραμματισμός Υπολογιστικών Συστημάτων
Κατασκευή και προγραμματισμός κυκλώματος αυτοματισμού σε περιβάλλον προσομοίωσης ThinkerCAD και εξοπλισμό Arduino.
Τάξη Β – Τμήμα Β3

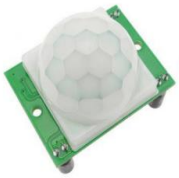
Ομάδα Μαθητών:

1) **Ονοματεπώνυμο:** ……..
2) **Ονοματεπώνυμο:** ……..
3) **Ονοματεπώνυμο:** ……..
4) **Ονοματεπώνυμο:** ……..

Χωριστείτε ανά δύο (02) για να γίνει καταμερισμός των εργασιών σε δύο (02) υποομάδες
1η Υπό - ομάδα: Δημιουργία Κυκλώματος στο πεδίο του εξομοιωτή Arduino – Thikercad – Χρήση υπολογιστή σχολικού εργαστηρίου.
2η Υπό – ομάδα: Δημιουργία Κυκλώματος στο πεδίο των υλικών που σας παρέχονται – συναρμολόγηση και σύνδεση των υλικών.

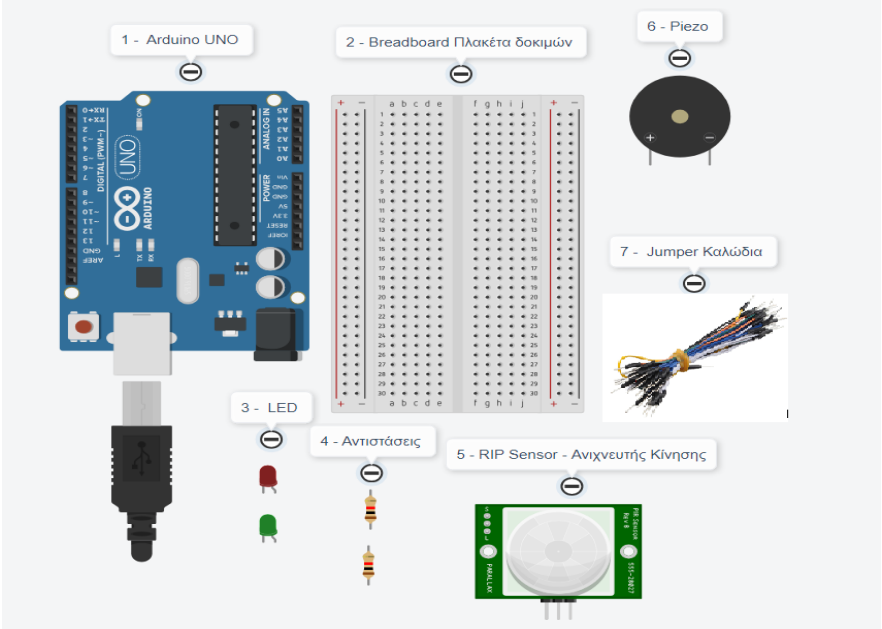
Δημιουργία Κυκλώματος στο πεδίο του εξομοιωτή Arduino – Thikercad – Χρήση υπολογιστή σχολικού εργαστηρίου.
Θεωρητικό Πλαίσιο: Ένας Αισθητήρας Ανίχνευσης Κίνησης PIR μπορεί να ανιχνεύσει πότε ένα άτομο κινείται κοντά του ανιχνεύοντας υπέρυθρες ακτίνες οι οποίες εκπέμπονται από το ανθρώπινο σώμα σε ακτίνα και όχι σε γραμμή. Αφού μετακινηθεί σε ένα συγκεκριμένο εύρος, ο αισθητήρας PIR θα σας εντοπίσει και θα αλλάξει δίνοντας κάποιο σήμα (led,ήχο κλπ). Έχει την δυνατότητα να ανιχνεύσει την κίνηση μέσα σε ένα δώματιο σε εμβέλεια έξι μέτρων. Ο αισθητήρας διαθέτει δύο μεταβλητές αντιστάσεις (trimmer) όπου μπορείτε να ρυθμίσετε την ευαισθησία και τον χρόνο ενεργοποίησης του από την στιγμή που θα ανιχνεύσει την κίνηση.

- Τάση Εισόδου: 5 - 12 V DC
- Κατανάλωση <60uA
- Σήμα Εξόδου: 3.3V TTL
- Απόσταση Ανίχνευσης: 3 - 6 μέτρα
- Γωνία Ανίχνευσης <140°
- Χρόνος ενεργοποίησης: 5 - 200 sec
- Χρόνος καθυστέρησης: 2 - 4 sec



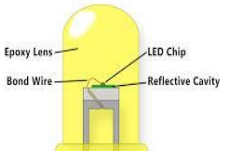


Απαιτούμενα Εργαλεία και Υλικά για τη κατασκευή



Εικόνα 1 Απαιτούμενα Υλικά

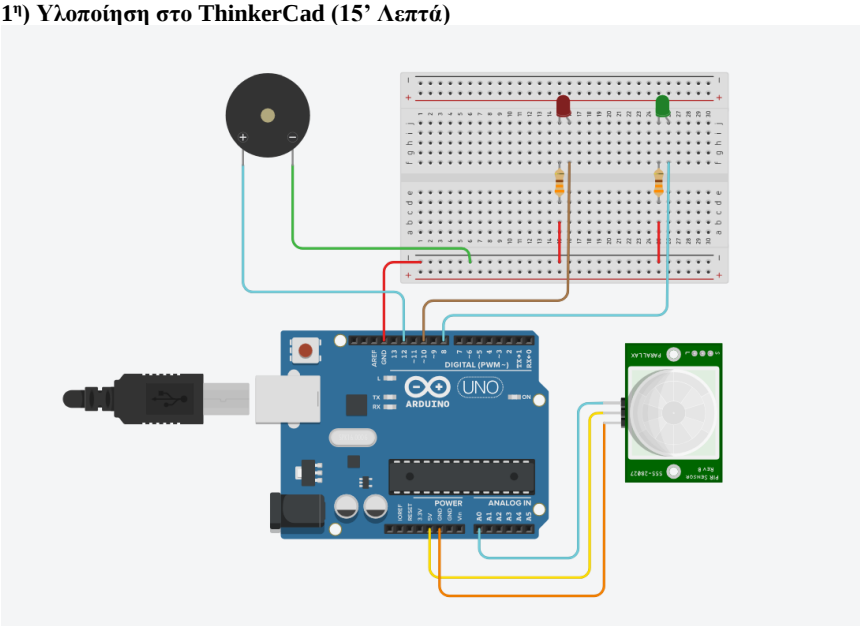
1) Arduino UNO
2) Breadboard Πλακέτα δοκιμών
3) 2 x LED (Κόκκινο – Red, Πράσινο - Green)
4) 2 x Αντιστάσεις 330 Ω
5) 1 x RIP Sensor
6) 1 x Piezo
7) Jumper Καλώδια
8) TinkerCad για προσομοίωση και προγραμματισμό
9) Arduino IDE για υλοποίηση



Εικόνα 2 Δομή του LED

Δραστηριότητες:

1η) Υλοποίηση στο ThinkerCad (15' Λεπτά)



Εικόνα 3 Κύκλωμα Arduino με αισθητήρα RIP, Piezo, Αντιστάσεις και LEDs

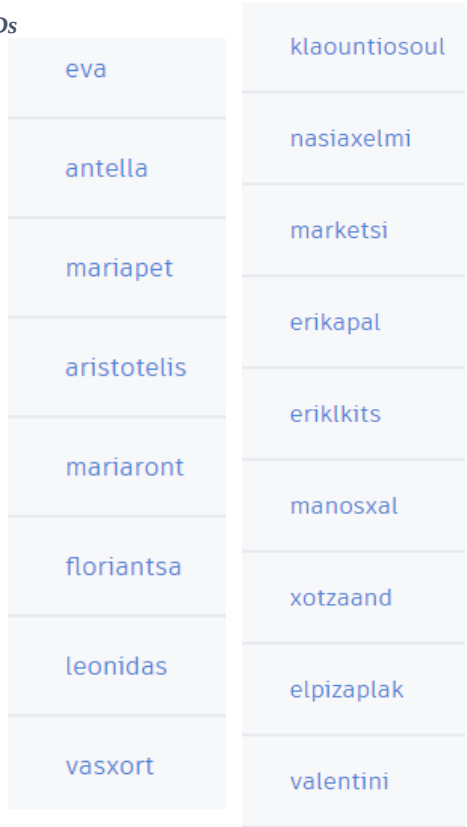
Να υλοποιήσετε το παραπάνω κύκλωμα στο προσομοιωτή του ThinkerCad (με προσοχή).
Συνδεθείτε στο https://www.tinkercad.com/joinclass
Type Code : VH4BXDRZR
NickName: Χρησιμοποιήσετε τα διπλανά NickName για κάθε ομάδα (ένα 01 για κάθε ομάδα – οποιοδήποτε).
Προσοχή στις τιμές των αντιστάσεων!

2η)

Component List

Name	Quantity	Component
R1 R2	2	330 Ω Resistor
D1	1	Green LED
D2	1	Red LED
U1	1	Arduino Uno R3
PIR1	1	PIR Sensor
PIEZO1	1	Piezo

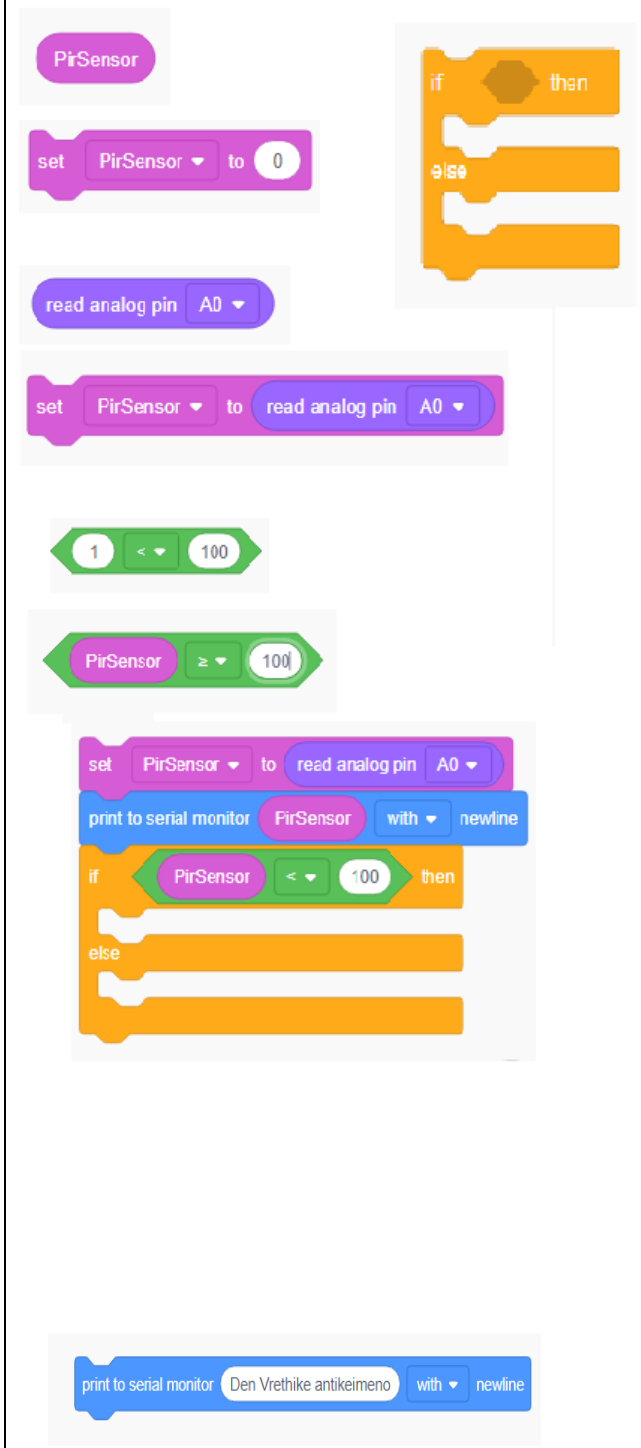
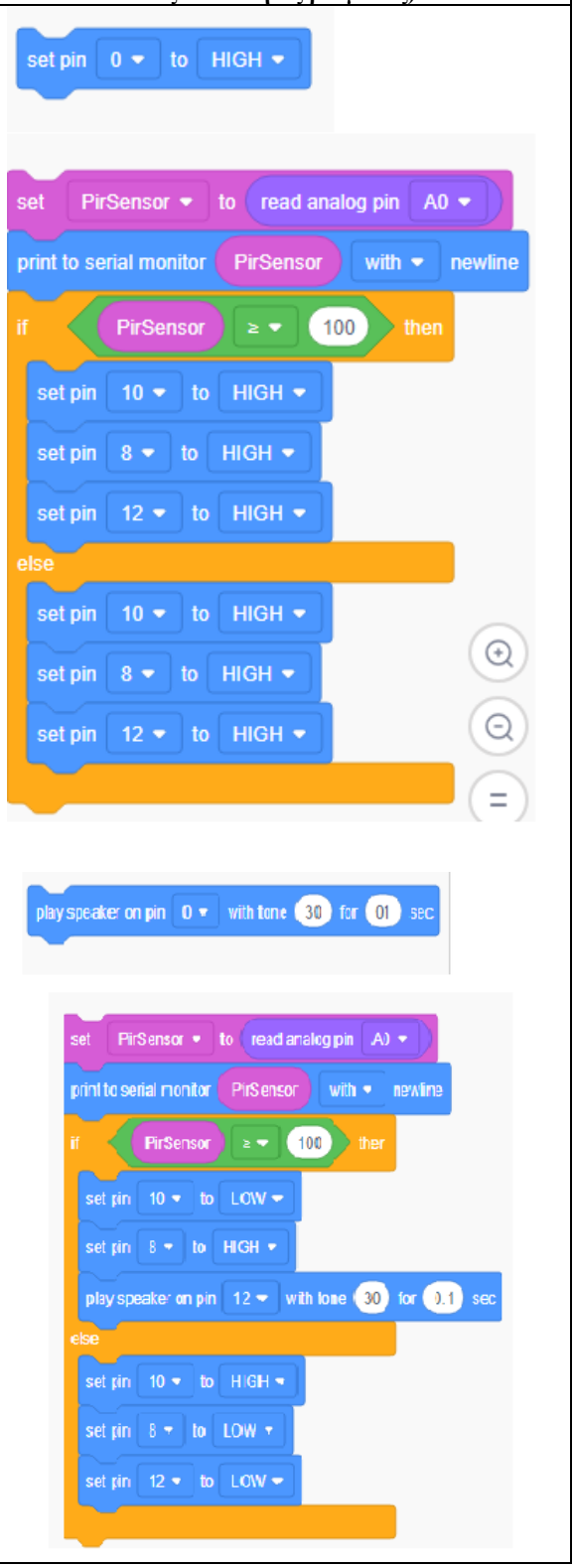
Εικόνα 4 Λίστα Αντικειμένων



Εικόνα 5 Users Names Μαθητών

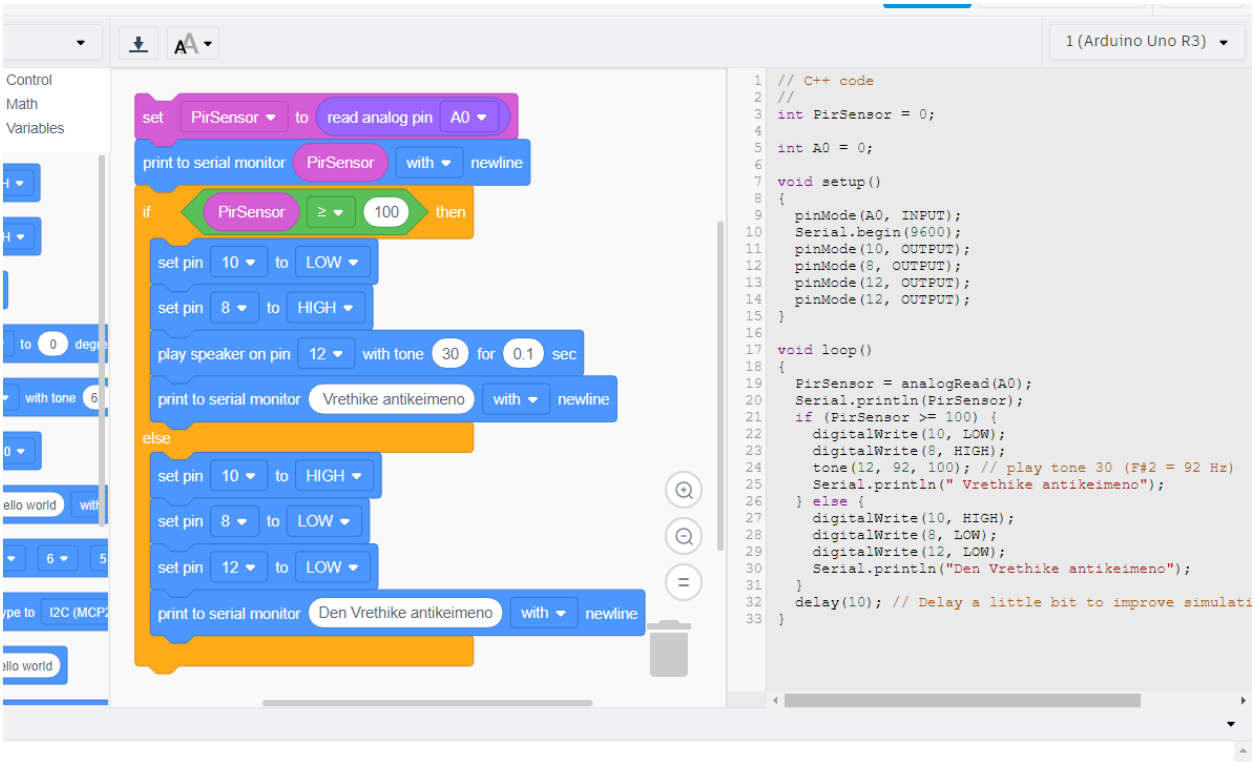
Μπλοκς (Blocks)που θα χρησιμοποιήσετε για τη δημιουργία του Κώδικα

Πίνακας 1 Κώδικες

#01 κώδικας (Μεταβλητή PirSensor – Δομή Επιλογής – Σύνθετη)	#02 κώδικας (Ενεργοποίηση LEDS, RIP και Piezo με τις κατάλληλες ρυθμίσεις)
	

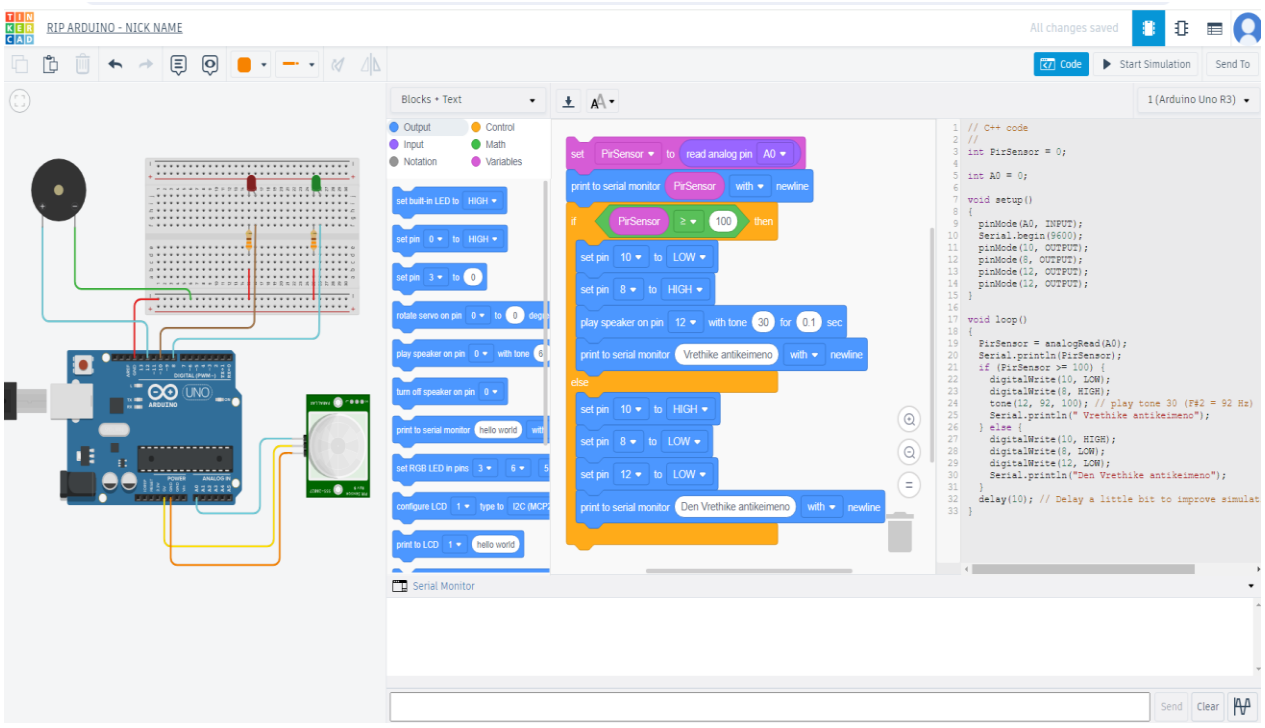
Εικόνα 6 Users Names Μαθητών

3η) Ο πλήρες κώδικας της εφαρμογής μας σε μορφή μπλόκς και κειμενική γλώσσα - C++



Εικόνα 7 Πλήρες Κώδικας της Εφαρμογής

4η) Αποθηκεύτε το κύκλωμα και το πρόγραμμα ως RIP ARDUINO και το NickName σας!

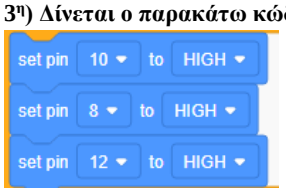


Εικόνα 8 Το Κύκλωμα Ολοκληρωμένο (Προσομοίωση με τα υλικά και Κώδικας σε Μπλοκς και C++)

Δραστηριότητες Εμπέδωσης της 1η διδακτικής ώρας

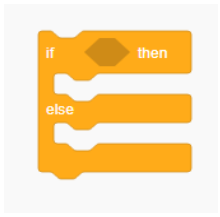
1η) Αφού ολοκληρώσετε το πρόγραμμα να συζητήσετε με την ομάδα σας, και να να γράψτε ποια είναι η πιθανή λειτουργία του προγράμματος.

……
……
2η) Παρατηρήστε τα leds εάν αναβοσβήνουν και πότε ακριβώς συμβαίνει;
……
……
3η) Δίνεται ο παρακάτω κώδικας σε μπλόκς. Τι ακριβώς πιστεύτε ότι κάνουν τα leds;Γράψτε την απάντηση σας.



Εικόνα 9 Blocks

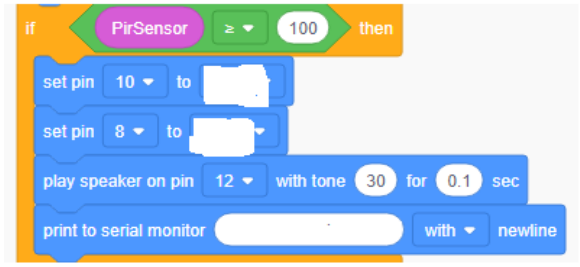
……
4η) Ποια δομή επιλογής είναι η παρακάτω;
……



Εικόνα 10 If else
5η)Δίνεται ο παρακάτω κώσεικας σε C++

```
if (PirSensor >= 100) {
  digitalWrite(10, LOW);
  digitalWrite(8, HIGH);
  tone(12, 92, 100); // play tone 30 (F#2 = 92 Hz)
  Serial.println(" Vrethike antikeimeno");
```

Εικόνα 11 Κώδικας σε C++
Συμπληρώστε τα κενά στα blocks ώστε να εκτελεί ακριβώς την ίδια λειτουργία με τον κώδικα C++.



Εικόνα 12 Blocks σε ThinkerCad

6η) Δίνεται το παρακάτω block εντολών. Συμπληρώστε τα κενά στο αντίστοιχο πρόγραμμα στη C++ ώστε να εκτελεί την ιδία λειτουργία με το block εντολών.




```
 if (PirSensor >= ____) {
digitalWrite(__, LOW);
digitalWrite(8, ___);
tone(12, 92, 100); // play tone 30 (F#2 = 92 Hz)
Serial.println(" _____");
 } else {
digitalWrite(10, ____);
digitalWrite(8, ____);
digitalWrite(12,____);
Serial.println("Den Vrethike antikeimeno");
} delay(10); // Delay a little bit to improve simulation performance}
```



Εικόνα 13 Blocks σε ThinkerCad και Arduino IDE

Δραστηριότητες Εμπέδωσης της 1η διδακτικής ώρας

1η) Σε ποιες ψηφιακές ακίδες (pins) πάνω στο Arduino βρίσκονται τα LEDs (Κόκκινο και Πράσινο);
……
……

2η) Τα τρία (03) pins του Αισθητήρα RIP αντιστοιχούνε σε; (κυκλώστε τι σωστή απάντηση)
α) Σήμα-Ρεύμα-Γείωση
β) Σήμα-Ρεύμα-Ρεύμα
γ) Γείωση-Σήμα-Σήμα
3η) Τι τιμές σε Ωμ (Ohm) έχουν οι δύο (02) αντιστάσεις;
……
……
4η) Η γείωση σε ποιο ποδαράκι από τα LEDS αντιστοιχεί; Άνοδο ή Κάθοδο;
……
……
5η) Τι άλλους αισθητήρες θα μπορούσαμε να συναρμολογήσουμε πάνω στο breadboard;
Καταγράψτε τις ιδέες και το πως θα μπορούσε να υλοποιηθεί (συνοπτικά).
……
……
6η) Πόσα ποδαράκια στο κάτω μέρος του Piezo υπάρχουν και που συνδέονται το καθένα;;
……
……
7η) Σε ποια θύρα pins του Arduino συνδέεται το Piezo;
……
……
6η) ***Συζήτηση στη ολομέλεια της τάξης – Παρουσίαση αποτελεσμάτων – Αναστοχασμός !!!***

Φύλλο Εργασίας 2ης Διδακτικής Ώρας

7η)

Συζήτηση στη ολομέλεια της τάξης – Παρουσίαση αποτελεσμάτων – Αναστοχασμός !!!
Αλγοριθμική – Προγραμματισμός Υπολογιστικών Συστημάτων
Κατασκευή και προγραμματισμός κυκλώματος αυτοματισμού σε περιβάλλον προσομοίωσης ThinkerCAD και εξοπλισμό Arduino.
Τάξη Β – Τμήμα Β3

Ομάδα Μαθητών:

1) **Ονοματεπώνυμο: ……..**
2) **Ονοματεπώνυμο: ……..**
3) **Ονοματεπώνυμο: ……..**
4) **Ονοματεπώνυμο: ……..**



Χωριστείτε ανά δύο (02) για να γίνει καταμερισμός των εργασιών σε δύο (02) υποομάδες
1η Υπό - ομάδα: Δημιουργία Κυκλώματος στο πεδίο του εξομοιωτή Arduino – Thikercad – Χρήση υπολογιστή σχολικού εργαστηρίου.
2η Υπό – ομάδα: Δημιουργία Κυκλώματος στο πεδίο των υλικών που σας παρέχονται – συναρμολόγηση και σύνδεση των υλικών.

Δημιουργία Κυκλώματος στο πεδίο του εξομοιωτή Arduino – Thikercad – Χρήση υπολογιστή σχολικού εργαστηρίου.

Δραστηριότητες Εμπέδωσης της 2η διδακτικής ώρας

Πίνακας 2 Τελικός Κώδικας της προσομοίωσης




```
// C++ code
//
int PriSensor = 0;
void setup()
{
  pinMode(A0, INPUT);
  Serial.begin(9600);
  pinMode(10, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(12, OUTPUT);
  pinMode(12, OUTPUT);
}
void loop()
{
  PriSensor = analogRead(A0);
  Serial.println(PriSensor);
  if (PriSensor >= 100) {
    digitalWrite(10, LOW);
    digitalWrite(8, HIGH);
    tone(12, 92, 1000); // play tone 30 (F#2 = 92 Hz)
    Serial.println("Vrethike Antikeimeno ");
  } else {
    digitalWrite(10, HIGH);
    digitalWrite(8, LOW);
    digitalWrite(12, LOW);
    Serial.println("Den Vrethike Antikeimeno ");
  }
  delay(10); // Delay a little bit to improve simulation
performance
}
```

Συζητήστε με την ομάδα σας και απαντήστε στα παρακάτω:1)Ποια η λειτουργία του προγράμματος;
……
……

1) Παρατηρήστε ότι εάν ανάψει το led χρώματος κόκκινο σβήνει και για πόση χρονική διάρκεια είναι σβησμένο . Καταγράψτε σε ποια εντολή πραγματοποιείται στο παραπάνω κώδικα και τη θα προτείνατε για να μην σβήνει ποτέ.
……
……

2) Παρατηρήστε σε ποια περίπτωση το led χρώματος πράσινο ανάβει και για πόση χρονική διάρκεια είναι αναμμένο. Σε ποιο σημείο – εντολή πραγματοποιείται η συγκεκριμένη λειτουργία;
……
……

3) Ποια είναι η εντολή που εμφανίζει το μήνυμα: «Den Vrethike Antikeimeno» σε πλακίδιο και σε C++;
……
……

Δίνεται ο παρακάτω κώδικας σε C++

```
  if (PriSensor >= 100) {
  digitalWrite(10, LOW);
  digitalWrite(8, HIGH);
  tone(12, 92, 1000); // play tone 30 (F#2 = 92 Hz)
  Serial.println("Vrethike Antikeimeno ");
 }
```

4)Σε ποιο σημείο του κώδικα ελέγχεται η μεταβλητή (PriSensor) ώστε να ηχήσει το ηχείο λόγο του αντικειμένου που εντοπίστηκε;
……
……

5) Προτάσεις – βελτιώσεις που θα μπορούσαν να γίνουν μελλοντικά; Καταγράψτε τις σκέψεις σας.
……

Συζητήστε τα αποτελέσματα με την ομάδα σας - Αναστοχασμός !!! Παρουσίαση αποτελεσμάτων !!

CROCUS CULTIVATION ALGORITHM – EXPLORING NATURE'S STEPS THROUGH PROGRAMMING

Antigoni Tsirou
Computer Science Teacher, MSc
Directorate of Primary Education of Kozani, Hellenic Ministry of Education and Religious Affairs
Kozani, Greece
e-mail: tsirouant@gmail.com

ABSTRACT

The project titled "Crocus Cultivation Algorithm – Exploring Nature's Steps through Programming" presents an innovative teaching approach for primary school students that combines programming with the exploration of natural phenomena. The core focus is the development of algorithmic thinking through experiential, visual, and tactile learning, using a digital layout that depicts the stages of saffron (Crocus Kozanis) cultivation.

Drawing on her experience in computer science, the educator designed and printed a visual layout illustrating each cultivation stage of the crocus plant. When placed on a classroom table, students are prompted to identify the specific stage indicated by the teacher and construct the corresponding algorithm. Before programming the Bee-Bot robot, the teacher introduces command cards (created by herself) that represent movements such as "forward," "backward," "right," "left," "pause," "start," and "reset." These cards are arranged sequentially next to the layout, offering a visual representation of the steps required for cultivation.

The methodology is implemented through hands-on activities that actively engage students in designing and executing the algorithm with the robot. Beyond enhancing technical skills, the activity fosters critical thinking and collaboration. The key findings indicate that linking theoretical knowledge with practical application through experiential learning improves students' understanding of algorithmic concepts and promotes teamwork.

Moreover, results show that the use of visual and tactile tools contributes to creating an engaging learning environment where students develop problem-solving skills and gain confidence in applying technological solutions. This approach enables learners to connect natural processes with programming, highlighting the importance of sequence and structure in a multidimensional learning context. Additional observations confirm the method's positive impact on creativity and educational outcomes.

Keywords: algorithmic thinking, programming, experiential learning, visual learning, tactile learning, collaboration, crocus cultivation.

INTRODUCTION

Teaching programming and computational thinking in Primary Education is a challenge, as it requires approaches tailored to the developmental stage and needs of young students. Experiential and visual learning provide fertile ground for cultivating algorithmic thinking in ways that are understandable and engaging for children.

This teaching proposal uses the theme of Crocus cultivation in Kozani—a plant with strong local, cultural, and economic significance—as a starting point for introducing students to the basic principles of programming. Through the use of an educational robotic tool (Bee-Bot) and a specially designed mat, students are invited to recognize stages of natural processes and transform them into sequences of commands.

Introducing nature into programming, by connecting cultivation stages with the concept of the algorithm, offers a multisensory learning environment that promotes creativity, collaboration, and active participation.

Algorithmic Thinking through Nature: An Experiential Approach with Crocus Kozanis and Bee-Bot.

This work leverages the local natural and cultural wealth of the Kozani region, focusing on Crocus cultivation, as a starting point for developing algorithmic thinking skills in Primary Education students. The connection of nature with programming is achieved through experiential learning and the use of educational robotics, making the learning process more attractive and comprehensible.

This innovative approach includes the use of a mat, designed and printed by the teacher, depicting the sequential stages of Crocus cultivation. Students, in groups, identify the indicated stage each time and create movement algorithms for the Bee-Bot robot, using command cards symbolizing directions and actions. This process encourages them to develop skills of analysis, sequencing, prediction, and problem-solving.

Children's participation is active and collaborative, with an emphasis on understanding the concept of the algorithm and cultivating social skills. The approach has proven particularly effective in enhancing creativity, self-confidence, and the connection between theory and practice. Furthermore, it promotes the connection of school with local culture, enhancing the educational value of designing and utilizing local themes in the ICT curriculum.

TEACHING SCENARIO

Title of the teaching scenario: "Crocus Cultivation Algorithm – Exploring Nature's Steps through Programming."

Estimated duration of the teaching scenario: 2 hours, aimed at lower grade primary school students.

TEACHING OBJECTIVES

Algorithmic Thinking & Sequence of Commands: Students will develop the ability to think sequentially and compose simple algorithms (commands such as "forward," "backward," "right," "left," "pause," "start," "clear memory").

Visual and Tactile Learning: Through the mat depicting the stages of Crocus growth, students will enhance their ability to connect images with processes and actions.

Connecting Nature and Technology: The activity aims to show how technology (robot programming) can be used to understand and represent natural phenomena, such as plant cultivation.

Collaboration and Team Spirit: Group activities encourage collaboration, dialogue, and collective reflection.

Experiential and Interactive Learning: Through play and the practical application of commands, students will experience the process of trial, error, and correction, essential for problem-solving.

TEACHING MATERIALS

Crocus Mat: Images depicting the stages of growth of the Crocus (Kozani saffron) plant.
Command Cards: Cards showing commands (forward, backward, right, left, pause, start, clear memory).
Bee-Bot Robot: Programmable robot for executing commands.
Flower Cubes: Small objects placed on the mat to be collected by the robot.

Cart: A special surface to place the cubes once they are collected.

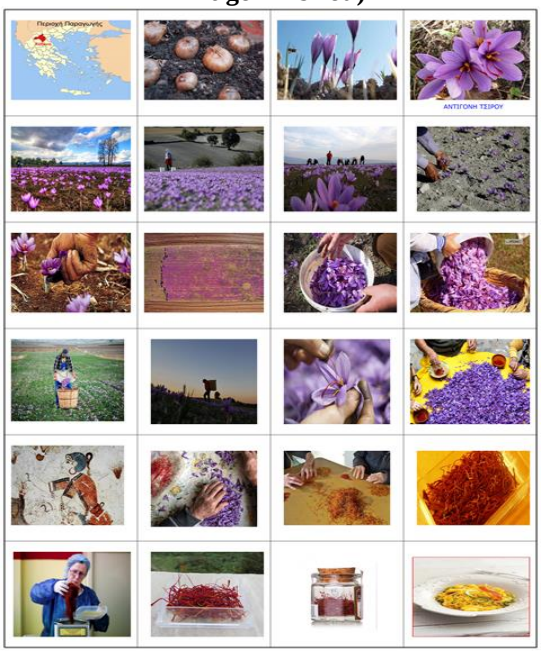
Picture Dice: Dice containing images from the mat, with one image (a mole eating the bulb) having a special meaning in the game (loss of turn).

STRUCTURE OF THE ACTIVITY

INTRODUCTION TO THE SCENARIO

The introduction takes place through the myth and history of the crocus, connecting the teaching of programming with the use of the Bee-Bot educational robot and a specially designed mat. The teacher narrates to the children the myth of the crocus: according to the myth, Crocus was a young man who was accidentally killed by the god Hermes during a game. Out of his grief, Hermes transformed him into a crocus flower, and the three drops of blood from his head became the red stigmas of the flower, the well-known saffron, which has been cultivated in Kozani since antiquity. The teacher then explains the stages of the plant's growth, highlighting the importance of proper cultivation and connecting the activity to real life and nature. At the same time, the concept of the algorithm is introduced, showing how each command or step leads to a specific result, just as in nature each stage leads to the development of the plant, creating a meaningful connection with programming**.**

Picture 1
Mat with various images depicting the stages of the Crocus Kozanis plant. (The material was designed by Antigoni Tsirou)



DESCRIPTION OF ACTIVITIES

In the first activity, the Bee-Bot robot is introduced, focusing on the direction buttons. This is followed by group work, where each group is asked to operate the robot, experiment with the direction buttons, and explore its basic capabilities through hands-on interaction.

The second activity, "The Bee-Bot Robot Algorithm," involves preparing the algorithm: the teacher places the command cards in the correct sequence on the table next to the mat, according to the selected stage of the Crocus, so that the Bee-Bot robot is programmed to reach that point.

Group Participation: Students propose, discuss, and confirm the sequence of commands. The teacher reinforces the logical order and the reasoning behind each step.

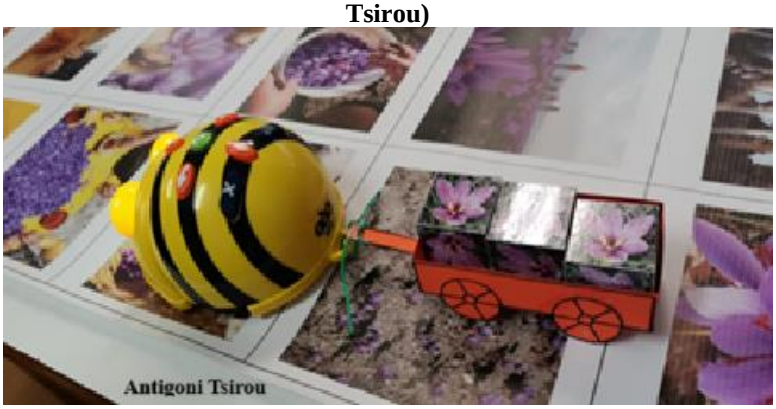
The third activity, Application with the Robot: The Bee-Bot robot executes the commands to collect the cubes placed on "various images" on the mat and transport them to the cart. We discuss the results and correct any errors in the sequence of commands.

Picture 2
Mat used depicting the stages of the Crocus Kozanis (saffron) plant, the Bee-Bot robot, and programming cards. (The material was created by Antigoni Tsirou)



The third activity, Application with the Robot: The Bee-Bot robot executes the commands to collect the cubes placed on "various images" on the mat and transport them to the cart. We discuss the results and correct any errors in the sequence of commands.

Picture 3.
The Bee-Bot robot on the mat transporting the crocus (flower cubes) to the cart. (Material created by Antigoni Tsirou)



The fourth activity, "The Dice Game." Grouping and Explaining Rules: Students are divided into groups. Each group rolls the special dice created with images from the mat. Important: If a die shows the image of the mole (eating the crocus plant bulb), the group loses its turn, even at the start of the game.

Through the game, students are encouraged to think quickly, take initiative, and collaborate to find the best strategy to progress in the "algorithm" of cultivation. This is followed by a concluding discussion and reflection, during which students reflect on the steps taken, what worked well, and what could be improved. At the same time, connections are made to everyday life, discussing how the sequences and commands used mirror processes in nature and how programming can be applied in many areas of life. The importance of collaboration and collective thinking in achieving a common goal is emphasized. In closing, the teacher summarizes the lessons learned from the activities, focusing on the value of algorithmic thinking and the connection between technology and nature, while giving students the opportunity to ask questions and share their impressions.

ADDITIONAL REMARKS

The activity aims to help students experience the process of programming by seeing the immediate impact of

their commands on a physical model (experiential learning). At the same time, the use of the mat with images and objects, as well as the dice and command cards, facilitates understanding through vision and touch (visual and tactile teaching). Additionally, the teacher has the ability to adapt the commands and level of difficulty according to the needs and abilities of the students, enhancing their autonomy and creativity (flexibility and differentiation).

Picture 4.
Mat used in the activity depicting the Crocus Kozanis (saffron) plant with the Bee-Bot robot and the special dice. (Material created by Antigoni Tsirou)



CONCLUSIONS

The implementation of this teaching proposal highlighted the potential of connecting local cultural themes with the teaching of programming in Primary Education. Integrating the cultivation of Crocus Kozanis as a thematic framework increased student interest and participation, while also making the concept of algorithmic thinking more comprehensible.

The use of the Bee-Bot robot and the mat proved effective in developing skills of visualization, sequencing commands, and problem-solving, while also providing a collaborative and creative environment. Students are actively involved in the learning process, take on roles, and act responsibly, demonstrating increased confidence in executing algorithms.

This approach demonstrates that educational robotics, when meaningfully integrated into the curriculum and connected to students' real-world contexts, can transform the teaching of Informatics. Finally, it underscores the value of experiential learning and the use of local themes as drivers of educational innovation.

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TA15: Gamification in education

GAMIFICATION AND DIGITAL STORYTELLING AS TOOLS FOR DEVELOPING SCREENING ACTIVITIES FOR PRAGMATIC DEFICITS IN CHILDREN

Koskeridou Marina
Undergraduate Student,
Department of Speech and Language Therapy
University of Ioannina
Panepistimioupoli B', 45500, Ioannina, Greece
e-mail: slt01263@uoi.gr

Toki Eugenia
Professor,
Department of Speech and Language Therapy
University of Ioannina
Panepistimioupoli B', 45500, Ioannina, Greece
e-mail: toki@uoi.gr

ABSTRACT

Pragmatic skills are fundamental for children's social interaction and academic success. Traditional screening methods can be unengaging for young learners, prompting interest in digital, game-based alternatives. This study explores the feasibility of the digital activities, combining gamification and digital storytelling, as a screening tool for pragmatic deficits in primary school children.

We designed and developed the interactive digital activities using PowerPoint, integrating narrative elements and game mechanics to assess various aspects of pragmatic competence. Six children aged 8–12 years participated, each with parental written consent. Individual sessions were conducted in supportive environments, and usability, engagement, and overall experience were evaluated through structured interviews.

Children responded positively to the digital activities, reporting high levels of interest and engagement. Most found the interface intuitive and the activities enjoyable, especially the interactive dialogue component. Minor technical or usability issues were noted by a few participants, but did not detract significantly from the experience.

Initial findings of this study suggest that a digital activities format may offer a child-friendly, engaging approach for preliminary screening of pragmatic skills. As this was a feasibility study with a small, non-clinical sample, further research with larger and more diverse groups is required to validate the tool's effectiveness and expand its application in educational and clinical settings.

Keywords: Pragmatics, interactive screening, feasibility study, gamification, digital storytelling, children

INTRODUCTION

In recent decades, the rapid advancement of technology has transformed educational environments and opened new possibilities for addressing persistent challenges in learning and assessment (Ancona et al., 2024; Bernardini et al., 2014; Gong et al., 2019; Hookham et al., 2019; Kinross, 2018; Min et al., 2022; Mojtahedzadeh et al., 2021; Xu et al., 2023). Among these challenges is the early detection of pragmatic language deficits in children, which remains a complex and often overlooked area in both clinical and school settings (Mood et al., 2020; Toki et al., 2018; Wong et al., 2022). Pragmatic skills—the ability to use language appropriately in social and communicative contexts—are fundamental for children's interpersonal relationships, social integration, and academic progress (Alduais et al., 2022; Hwa-Froelich et al., 2019; Szarkowski et al., 2020; Wong et al., 2022). Deficits in this domain can have profound consequences, including social isolation, reduced self-esteem, and long-term educational difficulties (Mood et al., 2020; Murphy et al., 2014; Rodas et al., 2017).

Traditional assessment methods for pragmatic skills, such as structured interviews and observational checklists, are well established but often limited in their ability to engage young children or reflect real-life social interactions (Toki et al., 2018; Mood et al., 2020). Recognizing these limitations, researchers and clinicians have increasingly turned to innovative approaches that leverage digital technology and interactive design. Serious games—digital games designed for purposes beyond entertainment—have been shown to increase engagement, motivation, and learning outcomes in various educational and health domains (Ancona et al., 2024; Bernardini et al., 2014; Min et al., 2022; Silva, 2019; Tung et al., 2024; Xu et al., 2023). Gamification, the application of game-like elements such as levels, rewards, and interactive challenges, has been widely used to foster participation and enjoyment in learning tasks (Khan, 2025; Toki et al., 2018; Tung et al., 2024; Xu et al., 2023). Meanwhile, digital storytelling incorporates sound, images, animations, and narrative structure to create rich, multimodal experiences that can support both assessment and skill development (Khan, 2025; Mills et al., 2022; Mojtahedzadeh et al., 2021; Moreau et al., 2018; Xu et al., 2023).

The convergence of these approaches presents a unique opportunity to reimagine how pragmatic skills are screened and supported in children. Gamification and digital storytelling not only capture children's attention but also simulate realistic social situations, making the assessment process more natural and less intimidating. Recent systematic reviews have documented the effectiveness of gamified interventions in fostering social communication and pragmatic abilities, especially among children with neurodevelopmental disorders such as autism (Ancona et al., 2024; Bernardini et al., 2014). At the same time, research into digital storytelling has highlighted its value for engagement and learning across diverse populations (Mills et al., 2022; Moreau et al., 2018; Mojtahedzadeh et al., 2021). Despite these advances, the integration of gamification and digital storytelling into pragmatic assessment is still in its early stages, and evidence regarding its feasibility and acceptability in routine practice remains limited.

In response to this gap, we set out to design, develop and test a set of digital gamified activities for the initial screening of pragmatic language skills in primary school children. We were motivated by the desire to create an assessment experience that is both enjoyable for children and informative for educators and clinicians. This feasibility study represents our first step in this process, focusing on the development and initial evaluation of digital activities that incorporates both gamification and digital storytelling elements. By inviting a small group of children to participate, we aimed to explore how they interact within the activities, what aspects they find engaging or challenging, and whether the approach is practical for real-world settings.

Specifically, our study builds upon previous work demonstrating the positive effects of interactive, gamified methods in educational and therapeutic contexts (Toki et al., 2018; Silva, 2019; Tung et al., 2024; Xu et al., 2023), while also responding to calls for more user-centered and contextually relevant assessment practices (Mood et al., 2020; Szarkowski et al., 2020). The digital activities we developed offers three distinct sections, each targeting a different facet of pragmatic competence: understanding emotions, narrative sequencing, and conversational skills. These activities draw on both evidence-based principles and teachers' feedback with the ultimate aim of creating a tool that is accessible, motivating, and relevant for primary school children.

This feasibility study does not seek to validate the diagnostic effectiveness of the tool or to generalize findings to broader populations. Instead, our primary objective is to assess the usability, acceptability, and procedural practicality of the digital activities when used with a small, non-clinical sample. We view this as a necessary precursor to future, larger-scale validation studies that will more rigorously examine such tools' accuracy and educational impact. Through this initial research, we hope to contribute to the growing literature on digital assessment tools and to lay the groundwork for more inclusive, engaging, and effective approaches to pragmatic screening in children.

METHODOLOGY

This feasibility study was designed to explore the practical aspects of implementing a digital, game-based tool for the preliminary screening of pragmatic skills in children. Our methodological approach prioritized both the development process and the user experience, reflecting our commitment to participant-centered research and ethical practice.

Digital Activities Design and Development

The digital activities were designed for screening pragmatic skills in elementary school children. We developed the activities using Microsoft PowerPoint, a software chosen for its accessibility and flexibility in supporting multimodal interactive experiences for non-experienced programmers. In alignment with the linguistic and cultural background of our intended users, the activities were created in Greek. The design process was guided by two foundational pillars, gamification and digital storytelling.

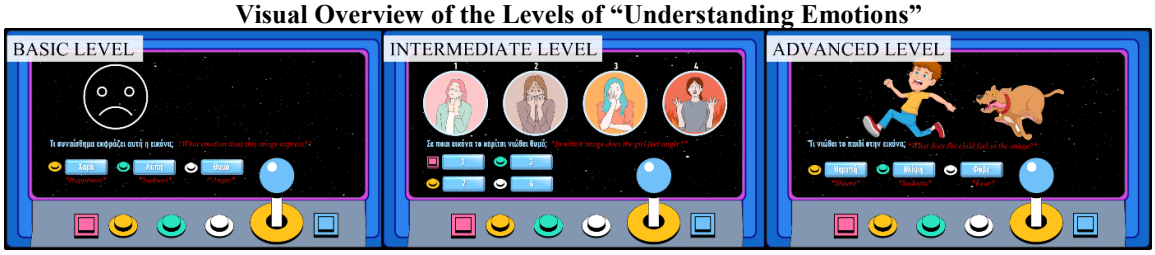
Digital storytelling was operationalized through the integration of multimedia elements such as voiceovers, high-quality images, animations, and concise narrative texts, all crafted to form a cohesive and engaging narrative journey for the user (Khan, 2025; Mills et al., 2022; Mojtahedzadeh et al., 2021; Moreau et al., 2018; Xu et al., 2023). Gamification mechanisms were incorporated throughout the activities, including escalating difficulty levels, a reward system featuring positive feedback and virtual awards, and a series of interactive challenges, all designed to heighten engagement and motivation (Khan, 2025; Toki et al., 2018; Tung et al., 2024; Xu et al., 2023).

The overall design embraced an arcade-inspired aesthetic, aiming to create a dynamic, immersive, and age-appropriate environment for children.

The resulting set of digital activities consist of three main sections, each targeting a distinct dimension of pragmatic competence as follows.

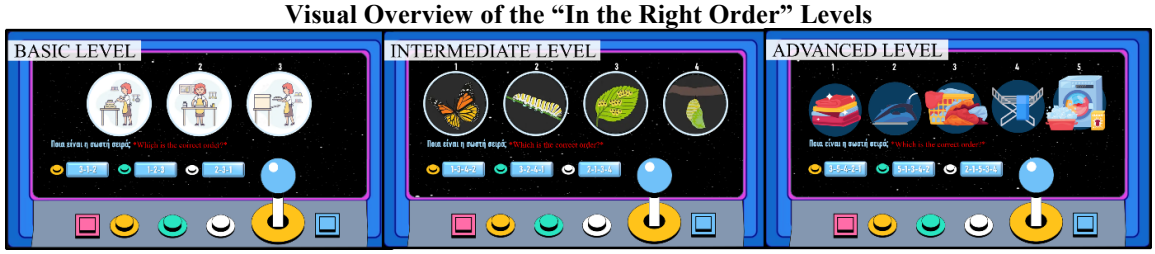
1. *Understanding Emotions:* This module assesses children's ability to recognize and interpret emotions through progressively challenging tasks, starting from individual facial expressions and advancing to complex scenes involving human-animal interactions (Image 1).

Image 1
Visual Overview of the Levels of "Understanding Emotions"



2. *In the Right Order:* This section evaluates narrative sequencing skills by asking children to organize images into logical and chronological order, thereby supporting their grasp of temporal and causal relationships (Image 2).

Image 2
Visual Overview of the "In the Right Order" Levels



3. *A Walk with Mumu***:** This final section simulates real-life social scenarios through interactive dialogue with a character, "Mumu." Here, children are presented with binary response options that gauge their application of politeness rules, their ability to sustain a coherent dialogue, and their adaptability across varied social contexts (Image 3).

Image 3.
Visual Overview of the Social Scenarios in "A Walk with Mumu"



Participants and Procedure

For this initial feasibility phase, we sought to engage a small group of primary school children. Our final sample comprised six children, aged 8 to 12 years, drawn from various grades of the Greek primary school system. Participation was entirely voluntary, contingent on the provision of written parental consent, and all children were adequately informed about the study's purpose, their right to withdraw, and the confidentiality of their responses.

Each child participated in an individual session conducted in a quiet, supportive environment, tailored to minimize distractions and accommodate individual needs. We aided only as needed to ensure understanding of gamified instructions, while striving to preserve the authenticity of the children's independent engagement with the tool.

Ethical Considerations

Ethical integrity was a cornerstone of our study design. All procedures adhered to the ethical standards of the University of Ioannina and followed best practices for research involving minors. The voluntary nature of participation, the right to withdraw at any time, and the assurance of confidentiality were emphasized throughout.

This study was conducted in accordance with the Declaration of Helsinki and approved by the Research Ethics Committee of the University of Ioannina (protocol code 25972/2025).

Evaluation of the Procedure

Immediately following gameplay, we conducted a structured interview with each participant. These interviews sought to elicit the children's perspectives on the digital activities' usability, clarity, and their level of engagement. By focusing on the lived experience of participants, we aimed to capture feedback that would inform future refinements of both the activities and the assessment protocol.

RESULTS

The findings of this feasibility study provide initial insights into the acceptability and practicality of the set of digital activities as a preliminary tool for screening pragmatic skills among primary school children.

Demographic Characteristics

Table 1
Study's Population by Elementary Class

Elementary School Class	Number of Children
2nd Grade	1
4th Grade	2
5th Grade	1
6th Grade	2

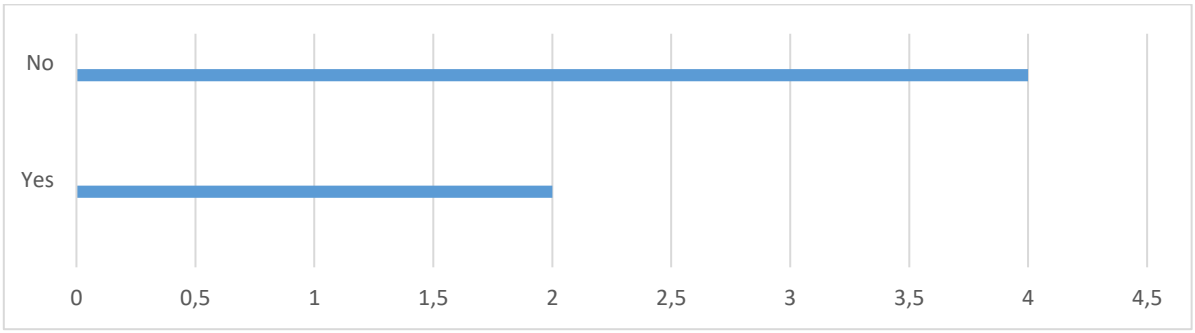
The six participants in the study ranged in age from 8 to 12 years, representing a cross-section of primary school

children in classes according to the Greek educational system. Gender distribution was balanced, with equal numbers of boys and girls. This small but diverse sample provided a preliminary opportunity to observe the activities' responses across different ages and backgrounds as described in Table 1. Study's Population by Elementary Class.

Previous Experience with Digital Games

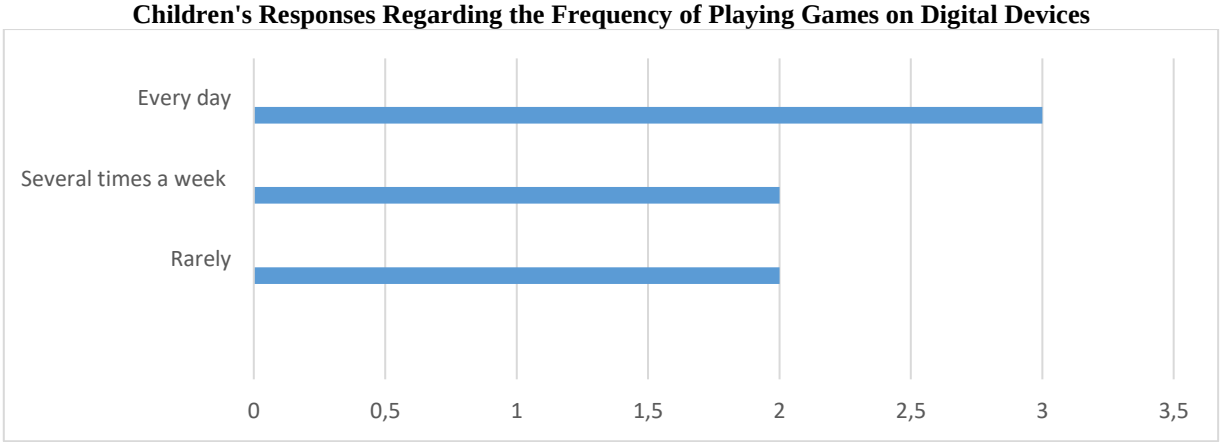
Most participants reported limited prior exposure to similar digital activities, though their engagement with digital games in general varied from frequent to occasional. This diversity in background is noteworthy, as it suggests the tool's accessibility to children regardless of their familiarity with digital platforms as illustrated in Image 4. Children's Responses Regarding Prior Use of Similar Digital Activities.

Image 4
Children's Responses Regarding Prior Use of Similar Digital Activities



In terms of the frequency with which children played digital games in their everyday lives (Image 5), responses were distributed as follows: two children (33%) stated that they played rarely, three children (50%) played several times per week, and one child (17%) played daily.

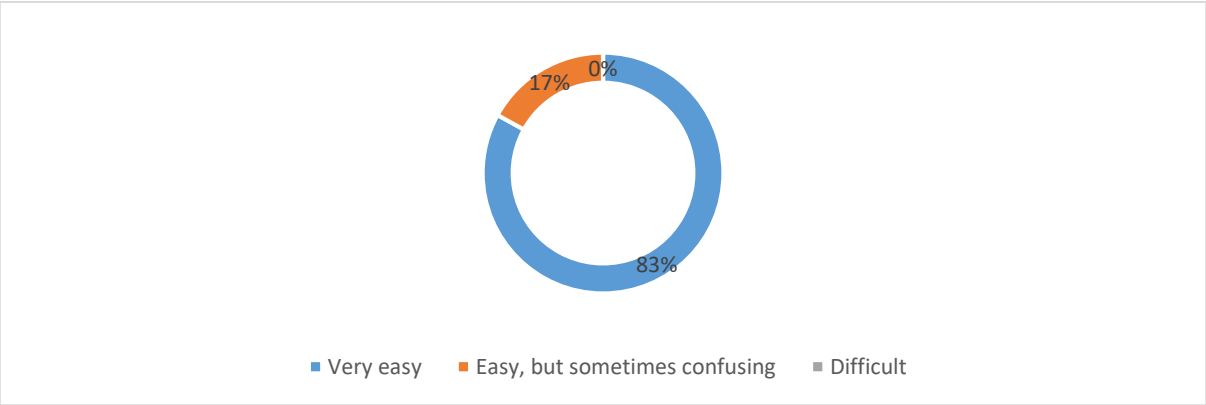
Image 5
Children's Responses Regarding the Frequency of Playing Games on Digital Devices



Digital Activities Usability and Engagement

Feedback from the structured interviews indicated that most children found the digital activities easy to use, with minor variations in perceived usability. Precisely, five out of six children (83%) found the game either "very easy" or "easy but sometimes confusing," while one child (17%) described it as "difficult" (see Image 6).

Image 6
Children's Responses on the Game Perceived Ease of Use



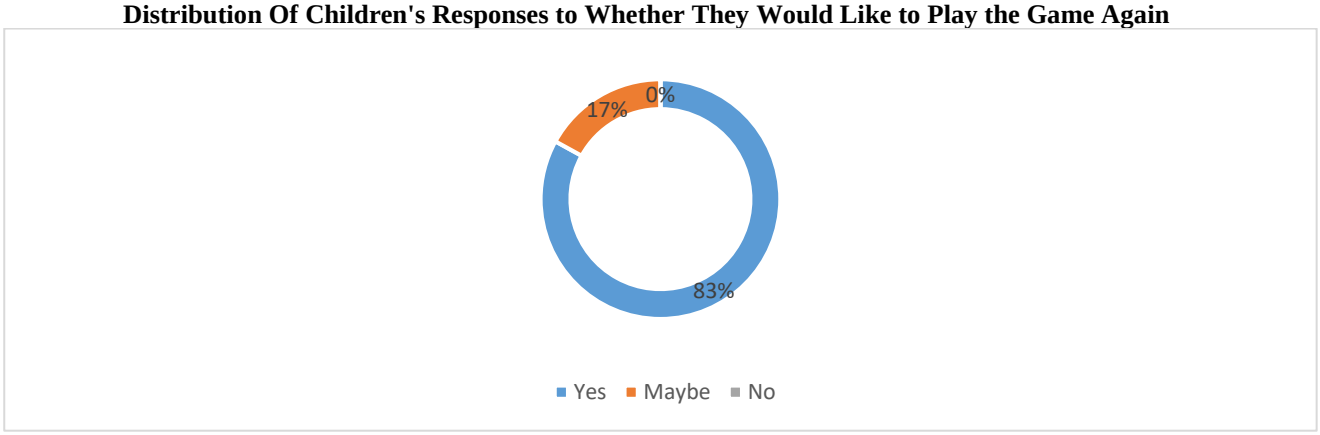
Notably, all children described the activities as interesting and visually appealing, and the majority expressed enthusiasm about "playing the game" again or exploring similar activities in the future. The third module, "A Walk with Mumu," emerged as a particular favorite, cited by all participants as the most enjoyable component of the experience.

Technical Issues and Suggestions

While most technical and usability issues were minimal, their identification at this stage is valuable for informing future development. In terms of technical issues encountered during gameplay, the vast majority (83%) reported that they did not experience any technical problems, while only one child (17%) reported occasional difficulties.

When asked whether they felt unsure about what to do during the game, five participants (83%) indicated that they did not experience uncertainty, whereas one participant (17%) mentioned feeling unsure at times. For example, isolated reports of confusion or technical difficulty underscore the need for clear instructions and robust platform design in subsequent iterations.

Image 7.
Distribution Of Children's Responses to Whether They Would Like to Play the Game Again



Overall, all participants characterized the game as interesting and visually appealing. When asked if they would like to play the game again (Image 7), five children (83%) responded positively, while one child (17%) answered "maybe." Notably, all participants highlighted the third sub-game, "A Walk with Mumu," as the most enjoyable aspect of the experience.

DISCUSSION

This feasibility study sets out to examine whether digital activities that combine gamification and digital storytelling could serve as an engaging and practical tool for the preliminary screening of pragmatic language skills in children. Our findings offer promising indications: the children in our small sample not only enjoyed the game but also

demonstrated a high level of engagement and adaptability, even among those with limited prior experience with digital educational tools.

The enthusiastic reception of the "A Walk with Mumu" digital activity suggests that interactive, dialogue-based activities resonate with young users, potentially increasing their motivation and the authenticity of their responses. These findings align with broader literature on the value of gamification and narrative design in educational contexts (Ancona et al., 2024; Bernardini et al., 2014; Mills et al., 2022; Min et al., 2022; Mojtahedzadeh et al., 2021; Tung et al., 2024; Xu et al., 2023).

Nevertheless, the study also brings to light several important limitations, each of which offers direction for future research and improvement. In detail, the small, non-clinical sample precludes any generalization of results and limits statistical validity. Next, the current iteration focused primarily on usability and engagement, rather than on validating the tool's effectiveness against established pragmatic assessment methods. Subsequently, our evaluation centered on the children's immediate experience, without investigating long-term effects. Further, developing the digital activities in PowerPoint facilitated rapid prototyping in a tool familiar to non-programmers. The activities were developed and tested exclusively in Greek, limiting the applicability to other cultural or linguistic settings. Finally, reliance on self-reported engagement may introduce response bias.

Looking ahead, future research may build on the insights gained from this feasibility study. Larger and more diverse samples, including children with language impairments or neurodevelopmental disorders, can be recruited to better understand the tool's utility across populations. Comparative studies, using both quantitative and qualitative methods, can evaluate the digital activities alongside established pragmatic assessment tools to determine its accuracy and reliability. The digital activities can be redeveloped on an advanced digital platform to enhance interactivity, accessibility, and data management. Furthermore, researchers may also translate and culturally adapt them for broader use. Longitudinal research could assess the long-term impact of repeated use on pragmatic skill development. Moreover, embedding intervention digital activities could extend their function in a systemic personalized approach.

By following these directions, future studies will strengthen the evidence base and expand the tool's value for educators, clinicians, and, most importantly, the children it aims to support. As digital approaches become more integrated into educational and clinical practice, such tools may play a crucial role in early identification and support for children with pragmatic difficulties.

CONCLUSION

This feasibility study demonstrates that combining elements of gamification and digital storytelling may serve as an engaging and practical tool for the preliminary screening of pragmatic language skills in primary school children. The positive responses from participants highlight the promise of interactive, child-centered approaches for early identification of pragmatic deficits. While the small sample and methodological limitations restrict generalizability, these initial results provide valuable guidance for further development and validation. Future research may focus on expanding the sample, comparing the tool with established assessment methods, and enhancing its technological features and cultural adaptability. Ultimately, integrating innovative digital tools into educational and clinical settings may contribute to more effective, inclusive, and motivating pathways for supporting children's communication skills.

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GAMIFICATION IN SECONDARY EDUCATION: BENEFITS, IMPLEMENTATION AND CHALLENGES

Chatziantonakis Dimitrios
Secondary Education Teacher, PE 82. Ms, Med.
1st Vocational High School of Nea Ionia, Volos, Greece
e-mail: dxatzh@gmail.com

ABSTRACT

Modern educators constantly seek innovative teaching approaches that enhance the learning process and engage students. One of the most widely adopted techniques is gamification, which incorporates game elements, mechanisms, and characteristics into non-game contexts. Through the use of badges, points, leaderboards, and challenges, gamification aims to increase student participation, boost motivation, and improve interactivity in the educational process. In secondary education, the implementation of gamification can contribute to the creation of a more engaging learning environment, enhancing both student involvement and teaching effectiveness. At the same time, educators tend to have a positive attitude toward its application, recognizing the benefits of its integration.

This study focuses on the applications of gamification in secondary education in Greece, examining both the benefits and challenges associated with its implementation. Initially, a literature review was conducted, analyzing research studies and articles that present gamification applications in secondary education, both in general and special education settings. The findings highlight the advantages and potential of gamification in diverse learning environments, demonstrating its association with increased student engagement, higher learning motivation, and improved interaction between students and teachers.

Subsequently, a quantitative study was conducted through a questionnaire survey involving 45 secondary education teachers from various disciplines in the Magnesia and Larissa regional education departments. The objective of the study was to identify the main challenges that educators face when implementing gamification in their teaching practices. The findings reveal that despite educators' positive attitudes, significant barriers hinder the adoption of gamification. Specifically, the key obstacles identified include the lack of teacher training, insufficient technological infrastructure, large class sizes, and limited instructional time.

The study concludes that the successful integration of gamification in secondary education requires institutional support, an upgrade of school infrastructure, and targeted teacher training. These factors are essential to fully harness the potential of this technique for the benefit of the learning process.

Keywords: Gamification, Secondary Education, Benefits, Challenges, Student Engagement

INTRODUCTION

In recent years, the integration of educational games into teaching practices has become increasingly prominent, as play constitutes a dynamic pedagogical approach that supports students' development on cognitive, emotional, and social levels (Papastergiou, 2009). At the same time, it fosters motivation and facilitates the learning process through engagement and interaction (Plump, 2017). The recognition of these features has led to the systematic development of game-based instructional methodologies, with gamification being the most prominent.

The term "gamification" gained widespread usage in 2010 (Deterding et al., 2011), with its initial applications primarily observed in the economic sector (Dicheva et al., 2015). In the field of education, the term emerged in 2012 and has since attracted steadily increasing research interest (Harman et al., 2014). For a more comprehensive understanding of the concept, it is essential to clarify its definition. Most researchers converge on the following formulation: "The use of game design elements, mechanics, features, and structures in contexts that are not inherently game-related" (Deterding, Dixon, Khaled & Nacke, 2011, p. 10). According to Werbach and Hunter (2012), gamification is based on three fundamental components: dynamics, mechanics, and design elements. Specifically, dynamics refer to the overall context of implementation, mechanics concern the activities carried out, and design elements include rewards, badges, leaderboards, and avatars.

Within the educational process, one of the primary objectives of the educator is the active engagement of students (Lee & Hammer, 2011). Gamification constitutes a pedagogical technique which, according to Dicheva et al. (2015), enhances students' motivation, leading to increased participation in the learning process and greater willingness to act. Moreover, it strengthens interaction, fosters socialization and mutual support (Toba et al., 2018). It also contributes to the development of skills and the cultivation of problem-solving abilities, positively impacting academic performance (Gooch et al., 2016).

According to Dicheva et al. (2015), most studies agree that gamification has a positive effect on the learning process, contributing to the creation of a dynamic and participatory learning environment. Through this approach, students' collaboration, autonomy, and creativity are enhanced. Overall, its implementation can significantly improve the learning experience, making the educational process more effective and engaging.

GAMIFICATION IN SECONDARY EDUCATION: IMPLEMENTATION AND PEDAGOGICAL BENEFITS

Numerous studies support that the implementation of gamification in education leads to positive outcomes. The integration of gamification techniques into the learning process enhances students' active participation, reduces anxiety, fosters a learning environment free of fear of failure, increases interactivity, and approaches knowledge through enjoyment (Katsigiannakis & Karayiannidis, 2015 · Hamari et al., 2014). Additionally, these techniques have been linked to the reduction of school failure, the narrowing of performance gaps among students of differing abilities, and the overall improvement of learning outcomes (Dicheva et al., 2015).

However, despite the many well-documented benefits of gamification, studies focusing on its implementation in secondary education—particularly within the Greek educational system—remain limited. In contrast, gamification is more widely applied in higher education, a trend attributed to the greater specialization of university instructors and their enhanced access to technological resources (Dichev & Dicheva, 2017).

In Greek secondary education, according to findings from the literature review, gamification has been implemented in various subjects such as Informatics, Natural Sciences, History, and Agricultural Studies, with positive effects on both the learning experience and student performance. In the teaching of HTML at a General Lyceum, Mastoras and Fotaris (2015) applied gamification techniques using platforms such as Kahoot and Codecademy, resulting in increased interest and improved student performance compared to traditional teaching methods. Similarly, Angelinas (2022) utilized animation and augmented reality in teaching Ohm's Law to third-grade lower secondary students, incorporating elements such as levels and points. Students demonstrated increased engagement and reduced anxiety regarding failure.

In History, Michala et al. (2018) introduced gamification elements in a teaching scenario focused on Cycladic Civilization during the Bronze Age, with students exhibiting greater enthusiasm, enhanced collaboration, and positive emotional involvement. Stagias (2020) applied gamification techniques in a Vocational Lyceum in the field of Agricultural Studies, reporting high levels of student satisfaction and participation. Additionally, in the subject of Internet Safety,

Torosiadou (2018) implemented gamification in a distance learning course, noting increased student participation and improved performance compared to traditional methods.

Beyond general education, gamification has proven particularly effective in special education, where it is adapted to meet the needs of students with learning difficulties. Lyris (2019) used the Kahoot application with students with special needs in the subject of Health Education in the first and second grades of lower secondary school, recording positive outcomes in terms of satisfaction, motivation, and learning experience. Improvements were also noted in classroom dynamics and a reduction in inappropriate behaviors. Furthermore, Vareli and Skanavi (2019) incorporated gamification elements into customized board games tailored to the educational needs of students in special education during Modern Greek Language lessons. The results indicated improved classroom atmosphere, enhanced interactivity, and increased student self-confidence.

BENEFITS OF GAMIFICATION IN SECONDARY EDUCATION

According to our literature review, the benefits of implementing gamification in secondary education can be categorized as follows—findings that are consistent with international studies (Hamari et al., 2014 · Dicheva et al., 2015):

- **Improved academic performance**: Students who participated in gamified lessons achieved higher scores compared to those taught using traditional methods (Mastoras & Fotaris, 2015 · Torosiadou, 2018).
- **Increased engagement and participation**: The use of interactive tools such as Kahoot and levels created a more engaging learning environment (Angelinas, 2022 · Stagias, 2020).
- **Positive emotional impact**: Gamification reduced students' anxiety related to failure and boosted their self-confidence (Angelinas, 2022 · Michala et al., 2018).
- **Enhanced collaboration**: Students developed better interpersonal relationships and learned through collaborative activities (Michala et al., 2018).
- **Support for students with special needs**: Gamification was adapted to meet the needs of students in special education, improving their learning experience and behavior (Lyris, 2019 · Vareli & Skanavi, 2019).

In conclusion, gamification has been successfully applied across various subjects in secondary education and can be tailored to the specific needs of students in special education. This method enhances academic performance, provides motivation, reduces anxiety, and fosters collaboration. Future research could focus on evaluating the long-term effectiveness of gamification and developing strategies tailored to the demands of diverse learning environments.

RESEARCH QUESTIONS

Based on the theoretical framework, the present study aims to investigate the extent to which secondary education teachers recognize the benefits of gamification, whether they implement it in their teaching practice, and which factors may hinder its adoption. Specifically, the research is guided by the following questions:

1. What is teachers' attitude toward the implementation of gamification in secondary education?
2. What are the main factors that act as barriers to its implementation?

Thus, the study seeks to highlight both the practical application of gamification and the challenges that educators face in its adoption.

METHODOLOGY, SAMPLE, AND RESEARCH PROFILE

The objective of this study is to explore the obstacles that hinder the implementation of gamification in secondary education in Greece. The research follows a quantitative approach (Cohen & Manion, 1994) and was conducted through the use of a questionnaire, as this method offers advantages such as wide distribution, ease of completion, and the ability to quantitatively analyze the data collected (Cohen et al., 2007).

The questionnaire was created using the Google Forms platform and distributed online. A total of 45 secondary education teachers (both permanent and substitute) participated, primarily from Vocational High Schools within the Directorates of Secondary Education of Magnesia and Larissa. For the analysis of the data, modern tools for assisted processing and classification were employed under the supervision of the researchers.

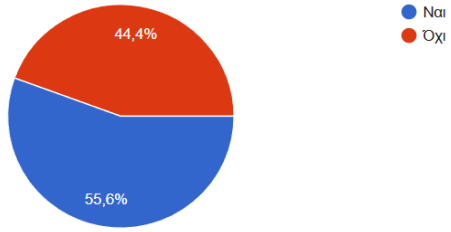
DEMOGRAPHIC ANALYSIS OF PARTICIPANTS

The study involved a total of 45 educators, of whom 25 were female (56.8%) and 19 male (43.2%), while one participant did not respond to the gender-related question. Regarding employment status, 84.1% of the participants were tenured teachers, whereas 15.9% were employed on a temporary basis. In terms of teaching experience, the majority of

participants (18 individuals) reported having over 10 years of professional teaching service.Concerning academic qualifications, 57.8% (26 participants) held a Master's degree, 40% (18 participants) possessed a Bachelor's degree from a university or technical institution, and one participant (2.2%) held a doctoral degree.

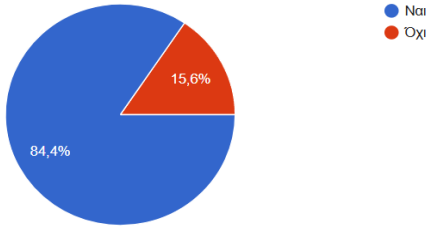
One of the central research questions addressed in this study concerns educators' overall attitudes toward the implementation of gamification. In response to the question: *"Have you ever implemented gamification in your educational practice at least once?"* (Figure 1), 55.6% of the respondents (25 educators) answered affirmatively, whereas 44.4% (20 educators) reported they had never applied gamification in their teaching process.

Figure 1
Have you ever implemented gamification in your educational practice at least once?



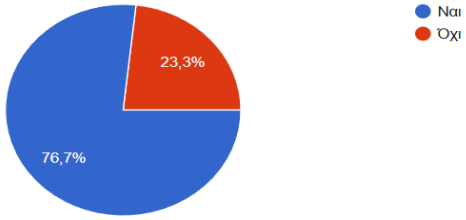
Regarding educators' perceptions of the applicability of gamification in secondary education (Figure 2), the majority of respondents (84.4%) expressed a positive view, while 15.6% believed it is not practically feasible.

Figure 2
Do you believe that gamification can be applied in secondary education?



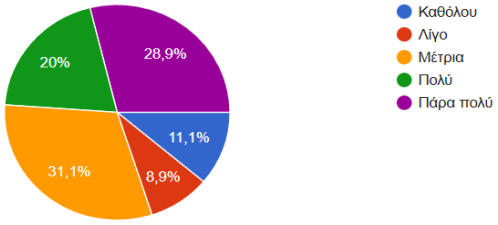
Among those educators who have already incorporated gamification into their teaching practices (Figure 3), the majority (76.7%) reported positive outcomes from its implementation, while 23.3% indicated that they did not observe any significant benefits.

Figure 3
Following the implementation of gamification, did it yield positive outcomes?



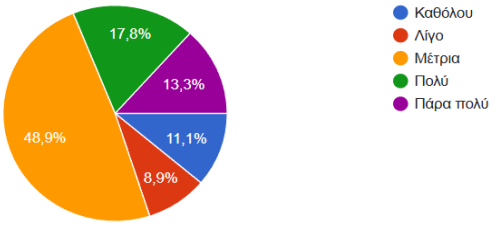
A central issue addressed by the research concerns the investigation of obstacles hindering the integration of gamification into educational practice. In response to the question regarding the legal framework as a potential barrier (Figure 4), 28.9% of educators considered it a "very high" barrier, 20% evaluated it as a "high" barrier, 31.1% rated it as "moderate," 8.9% as "low," while 11.1% stated that it does not constitute a barrier at all.

Figure 4
To what extent is the current legal framework considered an obstacle to the implementation of gamification?



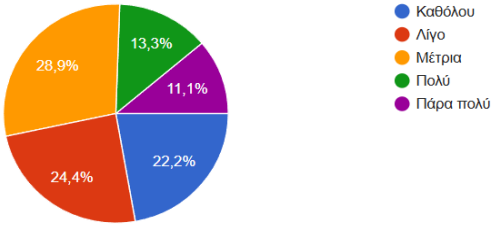
As for the curriculum guidelines acting as a restrictive factor in applying gamification (Figure 5), 13.3% of participants identified them as a "very high" barrier, 17.8% as a "high" barrier, and 48.9% assessed them as a "moderate" obstacle. Meanwhile, 8.9% considered them a "low" barrier, and 11.1% indicated that they pose no obstacle.

Figure 5
To what extent are curriculum guidelines considered a barrier to the implementation of gamification?



In response to the question examining whether the nature of the subjects (theoretical or practical) affects the implementation of gamification (Figure 6), 11.1% of participants perceived it as a "very high" barrier, and 13.3% as a "high" one. Furthermore, 28.9% rated it as "moderate," 24.4% as "low," and 22.2% believed it does not constitute a barrier.

Figure 6
To what extent is the nature of the subjects (theoretical/practical) considered a barrier to the implementation of gamification?



Effective time management in teaching is, in itself, a significant challenge. When asked whether the available instructional time acts as a barrier to the application of gamification (Figure 7), 20% of respondents described it as a "very high" barrier, 33.3% as "high," and 28.9% as "moderate." In contrast, 13.3% evaluated it as a "low" barrier, and 4.4% stated that it does not constitute an obstacle.

A further limiting factor is the potential lack of technological infrastructure (Figure 8). Specifically, 25% of educators identified it as a “very high” barrier, 38.6% characterized it as “high,” while 22.7% evaluated it as a “moderate” obstacle. In addition, 6.8% considered it a “low” barrier, and another 6.8% stated that it does not constitute a barrier.

Figure 7
To what extent is the available instructional time considered a barrier to the implementation of gamification?

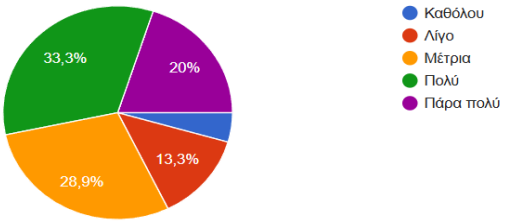
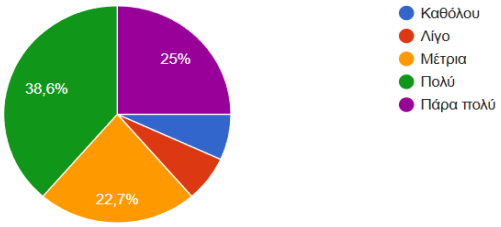
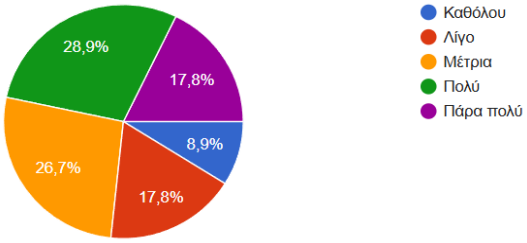


Figure 8
To what extent is the potential lack of technological infrastructure considered an obstacle to the implementation of gamification?



Regarding whether technical issues and internet connectivity hinder the application of gamification (Figure 9), 17.8% of respondents perceived them as a "very high" barrier, 28.9% evaluated them as "high," and 26.7% rated them as "moderate." Moreover, 17.8% classified them as a "low" barrier, while 8.9% stated that they do not constitute an obstacle.

Figure 9
To what extent are technical issues considered an obstacle to the implementation of gamification?



In response to whether class size affects the implementation of gamification (Figure 10), 22.7% of educators viewed it as a "very high" barrier, 38.6% as "high," and 27.3% as a "moderate" obstacle. Conversely, 4.5% considered it a "low" barrier and 6.8% stated that it does not pose an obstacle.

The lack of student familiarity with gamification may also act as a deterrent to its implementation. In this regard (Figure 11), 11.1% of educators identified it as a "very high" barrier, 20% as "high," and 31.1% as a "moderate" obstacle. Additionally, 24.4% considered it a "low" barrier, while 13.3% stated that it does not constitute an obstacle.

Another factor investigated was the lack of incentives for educators. In response to the question *"To what extent do you consider the lack of incentives for teachers to be an obstacle to the implementation of gamification?"* (Figure 12), 13.3% of participants evaluated it as a "very high" barrier, 35.6% as "high," and 33.3% as a "moderate" obstacle. Respectively, 11.1% and 6.7% regarded it as a "low" or "non-existent" obstacle.

Figure 10
To what extent is class size considered an obstacle to the implementation of gamification?

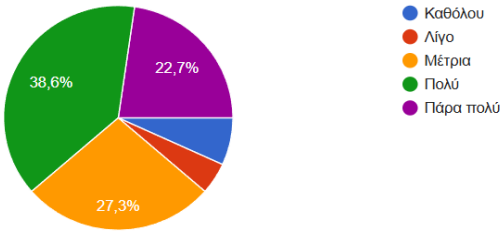


Figure 11
To what extent is the lack of student familiarity with gamification considered a barrier to its implementation?

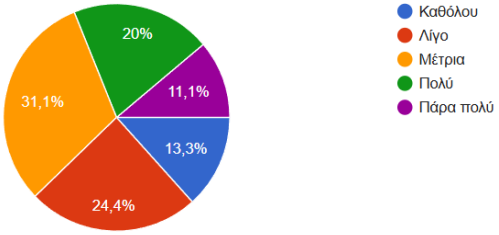
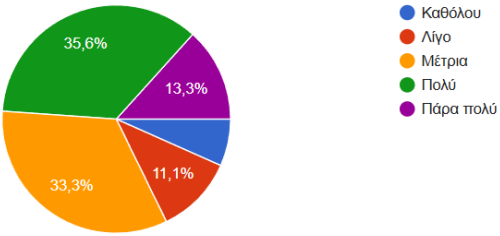
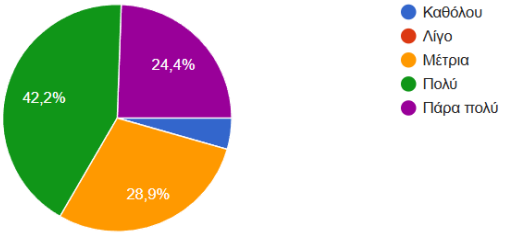


Figure 12
To what extent is the lack of incentives for teachers considered a barrier to the implementation of gamification?



Finally, the study explored the extent to which the lack of teacher training acts as a barrier to the implementation of gamification (Figure 13). Specifically, 24.4% of educators identified it as a "very high" obstacle, and a substantial 42.2% considered it a "high" barrier. Moreover, 28.9% rated it as "moderate," 4.4% as "low," and 2.2% reported that it is not an obstacle.

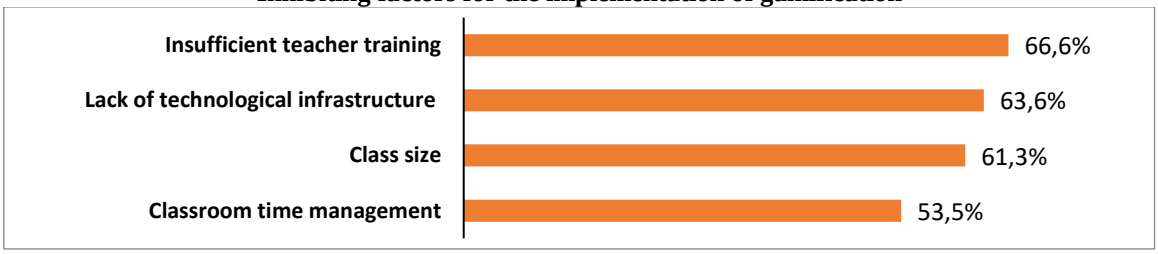
Figure 13
To what extent is the lack of teacher training considered a barrier to the implementation of gamification?



DISCUSSION OF FINDINGS

This study examined the attitudes of secondary education teachers regarding the implementation of gamification, as well as the barriers that hinder its use. According to the findings, 84.8% of participants expressed a positive attitude toward the application of gamification in secondary education, which is consistent with previous international research (Li et al., 2022; Martí-Parreño et al., 2016). However, this positive attitude is not fully reflected in actual teaching practice, as only 55.6% of respondents reported having implemented gamification at least once in their instructional process. This discrepancy between theoretical acceptance and practical application has also been observed in the study by Martí-Parreño et al. (2016), where a similar divergence was noted. This gap may be attributed to factors such as lack of teacher training, insufficient infrastructure, and constraints related to available instructional time—barriers that were also identified in the present research and will be analyzed in the following sections.

Figure 14
Inhibiting factors for the implementation of gamification



According to the data analysis, the most significant barrier identified was the lack of teacher training, reported by 66.6% of participants. This factor acts as a major deterrent to the adoption of gamification in educational settings. This finding aligns with previous studies (Mee Mee et al., 2020 · Pasia, 2023 · Simitsi, 2024), which also highlighted that the absence of professional development and, consequently, the lack of relevant knowledge, hinders the integration of gamification. The limited familiarity of educators with the principles of gamification, combined with a lack of experience in applying it, has been broadly recognized as a key challenge to its effective use in instructional practice (Araújo & Carvalho, 2017· Sánchez Mena & Martí-Parreño, 2017).

Educators also identified the lack of technological infrastructure as one of the most important obstacles to implementing gamification, with 63.6% of respondents rating it as either a “very high” or “high” barrier. The inadequacy or obsolescence of equipment has been similarly reported in earlier studies as a hindrance to the integration of innovative teaching approaches, including gamification, in Greek schools (Tziafetas et al., 2013 · Foutsitzi & Caridakis, 2021).

Another significant barrier identified was class size, with 61.3% of teachers viewing it as a “very high” or “high” barrier. Large class sizes hinder the ability to personalize instruction and adapt gamified activities to individual student needs. Moreover, managing a large group requires additional time and resources, which may discourage teachers from adopting new methodologies such as gamification. Although there are no specific studies directly linking class size to gamification implementation, it is widely accepted within the educational community that smaller class sizes facilitate the application of innovative teaching practices.

Time management remains a major challenge for educators. Gamification often requires more extensive preparation compared to traditional teaching methods (Vasilakopoulou, 2018). In addition to preparation, our findings indicate that 53.3% of educators perceive the available instructional time as insufficient for implementing gamification. The issue of limited time has also been cited in previous studies as one of the main factors that either hinders or, in some cases, renders the application of games in teaching unfeasible (Becker, 2007 · Becker & Jacobsen, 2005 · Macedonia, 2005 · Stojković & Jerotijević, 2011).

The above-mentioned barriers emerged as the most critical for the effective use of gamification. However, other factors were also evaluated—primarily as “moderate” obstacles—such as curriculum guidelines (48.9%), the nature of the subjects (28.9%), technical issues (26.7%), and students’ unfamiliarity with gamification (31.1%). These findings suggest that, although these elements may influence the application of gamification, they are not regarded by the majority of educators as prohibitive.

CONCLUSIONS

Gamification represents an innovative instructional approach that can be applied across all educational levels, enhancing the learning process through increased engagement, collaboration, and interactivity. In secondary education, its implementation has proven particularly effective in both general and special education settings, contributing to improved academic performance and heightened emotional involvement among students.Despite its documented benefits, studies focusing on the implementation of gamification in Greek secondary education remain limited. This highlights the need for further research aimed at exploring its feasibility and effectiveness within the Greek educational context. While educators recognize the value of gamification and maintain a generally positive attitude toward this technique, its practical application remains constrained due to several inhibiting factors, such as insufficient teacher training, inadequate technological infrastructure, large class sizes, and limited instructional time. The successful integration of gamification into the educational process requires institutional support, an upgrade of school facilities, and targeted professional development for secondary school educators . These measures are essential to ensure its sustainable and effective implementation.Finally, future research should focus on evaluating the long-term effectiveness of gamification and developing strategies that facilitate its adaptation across diverse learning environments.

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TA16: Virtual, augmented, and mixed reality in education

VIRTUAL LABORATORIES IN STEM SECONDARY EDUCATION

Athanasios Sypsas
Adjunct faculty member, School of Science and Technology
Hellenic Open University, Greece
e-mail: athanasios.sypsas@ac.eap.gr

Vasilis Zafeiropoulos
Adjunct faculty member, School of Science and Technology
Hellenic Open University, Greece
e-mail: vasiliszaf@eap.gr

Evgenia Paxinou
Adjunct Professor, School of Humanities
Hellenic Open University, Greece
e-mail: paxinou.evgenia@ac.eap.gr

Dimitris Kalles
Professor
Hellenic Open University, Greece
e-mail: kalles@eap.gr

ABSTRACT

The integration of virtual laboratories (VLs) into secondary STEM (Science, Technology, Engineering, and Mathematics) education is transforming traditional teaching practices by providing interactive, cost-effective, and flexible learning environments. This study investigates the instructional approaches, benefits, challenges, and prospects of VLs in enhancing scientific learning. VLs simulate real lab environments, enabling students to conduct experiments digitally, manipulate variables, and visualize complex phenomena—promoting engagement, motivation, and inquiry-based learning. Despite their advantages, limitations such as the lack of tactile experience, the need for teacher training, curriculum alignment, and digital access disparities remain significant. A blended learning approach combining physical and virtual labs is recommended to ensure comprehensive skill development. With emerging technologies like AI, augmented reality, and collaborative platforms, the future of VLs in secondary STEM education appears promising. Overall, VLs have the potential to play a critical role in preparing students for higher STEM education by fostering conceptual understanding and essential 21st-century skills.

Keywords: Virtual laboratories, Secondary education, STEM

INTRODUCTION

Laboratory experiments have long been considered a core component of science education, providing students with the opportunity to manipulate scientific equipment, observe phenomena, and construct conceptual understanding. Through physical interaction, learners are expected to develop deeper interest in science, enhanced understanding of principles, and improved retention of knowledge (Sypsas and Kalles, 2018). Additionally, laboratory instruction plays a crucial role in many STEM (Science, Technology, Engineering, and Mathematics) courses by enabling the practical application of theoretical knowledge through hands-on experimentation (Rahmadani et al., 2023). It offers numerous educational benefits, allowing students to engage actively in the learning process and develop their problem-solving and critical thinking abilities through inquiry-based methods. However, studies have revealed that traditional laboratory instruction often fails to achieve its educational goals (Lunetta et al., 2007). Students may follow procedures mechanically without engaging in authentic scientific inquiry, leading to superficial learning or rote memorization of textbook content. To address this, science education has increasingly turned toward inquiry-based approaches that emphasize exploration, hypothesis formulation, experimentation, and reflection (Paxinou et al., 2018).

Grounded in constructivist theory, inquiry-based learning encourages students to actively investigate scientific phenomena, build hypotheses, conduct tests, and draw conclusions. Yet, implementing inquiry-based instruction in physical labs presents significant challenges, including logistical limitations, classroom management issues, and lack of instructional support (Sypsas et al., 2019; Olympiou et al., 2013). Recent technological advancements have introduced virtual laboratories (VLs) as an innovative alternative or complement to physical labs (Parastatidis et al., 2022). VLs are technology-driven environments that simulate real laboratory settings in either two or three dimensions (Reeves et al., 2021). They immerse learners in interactive simulations where they can operate virtual equipment and handle digital materials using a keyboard, mouse, or handheld controllers (Andersen et al., 2023). VLs allow students to access simulated experimental environments via computers or VR headsets, overcoming constraints of time, space, safety, and cost. These platforms can provide structured guidance, real-time feedback, and increased visibility of complex or invisible scientific processes. A growing body of research supports the effectiveness of VLs in enhancing student engagement, motivation, procedural knowledge, and conceptual understanding (Sypsas et al., 2025). Particularly in the context of immersive virtual reality (VR), learners report increased presence and emotional involvement. However, questions remain about how to integrate VR-based labs effectively within traditional classroom settings and how varying degrees of immersion affect learning outcomes (Makransky et al., 2019).

This paper explores the pedagogical integration of virtual laboratories in secondary STEM education. It examines the theoretical foundations, instructional benefits, challenges to implementation, and prospects of VLs, with particular focus on inquiry-based learning models and immersive VR technologies.

ADVANTAGES AND CHALLENGES OF VIRTUAL LABS

Laboratory Learning in STEM Education

Laboratory activities play a pivotal role in STEM education, particularly in science disciplines, by offering learners hands-on experiences that bridge theoretical knowledge with real-world phenomena. Traditionally, labs are designed to help students develop experimental skills, foster scientific thinking, and validate theoretical principles through observation and manipulation of physical materials.

Virtual Laboratories: Definitions and Modalities

Virtual laboratories (VLs) are computer-based environments that simulate real-life laboratory conditions, enabling learners to conduct experiments in a digital space. VLs can be broadly categorized based on the level of immersion they offer (Jensen and Konradsen, 2018; Makransky et al., 2019; Potkonjak et al., 2016; Sypsas and Kalles, 2017):

- **Desktop Virtual Labs**: These are accessed through a standard computer interface (monitor, mouse, keyboard) and are widely used due to their ease of access and low cost. They support interactive experiments with guided tasks, simulations, and embedded assessments.
- **Immersive Virtual Reality Labs (HMD VR)**: These utilize head-mounted displays and motion controllers to provide a fully immersive 3D experience. Immersive VR enhances the learner's sense of presence, enabling a more realistic and embodied interaction with the virtual environment.

VLs are particularly valuable in contexts where physical laboratories are unavailable, unsafe, or limited by budgetary or logistical constraints. They offer flexibility, repeatability, and customizable feedback, aligning well with

inquiry-based learning objectives. Furthermore, VLs allow students to visualize abstract or invisible phenomena—such as electric currents or molecular interactions—that are often difficult to observe in traditional labs (Sypsas and Kalles, 2018). For instance, Onlabs, a 3D virtual reality biology laboratory developed by the Hellenic Open University, exemplifies how technology can be used to simulate lab environments for learners across various academic levels, enhancing accessibility and motivation (Zafeiropoulos and Kalles, 2016).

In summary, virtual laboratories serve as both a pedagogical and technological innovation in STEM education. When combined with inquiry-based methodologies, they have the potential to enrich student learning by fostering engagement, curiosity, and scientific literacy.

Pedagogical Advantages

Virtual laboratories (VLs) offer numerous benefits that enhance the quality and accessibility of STEM education. One of their most significant strengths is the ability to engage students in interactive and inquiry-driven learning without the constraints of physical resources or safety concerns. Students can manipulate variables, repeat experiments multiple times, and explore scientific phenomena at their own pace, thus supporting differentiated instruction and personalized learning paths (Paxinou et al., 2020a). Moreover, VLs facilitate visualization of complex or abstract scientific concepts (e.g., electron flow, molecular structures), which are often invisible or difficult to observe in traditional settings. These visual and interactive elements promote deeper conceptual understanding and long-term retention (Lai et al., 2022; Sypsas and Kalles, 2018). In immersive environments, students can experience a heightened sense of presence, which has been linked to increased engagement and motivation (Andersen et al., 2023; Makransky et al., 2019).

Gamification features, such as missions, real-time feedback, and adaptive difficulty levels, further enhance learner motivation (Bonde et al., 2014). For instance, in the SIVRLAB study, students were tasked with rescuing a robot by constructing a galvanic cell, thereby embedding scientific inquiry into a narrative structure that fostered purposeful learning (Lai et al., 2021).

Finally, VLs are cost-effective and scalable, providing access to high-quality experimental activities in schools that may lack physical labs, specialized equipment, or trained technical staff (Paxinou et al., 2018).

Inquiry-Based Learning and Constructivism

Inquiry-based learning (IBL) is rooted in constructivist educational theory, which posits that learners actively construct knowledge through meaningful experiences. IBL places students at the center of the learning process, guiding them to pose questions, investigate phenomena, collect and analyze data, and derive conclusions (National Research Council, 2000; de Jong, 2019). This method contrasts with didactic instruction, as it requires students to assume responsibility for their learning and develop skills such as scientific reasoning, problem-solving, and hypothesis testing (Sypsas et al., 2019). Nevertheless, implementing IBL in traditional classroom settings is not without challenges. Educators may struggle with time constraints, lack of resources, and difficulty providing sufficient scaffolding during open-ended tasks (Lai et al., 2021).

Implementation Challenges

Despite their benefits, virtual laboratories are not without limitations. A primary concern is the absence of tactile, hands-on experiences, which are essential for developing procedural skills and kinesthetic awareness. While VLs simulate experimental processes, they may not fully replicate the fine motor tasks or haptic feedback involved in handling real lab equipment (Potkonjak et al., 2016). This gap can lead to incomplete skill development if VLs are used in isolation. To address this, many scholars recommend a blended approach that combines virtual and physical labs, ensuring that students benefit from both cognitive modeling and real-world manipulation (de Jong, Linn, & Zacharia, 2013).

Another challenge is the need for teacher training. Effective implementation of VLs requires educators to be proficient not only in using the digital tools but also in designing inquiry-based learning scenarios and integrating VLs into the existing curriculum. Without proper training and support, teachers may revert to procedural instruction, undermining the exploratory nature of virtual labs (Sypsas et al., 2025).

Lastly, digital equity remains a pressing concern. Access to reliable hardware, internet connectivity, and technical support varies widely across schools and regions. Ensuring equitable access to high-quality digital labs is critical to preventing the deepening of educational inequalities.

APPLICATIONS AND CASE STUDIES

Virtual laboratories are increasingly used across a wide range of STEM subjects. In physics, VLs simulate experiments on motion, electricity, and optics, enabling students to manipulate variables like voltage or force and observe real-time changes. In chemistry, they allow safe experimentation with chemical reactions and molecular interactions. Biology labs often include dissections, microscopy, or ecological simulations, while engineering and electronics VLs offer circuit building, robotics programming, and system modeling. These applications provide realistic and interactive learning environments that would otherwise be difficult to create in traditional classrooms. Moreover, in mathematics and computer science, VLs can visualize abstract algorithms, geometric constructions, or data structures. They also support logical thinking through programming and simulation tasks, reinforcing applied problem-solving skills. In the following sections, two virtual labs are presented as case studies.

Case Study 1: Onlabs – A Versatile 3D Virtual Laboratory for Biology and Chemistry

Onlabs is a freely available VR-based educational tool designed to simulate biology and chemistry lab procedures in a 3D environment (Images 1, 2). Developed by the Hellenic Open University, it supports various educational approaches including distance, blended, and flipped classroom models. In Onlabs, learners can conduct experiments such as microscopy and solution preparation across different learning modes: Instruction, Evaluation, and Experimentation. Onlabs employs an action-centric representation, where the impact of each action is predetermined (Paxinou et al., 2020b). The Onlabs simulation mirrors the design and interaction of adventure games, where the user utilizes the mouse to interact with various objects in the virtual lab. The use of a simplistic context-sensitive interface facilitates the incorporation of VR interfaces, as they require a minimal heads-up display. Most inanimate entities in Onlabs can be interacted with by the user, but not all entities are interactive, and not all actions are valid for every entity.

To explore Onlabs effectiveness in communicating experimental skills to novice audiences, experiments were conducted in various educational settings, encompassing secondary education and undergraduate students, and spanning different disciplines such as Biology, Chemistry Physics, Electrical and Computer Engineering, Civil Engineering, Archaeometry and Education. Thus, with Onlabs as the central tool, educational scenarios with interventions designed to foster self-reflection and inquiry for evaluating its educational contribution, were implemented (Sypsas et al., 2021).

Image5
Virtual laboratory of Hellenic Open University (Onlabs)

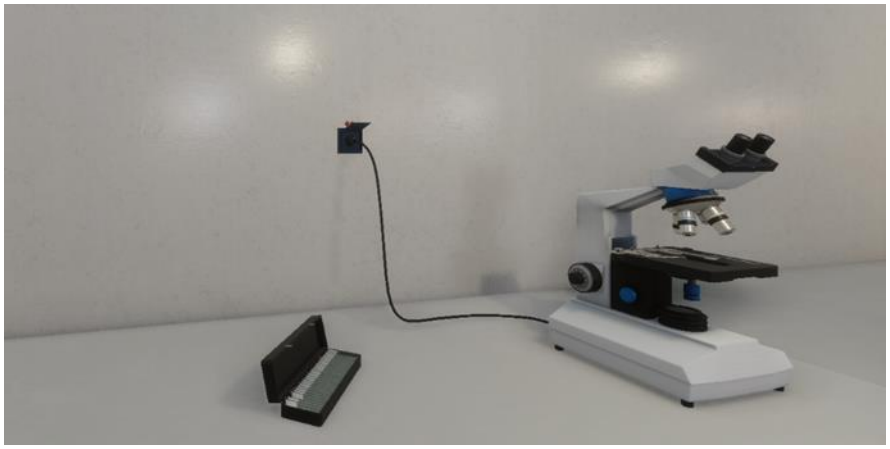


Learning Outcomes and Insights

Key findings from Onlabs implementation across secondary and higher education include:

- Learners who used Onlabs exhibited greater learning gains compared to those following traditional instruction or watching video demonstrations.
- Students reported high satisfaction, ease of use, and enhanced confidence in performing real lab procedures after virtual training.
- Analytics platforms allowed instructors to track learner interactions, adapting instruction based on data.
- Importantly, the desktop version of Onlabs was found to be more effective than immersive VR in maintaining learner focus and reducing cognitive overload, due to lower extraneous stimuli.

Image2
Onlabs version 4.0



Case Study 2: The SIVRLAB Project

A representative case study of effective VL implementation is the Scientific Investigation Virtual Reality Laboratory (SIVRLAB) developed by Lai et al. (2021). Designed for 9th-grade science students, SIVRLAB immersed learners in a guided, inquiry-based experience where they had to investigate oxidation-reduction reactions and assemble a voltaic cell to help a robot regain energy.

The virtual lab was offered in two versions:
Desktop VR, using mouse and keyboard for interaction, and Immersive VR, using head-mounted displays (HMD) for a fully embodied experience. Students were divided into three groups:
Individual use of immersive VR (HMD),
Individual use of desktop VR,
Observation of another student using immersive VR.

Learning Outcomes and Insights

The study revealed significant insights:

- Desktop VR users scored the highest on post-test knowledge assessments, possibly due to the clarity of instructions and ease of navigation.
- Immersive VR users performed better in follow-up physical lab tasks, suggesting stronger procedural memory and hands-on readiness.
- The observation group showed the least improvement, highlighting the limitations of passive learning in VR contexts.

- In terms of user experience:
- Immersive VR offered higher presence and engagement, but some students struggled with cognitive overload or VR sickness.
- Desktop VR users reported smoother learning and emotional satisfaction, likely due to familiarity with the interface.

These findings emphasize that different levels of immersion impact learning in diverse ways. While immersive VR enhances skill transfer and motivation, desktop VR may be better suited for conceptual understanding and sustained attention.

Challenges in Implementing Virtual Labs

While virtual laboratories offer significant advantages for STEM education, their implementation in real-world classroom settings is not without obstacles. Several practical, pedagogical, and infrastructural challenges must be addressed to ensure their effective and equitable integration into secondary education. These challenges include:

- Tactile limitations: VLs cannot fully replicate the physical manipulation of lab tools.
- Teacher readiness: Effective use of platforms like Onlabs requires professional development in digital pedagogy and instructional design.
- Technological constraints: While VLs are accessible on desktop and web platforms, immersive VR remains cost-prohibitive and cognitively demanding.
- Equity issues: Not all students have access to high-end devices or reliable internet connections. Desktop VLs address this by requiring lower specs and offering browser-based access.

DISCUSSION

Integrating Virtual Labs into STEM Classrooms

The use of virtual laboratories (VLs) in secondary STEM education presents an opportunity to reshape science instruction toward more student-centered, inquiry-driven models. The findings from recent studies, suggest that VLs are not merely substitutes for physical labs but can serve as pedagogical amplifiers, supporting both conceptual and procedural knowledge when implemented thoughtfully. However, effective integration of VLs requires more than technology adoption. Teachers must redesign their instructional strategies to align with inquiry-based learning principles. This includes guiding students in formulating questions, planning experiments, analyzing results, and drawing conclusions, skills that VL platforms can support through embedded tools such as virtual tutors, experiment logs, and scenario-based learning tasks.

The Case for a Blended Learning Approach

One of the most widely endorsed strategies in literature is a blended approach, where virtual and physical laboratories are combined. While VLs enhance accessibility and conceptual clarity, they may fall short in giving students real-world familiarity with lab equipment. By alternating between virtual simulations and hands-on experiments, educators can offer students a comprehensive and balanced learning experience. This hybrid model can be especially useful when resources are limited. For example, VLs can be used for pre-lab preparation or post-lab reflection, allowing students to explore procedures, visualize abstract concepts, and build confidence before engaging with physical materials. Moreover, this approach accommodates diverse learning styles, benefiting both visual and kinesthetic learners.

Equity and Accessibility

To ensure the inclusive adoption of virtual laboratories, equity considerations must be prioritized. Not all schools or students have equal access to high-speed internet, modern hardware, or immersive VR devices. Desktop-based VLs provide a scalable and low-cost alternative that can be deployed in most computer-equipped classrooms. Educators and policymakers should advocate for infrastructure upgrades and promote open-source or low-cost VL platforms to reduce barriers to participation.

Teacher Preparation and Professional Development

The success of VL integration largely depends on the teachers' digital competencies and pedagogical flexibility. Professional development programs must go beyond technical training to include instructional design for digital labs, facilitation of inquiry-based activities, assessment of virtual experiments, and classroom management in hybrid environments. Moreover, collaborative networks among educators can foster the sharing of best practices, co-development of instructional materials, and ongoing peer support. Engaging teachers in the co-creation and evaluation of VL content can also ensure better alignment with curriculum standards and student needs.

Toward Future Classrooms

Looking ahead, the integration of advanced technologies such as artificial intelligence (AI), augmented reality (AR), and collaborative online platforms will further enhance the interactivity, personalization, and social dimensions of virtual labs in secondary STEM education. These innovations can support adaptive learning pathways, real-time feedback, and collaborative experimentation, paving the way for more immersive, globalized, and student-centered STEM education. However, future implementations must remain grounded in pedagogical principles, as technology alone cannot guarantee effective learning, since its value lies in how it is used to support meaningful inquiry, reflection, and skill development.

CONCLUSIONS

Virtual laboratories (VLs) represent a significant advancement in the landscape of secondary STEM education, offering new ways for students to explore, understand, and engage with scientific concepts. By simulating authentic laboratory environments through interactive, technology-driven platforms, VLs facilitate inquiry-based learning and help bridge the gap between theoretical instruction and practical experimentation.

Evidence from research demonstrates that VLs can enhance students' conceptual understanding, motivation, and procedural skills. The type of VL, whether desktop or immersive, can influence learning outcomes differently. Desktop VR environments appear more effective for knowledge acquisition and task focus, while immersive VR strengthens procedural learning and the sense of presence. Both case studies affirm that when implemented with sound pedagogy and teacher support, virtual labs can enhance motivation, deepen understanding, and build procedural competence. As technology evolves—especially in VR/AR, AI, and analytics—virtual labs are likely to become an integral part of secondary STEM education.

Despite these promising outcomes, VLs are not a one-size-fits-all solution. Limitations such as reduced tactile engagement, the need for teacher training, and access inequalities must be addressed. Therefore, a blended approach, integrating virtual and physical labs, emerges as the most pedagogically sound model, maximizing the strengths of each medium while mitigating their shortcomings.

The integration of VLs into secondary STEM education will require sustained efforts in infrastructure, curriculum alignment, and teacher professional development. As emerging technologies such as AI, AR, and collaborative tools become more accessible, virtual laboratories are likely to evolve into even more dynamic, personalized, and collaborative learning environments.

In conclusion, when designed and implemented with careful consideration of both technical and pedagogical factors, virtual laboratories can play a transformative role in preparing students for STEM disciplines. They not only expand access to experimental learning but also cultivate essential 21st-century skills such as critical thinking, problem-solving, and scientific inquiry—skills that are foundational in STEM fields.

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TA17: Online educational environments for enhancing blended and distance learning

TA18: Social networks and education

TA19: Online learning communities

EXPLORING THE INNOVATION OF HARVARD'S "OUT OF EDEN LEARN" ONLINE LEARNING PLATFORM: A CASE STUDY IN A PRIMARY EFL CLASSROOM

Dermitzaki Kyriaki
English Language Teacher, M.Ed.
4th Primary School of Preveza
Preveza, Greece
e-mail: kdermitz@gmail.com

ABSTRACT

The emergence of new technologies and their infinite applications in all aspects of our lives, have affected the educational systems globally. In the Greek state school context many educators feel that the time has come to embrace new media pedagogies in their everyday lessons, not as a mere technological tool, but as a vehicle to amend their teaching approaches, promoting continuous professional development among fellow teachers and 21st century competences among students through their inspiring collaboration in Communities of Practice and Learning. The present study discusses the design, implementation and evaluation of our engagement in the English language classroom of the 4th Primary School of Preveza with the unique online learning community of "Out Of Eden Learn" (OOEL) of Project Zero in the Graduate School of Education in the University of Harvard. More specifically, the results of our participation in the various learning journeys designed by the Harvard researchers team since our initial "Skills Labs" pilot phase in 2020 on a national level and the international collaborations in the following years, revealed very positive results of students' intrinsic motivation enhancement as well as promotion of multiliteracies, fostering inclusive, digital and critical thinking skills in an interconnected, culturally and linguistically rich learning environment.

Keywords: Online Learning Communities, 21st century competences, Thinking routines, "Out of Eden Learn", Digital learning, Multiliteracies

INTRODUCTION

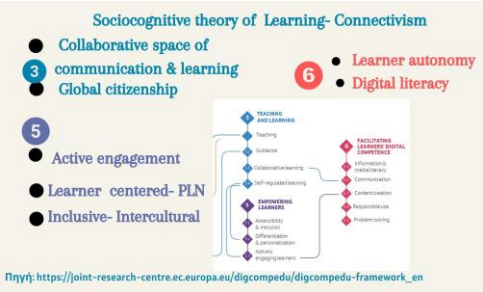
Teaching and Learning in the 21st century: Theoretical Background

Meeting 21st century requirements is at the heart of every educational reform. However, going beyond theory, there is still considerable debate among educators on successful approaches for teaching, learning, reflecting and evaluating of 21st century competences in the classroom. Despite continuous reshaping of the 21st century skills framework, there is a general consensus that life, soft, thinking and digital skills will aid today's learners navigate their evolving social environment with a successful career thriving as future global citizens (CEDEFOP, 2021). Ergo, adopting a sociocognitive perspective, creativity, communication and collaboration in European and international learning programs, such as the OOEL can promote critical and digital skills, in an increasingly interconnected world.

As the focus of this case study is the enhancement of the above skills in Greek state EFL learning environment in the post-methods era, we will attempt to look at how "OOEL" online learning community can support teachers in accommodating the needs of today's learners. Indeed, according to Vlachos (2010), developing communicative competence, a primary goal in EFL teaching, embraces linguistic, pragmatic, strategic, sociolinguistic and intercultural competences. Furthermore, language teaching and learning should not be considered as a rote learning of vocabulary and grammar, a mere transmission of knowledge, but as emphasized in the updated Common European Framework(Council of Europe, 2020) the co-construction of meaning through interaction, a dynamic process where learners as language users and social agents draw upon their plurilingual and pluricultural repertoires. All the above, coincide with the collaborative, cross-cultural, inquiry-driven curriculum framework offered by Project Zero researchers in the "Open Canopy", formerly known as "Out of Eden Walk" online platform (https://learn.outofedenwalk.com/). To avoid misunderstanding, we opt for the term "Out of Eden Learn" program here since our learning journeys refer to programs from 2020 until 2022. The OOEL changed its name to "Open Canopy" in a new innovative approach by the Harvard team in 2024, referring to pedagogies in online and in-person contexts.

Merging language learning theories with technology in the modern era of "normalization" (Bax, 2003) calls for a novel pedagogic framework entailing many parameters: a) psychological, fostering intrinsic and activity motivation (Papaefthymiou-Lytra, 2014), b) socio-cultural, transformative pedagogies, prioritizing connectivism (Siemens, 2005) testifying to the tectonic shifts of the digital age and AI and c) pedagogical parameters (Kourtis-Kazoullis and Vlachos, 2014). Besides, new learning paradigms call for "cultivating" multiliteracies, incorporating multimodalities facilitating the interpretation of visual, spatial, tactile, gestural, audio and oral modes of meaning in an ever-evolving universe that our learners inhabit (Knobel and Lankshear, 2014). Enhancing and innovating education, the updated European Digital Competence Framework (Redecker, 2017) identifies six different areas of digital competences including the educators' professional, pedagogic competences and the learners' competences. For the purposes of the present study, we will only concentrate on areas 3, 5 and 6, namely the teaching and learning, empowering learners and facilitating learners' digital competences. The diagram below (Diagram 1) attempts to present the efficacy of OOEL online community engagement in promoting our learners' digital competences.

Diagram 1
DigCompEdu Framework & OOEL



Out of Eden Learn Program

"The Open Canopy", formerly known as "Out of Eden Learn", is a free online educational program, an initiative of Project Zero of the Harvard Graduate School of Education, offering young people (aged 3-19) opportunities to interconnect and carry 8-12–week curricula, known as "learning journeys" actively engaging in the same format of activities. Students follow Paul Salopek, a National Geographic explorer and Pulitzer prize-winning journalist in his

colossal foot journey from Ethiopia to South America on the ancient migration routes, get inspired by his stories and videos and start their own explorations looking at the world around them with fresh eyes (Out of Eden Learn, n.d.).

At the heart of the program lie the three original OOEL learning principles: i) "slow-looking": observing the world carefully, listening attentively to others, ii) "exchanging stories", whilst reflecting on people, places and identities and iii) "making connections" between artifacts, experiences and global problems, pondering on the connectivity of their lives with bigger human stories, embracing diversity, seeking common solutions. According to Dawes Duraisingh & Tishman (2024), two more learning principles, supporting the above, have been added in the Open Canopy approach: "learner generated content" and "thoughtful peer-to-peer exchange" enhancing students' sense of wellbeing and belonging, moving from personal to local to global issues.

RESEARCH METHODOLOGY

The present study was based on the hypothesis that the Greek state EFL learning can greatly benefit from the empowerment afforded to us by the pedagogical use of digital technology (Blake, 2013). The novel quest for knowledge, creativity, collaboration, intercultural dialogue and the development of global competences (Boix-Mansilla, 2016) can primarily be sought via innovative, personalized, inclusive and engaging approaches attempting authentic learning encounters with same-age global students in non-formal, community-based learning journeys.

The research questions that guided this mixed methods small-scale case study were the following:

1. To what extent could the OOEL online learning community approach and related strategies enhance 21st century competences among primary students?
2. What is the added benefit for students in participating in the "Open Canopy" (formerly known as "Out Of Eden Learn") online learning journeys interconnected with global peers?
3. What are the gains for the Greek primary EFL teachers in adopting OOEL strategies and pedagogy in their everyday teaching practice?

Turning to the research context, the present study is based on the findings of four learning journeys, commencing with the 2020 "Skills Labs" pilot national phase and continuing with 2021 and 2022 international programs. Convenience sampling was applied and this included 50 4th Primary School of Preveza 5th and 6th grade students, aged 11-12 years old, who participated in the OOEL online learning community explorations. They comprised of 20 6th Grade participants in our initial Greek program and 5th and 6th grade groups of 15 students each that participated in the international programs. Our 5th Graders were indeed so enthusiastic that they took part in two consecutive learning journeys.

Crucial to our teaching, learning and assessing practices, guided by the adaptation of OOEL curriculum and Project Zero principles in our EFL classroom, were our observations and reflections, displayed on our teacher-researcher journals. All learning journeys were part of our regular EFL lesson, as the vehicle of communication and collaboration in the Harvard platform is the English language. Needless to say, we have also integrated in our EFL praxis many Erasmus+, eTwinning and other national projects. However, promoting storytelling and human to human exchange, aiding learners to use thinking routines, contemplative slow looking and dialogue toolkit online and in our classrooms, gives the Project Zero initiative a unique place in the educational landscape and this is the focus of the next section.

ENHANCING THINKING SKILLS THROUGH OOEL STRATEGIES

Aiding our students ameliorate their thinking skills is a challenge for all teachers who strive to make their students think creatively, critically and deeply, in line with higher order thinking skills discussed in Bloom's revised taxonomy (Krathwohl, 2002). Drawing on Harvard's Project Zero expertise, we can use the research-based approach of visible thinking, by employing thinking routines as sequential steps designed to scaffold and enhance student thinking. According to Dawes Duraisingh and Sachdeva (2021) these are simple structures and protocols inviting learners to think beyond the surface level as part of inquiry-driven innovation. Fostering a culture of thinking can have a great impact on developing 21st century competences as teachers can use a great array of thinking routines framework, documenting student learning and later reflection, as a consequence of deepening cognition (Ritchhart & Perkins, 2008).For the purpose of our learning journeys in 4th Primary School of Preveza, we mostly employed the core thinking routines from the wealth of the routines suggested in Project Zero platform, in an attempt to make competences more visible and transparent ((Ritchhart, 2015).

Similarly, two additional instructional tools supporting high-quality and thoughtful online interaction, as well as offline classroom meaningful practice, are the dialogue toolkit and the three O's. Having connected over 70.000 students in more than 70 countries in a highly successful online, intercultural learning community (Out of Eden Learn. n.d.) has

revealed the difficulty young learners have in online encounters, albeit in a digital education era, with students from very diverse socioeconomic and cultural backgrounds. A dialogue toolkit as sentence prompts or starters has come to the aid of teachers, who can help students slow down and think carefully before writing an answer or an asynchronous comment to a post of a student from their collaborating schools, named their "walking group". These dialogue routines are also embedded as symbols in the comment box (Image 1) and can be integrated across curriculum beyond the online community. They invite students to look more carefully before responding to the multimodal text "noticing" details, "appreciating" using specific examples, "snipping" a phrase and asking a question while "probing" for more details. Then in accordance with the thinking routine, "connect-extend-challenge", students are encouraged to "connect" the post with their own experience, "extend" their thoughts in new directions, gaining new perspective from the online exchange, challenge a "point of view" and "name" aspects of their identity and experiences.

Image 1
The Dialogue Toolkit

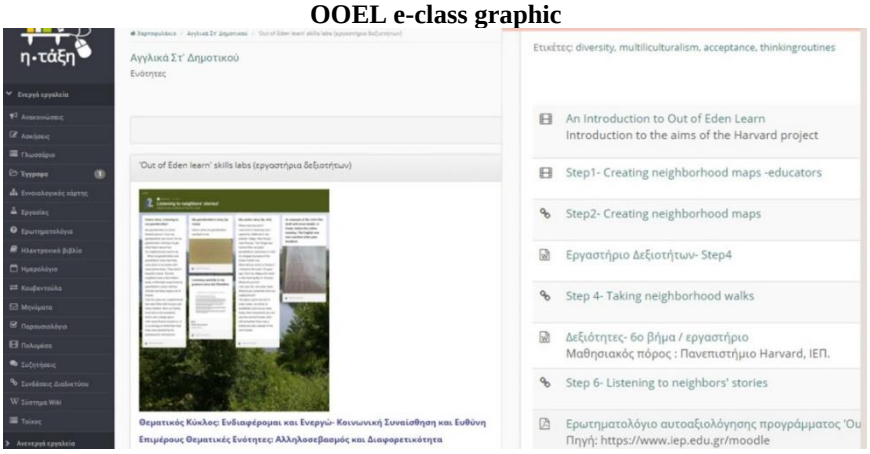


Built into many OOEL/ Open Canopy activities are also the three O's, "overgeneralization", "overconfidence", and "othering". These teach a valuable lesson in inclusive practices, as online dialogue can sometimes reveal subtle student behaviours, showing stereotyping of whole groups, assuming our own perspective as universal and overemphasizing differences, ultimately being disrespectful in our online discourse as well as in our everyday regular conversation. The above strategies are at the heart of nurturing global competences, including cognitive development, socioemotional skills and civic learning (Asia Society and OECD, 2018).

ENRICHING OUR PRIMARY EFL CLASSROOM PRACTICES WITH OOEL CORE LEARNING JOURNEY CURRICULA

We will now look more closely at how we attempted to explore the above Project Zero strategies and OOEL pedagogical tools in line with our EFL curriculum in 4th Primary School of Preveza. Our school was among the 217 primary and secondary schools that participated in the implementation of the pilot program "21st century Skills Labs" conducted in 2020/2021 (Eurydice, n.d.). This is an innovative educational module, launched by the Greek Ministry of Education marking a competency-based shift enhancing transversal, soft and digital skills, integral for a rapidly changing world (Institute of Educational Policy, n.d.). Under the thematic pillar of "Social Conscience and Responsibility" an adaptation of the aforementioned OOEL program was proposed as a 7-week "Skills Labs" workshop, exceptionally designed by Harvard's OOEL ambassador and School Co-ordinator Dr Melliou and Dr Retalis at the Department of Digital Systems in the University of Piraeus focusing on seven competencies including the 4 Cs, namely: i) communication, ii) creativity, iii) collaboration, iv) critical thinking , together with v) problem solving, vi) perspective taking and vii) appreciating diversity (Melliou and Retalis, 2024). 4th Primary School was the only primary school in our region Epirus that participated in this OOEL national pilot phase. The research team worked intensively and closely with the teachers and we had many online synchronous meetings with the organisers and Harvard experts discussing and reflecting on the principles of OOEL and competency-based learning.

Image 2
OOEL e-class graphic



Our students embarked on their first uniquely designed learning journey, informed by the alignment between OOEL pilot curriculum and "Skills Labs" framework, amidst COVID-19 pandemic in November 2020. In line with the Greek Ministry of Education requirements, distance learning was employed with additional modifications to the teaching approach and learning content. Ergo, Greek teachers, many of whom lacked Educational Technology Pre-service and In Service Education and Training (Dermitzaki, 2019), were suddenly asked to fulfil the role of distance educator and ultimately succeeded , perceiving the pandemic as a critical point for the elevated role of digital technologies in the Greek primary and secondary schools (Jimoyannis et al. , 2021). In the case of our 2020/2021 Special Leaning Journey for Greek schools, we adopted a blended learning model of i) asynchronous e-class, uploading all resources like Paul Salopek's articles and videos for every activity, called "footstep" in our OOEL learning journey and ii) synchronous Webex meetings, where we discussed the work process, visited the online platform and interacted in real time with the new posts from the other schools (Image 2).

Therefore, the teacher-researcher invited children to follow their "walking party", interacting with children from Greek schools far away from us (Evosmos, Kilkis, Rhodes, Serres, and Anavryta), following the steps assigned for the different weeks. First, the educators were doing the activity and then they asked students to follow the same step reflecting on the difficulties or challenges their students had encountered. The educators uploaded both their own and their students' activities on the Out of Eden Learn platform. To assist distance collaboration, our students uploaded their posts on collaborative Padlets and we answered questionnaires, had brainstorming activities or wrote texts on collaborative Google docs with the links provided in our synchronous sessions and also in our e-class OOEL specially allocated area. In later phases, we also experimented with the efficacy of Webex team escape rooms to cater for the different teams of students, fostering collaboration, communication and interpersonal skills. More specifically, they started by creating neighborhood maps, taking neighbourhood walks, which also included inside homes/balconies careful observation due to pandemic restrictions, and listening to neighbors', modified again to relatives', stories. The seventh week was dedicated to reflection and answering online questionnaires about the student appreciation of this unique experience.

Fortunately, in our next international learning journey launched in December 2021 we did not face strict pandemic restrictions. It was "Core Learning Journey 1: The Present and the Local" and we had a truly multicultural representation, with schools from India and the USA- New Jersey and Ohio. In accordance with OOEL requirements, the educators have to register their class for the particular learning journey, receive a class passcode and for 10-year-old students or older ones, help students register and create student accounts using the class code. Hence, in our international journeys our 5th and 6th Grade students could post on their own and comment on their fellow walkers' posts. Additionally, a flipped classroom approach has had a positive impact on our EFL class for all international and European programs we have participated. In the present case study, resources and generated digital material were uploaded in our e-class under the relevant thematic area of OOEL and all the activities/footsteps were launched in class. In comparison with the aforementioned national program, the core learning journey 1 contained three more steps- the initial "setting off", where the students had to introduce themselves, explain their avatar and reflect on OOEL slowing down stories and the two concluding steps, namely "documenting the everyday" and "looking ahead".

Each "footstep" had three phases. The first phase "get inspired", watching and discussing Paul Salopek's linguistically demanding for primary EFL learners videos or reading his articles, was a valuable part of Media Literacy exploration as well as of revisiting multimodalities (Kress, 2003) and multiliteracies (Kalantzis & Cope, 2008) expanding our meaning making/semiosis in real, authentic English language context. The "act" phase ensued, where students wrote their posts combining visual creativity, displayed in photos, drawings, diagrams, maps with English texts. The third part of each step, namely the "interact" phase was the one our students enjoyed the most, as they were eager to see how many responses they would receive and also respond to other students' posts. Needless to say, we had our dialogue toolkit icon in our classroom notice board to remind students of ways to expand their answers, showing appreciation, respect and elaborating on their thinking processes/routines departing from a dismissive social media "like" mode.

SPECIAL LEARNING JOURNEYS: PLANETARY HEALTH AND STORIES OF HUMAN MIGRATION

In 2022 we delved deeper in the Project Zero pedagogies, launching two extremely interesting, yet far more demanding on our Greek students' cognitive competences, special learning journeys. In spring 2022, we explored the "Introduction to Planetary Health" It was a transition from simpler, everyday issues, representing the personal and the local to global issues inquiring on sustainability, climate action, our responsibility as global citizens and civic engagement topics. Firstly in "Walking with health in mind" students were invited to walk slowly in their neighborhoods, carefully noticing and observing problematic areas that could have an impact on people's health. Secondly, in "Uncovering the big idea of planetary health" after being exposed to various, carefully-selected multimodal resources, they were asked to create a concept web to document graphically the connection between environment impact and health problems. Thirdly,

in "Zooming in, reporting out", students investigated and presented their findings on a topic of planetary health they had a special interest in, thus enhancing intrinsic student motivation and decision making. Finally in the step named "Exploring what we can do", students had to employ higher order thinking skills, seeking alternative choices they could make in their everyday routine concerning planetary health. Ultimately, they had to prepare a resource informing others about these issues and persuading them to adopt similar changes in their everyday habits in a globally responsible interconnected world.

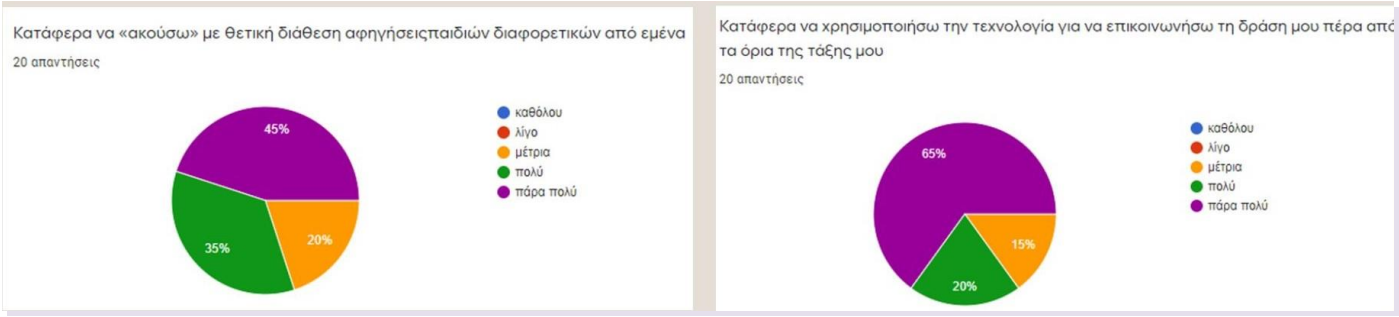
In the following winter "Stories of Human Migration" proposed a curriculum of four steps: i) "Our own stories of migration", with students depicting and documenting on maps personal migration stories and migratory routes of relatives or people within their local community, ii)"Everyday borders", taking thoughtful slow walks in their area, discovering visible and invisible borders, iii) "Migration in the media" , critically comparing the way media authors report migrant stories and finally iv) " Collecting our thoughts on migration" discussing, after thinking deeply and reflectively, how their views on this critical global subject have evolved during this journey.

DISCUSSION OF FINDINGS

This section focuses on the most prominent study results in relation to the three research questions. Our analysis was aided by data collected from the reflective student questionnaires and the non-formal discussions we had in class with the students sharing their thoughts, comments, ideas and reflections. A great contribution to our work process data was also the consultation online meetings we had with OOEL Ambassador, Dr Melliou and the OOEL Principal Investigators, namely Dr Dawes-Duraisingh and Dr Tishman as well as the Project Manager Sarah Sheya during our first learning journey. To aid corroboration of the quantitative findings, we decided to collect and analyse the data of 4th Primary School of Preveza students' posts, comments and creative contributions as part of our qualitative data analysis. All the above were complemented by the teaching journals that documented our observations, thoughts and reflections in ameliorating our teaching practices.

Research Question 1: OOEL and 21st century competences

Image 3
Students' post-questionnaire answers (Greek Learning Journey)



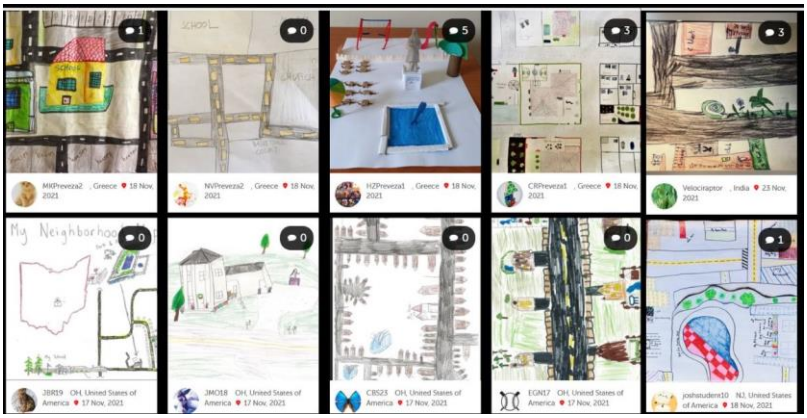
Concerning the first research question, the evidence of the efficacy of the OOEL online exchange and cultural interaction towards the enhancement of 21st century skills is not easily presented and measured in concrete data. We will first look at the answers given by 20 students-the key actors in this innovation- participating in our first online learning journey. They testified to the great impact the OOEL project had on tneir communication and collaboration with peers and on their digital skills. In relation to perspective taking 80% answered they listened to the stories of students from the other schools in an extremely positive (45%) and a very positive (35%) mood. Only 20% answered moderately. Regarding the digital skills enhancement and communication using technology for meaningful and thoughtful exchange of personal and local stories,65% answered they managed to use technology extremely effectively, 20% very effectively and only three students out of the 20 said they could communicate moderately (Image 3). They all agreed that the online platform was "a ray of hope", "a window" opening up to the world in the midst of the lockdown, a unique opportunity for them to discover new places and listen attentively to other students' stories.

Image 4
Reflective Collaborative Board



Besides the Likert-scale close-ended questions, we opted for more open-ended responses, due to the students' young age and inexperience in answering online questionnaires. Therefore in all learning journeys the students discussed freely about their thoughts, concerns or preferred activities of the OOEL program. Overall, the students responded with great enthusiasm when asked if they considered the OOEL program a rewarding experience. Despite the pandemic restrictions, the majority of 6th grade children said they extremely enjoyed their collaboration with same-age students and regretted not being able to slow walk round their neighborhood and take photos. Moreover, they appreciated discovering new friends and listening to stories from the other children. They were able to use the English language to communicate and were so proud to upload their work on the platform of such a famous University like Harvard. Our young students were asked to discuss and summarise their thoughts on the OOEL project activities work they had carried out and they completed it first in the form of sticky notes, some in Greek and some in English. We then transformed it into the next Jamboard poster (Image 4).

Image 5
Creating neighborhood maps: OOEL posts



Turning to the online learning community observations, the plethora of student digital generated content can inform our study concerning the enhancement of 21st century competences. To this end, some characteristic examples from all learning journeys will be presented here. Firstly, the activity of mapping meaningful geographies was a testament to the creativity competence of children, not only from an artistic point of view, but also as their own unique way of documenting their area, an observational drawing and designing practice, rarely employed in our regular curriculum. Furthermore, every map revealed a story of what the children envisioned as important for them on their everyday route to school, their neighborhood or their town park, setting the tone for a more holistic, experiential exploration of their learning experience connected with their family and community context (Image 5).

Secondly, the slow walking activity that invigorated all journeys was a novel way for our Primary students towards visible thinking, self-exploration and looking beyond the obvious trying to discern the connections between everyday objects and bigger systems. Their critical thinking and analytical skills were documented in this process.

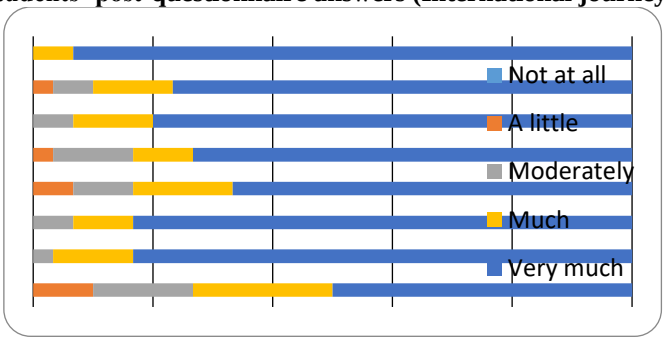
Revealing thoughtful observation, connecting feelings-emotional learning- to everyday objects, one characteristic post by a 6th Grade student taking an olive grove photo in the COVID-19 pandemic read: "I chose to take this photo because I liked the peace and quiet of the place. It was on the day we went to collect our olives to make our family olive oil. Although we do it every year, this was a special occasion in the midst of the lockdown and I really enjoyed my countryside day out!" This quotation is reminiscent of Tishman's (2018) four themes of slow looking: seeing with fresh eyes and philosophical wellbeing, reminding oneself of what is important in life. The other two, present in many online interactions concerning neighborhood walks are exploring perspective and noticing detail.

Finally, visibility in the OOEL platform was portrayed in every student's activity feed and the 'popularity" of our students' posts attracted a great number of thoughtful comments from students from other schools, thus enhancing self confidence and communication skills, writing and receiving comments using mainly the appreciation and probing dialogue tools.

Research Question 2: Added benefit for students embracing OOEL program

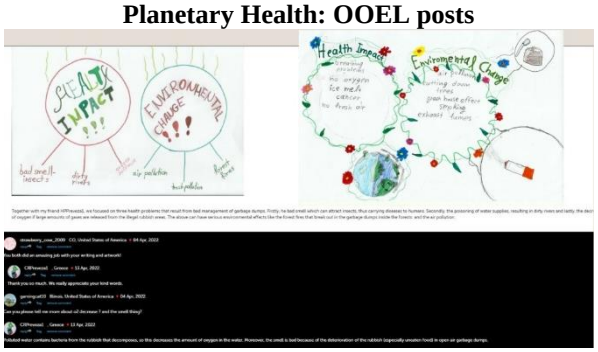
Turning to research question 2, we will utilize the post-survey reflective answers of our students' international journeys (Image 6) combining the data with their actual work posted on the OOEL platform. To quote some of the students' open-ended survey answers, a 12-year-old said: "I liked that we saw pictures from other cities and countries and I enjoyed talking in class about the new things we discovered". They unanimously valued the connection and collaboration with all their classmates and the youth from the other countries, which corresponded with their love for project-based learning in all our EFL Needs Analysis results. More than 90% valued collaborating with other children speaking in English, yet they acknowledged that they needed to improve their dialogue toolkit use, as this was never practiced in their Greek classroom before. 90% of them believed that walking round their neighborhoods slowly made them notice things they had never observed before. Also, thinking about local and global solutions was gradually part of their civic engagement repertoire. Finally, their digital competences had been empowered by their online engagement.

Image 6
Students' post-questionnaire answers (International journeys)



These findings accorded with the number of comments and platform activity our participants demonstrated, revealing a sense of belonging in a special group of this innovative online learning community. As already stated in image 4 above, students could appreciate how different individuals, cultures and educational systems can visualise maps of their areas. As one student marvelled, he loved the great number of different ingenious ways children from India or the USA could use to draw their areas, accompanied by a personal explanatory story. In the activity named "mapping connections to larger forces, stories or systems" (Dawes Duraisingh and Tishman, 2024) in our Planetary Health journey, children could appreciate how urgent solutions were needed for problems of protecting habitats, water resources, destruction of crops, waste landfills and human health problems, interrelated in a global perspective regardless of living in Colorado, Madrid, Toronto, Illinois or Preveza, Greece (Image 7).

Image 7
Planetary Health: OOEL posts



Interviewing people in the Stories of Human Migration curriculum helped our students "cultivate" interpersonal and intrapersonal skills, feeling empathy and listening attentively to others with respect to their history, family story and culture. It was an enlightening experience of dialoguing with an older generation, gaining valuable insights into their different views on social issues, an experience enriched by the interviews of their "fellow walkers" from the other schools and Salopek's slow journalism interviews. Moreover, it had the added benefit of media literacy practice and learning to decipher how supposedly "objective" stories could be biased in a subtle way using images, tone of voice or even headtitles to impress people.

Research Question 3: Gains of EFL teachers in endorsing OOEL program

"*Sir, I am too old to learn*" from Shakespeare's King Lear (Act II, Scene 2) is a quotation that succinctly summarises the frustration experienced by a great number of teachers, facing the challenges of the digital era. Yet, the EFL teachers have always been at the forefront of innovation endorsing the design of technologically-enhanced scenarios/lessons that promote 21st century competences. In the case of the present study, educators joining OOEL online learning Community can greatly benefit from the vast resources the Project Zero provides, but also the immense opportunities of connecting with esteemed experts and teachers from such diverse teaching environments. Consequently, addressing the specific needs and interests of our students before implementing the OOEL program, designing and enacting school-based change, was supported by the collaboration of a thriving community of practice and continuous professional development.

Undoubtedly, the OOEL curricula can be integrated in all school subjects. OOEL-inspired activity frameworks have been designed inter alia for 4th Grade Primary students (Papastamatiou, 2021) and for EFL Junior High school settings (Tsiachti, 2022). These go beyond the scope of this study and the expertise of the teacher-researcher. Focusing on our present study, the alignment between the OOEL and the Unified Curriculum for the teaching of Languages-EPS-XG (Government Gazette, 2016) is crucial. In particular, the EPS-XG prioritizes the social construct of learning, the value of multiliteracies and multimodality, plurilingualism and pluriculturalism, the need for communicative competence in a social setting. Needless to say, all the above assert the efficacy of the OOEL online learning activities towards communicative competences that transverse subjects and go beyond language proficiency of A1 and A2 level that our 5th and 6th Grade students are supposed to reach respectively in our EFL classroom (CEFR, 2020). In the Framework revisited by CEFR experts (2023) action-oriented, plurilingual and intercultural education are again highly valued. Our teaching journals were indeed in accordance with the above, as we documented our students thinking more critically, creating with greater imagination, writing and debating topics while noticing connections between personal, local and global problems. In sum, the teacher had the role of the designer, content and process facilitator, co-ordinator and supporter of the learning process, encouraging teamwork, peer-to-peer teaching and scaffolding as more competent linguistically and digitally students helped their peers in an autonomous learner-centred environment.

In the same vein, our learning journeys curricula were in line with the Council of Europe Reference Framework of Competences for the Democratic Culture (2018), as prioritizing cultural diversity, linguistic, communicative and plurilingual skills, knowledge and critical understanding of self and the world (history, cultures, media, sustainability, environment) are at the heart of the OOEL innovation. According to Melliou and Retalis (2024), the biggest gain asserted by primary teachers of the OOEL integrated with the 'Skills Labs' framework was the tools afforded to us for monitoring the development of competences. On a personal note, however, the biggest gain was that our EFL classroom, even amid lockdown restrictions, was a window for students opening up to the world and welcoming the students and teachers from so many beautiful places, cultures and languages to dialogue with our students.

CONCLUSION

The present study sought to explore the innovation for the teacher and students that embarked on "Out of Eden Learn"/ "Open Canopy" learning journeys, enriching their teaching and learning practices with Harvard's Project Zero strategies and pedagogical tools. Although the discussion was relevant to the EFL primary classroom, it can perhaps offer insights to other educators, who are interested in welcoming a global online learning community of teachers, students and University experts in their school environment with the unique privilege of belonging to a global community that supports teachers and students adopt multidisciplinary inquiry-based approaches, cultivating cultures of thinking embedding multiliteracies and 21st century competences. Regardless of the limitations and weaknesses of our small-scale study with a relatively small number of student-participants, our EFL adoption of OOEL practices recorded very positive findings. The complexity of the new learning constructs and the challenges teachers and students face everyday cannot be easily dismissed. However, the active and enthusiastic engagement of our students was really promising. It enriched our teaching and learning practices and gave us valuable insights in promoting 21st century competences and monitoring students' performance in an inclusive, creative learning environment, with activities coming closer to Koutsogiannis' (2011) missing third circle.

Imagine a classroom where children start their day by listening attentively to stories illustrated by maps, pictures or videos accessed online, sent to them by their "fellow walkers" from schools miles away from their own. Embracing initiatives like the above OOEL online learning program can really transform your classroom like that. Ergo, being educators in interesting and challenging times requires empowering young people to become agents of change, respectful global citizens that accept, appreciate, collaborate and endorse multicultural global learning contexts.

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TA20: Second-generation e-learning (Learning 2.0)

TA21: Mobile learning (Mobile Learning, BYOD)

TA22: Open educational resources

TA23: Free and open-source software for education

TA24: Teaching and digital media

VISUALIZATION OF PHYSICAL QUANTITIES OF ELECTROSTATIC FIELD, SPATIOTEMPORAL VARIATIONS OF WAVES, ATOMIC ORBITALS, AND DETERMINATION OF FUNCTIONAL CHARACTERISTICS OF CIRCUITS THROUGH SOFTWARE

Varsamis Agisilaos
Teacher of Physics (M.Sc., Ph.D.), Header of School Physics Laboratory
6th General Lyceum of Larissa
Larissa, Hellas (Greece)
e-mail: avars@sch.gr

ABSTRACT

The purpose of this work is to demonstrate the usefulness of scientific software in understanding, calculating and deepening the concepts of the physical sciences, through combinatorial and animated visualizations. It is particularly important especially for physical quantities and concepts that are abstract and there is no direct supervision over them (e.g., the field quantities, atomic and wave phenomena). All of the above is done with the using of the MAPLE and MATCAD software. Additionally, a powerful alternative proposal for the study of electrical circuits is given through the TINA simulation software in relation to the classical laboratory and its effectiveness is demonstrated, especially in cases where the laboratory activity cannot be carried out due to endogenous problems.

In the first part of the paper, the characteristic physical quantities of the electrostatic field are created and depicted, such as the intensity, the equipotential curves or surfaces, dynamic lines in two and three dimensions for a single charge, as well as, for a combination of charges.

In the second part of the paper, wave phenomena are presented in the plane and in space, such as the spatiotemporal propagation of a wave of constant amplitude, but also with damping, the spatiotemporal production of a standing wave, the spatiotemporal production and evolution of beats and waves interference.

In the third part of the paper, atomic orbitals are produced and designed. The atomic orbitals s, p, d, f and the hybrid sp^2 are depicted in the plane and in space, as well as, density diagrams and various sections of them in space.

In the last part of the paper, the study of electrical and by extension electronic circuits is presented, through the POSTPROCESSING feature of the electrical and electronic circuit simulation software TINA.

Keywords: Electrostatic Field, Waves, Atomic Orbits, Electrical Circuits.

INTRODUCTION

The great importance of the scientific visualization of physical phenomena was realized by the scientific community very early on. Initially, through the scientific programming languages FORTRAN (Stoimenos et al., 1978), PASCAL, C and then with specialized scientific software programs, such as MATLAB (Samaras & Sahalos, 2004), MATHEMATICA, etc. The visualization explains in a very understandable and comprehensible way natural phenomena that: a) are difficult to perceive through mathematical formalism or verbal description, b) there is no direct supervision of these phenomena, because they cannot be observed and easily perceived by our senses, c) it is difficult or impossible to carry them out in the real time laboratory.

This paper presents a very efficient, easy-to-use and parameterized method using the scientific software MALPE (Maple 9.5, 2004) and MATHCAD (Mathcad 14.0, 2007), for the visualization and study of characteristic quantities of electrostatic fields, wave phenomena and atomic orbitals. It should be emphasized that the three-dimensional visualizations produced, both in the MAPLE environment and in the MATHCAD environment, can be freely rotated horizontally and vertically (angles φ, θ). This capability constitutes an excellent means of supervision and monitoring of the phenomena. Also, the study of electrical circuits is presented through the TINA simulation software (TINA 8, 2008), with which we can study with great precision and in-depth parameters, which, with the classical laboratory method, would be laborious but also, in many cases, intrinsically impossible to do.

VISUALIZATION OF CHARACTERISTIC ELECTROSTATIC FIELD QUANTITIES

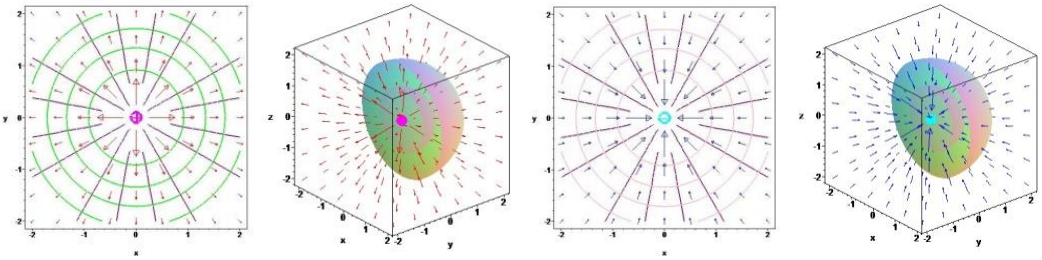
The characteristic quantities of the electrostatic field are its intensity and potential at any point (x,y,z) of the field. These two quantities are given respectively by the following relations (Papadimitraki – Hlihlia, 1980):

$$\vec{E}_{total}(x,y,z)=\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\sum_i\frac{Q_i}{r_i^2(x,y,z)}\hat{r}_i \quad , \; V_{total}(x,y,z)=\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\sum_i\frac{Q_i}{r_i(x,y,z)} \qquad \{A.1\}$$

Where ε is the dielectric constant of the medium, r_i is the distance of the point from the charge Q_i and $\hat{r}_i$ is the unit vector in the direction charge Q_i to point (x,y,z). Based on these equations, the intensity and potential for charges in the plane and in space will be calculated and visualized. Along with these two quantities, the dynamic lines and the equipotential curves or surfaces of the electrostatic field will also be depicted.

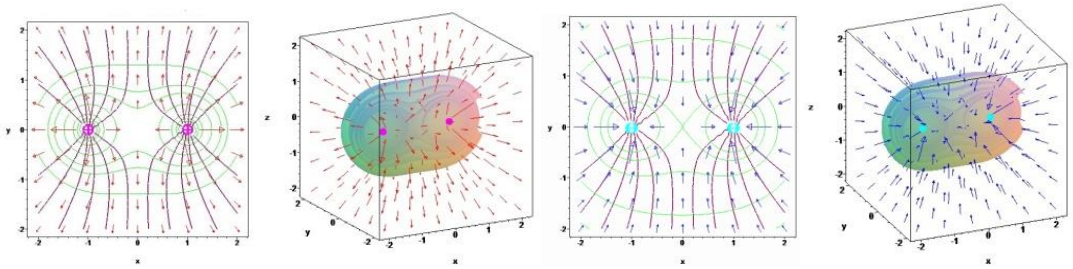
For a point charge + 5μCb and - 5μCb placed at the origin of the axes (Image 1) the vector field of the intensity, the dynamic lines and the equipotential curves in the plane are plotted. Also, in space, the vector field of the intensity and the equipotential surfaces in cross-section around the charge are depicted. The visualization was done with the MAPLE software.

Image 1
2D and 3D visualization of characteristic field quantities for a point charge +5μCb or -5μCb



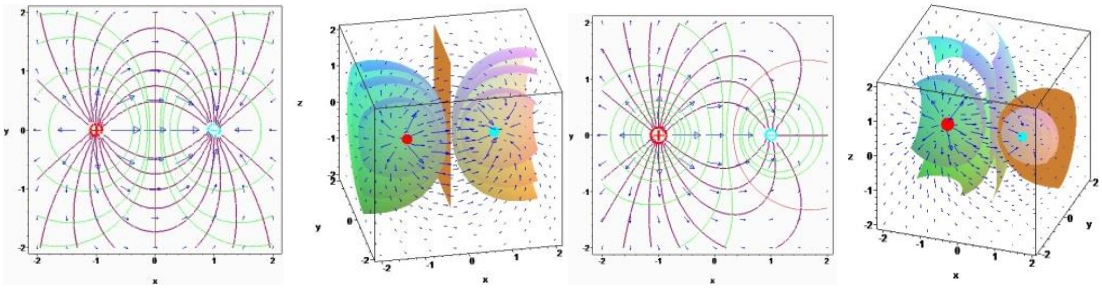
For two identical equal-sized point charges + 5μCb or - 5μCb placed at the positions (-1,0,0) and (1,0,0) (Image 2) the vector field of the intensity, the dynamic lines and the equipotential curves in the plane are depicted, together with the vector field of the intensity and the equipotential surfaces in cross-section in the space around these charges. The visualization was done with the MAPLE software.

Image 2
2D and 3D visualization of characteristics field quantities for two identical charges +5μCb or -5μCb



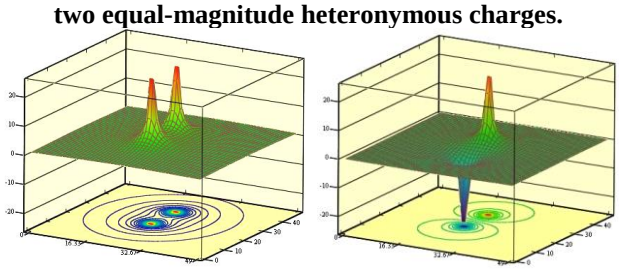
For two heteronymous point charges of equal magnitude + 5μCb, - 5μCb placed at positions (-1,0,0) and (1,0,0) (Image 3) are depicted, on the left, the vector field of the intensity, the dynamic lines and the equipotential curves in the plane and the vector field of the intensity and the equipotential surfaces in cross-section in the space around them. On the right, in the last two illustrations (Image 3), the positive charge is twice the magnitude of the negative one. The equipotential with the brown color in all illustrations is the equipotential $V = 0$ Volt. The visualization was done with the MAPLE software.

Image 3
2D and 3D visualization of characteristic field quantities. On the left, two heteronymous charges +5μCb, -5μCb and on the right, two heteronymous charges +10μCb, -5μCb



With the MATHCAD software, complex visualizations can be created, such as those shown in (Image 4). These diagrams depict the change in potential in the space around the point charges, with simultaneous projection of the equipotential curves on the plane, on the left for two equal homonymous positive point charges and on the right for two equal-magnitude heteronymous point charges. The magnitude of the charges is equal to $(4\pi\varepsilon_o)$Cb and the distance between them is equal to 0.8 m. The study and observation of the change in potential offered by this visualization is extremely educational and important. Because, in addition to calculating the numerical quantities, it also provides the most complete picture of the change in the field potential. Also, the free rotation of the diagram horizontally and vertically (angles φ, θ) within the MATHCAD programming environment allows the panoramic overview of the phenomenon.

Image 4
Composite 2D - 3D visualization of the field potential: a) left for two equal homonymous charges and b) right for two equal-magnitude heteronymous charges.



SPATIOTEMPORAL REPRESENTATION OF WAVE PHENOMENA

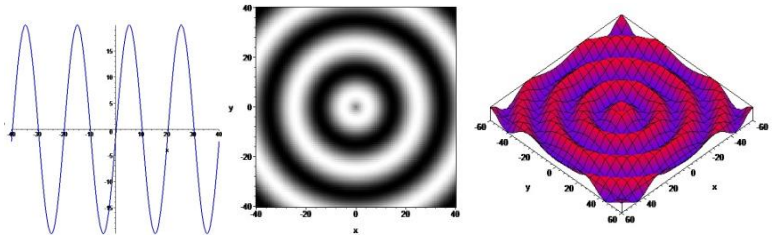
A disturbance propagating in space with a velocity υ is generally a function of the form $y(r,t)=f(r\pm\upsilon t)$ (Oikonomou, 1980), where r is the distance of a given point in space from the source of the disturbance. The minus (-) sign means propagation along the positives of the reference system and the plus (+) sign means propagation along the negatives of the reference system. When it comes to harmonic wave propagation, then the above general equation is written as follows (Allonso & Finn, 1979) & (Ioannou et al., 2019):

$$y(r,t)=Y_m\cdot\sin\left[2\pi\cdot\left(r\mp\upsilon\cdot t\right)\right] \quad \acute{\eta} \quad y(r,t)=Y_m\cdot\sin\left[2\pi\cdot\left(\frac{t}{T}\mp\frac{r}{\lambda}\right)\right] \qquad \{B.1\}$$

Where Y_m is the amplitude of the wave, T is the period and λ is the wavelength. Of course, the basic wave relations also apply: $\upsilon=\lambda f$ and $\omega=2\pi f$, where f is the frequency and ω is the angular frequency.

Based on the above equation, we produce and visualize (Image 5) with the MAPLE software a harmonic wave of constant amplitude, in one, two and three dimensions. The wavelength is λ=20 m and the velocity υ=0.4 m/s. Within the software environment, motion (animation) is generated depending on the choice of the wave propagation direction and thus we can observe the evolution of the phenomenon in space and time. This makes the study very efficient, but also pedagogically extremely effective.

Image 5
1D, 2D and 3D constant amplitude harmonic wave visualization

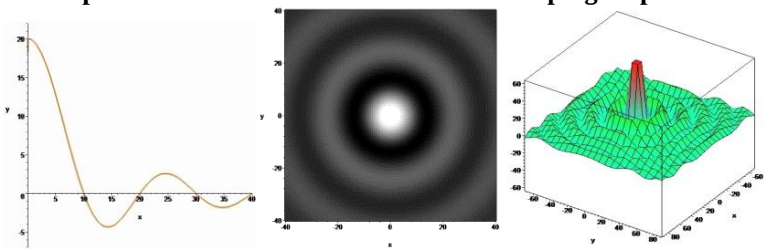


If the amplitude of the wave is damped by the distance from the source, e.g., it is of the form:

$$y'(r,t)=\frac{Y_m}{r}\cdot\sin\left[2\pi\cdot\left(r\mp\upsilon\cdot t\right)\right] \qquad \{B.2\}$$

then, the previous visualization is shaped like the one shown in (Image 6).

Image 6
1D, 2D and 3D representation of harmonic wave with damping amplitude with distance.



In the case where two generally different waves interfere, then the total disturbance at a point in space, which is at distances r_1 and r_2 from the wave sources, will be given by the relationship:

$$y_{1,2}(t)=Y_{m1}\cdot\sin\left[2\pi\cdot\left(\frac{t}{T_1}-\frac{r_1}{\lambda_1}\right)\right]+Y_{m2}\cdot\sin\left[2\pi\cdot\left(\frac{t}{T_2}-\frac{r_2}{\lambda_2}\right)+\varphi\right] \qquad \{B.3\}$$

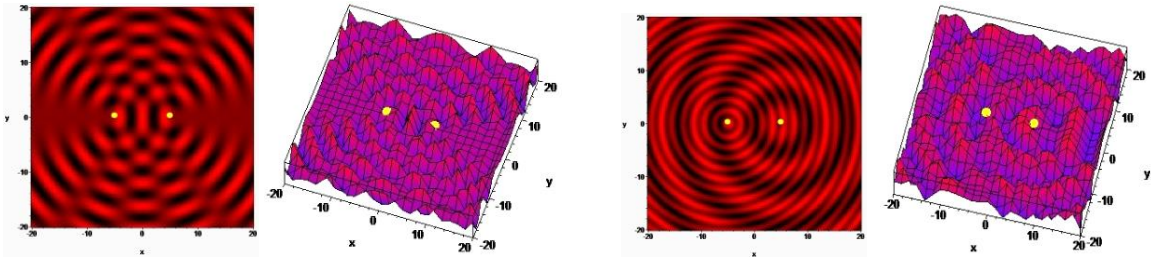
Where φ is the phase difference between the two waves.

If the waves have zero phase difference, the same amplitude, the same period and the same wavelength, then the above relationship {B.3} is simplified to (Oikonomou, 1980) & (Stoimenos et al.,1978):

$$y_{1,2}(t) = Y_m \cdot \sin\left[2\pi \cdot \left(\frac{t}{T} - \frac{r_1}{\lambda}\right)\right] + Y_m \cdot \sin\left[2\pi \cdot \left(\frac{t}{T} - \frac{r_2}{\lambda}\right)\right] = 2Y_m \cdot \cos\left[2\pi \cdot \left(\frac{r_1 - r_2}{2\lambda}\right)\right] \cdot \sin\left[2\pi \cdot \left(\frac{t}{T} - \frac{r_1 + r_2}{2\lambda}\right)\right] \quad \{B.4\}$$

The results of the interference of two waves with propagation velocity υ=0.4 m/s and wavelengths $\lambda_1 = \lambda_2$=4m are presented in the first two figures in (Image 7). The last two figures (Image 7) depict the interference of two waves with υ=0.4 m/s and wavelengths λ_1=2m and λ_2=7m. As mentioned above, within the software environment motion (animation) is produced and thus, we can observe the evolution of the interference phenomenon in space and time.

Image 7
2D and 3D visualization of the interference of two waves

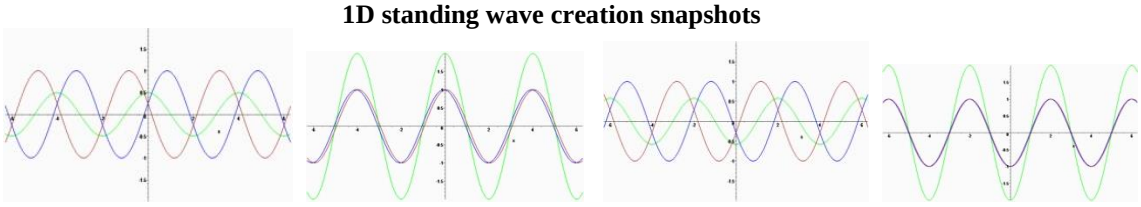


The interference of two waves moving in opposite directions generally leads to the formation of standing waves. The standing wave ratio SWR is an indicator of how strong the standing wave is. This phenomenon is particularly undesirable in electromagnetic wave emission systems. Due to poor or incorrect matching, the traveling wave is reflected by a percentage, resulting in the creation of a counter-propagating wave. The traveling wave interferes with the reflected one, resulting in the creation of a standing wave. For two identical waves propagating in opposite directions, the following will apply (Oikonomou, 1980) & (Ioannou et al., 2019).:

$$y_{sw}(x,t) = Y_m \cdot \sin\left[2\pi \cdot \left(\frac{t}{T} - \frac{x}{\lambda}\right)\right] + Y_m \cdot \sin\left[2\pi \cdot \left(\frac{t}{T} + \frac{x}{\lambda}\right)\right] = 2Y_m \cdot \cos\left(\frac{2\pi}{\lambda} \cdot x\right) \cdot \sin\left(\frac{2\pi}{T} \cdot t\right) \quad \{B.5\}$$

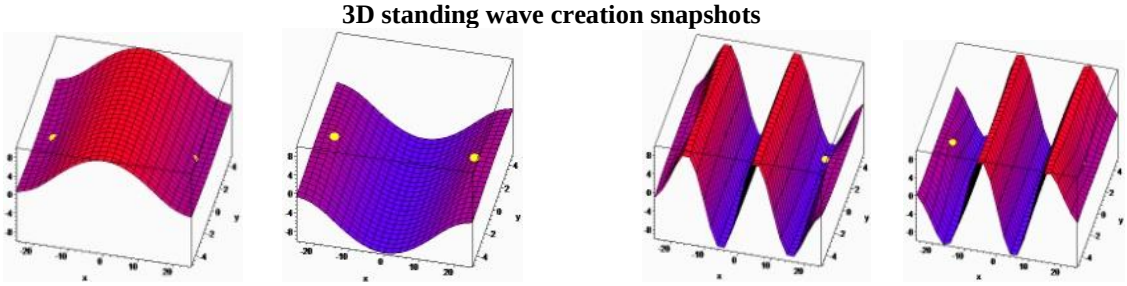
In (Image 8), four snapshots of a standing wave (in green color), resulting from the interference of two identical but oppositely propagating waves, are shown. Within the MAPLE software environment, animation is produced and thus, we can observe the evolution of the standing wave in space and time.

Image 8
1D standing wave creation snapshots



(Image 9) shows snapshots of a standing wave in space, resulting from the interference of two identical, but oppositely propagating waves. In the two figures on the left, the 1st vibration mode is shown. In the next two, the 2nd vibration mode is shown, with a phase difference between the waves equal to π. And here, by generating motion, we can observe the vibration of the standing wave in space and time.

Image 9
3D standing wave creation snapshots



The interference of two waves of the same amplitude and with a small difference in frequencies f_1 and f_2, moving in the same or opposite directions, leads to the formation of beats. Then, for the result of the interference and the creation of beats, the following will apply (Oikonomou, 1980) & (Stoimenos et al., 1978):

$$y_{1,2-BEAT}(t) = 2 \cdot Y_m \cdot \cos\left[2\pi \cdot \left(\frac{f_1 - f_2}{2}\right) \cdot t\right] \cdot \cos\left[2\pi \cdot \left(\frac{f_1 + f_2}{2}\right) \cdot t\right] \quad \text{and} \quad f_1 > f_2 \quad \{B.6\}$$

In (Image 10) two snapshots of beats are shown. The first on the left was created in the MATHCAD environment and the second on the right in the MAPLE environment. For both snapshots we can generate motion and observe the creation of the beat in space and time.

Image 10
Snapshots of beats

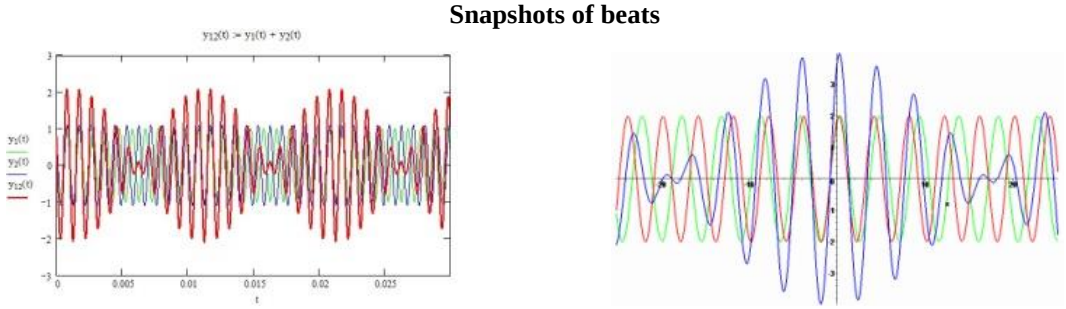


ILLUSTRATION OF ATOMIC ORBITALS

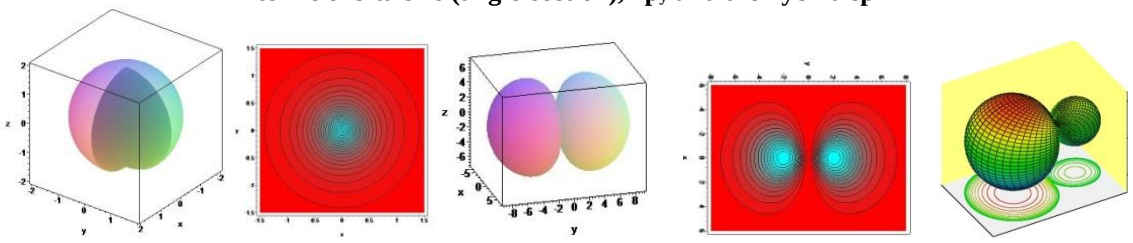
In the microcosm, at the atomic and subatomic level, we know that the orbit of a particle, as we know it from classical mechanics, is meaningless. Similarly, for the electron, its orbit cannot be determined in the sense of classical mechanics. Instead, the concept of the atomic orbital is used. The orbital is a space where the electron can exist with increased probability. Atomic orbitals are acceptable solutions of the Schrödinger equation for the wave function ψ, as given below (Haralampous, 1980) & (Manousakis, 1981):

$$\nabla^2 \cdot \psi + \frac{8 \cdot \pi^2 \cdot m}{h^2} \cdot (E - V) \cdot \psi = 0 \quad \acute{\eta} \quad \mathrm{H}\psi = \mathrm{E} \cdot \psi \qquad \{\Gamma.1\}$$

where H is the Hamilton operator and ψ is the wave function of the electron. The square of the wave function ψ^2 gives us the probability of the electron being present at a certain point in space. Based on the ψ solutions of the Schrödinger equation, we will visualize the orbitals.

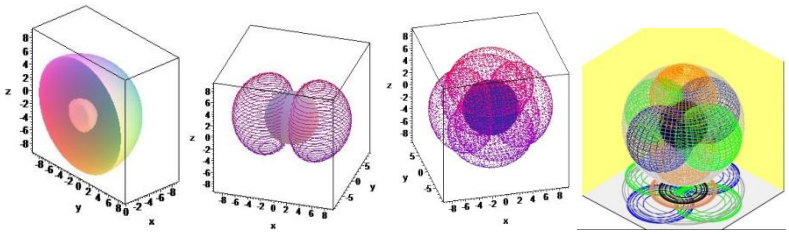
In (Image 11) the 1s (in angle-section) and $2p_y$ orbitals are illustrated together with the corresponding density diagrams. In the same Image, at the end, the hybrid orbital sp^2 is also presented, which results from the combination of the s orbital with one of the p_x , p_y , p_z orbitals.

Image 11
Atomic orbitals 1s (angle-section), $2p_y$ and the hybrid sp^2



In (Image 12) a combined depiction of the 1s and 2p orbitals is presented in order to provide, as best as possible, a more comprehensive overview of the relative position of these orbitals in space.

Image 12
Combined representation of 1s & 2s (cross-sections), 1s & $2p_x$, 1s & 2p, 1s & 2s & 2p



In the following figures (Image 13) to (Image 15) the orbitals $3d_z^2$, $4d_z^2$, $4f_z^3$, $3p_z$, $4p_y$, $4d_{x^2-y^2}$, $4f_{y(3x^2-y^2)}$ και $4f_{z(x^2-y^2)}$ are illustrated.

Image 13
Atomic orbital $3d_z^2$

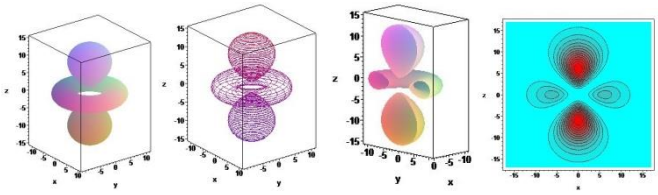


Image 14
Atomic orbitals $4d_z^2$ (the three initials) & $4f_z^3$ (the last three)

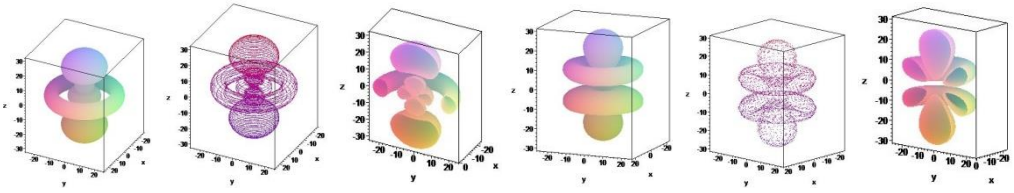


Image 15
Atomic orbitals $3p_z$, $4p_y$, $4d_{x^2-y^2}$, $4f_{y(3x^2-y^2)}$, $4f_{z(x^2-y^2)}$

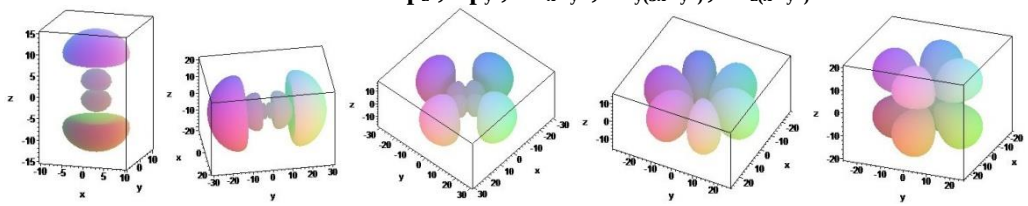
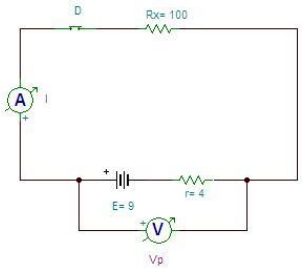


ILLUSTRATION OF FUNCTIONAL CHARACTERISTICS OF ELECTRICAL CIRCUITS

It is known that the laboratory analysis and study of an electrical circuit is subject to endogenous uncertainties, such as random and systematic errors (Zaharoulis, 2000). However, apart from these bugs, there are some other limitations. So, for example, we will mention that we cannot have zero resistance, we cannot short-circuit a voltage source, we cannot have a variety of resistors with any desired value. All of the above, as well as many others, introduce limitations in the study and analysis of electrical circuits in real time. An alternative study proposal, which overcomes all the above problems, is the analysis and study of electrical circuits through scientific simulation software. One such software is TINA (TINA 8, 2008). The full parameterization in many areas of analysis (DC, AC, Transient, etc.), as well as the flexibility in plotting graphs, make it a cognitively and pedagogically useful tool.

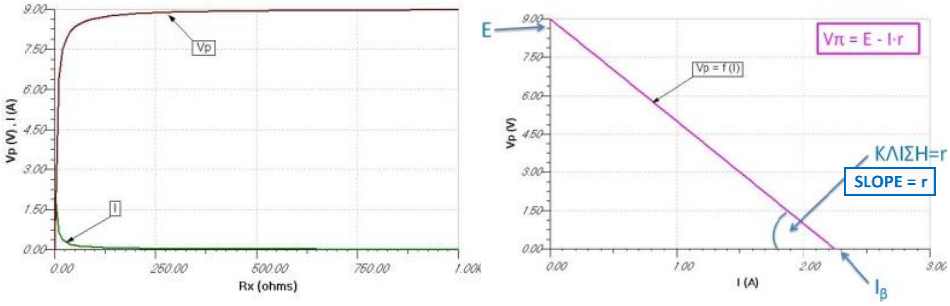
With the TINA simulation software, we will study an electrical circuit for calculating the internal resistance of an electrical voltage source, such as the one designed in (Image 16).

Image 16
Electrical circuit for calculating the internal voltage source resistance



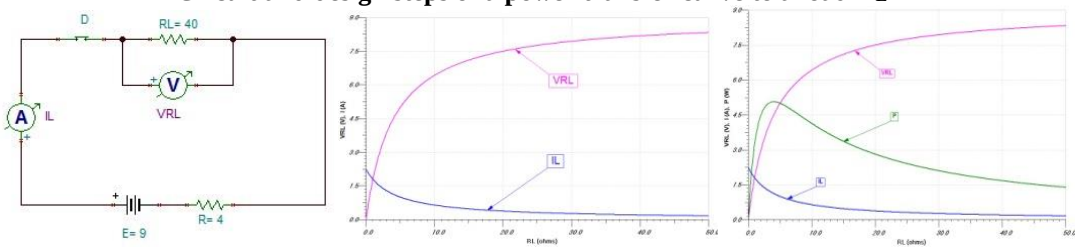
Let us assume a source with an electromotive force (EMF) E = 9V and an internal resistance r = 4Ω. The voltmeter Vp measures the polar voltage of the source, and the ammeter I measures the current flowing through the circuit. We vary the resistance Rx and thus obtain a range of current and voltage values, as drawn in (Image 17) on the left. Based on these values and using the POSTPROCESSING procedure, we obtain the characteristic straight line, as it is drawn in (Image 17), on the right. From the characteristic straight line, the electromotive force (EMF) of the source, the short-circuit current, and the internal resistance of the source can be calculated.

Image 17
Voltage and current variation (left). Characteristic straight line (right)



With the same methodology, as above, the power transfer curve to a load can be obtained and the condition for maximum power transfer can be calculated. The electrical circuit and the accompanying diagrams are shown in (Image 18). In the last diagram, the power curve (P) is drawn in green, which, as shown, presents a maximum for R_L=R=4Ω.

Image 18
Circuit and design steps of a power transfer curve to a load R_L



CONCLUSIONS

It has been observed that the majority of school and university textbooks are meager in illustrations concerning abstract quantities, such as field concepts and wave phenomena, but also concepts and quantities of the microcosm. Of course, as printed materials, they lack the movement or temporal evolution of phenomena in real time. (Alexakis et al., 2019) & (Ioannou et al., 2019) & (Liodakis et al., 2020).

The present paper comes to cover this weakness with the use of scientific software. It constitutes a powerful proposal with great cognitive and pedagogical value. By utilizing the possibilities of design, visualization in one, two and three dimensions, motion and parameterized calculations, we are given the opportunity to study in depth, as well as to supervise physical phenomena, which would otherwise be impossible to approach.

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EDUCATION AND DIGITAL MEDIA- INSPIRATION FOR THE IONIAN POET THROUGH "KALLIPATEIRA"

Giannouli Sofia
Philologist, PE02 (Secondary Education Teacher)
1st Model Junior High School of Preveza with Lyceum Classes
Preveza, Greece
e-mail: alexandropoulosalekos@yahoo.com

ABSTRACT

This paper examines the application of innovative pedagogical approaches in Ancient Greek language instruction, focusing on the combined use of traditional teaching and digital tools for the analysis of Pausanias' text "Kallipateira" and Lorentzos Mavilis' poem, also titled "Kallipateira."

The aim of this work is to highlight how modern technology can be integrated into the teaching of Ancient Greek, enhancing the learning experience and broadening the possibilities of understanding ancient texts. Specifically, it seeks to present how digital tools and artificial intelligence contribute to the analysis, comprehension, and retention of literature, while simultaneously strengthening students' cognitive skills.

The objective is to explore the synergistic use of traditional teaching methods with contemporary technology to bolster the learning process and underscore the significance of digital technology in modern education. The integration of technological tools, such as artificial intelligence (AI), chatbots, and text analyzers, offers personalized explanations and facilitates the understanding of the historical and literary elements of the works. This approach not only enhances text comprehension but also contributes to the development of critical thinking and the strengthening of students' digital literacy.

The application of Howard Gardner's Theory of Multiple Intelligences through digital tools fostered the development of various types of intelligence, enhancing students' linguistic, logical-mathematical, spatial, social, and intrapersonal intelligences. Specifically, tools like Google Docs strengthened linguistic intelligence, Google Sheets and Excel enhanced logical-mathematical intelligence, while Google Earth contributed to the development of spatial intelligence. Collaborative learning through tools such as Padlet and Trello enhanced social intelligence, promoting students' collaborative skills. Concurrently, reflective tools like Mind Maps and Journals strengthened intrapersonal intelligence, fostering personal reflection and self-awareness. The use of tools such as PowerPoint for presentation, the internet for research, and e-Class for managing and monitoring the learning process strengthened students' digital skills, offering a comprehensive and contemporary approach to learning. This implementation of innovative technologies highlights the importance of digital technology in education, broadening learning opportunities and preparing students for their future in the digital world.

Keywords: Ancient Greek, Kallipateira, Literature, Digital Media.

INTRODUCTION

The continuous evolution of technology undeniably acts as a catalyst for the transformation of the contemporary educational landscape, necessitating the revision and enrichment of traditional teaching methodologies (Prensky, 2001). Within this context, education is called upon to transcend its conventional structures and integrate innovative digital tools capable of cultivating in students skills of paramount importance, such as critical thinking, creativity, and the ability for effective collaboration, within a globalized and constantly evolving socio-economic environment (Anderson, 2016). The systematic integration of technology into the educational process, with a particular emphasis on the utilization of digital media and applications, highlights a pioneering perspective for the upgrading of the teaching of humanities and literature.

The selection of studying Pausanias' ancient text "Kallipateira" in conjunction with Lorentzos Mavilis' homonymous poem presents an exceptionally interesting field for exploring this dynamic educational synergy. The combination of the historical narrative of the ancient Greek world with the poetic interpretation of the 19th century offers a unique opportunity to understand the timeless impact of a historical event on literary creation. The holistic approach to these works, which combines traditional methods of textual interpretive analysis with the integration of modern digital tools, is estimated to qualitatively upgrade the learning experience, encouraging the active participation of students (Vygotsky, 1978), fostering their creativity, and enhancing the development of their critical thinking.

The strategic utilization of digital tools, such as PowerPoint for the dynamic visualization of information, the internet as a source of authentic and diverse information (Leu et al., 2004), and collaborative platforms like e-Class for interaction and co-creation, provides students with the ability to analyze and present the work in ways that are both visually appealing and structured (Mayer, 2009). Additionally, seamless access to external sources is facilitated, and collaboration and the exchange of ideas among students are enhanced, creating a supportive learning environment (Harasim, 2012). Furthermore, the integration of cutting-edge modern technologies, such as Artificial Intelligence (AI) and specialized text analysis platforms, opens new horizons for a personalized approach to learning (Popenici & Kerr, 2017). These technologies facilitate an in depth understanding of textual excerpts, the clarification of complex concepts, and the meaningful connection of theoretical knowledge with practical application. The targeted utilization of these tools provides students with the invaluable opportunity to bridge the knowledge of the past with the possibilities of modern learning tools, enhancing their analytical skills and promoting a multi-layered understanding of the work.

Consequently, the conscious synthesis of traditional and contemporary teaching methods emerges as a progressive and promising strategy in the educational process (Collins & Halverson, 2010). This approach transcends the passive assimilation of information and encourages students to develop a dynamic relationship with knowledge, combining theoretical understanding with active creation and meaningful interaction, making learning a more engaging, meaningful, and productive experience.

THE DIGITAL TRANSFORMATION OF THE LEARNING EXPERIENCE

The implementation of the teaching unit focused on the ancient text and the emblematic poem "Kallipateira" marked a radical renewal of traditional teaching (Siemens, 2005). It was based on a conscious and methodical integration of a wide range of modern digital tools, going beyond their simple use as supplementary means. The primary goal was the substantial upgrading of the learning experience, the transition from the passive reception of knowledge to the active participation (Vygotsky, 1978) and creative expression of students. This approach treated technology not as an end in itself, but as a powerful catalyst for cultivating critical thinking, enhancing collaboration (Harasim, 2012), and personalizing learning (Gardner, 2011).

THE DYNAMICS OF POWER POINT: VISUALIZING KNOWLEDGE AND STORYTELLING

One of the central tools utilized with ingenuity was PowerPoint (Mayer, 2009). Students were not limited to simply creating slides with bullet points but used it as a canvas for creating dynamic and visually appealing presentations that narrated stories and analyzed complex concepts. Through the skillful combination of concise yet comprehensive text, high-aesthetic and informative images, and multimedia material such as short but targeted videos, students managed to highlight with clarity and excellent organization the thematic complexity of the poem and the rich historical context of Kallipateira. The strategic use of inventive graphic representations, illuminating flowcharts depicting sequences of events or logical relationships, and enriching illustrative material that brought the era to life, contributed decisively to deepening the understanding of the historical and literary context, offering a holistic and multi-dimensional view of the work. These presentations were not simple reports but the product of personal processing and creative synthesis of information.

THE INTERNET AS A GATEWAY TO KNOWLEDGE AND CRITICAL RESEARCH

The seamless access and critical utilization of the internet played a crucial and irreplaceable role in the entire educational process (Leu et al., 2004). Students did not treat the internet as a simple repository of information but were trained to search for and evaluate the reliability and validity of a multitude of digital sources. This included navigating reputable academic libraries, searching specialized scientific articles with high informational value, and critically viewing educational videos that offered alternative perspectives and interpretations. This free access to diverse sources allowed students to deepen their understanding of the historical and mythological existence of Kallipateira, to discover unknown aspects of her story, and to inextricably link the text and the poem with the broader context of ancient Greek history and culture. The development of the ability to search, cross-reference information from different sources, and conduct in-depth study empowered students to synthesize a comprehensive and multi-dimensional review of the work, based on documented evidence and not superficial information.

THE E-CLASS PLATFORM : A COLLABORATIVE LEARNING AND FEEDBACK ENVIROMENT

Additionally, the strategic utilization of the e-Class educational platform significantly enhanced the collaborative dimension of learning among students (Harasim, 2012). The platform did not simply function as a digital space for storing assignments but as a dynamic environment for interaction and the exchange of ideas. It facilitated the easy posting of produced work, the immediate and meaningful exchange of constructive opinions among students, and mutual evaluation by both instructors and peers. Through this digital environment, students had the opportunity to receive immediate and targeted feedback on their work, identifying their strengths and areas for improvement, and to make the necessary revisions based on suggestions, thus strengthening the dynamic process of continuous learning and reflective thinking. The platform encouraged dialogue, the exchange of different perspectives, and the construction of knowledge through interaction (Vygotsky, 1978).

THE INNOVATION OF ARTIFICIAL INTELLIGENCE: PERSONALIZED ANALYSIS AND IN DEPTH UNDERSTANDING

The integration of Artificial Intelligence (AI) constituted one of the most innovative and groundbreaking elements of the teaching approach for the in-depth analysis of the poem (Popenici & Kerr, 2017). Through the creative use of platforms supported by advanced AI algorithms, such as interactive chatbots that simulated an experienced interlocutor and sophisticated text analysis tools that identified patterns and connections, students received personalized interpretations of complex words and phrases in the poem, tailored to their individual pace of understanding and their specific questions. Furthermore, intelligent AI systems provided useful suggestions for further research and original ideas for interpreting the work, facilitating its full understanding on multiple levels – linguistic, thematic, historical, and symbolic. The strategic integration of technology at this level promoted the development of critical thinking, enhancing students' ability to analyze the subtle conceptual connections and latent semantic nuances of the work, going beyond a superficial reading.

THE THEORY OF MULTIPLE INTELLIGENCE: PERSONALIZATION OF LEARNING AND TALENT DEVELOPMENT

Howard Gardner's Theory of Multiple Intelligence provided a fundamental and flexible pedagogical framework for the implementation of a deeply personalized teaching methodology (Gardner, 2011). Through the inventive and adaptive use of a wide range of digital tools, students had the opportunity to develop and cultivate different types of intelligence, aligned with their particular inclinations, unique learning styles, and personal interests:

- Linguistic Intelligence: The combined use of advanced text processing tools, such as Google Docs with its collaborative writing and commenting features, with interactive AI chatbots that provided immediate feedback on grammar and vocabulary, allowed students to delve into the processing and analytical understanding of the poem, while simultaneously strengthening their linguistic skills in terms of vocabulary, grammar, and syntax.
- Logical-Mathematical Intelligence: The effective utilization of data management and easy-to-read graph creation tools, such as Google Sheets or Excel, allowed students to organize, classify, and quantitatively analyze data related to the history and participation of women in the Olympic Games, thus developing their organizational, analytical, logical, and mathematical abilities. The visualization of data helped in drawing conclusions and understanding historical trends.
- Spatial Intelligence: The creative use of advanced geospatial tools, such as Google Earth for virtual tours of ancient Olympia, and the utilization of detailed three-dimensional digital models representing the ancient stadiums and

temples, allowed students to create vivid virtual representations of ancient Olympia and the Olympic Games, enhancing their geographical and historical understanding of the context of Kallipateira's story.

- Social Intelligence: The widespread use of collaborative digital tools, such as Padlet for collecting ideas and opinions and Trello for organizing group work, provided students with a dynamic and interactive environment for teamwork, free exchange of ideas, and co-creation of comprehensive projects, thus enhancing their social skills, the ability for effective communication, the development of empathy, and harmonious collaboration in achieving common goals (Vygotsky, 1978).
- Intrapersonal Intelligence: The targeted use of thought visualization tools, such as Mind Maps for organizing thoughts and connections, and the creation of digital personal journals where students recorded their thoughts and reactions, encouraged students to reflect deeply on the story of Kallipateira and its connection to modern reality, promoting self-awareness, introspection, and the development of personal interpretations.
- Musical Intelligence: The original utilization of digital music creation and editing tools, such as GarageBand or Soundtrap, gave students the opportunity to compose original musical pieces thematically related to the poetry and atmosphere of the ancient era, expressing emotions and ideas through the language of music, thus enhancing their musical perception, their aesthetic sense, and their creativity.

Through this multi-dimensional and innovative approach, the teaching unit on "Kallipateira" was not limited to the simple transmission of knowledge but was transformed into a dynamic and inspiring learning experience that encouraged active participation, critical thinking, and the development of multiple skills in students. The conscious integration of digital tools, combined with the pedagogical theory of Multiple Intelligences (Gardner, 2011), created an environment where each student had the opportunity to highlight their particular inclinations and acquire knowledge in their own unique way.

CONCLUSIONS: THE TRANSFORMATIVE POWER OF DIGITAL TECHNOLOGY IN EDUCATION

The systematic and methodical application of digital tools and modern technologies in the educational process, with a particular emphasis on the teaching of literary works such as Lorentzos Mavilis' emblematic poem "Kallipateira" and the in-depth study of the ancient Greek language through Pausanias' historical work "Kallipateira," emphatically emerges as a catalytic factor for the substantial and multifaceted improvement of the learning experience and the holistic development of critical skills necessary for students in the 21st century (Anderson, 2016). The harmonious and balanced synergistic use of traditional teaching methods with the unlimited possibilities offered by modern technologies not only enhances the active and meaningful participation of students in the learning process (Vygotsky, 1978) but also significantly broadens their potential for creative expression, authentic discovery of knowledge, and effective collaboration in a constantly changing digital environment (Siemens, 2005), simultaneously offering the invaluable opportunity for a deeply personalized learning journey that respects the individual needs and paces of each student (Gardner, 2011).

Firstly, the flexible and multi-dimensional digital tools, such as PowerPoint for the dynamic visualization of complex concepts and the engaging presentation of information (Mayer, 2009), the vast internet as an inexhaustible source of valid and diverse information (Leu et al., 2004), and the interactive e-Class platform for seamless and effective collaboration between students and teachers (Harasim, 2012), provide students with the necessary infrastructure and means to present their work in a well-structured, logically organized, and particularly engaging manner that captures interest and facilitates understanding. The creative integration of diverse and rich multimedia material, including texts, high-resolution images, illuminating diagrams, interactive maps, and short but concise videos, deeply enhances the understanding of abstract concepts and the historical, social, and cultural context of the literary work and the ancient text. Through the systematic use of these tools, students not only gain a deeper understanding of the subject matter but also develop critical digital skills (Siemens, 2005), acquiring valuable experience in the effective and targeted search for reliable information, the ability to analyze complex data from various sources, and the production of original and high-quality digital content that meets modern communication requirements.

Secondly, the strategic and pedagogically sound utilization of Artificial Intelligence (AI) in the interpretive analysis of literary and ancient texts and in the provision of personalized explanations that take into account the individual needs of students, allows them to understand the subtle conceptual nuances of the work in greater depth, to discover hidden connections, and to substantially enhance their linguistic skills (Popenici & Kerr, 2017). The advanced tools supported by AI algorithms offer analytical and targeted explanations for the linguistic and conceptual challenges that students inevitably face when engaging with the ancient text and the poem, making the learning process more personalized, directly focused on the individual needs and the particular learning paces of each student. Simultaneously, the creative integration of Howard Gardner's Theory of Multiple Intelligence (2011) encourages a deeply differentiated

approach to learning, allowing each student to fully utilize their dominant cognitive abilities and their unique talents through the flexible use of different digital tools that correspond to their personal inclinations and learning styles.

The widespread and systematic integration of digital media into educational practice is not limited to simply enhancing individual learning abilities and deepening the understanding of the cognitive subject but also contributes decisively to the development of students' social and emotional intelligence, skills of vital importance for their successful social integration and harmonious coexistence (Vygotsky, 1978). Through active collaboration in flexible groups, the free and constructive exchange of ideas, and the joint creation of digital products, students develop significant social skills such as effective communication, the ability to listen to and respect different opinions, negotiation, responsibility-taking, and creative problem-solving. Technology, as a powerful tool for enhancing collaboration and interaction, promotes emotional and social development, allowing students to experience learning not as a solitary and competitive process but as a collective, interactive, and supportive experience.

Furthermore, the inventive use of interactive digital tools and engaging educational platforms creates a learning environment that is not only more attractive and interesting but also directly adapted to the needs and preferences of the digitally literate students of the 21st century (Prensky, 2001), who have grown up in a world where technology is an integral part of their daily lives. The possibility of immediate and personalized feedback from the software and the teacher, the easy and quick access to diverse and up-to-date sources of information (Leu et al., 2004), and the ease in organizing, analyzing, and presenting information enhance student autonomy, their initiative, and their active participation throughout the learning process, transforming them from passive recipients of knowledge into active creators and researchers.

Finally, the overall and undeniable result of the conscious and pedagogically designed integration of digital tools into the educational process is the creation of a more dynamic, participatory, engaging, and deeply personalized learning environment that responds to contemporary educational needs and challenges (Siemens, 2005). The harmonious and balanced combination of the timeless value of traditional teaching with the unlimited possibilities offered by modern technology allows students to develop a wide range of skills that are essential for their success not only in their academic journey but also in their personal and professional lives in the demanding 21st century, such as critical and analytical thinking, the ability for effective and creative collaboration (Vygotsky, 1978), flexibility, adaptability, creativity, and digital literacy (Leu et al., 2004). Simultaneously, it promotes the recognition of the continuous and rapid evolution of the digital world and the undeniable importance of the continuous integration of new technologies into educational practice to create a more effective, engaging, and student-centered learning environment (Collins & Halverson, 2010). This paper emphatically underscores the imperative need for continuous research, systematic experimentation, and critical evaluation of the use of new technologies in education to ensure their optimal and pedagogically beneficial utilization for the substantial support of learning and the holistic development of students.

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THE VIDEO COURSE AS A MEANS OF TEACHING AND ASSESSMENT IN VOCATIONAL EDUCATION. DESIGN AND IMPLEMENTATION OF A VIDEO COURSE IN VOCATIONAL HIGH SCHOOL COURSES

Theofanous Ioannis
Teacher PE82
1st EPA.L. Preveza
Preveza, Greece
Email: igtheofanous@gmail.com

Mouranou Sofia
Teacher PE87, PE02
1st EPA.L. Preveza
Preveza, Greece
Email: mouranou@yahoo.gr

ABSTRACT

This paper provides an in-depth exploration of the video lesson as an essential digital teaching and assessment tool in vocational education. It advocates for the integration of video lessons by VET teachers, emphasizing their potential to enhance existing educational practices.

The paper presents a range of software options for creating video lessons, showcasing their versatility and pedagogical advantages while acknowledging challenges such as potential technical issues and the necessity for adequate training. The development of a video lesson is demonstrated using the Ted Ed platform, which enables educators to create interactive lessons by embedding questions and educational resources directly within the video content.

The study examines two video lessons designed for Vocational High School students: one focused on "Oral Hygiene" and the other on "Automotive Engine Cooling Systems." This methodology allows teachers to evaluate students' progress and engagement while also facilitating self-assessment for the students themselves. Feedback was collected through a questionnaire completed by students after the lessons, providing valuable insights into the effectiveness of this teaching approach and points for improvement. The conclusions underscore the significance of video lessons in vocational education and affirm their efficacy as a teaching tool.

Keywords: Video lesson, TedEd, flipped classroom, Health Education, Thermodynamics, EPAL.

INTRODUCTION

Technological advances have significantly transformed teaching methods. Hattie (2017) suggests that digital technology has fundamentally changed pedagogical practices, improving the interactivity and accessibility of knowledge. Nowadays, the use of video in teaching has become established, following the pace of time in the context of integrating ICT into educational practice (Georganta, 2019). Belt and Lowenthal (2021) highlight the crucial role that the COVID-19 pandemic has played in increasing the use of educational videos. In the same context, Kapandelis and Sofos (2024) remark that following the unprecedented educational conditions caused by the suspension of in-person school operations due to the COVID-19 virus, the use of video as an educational material increased. This trend continued later with the proliferation of interactive systems in schools.

Particularly in Vocational Education, where practical knowledge and visualized learning are crucial, the video course is one of the innovative tools used in the modern educational process, which Bates (2022) mentions as contributing substantially to its understanding and assimilation.

The pedagogical value of video has been recognized without doubt by the entire educational world (Koumi, 2006). Today, most teachers go through the process of viewing a video in class almost daily, which they usually find after searching online repositories (Pattier, 2021), in order to motivate students more effectively (Moreno-Guerrero et al., 2020). Vocational training requires methods that combine theory and practice, with video courses offering opportunities to simulate real-world business scenarios. Also, Kay and Kletskin (2012) found that videos improve students' performance in practical lessons by allowing for repetition and visualization of complex processes.

The purpose of this paper is to present the utilization of video lessons created through the TED-Ed platform in the context of the flipped classroom, with applications to two teaching subjects: "Oral Hygiene" and "Automotive Engine Cooling Systems."

CONCEPTUALIZATIONS - THEORETICAL APPROACH

A video can be defined as the technology used to capture, process, store, transmit, and reproduce still images in series, in the form of an animated image (Spanaka & Tsiapalos, 2012). Digital is the name of a video, for the production of which digital media is used (Bell & Bull, 2010).

Many learning theories offer insight into how instructional videos work as effective teaching and learning tools. Among them, behaviorism suggests that students can acquire new information and skills by observing and reproducing behaviors depicted in educational videos. In addition, cognitive theories place a strong emphasis on the role of the mind in learning, implying that students develop mental models of subjects using information provided in instructional videos (Rasiman et al., 2020). In particular, the theory of Constructivism argues that students can take advantage of opportunities to reflect and discuss the content of the video with others. Finally, Sociocognitive theories highlight the benefits of students' interaction with other viewers and the discovery of new knowledge (Rahman et al., 2024). Several studies have shown that technology can enhance learning (Schmid et al., 2013) and that video, in particular, can be a highly effective educational tool (Stockwell et al., 2015).

Students can benefit significantly from the use of educational videos in teaching, as research highlights that teaching based solely on textbooks and reading may not yield high performance for students (Sablić et al., 2021). Educational videos are valuable tools that help students understand lessons better due to their high acceptance (Acedo & Robles, 2019). They present information in a lively and engaging way, capturing students' attention and making complex ideas easier to grasp. These videos can also stir emotions and reactions (Wong et al., 2023), which improves the overall learning experience (Grammarly, 2025). Carmichael (2018) reports that many students express a preference for video lessons, as they provide an opportunity for high self-activity, and an increasing number of teachers are receiving requests to incorporate digital content into their teaching.

VIDEO LESSONS AS A TEACHING TECHNIQUE

Brame (2016) states that the coexistence of three elements (Cognitive Load - Student Engagement - Active Learning) provides a solid basis for the development and use of video as an effective educational tool and can help teachers maximize its usefulness in the classroom. Video lessons, when designed based on multimedia learning principles (e.g., incorporating close-to-life examples and focusing on substance), reduce cognitive load and enhance learning effectiveness (Mayer, 2020). Denning (1992) focuses on the structured use of video for active learning and proposes a

tripartite approach: pre-activity (e.g., preparation with discussions), activity (creative interaction with video through questions and reflections), and meta-activity (extending learning with experiential activities or discussions).

According to Hansch et al. (2015), video has numerous affordances as a medium for online learning, as shown in the graphic presentation that follows (Image 1).

Image 1
Possibilities of using a video lesson according to Hansch et al (2015)

		
Building Relationships Emotional Bond	**Switch to a virtual field Travel**	**Manipulation of time and space**
		
Storytelling	**Student Motivation**	**View History Footage**
		
Conducting Demonstrations	**Use of optics juxtaposition**	**Leverage multimedia presentation**

The educational video, like any technological tool, despite its potential, is not an educational tool if it is not accompanied by the appropriate pedagogical approach and design, so that its content is closely linked to an educational goal (Bell & Bull, 2010). For there to be learning success through the use of an instructional video in teaching, it should be targeted, have the appropriate format for the target group and the content it presents, and, of course, be didactically planned and coordinated with the teaching and learning goals (Sofos, 2021).

Video courses have become a popular teaching medium in education in recent years (Scagnoli et al., 2019). There is a significant amount of research in the literature regarding how video course content and its construction significantly determine learning outcomes (Rickley & Kemp, 2021). The result of this research is the formulation of fundamental principles for creating video courses to ensure their maximum effectiveness (Rickley & Kemp, 2021). Through video lessons, students' contact with new knowledge is removed from the narrow context of the school classroom and transferred to the familiar space of their home. (Triantafyllou & Dimitrakopoulou, 2022).

Important advantages of the video lessons mentioned in the literature are, among others:

A. The ability to cover learning gaps or questions that arise during classroom teaching.
B. The opportunity provided to students to attend classes that they missed due to their forced or non-compulsory absence from school.
C. The assistance provided to pupils with special educational needs who find it difficult either to attend the oral delivery of the course or to study the written texts in school textbooks, thus relieving them of a large part of their difficulties.
D. The ability of students to quickly refer to a specific part of the teaching and repeat it as many times as necessary (Ronchetti, 2010).

SOFTWARE FOR CREATING VIDEO LESSONS

Video search sources (for educational use) are:

Educational Television. Offers streaming and on-demand ERT films, organized by educational level and thematic area.

Phototree. It hosts short video tutorials (up to 10 minutes) for easy integration into teaching and learning.

YouTube. It is the most popular platform for educational materials, with the ability to create channels and playlists.

Alternatively, *TeacherTube* focuses solely on educational content, enabling teachers to share videos with each other.

For the creation of interactive videos and video lessons, teachers can also use the following:

EdPuzzle (https://edpuzzle.com/). Teachers can use videos from YouTube, Khan Academy, or other sources (or upload their own), edit them (including cuts and voiceovers), and insert questions (multiple-choice or open-ended) at specific points. It also supports creating classes and tracking student progress.

PlayPosit (https://go.playposit.com/) is a platform for designing interactive video lessons ("Bulbs"). Teachers select videos (e.g., YouTube, TED) and add activities (such as questions, discussions, and external links) at specified points in time. It offers functions for creating classes, assigning assignments, and monitoring students.

TED-Ed (https://ed.ted.com/). It allows teachers to create lessons based on YouTube videos, complete with added questions. Students can replay lessons as many times as they want, and the teacher can track their responses and progress.

PART B: IMPLEMENTATION OF A VIDEO COURSE ON THE TED-ED DIGITAL PLATFORM (IMPLEMENTATION STAGES)

Creating a video course on the TED-Ed digital platform requires the following steps:

Step 1: Create an account on the TED-Ed platform.

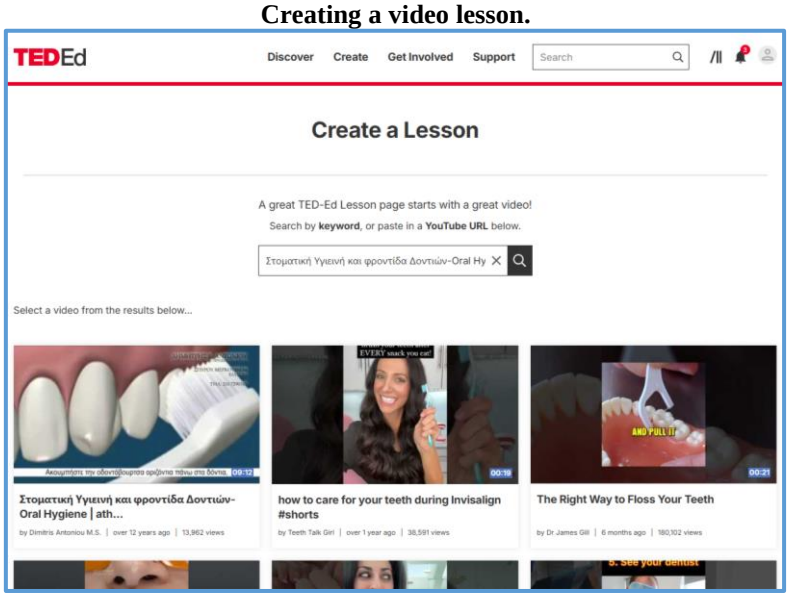
Step 2: Choose the video for your lesson. You can customize a TED-Ed Lesson or visit video search pages to select a video.

Step 3: Create your course (Image 2.).

3a) If you want to customize one of the TED-Ed video courses, visit any of the course pages you are interested in and use the red "Customize this course" button at the bottom right to copy the course to your account. Keep any of our pre-filled questions and resources that you like, or you can add your own.

3b) If you choose a new video from YouTube, put the URL in the line "Create course. You can then add an introduction to the video, as well as "Think" (multiple-choice and open-ended questions), "Dig Deeper" (additional resources), and discussion sections (guided or open forums).

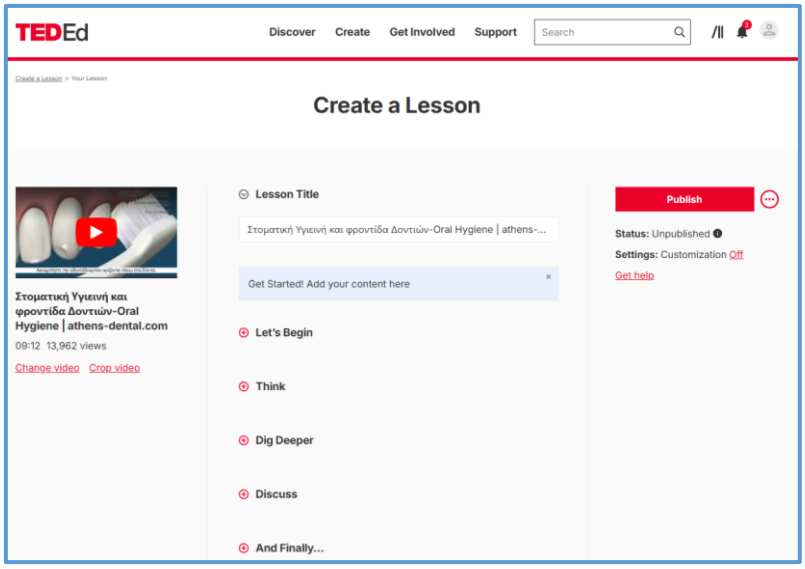
Image 2
Creating a video lesson.



Step 4: Publish your course (Image 3). After publishing your course, you will receive a unique URL for your course page. Anyone who owns this link will have access to it, so you can share it with your class in any way you choose.

Step 5: Track progress. As students submit assignments on your course page, you will be able to track their progress and see their responses. You can manage the lessons you have created, go back to editing your drafts, or access students' work at any time by going to the course activity page.

Image 3
Publishing the lesson



INDICATIVE EXAMPLES OF VIDEO LESSONS

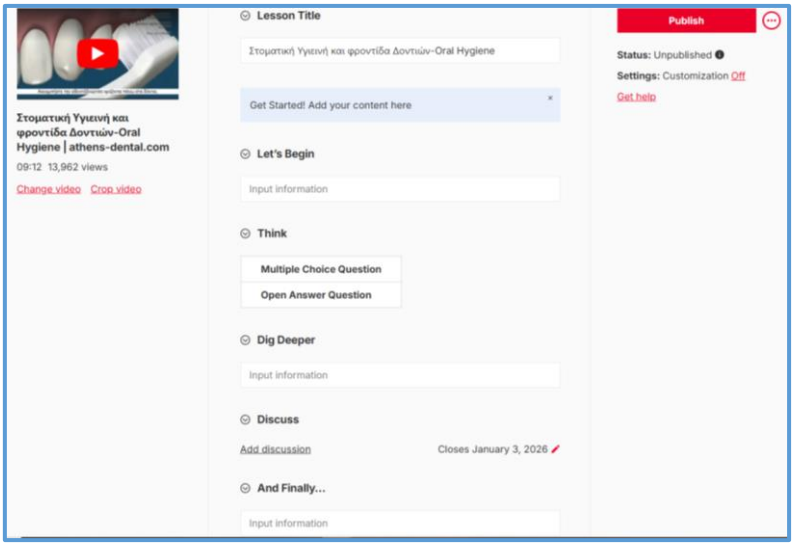
A. The first video course was developed for the needs of a two-hour teaching of the elective course "Health Education" for students of the first grade in the Day and Evening Vocational Lyceum. It aims at the issue of Oral Hygiene and is aligned with the Curriculum described in Government Gazette 64/22-1-2016 and specifically concerns content axis 3: "Consumption and Health – Nutrition and Eating Habits". The video course was implemented in the context of the implementation of an inverted order, for the design of which the six steps proposed by Dunn (2014) were followed. The "inverted order" model, according to Estes et al. (2014), in correspondence with Denning's (1992) proposal, includes three stages of preparation and implementation: the "Pre-class" stage, the "In-class" stage and, the "Post-class" stage.

1. Design: Initially, the thematic unit to be taught was chosen and the necessary Educational Design followed, recording the Objectives of the teaching, the Teaching Method chosen, as well as the teaching tools that will be used at each stage of teaching. A decisive role in the choice of video as a teaching tool for the implementation of this particular teaching was played by the view of Frencken et al. (2017) that the visualization of techniques in video hygiene improves practical skills. Finally, the activities that will be included in order to fulfill the objectives and achieve the expected Learning Outcomes were selected.

2. Video Selection - Video Lesson Creation: At this point, the three factors that, according to Hansch et al. (2015), ensure the optimal educational outcomes from the use of video as a teaching medium in teaching were seriously considered. Initially, it was carefully studied whether the video is the most appropriate teaching tool to achieve the learning objectives of the specific thematic unit. Then, the strengths of the specific teaching tool were identified and highlighted, in order to achieve a targeted choice of the video. In the event that a suitable video format and content could not be identified, a new one should be created, tailored to meet the specific educational needs, utilizing the appropriate digital tools for this purpose.

After conducting a search, a suitable video was chosen from the website (http://www.youtube.com/). It is a nine-minute and forty-four-second video that focuses on oral hygiene and incorporates all the key elements of the new knowledge that the specific teaching must include, presented in an engaging way that activates the students. Based on the selected video, the video course entitled "Our Oral Hygiene" was created on the TED-Ed platform, following the platform's guidelines and utilizing all relevant sections of a video course. In this phase, the teacher gathered and integrated (Image 4) the educational material to be included in the video lesson, in addition to the video that was placed in the Watch section of the TED-Ed platform. The material used to enrich the Think module was produced by the teacher himself and consisted of seven multiple-choice questions and three short-answer questions. For each question, the teacher set a video-hint, that is, the point in time in the video where the "answer" to the question is, so that in case of an incorrect answer, the student can look for the video-hint and perceive their mistake.

Image 4
The management of the lessons.



It is essential to acknowledge the significant advantage this platform offers teachers in evaluating students' progress and participation during video lessons. Furthermore, students have the opportunity for self-assessment accordingly. The content of the Dig Deeper section on the platform TED-Ed was enriched with material collected by the teacher from reputable online sources. Finally, to complete the Discuss section, the teacher asked the students a judgment question to test their metacognitive abilities, in other words, to recognize what they know and what they do not know (Raptis & Rapti, 2007). Metacognition is a skill that can be taught (Zimmerman, 2002) and offers a double benefit to the students, as they are initially able to self-regulate the new knowledge and then cultivate a positive attitude towards both the new knowledge and the educational system in general (Matsangouras, 2007). In addition, the worksheets were created by the teacher, who would then process them with the groups of students during in-person teaching.

3. Sharing: The link to the video lesson was then sent via email to the students, making it clear to them that the content of the video lesson would be discussed extensively in face-to-face teaching, where relevant educational activities would follow. The students attended the lesson and interacted autonomously. Their work and performance were recorded in a relevant field of the digital platform, which was available to the teacher for feedback and to organize face-to-face teaching.

4. Face-to-face teaching: In the classroom, within the time frame of face-to-face teaching, sufficient time was allocated for the teacher to assess the students' understanding of the new knowledge, address their questions, and thoroughly discuss any disagreements that may have arisen. With the toothbrush, dental floss, and oral model available in the Nursing Laboratory of our school, students practiced the correct way to brush their teeth and use floss. Experiential learning emphasizes the importance of hands-on experience and the connection of school with everyday life. In contrast to passive memorization, it encourages students to search for meaning and to engage fully, mentally and emotionally (Dedouli, 2002).

5. Work in groups: Following the face-to-face session, students were assigned to specific groups to work on a particular topic, adhering to the principles of the group collaborative teaching method. The first group searched for available oral hygiene products on the internet and, based on the knowledge gained by the students from their participation in the video lesson, they evaluated the characteristics of each product. The second group processed the results from the completed questionnaire on the students' oral hygiene, which was included in the final section, and presented them to the class. The third group visited the school's canteen to find packaging of sweets that had a special mark, which stated that the dessert was "tooth-friendly". They presented the results in class, and a discussion followed. Food products that do not harm the teeth and are suitable for the school canteen were then suggested. In this context, collaborative learning can enhance both learning outcomes and students' positive attitudes towards school, classmates, and the lesson. Based on group activities, these approaches foster innovation in teaching, centered on the group rather than the individual student (Dimitriadou & Efstathiou, 2008). At the same time, through teamwork, students develop key competences such as collaboration, structured criticism, and effective planning (Walberg & Paik, 2000).

6. Team interaction and presentation of each team's work through a representative.

B. Following the same approach, a "flipped classroom" course was designed for the course "The Cooling System of the Car" using TED-Ed, adapted for students of the Vocational High School (EPAL), which is part of the Curriculum of the course "Elements of Technical Thermodynamics" for students of the B' Grade EPA.L. of the Mechanical Engineering sector. In their study findings, Akçayır and Akçayır (2018) reveal that the most frequently cited benefit of the flipped classroom is the improvement of students' learning performance, and they point out that video courses are an effective teaching practice for laboratory courses. For this particular course, the use of video is quite common because its curriculum includes subjects from many specialties and laboratories that are not always available.

Video Lesson Design:

STEP 1: Preparation (Before the Lesson) – Use of TED-Ed. The teacher created the course using the TED-Ed platform and selected the video titled "Car engine cooling system" (https://www.youtube.com/watch?v=vRZu3-64yo0) that he later adapted using Adobe Premiere, CapCut, and Audacity programs. After the addition of multiple-choice questions and Discussion/Open-ended questions, such as: "What could be the consequences if the water pump breaks down?", the lesson was shared with the students (via link).

STEP 2: Classroom Activities (Flipped Classroom Application)

Activity 1: Review & Confirmation of Understanding (10 minutes). A short discussion of their answers to TED-Ed (what they struggled with, what surprised them). The teacher used key questions, such as: "Why does the car need a cooling system?" / "Which part of the system do you consider the most vulnerable and why?"

Activity 2: Teamwork – "Diagnostic Approach" (20 minutes). The teacher formed groups of 3 to 4 people, and each team undertook a failure scenario (e.g., overheating, refrigerant leakage) with the task of identifying which component was most likely to be responsible and suggesting remedial steps. By the end of this activity, every group presented the results of their work (2 minutes per group).

Activity 3: Practical Simulation (15 minutes). During activity 3, a demonstration of images and videos of genuine parts of the cooling system (such as the water pump and refrigerator) took place, and students had to match the names with the components and explain their functions.

STEP 3: The tools used for the Assessment of the course were: a) Self-assessment (via a questionnaire at TED-Ed), b) questions in the course flow (e.g., "How would you check the coolant levels?"), and c) Evaluation of the teamwork (grading by rubric: accuracy, collaboration, creativity).

STEP 4: Extension (Optional). The extension of the program is relatively easy. It can include, for example, an Extracurricular Assignment, such as observing and recording a real-life example (e.g., with a photo of the family car's cooling system).

EVALUATION

A team of students from the First Grade, along with another team from the Second Grade of the Mechanical Engineering Department at the 1st EPA.L. of Preveza, participated in the video lessons. At the end of each lesson, a classroom discussion occurred, which resulted in the recording of students' impressions, opinions, and concerns. In addition, the students were asked to evaluate various aspects of the two video lessons by completing a questionnaire compiled by the teachers. From analyzing the responses of 31 students to the relevant questionnaire, it was found that 83.9% of the students found this teaching method very interesting. In contrast, 74.2% described the TED-Ed platform as particularly easy to use.

Regarding the content of the selected video lessons and the assignments incorporated into them, 87.1% of students who responded to the questionnaire reported that they found the content understandable and did not encounter any obstacles or difficulties in their comprehension. A key point of interest is the fact that a significant percentage of students tend to overemphasize the importance of subtitles in the video content, as well as the self-evaluation opportunities that the platform provides to students. In response to a question about proposals for improving the video lesson, the vast majority of students stated that they would not like to see any changes. At the same time, a small percentage would prefer to reduce the duration of the video lessons. The teachers were expecting these replies, which agree with research findings that focus on controlling the duration of the videos. However, there were no other available videos that incorporated the necessary information for the lesson. Regarding the difficulties they faced during the video lesson, 95% of the students reported that they encountered no obstacles. Ultimately, 100% of the students would recommend this teaching method to their peers.

CONCLUSIONS

Video lessons are a crucial tool in modern education, especially for laboratory lessons. They provide flexibility, engagement, and opportunities for personalized learning, making them a valuable tool for educators. Case studies of the courses we presented highlight the effectiveness of TED-Ed as a platform for creating interactive and effective video lessons. Applying it to courses such as Oral Hygiene and Refrigeration Systems has empirically documented benefits. Implementing the video lesson in the context of the flipped classroom enhances the learning experience, offers flexibility in education, and promotes active student participation. It also saves teaching time and enhances practical exercise. The integration of tools like TED-Ed allows for the creation of personalized learning paths and offers a promising approach to modern education.

Video courses are a prime example of how technology is dynamically entering education, even if it is not yet fully integrated. This is true for many digital tools available, which have the potential to support the teaching process significantly. Although skepticism towards them is not unfounded, the teaching experience demonstrates that students accept them positively and can make valuable contributions to the educational process. Even when employed as a supplementary tool, video courses produced satisfactory results. In the future, it is proposed to expand the use of video courses to cover more subjects and to evaluate their effectiveness through empirical research.

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THE APPLICATION OF DIGITAL MEANS FOR DISTANCE TEACHING OF TECHNICAL SUBJECTS: APPLICATION STUDY FOR ROAD DESIGN COURSE

Lemonakis Panagiotis
Assistant Professor
School of Civil Engineering, Division of Transport and Project Management, Highway Laboratory, Aristotle University of Thessaloniki
Thessaloniki, Greece
e-mail: plemo@civil.auth.gr

Kaliabetsos Georgios
PhD
University of Thessaly, Department of Civil Engineering
Volos, Greece
e-mail: gekalia@uth.gr

Fotini Kehagia,
Professor
School of Civil Engineering, Division of Transport and Project Management, Highway Laboratory, Aristotle University of Thessaloniki
Thessaloniki, Greece
e-mail: fkehagia@civil.auth.gr

ABSTRACT

Distance learning and the examination of higher education courses are challenging tasks for both teachers and students. The qualitative and quantitative characteristics of the information to be communicated make the investigation and use of the most appropriate digital media necessary. In addition, the reduced and sometimes non-existent interaction between teachers and students and the limited, therefore, feedback throughout the educational process require the implementation of innovative teaching procedures. The recent mandatory implementation of all teaching activities in higher education and not only because of the pandemic, has highlighted the weakness of the system of teachers and digital media in order to maintain a level of study equal to that prevailing in the pre-pandemic era. At the same time, however, it was also an opportunity, especially because of the extended duration of distance education, to develop tools and procedures that will be able to offer an increased level of knowledge at any time. Besides, the realization of distance education in secondary education in the event of an extraordinary or unforeseen event has recently been legislated by the Ministry of Education, Religious Affairs and sports as well as the possibility of distance training in higher vocational schools (former Institute of Vocational Training (IVT)). In higher education, distance assessment of students under conditions has been in force for three years, which was recently applied in many universities during the final exams of the fall semester of the academic year 2023-2024. It is therefore possible that distance learning will be repeated in the future and hence it is necessary to look for methods that will deliver the expected result.

This paper describes how the educational process was covered, including the final assessment of students, in the context of a higher education course taught at the Department of Civil Engineering of the University of Thessaly and related to the Highway Engineering. This course is included in the study guides of the Departments of civil and rural and surveying engineering both in Greece and abroad. Both the technical means and the methodology applied throughout the academic semesters are analyzed and statistics on student performance are presented before and during the period of the distance learning process. It is worth noting that within the framework of this course the students developed a particularly demanding semester theme concerning the integrated study of a road project with weekly progress monitoring sessions and strict intermediate progress dates using a design program.

The research showed that during distance learning, the initial interest in developing the semiannual theme was high but fewer students than in other years completed it. In addition, during the first distance examination period, the percentage of successful students was particularly high, which decreased to pre-pandemic levels in the following examination periods.

The project aspires, among other things, to contribute to those fellow teachers who seek an effective process of distance delivery of lessons and conducting examinations using digital media. What has also been shown in the context of the research is that with the available digital media in universities, the levels of knowledge offered both qualitatively and quantitatively during the distance and in-person teaching and examination of this course and others with similar requirements and way of teaching, based on the percentage of students who received a promoted degree, may be similar.

Keywords: Distance teaching, distance evaluation, semester theme, digital media.

INTRODUCTION

The global COVID-19 pandemic caused major disruptions to traditional higher education models, forcing educational institutions into mass adoption of digital tools and distance learning. The technical sciences, with their intense dependence on laboratory activities, design work and collaborative exercises, faced particular difficulties (Rapanta et al., 2020). This study captures the experience of teaching the course "geometric road design" during this period and assesses the impact of digital media on teaching effectiveness, student participation and learning outcomes.

The digital transformation of the educational landscape, although anticipated for years, accelerated dramatically due to the pandemic, revealing both the benefits and weaknesses of virtual teaching (Hodges et al., 2020). This paper aims to contribute to the literature on educational resilience, with a specific focus on applied, software-centric engineering science courses.

COURSE DESCRIPTION: GEOMETRIC DESIGN OF ROAD PROJECTS

The course is part of the Civil Engineering curriculum and focuses on the horizontal and vertical alignment of roads, curve design, cross-section generation, and safety considerations. Students use specialized software such as AutoCAD and Anadelta Tessera (Anadelta Tessera software) to develop complete road design projects, often in collaborative groups.

Before the pandemic, the course followed a traditional format: lectures in physical classrooms, group-based project monitoring conducted in person, and paper-based submissions. Exams were conducted simultaneously for all students, with common questions.

The course involved both theoretical instruction and practical application. Students learned geometric design parameters such as design speed, road width, curve radius, longitudinal and lateral slopes, and applied these to develop road design files using professional software. In addition to acquiring technical knowledge, students were required to justify their choices based on national road design guidelines, which encouraged them to engage in analytical reasoning and apply normative criteria.

TRANSITION TO REMOTE TEACHING: TOOLS AND APPROACHES

During the pandemic, the course was delivered entirely through Microsoft Teams. All lectures, project discussions, and consultations took place online. The use of digital tools expanded to include collaborative feedback mechanisms, shared screen demonstrations, and asynchronous review of submitted work (Dhawan, 2020).

Assignments and final submissions were provided in digital format (PDF), replacing printed documents. Students continued to work in groups but received feedback via recorded sessions or live online meetings. Digital whiteboards, polls, screen annotations, and chat threads enriched interaction, while structured folders hosted on the university's Learning Management System allowed organized access to resources and session recordings.

Weekly lectures were complemented with digital handouts and pre-recorded tutorials explaining software functionality. The instructors also developed a series of annotated design templates that could be reused and adapted by students for various project cases. This modular content delivery encouraged independent study and supported late joiners or those with limited live session availability.

CHALLENGES IN DIGITAL EDUCATION DURING THE PANDEMIC

Several issues emerged during the remote teaching period:

- Absence of immediate feedback: Delays in communication and limitations in visual cues hindered interactive discussions (Kebritchi et al., 2017).
- Exam variability: During remote learning, each student was given individualized exam topics to prevent plagiarism. This increased grading complexity and introduced inconsistencies.
- Material adaptation: Redesigning instructional content to suit digital delivery (e.g., annotated screenshots, video demonstrations) required significant effort (Garrison et al., 2000).
- Technology barriers: Not all students had equal access to high-performance computers capable of running AutoCAD or Tessera, nor reliable internet connections for real-time collaboration.
- Engagement tracking: Unlike classroom environments, it was harder to detect disengagement or confusion during remote sessions, leading to potential learning gaps.

- Collaboration fatigue: Remote group work often lacked the natural rhythm and motivation of in-person teamwork. While messaging platforms facilitated communication, they also led to misinterpretation and lack of initiative among some participants.

DIGITAL TOOLS IN PRACTICE

The course leveraged technical software to simulate classroom exercises remotely:

- AutoCAD: Used for drafting horizontal and vertical alignments, cross-sections, and superelevation diagrams. The integration with cloud-based platforms allowed students to share files and receive real-time comments.
- Anadelta Tessera: Employed for advanced geometric design, including curve transitions and superelevation analysis. Tessera's interface provided dynamic visualizations, crucial in substituting the absence of hands-on, in-class demonstrations.

Figure 1
Parallel vertical alignment profiles in Anadelta Tessera (screenshot from online course)

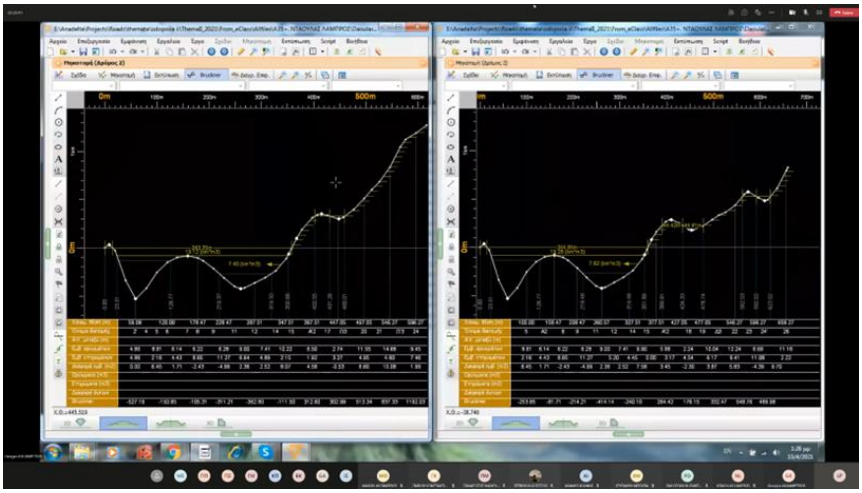
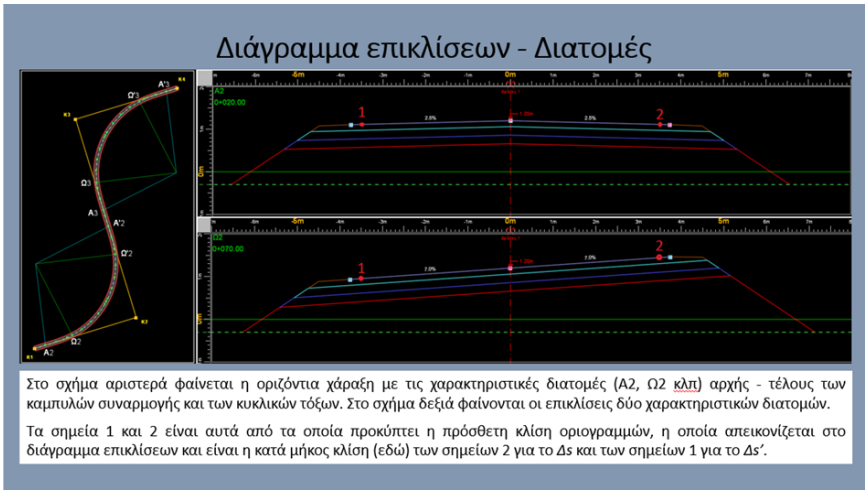
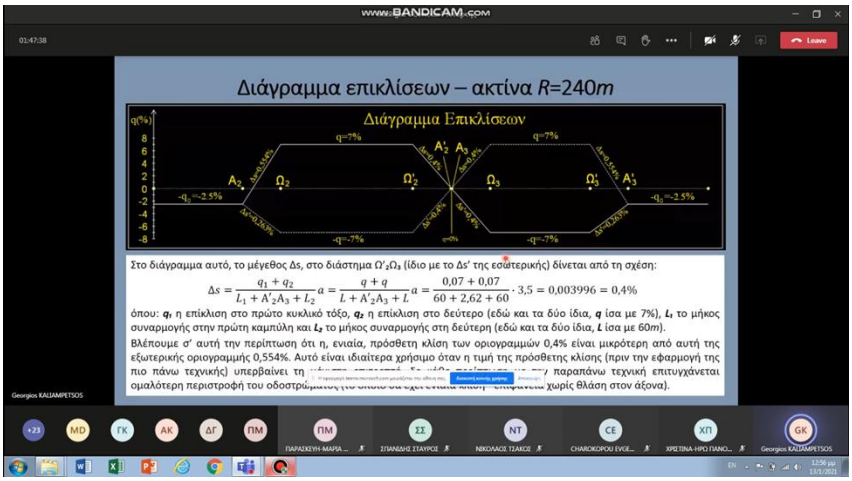


Figure 2
Superelevation and cross-section visualization with annotations (digital screenshot)



These visuals, when shared with the class, contributed to a deeper understanding of the concepts through concrete, visual representation, aiding particularly those who struggled with abstract geometric reasoning. The instructors also employed simulations of vehicle trajectories and turning paths to illustrate real-world constraints of road geometry, thereby enhancing practical awareness. Incorporating these examples digitally allowed students to relate theoretical content to applied traffic engineering principles (Berge, 2005).

Figure 3
MS Teams session showing transition diagram and formula analysis (live lecture screenshot)



STUDENT PARTICIPATION AND PERFORMANCE

Student registration, participation, and performance data were collected over six academic years (2017–2023). Table 1 summarizes the final success rates..

- During early pandemic semesters, completion rates of semester projects remained high, yet the number of students submitting a project declined.
- The highest pass rate (92.11%) occurred in January 2021, shortly after the initial digital transition. This was likely due to individualized exam topics and open-book conditions.
- Over time, performance rates normalized and reflected pre-pandemic levels.

Discrepancies were noted in engagement patterns. While digital convenience attracted consistent attendance at lectures, the quality and depth of student engagement varied. The decline in project completion in later years (e.g., September 2022) signals digital fatigue and possible motivational challenges (Hodges et al., 2020).

The data also revealed a stable long-term performance curve, with no significant learning loss. However, the difficulty in coordinating group submissions remotely might have affected team dynamics and peer accountability.

PEDAGOGICAL INSIGHTS AND OPPORTUNITIES

Several advantages emerged from remote instruction:

- Open corrections: Group feedback sessions were accessible to all students, enhancing peer learning.
- Digital archiving: Students could review past feedback, session recordings, and design examples at any time.
- Flexibility: Students engaged with material on their own time and pace.
- Scaffolding peer learning: Students could learn from others' mistakes and adjust their designs accordingly.
- Enhanced documentation: Each feedback interaction and assignment version created a traceable learning journey.

Remote teaching also offered students new skills. Beyond mastering technical design, they developed remote collaboration habits, improved digital communication, and practiced self-paced project planning. These competencies are increasingly relevant to the modern engineering workplace, which often blends in-person and virtual teamwork (Berge, 2005).

LIMITATIONS AND LESSONS LEARNED

While digital media enabled continuity, it exposed limitations in the scalability of one-on-one feedback, fairness in assessments, and the digital divide among students. Despite these, the teaching experience revealed that remote education can successfully deliver even technically demanding content, provided that proper infrastructure and pedagogical planning are in place (Garrison et al., 2000).

Table 1

Statistics of registration and students' performance before, during and after pandemic

	Before pandemic				
Academic Year	2017-2018		2018-2019		2019-2020
Period	January	September	January	September	January
Registered	156		190		154
For 1st time	**84 (54% of registered)**		**87 (46% of registered)**		**67 (44% of registered)**
Passing grade (%)	15.79%	50.00%	59.55%	75.26%	24.76%
Undertook semester theme	87 (56% of registered)		80 (42% of registered)		63 (41% of registered)
Type monitoring	In person		In person		In person
Completion rate	100%		100%		100%
Final success rate	**36.84%**	**48.08%**	**56.18%**	**76.29%**	**42.86%**

	Distance learning			
Academic Year		2020-2021		2021-2022
Period	September	January	September	January
Registered		118		117
For 1st time		**75 (64% of registered)**		**55 (47% of registered)**
Passing grade (%)	90.79%	36.56%	37.08%	22.97%
Undertook semester theme		60 (51% of registered)		60 (51% of registered)
Type monitoring		Distance		Distance
Completion rate		100%		57%
Final success rate	**92.11%**	**43.01%**	**38.20%**	**24.32%**

	In class course		
Academic Year		2022-2023	
Period	September	January	September
Registered		156	
For 1st time		**72 (46% of registered)**	
Passing grade (%)	38.46%	33.91%	40.00%
Undertook semester theme		53 (34% of registered)	
Type monitoring		Distance	
Completion rate		100%	
Final success rate	**59.62%**	**40.00%**	**42.00%**

Key lessons include the importance of planning digital transitions well in advance, training staff in remote instruction methodologies, and equipping students with both devices and digital literacy. The course benefited from consistent software platforms, but even minor technical disruptions (such as MS Teams connectivity issues) affected continuity.

Another important takeaway was the need to balance synchronous and asynchronous modes. While live sessions created immediacy, recorded content allowed flexibility, and students appreciated having both options.

Also, trust-building in virtual settings emerged as a key challenge. While in-person contact fosters spontaneous discussion and mentorship, remote environments require intentional facilitation of group dynamics. Course instructors must actively create opportunities for informal interaction, such as discussion forums or virtual office hours (Rapanta et al., 2020).

CONCLUSION AND FUTURE RECOMMENDATIONS

The forced digital transition during the COVID-19 pandemic provided valuable insights into how engineering education can evolve. While in-person instruction remains critical, particularly for hands-on design and collaboration, a

hybrid model can integrate the best elements of both formats.

Recommendations:

- Invest in faculty training for digital teaching tools.
- Develop standardized platforms for remote exams.
- Encourage open correction models to enhance peer learning.
- Combine synchronous live teaching with asynchronous materials to balance flexibility and immediacy.
- Use student analytics to monitor engagement and adapt instruction accordingly.
- Create hybrid assessment models that combine individualized open-book evaluations with interactive group critiques.
- Expand the use of case-based learning and real-world simulation projects to reinforce applied understanding.

The case of "Geometric Design of Road Projects" serves as a microcosm of the broader transformation in education—where digital media, when integrated thoughtfully, does not replace but amplifies pedagogical potential.

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ORGANIZING THE MUSIC LESSON WITH PADLET

Michailidou Matina
Music Science Educator
6th Junior High School of Kozani
Kozani, Greece
email: tiniomi22@gmail.com

ABSTRACT

The integration of digital technologies into teaching practices constitutes an integral part of modern educational reality, offering new possibilities for organizing and enriching the learning process. In this context, the present work focuses on the use of the digital platform Padlet as a tool for managing and enhancing the teaching of Music in secondary education.

Padlet is an interactive online application that allows the creation of collaborative digital boards, where teachers and students can post multimedia content such as texts, images, videos, and audio files. The flexibility of this tool makes it particularly suitable for the Music course, as it enables the creation of collective projects, the posting of student recordings, the exploration of musical genres, and collaboration in compositional and analytical musical tasks.

Specifically, this work presents best practices for utilizing Padlet in Music teaching, with an emphasis on the creation of interactive activities (interactive maps of musical genres, posting of recordings and exchange of opinions, collaborative music composition, research projects on composers and musical movements, creation of interactive quizzes and games, analysis of musical works and listening with comments, digital portfolios of music assignments, creation of an electronic classroom), all of which enhance the learning experience.

The prerequisites for creating a Padlet by the teacher involve setting up an account on the platform through registration with an email or via a Google/Microsoft account, selecting the appropriate plan (free or premium version), connecting with students (access via invitation code, link, or integration into a learning management system, e.g., Google Classroom, Microsoft Teams), setting privacy and collaboration preferences (public, password-protected, private), and adapting the layout (various formats such as grid, timeline, map) to fit the needs of the lesson.

The use of Padlet in the Music classroom provides a dynamic and collaborative approach to learning, enhancing student engagement and fostering creativity and critical thinking. Moreover, the use of multimedia content allows the adaptation of instruction to different learning styles, facilitating differentiation and personalization of the educational process.

This work will present the Padlets that have been created in recent years for the needs of the Music course in all three grades of Junior High School. Each academic year, every class has its own Padlet, where data related to the annual project and weekly teaching content is posted.

Padlet is a particularly useful digital tool for organizing the Music course, allowing the development of a more participatory and creative educational experience. Through the presentation of these best practices, the importance of integrating digital technologies into teaching practices is highlighted, contributing to the shaping of a modern and effective learning environment.

Keywords: teaching, Music lesson, digital tools, Padlet

INTRODUCTION

The integration of digital technologies in teaching has become an inseparable part of contemporary educational reality. The experience of distance education during the COVID-19 pandemic highlighted the need for tools that promote collaboration, interaction, and active student participation. Within this framework, teachers sought solutions through Web 2.0 applications, which allow users themselves to create and share content (Redecker et al., 2009:7).

My personal encounter with Padlet occurred in 2020, when during the lockdown a student of mine used it to organize her teaching practice with one of my classes. The experience was so positive that since then I have been using it in all secondary education classes where I teach. Its systematic use has revealed multiple advantages, mainly regarding material organization, the possibility of sharing multimedia resources, and the active involvement of students. At the same time, I observed that in certain schools, such as in Kozani where I currently serve, knowledge of this tool remains limited, making the presentation of good practices even more relevant.

DIGITAL TEACHING AND EDUCATIONAL PRACTICE

The integration of digital technologies into teaching practice has transformed the way students approach knowledge and how teachers organize their instruction. International research confirms that the incorporation of digital tools enriches the learning process, enhancing 21st-century skills such as collaboration, creativity, critical thinking, and problem-solving (Mahmud, 2023:5). In the same vein, Gall (2017:12-14) analyzes the trends and challenges of technology in music education in England and across Europe, emphasizing the importance of adapting teaching practices to digital innovations.

The theoretical foundation for understanding the contribution of digital technologies is drawn from contemporary pedagogical learning theories. Vygotsky's (1978) sociocultural approach emphasizes learning through interaction and collaboration with others—an idea that finds application in tools such as Padlet, where students collectively create knowledge environments. Bruner (1996:21-23) stresses the importance of scaffolding, namely guidance provided by the teacher, which can be implemented in digital environments through feedback and modeling. As early as 1999, Hennessy and Murphy highlighted the potential of collaborative learning through the use of technological tools, something that today finds concrete application in digital platforms such as Padlet (Hennessy & Murphy, 1999:10-12). In parallel, Tomlinson's (2014:45-46) theory of differentiated instruction underlines that digital tools enable the adaptation of teaching to different learning styles—something particularly crucial in music education, as students respond differently to auditory, visual, and textual stimuli.

In practice, the use of Padlet incorporates elements of formal, non-formal, and informal learning. Within the school framework, it functions as a tool of formal education, since it is embedded in the curriculum and linked to teaching objectives. However, it also promotes forms of non-formal learning, when used for projects, research, or collaborative activities outside the regular teaching period. At the same time, it supports informal learning, since students can explore Padlet content in their free time, discover new information, and enrich their musical experience beyond classroom requirements.

According to Dunbar (2017:28), the use of Padlet in music lessons led to a significant increase in students' interaction with musical concepts. Waltemeyer, Hembree and Hammond (2021:94–95) describe it as a "multipurpose Web 2.0 tool" that strengthens students' active engagement in a variety of learning environments. Fisher (2017:165-166) further emphasizes that Padlet can increase student collaboration and engagement, particularly through the opportunity to share ideas in real time, creating a more democratic learning environment. In the Greek educational context, its use during the period of distance education (Gyftoula & Mitsikopoulou, 2021:52; Komis et al., 2021:118) highlighted its potential as a tool for collaboration and digital material storage, confirming the importance of integrating it both in teaching practice and in face-to-face instruction.

WHAT IS PADLET?

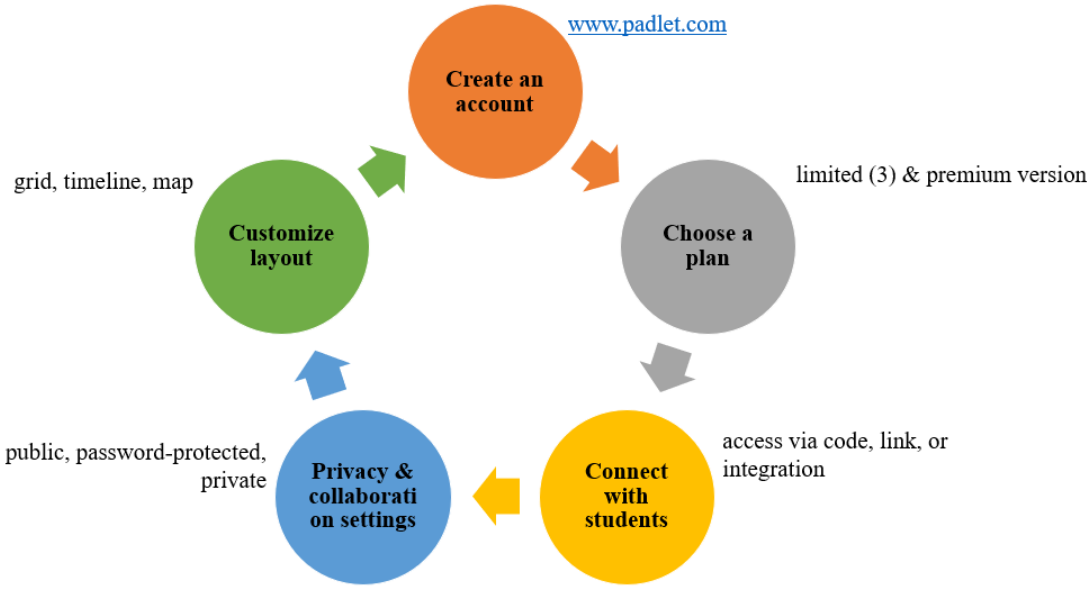
Padlet is an interactive Web 2.0 application that allows users to create collaborative digital noticeboards. On these boards, multimedia content can be posted, such as texts, images, videos, audio files, and hyperlinks. Its ease of use and flexibility in presentation formats make it particularly friendly for teachers and attractive to students (Waltemeyer et al., 2021:93). Fisher (2017:166) emphasizes that the platform fosters active participation, as all students have an equal opportunity to contribute and have their voices heard in a collective framework.

In international literature, Padlet is described as a "multipurpose tool" adaptable to different learning environments, enhancing interaction and student participation. In music education specifically, its use has been shown to increase student engagement with musical concepts and activities (Dunbar, 2017:26-29). Its multimodal nature (combining image, text, sound, and video) allows the creation of learning experiences that address different learning styles (Tomlinson, 2014:45).

In the Greek context, Padlet emerged as one of the most popular choices during the pandemic. According to Gyftoula and Mitsikopoulou (2021:52), it was used in foreign language education to implement innovative practices, while Komis et al. (2021:118) document its use as a tool for collaborative writing and project organization by teachers of various subjects.

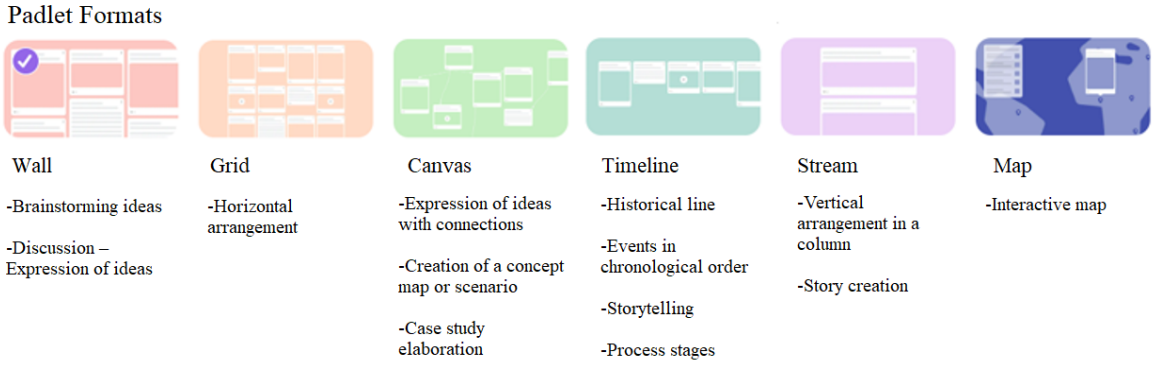
CONDITIONS FOR CREATING AND USING PADLET

Image 1
Prerequisites for Creating a Padlet



Creating a Padlet requires the teacher to register on the platform at www.padlet.com, either with an email or via a Google/Microsoft account. The teacher can choose between a free basic plan (with a limited number of boards) and subscription options that offer extended functionalities, better suited for schools or educational institutions (Waltemeyer et al., 2021:97).

Image 2
Padlet Formats



Students can access Padlet in three main ways: via a link, invitation code, or integration into the school's learning management system (e.g., Google Classroom, Microsoft Teams). Equally important are the privacy and collaboration settings: the teacher can determine whether the Padlet will be public, private, or password-protected, and who will be able to edit the content (Mahmud, 2023:7). (Image 1)

Adaptability of structure is also crucial: Padlet offers different layout formats (e.g., wall, grid, timeline, map, canvas), which serve different pedagogical purposes. For instance, the "Map" layout has been used to visualize geographic data in music history projects, while the "Timeline" format helps organize biographical data of composers in correct chronological order. (Image 2)

WHY PADLET IN THE MUSIC LESSON?

Music education in secondary schools is characterized by limited teaching time and the need for active student involvement within short timeframes. In this context, Padlet provides a highly flexible environment that facilitates lesson organization and extends the learning experience beyond classroom hours.

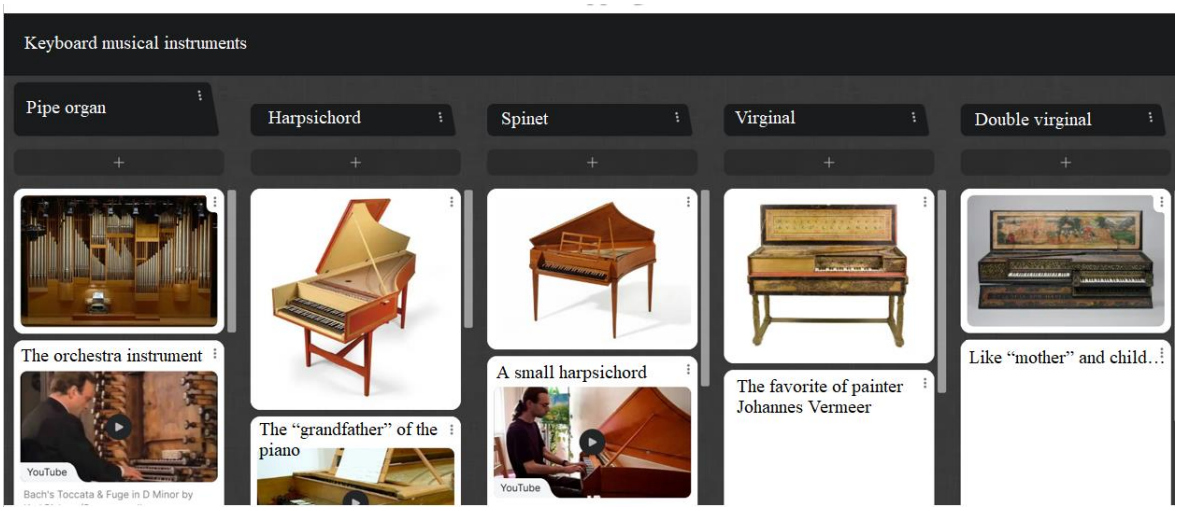
One of Padlet's most significant advantages is its ability to foster collaboration and creativity. Students can create collective digital collections of musical ideas, scores, recordings, or research material. Through this process they develop collaborative learning skills, while also cultivating the sense of "authorship" of musical knowledge as a collective product (Vygotsky, 1978:34; Bruner, 1996:41). Interaction is enriched through commenting and real-time feedback, strengthening students' active engagement (Mahmud, 2023:8).

Furthermore, Padlet supports differentiated learning. Since it accepts multimodal content (audio, images, video, text), students can express themselves in different ways according to their interests and learning styles (Tomlinson, 2014:46).

In music lessons, Padlet can be used in various activities: creating interactive maps of musical genres, posting recordings and exchanging comments, collaborative composition, research projects on composers and movements, interactive quizzes and games, as well as digital portfolios. According to Dunbar (2017:28), its use enhances student commitment to music learning. The research by Komis et al. (2021:118) in Greece confirms that the tool was widely used for project implementation during the pandemic. Likewise, Gyftoula and Mitsikopoulou (2021:52) report its use by foreign language teachers, highlighting its broad acceptance in the Greek educational community.

Beyond these applications, Padlet can also support the analysis of musical works and guided listening activities, where students are encouraged to add comments and reflections on specific excerpts. In addition, when systematically applied across the curriculum, Padlet functions as a digital classroom, centralizing weekly teaching materials, collaborative projects, and student portfolios in one shared online environment.

Image 3
Wall



PADLET FORMATS AND EXAMPLES IN MUSIC

The Padlet platform offers multiple layout formats that can be creatively used in music teaching:

- **Wall:** posting material in columns (e.g., musical instruments with images and sounds). (Image 3)
- **Timeline:** studying composers in chronological order (e.g., J. S. Bach). (Image 4)
- **Map:** geographic visualization (e.g., various places in the songs of Mikis Theodorakis). (Image 5)
- **Canvas:** free arrangement of information (e.g., Various Worksheets). (Image 6)
- **Stream / Grid:** organizing projects. (Image 7)
- **Portfolios:** each student collects their assignments in a personal Padlet.

Image 4
Timeline



Image 5
Map



Image 6
Canvas

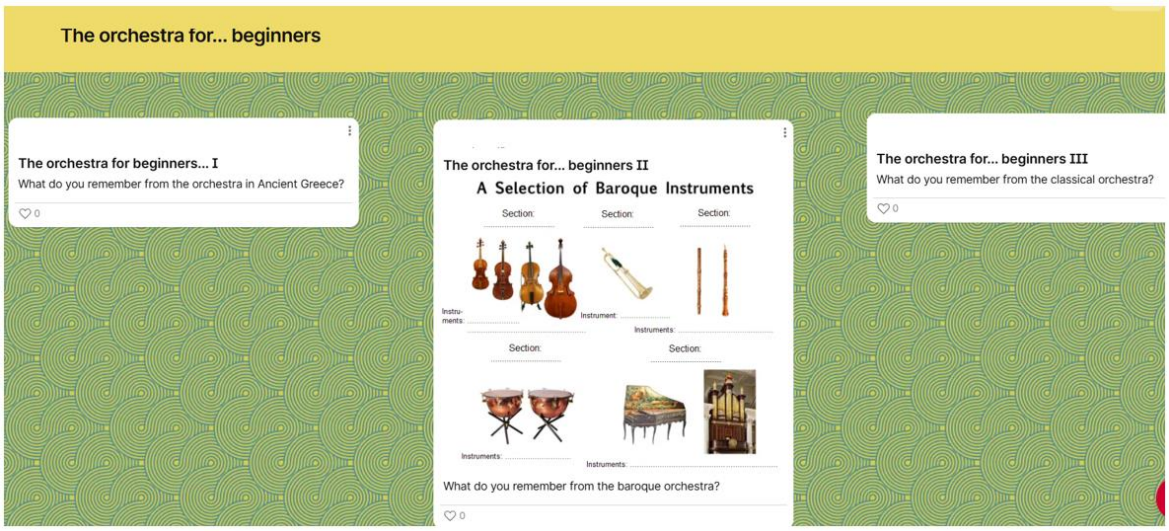
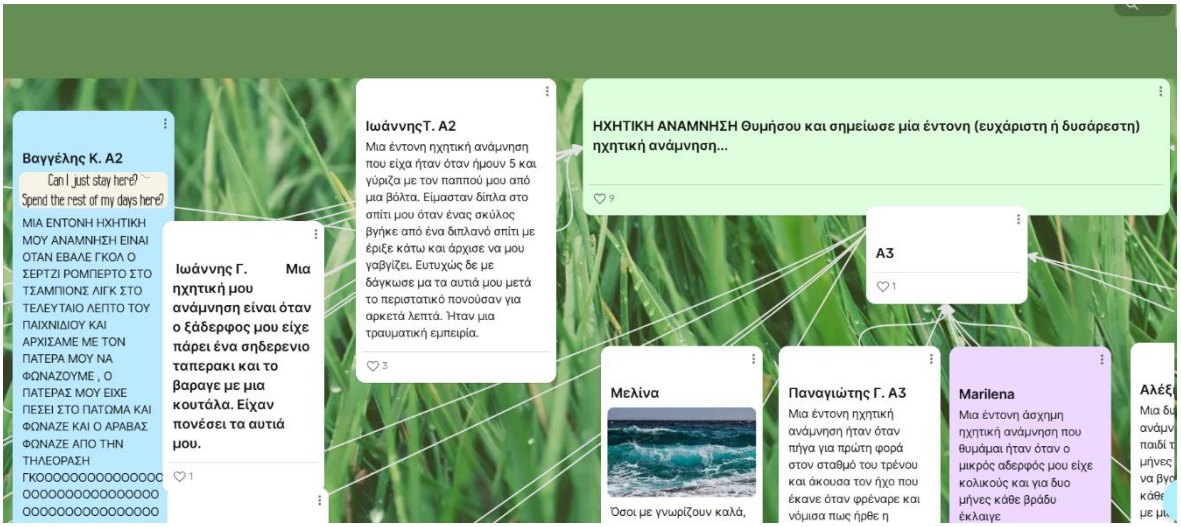


Image 7
Stream / Grid


Βαγγέλης Κ. Α2
Can I just stay here?
Spend the rest of my days here?
ΜΙΑ ΕΝΤΟΝΗ ΗΧΗΤΙΚΗ ΜΟΥ ΑΝΑΜΝΗΣΗ ΕΙΝΑΙ ΟΤΑΝ ΕΒΑΛΕ ΓΚΟΛ Ο ΣΕΡΤΖΙ ΡΟΜΠΕΡΤΟ ΣΤΟ ΤΣΑΜΠΙΟΝΣ ΛΙΓΚ ΣΤΟ ΤΕΛΕΥΤΑΙΟ ΛΕΠΤΟ ΤΟΥ ΠΑΙΧΝΙΔΙΟΥ ΚΑΙ ΑΡΧΙΣΑΜΕ ΜΕ ΤΟΝ ΠΑΤΕΡΑ ΜΟΥ ΝΑ ΦΩΝΑΖΟΥΜΕ , Ο ΠΑΤΕΡΑΣ ΜΟΥ ΕΙΧΕ ΠΕΣΕΙ ΣΤΟ ΠΑΤΩΜΑ ΚΑΙ ΦΩΝΑΖΕ ΚΑΙ Ο ΑΡΑΒΑΣ ΦΩΝΑΖΕ ΑΠΟ ΤΗΝ ΤΗΛΕΟΡΑΣΗ ΓΚΟΟΟ

Different Padlet formats (Wall, Timeline, Map, Canvas) proved flexible for information visualization and for supporting music teaching. The examples presented (projects, maps, portfolios, collaborative compositions) confirm that the tool can be creatively integrated into school practice.

Nevertheless, challenges remain, such as the limited number of free Padlets and the digital divide that hinders equal student participation (Komis et al., 2021:118).

Overall, Padlet represents a particularly valuable digital tool for the music classroom, provided it is combined with pedagogical guidance and careful planning. Experience shows that its integration into teaching not only enriches the learning process, but also contributes to shaping a more participatory, modern, and creative learning environment (Fisher, 2017:165; Waltemeyer et al., 2021:94).

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THE CORRELATION BETWEEN DIGITAL LITERACY AND COMMUNICATIVE LANGUAGE ACTIONS IN FOREIGN LANGUAGE LEARNING. GERMAN LANGUAGE: EXAMPLES FROM TEACHING PRACTICE WITH PRIMARY SCHOOL STUDENTS

Dr Papadimitriou Evangelia
Senior Fellow Teacher
University of Thessaly
Volos, Greece
email: evpap@uth.gr

Harmanta Argyroula-Arietta
German language Teacher in primary education
Halkida , Evia
email: ariettaharma@gmail.com

ABSTRACT

Teaching of foreign languages has been significantly transformed by the Common European Framework of Reference for Languages (CEFR), which is an international guideline that categorizes language proficiency into three main levels: A (basic user), B (independent user), and C (proficient user). It also defines learning outcomes as can- do-statements at the end of a learning process. Consequently foreign language educators can structure their teaching focusing on the learning objectives, learning strategies and assessment, which are defined by descriptors of communicative activities at each proficiency level. According to Common European Framework of Reference for Languages, which prioritizes learning outcomes approach and diverse methodological strategies, foreign language teachers have the flexibility to continually update and enrich course content focusing on applied communication and on the individual learner's interests, needs and achievements.

Therefore, in the last few years integrating digital literacy into everyday communicative and linguistic activities has become essential. The updated CEFR (2020) includes learning outcomes related to digital competencies. Given that digital tools also shape and transform students' social and educational environment, it is important for teaching to explore key questions such as: How does the integration of digital tools support the alignment of digital activities with learning objectives and the development of personalized learning in foreign language education? How can digital tools, (for example educational platforms or interactive games) can promote metacognitive skills like self-regulated learning or self-assessment? How can language teachers use these tools to support effectively differentiated instruction or blended and distance learning? In what ways can digital literacy increase student interaction, collaborative learning in foreign language teaching?

The presentation will conclude with concrete examples showcasing their implementation of digital tools in German language teaching to 5th-grade students at Level A (Beginners).

Keywords: German language, primary school, digital literacy, communicative language activities, digital competencies, differentiated instruction.

INTRODUCTION

The specificity of foreign language teaching is also highlighted to a significant extent by the Common European Framework of Reference for Languages [CEFR], which is a common international standard for describing the linguistic and communicative competences and skills of users by level of language proficiency for all languages [level A: basic user - level B: independent user - level C: proficient user].

According to the CEFR, in the process of organising the language syllabus, the foreign language teacher is asked to focus on the achievement of the Expected Learning Outcomes, which are identified through the descriptors of the communicative activities per level. In the breadth of this Framework, which emphasises the learning outcomes through the use of a variety of methodological approaches, it is possible for the content of the course to be systematically enriched and updated by the foreign language teachers, so that it can best respond to the interests and aptitudes of the students. As digital tools do not simply complement teaching, but rather shape the everyday, social and learning environment of students, it is clear that the association of digital literacy practices with everyday communicative language actions and activities is now inevitable.

At this point it is important to underline that already in the updated version of CEFR [2020], Expected Learning Outcomes have been included, which are related to students' digital skills, even for level A1- [7]. Consequently, the correlation between students' digital literacy and the desired communicative language actions in the foreign language course has been taken into account in the design and development of the Curriculum for Foreign Languages (2021). However, there is no similar reference to descriptors for digital skills in the curriculum for foreign languages in Primary and Gymnasium [2016][8], which is valid for primary and secondary schools. This curriculum specifies the general and individual indicators of communicative competence up to the B2 language proficiency level, i.e. the independent user level[9].

Consequently, a particular research interest arises effortlessly, regarding the introduction of the new descriptors for online communication at the PreA1 level, their inclusion and their use in the foreign language course. According to these new descriptors, as stated, for Pre A1 level, students should be able, in terms of online conversation, to :

- - post simple online greetings, using basic standard expressions and other symbols typical of online communication (emoticons)
- - post short and simple comments about themselves (e.g. their nationality, family situation, profession/employment, etc.), provided that they can select them from a list of options and/or search for them using an online translation tool,

  and, as regards targeted online transactions, to be able to:
- choose a product, its colour or size in an online transaction/purchase or complete an application with the help of visualised information[10].

It is important to mention at this point the addition to the curriculum of 2020 of some other descriptors for the Mediation[11], and in particular, the 'Individual Descriptor' for online communication at PreA1 level, where it is noted that, learners should be able to:

- *create an everyday social online contact, using the simplest everyday expressions of greetings and goodbyes[12].*

Given that at the PreA1 level the user should be able to use and process information related to time, place and numbers[13], we chose in our survey to combine the dynamics of the new descriptors for online communication with

[7] Council of Europe (2020), *Common European Framework of Reference for Languages: Learning, teaching, assessment – Companion volume*, especially 3.3.1.3 “online interaction”, pages 23 and 84 -89.

[8] Curriculum for Foreign Languages in greek primary and high school , (2016), https://www.minedu.gov.gr/publications/docs2016/%CE%A6%CE%95%CE%9A_%CE%92_2871_%CE%95%CE%A0%CE%A3_%CE%9E%CE%95%CE%9D%CE%A9%CE%9D_%CE%93%CE%9B%CE%A9%CE%A3%CE%A3%CE%A9%CE%9D_%CE%94%CE%97%CE%9C_%CE%93%CE%A5%CE%9C%CE%9D_2016.pdf

[9] For the CEFR Global scale : https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=090000168045bc7b

[10] Council of Europe (2020), p. 86 και 87.

[11] Mediation, according to CEFR , is “….one of the four modes in which the CEFR model organizes communication. Learners seen as social agents engage in receptive, productive, interactive or mediation activities or, more frequently, in a combination of two or more of them…” , see also: https://www.coe.int/en/web/common-european-framework-reference-languages/mediation-in-the-classroom

[12] Council of Europe (2020),p. 260.

[13] Council of Europe (2020), p. 93 ,” Relaying specific information”.

descriptors for the development of language and communication skills of students at this level; mainly because in this group of primary school students, there is a high degree of familiarity and comfort in using descriptors for online communication. Moreover, as will be shown below and through the answers to the questionnaire exploring the preferences and possible difficulties of the pupils, it is clear that they have a wide acceptance and positive attitude towards the integration of digital media and activities in their learning path.

SURVEY IDENTITY

The survey was carried out from 10-13 March 2025 on 51 students of primary school, aged 10 years, who are taught German as a second foreign for two hours per week, according to the class schedule. The sample consists of students attending three different schools: two schools located in the centre of Chalkida (urban area) and one school located in a peripheral, rural area, in the village of Agios Nikolaos-Bourtzi. Since the beginning of the school year the students have attended the German language course for about 30 hours and are at the beginners' level A1-(CEFR, Pre-A1).

Based on the descriptor for language communicative activities of the module Communicating specific information for level A1-, three activities were created. As this descriptor states, pupils should be able to communicate (in the target language) very basic information (e.g. numbers and values) from short, simple, illustrated texts (CEFR 95).

The first activity in printed form is a Crossword (1a) and a Word Search Puzzle (1b) . The second activity is digital, created with the toll “wordwall” and is an Anagram activity. Both activities were used in the consolidation phase (i.e. for testing and language awareness). The crossword was assigned in paper format to students in pairs, who most often process the A1- level activities to a satisfactory degree, as it is a more demanding activity, since it promotes deeper understanding of concepts, processing and relating information, as well as strengthening working memory.

Activity 1a: Crossword

Read the text carefully and identify numbers from 0 to 20. Then write down the numbers you found and work with your classmate to complete the crossword.
Mein Geburtstag 🎂

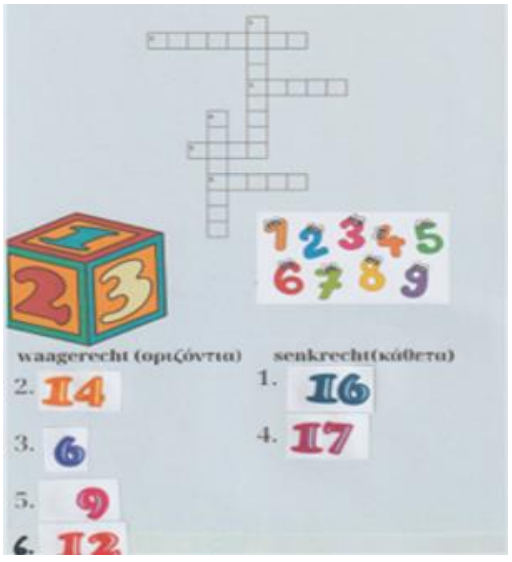
Hallo! Ich heiße Anna und ich bin **neun** Jahre alt. Ich habe am **siebzehn**ten April Geburtstag.

Zu meinem Geburtstag lade ich **sechzehn** Freunde ein. Wir spielen im Garten und essen **zwölf** Schokokekse.

Mein Bruder Max ist **vierzehn** Jahre alt. Er isst **sechs** Kekse und trinkt Limonade.

Am Abend bekommen wir **vierzehn** Luftballons!

Image 1
Crossword



Activity 1b- Word Search Puzzle

Read the text carefully and identify numbers from 0 to 20. Then write down the numbers you found and work with your classmate to find the "magic" number that is not in the text.

Mein Tag ○

Hallo! Ich heiße Tom.

Ich bin **acht** Jahre alt.

Mein kleiner Bruder ist **ein** Jahr alt.

Ich stehe um **sieben** Uhr auf.

In meiner Klasse sind **zwanzig** Kinder.

Am Nachmittag spiele ich **drei** Spiele im Garten.

Image 2
Word Search Puzzle



The activity of Word Search Puzzle can support differentiated instruction and , because of that, the activity was assigned to students with language learning difficulties, as well as to students diagnosed with dyslexia by the Centre for Interdisciplinary Assessment and Counselling Support in Evia (KEDASY). The choice of this activity was aimed at increasing their confidence and improving their ability to process basic linguistic information in the foreign language. During the observation of the activity it was found that students with dyslexia completed the exercise in a shorter time than other similar activities. This may be an interesting point for further investigation in the next phase of the research.

Activity 2: Anagram Activity (digital format)

Students were then individually assigned a digital Anagram activity (Activity 2), which contained numbers from 0 to 20. In this activity, which was chosen as a differentiated instuction tool that combines the enhancement of cognitive skills with the promotion of positive learning experiences, students are asked to place the letters in the correct order to form the number word correctly. Students were given immediate feedback through the digital environment, whether they had answered correctly or incorrectly. It should be noted that, in this activity, students could repeat their attempts until they find the correct answer . Thus, even the dyslexic students successfully completed the digital activity in the allotted time, which significantly boosted their self-esteem at that time, as reflected in their reactions after the end of the lesson.

Anagram Activity

You and your online friend create and exchange online quizzes and practice games, because you're both learning

German. Today your friend sent you a number anagram activity. Can you place the letters in their right order to form the word?

Image 3
Anagram Activity
Completion of the first phase of the survey through a questionnaire - Presentation of results



After completing the activities, the students answered a questionnaire with 6 closed-ended questions and one open-ended question.

Image 4
The questionnaire

Draw an "X" on your answer

QUESTIONS	much	little	never
Did you enjoy the digital exercise?			
Did you like the crossword/word search activity?			
Do you prefer solving exercises and doing repetition digitally?			
Do you prefer to solve and repeat exercises on paper?			
Do you like solving exercises by yourself?			
Do you like to solve exercises in pairs?			

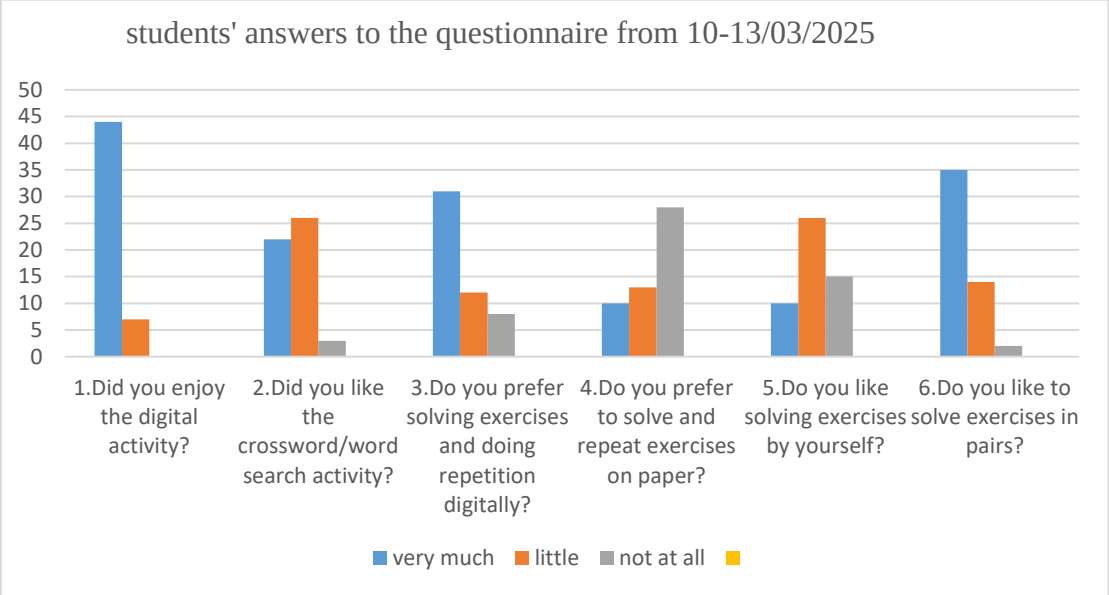
PRESENTATION OF RESULTS

From the analysis of the responses we collected, interesting findings emerge concerning the students' preferences regarding how they review the language material and whether they prefer to work individually or in pairs.

Although the majority of the students particularly liked the word search/crossword activities (printed-form activities), in response to the question *"Do you prefer solving exercises and revision digitally?"*, most of them answered positively, stating that they liked it *"a lot"*. This indicates a positive attitude towards the integration of digital activities in the teaching of the foreign language.

This preference is further confirmed by their answers to the question *"Do you prefer solving exercises and reviewing on paper?"*, where the majority stated *"not at all"*, highlighting a clear tendency towards the use of digital media.

Image 5
Students' answers



Regarding working alone, in response to the question *"Do you like solving exercises by yourself?"*, most students answered *"a little"*, while 15 students stated *"not at all"*. This shows a limited preference for working individually.

In contrast, the question *"Do you like solving exercises in pairs?"* revealed a strong preference for collaborative work, as most students answered *"very much"*.

The final open-ended question allowed students to freely express their opinion about the German course. The analysis showed a unanimously positive attitude, as 100% of the responses were positive. Students also expressed a strong interest in digital and collaborative activities.

CONCLUSIONS

Based on the survey results, several key conclusions can be drawn regarding students' preferences and attitudes toward language learning activities. Firstly, students demonstrate a clear preference for digital revision methods, with most expressing a strong positive attitude towards using digital tools for exercises and review tasks. This trend underscores the growing importance of integrating digital media into foreign language instruction to enhance student engagement and motivation.

Secondly, there is a marked disfavor towards traditional paper-based activities, indicating a shift in student preferences towards digital formats. This suggests that digital activities are perceived as more appealing and effective by the students.

Thirdly, the data reveal a limited inclination for individual work, with students favoring collaborative learning environments. The strong preference for pairing and group work highlights the importance of incorporating cooperative strategies into language teaching to align with students' learning preferences.

Finally, the overwhelmingly positive feedback regarding the German course and the students' enthusiasm for digital and collaborative activities suggest that innovative, student-centered approaches are highly effective. Overall, these

findings support the continued integration of digital tools and collaborative learning strategies to foster greater engagement, interaction, and active participation in foreign language learning contexts.

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DIGITAL PATHWAYS TO ANTIQUITY: TEACHING ANCIENT GREEK THROUGH EPIGRAPHY AND EDUCATIONAL TECHNOLOGY

Rosidou Dimitra
Philologist, M.A. in Language Teaching and New Technologies in Language Communication and M.A in Ancient Greek Philology. Member of DiGIA research project.
Aristotle University of Thessaloniki
Thessaloniki, Greece
email: rosidoudimitra@gmail.com

ABSTRACT

In recent years, there has been a growing scholarly interest in examining both educators' and students' attitudes toward Classical Studies, as well as the impact of using technological tools—such as educational applications, digital educational games, software, and other platforms—in the teaching of philological subjects. This interest arises from the observation that students often show low motivation for learning Ancient Greek language and literature. It has long been acknowledged—over the past five decades—that the integration of *Information and Communication Technologies* (ICT) into educational systems offers multiple benefits, but also presents notable challenges.

The theoretical framework of this study is based on the view that the engaging environment of digital games and the flexible learning environment enabled by successful ICT integration can serve as sources of learning motivation.

This paper focuses on the potential use of digital media in teaching the Ancient Greek language, aiming to familiarize students with both the language and the culture through the study of Ancient Greek inscriptions. Without such inscriptions, our understanding of ancient Greek civilization would be incomplete and potentially distorted, as literary and historical texts alone cannot fully capture the complexity of the ancient Greek world.

Inscriptions, as primary and direct sources, provide invaluable information and are often preserved in better condition than other written records due to the durability of the materials on which they were inscribed. Ancient Greek epigraphy, more specifically, concerns the study of inscriptions written in the Greek language and alphabet on hard materials such as stone, marble, pottery, wood, bone, or metal.

The aim of this study is to demonstrate how digital tools can facilitate access to and interpretation of inscriptions, thereby enhancing students' engagement with the Ancient Greek language and deepening their connection to the ancient world.

The methodology follows a multidimensional approach, combining theoretical research with practical application. Initially, a literature review was conducted on the teaching of Ancient Greek and the use of digital media. Subsequently, an educational program was designed and implemented, focusing on the development of digital learning objects—such as the *Phrasikleia*—which can be adapted for use at all levels of education, including university students of Philology. These activities are carried out within the framework of the DiGIA research project, based in the Department of Philology at Aristotle University of Thessaloniki.

Through interactive engagement, students develop critical thinking and linguistic skills, while gaining a deeper appreciation of the historical and cultural significance of inscriptions. At the same time, direct contact with authentic epigraphic material opens up new pedagogical possibilities, making the study of Ancient Greek more accessible and engaging.

Keywords: Ancient Greek epigraphy, Ancient Greek language, digital learning object

INTRODUCTION

In an era where technology, through the advanced capabilities of diverse digital media and tools, heralds a new chapter in the field of education, it becomes imperative to explore how such innovations may enhance the learning experience—particularly in subjects where educators face significant challenges in sustaining student engagement. The objective of this study is to illuminate how digital platforms and educational applications can redefine the study of Ancient Greek, rendering the language more accessible and appealing to contemporary learners.

THE CHALLENGE: DECLINING STUDENT MOTIVATION IN LEARNING ANCIENT GREEK

More specifically, it has been well-documented over the years by philologists and educators that a persistent and growing concern surrounds the markedly low levels of student motivation in relation to Ancient Greek instruction. The majority of secondary education students—both in middle and high school—tend to perceive the subject as uninteresting and overwhelmingly difficult. From the very beginning, learners often struggle to comprehend the original texts and to master the complex grammatical and syntactical phenomena. Moreover, a prevailing reason for their aversion lies in the perception that the language lacks practical utility, given that it is no longer spoken by any living community.

In contrast to modern foreign languages, which students are typically exposed to from an early age and gradually acquire with fluency, Ancient Greek is frequently dismissed as arcane and irrelevant. It is often considered inaccessible, and its perceived disconnect from contemporary life exacerbates the sense of detachment. However, Ancient Greek should not be understood merely as a linguistic system; it serves as a vital key to unlocking the intellectual and cultural legacy of a civilization that laid the groundwork for democracy, philosophy, rhetoric, and literature—pillars of thought and civic life that remain strikingly relevant today. Reorienting pedagogical approaches to highlight this relevance may prove essential in reinstating the value of the subject in the eyes of learners.

At the same time, students' resistance to the subject can, to some extent, be understood when one considers the characteristics of the present age. Concepts such as artificial intelligence and robotics have become defining features of contemporary society, ushering in what is widely recognized as a digital revolution. This transformation may not always be immediately perceptible in its entirety, yet its effects are undeniable: cinema has increasingly been supplanted by streaming platforms such as Netflix, and even the act of hailing a taxi is now mediated by mobile applications like Uber. Against this backdrop of rapid technological evolution and shifting modes of communication, traditional educational practices must also evolve in order to remain effective and relevant.

RETHINKING EDUCATION IN THE DIGITAL ERA: THE COGNITIVE PROFILE OF TODAY'S LEARNERS

In the current context, where the World Wide Web, Artificial Intelligence, and digital media more broadly have become deeply embedded in our daily lives—transforming the ways we communicate, learn, and think—it is crucial to reflect on how these developments are reshaping not only educational practices but also the cognitive and behavioral profiles of learners. Simultaneously, dominant societal values such as minimal effort, instant gratification, image-centric communication, and a utilitarian view of knowledge—often equated with measurable financial benefit—are reinforced through pervasive use of digital platforms and social media. These cultural trends tend to marginalize the cultivation of critical thinking, reflective inquiry, and imagination.

As a result, traditional tools of learning, such as printed encyclopedias, radio programs, and paper dictionaries, seem increasingly alien to the new generation of learners. These instruments of knowledge transmission no longer resonate with today's so-called *digital natives*, a term coined by Marc Prensky (2001:1–2) to describe individuals born and raised in a digital environment. Constantly exposed to the stimuli of digital technologies, these learners exhibit cognitive patterns distinct from previous generations—whom Prensky identifies as *digital immigrants*.

More specifically, one of the most salient characteristics of digital natives is their aptitude for multitasking: they are capable of simultaneously listening to music, studying, responding to mobile notifications, and engaging in background conversations—all with surprising effectiveness. Furthermore, they process large volumes of information at high speed, often preferring dynamic and image-based content. Their familiarity with online communication, electronic gaming, and immersive digital environments—where they assume personalized virtual identities (avatars)—reinforces a mode of learning grounded in interactivity and simulation (Krystalli, 2010).

It is thus evident that today's learners differ significantly from earlier generations who were not socialized in such media-rich environments. Nevertheless, it is precisely these digital immigrants—parents, educators, and academic instructors—who now assume the critical pedagogical role of guiding and mentoring younger generations. For this reason,

it is imperative that educators become thoroughly acquainted with the cognitive profiles and learning styles of their students if they are to communicate knowledge effectively and meaningfully.

This leads us to the central question: How can we rekindle students' interest in this rich cultural and linguistic heritage that Ancient Greek represents?

A foundational step in this direction is the integration of *Information and Communication Technologies* (ICT) into educational practice. Although not a novel proposition, the importance of this integration has been underscored repeatedly over the past five decades through extensive research that confirms the potential of digital tools to enhance learning. *ICT* enables the development of interactive, flexible, and learner-centered approaches, which can be particularly valuable in subjects that learners may initially find challenging or alienating.

From educational games to digital platforms and augmented reality applications, technology can transform the learning process from a passive transmission of knowledge into an active, experiential, and participatory engagement—a pedagogical goal of considerable importance in modern classrooms. However, it must be emphasized that the mere use of technology is not a panacea. Its implementation must be thoughtful, purposeful, and pedagogically sound. Digital tools should be employed only where they offer meaningful advantages over traditional methods—where the task cannot be accomplished just as effectively with pencil and paper.

ANCIENT GREEK LANGUAGE AND *ICT*

In recent years, there has been considerable research interest in educators' and students' attitudes (Poimenidou, 2011) and in the impact of digital tools—educational apps, games, and software—on philological subjects, particularly Ancient Greek, where students often lack intrinsic motivation (Chanquoy et al., 2007; Viau, 2009; Kelpanidis, 2009). While the integration of ICT in education has long been recognized for its benefits (Bikos, 2012), it also introduces significant challenges. Nevertheless, the engaging and flexible environments offered by educational technologies can enhance motivation and support personalized learning, allowing students to progress at their own pace, engage in self-assessment, and receive immediate feedback.

Digital platforms (e.g., MOOCs, collaborative tools like Google Docs or Teams, and content-sharing networks like Edmodo or Wikispaces) foster learner autonomy, interaction, and the development of 21st-century digital skills (Tzimogiannis, 2017; Arvanitis & Pangiotidis, 2009). These tools also expand access to educational content while reducing costs (Giannou, 2014), enabling multimodal, gamified, and culturally enriched learning experiences beyond rote translation or syntax analysis (Blakely, 2020).

In the context of Ancient Greek instruction, ICT tools like *Perseus Digital Library* and *Thesaurus Linguae Graecae* (*TLG*) offer extensive digital corpora and facilitate deeper textual engagement. Platforms such as *MicroWorlds Pro* further promote inquiry-based, interdisciplinary learning through programmable educational microenvironments (Papert, 1980).

However, several obstacles persist: educators may lack technical fluency (Koutsogiannis, 2001), infrastructures may be insufficient, and subscription costs can hinder adoption. Additionally, parents may express concerns about data privacy or excessive screen time. Effective integration of ICT thus demands careful pedagogical planning, alignment with curricula, and sensitivity to learners' needs and learning styles.

In conclusion, while ICT is not a panacea, its thoughtful, well-organized use can meaningfully enrich classical language education when accompanied by strategic planning, collaboration, and appropriate training.

DIGITAL GAMES IN LANGUAGE LEARNING

A brief reference to the role and significance of digital games in language education is warranted, especially given that some proposed activities incorporate game-based elements.

Games have been an integral part of human life since antiquity. Today, gamification—the integration of game-like elements into non-game contexts—has permeated many sectors, particularly education. In this context, digital educational games offer rich visual and auditory stimuli, virtual rewards (badges), customizable avatars, and interactive features. Beyond their aesthetic appeal and creation of an engaging learning atmosphere, such tools often provide opportunities for self-assessment and immediate feedback, both of which enhance learner autonomy—a core factor in intrinsic motivation (Ryan & Deci, 2000).

Game rules are foundational to the structure of gameplay, delineating the framework within which users operate (Krystalli, 2011). Whether digital or analog, collaborative or individual, games can be effectively employed in language teaching not merely as leisure-time activities, but also as tools for evaluation, review, or introduction of new material. They encourage spontaneous use of the target language in a low-risk, discovery-based environment that promotes collaboration and minimizes the consequences of errors. Language autonomy and long-term retention of knowledge are key benefits of integrating games into instruction (Godwin-Jones, 2014).

Notably, the creation of immersive virtual worlds and personalized avatars fosters learner engagement, even among shy or hesitant students, by creating a psychologically safe space where mistakes bear no real-life consequences (Krystalli, 2011; Malone, 1980). Conflict and challenge within games—often arising through competition—further boost motivation (Krystalli, 2011).

The judicious selection of games in language instruction can therefore sustain learners' attention, enhance motivation, and reinforce previously taught material in a more stimulating format than traditional instruction (Langran & Purcell, 1994). Research indicates that such engagement may also cultivate intrinsic motivation—essential for long-term language acquisition (Papanastasiou, Drigas & Skianis, 2017).

To those skeptical about the relevance of digital games in higher education, the study by Krystalli and Arvanitis (2018) offers compelling insights. Their research, conducted with students from the Department of French Language and Literature at Aristotle University of Thessaloniki, explored perceptions of serious games in tertiary education. While limited in scale and not representative of national trends, the study underscores a broader international shift: many foreign universities have already incorporated educational games into curricula, reporting positive pedagogical outcomes.

EPIGRAPHIC EVIDENCE AND ITS PEDAGOGICAL VALUE IN THE TEACHING OF ANCIENT GREEK

In the teaching of Ancient Greek, it is crucial not only to employ innovative methodologies but also to select appropriate materials that reflect the nature of the language and culture. Among the most valuable and authentic resources available for the study of Ancient Greek are inscriptions—epigraphic texts etched into various materials by the ancient Greeks themselves.

Inscriptions constitute the only direct, non-literary textual evidence preserved from antiquity. Whether composed in prose or verse, these texts span a wide range of domains—religion, politics, economy, law, and beyond—depending on their content and function. Archaeological findings attest to their diverse uses in ancient Greek society, which explains the remarkable plurality of their forms and themes (Oikonomaki – Tzifopoulos, 2015).

The study of inscriptions, particularly in relation to the dialects and regional alphabets used across the Greek world, offers critical insight into the evolution of the Greek language over time. Because inscriptions often reflect colloquial or semi-formal language use, they allow scholars to observe linguistic shifts and variations with a high degree of accuracy. Unlike literary texts, epigraphic materials often mirror the speech and concerns of ordinary individuals, rendering them invaluable in reconstructing the linguistic and sociocultural landscape of the ancient world.

In this regard, an inscription may be likened to a modern person's handwritten note in a book—a personal mark of identity, intent, or memory. It constitutes a form of expression, conveying individual thoughts, intentions, and desires in tangible and enduring form. Moreover, because inscriptions are often tied to specific objects or settings—such as a dedicatory text on a symposium vessel—they serve not only linguistic purposes but also function as entry points into the broader cultural practices of antiquity.

The educational use of inscriptions is further enhanced by their potential to create interdisciplinary connections. Students are not only exposed to Ancient Greek in its original and often dialectal forms, but are also prompted to explore the historical and cultural contexts in which these texts were produced. For example, a brief inscribed phrase on a drinking cup may lead to an exploration of the symposium, a central institution in classical Greek social life.

Additionally, inscriptions offer pedagogical opportunities for experiential learning. Students can relate more easily to ancient inscriptions when they are reminded of the inscriptions present in contemporary life—on public buildings, gravestones, or even household objects. This diachronic connection helps bridge the perceived distance between antiquity and the present. Engaging directly with inscribed artifacts, or even tactile replicas, provides a sensory, immersive experience that enhances comprehension and retention through embodied learning.

But what, precisely, is an inscription? In concise terms, it is a text incised with a sharp instrument—or more rarely painted—onto a durable surface such as stone, metal, clay, wood, bone, and, in rarer and less well-preserved cases, leather, fabric, or leaves. In a visual presentation, one could showcase representative examples of Greek inscriptions across these materials to illustrate their variety and scope.

One challenge, however, is that many inscriptions today are housed in museums and often fail to capture the attention of students when presented statically. A solution to this is to emphasize the continuity of inscriptional culture into the present day. By initiating lessons with modern inscriptions found in everyday contexts—such as signs, memorial plaques, or engraved household items—educators can stimulate curiosity and draw parallels between ancient and modern inscriptional practices.

Moreover, school textbooks have long included images of inscriptions as visual prompts for classroom activities. These can now be augmented using augmented reality (AR) technologies, such as the Web-AR Studio platform, to provide additional information, multimedia content, and interactive assessments. This integration of technology allows for the design of rich linguistic and cultural learning experiences.

In this terms, there can be little doubt that our current understanding of ancient Greek civilization would be incomplete—and, in some respects, distorted—without epigraphy. If our only sources were literary or historical texts, our knowledge would be largely confined to Athens, Sparta, and a few other well-documented poleis. Many Greek cities and colonies, for which no extensive literary corpus survives, are known to us primarily through epigraphic evidence. The value of inscriptions as primary historical sources is immense: they are direct testimonies of the past, and their durability has often ensured their preservation in better condition than manuscripts or papyri.

Through inscriptions, we gain access to a wide array of documents—laws, decrees, treaties, official lists, sacred texts, and more—that reveal vital aspects of civic life, religious practice, and economic organization. As such, they serve as fundamental sources for reconstructing the political, social, and cultural fabric of the ancient Greek world. They also provide an irreplaceable corpus for the study of ancient alphabets and dialectal variation, enabling researchers to trace linguistic developments with precision.

Finally, the widespread nature of epigraphic practice in antiquity means that inscriptions illuminate both public and private dimensions of life in the ancient world. From monumental state decrees to humble personal dedications, inscriptions form a multifaceted and dynamic archive—one that deserves a central place in both research and pedagogy in the field of Ancient Greek language and culture.

THE DiGIA PROJECT: DIGITAL EPIGRAPHY AND EDUCATION IN ANCIENT GREEK INSCRIPTIONS

Principal Investigator: Ioannis Z. Tzifopoulos

The Digital Greek Inscriptions & Alphabets (DiGIA) project is an ambitious digital humanities initiative developed by the Epigraphy and Papyrology Laboratory (EREP) within the Department of Philology at Aristotle University of Thessaloniki (AUTH). Its goal is to harness digital technologies to preserve, study, and teach the epigraphic heritage of ancient Greece. By digitizing inscriptions, documenting regional scripts, and designing educational resources, DiGIA brings the distant world of ancient Greek writing into classrooms, research labs, and public spaces in fresh and meaningful ways.

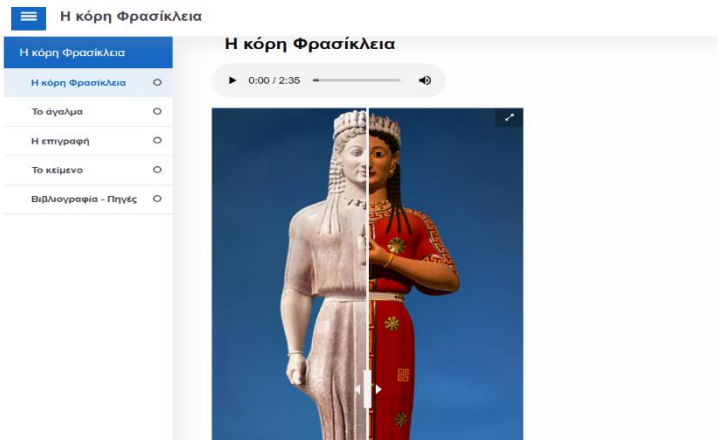
Main Objectives of DiGIA: Digitizing, Documenting, and Teaching Ancient Greek Inscriptions

DiGIA aims to preserve, study, and promote ancient Greek inscriptions through digital technology. Its primary goal is the digitization of key epigraphic collections, including squeezes from Aristotle University of Thessaloniki, artifacts from Makrygialos, and inscriptions from eastern Crete. High-resolution images and 3D models ensure the long-term preservation and wider accessibility of these invaluable sources. Secondly, DiGIA documents regional variants of the ancient Greek alphabet, particularly Cretan scripts, predating the standardized Ionic alphabet. The project creates digital typefaces that faithfully reproduce these letterforms, aiding transcription, analysis, and reconstruction. Finally, DiGIA develops educational tools to engage diverse audiences. These include augmented reality apps, interactive databases, and tailored lesson plans that bring inscriptions to life, fostering linguistic and cultural learning from school to university levels. Through these integrated efforts, DiGIA advances epigraphic scholarship and enhances the teaching and appreciation of ancient Greek language and culture in the digital era.

Phrasikleia Kore

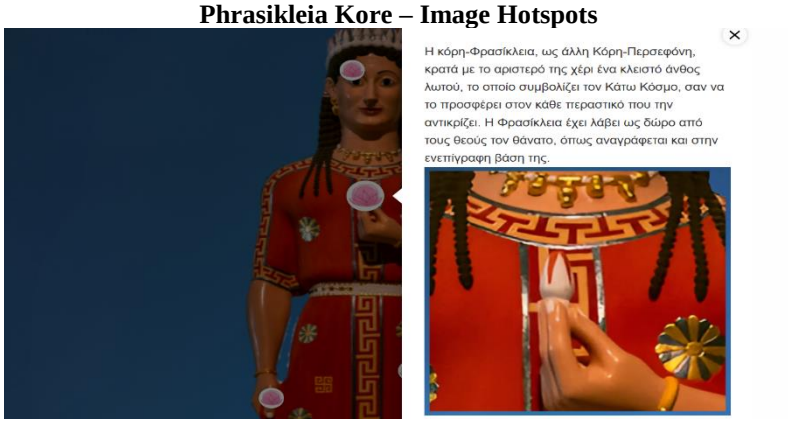
On the project's website (https://digia.lit.auth.gr/), a dedicated section has been developed for the integration of epigraphy into educational contexts, where digital learning objects are being progressively uploaded. Particular emphasis is placed on our inaugural digital object, which centers around the inscription of the Kore Phrasekleia (Image 1).

Image 1
Phrasikleia Kore – Image Juxtaposition



A variety of digital tools and object types were employed to enhance the learning experience, especially in the easy-to-use environment of the platform e-me. 4all. eu. Notably, "Image Hotspots" (Image 2) was used in order to mark and define key vocabulary directly on the inscription image, enabling learners to engage visually and linguistically with the ancient text. This object was developed as an interactive resource, and in the process, artificial intelligence technologies were also leveraged. Specifically, the "Dupdub AI Tools" application was used to create an interactive video, where the statue is speaking, enriching the multimodal dimension of the learning activity.

Image 2
Phrasikleia Kore – Image Hotspots



Furthermore, for the lexical component of the activity—focusing on vocabulary acquisition in Ancient Greek—the platform *Wordwall* was incorporated. It is a digital tool for creating educational activities, which include color, sound, images, movement. Furthermore, there is an element of competition and gamification, ensuring the active participation of all learners, who receive immediate feedback. This facilitated the development of gamified exercises and word-based activities that support learners in internalizing linguistic elements found in the epigraphic material.

Through this multidimensional approach, the educational use of epigraphy becomes not only more accessible but also engaging and pedagogically meaningful, bridging the gap between ancient texts and contemporary digital literacy.

CONCLUSIONS

Initial results show that students exposed to digital epigraphy tools show increased interest and better understanding of Ancient Greek. The interactivity of digital platforms improves comprehension, while the visualization of epigraphs within their historical context enhances appreciation for ancient texts.

In conclusion, the use of digital tools in teaching Ancient Greek is a promising field. With the help of technology, we can bridge the gap between the ancient world and modern education, keeping students' interest in the language and culture alive.

The finding of a positive effect on students' motivation and school performance will hopefully lead to the development of corresponding educational interventions both for the teaching of the specific subject of language teaching and for philological courses that teach ancient Greek culture or even for the organization of interactive educational tours to museums and archaeological sites – with appropriate modifications to give more emphasis to the cultural part of the application. Epigraphy, combined with digital innovation, can be a powerful tool in the preservation and dissemination of ancient Greek heritage.

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USE OF DIGITAL TOOLS IN EDUCATION

Vasiliki Sarkatzi
Mathematics Teacher (PE03), Informatics Teacher (PE86), MEd, MSc
Principal of the 3rd General Lyceum of Trikala "Odysseas Elytis"
Trikala, Greece
email: sarkatzikiki@gmail.com

ABSTRACT

The paper addresses the integration of digital tools in education and how they influence teaching and learning. The introduction highlights the use of digital tools such as educational platforms (e.g. Google Classroom), interactive courses (e.g. Kahoot!), educational videos (e.g. YouTube), and collaboration tools (e.g. Microsoft Teams). These tools enhance learning, facilitate communication and collaboration, and enable personalized learning experiences for each student.

In the literature review, the paper analyzes the role of Information Technology and ICT in education. It refers to the need for students to acquire basic knowledge about technology and ICT, while at the same time developing critical thinking and social behavior skills. Despite students' familiarity with digital technologies, research data shows that students do not fully utilize the potential of ICT in the learning process. Therefore, education must incorporate activities that enhance critical thinking and problem-solving skills.

The paper also examines the learning theories that influence the integration of ICT in the educational process, such as behaviorism and constructivism.. It also presents the evolution of the integration of ICT in education, from the use of mass media to their full integration into the educational process.

A significant part of the paper concerns Mobile Learning (m-learning), which uses portable devices such as mobile phones and tablets to support learning, while highlighting the importance of collaboration, critical thinking and lifelong learning. It is characterized by interactive elements, personal adaptation and immediate feedback, enhancing the effectiveness and interaction in the learning process. Finally, the paper refers to the use of Artificial Intelligence (AI) in education, which offers personalized learning experiences and supports the educational process with the help of algorithms and neural networks.

Overall, the integration of digital tools and ICT in education offers many possibilities for improving teaching and learning, but requires a careful approach to their effective utilization.

Keywords: Digital Tools, Artificial Intelligence, Mobile Learning, education, ICT

INTRODUCTION

In the context of the digital revolution, education has inevitably been influenced by rapid technological advancements. The integration of digital tools into the educational process now constitutes a fundamental element of contemporary pedagogy, as it enhances interactivity, accessibility, and the personalization of learning experiences. From interactive platforms to applications of artificial intelligence, these tools provide innovative opportunities for both educators and learners, reshaping traditional models of knowledge transmission and fostering more dynamic, engaging, and student-centered learning environments.

Key domains in which digital tools have been effectively implemented include: a) **Educational Platforms**, such as Google Classroom, Moodle, and Blackboard, which support the systematic organization of course content, facilitate the dissemination of educational materials, and enable the monitoring of student progress, b) **Interactive Learning Tools**, including applications like Kahoot! and Nearpod, which offer gamified quizzes and activities designed to actively engage students and promote participatory learning. c) **Educational Video Resources**, such as YouTube and Khan Academy, which provide extensive multimedia content across various subject areas, thereby supporting independent and differentiated learning pathways, d) **Collaborative Tools**, such as Microsoft Teams and Slack, which enhance communication and collaboration among students and teachers, enabling real-time interaction and the co-construction of knowledge, e) **Personalized Learning Systems**, which employ data analytics and algorithm-driven approaches to tailor educational content and pace to individual learner profiles, f) **Note-taking and Organizational Applications**, including Evernote and OneNote, which assist students in structuring, storing, and accessing their notes across different devices and learning contexts, g) **Virtual and Augmented Reality Technologies (VR/AR)**, which create immersive learning experiences that transcend the limitations of traditional classrooms—such as virtual explorations of historical sites or the three-dimensional visualization of complex scientific concepts, h) **Digital Assessment and Feedback Tools**, which streamline formative and summative evaluation through online quizzes and exams, while also providing immediate and constructive feedback to support continuous learner development.

LITERATURE REVIEW

Informatics, ICT, and Education

Informatics and Information and Communication Technologies (ICT) in schools serve a dual role: a) as subjects of instruction and b) as means of instruction. One of the primary objectives of teaching Informatics in compulsory education—according to the Cross-Thematic Curriculum Framework for Informatics (CTCFI) and the Detailed Curriculum for Informatics—is to provide students with an initial yet structured and comprehensive understanding of basic hardware and software concepts. This aim is pursued within the broader framework of technological literacy, enabling students to recognize the role of ICT while also developing critical thinking skills, ethical awareness, social behavior, and a willingness for engagement and creativity—both individually and collaboratively as members of a group.

The diverse tools offered by ICT (e.g., educational software, online learning platforms) have long been fundamental resources in the teaching of various subjects. Both formal and informal education are being transformed in multiple ways through ICT, while learning is enriched and reinforced both within and beyond the school environment (Hollman, Hollman, Shimerdla, Bice & Adkins, 2019).

Contemporary students are often referred to as "digital natives" (Prensky, 2001). However, research conducted both internationally and within the Greek educational context (Sybrahmanyam et al., 2001; Jackson et al., 2006; Vekiri & Chronaki, 2009) reveals that, although students are typically familiar with digital tools even before being introduced to them in school, they tend to use only a limited range of ICT capabilities. As a result, they often lack the skills necessary for effective use of Informatics tools in problem-solving, in the educational application of digital resources, and in critically evaluating information (European Commission, 2008, 2012; Mossberger et al., 2003).

A key issue that emerges, therefore, is the need for students to engage in activities that: a) develop their ability to use Informatics tools for solving real-world, authentic problems, b) encourage them to apply digital technologies for learning purposes and c) foster their critical thinking skills.

Learning Theories and ICT in the Educational Process

The integration of Information and Communication Technologies (ICT) into the educational process has been guided by various theories of human knowledge and learning. The behaviorist approach, which emphasizes the transmission of information from teacher to student and the modification of student behavior, inspired the development

of "closed-type" educational software. Such tools typically feature guided instruction and drill-and-practice activities (Panagiotakopoulos, Pierrakeas & Pintelas, 2003; Komis, 2004).

Constructivism, on the other hand, is a learning theory that has significantly influenced the design of ICT-based learning environments. According to this theory, learning is an active process whereby students construct, test, and reorganize their cognitive representations through experimentation and interaction with others (e.g., peers). In this context, the teacher assumes the role of a facilitator who supports students' exploratory and collaborative learning. Constructivist perspectives have led to the development of "open-ended" digital environments (e.g., tools for experimentation, creativity, and collaboration) (Bressler, Oltman & Vallera, 2018).

Many contemporary digital learning environments combine elements from both behaviorist and constructivist approaches, depending on the intended learning goals—e.g., using drill-and-practice activities for consolidating knowledge and open-ended exploratory tasks for conceptual understanding.

According to Komis (2005), the integration of ICT into education has gone through four phases, which can still be identified in varying degrees across educational systems that have adopted ICT in practice:

- **Phase One** (pre-1970): ICT integration involved the use of media such as television, radio, and video, primarily to support curriculum goals.
- **Phase Two**: Informatics was introduced as a standalone subject in the curriculum, emphasizing programming, particularly in secondary education.
- **Phase Three**: The appearance of personal computers in schools marked a shift where Informatics began to function both as an academic subject and as a tool for supporting other disciplines.
- **Phase Four**: ICT became broadly integrated into the educational process. Computers were used as teaching and learning tools across the curriculum, and efforts were made to embed ICT into everyday school practices and across subject areas (Papadopoulou & Kotridis, 2010).

The models used to guide ICT integration in education include the **technocratic**, **holistic (integrated)**, and **pragmatic** models (Komis, 2005):

1. **Technocratic Model**: This model emphasizes technical knowledge and skills, treating Informatics as an autonomous academic discipline. Its focus is on digital literacy, particularly programming and computer architecture. It is often described as a "vertical" model (Makrakis, 2000).
2. **Holistic or Integrated Model**:In this model, ICT is viewed as a learning tool and is considered essential for interdisciplinary approaches to knowledge. ICT is embedded into existing curriculum subjects and supports the integration of learning across domains.
3. **Pragmatic Model**:The pragmatic model represents a synthesis of the two previous models, combining technical training with interdisciplinary application.

LEARNING THROUGH MOBILE DEVICES – M-LEARNING

Informatics and ICT provide tools that can support students in approaching and understanding concepts included in school curricula. A characteristic example is that of Physical Education, where concepts relate to physical activity, exercise, human movement, sport, health, and quality of life (Antoniou, 2015). In Physical Education, students learn through multiple sensory channels: visual, auditory, and kinesthetic. The integration of these different modes of information reception enhances learning potential (Mohnsen, 2014). Text, digital images, videos, animations, and diagrams—used independently or combined within a multimedia application—can serve as motivational tools in Physical Education, increasing student engagement and satisfaction, while also facilitating the comprehension of concepts, processes, and skills embedded in the subject matter (Medina, 1992; Wilkinson, Pennington & Padfield, 2000; Antoniou et al., 2003; Antoniou et al., 2006).

Today, **mobile learning** (also known as *m-learning*) has attracted the interest of educational companies and researchers worldwide. This form of learning is increasingly gaining momentum, leading to the development of educational content and systems specifically designed for mobile learning contexts (Edwards et al., 2002; Biström, 2005). M-learning offers learning opportunities to individuals and groups who are mobile or at a distance, with the only required equipment being a smartphone or tablet (Pifarré, 2019). Critical components of the educational process include **collaborative interactions** and **critical thinking**. When students develop critical thinking skills, they engage more deeply with concepts, become more objective, and interpret situations with a logical and analytical perspective (Connerly, 2006). Mobile technologies offer students tools for direct, seamless interaction, promoting cooperation, idea-sharing, and the development of critical perspectives—processes that, as noted by Lonsdale, Baber, and Sharples (2003), foster the **constructive generation of new knowledge**.

Essentially, m-learning extends education beyond the classroom into **informal learning environments**, whether physical or virtual (O'Malley et al., 2005). Studies by Swank, Hooft, Kratcoski, and Hunger (2005) indicate that students using mobile technological tools collaborate more effectively and demonstrate higher levels of engagement. This leads to a redefinition of learning as **collaborative, creative, personal**, and ultimately **lifelong** (Amanatidis, 2010; Sypsas & Tsoumanis, 2014). Appropriately designed m-learning environments may also contribute to students' understanding of the value of lifelong physical activity, both within and beyond the school context.

As mobile learning gradually found its place within formal education systems, the need arose to define it and establish a **theoretical foundation**. Early definitions tended to focus on the technologies involved, as these were seen as the central element of mobile learning (Kukulska-Hulme et al., 2009; Traxler, 2009; Winters, 2007). Traxler (2009, p. 13), for instance, defined mobile learning as "learning that is delivered or supported exclusively or primarily through portable devices and mobile technologies, such as personal digital assistants (PDAs), smartphones, or laptops."

Wang et al. (2009, p. 93) offer a broader definition: mobile learning "refers to the provision of education to learners anytime and anywhere, through the use of wireless internet and mobile devices, including mobile phones, PDAs, smartphones, and digital audio players."

What fundamentally defines mobile learning is **mobility**, which has been thoroughly explored by researchers. According to Kukulska-Hulme et al. (2009), mobility can be categorized into three types: **spatial**, **temporal**, and **contextual**. Sharples et al. (2009) and Kakihara & Sørensen (2002) extend this further by identifying **five dimensions of mobility**, including:

Mobility in Physical Space: Students learn, explore, and interact with peers and learning materials as they move between locations. Their learning is no longer dependent on a fixed physical environment. Using mobile devices, students can focus on their learning activity while becoming immersed in it, independent of their surrounding space.
Thematic Mobility: Students shift their focus between different subjects based on their interests and obligations.
Social Mobility: Within the context of both formal and informal learning, students interact across various social groups.
Temporal Mobility: Learning transitions between formal and informal learning contexts.
Technological Mobility: For researchers, the focus of mobile learning is not on the devices themselves. Learning activities can be accessed through a wide range of devices. When all the above forms of mobility are combined, the core essence of mobile learning is achieved, according to Kukulska-Hulme et al. (2009).
Mobile learning (m-learning) is based on mobile device technologies such as smartphones and tablets, which enhance the learning experience by offering flexibility, immediate access to information, and opportunities for interactive and personalized education. Examples include:
Apps: A variety of educational apps for mobile devices allow students to learn in engaging and interactive ways.
E-learning: E-learning platforms can also function through mobile devices, enabling students to attend online classes, take quizzes, and interact with learning content from their phones.
Automation and notifications: Some m-learning apps include notifications and reminders, helping students keep track of deadlines and manage their time effectively.
Social learning: Through social networks and collaborative tools, students can engage with peers, share ideas, and exchange learning materials. M-learning incorporates these tools to support the social dimension of learning.

There are numerous mobile learning applications, such as:

- **Photomath**, which allows students to scan and solve math problems using their mobile devices;
- **Duolingo** and **Babbel**, for learning foreign languages using quizzes, videos, and audio;
- **Memrise** and **Anki**, for vocabulary and phrase practice in various languages;
- **Khan Academy** and **PhET Interactive Simulations**, where students can use simulation tools to experiment with physical phenomena (e.g., energy, motion, chemical reactions) and observe real-time changes in parameters;
- **GeoGebra**, which helps students create graphical representations to better understand mathematical concepts;
- **Google Earth**, allowing students to explore historical and geographical locations and gain a deeper understanding of global relations and events.

Mobile learning constitutes a significant field of educational innovation, leveraging portable technologies to enhance the learning process through flexibility, immediacy of access to knowledge, and the capacity for adaptation to individual learner needs. The use of mobile devices contributes to the promotion of lifelong learning, the development of

self-regulation and autonomy skills, and the creation of learning environments that transcend traditional spatial and temporal boundaries. As such, m-learning emerges as a critical tool for modernizing educational practice and aligning it with the demands of the digital age.

Effective teacher preparation for mobile learning should include both pedagogical strategies tailored to mobile contexts and basic technical training to enhance teachers' confidence. Educators should be given opportunities to engage with mobile technologies for their own professional development, as well as for designing instructional materials and exchanging resources and real-world examples[14]. Informal support networks and peer collaborations can be particularly valuable, especially in remote areas where access to technical support may be limited. These networks also play a key role in helping teachers stay informed about the fast-paced changes in both technology and teaching practices.

In practice, the use of mobile phones is restricted in many educational institutions, prompting some educators to incorporate them into their teaching practices covertly. To ensure effective and appropriate use, institutions must implement clear policies. Moreover, students who are primarily familiar with using mobile devices for social interaction require structured guidance on how to engage with these tools for academic purposes. Equally important is the integration of mobile learning with institutional learning management systems or virtual learning environments to support cohesive and efficient instruction. Mobile technologies are likely to remain valuable tools for achieving specific educational objectives, such as enhancing literacy and numeracy, and for addressing emerging global challenges. Looking ahead, mobile learning is expected to evolve through the integration of context-aware technologies, which can adapt to learners' locations, behaviors, and preferences in order to deliver relevant educational resources in the most effective settings.

LEARNING THROUGH ARTIFICIAL INTELLIGENCE (AI)

Artificial Intelligence (AI) is one of the most dynamically evolving technological fields with direct applications in education, bringing about radical changes in both teaching methods and the learning experience. Through the use of intelligent algorithms and machine learning techniques, adaptive educational systems are being developed that can analyze student performance in real time and dynamically adjust educational content to meet their needs (Holmes et al., 2019). At the same time, AI is widely used on platforms such as Duolingo, Khan Academy, and Squirrel AI, providing personalized learning experiences and recommendations based on data analytics (Chen et al., 2020).

Artificial intelligence (AI) has swiftly transitioned from a speculative idea to a foundational element of everyday life, with significant implications for the field of education. As of 2024, AI technologies are reshaping the educational landscape by enabling highly personalized learning experiences, streamlining administrative processes, and contributing to improved student outcomes. Applications such as intelligent tutoring systems and AI-supported classroom management demonstrate the extensive and transformative potential of these tools. Educators and school leaders now have the ability to utilize AI for analyzing large datasets, yielding insights that inform strategic planning and instructional decision-making. Furthermore, AI is helping to eliminate barriers to learning by offering adaptive tools that cater to diverse student needs and learning preferences. As AI technology continues to advance, its capacity to enhance educational practices and promote more individualized, effective learning environments is expected to expand even further.

AI also contributes to the automation of repetitive administrative tasks (such as test evaluations, managing learning profiles, and tracking progress), allowing educators to focus more on the creative and supportive aspects of teaching (Luckin et al., 2016). Additionally, technologies such as emotion recognition and facial recognition are being experimentally used to capture students' emotional states and improve their interaction with the learning environment (Zawacki-Richter et al., 2019).

Learning through Artificial Intelligence (AI) is a rapidly developing field that combines the theory of machine learning, statistics, and computational sciences. Its key concepts include:

- **Machine Learning:** A subcategory of AI focused on the development of algorithms that enable computers to "learn" from data. By analyzing large volumes of data, machine learning algorithms identify patterns and make data-driven predictions or decisions. This process allows AI systems to adapt to new information and improve performance over time. There are several types of machine learning, including supervised learning, where the model is trained on labeled data; unsupervised learning, where it explores unlabeled data to discover hidden patterns; and reinforcement learning, where an agent learns optimal behaviors through trial and error within a dynamic environment. Machine learning powers many AI applications today, from speech recognition and image

[14] https://www.open.edu/openlearncreate/course/index.php?categoryid=568

classification to recommendation systems and autonomous vehicles, making it a key driver of innovation in the AI field.

- **Networks**: Models inspired by the structure of the human brain, widely used for pattern recognition and natural language processing. In the context of **Artificial Intelligence (AI), networks** generally refer to **neural networks**. Neural networks consist of interconnected layers of nodes (or neurons) that work together to process and learn from data. The most common type of neural network used in AI is the **artificial neural network (ANN),** which is the foundation for deep learning models.
- **Supervised and Unsupervised Learning:** Supervised and unsupervised learning are two key approaches in Artificial Intelligence. Supervised learning involves training a model on labeled data, meaning the input comes with the correct output, allowing the model to learn and make predictions, such as identifying spam emails or recognizing images. In contrast, unsupervised learning deals with unlabeled data, where the model explores the data to uncover hidden patterns or groupings without predefined outcomes. This approach is often used for tasks like customer segmentation or anomaly detection. Both methods are fundamental in enabling AI systems to learn from data and make intelligent decisions.
- **Reinforcement Learning:** Is a type of machine learning in AI where an agent learns to make decisions by interacting with an environment. The agent takes actions, receives feedback in the form of rewards or penalties, and uses this feedback to improve its future behavior. Unlike supervised learning, reinforcement learning does not rely on labeled input/output pairs—instead, it focuses on learning a policy that maximizes cumulative reward over time. It is widely used in areas such as robotics, game playing (e.g., AlphaGo), and autonomous vehicles, where the AI must learn optimal strategies through trial and error in dynamic settings.

AI can offer personalized learning experiences, support educators, and improve the learning process. Key aspects of AI application in education include:

- **Personalized Learning**: AI systems can analyze each student's learning habits, pace, and interests, dynamically adjusting the content and teaching methodology. Platforms such as Knewton and Squirrel AI use performance data to dynamically shape personalized learning pathways (Chen et al., 2020).
- **Adaptive Learning Systems:** These systems use algorithms to adjust activities and questions to meet the needs of each student. Examples include Smart Sparrow and ALEKS, which focus on continuous assessment and real-time adaptation of educational content (Holmes et al., 2019).
- **AI Tutors & Chatbots**:Applications such as Duolingo, using AI, offer support for questions, reinforce learning through spaced repetition, and guide students with immediate feedback. Chatbots are already being used in university settings for student support (e.g., Jill Watson at Georgia Tech).
- **Automated Assessment & Feedback**: Systems for grading essays or complex responses rely on natural language processing (NLP) and are used in platforms like Gradescope. Immediate feedback supports continuous learning and self-improvement (Zawacki-Richter et al., 2019).
- **Learning Analytics**: AI collects and analyzes data from educational activities to identify patterns of success or difficulties, suggesting interventions at an individual or school-wide level. This enhances the decision-making process for educators and school administrations regarding student support.
- **Development of Soft Skills through Simulations & Game-Based Learning** :The use of AI in interactive learning environments (e.g., educational serious games) enhances skills such as problem-solving, collaboration, and decision-making. AI-based simulations are widely used in fields such as medicine, pilot training, and business education.
- **Support for Students with Learning Disabilities**: AI significantly contributes to inclusion with applications that convert text to speech, speech to text, or enhance communication for individuals with autism or mobility issues.

However, the integration of AI in education is not without concerns. Ethical and legal issues such as privacy, data management, algorithmic transparency, and the prevention of algorithmic bias are key challenges that must be addressed in order for AI to be used responsibly and fairly (Williamson & Eynon, 2020).

CONCLUSIONS AND RECOMMENDATIONS

This paper highlights the significance and potential of digital tools in education, emphasizing the multiple benefits they offer to both students and teachers. Their integration enhances the learning process by enabling students to develop skills such as critical thinking and collaboration, while also allowing for the personalization of the learning experience. However, challenges remain, as a strong educational strategy is required to ensure that technology supports — rather than replaces — meaningful learning.

Tools such as educational platforms, collaboration applications, and the use of virtual and augmented reality have created new opportunities for learning, offering experiences that transcend the traditional classroom. Digital technologies support learning through collaboration, encouraging interaction among students and fostering critical thinking. This leads to the creation of new knowledge and the development of personal skills. Mobile learning expands the learning process beyond the classroom, enabling students to interact and learn anytime and anywhere. This supports lifelong learning and the personalization of educational experiences. The application of Artificial Intelligence in education offers the prospect of individualized learning tailored to each student's needs, through data analysis and the use of advanced algorithms.

Nevertheless, it is essential for educators to be trained in the use of digital tools and Artificial Intelligence in order to effectively integrate these technologies into their teaching. The promotion of digital tools that foster collaboration between students and teachers should be prioritized. Collaboration platforms such as Microsoft Teams and Zoom can provide opportunities for group work and discussions. Additionally, the use of tools and algorithms that adapt learning to the individual needs of students contributes to more effectively addressing differences in learning pace and capacity.

The creation of mobile learning environments (M-Learning) encourages learning through mobile devices, giving students the ability to learn anytime and anywhere. Educators should stay informed about developments in Artificial Intelligence and how it can be used to enhance the educational process and offer customized learning. The effective integration of digital tools into education can transform teaching and learning, provided it is combined with strategic planning and appropriate teacher training.The benefits of using digital tools are significant for both educators and students.

From the educators' perspective, the use of digital tools can enhance teaching by adapting instructional materials to students' needs, enabling a more personalized and learner-centered approach. Formative assessment, incorporating real-time feedback, supports the monitoring and evaluation of student progress and facilitates the integration of experiential learning, which combines theory with practice.

From the students' perspective, digital tools provide a more interactive and flexible learning experience. The fast and effective assimilation of knowledge is supported through the use of multimedia and digital content, while the development of critical thinking is enhanced through tools that enable analysis, comparison, and critical evaluation of information. Furthermore, interaction between students and teachers becomes more direct and effective, promoting collaboration and active participation in the educational process.

This convergence of technology and education creates a more dynamic and advanced learning environment that benefits both educators and learners.

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THE UTILIZATION OF AUTOMATED EDUCATIONAL VIDEO SUMMARIES IN THE EDUCATIONAL PROCESS

Chasanis Vasileios
Electrical Engineer, PE83 & Computer Scientist, PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: vasileioschasanis@gmail

Gaki Vassiliki
Chemist, PE04.02 & Computer Scientist PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

Chasanis Konstantinos
Mathematician, PE03
High School of Myrina
Limnos, Greece
e-mail: kxasanis@gmail.com

ABSTRACT

The increasing use of educational videos in teaching creates new challenges and opportunities for improving the learning process. Automated summaries of educational videos, based on machine learning algorithms, offer an innovative tool that can be utilized for enhancing comprehension, student self-assessment, and feedback from educators. This work explores the ways in which automated summarization of educational videos can contribute to the more effective organization of the educational process.

The integration of educational videos in teaching may have helped educators; however, their comprehension can be demanding at times, particularly when the content is technical or of long duration. Automated summarization of a video can provide students with a brief and comprehensive presentation of its main points, facilitating information absorption and reducing cognitive load. Additionally, students can use the summaries for previewing content before viewing or for quick review after video completion, thus enhancing comprehension and memorization of basic concepts. We must not forget that students live in an era of rapid technological development and in the age of "speed" where they are bombarded daily with dozens of brief pieces of information in text format (Twitter) and video (shorts, TikTok). A relatively short summary of an educational video, beyond its educational nature, appears to better match the information pattern that students receive daily, making it more accessible and attractive compared to a long-duration video.

The main benefits for students include quick material review as well as better understanding of key points. Comparing an automated summary with the summary that students have created on the same topic can help them identify any oversights, misunderstandings, or gaps in their comprehension. This process enhances their metacognitive skills and helps them become more autonomous in their learning. They can also utilize summaries to quickly review the basic points of a chapter before examinations.

From the educators' perspective, automated summaries can be utilized as a feedback tool or for personalizing instruction. Educators can review the generated summaries to identify which video points challenge students and adjust their teaching approach accordingly. Furthermore, the ability to generate summaries at different levels of detail allows for differentiated instruction, responding to the needs of students with different levels of comprehension, different readiness levels, different interests, and generally different learning profiles. Another important application concerns accessibility. Automated summaries can support students with learning difficulties or those who prefer written information over auditory information, especially when the video is in a foreign language and subtitles can be incorporated into the summary. By providing a concise version of educational content, students can better understand key points, even if they struggle with direct processing of spoken language. Additionally, both students and educators can quickly identify the most important points of a video, save time, and improve the learning experience. For summary extraction, software (Chasanis et al., 2014) was used on educational videos from the Electrical Engineering Department and the Health Department, and overall student acceptance exceeded 80%.

In conclusion, automated generation of educational video summaries constitutes a powerful tool that can enhance the educational process on multiple levels. It helps students organize knowledge, self-assess, and improve their skills, while simultaneously offering educators useful means of feedback and instructional differentiation. The integration of these tools in modern education can lead to a more flexible, effective, and accessible learning environment.

Keywords: video summarization, educational video, self-assessment

INTRODUCTION

The proliferation of digital content in educational settings has fundamentally transformed the landscape of knowledge dissemination and acquisition. Educational videos, in particular, have emerged as a cornerstone of modern pedagogical practice, offering dynamic and engaging alternatives to traditional instructional methods. However, the exponential growth in video-based educational content has introduced significant challenges related to content navigation, information extraction, and cognitive processing efficiency.

Educational videos have become an important part of higher education, providing an important content-delivery tool in many flipped, blended, and online classes. Yet, the consumption of lengthy educational videos often presents cognitive burdens that can impede effective learning, particularly when content is technically complex or spans extended durations. This challenge is compounded by the contemporary media consumption patterns of digital natives, who are increasingly accustomed to concise, rapidly digestible content formats.

The advent of artificial intelligence and machine learning technologies has opened new possibilities for addressing these pedagogical challenges through automated content processing and summarization. This powerful tool, driven by advancements in artificial intelligence (AI) and machine learning technologies, leverages AI video summarization to parse through hours of video data, distilling it into short, actionable text that captures the essence and key points of the original material.

This research investigates the application of automated video summarization techniques specifically within educational contexts, examining how machine learning algorithms can be leveraged to create concise, pedagogically relevant content abstracts that enhance learning outcomes while reducing cognitive load. Our study addresses the gap between technological capability and educational application, providing empirical evidence for the effectiveness of automated summarization in supporting both student learning and instructional design.

The primary objectives of this research are threefold: (1) to establish a comprehensive framework for implementing automated video summarization in educational settings, (2) to evaluate the pedagogical effectiveness of generated summaries through empirical student assessment, and (3) to demonstrate the potential for these technologies to support differentiated instruction and accessibility initiatives.

RELATED WORK

Automatic video summarization is a subfield of artificial intelligence aimed at reducing the length of video content while preserving essential information. Two main approaches exist:

- Frame-based summarization: In this approach, keyframes or scenes are selected to represent the original video. In (Chasanis et al., 2009), the authors propose a methodology where the number of key-frames is estimated using elements of the spectral graph theory. Next, the frame sequence is clustered into groups using an improved spectral clustering algorithm.

Image 1
Example of Video Summarization Using Keyframes



- Semantic summarization: A narrative summary is constructed by employing features extracted from speech, text, and visuals. In (Ioannidis et al., 2014), a key-frame extraction algorithm based on different image descriptors is proposed.

In (Thompson et al., 2023), a detailed analysis and investigation of algorithms using deep learning techniques is presented in (Wilson et al., 2024). A similar survey is supported in (Apostolidis et al., 2021).

There are several other types of video summaries, such as montage, where the whole summary is depicted in a single frame composed of keyframes providing instant access to a specific part of the video by clicking the corresponding keyframe.

Image 2
Example of a Video Summary (Montage Type)



APPLICATION TO EDUCATIONAL VIDEOS

In educational contexts, video summaries are used to extract learning objectives, highlight essential points, and support instructional goals. Tools that utilize subtitles or transcripts enable the generation of summaries in multiple formats: bullet points, reports, and question sets. Summarized videos facilitate understanding through both visual and textual representation, making complex content more accessible and adaptable to different learning styles. Automatic video summarization is gaining ground in educational settings, particularly for simplifying long lectures and enhancing student engagement. Several proposed tools analyze video content, speech, visuals, and text to extract key segments or generate concise textual summaries, which have proven effective in several areas.

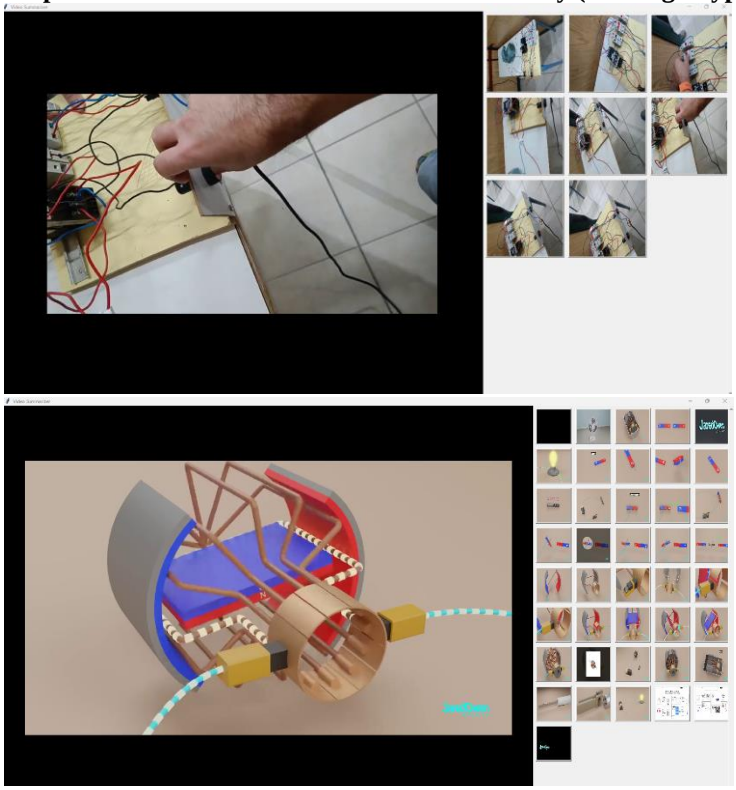
A variety of AI tools are proposed over the internet to convert lecture videos into rich text and keyframes, aiding note-taking and reducing cognitive load by syncing audio, transcripts, and visuals. Students often choose these summaries, when reading especially when under time pressure (Vimalaksha et al., 2018). AI-powered summarizers adapt content to individual needs, adjusting summary length and complexity for different proficiency levels or learning styles. Another category of AI video summarizers, such as Pixcile's AI Video Summarization, generates quizzes and flashcards from summaries, leveraging the "testing effect" to improve memory retention.

Moreover, educational platforms and institutions benefit by automatically summarizing hundreds of lecture videos, saving hours of manual effort. These tools integrate into Learning Management Systems, ensuring easy access for all students.

In summary, from a summary of an educational video we expect:

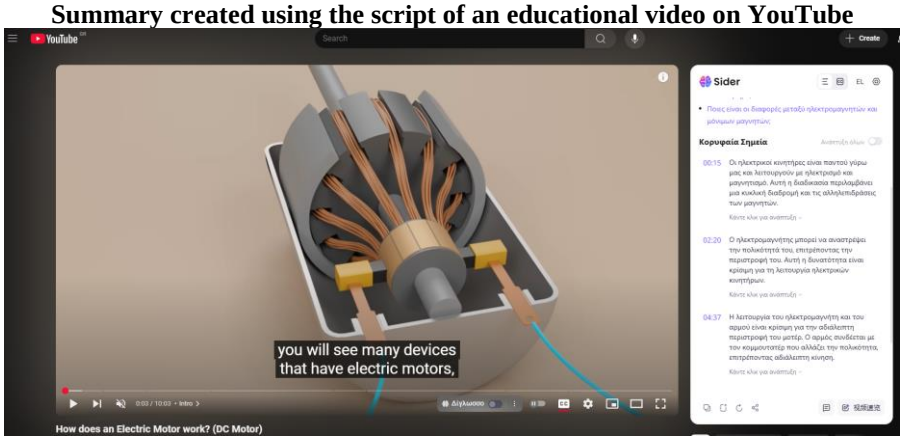
- Extraction of learning objectives: to assist students in comprehending the basic aspects of the original video
- Emphasis on key points: focus on the most important information
- Adaptation to teaching method
    - Selecting relevant material: The teacher employs the parts of the video that are needed
    - Taking into account the difficulty level: different levels of summary can be extracted

Image 3
Examples of Educational Videos and their summary (Montage Type)



As already mentioned, a variety of AI tools and applications available online can extract summaries not only from video content but also from video scripts. Moreover, alternative summaries can be created in various formats, including reports, questions, and bullet points. On the other hand, students can comprehend these summaries either by listening to or watching the summary, or by reading the alternative exported formats. In Image 4, we provide a summary created using a random AI tool on YouTube.

Image 4
Summary created using the script of an educational video on YouTube



INTEGRATION IN THE TEACHING PROCESS

From the educators' perspective, automated video summaries serve as powerful tools for enhancing teaching effectiveness and personalization. These AI-generated summaries function as feedback mechanisms that allow teachers to identify which parts of educational videos pose difficulties for students, enabling them to adapt their instructional approaches accordingly. The ability to produce summaries with varying levels of detail provides educators with the flexibility to differentiate their teaching methods to meet diverse student needs.

The implementation of automated summarization technology supports comprehensive educational differentiation by accommodating students with different levels of comprehension, varying degrees of readiness, diverse interests, and generally different learning profiles. This capability allows educators to customize their instruction more precisely, ensuring that educational content is accessible and engaging for all learners regardless of their individual learning characteristics. By leveraging these automated tools, teachers can create more inclusive and effective learning environments that respond to the unique needs of each student in their classroom.

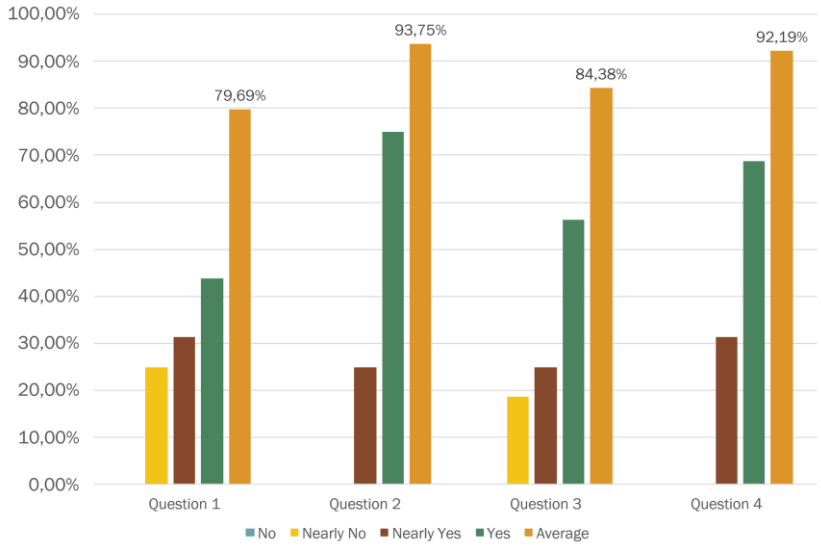
Another significant application of automated video summarization concerns accessibility in educational settings. These AI-generated summaries can provide crucial support for students with learning difficulties who may struggle with traditional video-based instruction formats. The technology offers alternative pathways for information processing, allowing educators to accommodate diverse learning needs and preferences within their classrooms.

Furthermore, automated summaries serve students who prefer written information over auditory input, particularly when dealing with foreign language videos. The integration of subtitles within the summary format creates an additional layer of accessibility, enabling students to engage with educational content regardless of language barriers or auditory processing preferences. This comprehensive approach to accessibility ensures that video-based learning materials can reach and effectively serve a broader range of students with varying abilities and learning styles.

From the students' perspective, automated video summarization technology offers numerous practical advantages that enhance their learning experience and academic performance. Students can quickly identify the most important points within educational videos, significantly saving time while improving their overall learning efficiency. This rapid content identification allows learners to focus their attention and energy on the most crucial concepts, making their study sessions more productive and targeted.

Additionally, students can leverage these automated summaries to create conceptual maps, quickly fill knowledge gaps in their understanding, and develop comprehensive study guides tailored to their specific needs. The technology also supports self-assessment practices, enabling students to evaluate their comprehension and identify areas requiring additional attention. These diverse applications empower learners to take greater control of their educational journey, promoting independent learning skills while providing them with versatile tools to enhance their academic success across various subjects and learning contexts.

Image 5
Evaluation Results on Educational Videos Summaries



EXPERIMENTS

A study was conducted at the Evening Vocational High School of Preveza. Four educational videos and their automated summaries were given to students. They answered questions regarding the accuracy, helpfulness, and

redundancy of the summaries, as well as the necessity of accompanying text. Responses were rated on a scale from 1 (No) to 4 (Yes). The summarization tool used was based on the platform proposed by Chasanis et al. (CVMP 2014), which achieved around 90% in summary adequacy.

In Image 5 we present the results where it is seen that:
- 79.69% of the students found the summaries covered key aspects of the original videos.
- 93.75% of the students indicated that no repetitive information was presented in the summaries.
- 84.38% of the students reported improved comprehension of the main aspects of the video after watching the summaries.
- 92.19% of the students preferred summaries with accompanying text.

DISCUSSION

Students today are immersed in fast, compact information formats such as social media and short videos. Automated summaries align with this trend, making educational content more approachable and engaging. The automated generation of educational video summaries represents a transformative technological advancement that can significantly revolutionize the learning experience across various educational contexts and levels. This innovative approach empowers students by providing them with sophisticated tools to:

Systematically organize and structure their acquired knowledge, creating coherent mental frameworks that facilitate deeper understanding and long-term retention.

Engage in meaningful self-assessment through reflective analysis of their comprehension gaps and learning progress, fostering metacognitive awareness.

Continuously refine and develop their academic skills through targeted practice and personalized feedback mechanisms.

Beyond these core advantages, automated video summarization technology offers several supplementary benefits. *Time efficiency* allows students to quickly grasp key concepts without watching entire lengthy videos, making their study sessions more productive and focused. Accessibility ensures that learners with different learning styles can benefit from condensed, text-based summaries that accommodate various preferences and abilities. *Review facilitation* transforms summaries into excellent study aids for exam preparation and knowledge consolidation, providing students with structured reference materials.

Furthermore, *personalized learning* capabilities enable AI systems to tailor summaries to individual learning needs and comprehension levels, ensuring that each student receives content appropriate to their academic requirements. Finally, *enhanced engagement* through interactive summaries can maintain student interest and motivation throughout the learning process, creating more dynamic and compelling educational experiences that encourage continued participation and deeper understanding of the subject matter. As it concerns teachers, video summarization of educational videos provides them with a sophisticated and invaluable resource for delivering comprehensive pedagogical feedback and implementing targeted instructional differentiation strategies that cater to diverse learning needs and styles.

The strategic integration of automated video summarization tools into contemporary educational frameworks has the potential to create transformative learning ecosystems. Video summarization technology provides transformative educational benefits through multiple dimensions of improvement. *Enhanced flexibility* adapts to individual student pacing, learning preferences, and scheduling constraints, allowing for personalized educational pathways that accommodate each learner's unique circumstances and academic journey. This adaptability ensures that students can engage with educational content at their own pace while maintaining their individual learning rhythms and personal schedules.

The technology also delivers *optimized effectiveness* through data-driven insights that enable educators to identify knowledge gaps, track progress, and adjust instructional methods in real-time, creating more responsive and targeted teaching approaches. Additionally, *universal accessibility* breaks down barriers for students with diverse abilities, language backgrounds, and technological access levels, ensuring that high-quality educational content reaches all learners regardless of their individual circumstances or limitations. These combined benefits create a more inclusive, efficient, and personalized educational environment that serves the needs of diverse student populations.

The implementation of these tools creates a ripple effect of benefits throughout the educational system, transforming multiple levels of the academic environment. For educators, the technology offers significant professional advantages including professional development opportunities as teachers gain access to advanced analytical tools that enhance their pedagogical expertise and instructional capabilities. Workload optimization becomes possible through automated processes that reduce time spent on routine tasks, allowing educators to focus on high-value instructional activities that directly impact student learning. Additionally, evidence-based teaching emerges as data from summaries provides concrete evidence for instructional decision-making, enabling more informed and effective pedagogical choices.

For educational institutions, the benefits extend to organizational and strategic levels through multiple key areas. Scalable learning solutions become achievable as technology enables consistent quality education delivery across large student populations without compromising educational standards. Cost-effective resource utilization maximizes the value of existing educational content through intelligent repurposing, ensuring optimal return on educational investments. Finally, innovation leadership positions educational institutions at the forefront of technological advancement in learning, enhancing their reputation and competitive advantage in the evolving educational landscape while demonstrating commitment to cutting-edge pedagogical approaches.

FUTURE WORK

In future work, we plan to employ a multimodal video summarization tool in order to provide summaries based on video, audio, and text. Moreover, we plan to explore the unique characteristics of educational videos that come from different subject areas and adapt the style of their summaries, with the ultimate goal of developing adaptive summarization methodologies that are precisely tailored to the unique stylistic and instructional requirements of each subject domain.

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TA25: Digital storytelling in teaching practice

TA26: Educational assessment using digital media and tools

TA27: Educational administration and digital technologies.

T.P.E. AS A TOOL FOR MANAGING AND IMPROVING PERFORMANCE IN EDUCATION

Chasiotis Nikolaos
Electronics Education Consultant P.E.84 Epirus
Counsellor's Office, Ioannina DPE
Veria, Greece
email: nikoshasi@gmail.com

ABSTRACT

The organizational and administrative reconstruction of the modern Greek school unit has as its main objective the smooth and efficient operation of the unit, in its internal context of operation, but also in the wider social fabric that exists and evolves. The use of Information and Communication Technologies (ICT) is a recurring reality and can offer, through practical and modern technological tools, more efficient and effective performance of human resources. Without affecting what type of organization it will be, i.e. whether it serves a school or a company, an efficient and reliable management information system, (MIS) is always a great investment for the organization. Its evaluation at regular intervals to judge the return on this investment is necessary.

An essential role of Educational Information Systems is to reduce, in the phase of planning individual measures of educational policy, the lack of certainty by providing information that can be used to make the right decisions in the right way. In other words, the benefits implied by the use of educational information systems are linked to the increase in the efficiency and effectiveness of the administration and educational staff of any school organization. Efficiency is related to the ability to make decisions correctly. Effectiveness refers to the ability to make the right decisions. Therefore, making the right decision does not mean making the right decision.

Educational Information Systems do not directly provide standardized decisions to users, nor do they suggest a pre-designed way of making decisions that ensures success. They serve the persons involved with educational issues in the decision making process by providing a range of selected information that are the outputs of processing appropriate data entered into the computer. Therefore, the person who will be considered to make some important decisions, from the field of education, will rely not only on the information provided by the information system, but also on his/her experience, judgment and intuition. Finally, one issue to be considered is the functionality of the existing information system and the need to rebuild or expand it.

The aim of this paper is to present the potential of information systems to provide a productive and efficient way to serve the needs of school structures. They are a useful tool in the hands of the administration, as they are able to know at any time the programming that has been carried out as well as all the important information related to it.

Keywords: Information technology, Digital reconstruction, Educational information systems.

INTRODUCTION

In the modern social reality of technological prevalence, information that has no borders and constant redefinition, education could not remain a laggard and an uninvolved observer, but must harmonize and integrate Information and Communication Technologies in its daily practice. The adoption of ICT is considered to be multidimensional and diverse, and Hooper & Rieber (1995) distinguish four stages of the introduction of ICT into the educational process, one of which is the administrative use. Regarding the introduction of ICTs in educational administration, they are involved in the task of efficient organization and processing of administrative information. The educational system produces a huge amount of digital information and in order to carry out its processing, the use of ICT is considered necessary, (Makri, A., Vlachopoulos, D. 201).

The simplification and flexibility of daily administrative activities, the possibility of accessing a large volume of information, the reduction of processing time, the modernization of educational administration and the realization of communication are considered necessary. The use of modern technology tools is a one-way street that helps the school to meet the requirements of competitiveness in the European area, as new integrated e-government systems have entered the education administration.

ICTs are considered powerful tools that make schools an essential lever of society, leading it to continuous progress. By ICT we mean the methods, applications and products of modern science that relate to the collection, electronic encoding, processing, classification, selective retrieval, dissemination - disclosure and study of any information in any form, namely text, number, graph, audio, image, video (Papastamatiou, 2008). The term ICT in Education Administration means the use of computer applications and systems to ensure the best conditions for the processes of communication and learning (Nolan & Tatnall, 1995).

LITERATURE REVIEW

In social terminology, an organization is a group of people with one or more common goals that they wish to realize through specific principles and institutions. Organizations that aim to realize profits by carrying out business activity are called business organizations or simply firms. They are open systems that receive inputs, transform them into outputs, distribute them to the environment and collect information from it. The internal world of an organisation or enterprise includes capital, lab our, natural resources, research and technology, work teams and finally management staff. The external world includes the technological development, the economic dimension, the cultural social dimension and the political and legal environment.

For an organization to be considered successful, it should aim to excel in its operations management, which involves improving the systems and techniques it follows to produce products and services, design and operate. Information systems designed to handle operations management processes must follow certain standards of compliance to regulations set by the state as well as its other regulatory authorities. These standards are different from country to country and are subject to modification with the passage of time.

Secondary and tertiary education make use of information systems for their computerization, with tasks such as the electronic recording of pupils' and students' files, the scheduling of courses at the level of quarters or semesters, the assignment of courses by teaching staff and the management of individual files of teaching and administrative staff. The rapid dissemination and contribution of ICT for improving administrative work are now considered undeniable, as they are a key component of successful educational management, while the tendency of some to reject their potential is tantamount to denying reality.

ICT is a very efficient tool for the management of information data, contributing to the effective secretarial support of the school through the use of various software programs. They facilitate the everyday life of the administration staff, achieving speed in information retrieval, the possibility of storing and reproducing information data, as well as facilitating and enriching the teaching of the course. At the same time they contribute to the facilitation of repetitive tasks, the simplification of teaching and administrative tasks, the saving of time and money and operate with respect to the environment, as revealed by the research of Dimakopoulos et al. (2011).

The point on which almost all researchers agree is the speed, accuracy and enhancement of two-way communication networks between all the "shareholders" of the educational process (Charalampous, 2008; Nakos, 2009; Makewa et al., 2013). The online information platform serves to inform parents-guardians about the student's assessment in each subject, his/her exam scores, the dates and frequency of exams, the average grade point average, the number of written exams, etc. (Baltogiannis et al., 2012). Nevertheless, we should keep in mind that the Greek educational system

is governed by a strong centralization and formalistic structures and in order to achieve the electronic 'digital' transition, a new mindset of human resources and a change in the institutional framework are required.

More specifically, a set of coordinated actions are considered necessary, such as the strengthening of the logistical infrastructure and the available financial resources with network and computer equipment, the development of appropriate educational software, the creation of technical support structures at national and local level, the finding of mechanisms for the maintenance and repair of existing technological equipment, the change in the perception of the usefulness of ICT and the continuous training of principals and all educational staff in the integration and use of ICT in education.

THE EDUCATIONAL INFORMATION SYSTEMS

In practice, they are the type of information systems that aim to produce information that is necessary for the management and the officials of educational organizations, in order to make the appropriate decisions at the most appropriate time and to optimize the overall performance of the educational work (teaching and administrative) at both strategic and operational level. (Stachteas H., 2009).

Essentially, these systems are tools for both the better management of educational work at the school unit level and for the implementation of effective management in education. In order to be beneficial, such a tool must be available directly to those who need it, it must respond to the needs of most users in the educational field to the maximum extent possible and it must be easy to use. The degree and acceptance of the use of information systems in education does not coincide with the degree of use of similar systems in other areas. Nevertheless, in the information society it has become an accepted fact that the importance of organized, regular gathering of information has become commonplace, management and analysis of educational data in order to create usable information for didactic and administrative applications.

As in every era, the organization and use of information is a strategic potential condition for policy-making at all levels and gives a competitive advantage to those who have it at their disposal, at the right time and in a reliable manner.

Especially nowadays, when the diversity of issues has increased so much and the lack of rapid and reliable information makes them unmanageable. In our education system, the tedious storage and formulation of the huge amount of information generated at local (school unit) and regional level (education directorate, education district) and its transfer to the central administration (ministry), can only be the point from which to start formulating strategic educational policy in order to achieve:

- Reasonable allocation of human resources and other
- Supporting unequal variables of the education system
- Upgrading the education services offered
- Existence of an act of evaluation of the educational work
- Improvement of response time and satisfaction of requests
- Serving the educational needs of society

It has been observed in school units, the educational staff responsible for the daily life of the school, that their power of intervention is minimal and they are almost always called upon to implement decisions coming from the central management bodies. As a result, a large proportion of school actors maintain a neutral attitude, where in practice, principals and teachers' associations are unable to deal satisfactorily with the needs of the educational process that constantly arise. Undoubtedly, today there are many teachers with will, faith and vision, and in their daily work they try to achieve more substantial results, but they are not the average of their colleagues.

THE OFFER OF THE INFORMATION SYSTEMS IN SECONDARY EDUCATION

Like all organizations in the wider public and private sector, educational institutions need a management information system or an internal business planning system in order to operate smoothly and efficiently. From handwritten work, where every administrative action and procedure is formulated and handled by traditional methods, inevitably with the use of computers we are heading towards the method of electronic or even digital processing. Where Information and Communication Technologies (ICT) enable the adoption of advanced technologies for the creation, organization and circulation of public information.

"Organization" is considered to be the appropriate constitution of various individual factors and their appropriate combination with the main aim of achieving a predetermined objective in the best possible way. The world of information

requires digital systems called in the literature 'Integrated Management Information Systems' or 'Management Information Systems'.

In today's ever-changing and extremely competitive environment, it is also referred to as "Business Intelligence". In particular, it is a set of technologies, techniques and practices for collecting, processing, analyzing and presenting data to provide instant access to large packages of reliable information for decision-making. Without affecting what type of organization it will be, i.e. whether it serves a school or a company, an efficient and reliable management information system is always a great investment for the organization. Its evaluation at regular intervals in order to judge the efficiency of this investment is necessary. Finally, one issue to be considered is the functionality of the existing information system and the need to rebuild or expand it.

ICTs effectively assist the electronic services that take place with the entry of information systems in school units and concern practical issues such as (Dagdilelis, 2005; Charalampous, 2008; Bakas, 2009; Nakos, 2009) the more efficient secretarial support and computerization of the school by keeping the electronic protocol, in which acts are recorded, e.g. e.g. the issuance, notification and receipt of all kinds of documents, to which the interested party will be able to have direct access with the appropriate online transaction form and receive information on the progress of his/her case. In addition, through the use of information systems, student information forms are issued for enrolment, attendance checks, recording and printing of student grades, absences, planning of administrative programmers and preparation of timetables.

Seamless electronic communication - correspondence and electronic transactions. Such as two-way communication with the student, with parents/guardians (via email), with school staff and with colleagues in other parts of the world. Furthermore, with local and educational institutions, participation in online communities, writing and sending messages, and information about events via the school's website. In addition, electronic information on legislation, on the syllabus and examinations per subject and on urgent incoming documents, direct access to the services of the Ministry of Education via the national school network and navigation on various network sites. Finally, the creation and management of a base for the operation of libraries and access to digital educational material.

CONCLUSION

ICT can be applied to the handling of a significant number of organizational tasks, if it is possible for managers to store information on the personal data of school staff in order to maintain the confidentiality of the information. They also contribute to the distribution of documents during seminars using PowerPoint, to the preparation of lesson plans, to the preparation of reports on various issues of the school's work cycle, to the purchase of products-services for the school online via the Internet, to the provision of the possibility of real-time staff training (through videoconferencing). In general, the use of ICT contributes to the detailed mapping of the school unit, aiming at simplifying the educational administrative activity and diversifying the communication of the educational community with the external environment, affecting all aspects of it.

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THE CONTRIBUTION OF INFORMATION SYSTEMS IN EDUCATION: EVALUATING THE EFFECTIVENESS OF MYSCHOOL

Kotzamouratoglou Georgios
Secondary Education Teacher, Educator in Electrical Engineering and Economics
1st Vocational Training Center of Preveza, Secondary Education Directorate of Preveza
Preveza, Greece
email: kotzamou@sch.gr

ABSTRACT

The digital era and the integration of information systems in organizations have led to significant changes in the management of educational structures, with information systems playing a crucial role in educational administration. This paper evaluates the contribution of Myschool information system to Greek education, its effectiveness, advantages and disadvantages, as well as proposals for its improvement, based on a literature review.

Myschool is an integrated system that allows the centralized management of information regarding infrastructure, students, teachers, and school unit processes. Its implementation has significantly improved educational administration by reducing bureaucracy, increasing transparency, and facilitating decision-making. The key benefits of using Myschool include the effective management of student records, the reduction of workload, and instant access to attendance, grading, and monitoring data. Digitalization has accelerated data processing and storage, providing a comprehensive overview of the educational status of each school unit. Additionally, Myschool enhances communication between teachers, parents, and administrative staff, offering continuous updates on student progress.

Despite its advantages, there are issues regarding the need for further simplification, facilitation, and automation of tasks within Myschool platform. Many teachers and administrative staff struggle to use it effectively due to a lack of training. This highlights the need for interface and functionality improvements to make it more user-friendly. The lack of guidance and training results in reduced efficiency and limited use of the system's capabilities. Further automation in data entry and updating processes would help reduce the workload for educators and administrators. The ability to extract data in a specific format from other programs (e.g., Excel, timetable software) would facilitate the faster input of large data volumes (such as laboratory equipment) or the easier entry of school timetables generated by other software. Ideally, Myschool should also include a timetable generation feature. Additionally, functionalities such as recording meeting minutes or automatically identifying teacher shortages and surpluses would assist in better planning for the upcoming academic year.

Furthermore, integration with other government platforms could streamline tasks, reducing the need for multiple data entries and enabling instant data validation. The system appears to be less capable in data analysis compared to international systems. A comparison of Myschool with systems such as SIMS (UK) and PowerSchool (USA), along with the examination of existing studies, revealed that the Greek system lags in data analysis and adaptability to school needs.

To enhance Myschool, proposed improvements include the addition of data analysis tools, integration with other platforms, and the development of a more user-friendly environment. Continuous user training, strengthening security mechanisms, and enabling data retrieval from other applications, are also crucial for optimizing the system's usage. Additionally, differentiated access for teachers, students, and parents could further enhance Myschool's role.

In conclusion, Myschool has played a significant role in modernizing Greek education by providing new tools for managing and analyzing educational data. However, for it to offer even more benefits, continuous system development, user-oriented adaptation, ongoing training, and improved data security and accessibility are essential. The future development of Myschool can significantly contribute to improving the effectiveness and quality of educational administration in Greece and enhancing teaching processes.

Keywords: Information systems, educational administration, Myschool, Digital data management.

INTRODUCTION

Information systems have become a key part of modern education, facilitating the management of schools and the organization of educational work. The continuous development of technology has led to significant changes in the way educational organizations are managed, offering new possibilities for automating, storing, managing and analyzing data. These possibilities not only improve the efficiency of educational processes but also enhance decision-making at the level of educational administration (Runhaar, 2016; Hua & Herstein, 2003). Its implementation also allows policymakers to identify problems in real time and make informed decisions. In addition, it facilitates the monitoring of educational indicators, human resource management and the improvement of resource allocation (Hua & Herstein, 2003).

Digital data management makes it easier to access critical information, reduces the administrative burden and contributes to the better organization of school units (UNESCO, 2003). Furthermore, the use of information systems enhances the transparency, accuracy and reliability of data, as the margins for errors and delays are reduced (Boddy, Boonstra & Kenned, 2010). Particularly in an educational system such as the Greek one, where the need for modernization and more efficient management is imperative, the integration of such systems can contribute decisively to the effectiveness of the educational process.

The Greek Ministry of Education began using information systems since 1994, mainly concerning Secondary Education. Since the beginning of 2014, we have had a universal implementation of Myschool in all school units and structures of the Ministry of Education. Myschool is an information system that allows the centralized management of all data related to school units, students, teachers and administrative staff. Through this system, schools can easily manage student registration, attendance monitoring, performance recording, as well as various administrative procedures, such as managing teaching staff, issuing documents and reports, and communicating with educational authorities (Stachteas, 2009). It should be noted that in Greece, MySchool was introduced mainly for the management of schools and student data and is not a comprehensive information system with human resources management capabilities, although some of its functions could be used for this purpose (Dragou, 2020).

The present paper aims to evaluate the effectiveness of the Myschool information system through the analysis of research works that have studied the impact of the system on the operation of school units, the benefits it offers, the challenges it still faces, as well as suggestions for its improvement according to the opinions of its users.

LITERATURE REVIEW

A review of the relevant literature and empirical research carried out in the last eight years in Greece was carried out, mainly selecting theses based on qualitative or quantitative research. The review of the relevant literature highlights the importance of information systems in educational administration, as well as the challenges arising from their integration into the daily operation of school units. The research papers examined provide valuable data for the implementation of Myschool in Greek education, highlighting both the advantages and the difficulties associated with its use. More specifically, we observe:

General Benefits of Using Myschool

The use of information systems in education administration has become an integral part of the effective functioning of school units (Koutouzis, 2008). According to relevant studies, Myschool has significantly contributed to the improvement of student record management, allowing for the quick, accurate, and secure updating of attendance, performance, and absence records. The digitization of these processes not only facilitates the collection and storage of data but also provides access to students' historical records, enabling educators and administrators to monitor their progress over the long term. It has also been observed that principals of secondary schools consider the use of Myschool to be more efficient compared to those in primary education (Dragou, 2020). A key prerequisite is that those responsible for the system’s operation input the necessary information promptly and accurately to ensure the system’s effectiveness (Zacharopoulos, 2019).

Another important advantage of using Myschool is the reduction of bureaucracy. The automation of various administrative tasks—such as issuing attendance certificates, recording absences, generating performance reports, and issuing diplomas—saves valuable time for teachers and administrative staff (Zacharopoulos, 2019; Dragou, 2020). This allows them to focus more on improving the quality of teaching and the educational process, rather than spending time on time-consuming handwritten entries and document management (Bisaso, Kereteletswe, Selwood & Visscher, 2008).

Moreover, Myschool serves as a tool to support educational policy, as it enables centralized data management at the national level. Through the system, the Ministry of Education can monitor student distribution, class sizes, teaching staff needs, and general trends in the education system. This allows for more informed decision-making regarding resource allocation, the design of new policies, and the improvement of the quality of education provided.

Improvement of Communication and Administration

Research shows that Myschool significantly facilitates communication between school principals, teachers, parents, and central administration. Through the system, principals can access real-time data about the school's status, student attendance, performance, and teachers' needs.

Through the eParents platform, which draws data from Myschool, parents can receive more immediate and reliable updates regarding their children's absences (the application is currently in pilot phase). As of now, Myschool allows class teachers or school administration to notify guardians via email. This contributes to improving cooperation between school and family, as parents can identify attendance or performance issues early on and take the necessary actions in collaboration with teachers. Literature reviews show that educators and educational staff are divided on the issue of whether parents should have direct access to updates through Myschool (Liapis, 2021).

Support of the Educational Process

The digitization of educational data through Myschool has brought significant benefits to the organization of teaching. Teachers can access information related to student attendance and performance, allowing them to plan more personalized teaching interventions. For example, they can identify students facing learning difficulties or frequent absences and collaborate with parents and appropriate support services to prevent school failure or dropout. Currently, this is only possible with the assistance of the school principal, as only they have access to all student data. Providing tiered access to more information within Myschool for teachers could be additionally helpful. It is therefore evident that the management of Myschool is primarily linked to administration and education officials.

At the same time, Myschool enables the extraction of statistical data and reports on student performance, which facilitates data-driven decision-making by both educators and administrators. The analysis of this data can be used to improve curricula, identify educational inequalities, and create targeted policies to support students in disadvantaged positions (Carter, 2005).

Enhancing Data Security and Information Management

The existence of a centralized, integrated information system such as Myschool enhances data security and protection. Unlike older methods of storing physical files, which carried the risk of data loss or tampering, Myschool ensures that information is secure, manageable, and accessible only to authorized users.

Myschool compliance with the General Data Protection Regulation (GDPR) guarantees the safe storage and management of personal data belonging to students, teachers, and parents. In addition, the use of encryption and security protocols reduces the risk of unauthorized access or data breaches.

However, despite its enhanced security capabilities, research shows that the human factor remains critical. Inadequate user training can lead to errors in data entry and management (Papadimitriou, 2024), while the lack of regular

security updates can make the system vulnerable to cyberattacks. Therefore, continuous user training and the implementation of additional security measures—such as multi-factor authentication and regular password updates—are recommended (Varelogiannis & Varsos, 2022).

Challenges and Limitations of Myschool

Despite the system's significant advantages, literature highlights certain obstacles and challenges affecting its effective use. One of the main challenges is the need for user training. Studies have shown that teachers and administrative staff often struggle to fully utilize Myschool capabilities, especially in the absence of adequate technical support or appropriate training (Katsoulas, 2020).

Research also shows that the acceptance of Myschool varies among users. Younger teachers, who are more familiar with digital technologies, tend to be more positive towards using the system, whereas older teachers face greater difficulties adapting to it. This highlights the need for ongoing training and user support to ensure the system is fully utilized at all levels of the educational community. School principals generally believe that the application is well-adapted to user needs, that it adequately meets school IT management requirements, and that the central support service of Myschool responds efficiently to problems and user queries, inspiring general trust (Dragou, 2020).

Furthermore, some studies identify shortcomings in Myschool adaptability to the needs of different schools. Although the system provides core management functions, it lacks features for customization and adaptation to the unique requirements of each school (Liapis, 2021). Nonetheless, the information system is generally considered to be fairly to highly user-friendly, although there is a lack of willingness among teachers to operate it (Zacharopoulos, 2019).

Compared to other international educational management systems—such as SIMS (School Information Management System) in the United Kingdom and PowerSchool in the United States—Myschool appears to have more limited data analysis capabilities and a lower level of customization. However, it is worth noting that in schools across Greece, the Myschool system is provided and supported free of charge, unlike the systems, which are private and come at a high cost.

Issues of Data Security and Privacy

A particularly critical issue highlighted in the literature is data security and privacy protection. With the growing use of information systems in education, the management of personal data of students, educators, and parents becomes of paramount importance. The literature warns about the risks of cyberattacks, as educational information systems are potential targets for malicious attacks due to the large volume of sensitive data they contain (Rainer & Ceyielski, 2012).

In this context, researchers recommend strengthening security mechanisms through ongoing system upgrades, implementation of stricter access protocols, and user training in best practices for cybersecurity (Papadimitriou, 2024). In the Greek educational landscape, the implementation of the General Data Protection Regulation (GDPR) has imposed stricter standards for managing educational data.

Research also shows that the Myschool application performs well in terms of user trust. In particular, the majority of school principals, who are the system's primary users, agree that the identification process requires only the necessary data, the login process is secure, and personal data is used solely for its intended purpose. However, they also seem uncertain about whether the personal data entered the system is stored securely (Dragou, 2020).

PERSPECTIVES AND FUTURE IMPROVEMENTS

We were unable to locate any literature comparing the Greek school information management system Myschool with international systems, such as SIMS in the United Kingdom and PowerSchool in the United States. However, there are studies and articles that examine the features and functions of these systems individually, allowing for indirect comparisons. Myschool, as a state-controlled system, focuses on compliance with national educational policies and

procedures. In contrast, SIMS and PowerSchool, as commercial products, offer broader customization capabilities, integration with other systems, and advanced data analysis functions. Enhancing Myschool with analytical dashboards (tools used to analyze and visualize data) and predictive analytics systems, which enable automatic predictions, anomaly detection, and reporting automation, could provide even greater value to users (Picciano, 2012).

Myschool could be connected to other educational information systems, such as e-learning platforms, digital libraries and equipment management software, to offer a more integrated experience to users. School principals believe that it would be very useful for Myschool to be upgraded to include functions for planning such as teacher job vacancies, declaration of needs for the next school year, as well as the ability to create a digital textbook, record practices, etc. (Dragou, 2020).

Some research records that the system interface is not always user-friendly, especially for teachers who are not very familiar with technology (Katsoulas, 2020). The adoption of more modern UI/UX design practices could make the system more accessible and user-friendly (Garrett, 2010). Modern UI/UX design is based on principles that aim to improve the functionality, aesthetics and usability of digital products. They include user research, which allows for design based on real needs, and micro-interactions enhance usability, while data-driven design optimizes interfaces through analytics. It also contributes to strengthening the user's connection with the product, adding elements that provoke positive reactions. Through these practices, modern UI/UX approaches shape more efficient and engaging user experiences, since the goal of UX design is to create easily manageable, effective and enjoyable experiences for the user. Picciano (2021) emphasizes that in the future there should be an evolution towards CLOUD-BASED SYSTEMS and artificial intelligence (AI) for automated data analysis, as well as strategic use of data for personalized learning and policy management.

Also, the continuous provision of technical assistance and training to users is crucial for maximizing the effectiveness of the system (Selwyn, 2011). The creation of interactive user guides, online courses and the improvement of the helpdesk could facilitate the adaptation of educators to new technological requirements.

CONCLUSION

The analysis of the literature and research data highlights the significant contribution of information systems to educational administration, with Myschool being one of the most characteristic examples of this technological development in Greek education. This system has improved the organization and operation of school units, reducing bureaucracy, facilitating communication between the bodies involved and providing timely and valid information regarding student data, as well as school administrative tasks.

The use of Myschool has also brought multiple benefits both at the level of school units and at the level of central administration. Initially, it contributes to the reduction of bureaucracy, as many procedures are now carried out electronically, saving time and human resources. At the same time, the central management of data ensures the accuracy and transparency of information, facilitating decision-making by the responsible bodies. It enhances communication between teachers, parents and administration, promoting transparency and cooperation. It helps to better support students, enabling teachers to monitor their progress and identify learning difficulties or cases of school dropout in a timely manner.

In addition, the system provides the ability to export statistical data, which allows education administrators to have a clear picture of the operation of school units and to proceed with documented interventions where necessary, thus helping to manage resources more efficiently and optimize educational policies through data analysis at the national level (Picciano, 2012).

However, despite its multiple benefits, the implementation of Myschool has also brought to the surface some challenges. One of these is the need for user training, as many teachers and administrators faced difficulties in transitioning from traditional management methods to digital tools (Selwyn, 2011). The lack of technical support and training often leads to reduced effectiveness and limited use of the system's capabilities. Further automation is considered important and will help to further reduce the workload of educational and administrative staff. Interconnection with other

state platforms can also significantly facilitate users' tasks, eliminating the need for multiple data entries and direct data cross-referencing. The system appears to lag in data analysis compared to international systems. From the comparison of the capabilities of Myschool with international educational information systems, such as SIMS (United Kingdom) and PowerSchool (USA), as well as from the review of relevant studies that have been carried out, it was found that the Greek system lags in terms of data analysis capabilities and adaptation to the needs of various school units.

In summary, we would say that Myschool is an important innovation for Greek education that enhances transparency, efficiency and quality of educational administration. With appropriate support and adaptation to technological developments, Myschool can continue to play a central role in the modernization and digital upgrading of Greek education, contributing to a more efficient, organized and quality educational system.

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EVALUATION OF THE MYSCHOOL PLATFORM: TEACHERS' VIEWS, PROBLEMS AND IMPROVEMENT STRATEGIES

Gaki Vassiliki
Chemist, PE04.02 & Computer Scientist PE86
Evening Vocational High School of Preveza
Preveza, Greece
email: iliasde66@gmail.com

ABSTRACT

This research focuses on the use of the MySchool platform by teachers and analyses their views on its functionality, its impact on school administration and the problems they face when using it. The aim is to investigate teachers' use of the platform, evaluate its functionality, and identify the problems and needs that arise during its use. It aims to understand how teachers perceive the contribution of the platform to the educational and administrative process of the school, to highlight differences in views between new and experienced teachers, as well as principals, and to suggest strategies for enhancing functionality and resolving the technical issues they face.

The research, which was carried out at a national level, is part of my thesis in the framework of the postgraduate program "Business and Organization Management" of the Department of Accounting and Finance of the University of Ioannina. The research is based on a sample of 143 teachers, of which 75 are women and 68 are men. The majority of the participants are aged 36-50 years old, hold a postgraduate degree, work in secondary schools and have not been trained in the Myschool information system and have no experience of using other information systems.

The results show that teachers' views on the MySchool platform are generally positive, with most of them finding it easy to use and the experience positive. However, variations in the evaluation of the platform are identified, mainly focusing on technical problems, such as difficulty in compatibility with other systems. Despite these difficulties, teachers acknowledge that MySchool contributes significantly to school data management and administrative tasks, although the survey shows that it has not significantly reduced their administrative burden.

Teachers express the need for new features on the platform, such as the possibility to request certificates online and receive real-time notifications, which would greatly facilitate their daily work.

The research concludes that there is a need for technical improvements to the platform and its integration with other digital applications and systems in order to enhance its overall functionality and better serve the needs of teachers and the school community. Suggestions for improving MySchool include developing new tools and optimising existing ones to enhance the efficiency and usability of the platform in the educational process.

Keywords: myschool, research, functionality, user perceptions.

THE MYSCHOOL PLATFORM

MySchool (https://myschool.sch.gr/) is an online platform developed by the Greek Ministry of Education, designed to unify and streamline the management of educational data in all public schools in Greece. The system represents an important step towards the modernization of public administration in education, with the aim of providing a centralized and efficient method of managing and accessing information related to schools, staff and students. The main function of MySchool is to serve as a comprehensive database containing detailed records for each school unit, including information on staff and students of the school. One of the primary goals of MySchool is to address the basic needs of information storage, data management, and communication within the education system. In conclusion, MySchool represents a significant advance in the management of educational data in Greece. By integrating various information systems into a unified platform, it addresses many of the challenges previously faced in the management of educational institutions (Aldarbesti & Saxena, 2014). The system's ability to store, manage and analyze vast amounts of data securely and efficiently makes it an invaluable tool for the Ministry of Education and school administrators. The MySchool platform has established itself as the official digital tool widely used in all public schools, enabling teachers and administrators to efficiently manage a variety of administrative processes (Stahteas, 2009; Kyriopoulos, 2025).

PURPOSE OF THE WORK

The purpose of this paper and the accompanying survey is to investigate teachers' perceptions on how they perceive the functionality and the overall contribution of the MySchool platform to the school's operation, with emphasis on its functionality, its contribution to the smooth management of school work, the functions they consider necessary and the problems they encounter when using it. Through the analysis of these parameters, the paper seeks to reveal the main points that affect the users' experience, highlighting the needs of teachers and the challenges they face in their daily work. Furthermore, the findings of this study are expected to provide guiding ideas for improving the platform to more effectively meet the requirements of teachers and enhance the overall efficiency of Greek school institutions, supporting education with more reliable and functional tools.

RESEARCH METHODOLOGY

This section describes the methodology used to investigate teachers' perceptions of the MySchool platform in terms of its functionality, its contribution to school operations, its desired features and the problems they face (El-Ebiary et al., 2016). The research follows a quantitative design, using a structured questionnaire based on the frameworks established by Pitsiavas and Vlahopoulos (2015) and Kalogeratos, Anastasopoulou and Pierrakeas (2024).

The questionnaire aimed to measure the following key areas: (1) the use and functionality of MySchool, (2) its contribution to school operations, (3) the desired features of MySchool, and (4) the problems encountered in using MySchool. Seven statement questions were included in each of these sections, which were answered on a Likert scale from 1 (strongly disagree) to 5 (strongly agree), providing a comprehensive evaluation of the impact of the platform.

The sample consisted of teachers from different educational levels and roles within schools, including principals, vice-principals and ordinary teachers. Participants were selected through a convenience sampling method, ensuring a broad representation of views.

Data were collected through an online survey distributed to participants. The collection period lasted for one month, during which time responses were collected and stored securely. The online format facilitated a broader approach, allowing a diverse group of teachers to participate. A total of 143 respondents replied and a further 7 out of a total of 150 did not provide complete responses and so were not ultimately counted in the sample. It should be noted that the questionnaire took no more than 15 minutes to complete.

THE RESULTS OF THE INVESTIGATION

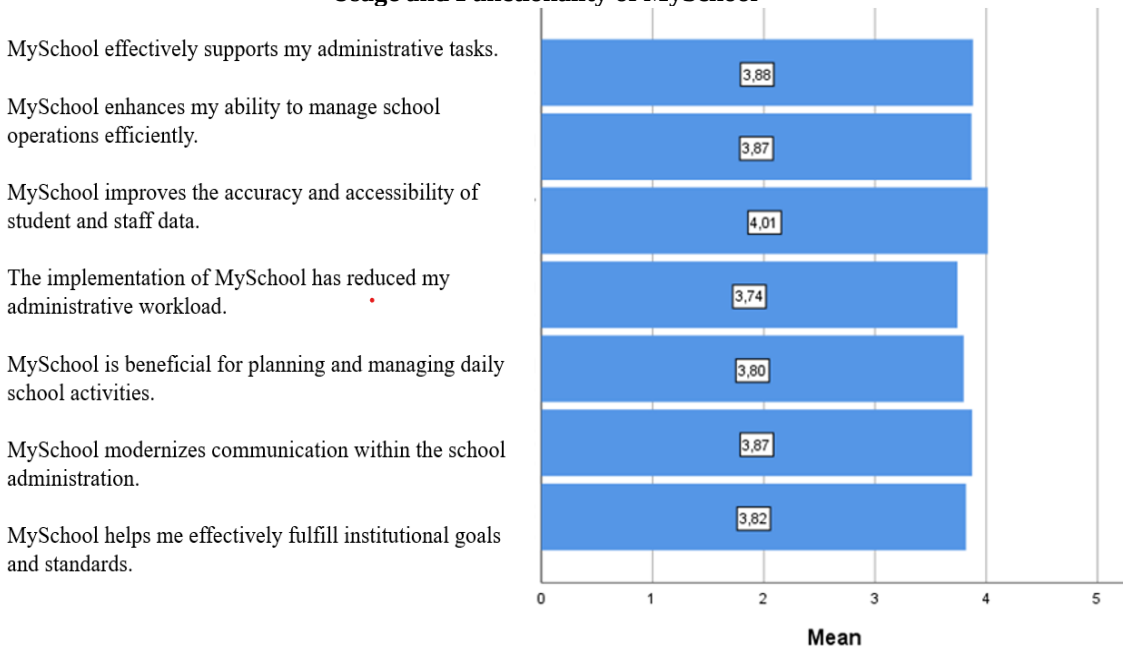
When examining the views of the sample teachers on the use and functionality of the MySchool platform, the responses were analysed to determine the mean score and standard deviation for each statement, revealing information about teachers' overall satisfaction and perceived ease of use of the platform. The responses are presented in chart (chart 1).

The statement that received the highest mean score was "Using MySchool for daily administrative tasks is easy", with a mean of 4.15 and a standard deviation of 0.664. This indicates that the majority of participants find the platform simple and accessible for managing routine administrative responsibilities, with relatively little variability in their

responses. The high mean and low standard deviation suggest a strong consensus among teachers that MySchool is user-friendly for these tasks.

Next, the statement "MySchool's overall user experience is positive" also scored highly, with a mean of 4.09 and a standard deviation of 0.660. This reflects an overall satisfaction with the platform, with most participants agreeing or strongly agreeing that their experience with MySchool was positive. The small standard deviation again indicates that there is little disagreement between respondents on this point, further reinforcing the perception that MySchool offers a favourable user experience.

Chart 1
Usage and Functionality of MySchool



This is followed by the statement "The MySchool platform is easy to use and simple to navigate", which had a mean score of 4.09 and a slightly higher standard deviation of 0.777. Although the mean score remains high, the increased standard deviation suggests that while most participants find the platform easy to navigate, there is some variability in how strongly they feel about this aspect. However, it is clear that a significant majority view the MySchool interface as intuitive.

Regarding the ability of the platform to meet users' expectations, the statement "MySchool meets my expectations in terms of ease of use" received a mean score of 3.99 and a standard deviation of 0.769. This result suggests that while most teachers believe that MySchool generally meets their expectations in terms of usability, there is a slightly wider range of opinion on this topic compared to the top ranked statements. Some users may have experienced minor difficulties or feel that the platform could be improved in certain areas.

The statement "I am satisfied with the speed of performance and reliability of MySchool" received a mean of 3.90 and a standard deviation of 0.785, indicating that teachers generally perceive that the platform performs well, although there is slightly more variability in their satisfaction with its speed and reliability. While the majority are satisfied with MySchool's performance, a notable minority may have experienced occasional delays or reliability issues.

Regarding the integration of MySchool with other digital tools used in the school environment, the statement "MySchool integrates well with other digital tools used in my school" received a mean score of 3.80, with a standard deviation of 0.824. This reflects a moderate level of agreement, with a larger difference in responses. While many teachers acknowledge that MySchool works well with other tools, some participants may have experienced difficulties in this regard, suggesting room for improvement in the platform's compatibility with other systems.

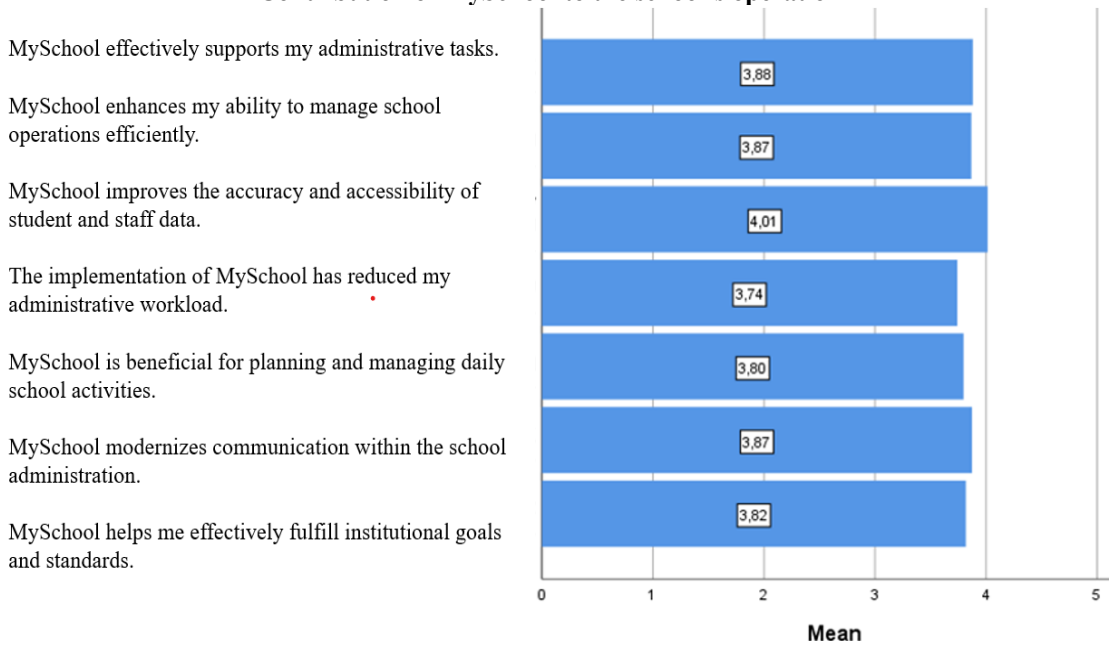
Finally, the statement "I do not often encounter errors or problems when using MySchool" had a mean score of 3.95 and a standard deviation of 0.834. Although the mean indicates a generally positive outlook on the reliability of the platform, the relatively higher standard deviation suggests a notable degree of variability in user experiences. Some

teachers may have experienced occasional technical issues, leading to a less consistent perception of MySchool's error-free performance.

Overall, teachers in this sample generally perceive MySchool as a user-friendly and reliable platform that meets their expectations for day-to-day administrative tasks. However, there is some variability in their experiences, particularly in terms of integration with other tools and the frequency of technical issues. Overall, the responses reflect a high level of satisfaction with the functionality of the platform, albeit with some areas for potential improvement.

Afterwards, teachers gave their views on the contribution of MySchool to the functioning of their schools. The responses are presented in chart (chart 2). The statement that received the highest mean score was "MySchool improves the accuracy and accessibility of student and staff data," with a mean of 4.01 and a standard deviation of 0.661. This suggests that the majority of teachers agree that MySchool significantly contributes to improving the accuracy and ease of access to important school data. The relatively low standard deviation suggests a strong consensus among the participants, indicating that most of them perceive the platform as highly effective in this area.

Chart 2
Contribution of MySchool to the school's operation



This is followed by two statements - "MySchool effectively supports my administrative tasks" and "MySchool enhances my ability to effectively manage school operations" - which scored similarly high levels of agreement. The former had a mean of 3.88 with a standard deviation of 0.707, while the latter had a mean of 3.87 and a standard deviation of 0.704. These results suggest that teachers generally find MySchool a valuable tool for streamlining administrative tasks and managing the wider operational functions of the school The narrow range of responses, as indicated by the low standard deviations, suggests that these views are widely shared among the sample.

The statement "MySchool streamlines communication within the school administration" also received a favourable rating, with a mean of 3.87 and a slightly higher standard deviation of 0.768. Although the mean score is comparable to other positive ratings, the somewhat higher standard deviation suggests that there is a bit more variability in how strongly respondents feel about this particular benefit. While many teachers appreciate the role of MySchool in facilitating communication, a minority may perceive less impact in this regard.

Regarding the role of the platform in helping teachers to meet institutional goals and standards, the statement "MySchool helps me to effectively meet institutional goals and standards" was rated with a mean of 3.82 with a standard deviation of 0.738. This reflects a generally positive attitude towards the platform's ability to support teachers in meeting formal objectives, although the slightly wider spread of responses suggests some variation in teachers' experiences.

The statement "MySchool is beneficial in planning and managing daily school activities" received a mean of 3.80 and a standard deviation of 0.827. While many participants agree that the platform plays a useful role in organising

the day-to-day operations of the school, the larger standard deviation indicates a wider range of opinions. Some teachers may find the platform more useful in this area than others, suggesting that the effectiveness of MySchool in day-to-day planning may depend on specific contexts or individual preferences.

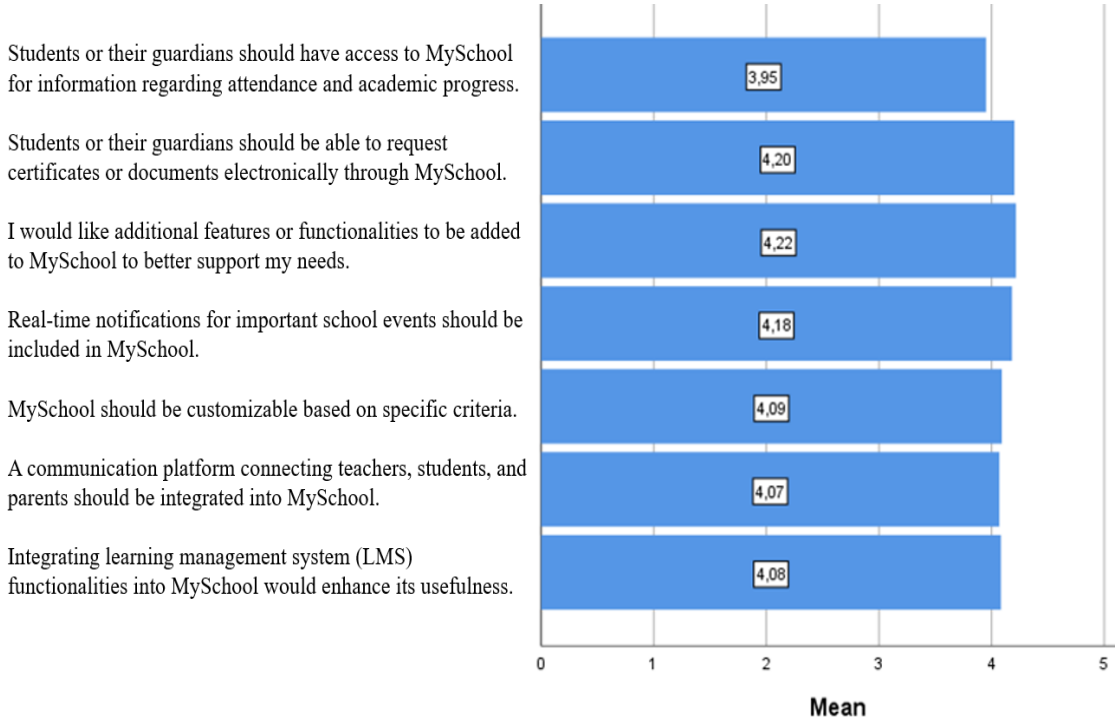
The statement with the lowest mean score was "MySchool app has reduced my administrative workload", which had a mean of 3.74 and a standard deviation of 0.811. While still generally positive, this lower score and higher standard deviation suggest that while many teachers believe that MySchool has helped alleviate some administrative burdens, there is a more pronounced variation in experiences. Some may believe that the platform has not significantly reduced their workload, or perhaps that the transition to digital systems has introduced new challenges that offset these potential gains.

Overall, teachers in the sample generally consider MySchool as a tool that improves the accuracy of data management and supports their administrative tasks. However, opinions are slightly more diverse in terms of its impact on communication, reducing workload and managing day-to-day school activities. Responses reveal a generally favourable impression of the platform's contribution to school operations, with some areas where perceptions of effectiveness are more varied.

In the next section of the questionnaire, teachers gave their views on the desirable features they would like to see incorporated into the MySchool platform. The responses are presented in chart (chart 3) .

The statement that received the highest average score was "I would like additional features or functionality added to MySchool to better support my needs", with a mean of 4.22 and a standard deviation of 0.761. This indicates a strong desire among educators for improvements to the platform, with most participants agreeing that additional features could improve their experience. The relatively low standard deviation suggests that this view is common, with little variation in responses.

Chart 3
Desirable characteristics



The second highest mean was for the statement, "Students or their guardians should be able to request certificates or documents electronically through MySchool," which had a mean of 4.20 and a standard deviation of 0.877. This high mean score suggests that teachers strongly support the idea of adding this capability, reflecting a clear demand for more efficient paperless administrative processes. The somewhat higher standard deviation suggests that while the majority of participants agree, there is slightly more variability in how strongly they feel about this issue.

Next, the statement "Real-time notifications of important school events should be included in MySchool" received a mean score of 4.18 and a standard deviation of 0.819. This result highlights the significant interest in improving

communication through real-time updates, with most teachers agreeing on the usefulness of this feature. The standard deviation indicator leads to an estimate of a moderate level of consensus, although some participants may place slightly less importance on real-time notifications.

Another well-supported statement was "MySchool should be adaptable to specific criteria", which scored a mean score of 4.09 and a standard deviation of 0.777. This suggests that teachers are interested in having the ability to customize the platform to their specific needs or the unique requirements of their schools. The low standard deviation indicates that this preference is consistent across the sample, with broad agreement on the importance of customization.

Similarly, the statement " A communication platform connecting teachers, students and parents should be integrated into MySchool" had a mean of 4.07 and a higher standard deviation of 0.909. While many teachers agree that improved communication features would be beneficial, the higher standard deviation suggests that there is more variation in how strongly participants feel about this integration. Some may prioritise this less than others or may believe that current methods of communication are sufficient.

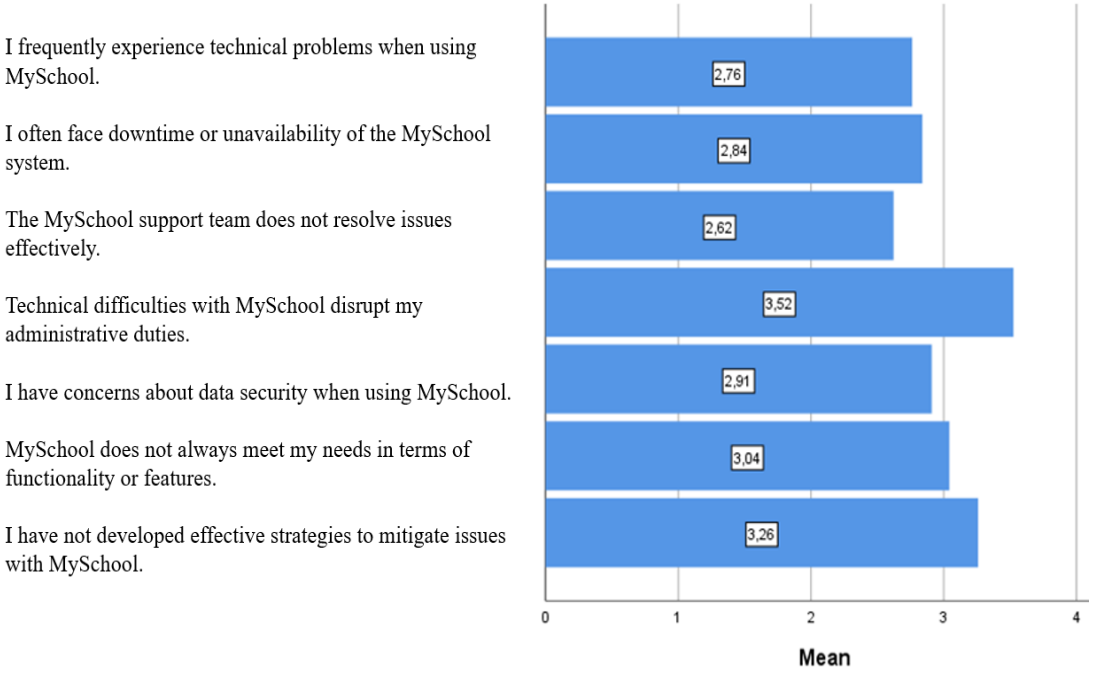
The statement "Integrating learning management system (LMS) functionality into MySchool would enhance its usefulness" received a mean score of 4.08 and a standard deviation of 0.800. This reflects strong support for the idea of integrating LMS functionality into MySchool, which would enhance its usefulness in managing and delivering educational content. The moderate standard deviation suggests that most participants agree, although there is some variation for this feature.

Finally, one communication platform's statement "Students or their guardians should have access to MySchool for information about attendance and academic progress" had a mean of 3.95 and the highest standard deviation of 1.115. While this still suggests general support for the idea, the higher standard deviation suggests a wider range of views. Some teachers may be concerned about the implications of providing this level of access to students and their families, leading to a wider spread of responses.

Overall, teachers in the sample expressed a strong interest in expanding the functionality of MySchool to include additional features such as electronic document requests, real-time notifications, and customization options. While there is broad support for these potential enhancements, opinions differ on student and caregiver access and integration of communication platforms, reflecting different priorities and perspectives on the ideal direction for platform development.

In the last section of the questionnaire, the teachers expressed their views on the problems they encounter when using and operating the MySchool platform, rating their experiences. The results are presented in chart(chart 4).

Chart 4
Problems encountered during the use and operation of MySchool



The statement that received the highest mean score was "Technical difficulties with MySchool disrupt my administrative tasks", with a mean of 3.52 and a standard deviation of 0.749. This suggests that many teachers believe that the technical issues they experience with the platform have a tangible impact on their ability to perform administrative tasks effectively. The moderate standard deviation suggests that while this is a common experience, there is some variability as not all teachers may be equally affected by these disruptions.

Next, the statement "I have not developed effective strategies to mitigate problems with MySchool" was rated with a mean of 3.26 and a standard deviation of 0.709. This result reflects a sense of frustration in many users, who may feel inadequate to handle technical issues that arise when using the platform. The relatively low standard deviation suggests that this feeling is consistent across the sample, with most teachers experiencing similar challenges in finding solutions to the problems they encounter.

The statement "MySchool does not always meet my needs in terms of functionality or features" received a mean score of 3.04 and a standard deviation of 0.711. This indicates a moderate level of dissatisfaction with the platform's ability to fully support teachers' professional needs. While some respondents may find MySchool adequate for their tasks, others believe it lacks certain capabilities. The consistency of responses, as suggested by the standard deviation, indicates a shared experience of the platform's limitations.

Concerns about data security when using MySchool were highlighted in the statement "I have concerns about data security when using MySchool", which had a mean score of 2.91 and a standard deviation of 0.768. Although this mean score is lower than the previous statements, it still indicates that some teachers have concerns about the security of sensitive information being passed through the platform. The moderate standard deviation indicates that these concerns are not common, but are quite significant for a notable portion of respondents.

Regarding system outages, the statement "I often experience outages or unavailability of the MySchool system" received a mean score of 2.84 with a standard deviation of 0.861. This suggests that while system outages are not a consistent problem, they occur frequently enough to be a source of frustration for some teachers. The relatively high standard deviation indicates a wider range of experiences, with some users experiencing this problem more frequently than others.

Similarly, the statement "I often encounter technical problems when using MySchool" was given a mean score of 2.76 with a standard deviation of 0.855. This reflects that while technical problems exist, they are not addressed in all areas. The range of responses suggests that the severity or frequency of these issues varies, with some teachers experiencing more difficulties than others.

The lowest mean score was for the statement "MySchool support team does not solve problems effectively", which had a mean of 2.62 and a standard deviation of 0.739. This indicates that, on average, teachers do not strongly believe that the support team is ineffective. However, there is some dissatisfaction, as evidenced by the moderate standard deviation, which suggests that while many respondents feel that the support group is quite effective, others have had less positive experiences with problem solving.

Overall, while technical problems with MySchool do not dominate the teachers' experience, they do create disruptions in administrative tasks, as reflected in the highest scoring concerns. In addition, there is a general sense that the platform could better meet user needs in terms of functionality, and some teachers have concerns about data security and system reliability. Overall, while the support team is not widely criticised, there is room for improvement in the technical reliability of the platform and user support.

CONCLUSION

Presenting the conclusions that emerged from the survey, analyzing teachers' views on the functionality and contribution of the MySchool platform to school operations, as well as their views on desirable features and problems they face, we observe that overall, the sample teachers viewed MySchool positively, especially in terms of its ease of use for daily administrative tasks. Most respondents agreed that the platform was user-friendly, with minimal technical difficulties. Teachers appreciated the way MySchool simplified routine tasks such as data entry and access to student and staff records, which improved the accuracy and accessibility of information. These perceptions were reflected in the consistently high mean scores among statements related to ease of use, reliability, and user experience of the platform. While most teachers found the platform functional, there were some differences in their experiences. A significant portion of respondents agreed that MySchool met their expectations for ease of use, but a smaller group expressed concerns about

its integration with other digital tools used in the school environment. Some teachers noted occasional technical issues that interrupted their work, although these problems were not widespread enough to significantly impact overall satisfaction. The speed performance and reliability of MySchool were generally viewed positively, but with some variability, suggesting that a minority of teachers experienced delays or technical issues that hindered their experience.

Regarding the contribution of MySchool to the school's operation, teachers generally agreed that the platform played an important role in supporting their administrative tasks. MySchool was perceived to enhance the efficiency of managing school operations, improve communication within the school administration and support teachers in meeting institutional goals. However, there was a notable degree of variability in opinions about specific aspects of the platform's functionality. For example, some teachers felt that while MySchool helped with planning and day-to-day management of the school, it had not significantly reduced their administrative workload. This suggests that the transition to digital systems may have introduced new challenges for some teachers, despite the overall benefits of the platform. Teachers also expressed a strong interest in expanding the functionality of MySchool. The greatest demand was for additional functionality that would better support their needs, such as the ability for students and guardians to request documents electronically and real-time notifications of important school events. There was also significant support for making the platform customizable to specific criteria and for incorporating communication tools to connect teachers, students and parents. However, views differed more on the level of access that should be provided to pupils and carers, particularly in relation to attendance and academic progress. This reflects different priorities among teachers about the direction of future improvements to MySchool.

In terms of problems encountered, the most common issues were technical difficulties that interrupted administrative tasks. Some teachers felt that they did not have effective strategies to mitigate these problems, while others were concerned about the security of the platform in handling sensitive data. System failures and technical errors were reported as recurring problems by a smaller group of respondents, although these issues were not prevalent across the sample. Despite these concerns, the majority of teachers did not strongly criticize the support team for resolving technical issues, indicating that while problems exist, they are not considered insurmountable.

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DIGITAL TRANSFORMATION AND EDUCATION: THE CONTRIBUTION OF MANAGEMENT INFORMATION SYSTEMS MYSCHOOL

Gaki Vassiliki
Chemist, PE04.02 & Computer Scientist, PE86
Evening Vocational High School of Preveza
Preveza, Greece
e-mail: iliasde66@gmail.com

ABSTRACT

The paper focuses on the study and analysis of Management Information Systems in the field of education, with particular emphasis on the MySchool system in Greece. Its aim is to examine the role of these systems in the effective management and storage of school data and their contribution to the digital transformation of the educational system. The paper highlights the importance of Management Information Systems, such as Student Information System, Learning Management System, Decision Support System, etc., in enhancing administrative and academic processes, supporting strategic decision making and achieving greater transparency and efficiency in educational institutions.

The methodology used includes a review of the literature on Management Information Systems in education, the analysis of the Greek MySchool system, as well as the reference to international studies and examples from other countries. There, the challenges associated with the implementation of these systems, such as resistance to change, lack of qualified staff and technological limitations are evaluated.

The findings of the study show that Management Information Systems, such as MySchool, contribute significantly to the better management of student and school data, as well as to the facilitation of administrative processes. At the same time, the integration of scattered systems into a single platform enhances transparency and efficiency, allowing for continuous monitoring of learning performance, teacher evaluation and improved strategic decision-making. During the COVID-19 pandemic, MySchool helped support electronic communication, demonstrating the necessity of digital technology in education.

Overall, the paper highlights the importance of Management Information Systems in the educational process, recognizing their advantages in the development of educational systems and strategic decision making, while highlighting the challenges associated with their implementation. The success of these systems depends on their appropriate support, training and adaptation to the current needs of education.

Keywords: Digital transformation, Management Information Systems, MySchool, education.

MANAGEMENT INFORMATION SYSTEMS IN EDUCATION

Management Information Systems (MIS) in education refers to the organized approach through which educational institutions manage the vast array of data and information necessary for effective operations. MIS include a broad set of tools and processes designed to collect, store, process and disseminate information within an organization, specifically tailored to support decision making, coordination, control, analysis and visualization within educational contexts. The role of MIS in education is multifaceted, covering both administrative and academic needs by providing a structured means of managing the flow of information and ensuring that critical data is accessible to those who need it for informed decision making.

At the core of an educational MIS are several key elements, each of which plays a critical role in the overall functionality of the system. The first element is data collection, which involves gathering information from various sources within the institution, such as student enrollment records, attendance logs, academic performance data, and financial information (Laudon & Laudon, 2018). This data is often collected through various data entry mechanisms, including manual entry, automated data collection, and integration with other digital systems. The second element is data storage, where the collected information is securely housed in databases, ensuring that it is maintained in a structured format that allows for easy retrieval and management (Stair & Reynolds, 2020).

After data collection and storage, the next critical element is data analysis, where the stored data is processed to create meaningful insights. This process often involves the use of analytical tools and software that can identify trends, patterns, and anomalies in the data, providing educational administrators with the information they need to make informed decisions (O'Brien & Marakas, 2011). The final element is reporting, which refers to the creation of various reports and tool tables that summarize the analyzed data in a user-friendly format. These reports are essential for communicating key findings to stakeholders such as school administrators, teachers, students, and even parents (McLeod & Schell, 2009). The ability of an MIS to generate timely and accurate reports is one of its most important strengths, as it ensures that decision makers are always equipped with the latest information.

The applications of MIS in education are broad, covering both administrative and academic processes. One of the most common applications is the Student Information System (SIS), which manages data about students, including personal information, enrollment status, grades, attendance records, and disciplinary actions (Rainer et al., 2017). SIS is a vital tool for school administrators as it provides a centralized platform where all student-related information can be managed efficiently. Another important application is the Learning Management System (LMS), which supports the delivery and management of educational content (Watson & Watson, 2007). An LMS allows teachers to create and distribute course materials, track student progress, manage assessments, and facilitate communication between students and teachers, all within a digital environment.

Decision Support Systems (DSS) represent another critical application of MIS in education, particularly in enhancing the strategic decision-making processes of educational leaders. A DSS typically integrates data from various sources within the institution and applies analytical models to assist in making complex decisions such as resource allocation, policy development, and long-term planning (Turban et al., 2015). These systems are particularly valuable in large educational institutions where decisions need to be made quickly and with a high degree of accuracy, often under conditions of uncertainty.

The impact of MIS on education management is profound, particularly in terms of improving the efficiency and effectiveness of operations. One of the most important impacts is the strengthening of decision-making processes. By providing real-time access to accurate and comprehensive data, MIS allows educational leaders to make more informed decisions based on concrete evidence rather than intuition or incomplete information (Laudon & Laudon, 2018). This data-driven approach to decision making can lead to better outcomes, such as improved student achievement, more efficient use of resources, and enhanced organizational accountability.

The MIS also contributes to a better allocation of resources within educational institutions. By analyzing data related to student enrollment, course demand, and faculty workload, MIS can help administrators identify areas where resources are under- or over-utilized, allowing for more strategic allocation of funding, staff, and materials (O'Brien & Marakas, 2011). In addition, MIS supports the automation of routine administrative tasks such as scheduling, payroll processing, and inventory management, freeing up time and resources that can be redirected to more critical instructional activities (Stair & Reynolds, 2020).

From the above, it can be seen that Management Information Systems play a critical role in the modern educational landscape by providing the tools and processes necessary for effective data management and decision support at all levels of the institution. MIS components, including data collection, storage, analysis, and reporting, are integral to

its functionality and effectiveness. Through various applications such as SIS, LMS and DSS, MIS enhances both administrative and academic processes, leading to improved efficiency, resource allocation and overall educational outcomes.

RESEARCH ON MANAGEMENT INFORMATION SYSTEMS IN EDUCATION

The literature on digital transformation in education emphasises the importance of integrating advanced technologies into education systems, while addressing both technological and human factors to ensure meaningful and sustainable change. Based on this foundation, the role of Management Information Systems (MIS) in educational institutions becomes critical as these systems facilitate effective information management, enhance decision-making processes and support the overall management of schools and universities. As educational institutions increasingly adopt digital strategies, effective MIS implementation is vital to maintain competitiveness, improve administrative efficiency, and support educational outcomes. This section of the literature review delves into the implementation and impact of MIS in different educational contexts, exploring how these systems contribute to the broader goals of educational digitization and the specific challenges they face in different institutional settings.

Initially, Verma (2022) explores the role of Management Information Systems (MIS) in the education sector, highlighting their critical impact on institutional management and decision-making processes. The study highlights the importance of integrating MIS with Information and Communication Technology (ICT) to improve the administrative and operational effectiveness of educational institutions. He argues that while the implementation of ICT is widely recognized as essential, the real value of MIS extends beyond the mere installation of computer systems and software. Effective MIS integration requires not only the acquisition of appropriate technology but also the readiness of educational managers to adopt these systems and the availability of skilled ICT professionals to support them. The research highlights that MIS plays a key role in streamlining data flow, improving communication and making informed decisions. Despite its potential, the study also identifies challenges such as resistance to change and lack of trained staff, which can hinder the successful deployment of MIS in educational environments. Verma (2022) concludes that in order to fully realize the benefits of MIS, an integrated approach that includes proper training, support and administrative commitment is necessary.

Aldarbesti and Saxena (2014) explore the interconnection of data, information and decision making in the context of Management Information Systems in the education sector. The authors elaborate on how data, when processed into information, becomes the foundation for effective decision making, thus highlighting the importance of MIS in educational management. The research highlights the rapid growth and evolving trends in MIS, particularly in the context of Education Management Information Systems (EMIS), which are vital for formulating strategies, policies and plans aimed at improving educational outcomes. Through case studies of EMIS implementations in Nigeria and Zambia, the authors provide insights into the challenges and successes associated with these systems, offering valuable lessons for other educational contexts. The study advocates for the adoption of a well-structured EMIS to ensure that educational institutions have access to accurate and timely information, which is essential for effective management and policy making. Aldarbesti and Saxena (2014) stress that a strong EMIS can contribute significantly to the overall efficiency and effectiveness of the education sector, particularly in developing countries.

El-Ebiary et al. (2016) investigated the effectiveness of Management Information Systems (MIS) implementation in educational organizations, specifically in Al-Madinah International University in Malaysia. The study explores the benefits and challenges associated with the current MIS in use, using non-random sampling methods and descriptive statistics to analyze survey data from system users. Findings suggest that MIS implementation has been generally successful, with users reporting improved productivity, improved task performance, and a reduction in administrative errors. The system also appears to facilitate better decision-making processes. However, the study also reveals some dissatisfaction among content management officials about the usefulness of the system, indicating areas for improvement. The authors recommend increasing awareness and providing further training on MIS to create a more conducive environment for successful implementation. This study highlights the importance of continuous evaluation and development of MIS to meet the evolving needs of educational institutions and their stakeholders.

Baiden et al. (2023) examine the impact of Management Information Systems (MIS) on productivity in tertiary institutions, focusing on colleges in Ghana. The study highlights the rapid growth of information technology in educational management and its positive impact on school administration such as improved access to information, more efficient use of resources and better time management. Despite these benefits, the study identifies significant challenges that hinder the effective implementation of MIS, such as high costs, lack of competent IT staff, inadequate computer systems and technology-related fears among users. The study uses stratified and purposive sampling techniques, using questionnaires and observation schedules to collect data, which are then analysed using SPSS software. SPSS (Statistical

Package for the Social Sciences) is a statistical analysis software widely used in research for data analysis. It provides tools for managing large data sets, conducting complex statistical analyses and creating graphs and reports. It is used in social sciences, education, medicine and business, facilitating the analysis of trends, correlations and other statistical models accurately and easily. The results highlight the importance of addressing these limitations to enhance the effectiveness of MIS in improving educational management. The authors suggest that overcoming these challenges will require targeted investments in technological infrastructure and training, as well as a cultural shift towards the adoption of digital tools in the educational environment.

Rahmatian (1999) advocates the integration of systems thinking in Management Information Systems (MIS) education, arguing that a systems approach is necessary for effective teaching and understanding of MIS. The paper reviews the historical development of MIS education and emphasizes the importance of maintaining its systems thinking. Rahmatian (1999) argues that systems thinking should not be just a nominal part of the curriculum, but should fundamentally shape the way MIS is taught and understood. The author argues that this approach will better prepare students to manage complex information systems in a way that takes account of wider organisational and environmental contexts. By integrating systems thinking into MIS education, educators can ensure that students develop a holistic understanding of how information systems work in larger organizational systems. This perspective is critical to cultivating the next generation of MIS professionals who can navigate and manage the complexities of modern information environments.

Prasetyo et al. (2023) explore the application of Management Information Systems (MIS) in the online learning process in Madrasahs, highlighting the critical role of MIS in facilitating educational services and improving the learning environment. The study uses a descriptive qualitative approach, collecting data through observations, interviews and documentation to analyse how MIS supports online learning. The findings reveal that MIS, particularly the Educational Management Information System (EMIS), plays an important role in integrating online and offline learning by providing basic technological infrastructure such as learning facilities equipped with computers and internet access. The implementation of MIS in Madrasahs is structured around three key stages: planning, implementation and evaluation of learning. The planning stage includes the development of curricula, lesson plans and learning tools, while the implementation stage includes preliminary activities, core teaching activities and integration exercises. The assessment stage evaluates student outcomes through a variety of methods, including written and oral examinations, assignments and practical assessments. The study highlights the need for continuous efforts to improve the management of online learning to achieve optimal outcomes for students, suggesting that the integration of MIS in Madrasahs can significantly enhance the effectiveness and efficiency of the educational process.

Ajobiewe (2020) examines the role of Management Information Systems (MIS) in school administration, emphasizing their importance in improving efficiency and communication within educational institutions. The study argues that the increasing complexity and demands of modern educational environments necessitate the adoption of robust MIS to address the growing information needs of schools. The study highlights that MIS provides critical support for decision-making processes by ensuring that accurate, timely and comprehensive information is available to administrators. This, in turn, enhances schools' overall performance by improving resource utilisation, reducing workload and enabling better time management. The research also examines the impact of MIS on various administrative functions, including accessibility to information, quality of reporting, and overall effectiveness of school management. The study concludes that successful implementation of MIS in educational institutions is essential to address the challenges of modern school management, particularly in terms of supporting effective communication and decision-making processes. The work of Ajobiewe (2020) highlights the need for educational institutions to invest and fully utilize MIS to improve both administrative and academic outcomes.

Finally, Baharun (2019) also explores the importance of Management Information Systems (MIS) in enhancing the competitiveness of higher education institutions, particularly through the prism of electronic public relations. Focusing on Nurul Jadid University in East Java, Indonesia, the study uses a qualitative case study approach to examine how MIS can improve institutional competitiveness in the increasingly competitive educational landscape. The findings show that MIS plays a critical role in facilitating effective communication between the university and its stakeholders. This is achieved through the use of various digital media and communication techniques that enhance the public image of the institution and attract prospective students. In addition, the study highlights that MIS contributes to cost savings, improves operational efficiency and promotes greater community engagement. By streamlining communication processes and enhancing the institution's ability to reach and interact with its audience, MIS helps Nurul Jadid University maintain a competitive advantage in the higher education sector. Baharun's (2019) research highlights the strategic importance of integrating MIS with electronic public relations efforts to enhance the overall competitiveness of educational institutions.

From the above research it is clear that the exploration of Management Information Systems within educational institutions highlights their important role in improving administrative processes, enhancing decision making and supporting the digital transformation of education. MIS serves as a critical tool for educational institutions to manage information effectively, streamline operations, and maintain competitiveness in an increasingly digital landscape. However, successful implementation of MIS requires careful consideration of institutional needs, adequate training, and ongoing support to address challenges such as resistance to change and technological limitations. Overall, integrating MIS into education systems offers significant benefits, but its effectiveness depends on careful planning, execution, and continuous improvement efforts.

THE CASE OF MYSCHOOL

MySchool is an online platform developed by the Greek Ministry of Education, designed to unify and streamline the management of educational data in all public schools in Greece. The system represents an important step towards the modernization of public administration in education, aiming to provide a centralized and efficient method of managing and accessing information related to schools, staff and students (https://myschool.sch.gr/).

The main function of MySchool is to serve as a comprehensive database containing detailed records for each school unit, including information on school staff, student enrollment, course schedules and overall academic performance. Schools are required to update the system regularly, particularly with respect to teacher enrollment, assigned duties, schedules, and overall classroom structure. In addition, the system stores data on student attendance and academic records, allowing real-time monitoring and management of student progress (https://myschool.sch.gr/).

One of the primary goals of Myschool is to address the basic needs of information storage, data management and communication within the educational system. Prior to the implementation of MySchool, several electronic systems existed, but often operated in isolation, leading to inefficiencies and lack of coordination. MySchool aims to unify these disparate systems into a single, coherent platform, thereby enhancing data security and allowing large volumes of information to be managed more reliably (https://myschool.sch.gr/).

MySchool provides the Ministry of Education with a powerful governance tool, enabling the central administration to have an accurate and up-to-date overview of the education landscape at any time. This feature is vital for informed decision making as it allows policy makers to understand the current state of schools across the country, identify trends and anticipate future needs. In addition, the system functions as a statistical tool, providing valuable insights that can be used to design and implement major upgrades to the Greek education system (https://myschool.sch.gr/).

In practice, MySchool supports various administrative processes within schools. For example, it facilitates the accurate recording and tracking of student absences, which is a critical aspect of student management. Schools can enter and update absence records in real-time, ensuring that this data is always up-to-date and accessible. This functionality not only helps schools maintain discipline, but also allows for early intervention in cases where students are systematically absent (https://myschool.sch.gr/).

In addition, MySchool plays a vital role in ensuring transparency and accountability within the education system. By aggregating data, the platform allows for greater oversight and ensures that information is consistent and easily accessible to those who need it. This transparency extends to the Ministry, school principals, and potentially parents, who may have access to relevant information about their children's school and academic progress (https://myschool.sch.gr/).

MySchool is also part of Greece's broader efforts to align its public administration with European digital governance standards. The platform embodies the principles of e-government, where the use of technology enhances the efficiency, transparency and accessibility of government services. In the context of education, MySchool is a step towards creating a more responsive and data-driven education system that can better serve the needs of students, teachers and administrators (https://myschool.sch.gr/).

In conclusion, MySchool represents a significant advance in the management of educational data in Greece. By integrating various information systems into a unified platform, it addresses many of the challenges previously faced in the management of educational institutions. The system's ability to store, manage and analyze vast amounts of data securely and efficiently makes it an invaluable tool for the Ministry of Education and school administrators.

STUDIES ON MYSCHOOL

Investigation of the acceptance and implementation of Education Management Information Systems (EMIS) within educational settings has revealed critical factors that influence their effectiveness, such as system usability, institutional support and alignment with organizational needs. As educational institutions increasingly adopt these systems to improve administrative efficiency and decision-making, understanding how these technologies are perceived and used by various stakeholders becomes essential. This understanding provides the basis for broader discussions about the role of digital tools such as the MySchool system, which further extend the capabilities of EMIS by integrating them into the everyday practices of educational institutions. As these tools become prominent, it becomes vital to critically evaluate their impact on educational practices, particularly how they shape the experiences of teachers, students and parents, and how they align with broader educational goals.

Firstly, regarding Greece, Kalogeratos, Anastasopoulou and Pierrakeas (2024) investigate the key role of the MySchool Information System in the digital transformation of Greek public schools, with a case study focusing on the region of Achaia. The study highlights how the system has contributed to the transformation of public education units into digital learning organisations, supporting the administrative responsibilities of school principals. The survey, which involved gathering views from primary school principals, highlights the effectiveness of the system in meeting current requirements, but also highlights areas where further development is needed. The findings suggest that while MySchool is a valuable tool for school management, it needs to be improved to keep pace with the growing demands of the education sector, particularly in the context of the ongoing digital revolution.

Sofos & Chroni (2021) document the experiences of two primary schools in Corinthia during the COVID-19 pandemic, focusing on the organisation and implementation of distance education. The study highlights the critical role of school leadership in maintaining communication, cohesion and guidance within the school community amidst the challenges posed by the sudden shift to distance education. The research concludes that the adoption of distance education has opened up new organizational and pedagogical possibilities that should be further explored even after schools are reopened. The study stresses that the integration of digital tools in education should not be limited to technological aspects, but should also include the pedagogical opportunities they offer. To achieve this, a shift from outdated school practices is necessary, with school leaders playing a central role in fostering a collaborative culture that supports co-teaching and effective learning through distance education.

Kessopoulou and Tsibidaki (2021) investigate the electronic communication between school and family during the COVID-19 pandemic, focusing on secondary education in Greece. The study, based on a quantitative survey with a sample of 62 school principals, analyses the changes in communication caused by the pandemic. The findings show that the pandemic led to significant changes, with the adoption of a variety of electronic means of communication. The themes of school-to-family discussions were reshaped, with distance learning taking centre stage. The research reveals that the family and pupils positively adopted the new form of communication, while the urbanity of the area influenced the means and practices of communication. Overall, the research shows that the pandemic has changed the way schools and families communicate, with electronic communication becoming an important factor in the new educational reality.

Finally, Kluvatos (2021) examines the impact of the coronavirus pandemic on distance education and the wider use of information and communication technologies (ICT) in schools. The study says that the pandemic caused an abrupt change in digital learning and communication, forcing schools to adapt quickly to the new conditions. It examines the pre-existing situation in terms of the technological infrastructure of schools, the expertise of teachers and the innovative practices developed during the first wave of the pandemic. The research predicts that the changes resulting from the pandemic will have a long-term impact on future education, leading to an educational environment that is more digitally empowered and continues to evolve.

Savin and Dumitriu (2021) propose the integration of a mobile learning app, MySchool, with the Moodle e-learning platform to improve the effectiveness of training, particularly in pre-university education. The study identifies key shortcomings in existing e-learning platforms, particularly in their design and the structure of training models. By adding a mobile learning component, the authors argue that the MySchool application can address these shortcomings, offering students greater flexibility and accessibility in their learning process. The research outlines the design of the proposed system using the ALDIE software design model and rapid prototyping, establishing functional and non-functional requirements for the application. The authors also discuss the benefits and challenges of mobile learning, concluding that the MySchool application could significantly improve student engagement and learning outcomes when integrated with existing e-learning platforms such as Moodle.

The study by Pitsiava and Vlahopoulos (2015) investigates the role of Information and Communication Technologies (ICT) and the then new Information System "MySchool" in the administrative processes of primary schools, focusing on the perceptions of school principals in the region of Imathia. The survey, conducted through a mixed-methods approach involving questionnaires and semi-structured interviews, reveals that principals are strong supporters of the use of ICT in school administration, as they recognise the significant contribution of the MySchool system in enhancing educational and administrative processes in schools. While the system is perceived positively, particularly in terms of student and staff data management, the study suggests that its current role is somewhat limited, focusing mainly on monitoring and managing educational resources. The research highlights the potential for Myschool to further improve education management, provided it evolves to meet more comprehensive management needs in schools.

The studies reviewed in this section highlight the potential for transforming digital tools such as MySchool into educational environments, underlining their ability to streamline administrative processes and improve communication between schools and stakeholders. However, these technologies also raise significant concerns about the abstraction and quantification of educational practices, which may lead to a limited focus on performance metrics at the expense of more holistic educational goals. Findings suggest that while such systems offer substantial benefits in terms of efficiency and transparency, there is a critical need for ongoing evaluation to ensure that they support, rather than undermine, broader educational goals. Ultimately, successful integration of these systems requires a balanced approach that takes into account both the technical capabilities and the educational values they are intended to serve.

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QUALITATIVE EVALUATION OF OPSYD AS AN EGOV SYSTEM FOR EDUCATION MANAGEMENT

Baga Dina
Administrative Personnel – Computer Scientist
Dieuthinsi Deuterovathmias Ekpedeusis Prevezas
Preveza, Greece
e-mail: dinabaga@sch.gr

Siriou Anastasia
Secondary School Teacher
Tripoli, Greece
e-mail: ansiriou@gmail.com

Skartsili Vassiliki
Administrative Personnel
Kentro Eksipiretisis Politon (Greek Citizen Service Offices)
Kalamata, Greece
e-mail: vasilikiskartsili8@gmail.com

Koulogeorgiou Dimitra
Vodafone Personnel
Tripoli, Greece
e-mail: dimitrakoulo.sar90@gmail.com

ABSTRACT

This qualitative study evaluates OPSYD (Integrated Information System for Primary and Secondary Education), an e-Government system integral to the management of personnel in Greek Primary and Secondary Education. OPSYD, classified as a human resources management information system, enables two-way interaction between educators and regional Education Directorates, allowing electronic application submissions, document uploads, and formal requests. The research, conducted between February and June 2024 through structured interviews in the regions of Epirus and Peloponnese, involved 15 non-permanent teaching staff and 7 administrative personnel from regional education directorates. The interviews aimed to document user interactions, identify difficulties, and gather suggestions for improving administrative processes.

Key findings reveal that the primary concerns are not technical issues with OPSYD itself, but rather challenges stemming from administrative procedures and their implementation, particularly the fragmentation across multiple information systems. This user group advocates for a single information system or automatic data transfer between systems and suggests allowing file updates at any time, not solely during open calls. Administrative personnel reported significant time waste due to repetitive data entry across different systems like MySchool, eDataCenter, and the Human Resource Register, none of which interoperate for automatic data synchronization.

The study concludes that designing and implementing interoperability solutions between existing information systems is imperative to enable mass data input and automated synchronization, thereby reducing processing times and allowing staff to focus on substantive tasks. It also proposes enhancing communication capabilities to facilitate timely error correction for applicants. Recommendations include decoupling document updates in OPSYD from call announcements, allowing continuous submission, and integrating AI-supported chatbots, supervised by human experts, to provide guidance to applicants. Furthermore, incorporating specialized knowledge for assigning educational specialties into the eDiplomas system would ensure automatic and accurate updating of educational specialties directly from universities.

Keywords: OPSYD, e-Government, Human Resources Management, Education Management, Administrative Procedures, Interoperability

INTRODUCTION

The online portal of OPSYD (Integrated Information System for Primary and Secondary Education) is a comprehensive information system for the electronic submission of applications, as well as for the management of personnel in Primary and Secondary Education across the Greek territory. As such, it is classified as an e-Government system.

There are many definitions of e-Government, which vary depending on the perspective of the authors (technological introduction, organizational changes) (Tambouris, E & Tarabanis, K., 2024). This study focuses on the definitions provided by the OECD (Organisation for Economic Co-operation and Development) and the European Union. Specifically, the OECD defines e-Government as "the use of information and communication technologies, particularly the internet, as a tool to achieve better governance" (OECD E-government Task Force, 2023). The European Union defines e-Government as: "the use of information and communication technologies (ICT) in public administrations, combined with organizational changes and new staff skills, aimed at improving public services and strengthening democratic processes and public policy support mechanisms" (European Commission, 2003).

The main characteristics of e-Government, as defined in the Greek Act no. 4727/2020 (Government Gazette 184/A'/23-09-2020), are:

a) the principle of legality (protection of personal data),
b) the principle of transparency,
c) the principle of equality and accessibility,
d) the principle of good administration (efficiency), and
e) the principle of integrity, security, and confidentiality.

However, it is important to emphasize that e-Government is not simply the digitization of bureaucratic procedures but rather a transformation in the operational mindset of government services through technology (Giannoukakou, 2011).

Through the use of technology and various digital tools and platforms, the Greek public sector has become more accessible—both to citizens and to society and the state. The institutional framework for the provision of e-Government services is structured across five levels (Lakazidou, 2021):

- Level 1: Information Services
- Level 2: One-way Communication Services
- Level 3: Two-way Interaction Services
- Level 4: Transactional Services
- Level 5: Personalized Services

OPSYD is a comprehensive information system, which, based on its features and functionalities, can be categorized as a human resources management information system, specifically for Primary and Secondary Education. It belongs to the third level of e-Government service classification—two-way interaction—as educators can interact with the regional Education Directorates, which in turn interact with the Ministry of Education. In other words, beyond simply receiving information, users are able to fill out electronic applications, submit documents, and make formal requests. It is clarified that communication with the Education Directorates is not supported in real-time, e.g., through a dialog system (Chatbot).

The purpose of this study is to evaluate the OPSYD information system as an e-Government system for the Administration of Primary and Secondary Education. It is based on qualitative research conducted between February 2024 and June 2024.

KEY FEATURES

Users of the OPSYD platform initially have the ability to access information about upcoming ranking procedures based on criteria, current open calls for teacher recruitment, the declaration of preferred school placement areas, and more. This information is provided on the system's homepage in the form of announcements, along with user manuals in electronic documents (PDF) and relevant instructional videos.

Beyond the provision of basic information, OPSYD allows users who are educators to electronically submit their applications for recruitment to school units, transfers, or placements by completing the available online forms (O.P.S.Y.D., 2023). At the same time, users from the Education Directorates are required to review and validate the submitted

applications electronically and to enter data concerning the teachers' prior service, based either on the documents submitted by the teachers themselves or from the Directorate's own records (O.P.S.Y.D., 2016).

More specifically, OPSYD serves three types of users: substitute/hourly-paid teachers or members of the Special Educational Personnel (E.E.P.)/Special Support Staff (E.V.P.), permanent teachers, and the administrative personnel of the Ministry of Education. Access to the system is possible either directly at https://opsyd.sch.gr/ , or via the MySchool platform or the gov.gr portal (O.P.S.Y.D., 2022). Logging into the OPSYD portal requires user credentials, after the user has registered and been authenticated through the General Secretariat for Information Systems (GSIS).

With regard to the submission of applications and the updating of personal data by educators, OPSYD is active for a specific period—namely, when there is an open call issued by the Ministry of Education for inclusion in ranking lists or for appointment from existing lists. For inclusion in ranking lists, the process of entering or modifying personal data occurs every three years, and the updated data validated by the Education Directorates and the Ministry is "transferred" to ASEP (Supreme Council for Civil Personnel Selection), provided the applicant has also submitted the relevant application through ASEP's information system.

Applications by educators already on the ranking lists for recruitment are submitted during specific timeframes announced by the Ministry during the academic year, with the majority taking place in July and August each year. Permanent teachers submit transfer applications during designated periods based on ministerial decisions, typically in October and November of each school year.

Until February 2025, the OPSYD online portal operated as an independent information system, as there was no interoperability with any other e-Government information system—except for the initial verification of registered users' personal data via GSIS. Since then, OPSYD has been linked with AADE (Independent Authority for Public Revenue) to check whether newly appointed educators have any commercial activity, using their tax identification number (AFM).

ADMINISTRATIVE APPROACHES AND INFORMATION SYSTEMS IN OTHER COUNTRIES

Significant differences can be observed in the organization of educational systems across European Union countries. In most countries, the administration of education is decentralized, managed either by the governments of federal states or by equivalent local authorities (second-level municipalities), and in some cases, even first-level municipalities (e.g., Austria, Belgium, Germany, Spain). In contrast, in countries such as France, Greece, Cyprus, and Portugal, education is centrally organized and administered by state bodies (e.g., Ministry of Education). In Portugal, Higher Education is under the jurisdiction of a separate ministry, whereas Primary and Secondary Education fall under the Ministry of Education. These variations in educational governance influence teacher recruitment procedures and lead to the development of distinct information systems in each country.

In France (European Commission Eurydice, 2023[b]), prospective teachers must complete a two-year postgraduate program in pedagogy and teaching. Upon completion, they must pass certification exams (separate certifications for primary and secondary education). Successful candidates are initially hired as probationary teachers and later appointed permanently. This certification also qualifies them for employment in private schools. Those without certification may be hired for short periods and limited hours, mainly to substitute for permanent teachers on leave. These local-level hirings follow special procedures.

In Cyprus (European Commission Eurydice, 2023[a]), the Education Service Commission (ESC) (E.E.Y. Cyprus, n.d.[a]) is responsible for teacher appointments, placements, confirmation of appointments, ranking, tenure, promotions, transfers, secondments, granting of services, retirements, and the exercise of disciplinary control—including dismissal or release from duties. Teacher recruitment is based on ranking lists. Until 2027, two such lists are in use: one for first-time appointees and one for those previously employed on a contract basis. Applications to be included in the lists may be submitted at any time but are assessed for ranking either at the end of each year—with the appointment list announced in early February—or on August 31st—with the eligibility list published in September. These lists remain valid from January through December of the following year.

Applications are submitted electronically through the ESC's website after user registration (E.E.Y. Cyprus, n.d.[b]). The platform uses electronic forms equipped with automated checks to ensure accurate data entry by applicants. Appointments for permanent positions, contractual placements (similar to substitute teachers in Greece), or temporary replacements are made based on ranking order within the lists. Applications must be submitted within 15 days of the public notice published on the Commission's website.

In Portugal, teacher recruitment begins with the publication of a national public notice, followed by the submission of electronic applications. The process resembles that of Greece (European Commission Eurydice, 2024), but participation is limited to individuals holding a certificate of pedagogical competence, as is also the case in France. Additionally, previous teaching performance evaluations are taken into account during candidate ranking. Since February 2024, SIGRHE—a nationwide online portal managed by the Ministry of Education (DGAE)—has been used for Human Resource Management (DGAE - Ministry of Education - Portugal, 2024). The platform was developed using the OpenERP (Odoo) tool (Odoo, n.d.).

In general, from the cases examined, it is evident that legislation, the structure of the educational system, and the institutional culture of the bodies responsible for teacher career management have resulted in different approaches and have shaped highly specific needs and solutions in each country.

EVALUATION METHODOLOGY

This paper is a qualitative study based on the analysis of data collected through structured interviews with users of the OPSYD system in the regions of Epirus and the Peloponnese, during the period from February 2024 to May 2024.

The purpose of the interviews was to document the ways users interact with the OPSYD system, the difficulties encountered by each user group (teachers and administrative staff), and to highlight suggestions for improving the processes followed in daily administrative practice. The interviews were structured in a way that allows for an assessment of the information system as a system of governance, following the structure below:

- Identification of OPSYD services used by the participant
- Issues encountered while using the application
- Issues related to administrative organization and procedures
- Suggestions for improvements/solutions to the problems
- Suggestions for changes to administrative processes

A total of 15 interviews were conducted with non-permanent teaching staff and 7 interviews with administrative staff from regional education directorates. The interviews were conducted by the members of the writing team. They were held in person, as one-on-one discussions with each participant, based on the interview structure described above. For each participant, the responses were recorded and categorized according to the structured interview format. The interviews with administrative staff were conducted at their workplace.

After all interviews were completed, the responses were processed in order to identify common problems and proposed improvements, which are presented in the following section.

EVALUATION FINDINGS

The main findings of the qualitative research conducted are presented separately for the two categories of users who participated in the study: non-permanent teaching staff and administrative personnel of Regional Education Directorates.

Non-Permanent Teaching Staff:

The main concern of non-permanent teaching staff relates to the process followed for submitting applications for inclusion in ranking lists. The obligation to submit an application to ASEP (Greek Supreme Council for Civil Personnel Selection) and subsequently requests for data updates in the OPSYD platform causes confusion and stress among candidates. As a result, many turn to third-party "specialists" to submit the relevant applications on their behalf.

Compared to the older process, where candidates had to submit physically their supporting documents to the local Directorate of Education for review, they consider that there has been significant improvement as the new process reduces waiting times. However, the personal contact with employees previously allowed better identification and guidance for submitting the correct supporting documents.

Moreover, a major issue raised was the lack of two-way communication in cases where a document was rejected, or the inability to correct it. The problem lies in the fact that, although Education Directorates could provide justifications for the rejection of a request, these justifications were not visible to the applicant teacher. Even if visible, corrections could not be made once the application submission deadline had passed.

Finally, since most non-permanent teachers have already uploaded their documents to the ASEP platform for participation in hiring processes of other ministries (beyond the Ministry of Education), they believe there is no reason to repeat the process on the OPSYD platform and re-enter all their information.

Improvement proposals concern both the use of the application and the enhancement of the processes. Regarding the process, non-permanent teachers suggest the use of a single information system or the ability to automatically transfer data from one system to another. They also emphasize that updates to a teacher's file should be allowed at any time, not only when a call for ranking list submissions is open. In terms of application usage, they suggest that the comments from the Education Directorate about any issues with the documents should be visible, and corrections should be allowed.

Administrative Personnel of Regional Education Directorates:

The main concern expressed by Directorate employees is the repeated entry of the same personal data into different information systems used to handle administrative procedures. Specifically:

Myschool (https://myschool.sch.gr/) is used for the daily management of schools and records data for both permanent and non-permanent teachers. *eDataCenter* (https://edcportal.minedu.gov.gr) holds data about permanent teachers and is used for their transfers.OPSYD contains similar data and is used for teacher secondments. The *Human Resource Register of the Hellenic Public Sector* (https://hr.apografi.gov.gr/login) holds part of this information and is used for administrative changes such as transfers, secondments, and evaluations. These systems do not allow for the automatic update of shared data (e.g., identification info, family status, placements), leading to wasted time on repetitive procedures. This is especially burdensome given the ongoing staff shortages since 2010, resulting in excessive workloads—particularly in the HR and Financial departments.

In addition, with regard to processing applications of non-permanent teachers for inclusion in ranking lists, employees find it very difficult to identify the correct degree titles—especially after the merger or upgrade of former Technological Educational Institutes (TEIs) into Universities. They struggle to understand the certifications issued by the new institutions. It is important to clarify that students who studied at former TEIs, which have now merged into new university institutions, follow the curricula of the original TEIs and receive degrees reflecting the name of the department at the time of their admission, even if the current name of the issuing institution differs.

Many also point out the difficulty of verifying the correct level of foreign language proficiency, especially in German, noting the need for constant communication with the relevant departments of the Ministry of Education. They also emphasize that the time available to review user applications is very limited. These procedures take place in June and July, during which multiple critical administrative changes happen simultaneously (e.g., dismissals of non-permanent teachers, hiring of permanent ones, secondments, transfers, and placements of permanent staff).

Regarding the use of the OPSYD system itself, no major issues were recorded, as most administrative staff focused more on the procedures and how these are integrated into their annual operational planning.

DISCUSSION

By analyzing the collected observations, it becomes evident that concerns regarding the use of OPSYD focus primarily on the design and implementation of the procedures for the submission and verification of supporting documents. The main issue is not the use of the information system itself, but rather how it is utilized—particularly the multitude of different information systems handling identical or similar personal data that individuals must manage in both their personal and professional lives.

Specifically, OPSYD is used by non-permanent teachers to submit their supporting documents for inclusion in appointment ranking lists. They are required to submit to OPSYD data that, in most cases, has already been stored in ASEP, the competent authority for the final ranking process. It is understood that the current legislation governing the evaluation of supporting documents for teachers and their classification into teaching specialties is far more complex than that for other positions in the public sector. This means that a potential full transfer of this responsibility to ASEP would burden its procedures with delays. Nonetheless, it is possible to explore, design, and implement interoperability solutions between the two systems, allowing the utilization of already verified documents.

Furthermore, as evident from the research observations, various personal data are used across numerous information systems in daily administrative practice (e.g., MySchool, eDataCenter, Human Resources Registry, eDiplomas[15]) and possibly other locally developed systems within individual services.

In our opinion, it is imperative—not necessarily to unify these systems—but to ensure the capability for mass data input and automated synchronization between systems. This should include automatic detection of the data that require human intervention and correction (e.g., differences in the point calculation for hiring, transfers, or secondments). We believe that implementing such technical interoperability solutions would positively impact administrative procedures in terms of processing time and allow focus on substantial administrative tasks beyond the repeated input of identical data into separate management systems.

Another important finding from the research is that emphasis should shift toward integrated communication and interaction capabilities so that any errors can be corrected in a timely manner, preventing the exclusion of teachers from hiring processes due to mistakes that are rectifiable. The purpose of Public Administration is not to punish the citizen, but to assist them in fulfilling the required procedures as defined by legislation. To this end, we suggest the incorporation of AI supported chatbots to provide necessary guidance to the teacher applicants, given they are supervised by human administrative experts, that can identify their performance and take measures when needed.

In our view, the process of updating recruitment-related documents in OPSYD should be decoupled from the announcement of calls for inclusion in ranking lists. This way, teachers could upload their documents as soon as they obtain them, while the verification process could be scheduled at fixed intervals during the school year to avoid additional workload. Meanwhile, hirings would proceed based on the valid ranking lists, which are updated every three years.

CONCLUSION

The evaluation of OPSYD as an electronic governance system in Education showed that the problems we identified are not technical issues, but mainly problems in administrative procedures and their implementation. We observe that the information systems used by education administrative services are legacy systems designed or adapted to address different needs of administrative changes (hirings, secondments, transfers) and now contain a large amount of data on both permanent and potential teaching staff of primary and secondary education. The design and implementation of interoperability solutions between the available systems is imperative. In our opinion, implementing new unified systems that integrate all processes is time-consuming and only temporarily solves the problems, since new legislation will create the need for new systems to address any new processes that arise as needs of the time. Interoperability must be required for every new information system that emerges in the future, and in a specific and structured way that addresses the different methods of storing information between various systems, addressing the Principle of once-only Design, as described in the Greek Bible of Digital Transformation (Hellenic Republic Government, 2020). Similarly, for every old and still in-use system, interoperability must be ensured with each of the existing information systems.

Emphasis should also be given to exploring the incorporation of AI assistants (e.g. chatbots) into the communication between public administration and citizens (applicant teacher). Human like dialogues coupled with knowledge acquired from manuals, guidance documents, call texts and human expertise should be implemented, tested and incorporated in everyday administrative practice, to provide quick and quality support when needed.

Finally, to address the problems of specialized knowledge required for assigning educational branches to graduates, we propose to incorporate this knowledge into the eDiplomas information system, to which all universities in the country have either been integrated or are expected to be integrated for the degrees they issue. In this way, we ensure the updating of educational specialties en masse and automatically, directly from the institutions issuing the degrees, which does not impose any additional burden on them but guarantees the proper treatment of prospective teachers even against future, currently unknown, changes.

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EDUCATIONAL DIGITIZATION: CHALLENGES, OPPORTUNITIES, AND ITS IMPORTANCE FOR MODERNIZATION AND EQUALITY IN THE EDUCATIONAL PROCESS

Ntentes Ilias
Economist, PE80 & Electronics, PE84
1ºGeneral Higj School of Preveza
Preveza, Greece
email: iliasde66@gmail.com

ABSTRACT

This paper examines digitisation in education, focusing on understanding its basic concepts, its historical development, global trends, its importance and its application in public education, as reflected in the relevant literature. It aims to provide a comprehensive overview of the various dimensions of digitisation in education, as well as the challenges and opportunities arising from the use of technologies in educational processes. In addition, it aims to highlight the importance of digitisation for modernising education and enhancing students' skills, while examining its impact on equity and accessibility in education.

First, the paper examines the definition and scope of digitisation in education. Some of the main features of digitisation include the integration of digital tools and resources, such as e-platforms, digital textbooks and online learning platforms, which enable teaching and learning in a variety of environments and formats. Digitisation extends to many areas, such as the storage and distribution of materials, the interaction between students and teachers and the possibility of customised learning pathways for students.

The process of digitisation started with the introduction of computers in classrooms and gradually evolved with the use of online tools and platforms. Today, digitisation is promoting the development of new pedagogical models that combine interactivity and personalisation of learning, allowing students to interact with the teaching material and actively participate in the educational process. Through these tools, it is possible to better organise and monitor the educational process and to ensure the proper functioning of schools.

A key element of the work is the analysis of digitisation in education, which strengthens students' digital literacy skills, preparing them for the demands of the 21st century and the modern labour market. The development of skills such as critical thinking, creativity and problem-solving is becoming imperative to ensure the smooth integration of students into the information and technology society. In addition, digitisation offers the possibility of effective management of the educational environment, both at administrative and pedagogical level, making educational processes more efficient, flexible and adapted to modern needs.

This paper then focuses on enhancing equity in education by ensuring that educational resources are accessible to all students, regardless of socio-economic status or geographical location. The COVID-19 pandemic has accelerated this process, making digital solutions essential to ensure uninterrupted education in challenging circumstances. The increased reliance on digital technologies during the pandemic highlighted their fundamental importance for the adaptation and effectiveness of the education system in emergency situations. Today, digitalisation is recognised as a critical element for the modernisation and evolution of education, contributing to the transformation of the educational process in the era of digital transformation.

Keywords: Digitization, education, modernization.

THE THEORETICAL BACKGROUND

DIGITISATION IN EDUCATION: DEFINITIONS AND CONCEPTS

DEFINITION AND SCOPE

Digitalisation in public education refers to the overall transformation of educational systems, processes and practices through the integration of digital technologies. This transformation involves moving from traditional, often paper-based, teaching and management methods to the use of digital platforms that enable more interactive, effective and accessible learning experiences. In the context of public education, digitisation includes the adoption of tools such as online learning management systems, digital textbooks, virtual classrooms and data-driven decision-making processes. These technologies facilitate the delivery of content as well as the management of educational functions, enhancing the overall educational environment (Selwyn, 2011).

The scope of digitisation in education extends beyond the mere digital reproduction of existing practices, as it involves a rethinking of pedagogy, curriculum design and the roles of teachers and students. Digitisation is characterised by the integration of interactive technologies that enable personalised learning experiences, real-time feedback and the development of digital literacy skills that are essential in the 21st century. This digital transformation is not limited to the classroom, but also includes the administration of educational institutions, where digital tools streamline functions such as enrollment, attendance tracking, and communication with parents and the community (Selwyn, 2011).

THE HISTORICAL CONTEXT OF DIGITISATION

The historical context of digitisation in education reflects a gradual evolution that started with the introduction of computers in schools in the second part of the 20th century, initially in developed countries. Early milestones include the use of computers for administrative tasks and the introduction of computer science courses in schools (Papert, 1980). The 1990s saw an increase in the use of the internet, which brought about significant changes in educational practices, including the use of email for communication and the emergence of online resources. The early 2000s marked the beginning of a more profound change as e-learning platforms and online courses became more prevalent, leading to the development of Massive Open Online Courses (MOOCs) and other online educational resources (Selwyn, 2011).

One of the key milestones in the evolution of digitisation in education was the introduction of the 1:1 computing initiative, where schools began to provide individual devices to students, such as laptops or tablets, to facilitate digital learning (Bebell & O'Dwyer, 2010). This initiative highlighted the growing recognition of the potential of digital tools to improve learning outcomes. In recent years, the rise of mobile and cloud computing technologies has further accelerated the digitisation process, making educational resources more accessible and enabling new forms of collaborative learning (Johnson et al., 2016).

GLOBAL TRENDS IN THE DIGITISATION OF EDUCATION

Global trends in the digitisation of education reveal an area where the pace and success of digitisation efforts vary significantly between regions and countries. In developed countries, such as the United States, the United Kingdom and several European countries, digitization in education has advanced rapidly, driven by significant investments in technology infrastructure and professional development for teachers (OECD, 2015). These countries have experienced widespread adoption of digital learning platforms, online assessments and data analytics to support personalized learning and improve educational outcomes.

In contrast, many developing countries face significant challenges in their digitisation efforts, including limited access to technology, inadequate infrastructure and a lack of trained teachers (UNESCO, 2020). However, there are notable examples of successful digitization initiatives in these areas, often supported by international organizations and private sector partnerships. For example, countries such as India and Brazil have implemented large-scale digital literacy programmes to increase access to quality education for underserved populations (Warschauer & Ames, 2010). Furthermore, the COVID-19 pandemic has served as a catalyst for digitization across the world, forcing even the most resource-constrained regions to adopt digital solutions for continuous education delivery (Hodges et al., 2020).

THE IMPORTANCE OF DIGITISATION

The importance of digitisation in public education is multifaceted, with significant implications for educational outcomes, accessibility and equity. Digitalisation has the potential to improve learning by providing students with access to a huge range of resources and tools that can be tailored to individual learning needs. Digital platforms enable

personalised learning experiences that cater for different learning styles and paces, thus improving student engagement and achievement (Means et al., 2010). In addition, digitization supports the development of assessment practices by providing real-time feedback, allowing teachers to make data-driven decisions that can directly address learning gaps.

Accessibility is another crucial aspect of digitisation, as digital tools can break down geographical and physical barriers to education. Online learning platforms allow students in remote or underserved areas to access high-quality educational content and connect with teachers and peers worldwide (Anderson & Simpson, 2012). This increased accessibility is particularly important for marginalized groups, including students with disabilities, who can benefit from assistive technologies and other digital tools designed to support different learning needs.

In addition, digitisation plays a crucial role in promoting equality in education. By providing equal access to digital resources and opportunities for all students, regardless of their socio-economic background, digitisation can help level the playing field and reduce educational inequalities (Selwyn, 2014). However, this potential depends on addressing the digital divide by ensuring that all students have access to the necessary devices, internet connectivity and support to fully participate in the digital learning environment.

THE DIGITISATION OF PUBLIC EDUCATION IN THE RELEVANT LITERATURE

The literature on the digital transformation of education presents a multifaceted exploration of how digitisation is reshaping education systems worldwide. Scholars have examined various aspects of this transformation, including the role of digital assets, digital labour and digital capacity in facilitating overall change within educational institutions. The transition from traditional to digital learning environments has been accelerated by global challenges, such as the COVID-19 pandemic, causing a reassessment of educational strategies and practices. The body of research presented below highlights the complexities involved in integrating digital technologies into education, emphasising the need for strategic planning, inclusive digital practices and a deeper understanding of the pedagogical implications of digitisation. The studies carried out analysing the implications and opportunities associated with digital transformation contribute to a broader debate on how education systems can evolve to meet the demands of the digital age.

Initially, Qayyum (2023) proposes an index of digitization of education that includes four critical variables: digital data, digital usage, digital work and digital outcomes. This index serves as a tool to assess the extent of digital transformation in education systems worldwide. While considerable research has focused on digital use - applying specific digital technologies to educational environments - Qayyum (2023) argues that countries with significant digital assets and a strong commitment to digital work are better positioned to transform their education systems overall. The COVID-19 pandemic highlighted the importance of these factors, as they played a key role in maintaining continuity of education during crises. It also highlights that, moving forward, researchers and practitioners need to prioritise digital access and work over simply expanding digital use. He suggests that future research should focus on indicators of digitization of education by country, best practices for addressing the challenges of digital work, and the impact of digitization on existing open and distance learning institutions. Ultimately, it argues that the critical question is not whether education systems should digitise, but rather what specific problems digitisation can solve in a given context. This perspective prompts a reassessment of how to approach digital transformation and highlights the need for continued research in this evolving field.

In the context of higher education in Thailand, Romprasert and Monjagapate (2020) explore the challenges and prospects of digitisation of university systems, particularly in autonomous institutions. Despite being independently organized, many Thai universities still operate under inefficient, bureaucratic frameworks, relying heavily on form-based documents. The authors argue that redesigning these systems to incorporate digital technologies is necessary but fraught with challenges, including significant costs and the need for specialized training and expertise. Although foundational technologies have been implemented, the transition to fully digitised education - where online learning and distance learners are the norm - remains incomplete. The authors criticise the slow adoption of active learning methods, which the Thai government has repeatedly stressed as necessary but not fully implemented. To address these shortcomings, Romprasert and Monjagapate (2020) recommend the adoption of digital instruments and a comprehensive redesign of university systems. They argue that these changes are necessary to meet current market demands for labour and to enhance the overall efficiency and effectiveness of educational institutions. The authors also highlight the importance of ongoing support and training for educators to ensure the successful implementation of these digital initiatives. Their work highlights the complexity of digitising education systems, particularly in contexts where traditional practices are deeply entrenched.

Shakhina et al. (2022) focus on the broader challenges of digitisation in the educational environment, emphasising the role of digital literacy as a cornerstone of this transformation. The authors argue that successful

digitization of education depends not only on the availability of digital technologies but also on the digital literacy of teachers. Digital literacy, as defined by Shakhina et al. (2022), includes a set of knowledge and skills necessary for the safe and effective use of digital technologies and Internet resources. The authors distinguish between digital literacy and digital competence, noting that the former includes elements of motivation and responsibility, which are crucial for the effective integration of digital tools in the educational process. The study identifies different levels of digital literacy - basic, advanced and proficient - each of which is characterised by different skills and competences. The authors also discuss the role of digital marketing in managing the digitisation of educational institutions, highlighting the importance of creating new digital communities, monitoring changes in the institution's image and developing customised marketing materials. Shakhina et al. (2022) conclude that the digital transformation of education is not only about adopting new technologies, but also about promoting a culture of digital literacy and competence among teachers and students. Their work highlights the complexity of digitising education systems, particularly in contexts where traditional practices are deeply entrenched.

Strokov (2020) provides a comprehensive analysis of the digitization process in contemporary education, emphasizing its relevance in the post-industrial era where the effectiveness of education directly affects the readiness of society to face various challenges. The author argues that as modern technologies increasingly affect education, they simultaneously require a reassessment of existing educational practices and their wider societal implications. Strokov (2020) identifies several critical problems associated with digitalisation, including the risk of dehumanising educational and social relations, the potential deepening of spiritual culture crises and the rise of pragmatism and individualism driven by personal comfort and consumption. Despite these challenges, the author outlines promising prospects for the future of digitization in education. These include equipping educational institutions with high-quality software, integrating information and web-based technologies, and adapting to new organisational structures. Strokov (2020) concludes that for digitization to succeed, it must be harmoniously integrated with the best traditions of domestic education while addressing the evolving socio-cultural needs of modern society. This dual approach, the author suggests, will not only modernise education but also contribute to the wider socio-economic and cultural development of society.

In another important study, Ronzhina et al. (2021) explore the impact of global digital transformations on the education sector, particularly in the context of the digital economy and society. The research focuses on assessing the quality of digitisation in Russian higher education through a questionnaire survey involving students and teachers at the Russian State Vocational Pedagogical University. The study reveals a generally low penetration of digital technologies in Russian higher education, as indicated by the participants' ratings. However, the contribution of digitisation to academic performance was moderately positive, although there were significant differences between students and teachers on the role of digital environments in education. Students found the digital environment more convenient compared to professors, highlighting a generational gap in the acceptance and use of digital tools. This research highlights the importance of further developing digital education strategies that align with both student expectations and pedagogical goals. The authors suggest that the insights gained from this study could contribute to reforms in the education system, thus accelerating and enhancing the digitization process in Russian universities.

Zizikova, Nikolaev and Levchenko (2023) delve into the need for a qualitative transformation of educational content through digitisation. The authors emphasize that digital technologies have become an integral part of educational processes at various levels of education, from preschool to higher education. Drawing on both domestic and international sources, the study presents examples of the use of digital resources and its impact on educational outcomes. A key focus of the research is the dual role of education not only in transmitting knowledge and skills but also in shaping responsible individuals. The study highlights the benefits of digitisation, such as improved access to information and enhanced learning opportunities. However, it also highlights important disadvantages, including the potential for digital tools to exacerbate inequalities and undermine traditional educational values. The authors call for a careful and strategic approach to integrating digital technologies into education, one that takes into account existing experiences and aligns with the long-term goals of educating the younger generation. They argue that while digitisation offers many opportunities, its implementation needs to be carefully managed to ensure that it supports rather than detracts from the educational mission.

Godin and Terekhova (2021) explore the multifaceted impact of information and communication technologies (ICT) on educational institutions, proposing a framework for understanding digital transformation in education. They argue that ICT integration affects educational institutions in four main dimensions: pedagogy, technology, organisation and economics. To analyse these impacts, the authors introduce four models that collectively describe the potential transformations caused by technology in education. These include a value chain model, which outlines the primary and secondary activities of educational institutions, and a quality chain diagram, which maps the sequence of activities within these institutions. In addition, they propose a model of a routine loop for teachers, which captures the daily activities of teachers in relation to software and communication technologies. Finally, the event chain process model details the interactions between students, teachers and educational materials, highlighting the role of ICT in these interactions. This

integrated modelling approach provides a powerful tool for examining the ongoing digital transformation in education, offering insights into how technological developments can be harnessed to enhance educational practices. By integrating these models, the study sheds light on the complexities of digitization and its potential to substantially reshape educational institutions.

Tække and Paulsen (2017) propose a theory of digitalisation in education based on an empirical study that describes how classroom teaching evolves in response to the pervasive influence of digital media. They introduce the concept of the 'three waves' of digitisation, describing a dialectical process of change within educational contexts. In the first wave, the traditional, closed classroom is disrupted as students gain access to the Internet, leading to challenges in maintaining focus and structure in teaching. Teachers often find themselves unprepared to manage these new dynamics, resulting in a period of adjustment. The second wave sees a re-evaluation of the teaching environment as social media and other digital tools are integrated into teaching practices, helping to restore focus and use more interactive learning experiences. In this phase, the Internet begins to enhance rather than disrupt the educational process. The third wave represents the maturation of digitisation in education, where teachers and students engage in meaningful interactions with external experts, researchers and other third parties, enriching the educational experience. This final stage marks a significant change in the way education is delivered, with digital media enabling a more open, connected and dynamic learning environment. Tække and Paulsen's (2017) theory provides a valuable framework for understanding the stages of digital transformation in education and highlights the potential of digital tools to fundamentally change traditional pedagogical models.

Pettersson (2021) examines the concept of digitisation in education through the prism of cultural-historical activity theory and learning levels, arguing that digitisation is not just about the application of technology but involves integrated organisational and pedagogical changes. The study focuses on two schools with extensive digitization processes, analyzing how these institutions perceive and implement digital practices. Pettersson (2021) finds that the way schools understand and define digitisation significantly affects their planning, budgeting, professional development and overall organisational strategy. The study highlights the importance of clear discussions about what digitisation entails, as different interpretations can lead to a variety of approaches and outcomes. For example, if digitisation is perceived primarily as a technological upgrade, schools may focus more on acquiring hardware and software, possibly neglecting necessary pedagogical adaptations. In contrast, a broader understanding of digitisation that includes pedagogical innovation and organisational restructuring may lead to more holistic and effective educational transformations. Pettersson's (2021) research highlights the need for schools to engage in deep, thoughtful conversations about the meaning and implications of digitisation to ensure that the process leads to meaningful and sustainable educational improvements.

Alnagrat et al. (2022) explore the impact of digitisation strategies in higher education, particularly in response to the unprecedented challenges posed by the COVID-19 pandemic. The authors discuss how the rapid shift towards online learning and virtual education has forced institutions, educators and students to seek flexible solutions to mitigate disruptions. Through a comprehensive review of the academic literature, the study identifies the key processes, issues, and implications associated with this rapid digital transformation. The findings suggest that digitisation strategies were crucial to enable higher education institutions (HEIs) to adapt to the challenges of the pandemic. The authors highlight the emergence of new learning opportunities through technologies such as virtual reality, which has become increasingly important in the digital learning landscape. The study highlights the need for HEIs to develop strong digital learning strategies that are practically focused and inclusive. This approach not only supports the continuity of education during crises, but also promotes the long-term sustainability of education systems. The research highlights the importance of strategic planning and policy development to ensure effective integration of digital learning technologies in higher education, paving the way for future developments in the field.

Vivitsou (2019) offers a critical examination of the metaphor of digitisation within educational discourse, exploring how this concept has evolved in response to the socio-economic changes of the twenty-first century. The study argues that digitisation has become a dominant narrative in education, often constructed as an essential and inevitable process to be embraced to address contemporary challenges. However, he argues that this narrative has been imbued with a sense in which digitisation is portrayed as a panacea that transcends its practical applications. Through a thematic and discourse analysis of policy and educational research documents, the study reveals how digitisation is framed in abstract and sometimes vague terms that can obscure the real implications and challenges of integrating technology into education. It also highlights how these narratives often blur the boundaries between technological and educational domains, leading to a discourse that can be both empowering and problematic. The study calls for a more in-depth understanding of digitisation, one that critically examines its underlying assumptions and addresses the complex realities of applying digital technologies in educational settings. In this way, educators and policymakers can better navigate the potential benefits and pitfalls of digitisation.

Rosak-Szyrocka (2024) explores the evolving landscape of higher education in the context of digitisation, focusing on the transition from University 4.0 (University 4.0) to the anticipated University 5.0 (University 5.0). The study uses a comprehensive analysis of research articles published between 2019 and 2023 to map current trends and future directions of digitisation in higher education. The findings reveal that digitisation is not just a technological change, but an interdisciplinary phenomenon that intersects with areas such as technology, education and management. The analysis highlights the strong links between digitisation and concepts such as online learning, digital transformation and sustainable development. The study suggests that the next evolution, University 5.0, will be characterised by a fully integrated digital environment that not only enhances educational processes but also aligns with sustainable development goals. Furthermore, Rosak-Szyrocka (2024) stresses the importance of developing soft skills, particularly emotional intelligence, among educators to effectively navigate this digital future. The study concludes that as universities continue to evolve, they must focus on creating a balance between technological advances and the human elements of education to promote a more holistic and sustainable educational environment.

Siljebo (2020) addresses the critical need for theoretically robust definitions of digitisation and digital transformation within educational research, particularly within schools. The author argues that while digitisation is often seen as a prerequisite for digital transformation, it does not necessarily enable such transformation. The study argues that both digitisation and digital transformation need to be fundamentally grounded in concepts of human learning and development to make sense in the educational context. This theoretical framework was empirically tested through a survey of seventeen Swedish school principals, which provided support for the proposed definitions and their practical application in the school environment. The findings suggest that leaders' perceptions align with the theoretical perspective, indicating that digitalisation, when understood in relation to learning and development, offers a solid basis for guiding digital transformation in schools. However, the study also acknowledges its limitations, particularly the small sample size, and calls for further research to refine and extend these definitions, especially in the context of distance learning in rural schools. Siljebo's (2020) work makes an important contribution to educational theory by offering an understanding of digitisation and its role in promoting educational transformation.

Finally, Mišianiková et al. (2021) explore the digital transformation of primary and secondary schools in Slovakia, focusing on the use of the SELFIE survey as a tool for training school principals. The authors stress the importance of a well-structured and systematically managed digital transformation process that is aligned with the evolving needs of the digital age. Their study highlights the critical role of school leaders and digital coordinators in leading this transformation, ensuring that schools not only adopt digital technologies but also integrate them meaningfully into the educational environment. The SELFIE tool was used to assess the current state of digitisation across various dimensions, including perspectives from leaders, teachers and students. The results of this assessment provided the basis for schools to develop customized action plans to achieve comprehensive digital transformation over a four-year period. The study highlights the importance of long-term support for school leaders as they navigate the complexities of digital transformation, suggesting that this support is essential for successful implementation at the national level. Mišianiková et al. (2021) contribute to the debate on digitisation in education by showing how structured assessments and leadership training can lead to effective transformation in schools.

CONCLUSIONS

This paper examines educational digitization as a complex and multidimensional transformation that significantly influences the operation of educational systems, pedagogical practices, and equity in access to knowledge. Through the analysis of theoretical concepts and a comprehensive review of the relevant literature, it highlights the key parameters, challenges, opportunities, and the importance of digitization for modernization and social justice in the educational process.

Digitization is defined not merely as a technological upgrade, but as a profound organizational and pedagogical change that redefines the roles of teachers and students, impacts curriculum design, and introduces new forms of learning and assessment. The historical overview demonstrates the gradual integration of technologies, from the first computers to the establishment of digital learning environments, with the global pandemic acting as a catalyst that accelerated developments and exposed the need for flexibility and resilience in education systems.

Challenges identified in the literature include implementation difficulties in countries with limited infrastructure, the need for professional development, inequalities in access to technology, and the risk of depersonalizing the educational relationship. Nevertheless, the opportunities offered are equally important: personalized learning, data-driven teaching improvements, elimination of geographical barriers, and the promotion of educational equity, especially for socially vulnerable groups. Digital competence and literacy are highlighted as critical success factors, along with the necessity for strategic planning, clear conceptual understanding of digitization, and strong leadership within educational institutions.

In conclusion, this study argues that digitization is not merely a technological advancement, but a fundamental pillar for modernizing education systems. When implemented with pedagogical soundness and social sensitivity, digitization can contribute significantly to the creation of a fairer, more flexible, and more effective education system.

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THEORETICAL APPROACHES TO THE PERCEPTION OF INFORMATION SYSTEMS USERS EDUCATION MANAGEMENT

Ntentes Ilias
Economist, PE80 & Electronics, PE84
1st General High School of Preveza
Preveza, Greece
email: iliasde@hotmail.com

ABSTRACT

This paper aims to analyze the theoretical approaches related to the acceptance and adoption of new technologies in the field of education, with particular reference to Educational Management Information Systems (EMIS). Its main purpose is to investigate the parameters that influence the use of these systems by their users, such as teachers, school principals, and other educational stakeholders, as well as to analyze the theoretical concepts related to their usage, through the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Rogers' Diffusion of Innovations Theory.

The objective of the study is to understand the factors that affect the acceptance of Educational Management Information Systems by their users, and to explore the strategies required to enhance the effectiveness of these systems in the educational sector. The paper focuses on examining the implementation of EMIS in various educational environments, analyzing the challenges and difficulties users face, and the potential impacts these challenges may have on the adoption and effectiveness of such systems.

The methodology followed aims to investigate theoretical approaches and evaluate their application at a practical level. Additionally, the study seeks to identify the barriers users encounter during the implementation of EMIS and to analyze strategies that could strengthen their adoption. Central to the discussion is the need for effective user support and training, as well as the improvement of infrastructure necessary for their successful implementation.

The study focuses on analyzing parameters associated with the positive or negative impact of user perceptions regarding the usability and usefulness of Educational Management Information Systems. It also examines the importance of social influence and facilitating conditions in the acceptance of these technologies.

This research presents important findings and proposals for improving EMIS in order to enhance efficiency and equity in education through the use of new technologies.

Keywords: Educational Management Information Systems, Methodology, Users

THEORETICAL APPROACHES TO THE PERCEPTION OF USERS

Theoretical frameworks for user perception and technology adoption are essential for understanding how individuals and organisations adopt new technologies, particularly in the context of education. These frameworks provide insights into the factors that influence the acceptance, use and diffusion of digital tools, including Management Information Systems (MIS) in educational environments. Among the most important models are the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT) and Rogers' Diffusion of Innovations Theory (Rogers' Diffusion of Innovations Theory). Each offers a unique perspective on the process by which users adopt and integrate new technologies into their routines.

The technology acceptance model (TAM), developed by Davis (1989), is one of the most widely recognized models in the field of information systems. TAM argues that two main factors determine user acceptance of technology: perceived ease of use and perceived usefulness. Perceived ease of use refers to the extent to which a user believes that using a particular technology will be effortless, while perceived usefulness relates to the extent to which a user believes that the technology will improve their work performance. These factors influence a user's attitude towards the use of the technology, which in turn influences the user's intention to use the technology, ultimately leading to the actual adoption of the technology. TAM has been extensively validated in various contexts, including education, where it has been used to predict the acceptance of learning management systems, educational software and other digital tools (Venkatesh & Davis, 2000).

Based on TAM, the Unified Theory of Technology Acceptance and Use (UTAUT) was developed by Venkatesh et al. (2003) to provide a more comprehensive understanding of technology adoption. The UTAUT incorporates additional factors such as social influence, facilitating conditions and user demographics. Social influence refers to the extent to which individuals perceive that "significant others" believe they should use the new technology. Enabling conditions include the resources and support available to users that can facilitate the adoption process. UTAUT also considers gender, age, experience and willingness to use as moderators that can influence the impact of these factors on technology adoption. In educational settings, the UTAUT has been particularly useful in understanding the adoption of complex systems such as MIS, where social dynamics and organizational support play a critical role in successful implementation (Venkatesh et al., 2012).

Rogers' (2003) Diffusion of Innovation Theory offers a broader sociological perspective on how new ideas and technologies spread in a society or organisation. Rogers (2003) identifies five key stages in the adoption process: knowledge, persuasion, decision, implementation and confirmation. The theory also highlights the role of individual characteristics (such as innovation) and social systems in the diffusion process. Rogers (2003) categorizes adopters into five groups-innovators, early adopters, early majority, late majority, and late adopters-each of which adopts new technologies at different rates. In the context of education, this theory helps explain how digital tools and MIS can be adopted more quickly by some groups within an institution, while others may resist or delay adoption. Understanding these dynamics is crucial for designing interventions that can facilitate wider acceptance and integration of new technologies into educational environments (Rogers, 2003).

The perception of users in education is deeply influenced by these theoretical frameworks, which collectively emphasise the importance of both individual and contextual factors in technology adoption. In educational settings, perceived ease of use and usefulness (as described in TAM) are critical in determining whether teachers, students, and administrators will adopt new digital tools. For example, if an MIS is perceived as too complex or not particularly beneficial for enhancing educational outcomes, it is unlikely to be widely adopted, regardless of its potential capabilities (Davis, 1989). Furthermore, the role of social influence and enabling conditions (as emphasized in UTAUT) cannot be underestimated in educational institutions, where decisions to adopt technology are often influenced by colleagues, leadership and the availability of adequate training and resources (Venkatesh et al, 2003).

The application of Rogers' Diffusion of Innovation Theory to education further illustrates the challenges and opportunities associated with the introduction of new technologies. Teachers and administrators categorized as innovators or early adopters are often more willing to experiment and support new tools such as MIS, paving the way for wider acceptance within the educational institution. However, for widespread adoption to occur, it is necessary to address the concerns of the early and late majority, who may require additional support and evidence of the technology's effectiveness before committing to its use (Rogers, 2003). This diffusion process is particularly important in large educational organisations, where successful integration of technology often depends on the ability to manage change across diverse groups with different levels of technological competence and openness to innovation.

USERS' PERCEPTIONS OF EDUCATION MANAGEMENT INFORMATION SYSTEMS IN THE MODERN LITERATURE

An exploration of Education Management Information Systems (EMIS) reveals their critical importance in enhancing administrative efficiency and decision making within educational institutions. Based on the general understanding of EMIS as a tool to streamline operations and support educational management, the following studies delve into the perceptions of EMIS users in various educational contexts. These studies highlight the varying degrees of success, challenges and opportunities associated with EMIS implementation, providing an understanding of how these systems can be optimized to meet the specific needs of different educational environments.

Alshamsi et al. (2023) investigate the factors that influence the intention to use educational management information systems (EMIS) in private universities in the United Arab Emirates. The study uses a quantitative approach, using the Technology Acceptance Model (TAM), Task Technology Fit (TTF) and DeLone and McLean (D&M) models, alongside trust as a new variable, to examine the relationships that influence executive decisions to adopt EMIS. Data were collected using a structured questionnaire and analyzed using IBM SPSS and Partial Least Squares (PLS) software. The results provide valuable insights into how usability, work technology, and trust significantly influence the intention to use EMIS. The findings highlight the need for private universities to focus on these key factors to ensure successful EMIS implementation. The study suggests that understanding these influences can help senior managers make informed decisions about EMIS adoption and integration, thereby improving the effectiveness of information management within their institutions.

Jallow and Sanner (2023) explore the role of EMIS in improving equity in education, focusing on a case study from The Gambia. The study examines how the Ministry of Basic and Secondary Education (MoBSE) in The Gambia uses EMIS, supported by digital technologies, to monitor and address inequitable distribution of educational resources. The case study methodology includes interviews, observations and thematic content analysis to explore the challenges and opportunities associated with implementing EMIS at the regional level. The findings reveal that challenges in the delivery of education services are primarily due to organizational, institutional, capacity, infrastructure and resource constraints. However, the most significant challenge identified is the lack of access and capacity to use data-an information challenge that EMIS aims to address. The study concludes that overcoming these information challenges is necessary to improve the efficiency, effectiveness and equity of education service delivery. The research provides valuable insights into how digital technologies, through EMIS, can improve education management and promote equitable resource allocation.

Wamutoro et al. (2022) investigated the effectiveness of Education Management Information Systems (EMIS) in managing student information in public secondary schools in Uasin Gishu County, Kenya. The study highlights the growing need for EMIS as manual systems are proving increasingly cumbersome, affecting overall management effectiveness in schools. Using a mixed-methods research design, the study collected data from 302 respondents, including school principals, vice-principals, heads of departments and directors of education. The findings reveal that EMIS significantly enhances the management of public secondary schools, with a notable impact on student information management. Regression analysis shows a strong positive relationship between EMIS effectiveness and improved school management practices, particularly in communication and instructional strategies. The study concludes that continuous improvement and investment in EMIS is vital to maintain its effectiveness, recommending that schools focus on better implementation practices to maximize the benefits of EMIS in student records management and overall school administration.

Chowdhary (2022) evaluates the effectiveness of Education Management Information Systems (EMIS) in non-government colleges in Bangladesh, focusing on the perceptions of college principals. The study uses a descriptive survey design with a quantitative approach, using structured questionnaires to collect data from a sample of 92 principals. The findings reveal that while system quality (SQ) and system use (SU) are perceived neutrally, there is a positive trend in their evaluation. Furthermore, information quality (IQ), user satisfaction (US) and perceived net benefits (PNB) were rated moderately good or good, suggesting that EMIS is generally perceived as beneficial but with room for improvement. The study suggests that the insights gained could be valuable for policy makers and educational administrators in terms of upgrading EMIS and making informed decisions to improve the effectiveness of the system. Chowdhary's (2022) research highlights the importance of continuous evaluation and improvement of EMIS to meet the evolving needs of educational institutions and ensure optimal performance.

Stamenkov and Zhaku-Hani (2021) investigate the perceived benefits and use of Education Management Information Systems (EMIS) after adoption in a mandatory context, focusing on public primary schools in North

Macedonia. The study integrates the Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE) framework to develop a conceptual model that examines how different factors influence EMIS use after adoption. Using PLS-SEM for data analysis, the study finds that perceived ease of use, perceived usefulness, compatibility, complexity, and government support indirectly influence post-adoption use. However, technological knowledge and external ICT support are the only factors that directly influence how EMIS is used after adoption. The research highlights that in mandatory settings, the perceived benefits of EMIS use become crucial as they determine the extent to which individuals continue to engage with the system. The study contributes to the literature by identifying key factors influencing continued EMIS use, highlighting the importance of perceived benefits as a mediator in this process.

Ali et al. (2021) provide a comprehensive analysis of the applicability of Education Management Information Systems (EMIS) in secondary education, focusing on the perceptions of principals using the Technology, Organization, and Environment (TOE) framework. The study involved a large-scale survey of secondary school principals to assess how effectively EMIS fulfills its objectives in school management. The results indicate that principals perceive EMIS as extremely useful for improving administrative performance, particularly in terms of data management and decision-making processes. However, the study also highlights the need for additional resources, both human and financial, to fully realize the potential of EMIS in these schools. The findings suggest that while EMIS has a significant impact on improving the efficiency and effectiveness of school management, its successful implementation depends on the availability of appropriate support from top and middle management. The study highlights the importance of providing the necessary infrastructure and training to ensure that EMIS can be used effectively in secondary education.

Danso et al. (2021) conducted a study to validate the DeLone and McLean Information Systems (IS) success model in the context of Education Management Information Systems (EMIS). The research focuses on how the quality of the system, information and service affects the overall success of EMIS, particularly in terms of usage, user satisfaction and net benefits. Using purposive sampling and a structured questionnaire, the study collects data from 100 EMIS users. The findings show that system quality, information quality and usage have a significant positive impact on the net benefits of EMIS, reflecting the effectiveness of the system in achieving the intended outcomes. However, service quality was found to contribute insignificantly to user satisfaction, suggesting that other factors may play a more critical role in influencing satisfaction levels. This study highlights the importance of maintaining high standards in system and information quality to ensure successful adoption and continued use of EMIS in educational environments, ultimately leading to improved institutional performance.

Saad and Daud (2020) investigate the acceptance of a web-based Education Management Information System (EMIS), with particular focus on the Data and Information (DI) domains in Malaysia, focusing on factors such as usability, ease of use and user satisfaction. The study employs a quantitative approach, using Pearson's correlation and linear regression to analyse survey data from 120 DI teachers. The findings reveal that usability and ease of use are critical determinants of user satisfaction, which in turn affects the overall acceptance of online EMIS. The study also identifies significant demographic differences in attitudes towards EMIS, with teachers aged between 31 and 40 years and those with a high frequency of use reporting higher levels of satisfaction. These results highlight the importance of designing EMIS with a user-friendly interface and providing sufficient training to ensure that teachers can use the system effectively. The study concludes that by focusing on these key factors, educational institutions can enhance the adoption and effectiveness of EMIS in managing school data and information.

Nkata and Dida (2019) explore the implementation of an Education Management Information System (EMIS) in Tanzanian secondary schools, focusing on its potential to improve the quality of education for sustainable development. The study identifies significant limitations in the existing manual systems used to collect, store and disseminate education information, which prevent timely and accurate data management. The study highlights that inadequate parental involvement in monitoring students' academic progress, often due to manual system limitations, leads to suboptimal student performance. To address this issue, the study developed and implemented a centralized EMIS to improve parental involvement, allowing for more effective monitoring and tracking of student progress. The findings suggest that the implementation of such a system could significantly improve educational outcomes by enhancing better communication between parents and schools, ultimately contributing to the overall improvement in the quality of education in Tanzania.

Cuartero and Role (2018) investigate the implementation and effectiveness of Education Management Information Systems (EMIS) in public elementary schools in Surigao Del Sur, Philippines. The study employed a descriptive survey method using a questionnaire to collect data from nine selected public elementary schools in three clusters in Surigao Del Sur Division. The findings revealed that the Student Management Information Systems (MIS) module was the most effectively implemented, receiving the highest mean score among the eight EMIS modules evaluated. In contrast, the Finance MIS module was found to be the least effectively implemented, indicating the need for

further improvement in the design, implementation and evaluation processes. The study concluded that while EMIS is generally well implemented in public primary schools in the district, there is a particular need to strengthen the Finance MIS module. The researchers recommend sharing best practices among schools to create a more sustainable and effective EMIS, particularly in the financial management aspects.

Damin et al. (2015) investigated the use of Education Management Information Systems (EMIS) in Iraq, focusing on factors influencing the adoption and effectiveness of these systems. The study highlights that EMIS can provide education leaders and decision makers with comprehensive, integrated and timely data, which is vital for effective planning, monitoring and decision making. However, the study identifies significant challenges to EMIS adoption in Iraq's education sector, including issues related to ease of use, utility, cultural attitudes, management policies, and security concerns. The study uses mixed research methods to explore these challenges and proposes a model for addressing them, highlighting the need for a more strategic approach to EMIS implementation. The findings suggest that improving the usability and accessibility of EMIS, along with addressing cultural and political barriers, could enhance the adoption and impact of these systems in supporting educational management in Iraq.

Aheto and Fletcher (2012) examine the awareness and use of Education Management Information Systems (EMIS) among educational institutions in the Greater Accra Region in Ghana. The descriptive research design used in the study reveals that while EMIS offices are present in district and local education offices, there is varying awareness and use among stakeholders such as teachers, parents and education NGOs. The study finds that EMIS key targets, particularly the Annual School Census, are identified as vital sources of information for educational planning and management. However, the lack of a dedicated EMIS website and limited information for some user groups, particularly parents, prevent full use of the system. The study recommends the development of a dedicated EMIS website to improve accessibility and use by all stakeholders. By improving user awareness and providing reliable access to educational data, the study suggests that EMIS can better serve its intended purpose of supporting educational decision-making and policy development.

Magaña et al. (2012) present the development and implementation of an Education Management Information System (EMIS) designed to support institutional planning at the University of Colima, Mexico. The system, called e-Planea, was created to systematize and streamline the process of creating annual reports for different university departments and faculties. By automating the report creation process, EMIS significantly reduced the time and effort required by department heads and planning consultants, improving overall efficiency. Usability testing of the system revealed high user satisfaction, indicating that the platform effectively met the needs of its users and enhanced institutional management. The study highlights the importance of integrating user-friendly EMIS platforms in higher education institutions to facilitate better planning and decision-making processes. The success of e-Planea at the University of Colima demonstrates how a well-designed EMIS can contribute to effective management of educational institutions by providing timely and relevant information to administrators.

Also, Santana-Mancilla et al. (2013) present a detailed usability study of the Education Management Information System (EMIS) e-planea at the University of Colima in Mexico. The study specifically evaluated the usability of three key modules within the platform: Annual Reports, Undergraduate Statistics and High School Statistics. The study was conducted in two phases: the first phase included a heuristic evaluation, while the second phase used the System Usability Scale (SUS) and the Technology Acceptance Model (TAM) to measure user satisfaction. The findings of this study showed that users were very satisfied with the platform, as evidenced by the positive scores on the SUS and TAM assessments. The study highlights the importance of rigorous usability testing in developing and improving EMIS platforms to ensure that they effectively meet user needs. The high user satisfaction reported in this study suggests that e-planea is a valuable tool for institutional data management that can enhance decision-making processes in the university.

Dospinescu et al. (2011) examine the perceptions of students from the financial sector about new learning methods in the knowledge society, with a particular focus on e-learning. The research was conducted among students of the Faculty of Economics and Business Administration at the University "Alexandru Ioan Cuza" in Iasi, Romania. The study aimed to identify students' acceptance and perceived usefulness of e-learning methods, as well as their preferences for different types of teaching-learning processes, including traditional methods, e-learning and blended methods. The findings reveal significant discrepancies between theoretical expectations of e-learning and students' practical acceptance and use of e-learning. One of the main barriers identified is students' reluctance to adopt new learning methods, which the authors attribute to resistance to change and lack of information about the advantages of e-learning. The study suggests that extending the research to other universities could provide a more comprehensive understanding of the impact of e-learning nationally, potentially leading to more effective implementation strategies across the country.

The studies reviewed highlight the multifaceted role of EMIS in educational institutions, emphasising the importance of usability, proper implementation and continuous evaluation to maximise their effectiveness. While EMIS has been shown to significantly enhance administrative functions and decision-making processes, the success of these systems depends largely on factors such as user satisfaction, institutional support and the quality of the system itself. The findings suggest that continuous improvements in system design, coupled with adequate training and resource allocation, are necessary to maintain the benefits of EMIS. In addition, a tailored approach that takes into account the specific needs and challenges of each educational setting is vital to ensure that EMIS can effectively support institutional goals and contribute to the overall quality of education.

CONCLUSIONS

This study highlighted the importance of theoretical approaches in understanding the acceptance and use of Educational Management Information Systems (EMIS) by their users, including teachers, school principals, and other educational administrators. Through the analysis of the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Rogers' Diffusion of Innovations Theory, it becomes evident that users' perceptions of usefulness and ease of use, along with social influence and facilitating conditions, are crucial factors for the successful adoption and implementation of such systems.

The review of contemporary literature revealed that while EMIS offer multiple benefits for educational administration—such as improved data management, decision-making support, and enhanced efficiency—their effectiveness depends on key factors. These include system usability, the quality of the information provided, the level of user training and support, and the availability of adequate technical and financial infrastructure. Furthermore, the research emphasized the need for continuous evaluation and adaptation of EMIS to meet the evolving needs of educational institutions.

Special emphasis was placed on the sociocultural and organizational factors that influence the diffusion of innovative technologies in education. The studies indicated that successful adoption requires strong leadership support, active user involvement, and the cultivation of digital literacy. In addition, the differentiation between early and late adopters shows that EMIS implementation cannot be uniform, but must be tailored to the level of technological maturity and acceptance within each educational context.

In conclusion, the successful adoption of EMIS is not merely a technical challenge but primarily an educational and organizational one. Understanding the theoretical models of technology acceptance, combined with empirical evidence from diverse educational systems worldwide, provides a valuable framework for designing strategies that enhance the functionality and impact of EMIS. Ultimately, this contributes to the improvement of quality and equity in education through the effective integration of new technologies.

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THE ATTITUDES AND PERCEPTIONS OF PRIMARY AND SECONDARY EDUCATION EXECUTIVES IN THE GREEK EDUCATION SYSTEM, ON THE ADMINISTRATION OF EDUCATION AND THE INNOVATIONS THAT ARE IMPLEMENTED

Paschodimas Georgios
Secondary Education Teacher, PE11 Physical Education
Preveza, Greece
email: g.paschodimas@yahoo.gr

ABSTRACT

This research was carried out for the needs of writing the teacher's Thesis in the context of completing the Postgraduate Program entitled "Administration & Organization of Educational Units" at the International Hellenic University, which was completed in June 2024.

The study presents important findings regarding: the profile, perceptions of educational executives on educational administration, the needs and challenges they face, as well as the priorities for improving the educational system.

For the needs of publishing research data at the 1st International Scientific Conference of Preveza entitled: "Digital Media in Modern Educational Reality, Positions, Contrasts, Challenges and Prospects", results of the study that deal with the evaluation of the use of digital media as innovative practices in educational administration, with the aim of upgrading administrative procedures and improving communication within the educational organizationwere sought.

This study explored, among other things, how digital transition can contribute to reducing bureaucracy, saving time and resources, as well as enhancing transparency and collective decision-making. A quantitative methodology was used to carry out the research, collecting data through structured questionnaires distributed to teachers and administrators from various levels of the education system. The sample was selected purposively to ensure the representativeness of the population and to capture different perspectives on the use of digital media in daily administrative practice. The data analysis was carried out using statistical methods, allowing conclusions to be drawn about the effects and challenges that accompany the integration of digital technology.

Keywords: digital media, educational administration, innovation, digital transition, vocational training.

INTRODUCTION

The administration of education in the Greek education system consists of various bodies, levels and entities that collaborate to plan, organize, implement and monitor the educational process. The main bodies of education administration in Greece are the following: The Ministry of Education and Religious Affairs (central level): The ministry is responsible for establishing educational policies and programs, managing resources and providing general guidance to the education system. The Regional Directorates of Education (regional level): The regional directorates are responsible for implementing educational policies and programs at the regional level. They coordinate the actions of schools and provide support to the Directors of Education. The Directorates of Education (prefecture level): The Directorates of Education are responsible for implementing educational policies and programs at the level of the Regional Unit (Prefecture). They coordinate the actions of schools and provide support to the directors of school units. The Principal at the school level: Principals are responsible for the administration and organization of schools. They provide guidance and support to the teaching staff, manage the school's resources and ensure the smooth functioning of the educational process. Principals are supported by: The Deputy Principal, the Teachers' Association, the School Committee, the Municipal Education Committee and the Parents' and Guardians' Associations.

At the local level, recent reforms redefine the role of education institutions, giving the school unit greater autonomy as well as the ability to plan, organize and evaluate its work (European Commission-Eurydice, 2023).

FORMULATION OF THE PROBLEM

Educational administration in the Greek educational system involves the coordination, organization and implementation of policies and programs concerning the education sector. The responsibilities of educational administration cover issues such as school management, training of educational staff, evaluation of the educational process and development of policies to improve the quality of education. (Katsaros 2008).

Regarding the innovationsapplied during its implementation, boththe political leadership and the executives participating in the design of its policies have shown interest and efforts to introduce innovations aimed at improving the administration of education,

Some innovations used to date in educational administration were the following:

- Digital governance with the introduction of technological tools for more flexible and efficient administration. Educational assessment for the fairer and more comprehensive evaluation of students, teachers and processes. Open schools and administration structures that promote cooperation between teachers, students, parents and the local community. Education for sustainability, incorporating environmental and administrative sustainability practices. Decentralization and autonomy. Although it remains limited, as most decisions are made centrally. Continuous training of executives, through institutionalized bodies and university programs. Support of administrative bodies, with specialized personnel: and possible restructuring of the administrative organization chart, (Dagdilelis, 2005), (Karachaliou, 2022), (EuropeanCommission - Eurydice , 2023), (Tintoreandal , 2022)
- Efforts to introduce innovations continue to evolve, as education adapts to the needs of modern society and technology, and in this context, this study aspires to contribute with its findings both to the evaluation of existing innovations and good administrative practices, but also to highlight the need for new ones, which will strengthen and empower both educational institutions and those who administer them.

REVIEW OF RELEVANT STUDIES

The literature review helps the reader understand the context of the research and recognize the value of adding their own contribution to the field being investigated (Creswell, 2008).

In order to better study the problem and seek data on the innovations implemented in educational administration, to evaluate them, and to highlight new ones, relevant research in Greece and abroad was selected.

From Greece were selected

The research by **M. Lazarou, P. Papageorgaki, G. Fouzas** entitled "The introduction and implementation of technological innovations as a factor of administrative efficiency in education" Lazarou M, Papageorgaki P, Fouzas G (2017), which was carried out on a sample of two hundred and sixty (260) active teachers (permanent and substitute) of the Primary Education Directorate of Corinth, who served in the prefecture during the five-year period 2010-2015 (continuously or in parts). Another research implemented in Greece by **M. Kazakou** and **G. Koutromanos** is entitled "E-

Governance in the administration of education: Investigation of the factors that influence the intention to use it by education executives" Kazakou M., Koutromanos G., (2016). The survey was conducted from November 12, 2014 to December 24, 2014 at the Central Office (CO) of the Ministry of Education, Research and Religious Affairs, which houses the General Secretariat of the Ministry of Education, Research and Religious Affairs and the General Secretariat of Religious Affairs. 88 Heads of General Directorates, Directorates and Departments of the above General Secretariats participated . In the survey entitled: "Attitudes and perceptions of primary education teachers on issues related to sustainable development and the sustainability of the school unit" conducted by **Vasiliki Karachaliou,** the views of primary education teachers on Sustainability and the Sustainable School were investigated. Some of the research questions of the survey had to do with innovations in school administration, Karachaliou, (2022).

From abroad were selected

The research entitled:"The Relationship between School Administrators' Agile Leadership and their Innovation Management Competencies" was doneinTurkey by**Gökçe Özdemir** ., G. Özdemir, (2023). The purpose of this research was to determine the relationship between school principals' flexibility, leadership and innovation management capabilities according to teachers' perceptions. The research was conducted with the scanning model, which is one of the descriptive research methods. The population of the research was primary school teachers working in the Şahinbey district of Gaziantep.

A comparative study conducted by **Tintoré et al. (2022)** in Spain, titled "Management model, leadership and autonomy in Portuguese and Spanish public schools: A comparative analysis," examined the educational systems of Portugal and Spain. The research focused on key variables related to the management model, including the general organization of education, the characteristics of the teaching profession (encompassing the recruitment and selection processes for teachers and principals), and the level of school autonomy and the nature of administration and leadership. The study's findings revealed a structural proximity in school governance in both countries, which adhere to a management model that is simultaneously centralized and participatory. The researchers concluded that the policies implemented by Portugal to improve education – such as the extension of compulsory education, legislative stability, and the re-evaluation of schools' internal organization – have been successful and can serve as a model for Spain. It was also emphasized that both countries could benefit from empowering principals to emerge as leaders for learning and from enhancing school autonomy to foster necessary changes in education.

A large survey of educational institutions in the countries of the European Union was carried out by the **European Commission, EACEA, Eurydice, 2013.** Entitled "Key Figures for Teachers and School Leaders in Europe", EACEA, Eurydice, (2013). In terms of the correlation of this report with the present study, the results regarding the sixth thematic chapter referring to the Levels of Autonomy and Responsibilities of Teachers and School Leaders are of interest.

PURPOSE OF THE STUDY AND RESEARCH QUESTIONS.

The purpose of the thesis is to investigate, analyze and understand the opinions, beliefs and perceptions of Primary and Secondary Education executives regarding the way education is administered and how they are influenced by the innovations it implements.

Specifically, the main objectives of the work could be: Understanding the specific views and beliefs of teachers regarding educational administration and administration innovations. Highlighting the challenges and obstacles that teachers face in implementing innovations in educational administration. Assessing the political, institutional and economic context that influences teachers' perceptions and attitudes. Exploring how teachers' perceptions and attitudes influence educational policy and the quality of education.

Deepening and understanding the way teachers perceive educational administration and how they react to innovations introduced in this field can provide useful indications for improving educational policy and promoting innovations in educational administration.

Having previously formulated the objectives of the thesis and in order for them to be better understood, the following research questions were formulated:

1. What are the attitudes and perceptions of primary and secondary education executives regarding the importance of educational administration?
2. Are there differences in perceptions and attitudes between primary and secondary education executives regarding educational administration and innovations?

3. How do education executives perceive innovations in the field of administration and what are their views on the need for innovation in this area?
4. How do primary and secondary education executives perceive the influence of educational administration on student learning and education?
5. What are the key challenges and constraints that education executives face when trying to implement innovations in educational administration?
6. What are the institutional and political frameworks that influence communication and collaboration between executives when they are called upon to implement innovative policies in educational administration?

METHODOLOGY

The sample selection process in a quantitative study is critical to the reliability and specificity of the results. The steps followed to select a representative sample were clearly defined by the purpose of the study and the research questions formulated. This helped in understanding the population-group that was decided to be examined.since the population of a study consists of those who have characteristics that are of interest to our research (Creswell, 2008).

In the effort to select the appropriate sample population, the crucial question of the size of the population serving this research was raised. It was judged that this research could be served by a population of one hundred and thirty-two (132) education executives who would be selected using the purposive sampling method and who meet the conditions to serve the purpose of the research (Creswell, 2008).

Of these, 80 will be secondary education executives and 52 primary education & preschool education executives, 80 will be men and 52 women, while an effort will be made to select 50-50 new and old executives, from a list of executives per Education Directorate. Initially, the electronic questionnaire was sent to all primary & secondary education school units in the Greek territory and from the responses, 132 responses that met the demographic characteristics (region of education, level of education, gender and relevant experience in administration) were deliberately checked so that the sample would be more representative of the entire population of education executives in the Greek territory.

RESULTS & ANALYSIS

Table 3
Distribution of gender, age, years of experience in education and as an education executive

		N	%
Sex	Man	53	40.2
	Woman	79	59.8
Age	21-30	4	3.0
	31-40	13	9.8
	41-50	39	29.5
	51-60	64	48.5
	Over 61	12	9.1
Years of Experience in Education	1-10	19	14.4
	11-20	35	26.5
	21-30	54	40.9
	Over 31	24	18.2
Years of Experience as an Executive in Education	1-5	67	50.8
	6-10	25	18.9
	11-15	22	16.7
	16-20	11	8.3
	Over 21	7	5.3

Mean values and standard deviations were used to describe the dimensions and the remaining quantitative variables, while for categorical measurements such as gender, populations and percentages were used. The effect of education level and total years of experience in education on the dimensions was evaluated using the analysis of variance criterion, followed by multiple comparisons tests with the Bonferroni criterion. The analysis was performed with SPSS v28.0 software and the significance level was set equal to 0.05 in all cases.

Demographics and key figures

Table 1 describes the distribution of gender, age, years of experience and years of experience working as an education executive in the sample. Initially, there is a distribution of the 132 participants by gender, with men constituting 40.2% (N=53) and women 59.8% (N=79) of the sample.

Table 2 presents the distribution of participants' responses to questions concerning their attitudes and perceptions regarding innovations in educational administration. Analyzing the responses, it is found that, to the question "I appreciate the innovations applied in educational administration." 49.2% of the sample agree, 34.1% fully agree, while 16.7% responded in a neutral manner. Regarding whether innovative practices are applied in the administrative procedures of the participants' educational organizations, 35.6% held a neutral position, 30.3% agree, 17.4% disagree, 14.4% fully agree, while only 2.3% completely disagree with this view. Additionally, 40.2% agree that innovative practices have an impact on the effectiveness and quality of the educational process, 28.8% responded neutrally, 26.5% fully agree, 3.8% disagree, while 0.8% completely disagree. To the question "Are you informed about the technological innovations that are incorporated into educational administration?", 47.7% of the sample agree, 24.2% responded neutrally, 17.4% fully agree, 8.3% disagree, while only 2.3% completely disagree. Regarding whether administrators are willing to adopt innovative ideas, 37.9% of the sample responded in a neutral way, 35.6% agreed, 13.6% disagreed, 11.4% completely agreed, while 1.5% completely disagreed. Finally, 43.2% of the sample agreed with the view that participation in the decision-making process enhances innovation in educational administration, 37.1% completely agreed, 15.95 responded in a neutral way, 3.0% disagreed, while only 0.8% completely disagreed.

Table 2
Distribution of the sample's responses to questions concerning attitudes and perceptions regarding innovations in management

	I Completely agree.		Agree		Neutral		Disagree		I Completely disagree.	
	N	%	N	%	N	%	N	%	N	%
8. I appreciate the innovations implemented in educational administration.	45	34.1	65	49.2	22	16.7	0	0.0	0	0.0
9. Are innovative practices applied in the administrative processes of your educational organizations?	19	14.4	40	30.3	47	35.6	23	17.4	3	2.3
10. Do innovative practices have an impact on the effectiveness and quality of the educational process?	35	26.5	53	40.2	38	28.8	5	3.8	1	0.8
11. Are you up to date on technological innovations being incorporated into educational administration?	23	17.4	63	47.7	32	24.2	11	8.3	3	2.3
12. Are management willing to adopt innovative ideas and practices?	15	11.4	47	35.6	50	37.9	18	13.6	2	1.5
13. In your opinion, is participation in the decision-making process a process that enhances innovation in educational administration?	49	37.1	57	43.2	21	15.9	4	3.0	1	0.8

Table 3 presents the distribution of participants' responses to a question regarding the challenges facing education administration in relation to preparing for technological change. More specifically, 30.3% of the sample believe that the administration faces no challenge, 46.2% believe that it faces a slight challenge, 17.4% took a neutral stance, 4.5% believe that it faces a significant challenge, 4.5% believe that it faces a significant challenge, while only 1.5% believe that it faces a very significant challenge in terms of preparing for technological change.

Table 3
Distribution of responses to a question concerning management challenges in relation to technological development

		N	%
24. In your opinion, does education administration face challenges in relation to preparing for technological development?	No challenge at all	40	30.3
	Light challenge	61	46.2
	Neutral	23	17.4
	A significant challenge	6	4.5
	Very important challenge	2	1.5

DISCUSSION & CONCLUSIONS-ANALYSIS OF THE FINDINGS IN RELATION TO THE LITERATURE

Comparative Analysis with Research in Greece:

Perception of Innovations and Collaboration: Teachers are distinguished as positively disposed towards innovations, with particular emphasis on technological development and collaboration at various levels of the education system, despite the fact that lack of funding constitutes a significant challenge.

Effect of Experience and Educational Level: no statistically significant differences were found between educational levels regarding the various dimensions (management, innovation, etc.). On the contrary, differences in perceptions appear with respect to years of experience, with the sample with 21–30 years of experience showing higher values in various dimensions (management, innovation, relevance) compared to those with more experience.

These findings offer valuable insights into the needs and challenges faced by the educational organization and can form the basis for targeted policies and programs that will improve administrative processes, enhance innovation, and promote effective collaboration in the field of education.

The analysis of the findings and the comparison with other studies show that the teachers participating in the study are mainly women in the age group of 51–60 years, with significant experience and a high educational level (postgraduate). They agree on the positive impact of administration on the quality of educational services, but recognize the need for further support in their professional development. The study highlights the importance of innovations and technological development in improving administrative efficiency, reducing bureaucracy and costs. These conclusions are consistent with the research of Lazarus, Kazakos & Koutromanos and international studies, which highlight the need for structural changes. The statistical findings show that perceptions of administration, innovation, relevance and challenges differ significantly depending on years of experience, while opinions regarding collaborations remain uniform. This highlights the impact of experience on teachers' practices and perceptions.

Comparative Analysis with International Research:

Comparison with research from abroad (e.g. by Gökçe Özdemir and Tintoré et al.) confirms the importance of flexible leadership and collective management, while common problems such as lack of funding and excessive bureaucracy are observed. Özdemir's study on the Turkish education system highlights the importance of flexible leadership in managing innovation and creating an organizational culture that enhances the effectiveness of school units. Tintoré et al.'s research on Portugal and Spain highlights the need to increase school autonomy and reduce bureaucracy, while the European Commission's report (Eurydice, 2013) demonstrates the complexity of the tasks of school heads, the importance of professional experience and the diversity in leadership and management structures in Europe.

Overall, research confirms the importance of structural changes, technology, leadership, and autonomy in improving education and its administration.

The main findings of the paper reveal a complex, yet coherent portrait of teaching staff and their perceptions of management and innovation in education, providing a deeper virtual vision of the needs and challenges in the field of educational management and indicate that improvement proposals should take into account both the educational level and the experience of staff, aiming to develop policies that promote innovation, flexible leadership and collaboration at all levels of the education system. These findings show that the digital transition can act as a catalyst for innovation in the

field of educational management, while at the same time highlighting the need for continuous support and professional development of executives in this field.

Suggestions for study and further research

The paper also provides valuable information for formulating strategies that will lead to a more efficient, transparent and innovative educational environment, while also suggesting further research to identify and address the factors that limit the effective use of digital media as well as modern innovative practices in educational administration such as the use of artificial intelligence (AI).

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TA28: Teachers' professional development through the use of new technologies.

THE GENDER DIMENSION IN THE UTILIZATION AND USE OF DIGITAL TECHNOLOGY (BY TEACHERS, MALE AND FEMALE) IN SECONDARY EDUCATION

Efstathiadou Anna
Teacher PE02 Philology
1st Ptolemaida High School
Kozani, Greece
email: annitaefkoz@gmail.com

ABSTRACT

Since the 1980s, a decade in which New Technologies gradually made their presence apparent in many areas of human activity - in work, in education, in science, in politics - until today, gender differences have been observed in the access, use and exploitation of Information Technologies. The qualitative improvement of educational systems, the equal provision of digital skills, the reshaping of the educational system through digital transformation is a goal of strategic importance for the European Union and, of course, for Greece.

Modern research shows that gender, as a social construct, continues to be a significant factor of inequality in the field of digital technology. This is because stereotypical perceptions regarding the relationship between gender and new technologies reflect the widespread view that digital skills are a male field of action rather than a subject of women's occupation and specialization. Teachers themselves, both men and women, consider their students to be more capable than their female students in using and exploiting the potential of digital technology. Female teachers have lower expectations and limited confidence in their ability to integrate and use digital technology in everyday teaching practice.

This paper attempts a bibliographic overview of gender differences regarding the degree of utilization and use of digital technology by secondary education teachers in the educational process during the last two decades, especially, with the complete "penetration" and prevalence of ICT in all areas of human activity and expression, especially after the pandemic period. The COVID-19 epidemic crisis had serious consequences for education and training and created new data in the educational reality.

Specifically, gender differences are examined in terms of the attitudes and perceptions of female teachers towards the ever-increasing use of technology in education, the understanding of the urgent need to acquire digital skills for more effective adaptation to modern educational data, the digital skills possessed by female teachers compared to their male colleagues, their knowledge of digital tools (software, platforms, applications), and the degree of utilization of a wide range of digital technologies in the learning process and any changes that have occurred over the decades.

Keywords: gender differences, digital technology, teachers in secondary education, digital skills, digital literacy

INTRODUCTION

The widespread use of digital technologies, specifically over the past decade has transformed many aspects of work, education and, generally, everyday life. Educational systems, as part of the digital transformation, are globally faced with the challenge of the ever-increasing need for the use of ICT. Teachers are expected to be appropriately trained so that they can use digital technology skillfully, equitably and effectively and to adapt their teaching practice in such a way as to teach their students the knowledge and skills required for high-quality and inclusive education and training (European Commission, 2020).

The Covid-19 crisis has created a new educational reality and accelerated the need to provide education and training using digital technologies. Digital literacy, that is the acquisition of skills by teachers to successfully handle, process, organize, understand, evaluate and analyze information through the use of digital tools with the aim of safely sharing digital content with students, is of universal importance for the educational process (Polydora, et al., 2023, Network for Reform in Greece and Europe, 2024) and its integration into the school curriculum is considered necessary from the earliest stages of education (Kaur & Sharma, 2023).

However, technology has not been accepted in the same way and to the same extent by all teachers. Although Greek teachers, male and female, recognize the usefulness of ICT in teaching practice, a large number of teachers exhibit phenomena of technological illiteracy and attempt to avoid its use.A significant number of teachers believe that the use of ICT contributes positively to the educational process, while others believe that their without consideration, unplanned and excessive use in education creates problems. Teachers' attitude towards the systematic use of digital technology in the teaching process is also largely influenced by their gender.

Gender differences in the attitudes and perceptions of female teachers towards the ever-increasing use of technology in education, the degree of understanding the need to acquire digital skills in order to adapt modern educational data more effectively, the digital skills possessed by female teachers compared to their male colleagues, their knowledge of digital tools (software, platforms, applications), the degree of utilization of a wide range of digital technologies in the learning process and any changes that have occurred over the decades is the subject of interest in this paper**.**

GENDER DIGITAL DIVIDE

The use of New Technologies shows differences between the two genders (Bodilas, 2013). Research that has been carried out internationally over the last decades on gender and ICTs, focuses mainly on what is called the "gender digital divide" or "gender gap" (Andreou, Riga & Papagiannis, 2014).

According to modern research data, the digital world reflects the gender imbalance in the physical world and despite many and ongoing interventions – socio-political, legislative, economical – over the decades, no increase in female participation in STEM (Science, Technology, Engineering, Mathematics) fields has been noted neither in the field ofInformation and Communication Technologies, in which women still constitute an *invisible* minority (Kamberidou, 2019)[16].

Compared to men and boys, women and girls accept and use digital technology at a significantly lower rate. Computer use, digital skills, and self-perception related to digital technologies are subject to gender differences. These differences can affect classroom interactions and learning processes (Kaur & Sharma, 2023). Teachers spend a lot of time with their students every day, they are considered to be holders of power and knowledge, people with authority, with prestige, and, therefore, often have an influence on the students' way of thinking. During this interaction, they may reproduce their own stereotypical and entrenched gender biases regarding technology and its use in educational practice, thereby influencing students' opinions, attitudes, and behaviors (Bussey & Bandura, 1999).

These stereotypical beliefs of male and female teachers also reflect their expectations for the professional future of their male and female students depending on their gender. Citizens themselves, who were brought up in societies with a specific gender role orientation, have internalized perceptions and stereotypes that influence their way of thinking and behaving. Thus, while they consider themselves free from prejudices and stereotypes, they treat their students differently, depending on their gender. But students notice, perceive the difference and tend to adopt a similar attitude and mentality towards their classmates, having their teachers as role models (Efstathiadou, 2023).

[16] Increasing the number of women in science, technology, engineering and mathematics (STEM) fields is very important as it can contribute to the improvement in all sectors of activity - education, economy, society, culture (Barbucci, 2018).

Considering studies of perceptions of gender and new technologies, it emerges that stereotypes do not only concern girls' abilities in IT, but also the compatibility or non-compatibility of the cognitive subject with the feminine nature and the interests of women. The prevailing view is that studies and professions related to IT and Computer Science do not suit the female temperament and, thus, the stereotypical perceptions of the teachers about the incompatibility of the female identity with Informatics can negatively affect the perceptions of female students regarding engagement with Informatics and new technologies (Vekyri & Shoretsanitou, 2020).

For this reason one of the European Commission's actions to support a high performance digital education system in the context of strategic planning for inclusive accessibility and participation in the development of European digital educational content is to encourage women to engage in STEM (science, technology, engineering and mathematics) fields , in order to make them more attractive to women and to increase their participation and career development, while combating gender stereotypes (European Commission, 2020).

The gender digital divide is not just a technological issue: it is an economic, social and cultural issue, which must be addressed with multi-level and holistic policies in order to address gender inequality at its deepest social and cultural roots (Barbucci, 2018)

GENDER DIFFERENCES IN THE USE OF DIGITAL TECHNOLOGY IN THE EDUCATIONAL PROCESS - RESEARCH FINDINGS

Steiner & Mendelovitch (2017), argue that teachers perceive digital technologies as a means of stimulating learning. It is a tool for building relationships and connecting them with students. Children find technology attractive and interesting. Digital tools help teachers diversify their teaching and are perceived by them as a welcome change compared to traditional teaching methods. A significant number of educators believe that the use of digital technologies enhances critical thinking and activates learning.

Although teachers are encouraged to integrate digital technology into teaching, there is evidence that their readiness to do so has a decisive influence on the effectiveness of integrating digital tools into the teaching process in the classroom. Despite the fact that most people recognize the great utility of I.C.T.'s and have positive attitudes towards related trainings, but maintain a critical and cautious attitude towards the use of ICT. in teaching (Tassi, 2014). Inhibiting factors for the integration of ICT in teaching practice are the limited skills of using ICT, the lack of experience and their attitudes towards them. In some member states of the European Union, the vast majority of teachers and trainees had, before the outbreak of the pandemic, little or no experience at all with online teaching and learning and the different pedagogical methods required for this way of teaching (European Commission, 2020).

There are differences between men and women regarding how they judge their computer skills and their self-efficacy when dealing with ICT. Women tend to have a lower degree of confidence than men in using digital technology effectively at all levels, starting with basic use (Kaur & Sharma, 2023; Vekyri & Schoretsanitou, 2020).

Gender differences, in relation to their computer use experience, sense of competence, self-efficacy and self-concept have an impact on male and female students' performance, when learning materials are taught using digital technology and can influence classroom interactions as well as learning processes. According to Russell and Bradley (1997) stress and a lack of confidence or ability to use digital tools often mean that teachers revert to conventional learning techniques.

Teachers themselves, both men and women, consider their male students more capable than their female students in using and exploiting the possibilities of digital technology (Vekyri & Shoretsanitou, 2020). Female teachers have lower expectations and limited confidence in their ability to integrate and use digital technology in everyday teaching practice (Gebhardt et al., 2019) and less positive views on the value and usefulness of the educational use of new technologies compared to their male colleagues[17].

The analysis of correlations between stereotypical views and other characteristics of teachers, such as years of teaching experience, self-efficacy, views on the value of integrating ICT in teaching practice, showed that in women

[17] As studies have shown (Law et al. 2008) teachers who are confident are more likely to use/adopt ICT as part of their daily teaching practice than teachers with less confidence. Therefore, confident female teachers are more likely to use ICT than their less confident colleagues, and confident female teachers may play an important role in ICT uptake by both male and female students as tools used equally by both male and female teachers.

acceptance of stereotypes is negatively related to years of teaching experience. These findings suggest that younger female teachers may present a more positive role model for girls as they appear to challenge stereotypes and have more confidence in their abilities to use new technologies in the classroom (Vekyri & Shoretsanitou, 2020).

Data of the most recent analyses, shows that over the years any differences in the use, experience, positive or negative attitude towards digital technology are small between male and female teachers although there are differences between countries. On average, 70% of male teachers and 77% of female teachers said they used ICT to support classroom teaching. There were slight differences in some countries in the emphasis placed on teaching students ICT-based skills

The negative correlation between stereotypical views and teaching experience among female teachers suggests that views on gender and technology have more to do with changes in value systems and sociocultural perceptions, as these have been shaped in recent decades, and less with teachers' attitudes towards technology

Teachers should realize that their own contribution to the formation of their students' perceptions and interests is crucial to the development of educational practices that can positively influence their choices.

CONCLUSION

Teachers' beliefs and attitudes towards information and communication technologies (ICT) in teaching and learning are crucial for their successful implementation in the classroom. While teachers are encouraged to integrate ICT into their teaching, the effectiveness of this integration depends largely on their readiness to do so, something that is directly correlated with their confidence and knowledge in the use of ICT, as well as with their beliefs about the value of ICT in education (Gebhardt et al., 2019)[18]

Female teachers who use technology effectively provide a role model for young women in school, although previous studies have shown that female teachers are less likely to use computers in their personal lives than their male counterparts. When female students are exposed to strong female role models such as female teachers, their interest and ambition grow. Gender equality in STEM education promotes education, digital literacy and digital skills (Gebhardt et al., 2019)

Girls have the right to high-quality education, which covers all levels and closes the gender gap in their later professional development. Classrooms and learning environments, whether physical or virtual, must be free of negative stereotypes, especially those related to gender issues. Every child, regardless of gender, needs to be inspired to learn and succeed in subjects or career paths it chooses (Kaur & Sharma, 2023).

Gender dimension in teachers' relationships with ICT is constantly changing and is shaped by different socio-cultural contexts in various time periods (Tassi, 2014). Equal access and utilization of ICT by both genders in learning subjects of all specialties requires changing social stereotypes that consider technology a male affair, the gradual familiarization with ICT with the aim of getting rid of the fear of using computers, the readjustment of school curricula by enhancing interactive teaching and the training of teachers in the use of technologies and more modern tools but also in the way of combining pedagogical methodology with educational software (Syropoulos, & Lefkos, 2023). Support at the administrative and institutional level contributes decisively to achieving this goal.

Equal access and utilization of ICT by both genders in learning subjects of all specialties requires changing social stereotypes that consider technology a male affair, gradual familiarization with ICT with the aim of eliminating the fear of using computers, the readjustment of school curricula by enhancing interactive teaching and the training of teachers in the use of technologies and more modern tools but also in the way of combining pedagogical methodology with educational software (Syropoulos, & Lefkos, 2023). Support at αν administrative and institutional level contributes decisively to achieving this goal.

Educational policies that encourage digital teaching and learning and respond to gender needs, invest in teacher training in digital pedagogy by eliminating gender biases and stereotypes from curricula. Digital books and educational materials that offer opportunities for learning both inside and outside the classroom, without exclusion, without discrimination can form the basis for bridging the gender digital divide (UNICEF, 2021).

[18] Most studies reporting on teachers' ICT skills have been based on self-report data. Three ICT skills factors have been identified: basic digital skills, advanced technical skills and professional ICT skills (Kaarakainen et al. 2018).

As stated in the Digital Education Action Plan 2021-2027, redefining education and training for the digital age: Digital technology, when used skillfully, equitably and effectively by educators, can fully support the agenda of high-quality and inclusive education and training for all learners. It can facilitate more personalized and flexible student-centered learning, across all phases and stages of education and training. Technology can be a powerful and engaging tool for collaborative and creative learning (European Commission 2020).

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Περιλήψεις Άρθρων

ΘΠ1: Έρευνα για την ανάπτυξη, εφαρμογή και χρήση σύγχρονων τεχνολογιών στο σύγχρονο σχολείο, στην εκπαίδευση και τη μάθηση

ΚΑΙΝΟΤΟΜΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ: Η ΣΥΜΒΟΛΗ ΤΗΣ ΕΠΑΥΞΗΜΕΝΗΣ ΚΑΙ ΕΙΚΟΝΙΚΗΣ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑΣ ΣΤΗΝ ΕΚΜΑΘΗΣΗ ΤΗΣ ΑΓΓΛΙΚΗΣ ΓΛΩΣΣΑΣ ΜΕΣΩ ΦΥΣΙΚΗΣ ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ

Κάρμη Βασιλική
Εκπαιδευτικός ΠΕ06 Αγγλικής Γλώσσας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Κερκύρας
Κέρκυρα, Ελλάδα
email: vaskarmi1976@gmail.com

Ανδρουτσόπουλος Παναγιώτης
Σύμβουλος Εκπαίδευσης ΠΕ11 Ηλείας-Ζακύνθου-Κεφαλληνίας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Ηλείας
Πύργος Ηλείας, Ελλάδα
email: : panagiotisandrouts@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα έρευνα διερευνά την εφαρμογή της Επαυξημένης (Augmented Reality, AR) και Εικονικής Πραγματικότητας (Virtual Reality, VR) στη διδασκαλία της Αγγλικής γλώσσας μέσω φυσικής δραστηριότητας σε γυμνάσια και λύκεια της Δυτικής Ελλάδας.

Με δείγμα 65 μαθητών/τριών και 15 εκπαιδευτικών, αξιολογήθηκε η επίδραση των ψηφιακών τεχνολογιών στη βελτίωση των γλωσσικών δεξιοτήτων και στην ενίσχυση της κινητικής εμπλοκής. Το πρόγραμμα, που βασίστηκε στις αρχές της ενεργητικής μάθησης, περιελάμβανε διαδραστικά σενάρια όπου οι μαθητές εξασκούσαν γλωσσικές δεξιότητες μέσω σωματικών και συνεργατικών δραστηριοτήτων.

Τα αποτελέσματα ανέδειξαν σημαντική βελτίωση στη συμμετοχή, στη γλωσσική πρόοδο (λεξιλόγιο, προφορά) και στη μνήμη μέσω κίνησης. Επιπλέον, παρατηρήθηκε ενίσχυση της κοινωνικής αλληλεπίδρασης και της συνεργασίας. Παρά τα θετικά αποτελέσματα, καταγράφηκαν και ορισμένες προκλήσεις, όπως το υψηλό κόστος του απαιτούμενου εξοπλισμού και η ανάγκη κατάρτισης των εκπαιδευτικών στη χρήση των τεχνολογιών αυτών.

Συνεπώς, ο συνδυασμός της AR και VR με φυσική δραστηριότητα αναδεικνύεται ως καινοτόμα εκπαιδευτική πρακτική, με δυνατότητα εφαρμογής σε ευρύτερα εκπαιδευτικά πλαίσια.

Λέξεις-κλειδιά: Ψηφιακά μέσα, AR, VR, αγγλική γλώσσα, φυσική δραστηριότητα

STOP MOTION: ΕΝΑ ΣΧΕΔΙΑΣΤΙΚΟ ΕΡΓΑΛΕΙΟ ΓΙΑ ΤΗΝ ΠΑΡΑΓΩΓΗ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΥΛΙΚΟΥ

Τζιαρού Αθηνά
Μηχανικός Σχεδίασης Προϊόντων και Συστημάτων
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: athinatziarou@gmail.com

Ευκολίδης Νικόλαος
Αναπληρωτής Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: nefkolidis@uowm.gr

Κυράτσης Παναγιώτης
Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: pkyratsis@uowm.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία ερευνά την εφαρμογή της τεχνικής Stop Motion ως εργαλείο για τη δημιουργία εκπαιδευτικού υλικού, παρουσιάζοντας τη συμβολή του στην ενεργητική μάθηση και στην ανάπτυξη γνωστικών, κοινωνικών και τεχνικών δεξιοτήτων. Το Stop Motion ενδείκνυται για παιδαγωγικές εφαρμογές, που προάγουν τη βιωματική και δημιουργική μάθηση, ενισχύοντας την προσωπική έκφραση, τη συνεργασία και την αφηγηματική ικανότητα των μαθητών. Μέσω της χρήσης φυσικών υλικών εργαλείων και τεχνολογικών μέσων, οι μαθητές αποκτούν εμπειρική επαφή με τη μάθηση, αναλαμβάνουν ρόλους δημιουργών και αφηγητών, και μαθαίνουν πώς να οργανώνουν και να υλοποιούν σύνθετα έργα με παιδαγωγικό περιεχόμενο.

Η εργασία εξετάζει τόσο τη θεωρητική θεμελίωση της μεθόδου, όσο και την εφαρμογή της. Επιπλέον, παρουσιάζονται τα οφέλη και οι προκλήσεις που σχετίζονται με την ενσωμάτωση του Stop Motion στην τάξη, καθώς και προτάσεις για την αποτελεσματική αξιοποίησή του από τους εκπαιδευτικούς. Τέλος, τονίζεται η διαθεματική και συμπεριληπτική δυναμική της τεχνικής, που επιτρέπει την προσαρμογή της στις ανάγκες των μαθητών, προάγοντας την παιδαγωγική καινοτομία και την ενεργή συμμετοχή όλων. Η προσέγγιση αυτή αντανακλά τις σύγχρονες διδακτικές προσεγγίσεις, όπου ο μαθητής τοποθετείται στο επίκεντρο της μαθησιακής διαδικασίας και η τεχνολογία λειτουργεί υποστηρικτικά προς την ανάπτυξη της δημιουργικότητας και της συνεργατικής κουλτούρας.

Λέξεις – κλειδιά: stop motion, εκπαιδευτικό υλικό, ψηφιακή αφήγηση, βιωματική μάθηση, δημιουργικότητα, συνεργατική μάθηση, τεχνολογία στην εκπαίδευση, πρωτοτυποποίηση, project-based learning (PBL), συμπερίληψη, συναισθηματική ενδυνάμωση

ΤΟ ΜΕΛΛΟΝ ΤΗΣ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΚΠΑΙΔΕΥΣΗΣ ΜΕΣΑ ΑΠΟ ΤΟ ΠΡΙΣΜΑ ΜΑΘΗΤΩΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΩΝ ΝΟΜΩΝ ΑΤΤΙΚΗΣ ΚΑΙ ΚΥΚΛΑΔΩΝ

Βλασσόπουλος Γεράσιμος
PostDoc Researcher, PhD, MSc, Εκπαιδευτικός ΠΕ82,
Πανεπιστήμιο Δυτικής Αττικής, τμήμα Βιοϊατρικών Επιστημών – ΣΕΥΠ,
Ελλάδα, Αθήνα
e-mail: makisvlass@gmail.com

ΠΕΡΙΛΗΨΗ

Σε περιόδους κρίσεων επέρχονται ριζικές αλλαγές της κοινωνίας. Στην Ελλάδα ο Covid-19 παρουσιάστηκε τον 02/2020 με το κλείσιμο των σχολείων και την εφαρμογή της εξ αποστάσεως εκπαίδευσης.

Μέσω της έρευνας διερευνήθηκε το μέλλον της ΕξΑΕ, μέσα από το πρίσμα των μαθητών δευτεροβάθμιας εκπαίδευσης. Εφαρμόστηκε μικτή δειγματοληψία (Στρωματοποιημένη και κατά Συστάδες). Συμμετείχαν 462 μαθητές Γυμνασίων και Λυκείων των νομών Αττικής και Κυκλάδων. Η έρευνα διεξήχθη τον 05/2020. Τα δεδομένα συλλέχθηκαν στο LimeSyrvey, αναλύθηκαν με SPSS (25), ακαδημαϊκή άδεια. Πραγματοποιήθηκε έλεγχος αξιοπιστίας του ερωτηματολογίου με τον δείκτη Cronbach's alpha, περιγραφική στατιστική, παραγοντική ανάλυση και η δοκιμασία Chi-square.

Η ανάλυση Chi-square έδειξε ότι το 76,2% των μαθητών δεν επιθυμούσε μελλοντικά την εφαρμογή της ΕξΑΕ, ενώ μόλις το 13% τη θεωρούσε σημαντική ως μορφή εκπαίδευσης και επιθυμούσε τη μελλοντική εφαρμογή της.

Εν κατακλείδι, η ΕξΑΕ δεν οργανώθηκε με μεθοδικότητα βάσει παιδαγωγικών μεθόδων και τεχνικών με αποτέλεσμα να μη γίνει αποδεκτή από την εκπαιδευτική κοινότητα. Οι απόψεις των μαθητών Γυμνασίων και Λυκείων (ΓΕΛ - ΕΠΑΛ) επηρεάστηκαν αρνητικά με αποτέλεσμα να μην επιθυμούν μια ενδεχόμενη μελλοντική εφαρμογή της, δεδομένης της μη εφαρμογής των αρχών που διέπουν την ΕξΑΕ.

Λέξεις - κλειδιά: Εξ Αποστάσεως Εκπαίδευση, Τηλεκπαίδευση, Τεχνολογίες Πληροφοριών και Επικοινωνιών, Σύγχρονη, Ασύγχρονη.

Συντομογραφίες: Απλή Τυχαία Δειγματοληψία (ΑΤΔ), Εξ Αποστάσεως Εκπαίδευση (ΕξΑΕ), Τεχνολογίες Πληροφοριών και Επικοινωνιών (ΤΠΕ)

ΠΑΡΑΓΟΝΤΕΣ ΠΟΥ ΕΠΗΡΕΑΣΑΝ ΤΗ ΣΥΜΜΕΤΟΧΗ ΤΩΝ ΜΑΘΗΤΩΝ ΣΤΗΝ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΔΙΔΑΣΚΑΛΙΑ ΚΑΤΑ ΤΗΝ ΠΑΝΔΗΜΙΑ

Ζιώγα Στυλιανή
ΠΕ 86, 1ο ΓΕΛ Ιωαννίνων
Ιωάννινα Ελλάδα
email: ziogastella68@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία αυτή ερευνά την εμπειρία των μαθητών Λυκείου από την εξ αποστάσεως εκπαίδευση κατά την πανδημία, εξετάζοντας τους παράγοντες που επηρέασαν την ανταπόκρισή τους. Στόχος ήταν να διερευνηθεί το ενδιαφέρον των μαθητών και οι τεχνολογικοί και παιδαγωγικοί παράγοντες που επηρέασαν τη συμμετοχή τους, να αναλυθούν οι αντιλήψεις τους σχετικά με την υποστήριξη, την αλληλεπίδραση, το εκπαιδευτικό υλικό και την ποιότητα των συστημάτων διαχείρισης μάθησης και τον ρόλο της οικογένειας. Η έρευνα πραγματοποιήθηκε τον Οκτώβριο του 2020 σε 100 μαθητές Α' και Β' Λυκείου από τα Ιωάννινα, με τη χρήση ψηφιακού ερωτηματολογίου 12 ερωτήσεων κλειστού τύπου και πολλαπλής επιλογής. Τα αποτελέσματα έδειξαν ότι η εξάρτηση από την τεχνολογία δημιούργησε προβλήματα (εξοπλισμός, σύνδεση), επηρεάζοντας αρνητικά τη συμμετοχή των μαθητών, ενώ οι εκπαιδευτικοί χρειάστηκε να αναπτύξουν νέους ρόλους. Οι μαθητές αντιμετώπισαν τεχνικά προβλήματα που επιλύθηκαν σχετικά γρήγορα, αλλά η κουλτούρα της συμβατικής εκπαίδευσης δυσκόλεψε την προσαρμογή στην εξ αποστάσεως εκπαίδευση. Εξέφρασαν αρνητικές αντιλήψεις για την επικοινωνία και την υποστήριξη από τους εκπαιδευτικούς, καθώς και για την ποιότητα του εκπαιδευτικού υλικού, ενώ η οικογένεια διαδραμάτισε σημαντικό ρόλο στην υποστήριξή τους.

Λέξεις - κλειδιά: εξ αποστάσεως διδασκαλία, πανδημία, υποστήριξη, αλληλεπίδραση

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΦΥΣΙΚΗ ΑΓΩΓΗ. ΔΙΕΡΕΥΝΗΣΗ ΓΝΩΣΕΩΝ ΤΩΝ ΚΑΘΗΓΗΤΩΝ Φ.Α ΠΡΩΤΟΒΑΘΜΙΑΣ ΚΑΙ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ

Ζούγρας Διονύσιος
Εκπαιδευτικός Φυσικής Αγωγής, Μεταπτυχιακός Φοιτητής
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
email: zougras77@yahoo.gr

Καμπάση Αικατερίνη
Καθηγήτρια Πανεπιστημίου, Κοσμήτορας της Σχολής Περιβάλλοντος
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
e-mail: kkabassi@ionio.gr

Φλάμπουρας Νιέτος Ηλίας
Διευθυντής 1ου Δημοτικού Ζακύνθου, Διδάκτορας
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
e-mail: hflabouras@yahoo.gr

Φλάμπουρα Νιέτου Υακίνθη
Φοιτήτρια ΤΕΦΑΑ Αθηνών
Εθνικό και καποδιστριακό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: yakinthinietou@gmail.com

ΠΕΡΙΛΗΨΗ

Η συγκεκριμένη εργασία εξετάζει την εφαρμογή της Τεχνητής Νοημοσύνης (ΤΝ) στον τομέα της Φυσικής Αγωγής, με έμφαση στις γνώσεις των εκπαιδευτικών. Η χρήση της ΤΝ στην εκπαίδευση έχει επεκταθεί ραγδαία τα τελευταία χρόνια, με ιδιαίτερες δυνατότητες για την προσαρμογή και ενίσχυση της εκπαιδευτικής εμπειρίας. Στη Φυσική Αγωγή, ωστόσο, η υιοθέτηση της παραμένει περιορισμένη, κυρίως λόγω έλλειψης γνώσης και επιμόρφωσης. Η έρευνα αυτή στοχεύει στη διερεύνηση του βαθμού κατανόησης και αποδοχής της από τους εκπαιδευτικούς, εστιάζοντας στις προοπτικές ενσωμάτωσής της στη διδασκαλία.

Η μεθοδολογία της έρευνας ακολούθησε ποσοτική ερευνητική προσέγγιση και περιλάμβανε τη συλλογή δεδομένων μέσω ηλεκτρονικών ερωτηματολογίων, τα οποία διανεμήθηκαν σε καθηγητές Φυσικής Αγωγής από όλη την Ελλάδα. Το δείγμα περιλάμβανε 250 συμμετέχοντες, οι οποίοι εργάζονται τόσο στην πρωτοβάθμια όσο και στη δευτεροβάθμια εκπαίδευση. Η ανάλυση των δεδομένων πραγματοποιήθηκε με τη χρήση περιγραφικών και επαγωγικών στατιστικών τεχνικών, μέσω του λογισμικού SPSS.

Η έρευνα ανέδειξε ότι οι γνώσεις των εκπαιδευτικών σχετικά με την ΤΝ είναι γενικά περιορισμένες. Το 23,6% δήλωσε ότι δεν είναι καθόλου εξοικειωμένο ενώ το 37,2% ανέφερε χαμηλό επίπεδο εξοικείωσης. Μόνο το 32,4% δήλωσε μέτρια εξοικείωση, ενώ τα ποσοστά των εκπαιδευτικών που αισθάνονται υψηλό επίπεδο εξοικείωσης είναι πολύ χαμηλά (Πολύ: 6,0%, Πάρα πολύ: 0,8%).Η εξοικείωση με τις βασικές αρχές, όπως η λειτουργία και οι τύποι της είναι επίσης περιορισμένη, με ορισμένους να αναγνωρίζουν μόνο τις πιο διαδεδομένες εφαρμογές της τεχνολογίας. Βρέθηκε θετική συσχέτιση μεταξύ της επιμόρφωσης στις ΤΠΕ και της επιμόρφωσης στην ΤΝ ($\rho=0.176, p=0.005$). Οι εκπαιδευτικοί που έχουν λάβει επιμόρφωση στις ΤΠΕ είναι πιο πιθανό να έχουν εμπειρία ή ενδιαφέρον και για επιμόρφωση στην ΤΝ. Αυτό υποδεικνύει ότι η προηγούμενη εκπαίδευση στις τεχνολογίες γενικά αυξάνει το ενδιαφέρον για πιο εξειδικευμένους τομείς. Σχετικά με την εμπειρία τους στη χρήση της, οι περισσότεροι εκπαιδευτικοί δήλωσαν ότι δεν έχουν χρησιμοποιήσει την τεχνολογία αυτή είτε στο εκπαιδευτικό πλαίσιο είτε σε άλλους τομείς.

Τα αποτελέσματα της έρευνας ανέδειξαν έντονη την ανάγκη για επιμόρφωση των εκπαιδευτικών Φυσικής Αγωγής στον τομέα της Τεχνητής Νοημοσύνης, ενώ οι συμμετέχοντες αναγνώρισαν τη σημασία και τη χρησιμότητα τέτοιων πρωτοβουλιών για την εκπαιδευτική διαδικασία. Παρά τη σχετική έλλειψη εξοικείωσης που αναδείχθηκε στα αποτελέσματα η πλειονότητα των συμμετεχόντων αξιολόγησε την επιμόρφωση ως πολύ χρήσιμη, εύρημα που υπογραμμίζει την ανάγκη για επαγγελματική ανάπτυξη στον τομέα αυτό.

Λέξεις - κλειδιά: Τεχνητή νοημοσύνη, Φυσική Αγωγή, Γνώσεις, Εκπαίδευση.

VIVLIOTHINKY: ΕΝΑ PROJECT ΣΥΝΕΡΓΑΤΙΚΗΣ ΜΑΘΗΣΗΣ ΓΙΑ ΤΗΝ ΑΝΑΠΤΥΞΗ ΤΩΝ ΚΟΙΝΩΝΙΚΩΝ ΚΑΙ ΨΗΦΙΑΚΩΝ ΔΕΞΙΟΤΗΤΩΝ ΒΑΣΙΣΜΕΝΟ ΣΤΗΝ ΥΠΗΡΕΣΙΑ E-GRAFIS ΤΟΥ ΠΣΔ

Κρητικάκης Μάρκος
Εκπαιδευτικός ΠΕ86
Β/θμια εκπαίδευση Γ' Αθήνας
Αθήνα, Ελλάδα
e-mail: hp2221203@hua.gr

Σοφιανοπούλου Χρύσα
Καθηγήτρια Τμήμα Πληροφορικής και Τηλεματικής
Χαροκόπειο Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: csofian@hua.gr

ΠΕΡΙΛΗΨΗ

Τα νέα Προγράμματα Σπουδών έχουν ως αφετηρία τα μαθησιακά αποτελέσματα, δηλαδή όλα όσα χρειάζεται να γνωρίζουν, να κατανοούν και να μπορούν να εφαρμόσουν οι μαθητές και οι μαθήτριες μετά την ολοκλήρωση κάθε μαθησιακής διαδικασίας μετακινώντας το κέντρο βάρους της έμφασης από το γνωστικό αντικείμενο, τους/τις διδάσκοντες/ουσες και τη διδακτική διαδικασία προς τους/τις μαθητές/τριες και τα προσδοκώμενα αποτελέσματα μάθησης. Στον πυρήνα της διδακτικής μεθοδολογίας βρίσκονται η δημιουργία περιβαλλόντων καθοδηγούμενης μάθησης, η αυτενέργεια, η συνεργατική δράση σε ομάδες, η διερευνητική μάθηση, η βιωματική προσέγγιση, η συνεργατική επίλυση προβλήματος, η επικοινωνιακή προσέγγιση, και η μετασχηματιστική λογική.

Το παρόν διδακτικό σενάριο, έχει ως θέμα την «ψηφιακή» οργάνωση της σχολικής βιβλιοθήκης και εφαρμόσθηκε στα πλαίσια πολιτιστικού προγράμματος με τη συμμετοχή μαθητών και μαθητριών ενός Ημερήσιου Γυμνασίου της Αττικής ενισχύοντας τη συνεργατική μάθηση με τη βοήθεια των ΤΠΕ και επιτυγχάνοντας γνωστικούς διδακτικούς στόχους σχετικούς με τα υπολογιστικά φύλλα, τα συνεργατικά έγγραφα και τις ιστοεξερευνήσεις. Η υλοποίησή του βασίστηκε στη χρήση της υπηρεσίας e-grafis που παρέχεται από το Πανελλήνιο Σχολικό Δίκτυο και έχει ως απαραίτητη προϋπόθεση τη δημιουργία και χρήση Μαθητικών Λογαριασμών για όλους/ες τους/τις συμμετέχοντες/ουσες. Ο σχεδιασμός του σεναρίου περιλαμβάνει τέσσερις φάσεις υλοποίησης, γνωστικούς και ψυχοσυναισθηματικούς στόχους, ανατροφοδότηση πριν από κάθε νέα φάση, αξιολόγηση στο τέλος και αναστοχασμό των πεπραγμένων.

Για το σχεδιασμό και την υλοποίηση του εκπαιδευτικού σεναρίου εφαρμόσθηκε η μέθοδος project και οι στρατηγικές διδασκαλίας που ακολουθήθηκαν ήταν η άμεση διδασκαλία και η ανακαλυπτική μάθηση. Κατά την εφαρμογή του σεναρίου παρατηρήθηκε ότι η συνεργατική μάθηση με τη βοήθεια των υπολογιστών προωθεί την καλλιέργεια κοινωνικών δεξιοτήτων όπως η επικοινωνία και η συνεργασία και την καλλιέργεια ψηφιακών δεξιοτήτων με κυριότερη τη διαχείριση συνεργατικών περιβαλλόντων υλοποίησης δραστηριοτήτων. Παράλληλα διαπιστώθηκε ότι η αξιοποίηση των Ψηφιακών Μέσων σε πολιτιστικά προγράμματα ή στα εργαστήρια δεξιοτήτων μπορεί να ενισχύσει τη δυναμική της διδασκαλίας, να τονώσει το ενδιαφέρον των μαθητών, να βελτιώσει το μαθησιακό κλίμα και να ενισχύσει την αποτελεσματικότητα της εκπαιδευτικής διαδικασίας. Το θέμα του project και η καθοδήγηση από τον/την εκπαιδευτικό αναφέρθηκαν ως οι κυριότεροι θετικοί παράγοντες ενώ η ώρα διεξαγωγής ως ο σημαντικότερος αρνητικός παράγοντας. Τέλος, η διαφορετική ταχύτητα με την οποία εργάζονται τα μέλη μιας ομάδας αναφέρθηκε ως το σημαντικότερο πρόβλημα της συνεργατικής δράσης.

Λέξεις κλειδιά: συνεργατική μάθηση, e-grafis, ιστοεξερεύνηση, ΤΠΕ, εκπαιδευτικό σενάριο, πρόγραμμα σπουδών, πολιτιστικό πρόγραμμα

ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΚΒΑΝΤΙΚΉΣ ΘΕΩΡΙΑΣ ΣΤΗ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ: ΤΟ ΠΕΊΡΑΜΑ ΤΗΣ ΔΙΠΛΗΣ ΣΧΙΣΜΗΣ ΚΑΙ Η ΔΗΜΙΟΥΡΓΊΑ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΣΕΝΑΡΙΟΥ ΓΙΑ ΜΑΘΗΤΕΣ-ΜΑΘΗΤΡΙΕΣ ΤΗΣ Γ' ΓΥΜΝΑΣΙΟΥ ΜΕ ΧΡΗΣΗ ΤΠΕ

Μαγαλιού Μαρία
Εκπαιδευτικός ΠΕ04.01 (Φυσικός) –Υποψήφια Διδάκτορας,
Παιδαγωγικό Τμήμα Δημοτικής Εκπαίδευσης,
Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών
email: mvpmag@gmail.com

ΠΕΡΙΛΗΨΗ

Η κβαντική φυσική, παρά την αντιλαμβανόμενη πολυπλοκότητά της, αποτελεί το θεμέλιο πολλών σύγχρονων τεχνολογιών που διαμορφώνουν την καθημερινή μας ζωή. Από τους υπολογιστές που χρησιμοποιούμε έως την ιατρική διαγνωστική απεικόνιση, η κβαντική θεωρία είναι αναπόσπαστο μέρος της σύγχρονης πραγματικότητας. Ωστόσο, στην Ελλάδα, η διδασκαλία της στη Δευτεροβάθμια Εκπαίδευση περιορίζεται κυρίως σε μαθητές που προετοιμάζονται για τις πανεπιστημιακές εισαγωγικές εξετάσεις, αποκλείοντας έτσι ένα σημαντικό μέρος του μαθητικού πληθυσμού από την επαφή με αυτές τις συναρπαστικές έννοιες. Η κβαντική θεωρία εγείρει βαθιά ερωτήματα σχετικά με τη φύση της πραγματικότητας, τη γνώση και τον ρόλο του παρατηρητή. Το πείραμα της διπλής σχισμής, ένα εμβληματικό φαινόμενο που αναδεικνύει θεμελιώδεις κβαντικές έννοιες και φιλοσοφικές προεκτάσεις, απουσιάζει χαρακτηριστικά από το ελληνικό αναλυτικό πρόγραμμα της Δευτεροβάθμιας Εκπαίδευσης. Παρ' όλα αυτά, η διδασκαλία του μπορεί να αποτελέσει ένα ισχυρό εργαλείο όχι μόνο για την καλλιέργεια της επιστημονικής κατανόησης, αλλά και για την ανάπτυξη της κριτικής σκέψης.

Η παρούσα εργασία προτείνει ένα διδακτικό σενάριο για μαθητές της Γ΄ Γυμνασίου (9η τάξη στο ελληνικό εκπαιδευτικό σύστημα), το οποίο αξιοποιεί τις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ), και συγκεκριμένα εκπαιδευτικά βίντεο και προσομοιώσεις PhET Colorado («Wave Interference», «Quantum Wave Interference»), με στόχο την εισαγωγή στο πείραμα της διπλής σχισμής. Το σενάριο αποσκοπεί στην προώθηση της ενεργού συμμετοχής των μαθητών, στην ανάπτυξη δεξιοτήτων κριτικής σκέψης και στη σύνδεση της επιστημονικής γνώσης με ευρύτερα φιλοσοφικά και κοινωνικά ερωτήματα.

Το βασικό ερευνητικό ερώτημα που διερευνάται είναι: πώς μπορεί ένα διδακτικό σενάριο που αξιοποιεί τις ΤΠΕ να ενισχύσει τη διδασκαλία του πειράματος της διπλής σχισμής στη Δευτεροβάθμια Εκπαίδευση και πώς αντιλαμβάνονται και αποδέχονται οι μαθητές τη διδασκαλία κβαντικών θεμάτων μέσω αυτών των εργαλείων; Ειδικότερα, η έρευνα εστιάζει στην αξιολόγηση της αποτελεσματικότητας των ΤΠΕ στη διδασκαλία κβαντικών εννοιών, όπως η δυαδικότητα κύματος-σωματιδίου, και στο πώς οι τεχνολογίες αυτές βοηθούν τους μαθητές να αποκτήσουν μια πιο προσιτή και ουσιαστική κατανόηση του πειράματος της διπλής σχισμής.

Τα προκαταρκτικά ευρήματα από την πιλοτική εφαρμογή του σεναρίου σε μαθητές της Γ΄ Γυμνασίου δείχνουν ότι η εισαγωγή βασικών κβαντικών εννοιών σε αυτή την ηλικία είναι εφικτή. Η ενσωμάτωση των ΤΠΕ φάνηκε να αυξάνει σημαντικά το ενδιαφέρον των μαθητών, να ενισχύει τη συμμετοχή τους και να συμβάλλει στην ανάπτυξη βαθύτερης κατανόησης των κβαντικών φαινομένων, και ιδιαίτερα της δυαδικότητας κύματος-σωματιδίου όπως αυτή εκδηλώνεται στο πείραμα της διπλής σχισμής. Αν και τα αρχικά αυτά αποτελέσματα είναι ενθαρρυντικά, απαιτείται περαιτέρω έρευνα σε μεγαλύτερη κλίμακα, προκειμένου να αξιολογηθεί πλήρως η αποτελεσματικότητα των ΤΠΕ και να διερευνηθούν οι παράγοντες που επηρεάζουν την αποδοχή και την κατανόηση αυτών των αφηρημένων επιστημονικών πεδίων από τους μαθητές.

Λέξεις – κλειδιά: Κβαντική φυσική, Διδακτικό σενάριο, Πείραμα διπλής σχισμήςΤεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ), Κριτική σκέψη

ΣΤΑΣΕΙΣ ΚΑΙ ΠΕΠΟΙΘΗΣΕΙΣ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΓΙΑ ΤΗ ΧΡΗΣΗ ΕΡΓΑΛΕΙΩΝ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Τόλη Γεωργία
Διευθύντρια ΓΕΛ Νεοχωρίου Άρτας, Δρ Φυσικός

Καρδαράς Ιωάννης
Διευθυντής ΓΕΛ Πύλης Τρικάλων, Δρ Φυσικός

Κούτσικος Αθανάσιος
Αν. Διευθυντής Π.ΕΠΑ.Λ. Βελεστίνου, ΜΔΕ Φυσικός

ΠΕΡΙΛΗΨΗ

Όσο η εξέλιξη των εργαλείων που βασίζονται στην Τεχνητή Νοημοσύνη (Τ.Ν.) προχωρά και η χρήση τους στη διδασκαλία των Φυσικών Επιστημών διευρύνεται, καθίσταται φανερό ότι δημιουργεί πολλές ευκαιρίες βελτίωσης της διδασκαλίας και συνακολούθως των μαθησιακών αποτελεσμάτων. Επιπλέον, η μελέτη των πεποιθήσεων και των στάσεων των εκπαιδευτικών στην ενσωμάτωση της Τ.Ν. στην εκπαιδευτική διαδικασία αναδεικνύεται ως ένα σημαντικό ζήτημα. Τα αποτελέσματα πολλών μελετών στη διδασκαλία των Φυσικών Επιστημών (Φ.Ε.) αναφέρουν τους ποικίλους και επικείμενους ρόλους της τεχνητής νοημοσύνης στην εκπαίδευση. Παρόλα αυτά, οι εκπαιδευτικοί Φ.Ε., αντιμετωπίζουν, την τελευταία δεκαετία, μια ιδιαίτερα μεγάλη πρόκληση, τη χρήση της Τ.Ν. στη σχολική τάξη χωρίς όμως να έχει υπάρξει ένας σημαντικός κεντρικός σχεδιασμός που να τους υποστηρίζει.

Η παρούσα μελέτη ερευνά τις στάσεις και πεποιθήσεις 40 εκπαιδευτικών Φ.Ε. Δευτεροβάθμιας εκπαίδευσης, της Θεσσαλίας και της Ηπείρου, απέναντι στην ενσωμάτωση των υπαρχόντων εργαλείων Τ.Ν., στην τάξη τους. Ειδικότερα, η έρευνα αυτή μελετά τις απόψεις των εκπαιδευτικών σχετικά με τα εργαλεία Τ.Ν., όπως το Gemini, το πρόγραμμα για την περίληψη αρχείων pdf με τεχνητή νοημοσύνη, το Gamma.app, τα οποία κατέχουν δυναμικό ρόλο στη βελτίωση παιδαγωγικών πρακτικών. Για τη συλλογή των δεδομένων της έρευνας σχετικά με την αξιολόγηση των στάσεων και πεποιθήσεων των εκπαιδευτικών, σχεδιάστηκε και διανεμήθηκε σε αυτούς ένα ερωτηματολόγιο 19 ερωτήσεων κλειστού τύπου και οι απαντήσεις δόθηκαν στην τετραβάθμια κλίμακα Likert.

Από τα αποτελέσματα των απαντήσεων προκύπτει ότι οι εκπαιδευτικοί παρόλο που στην πλειονότητά τους είναι εξοικειωμένοι με τη χρήση των ηλεκτρονικών υπολογιστών και στη χρήση των διαδραστικών πινάκων στη καθημερινή τους διδασκαλία, αισθάνονται σε μεγάλο βαθμό επιφυλακτικοί απέναντι στη χρήση των εργαλείων της Τ.Ν. και επιπλέον δηλώνουν ότι έχουν ελλιπή γνώση αυτών καθώς και ότι πιστεύουν ότι είναι ανέτοιμοι να προχωρήσουν στη χρήση αυτών των εργαλείων αποτελεσματικά στη σχολική τάξη, Τα αποτελέσματα καταδεικνύουν την ανάγκη δημιουργίας επιμορφωτικών σεμιναρίων για την αποτελεσματική γνωστική υποστήριξη των εκπαιδευτικών.

Λέξεις – κλειδιά: εκπαιδευτικοί, ερωτηματολόγιο, τεχνητή νοημοσύνη

ΕΚΠΑΙΔΕΥΤΙΚΕΣ ΔΡΑΣΕΙΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΑ: Ο ΚΡΟΚΟΣ ΚΟΖΑΝΗΣ ΚΑΙ ΤΟ BEEBOT ΩΣ ΔΙΔΑΚΤΙΚΑ ΕΡΓΑΛΕΙΑ

Τσίρου Αντιγόνη
Εκπαιδευτικός Πληροφορικής, MSc
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Κοζάνης, Υπουργείο Παιδείας και Θρησκευμάτων
Κοζάνη, Ελλάδα
e-mail: tsirouant@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα έρευνα διερευνά την αποτελεσματικότητα της δράσης «Κρόκος Κοζάνης» σε συνδυασμό με τη χρήση του ρομπότ Bee-Bot σε μεικτές ομάδες της πρωτοβάθμιας εκπαίδευσης στην περιοχή της Κοζάνης. Η εργασία εστιάζει στη σύνδεση του τοπικού πολιτισμού, των παραδόσεων και της οικονομικής σημασίας του κρόκου με την εκπαιδευτική διαδικασία, ενώ παράλληλα αξιοποιεί την καινοτόμο τεχνολογία της ρομποτικής για την ενίσχυση της ομαδικής μάθησης και των δεξιοτήτων προγραμματισμού.

Στο πλαίσιο της έρευνας, δημιουργήθηκε ένα ηλεκτρονικό ερωτηματολόγιο (Google Forms), το οποίο διανεμήθηκε σε 32 εκπαιδευτικούς μετά την ολοκλήρωση εκπαιδευτικών δράσεων για τον Κρόκο Κοζάνης. Οι εκπαιδευτικοί απάντησαν ανώνυμα, ενώ τα δεδομένα συλλέχθηκαν και επεξεργάστηκαν αυτόματα, επιτρέποντας μια συστηματική ανάλυση των απόψεων τους για τη σύνδεση του διδακτικού θέματος με την πραγματική ζωή και τη χρήση του ρομπότ Bee-Bot στην τάξη.

Η μεθοδολογία περιλάμβανε την καταγραφή δημογραφικών στοιχείων (φύλο, ηλικία, μορφωτικό επίπεδο, χρόνια υπηρεσίας), που υποδεικνύουν ένα δείγμα έμπειρων εκπαιδευτικών με κυρίαρχη παρουσία γυναικών και σημαντική επαγγελματική προϋπηρεσία. Τα αποτελέσματα της έρευνας αποκαλύπτουν ότι οι εκπαιδευτικοί θεωρούν το θέμα του Κρόκου άρρηκτα συνδεδεμένο με την καθημερινή ζωή των μαθητών, επισημαίνοντας την αξία του για την τοπική κουλτούρα, τα έθιμα και την οικονομία της περιοχής.

Παράλληλα, η χρήση του ρομπότ Bee-Bot ενίσχυσε την ομαδοσυνεργατική μάθηση, προωθώντας την αμοιβαία αλληλεπίδραση, την κριτική και δημιουργική σκέψη, καθώς και την πρακτική εξοικείωση με βασικές αρχές προγραμματιστικής σκέψης. Οι εκπαιδευτικοί παρατήρησαν ιδιαίτερα οφέλη όσον αφορά τη συμμετοχή όλων των μαθητών, συμπεριλαμβανομένων των «αδύναμων», και την ενίσχυση των κοινωνικο-συναισθηματικών δεξιοτήτων.

Τα συνολικά συμπεράσματα επιβεβαιώνουν τη θετική διάθεση για την ενσωμάτωση καινοτόμων πρακτικών στη διδασκαλία, επισημαίνοντας την ανάγκη για περαιτέρω επιμόρφωση στη χρήση ρομποτικών εργαλείων. Η παρούσα περίληψη προσφέρει μια συνοπτική εικόνα της έρευνας, προσκαλώντας τον αναγνώστη να ανακαλύψει σε βάθος τις λεπτομέρειες της μεθοδολογίας και των ευρημάτων, τα οποία συμβάλλουν στη βελτίωση της εκπαιδευτικής πρακτικής.

Η μελέτη αυτή παρουσιάζει όχι μόνο την άμεση επίδραση των καινοτόμων μεθόδων στη μάθηση, αλλά και τις προοπτικές για μελλοντικές εφαρμογές που μπορούν να ενισχύσουν την ποιότητα της εκπαιδευτικής διαδικασίας.

Λέξεις-κλειδιά: Κρόκος Κοζάνης, Bee-Bot , διαφοροποιημένη διδασκαλία, ομαδική συνεργασία, ρομποτική, βιωματική μάθηση.

ΕΞΕΡΕΥΝΗΣΗ ΤΗΣ ΔΥΝΑΜΙΚΗΣ ΤΩΝ ΔΙΚΤΥΩΝ ΦΙΛΙΑΣ ΑΞΙΟΠΟΙΩΝΤΑΣ ΑΛΓΟΡΙΘΜΟΥΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ: ΜΙΑ ΜΕΛΕΤΗ ΣΕ ΕΙΔΙΚΟ ΣΧΟΛΕΙΟ

Τσώνη Ροζίτα
Εκπαιδευτικός, Καθηγήτρια Σύμβουλος, Ελληνικό Ανοικτό Πανεπιστήμιο
Ηγουμενίτσα, Ελλάδα
tsoni.rodanthi@ac.eap.gr

Τσιρώνης Θωμάς
Εκπαιδευτικός, Διευθυντής ΕΝΕΕΓΥΛ Ηγουμενίτσας
Ηγουμενίτσα, Ελλάδα
thomatsironis@gmail.com

Βερύκιος Σ. Βασίλειος
Καθηγητής, Ελληνικό Ανοικτό Πανεπιστήμιο
Πάτρα, Ελλάδα
verykios@eap.gr

ΠΕΡΙΛΗΨΗ

Η φιλία αποτελεί βασική συνθήκη για την υγιή ανάπτυξη των ατομικών και κοινωνικών σχέσεων, ιδίως κατά την ευαίσθητη περίοδο της εφηβείας. Ενώ κατά βάση η φιλία θεωρείται αμοιβαία και αμφίδρομη, συχνά στο πλαίσιο της ειδικής αγωγής, η διάκριση μεταξύ φιλίας, συνοδείας και φροντίδας συχνά συγχέεται. Αυτή η ασάφεια μπορεί να οδηγήσει σε φιλίες που στερούνται αμοιβαίας δυναμικής η οποία παρατηρείται στα τυπικά σχολεία, δημιουργώντας αισθήματα απογοήτευσης, απομόνωσης και κοινωνικής περιθωριοποίησης.

Η παρούσα εργασία επιχειρεί να αναδείξει τη δυναμική των σχέσεων φιλίας σε ένα μικρό σχολείο ειδικής αγωγής δευτεροβάθμιας εκπαίδευσης, χρησιμοποιώντας την ανάλυση κατευθυνόμενων δικτύων. Μέσω της ανάλυσης κοινωνικών δικτύων, υπολογίζονται μετρικές, μερικές εκ των οποίων βασίζονται σε αλγόριθμους τεχνητής νοημοσύνης, ώστε να αναδειχθούν σημαντικοί ρόλοι και δομικές ιδιαιτερότητες του δικτύου φιλίας των μαθητών. Αυτές οι μετρικές, αποκαλύπτουν κρυφά μοτίβα και δυναμικές που δεν είναι άμεσα ορατές, προσφέροντας πολύτιμες πληροφορίες για την κατανόηση των κοινωνικών αλληλεπιδράσεων τους.

Στόχος της έρευνας είναι να παράσχει στους εκπαιδευτικούς και τους ειδικούς επαγγελματίες ένα εργαλείο για την ενίσχυση των κοινωνικών σχέσεων, την καταπολέμηση της απομόνωσης και την πρόληψη του εκφοβισμού. Στην ανάλυση χρησιμοποιήθηκαν ανωνυμοποιημένα δεδομένα από 22 ενεργούς μαθητές, με κάθε μαθητή να συνδέεται με 3 έως 5 φίλους.

Λέξεις – κλειδιά: Ειδική Αγωγή, Φιλία, Κοινωνικά Δίκτυα, Ανάλυση Συνδέσεων

ΔΙΕΡΕΥΝΗΣΗ ΓΝΩΣΕΩΝ ΜΑΘΗΤΩΝ ΔΗΜΟΤΙΚΩΝ ΣΧΟΛΕΙΩΝ ΓΙΑ ΤΗΝ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Φλάμπουρας Νιέτος Ηλίας
Διευθυντής 1ου Δημοτικού Ζακύνθου, Διδάκτορας
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
hflabouras@yahoo.gr

Καμπάση Αικατερίνη
Καθηγήτρια
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
kkabassi@ionio.gr

Ζούγρας Διονύσιος
Εκπαιδευτικός, Μεταπτυχιακός Φοιτητής
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
zougras77@yahoo.gr

Φλάμπουρα Νιέτου Ήλια
Μεταπτυχιακή Φοιτήτρια
Πάντειο Πανεπιστήμιο
Αθήνα, Ελλάδα
ilianietou@gmail.com

ΠΕΡΙΛΗΨΗ

Σκοπός της εργασίας είναι να διερευνήσει τις γνώσεις των μαθητών Δημοτικού για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση. Για το σκοπό αυτό πραγματοποιήθηκε μια ποσοτική έρευνα σε δείγμα 321 μαθητών Δημοτικού που πηγαίνουν στις τάξεις Δ, Ε και ΣΤ στο Νομό Ζακύνθου. Η συλλογή των δεδομένων έγινε με διανομή έντυπου ερωτηματολογίου στους μαθητές. Τα αποτελέσματα της έρευνας έδειξαν πως η πλειοψηφία των μαθητών γνώριζαν την έννοια της τεχνητής νοημοσύνης (78.5%) και είχαν χρησιμοποιήσει οι ίδιοι ή οι γονείς τους τεχνητή νοημοσύνη (59.7%). Από την ανάλυση των δεδομένων προέκυψε πως οι μαθητές τείνουν να συμφωνήσουν με το ότι η Τεχνητή Νοημοσύνη μπορεί να δημιουργήσει εκπαιδευτικά παιχνίδια που κάνουν τη μάθηση πιο διασκεδαστική, μπορεί να χρησιμοποιηθεί για να δημιουργήσει εκπαιδευτικά παιχνίδια, μπορεί να βοηθήσει τους μαθητές να μάθουν νέες γλώσσες με πιο εύκολο τρόπο και μπορεί να βοηθήσει στην επίλυση μαθηματικών προβλημάτων με εξηγήσεις βήμα-βήμα. Γενικά, οι μαθητές έχουν ένα μέτριο προς υψηλό επίπεδο γνώσεων σε ζητήματα τεχνητής νοημοσύνης, μια ουδέτερη στάση απέναντι στην τεχνητή νοημοσύνη και σε μέτριο βαθμό αναγνωρίζουν τα οφέλη της τεχνητής νοημοσύνης σε διάφορους τομείς της καθημερινότητας. Τέλος, τα ευρήματα έδειξαν πως η αύξηση των γνώσεων των μαθητών και η διαμόρφωση μιας θετικότερης αντίληψης για την τεχνητή νοημοσύνη επηρεάζει θετικά τη στάση των μαθητών για τη χρήση τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: Τεχνητή νοημοσύνη, εκπαίδευση, γνώσεις μαθητών, πρωτοβάθμια εκπαίδευση

ΘΠ2: Η παιδαγωγική ενσωμάτωση των Ψηφιακών Μέσων στη διδακτική πράξη (Θεωρίες Μάθησης, Προγράμματα Σπουδών και Ψηφιακά Μέσα)

Η ΕΠΙΔΡΑΣΗ ΤΩΝ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΦΥΣΙΚΗΣ ΑΓΩΓΗΣ: ΑΝΑΛΥΣΗ ΕΠΙΠΤΩΣΕΩΝ ΚΑΙ ΑΞΙΟΛΟΓΗΣΗ ΑΠΟΔΟΣΗΣ ΜΑΘΗΤΩΝ ΚΑΙ ΕΚΠΑΙΔΕΥΤΙΚΩΝ

Ανδρουτσόπουλος Παναγιώτης
Σύμβουλος Εκπαίδευσης ΠΕ11 Ηλείας-Ζακύνθου-Κεφαλληνίας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Ηλείας
Πύργος Ηλείας, Ελλάδα
email; panagiotisandrouts@gmail.com

Κάρμη Βασιλική
Εκπαιδευτικός ΠΕ06 Αγγλικής Γλώσσας.
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Κερκύρας
Κέρκυρα, Ελλάδα
email: vaskarmi1976@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα ερευνητική μελέτη διερευνά την επίδραση της ενσωμάτωσης ψηφιακών τεχνολογιών στη διδασκαλία της Φυσικής Αγωγής στη Δευτεροβάθμια Εκπαίδευση, με ιδιαίτερη έμφαση στη χρήση παιγνιωδών εφαρμογών (gamification), εικονικής πραγματικότητας (Virtual Reality, VR) και επαυξημένης πραγματικότητας (Augmented Reality, AR).

Μέσω της συλλογής ποιοτικών και ποσοτικών δεδομένων από 15 εκπαιδευτικούς και 60 μαθητές/τριες σε σχολικές μονάδες της Περιφερειακής Διεύθυνσης Εκπαίδευσης Δυτικής Ελλάδας, η έρευνα αποσκοπεί στην αξιολόγηση της συμβολής των εν λόγω τεχνολογιών στην ενίσχυση της μαθητικής συμμετοχής, κινητοποίησης και βελτίωσης των κινητικών δεξιοτήτων.

Τα ευρήματα καταδεικνύουν ότι η αξιοποίηση ψηφιακών εργαλείων ενισχύει το ενδιαφέρον και τη δραστηριοποίηση των μαθητών, ιδίως εκείνων που εμφάνιζαν περιορισμένη εμπλοκή στο παραδοσιακό διδακτικό πλαίσιο. Ωστόσο, αναδεικνύονται κρίσιμες προκλήσεις, κυρίως ως προς την επαρκή επιμόρφωση και την τεχνική υποστήριξη των εκπαιδευτικών.

Η μελέτη καταλήγει σε προτάσεις για την παιδαγωγικά τεκμηριωμένη ενσωμάτωση της τεχνολογίας στη Φυσική Αγωγή, συμβάλλοντας τόσο στη βελτίωση της ποιότητας της διδασκαλίας όσο και στην προώθηση της εκπαιδευτικής ισότητας.

Λέξεις – κλειδιά: Ψηφιακές τεχνολογίες, Φυσική Αγωγή, Gamification, εικονική πραγματικότητα (VR), εκπαιδευτικά Αποτελέσματα

ΔΙΔΑΣΚΑΛΙΑ ΟΛΟΚΛΗΡΟΥ ΤΟΥ ΛΟΓΟΤΕΧΝΙΚΟΥ ΕΡΓΟΥ ΤΟΥ Κ. ΘΕΟΤΟΚΗ «Η ΤΙΜΗ ΚΑΙ ΤΟ ΧΡΗΜΑ» ΜΕ ΤΗ ΧΡΗΣΗ Τ.Π.Ε.

Βοντίτσου Άννα
Εκπαιδευτικός, Π.Ε.02
Δ.Δ.Ε. Πρέβεζας
Πρέβεζα, Ελλάδα
avontitsou@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η εισήγηση αυτή αναδεικνύει την αξιοποίηση των Τ.Π.Ε. στη διδασκαλία της λογοτεχνίας στη Β΄ Λυκείου, συγκεκριμένα στο έργο «Η τιμή και το χρήμα» του Κ. Θεοτόκη. Η χρήση ψηφιακών μέσων -το διαδίκτυο, ο διαδραστικός πίνακας, η e-τάξη, το οπτικοακουστικό υλικό (ebook, ταινία) και η τεχνητή νοημοσύνη (γλωσσικά μοντέλα)- συνεισφέρει στην επίτευξη των διδακτικών στόχων μέσω καινοτόμων μεθόδων.

Εισαγωγικά, παρουσιάζονται τα προγράμματα σπουδών των ετών 2011, 2021, 2023-2024 που στοχεύουν στον κριτικό και ψηφιακό γραμματισμό. Στη συνέχεια, καταγράφονται ο θετικός ρόλος των Τ.Π.Ε. στην εκπαίδευση και ειδικότερα στη διδασκαλία της λογοτεχνίας αλλά και οι προκλήσεις.

Στο κύριο μέρος της εισήγησης αναλύεται η διδακτική πρόταση ολόκληρης της νουβέλας του Κ. Θεοτόκη μέσω της πλατφόρμας e-τάξη. Περιγράφονται το μοντέλο διδασκαλίας, οι μέθοδοι, η πορεία διδασκαλίας, τα βοηθητικά μέσα και δειγματικά παρουσιάζονται σε φύλλα εργασίας ερωτήσεις κατανόησης, σχολιασμού απόψεων, αφηγηματολογίας, διακειμενικότητας, οπτικοποίησης παραγράφων, αλλαγής αφηγηματικών τρόπων ή οπτικής γωνίας αλλά και παραγωγής λόγου με τη βοήθεια της Τ.Ν.

Στο τέλος της εισήγησης, συνάγονται τα συμπεράσματα από την αλληλεπιδραστική σχέση των Τ.Π.Ε. με τη διδακτική της λογοτεχνίας.

Λέξεις – κλειδιά: λογοτεχνία, μεικτό μοντέλο διδασκαλίας, χρήση Τ.Π.Ε., τεχνητή νοημοσύνη (Τ.Ν.), ψηφιακός γραμματισμός, νέα προγράμματα σπουδών.

ΜΙΚΡΑΣΙΑΤΙΚΗ ΚΑΤΑΣΤΡΟΦΗ ΚΑΙ ΜΙΚΡΑΣΙΑΤΙΚΑ ΜΝΗΜΕΙΑ: ΕΚΠΑΙΔΕΥΤΙΚΗ ΠΡΩΤΟΒΟΥΛΙΑ ΜΕ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΕΡΓΑΛΕΙΩΝ

Γιαννούλη Σοφία
Φιλόλογος, ΠΕ02
1ο Πρότυπο Γυμνάσιο Πρέβεζας με Λυκειακές Τάξεις
Πρέβεζα, Ελλάδα
e-mail: alexandropoulosalekos@yahoo.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει την εκπαιδευτική πρωτοβουλία του μαθητικού ομίλου Ιστορίας με τίτλο «Μικρασιατική Καταστροφή και Μικρασιατικά Μνημεία», η οποία υλοποιήθηκε στο 1ο Πρότυπο Γυμνάσιο Πρέβεζας κατά το σχολικό έτος 2022-2023. Σκοπός της πρωτοβουλίας ήταν η συνδυασμένη εμβάθυνση στην ιστορική γνώση και μνήμη της Μικρασιατικής Καταστροφής, μέσω της ενσωμάτωσης καινοτόμων ψηφιακών εργαλείων στην εκπαιδευτική διαδικασία. Η εργασία αναλύει πώς η χρήση της τεχνολογίας ενίσχυσε την κατανόηση των ιστορικών γεγονότων, επιτρέποντας στους μαθητές να προσεγγίσουν και να παρουσιάσουν την ιστορία με σύγχρονο και διαδραστικό τρόπο.

Η μεθοδολογία που ακολουθήθηκε περιλάμβανε τη χρήση ψηφιακών πλατφορμών για την αναζήτηση, ανάλυση και επεξεργασία ιστορικών πηγών, όπως επίσης και την εκπόνηση εργασιών και δημιουργία παρουσιάσεων μέσω λογισμικών παρουσίασης (π.χ. PowerPoint). Παράλληλα, χρησιμοποιήθηκαν ψηφιακά εργαλεία για τη συγκέντρωση φωτογραφικού υλικού, τη δημιουργία ψηφιακών αφισών και την οργάνωση ψηφιακών εκδηλώσεων. Ένα σημαντικό στάδιο του προγράμματος ήταν η δημιουργία ενός τραγουδιού, το οποίο μελοποιήθηκε με τη χρήση μουσικών λογισμικών παραγωγής (όπως το GarageBand και το FL Studio), καθώς και η δημιουργία ψηφιακού ραδιοφωνικού προγράμματος, όπου οι μαθητές παρουσίασαν ιστορικά δεδομένα μέσω ενός σύγχρονου μέσου επικοινωνίας.

Τα κύρια ευρήματα της εργασίας υποδεικνύουν τη θετική επίδραση της χρήσης ψηφιακών εργαλείων στην ενίσχυση της συνεργασίας και της δημιουργικότητας των μαθητών. Η αξιοποίηση των τεχνολογικών εργαλείων επέτρεψε στους μαθητές να συμμετέχουν ενεργά σε όλες τις φάσεις του έργου, ενισχύοντας την κριτική σκέψη και την ικανότητά τους να παράγουν ψηφιακό περιεχόμενο. Ιδιαίτερα, η δημιουργία του τραγουδιού και του ψηφιακού ραδιοφωνικού προγράμματος αποτέλεσε μια κορυφαία στιγμή της μαθησιακής διαδικασίας, καθώς συνδύασε τη μουσική και την ιστορική μνήμη με την τεχνολογία, προσφέροντας στους μαθητές τη δυνατότητα να εκφραστούν δημιουργικά.

Τα αποτελέσματα καταδεικνύουν ότι η συνδυασμένη χρήση παραδοσιακών μεθόδων διδασκαλίας και ψηφιακών εργαλείων ενισχύει την εκπαιδευτική διαδικασία, προσφέροντας στους μαθητές πολύτιμες δεξιότητες για τη σύγχρονη εποχή. Οι μαθητές ανέπτυξαν τις δεξιότητές τους στην κριτική σκέψη, την έκφραση και τη συνεργασία σε ψηφιακό περιβάλλον, αποκτώντας εμπειρίες που ενισχύουν την ικανότητά τους να προσεγγίζουν ιστορικά θέματα με δημιουργικό και σύγχρονο τρόπο.

Λέξεις – κλειδιά: Μικρασιατική Καταστροφή, ιστορική μνήμη, ψηφιακά εργαλεία.

Η MUSIQUE CONCRETE ΩΣ ΕΡΓΑΛΕΙΟ ΨΗΦΙΑΚΗΣ ΑΦΗΓΗΣΗΣ: ΕΝΑ ΕΡΓΑΣΤΗΡΙΟ ΗΛΕΚΤΡΟΑΚΟΥΣΤΙΚΗΣ ΜΟΥΣΙΚΗΣ ΣΥΝΘΕΣΗΣ ΣΤΟ ΜΑΘΗΜΑ ΤΩΝ ΜΟΥΣΙΚΩΝ ΣΥΝΟΛΩΝ

Δημητρακόπουλος Αριστοτέλης
Υποψήφιος Διδάκτωρ Ιονίου Πανεπιστημίου, Εκπαιδευτικός Μουσικής Επιστήμης, Συνθέτης
Μουσικό Σχολείο Πρέβεζας

ΠΕΡΙΛΗΨΗ

Το παρόν επιστημονικό άρθρο διερευνά την ενσωμάτωση της *Musique Concrète (Συγκεκριμένη Μουσική)* στην εκπαιδευτική μεθοδολογία της Ψηφιακής Αφήγησης *(digital storytelling)*, εξετάζοντας τις προοπτικές σύνδεσης του ηχητικού (προ)σχεδιασμού με την αφηγηματική πρακτική. Ως μια μορφή πειραματικής μουσικής δημιουργίας του 20ου αιώνα, με θεμελιώδη εργαλεία την ψηφιακή επεξεργασία, τροποποίηση και αναδιάταξη προ-ηχογραφημένων ήχων περιβάλλοντος, η *Musique Concrète* διευρύνει τα όρια της «παραδοσιακής» σύνθεσης και αψηφά τους αυστηρούς μουσικούς κανόνες και τεχνοτροπίες, σχηματίζοντας πολύμορφα ηχοτοπία. Παράλληλα, η έννοια της Ψηφιακής Αφήγησης εξετάζεται ως ένα εκπαιδευτικό εργαλείο, που συνδυάζει την αξιοποίηση των τεχνολογικών μέσων στην εκπαιδευτική διαδικασία με τη διερευνητική μάθηση και τον αναστοχασμό, για τηδιατύπωση μιας δομημένης και ενδιαφέρουσας ιστορίας.

Με την σύσταση ενός εργαστηρίου σύνθεσης, εντός του μαθήματος των «Μουσικών Συνόλων», διερευνώνται οι τρόποι με τους οποίους οι μαθητές μπορούν να αναπτύξουν τις αφηγηματικές τους ικανότητες, όχι με «πρώτες ύλες» τον λόγο και τα οπτικά μέσα, αλλά αξιοποιώντας τον ηχητικό σχεδιασμό και τη δημιουργία πρωτότυπων συνθέσεων, στα πρότυπα της Musique Concrète.

Για την ανάπτυξη των στόχων της έρευνας, επιστρατεύεται, εκτός των άλλων, ο μεθοδολογικός άξονας της αυτοεθνογραφίας, μέσω της οποίας ο εκπαιδευτικός προγραμματίζει και τροποποιεί το πλάνο μαθήματός του, ισορροπώντας μεταξύ της διδακτικής των τεχνικών μέσων και της φιλοσοφίας της σύνθεσης και μουσικής ρητορικής. Για την ψηφιακή ηχητική επεξεργασία χρησιμοποιείται το ελεύθερο λογισμικό *(DAW) Audacity* και για την αρχειοθέτηση/καταλογοποίηση των συνθέσεων των μαθητών χρησιμοποιείται η διαδικτυακή πλατφόρμα *(streaming service) Soundcloud*.

Το ερευνητικό εγχείρημα επικεντρώνεται στον τρόπο με τον οποίο η διδασκαλία της Musique Concrète σε μαθητές από Γ' Γυμνασίου έως Β' Λυκείου, μπορεί να διεγείρει τη φαντασία, να προωθήσει τη συνεργατική εργασία και να εμβαθύνει την κατανόηση των μαθητών για το ρόλο του ήχου ως μοναδικό υλικό αφήγησης ιστοριών. Τα επιδιωκόμενα αποτελέσματα της εφαρμογής του εργαστηρίου συνοψίζονται στην ανάδειξη της δυναμικής σύνδεσης του ήχου με την αφήγηση στον ψηφιακό κόσμο, εστιάζοντας στη δημιουργία ηχητικών αφηγήσεων που ενισχύουν τη συναισθηματική και νοηματική διάσταση της ιστορίας.

Θεμελιώδη στόχο, αλλά και αποτέλεσμα της εφαρμογής του εργαστηρίου, αποτελεί η σύνθεση πρωτότυπης μουσικής από τους ίδιους τους μαθητές. Το παραπάνω, αφενός, συνιστά την αρχική δημιουργία ενός *portfolio* για μελλοντική χρήση των μαθητών και, αφετέρου, συγκεράζει την αφήγηση με τον ηχητικό σχεδιασμό ως ένα πρώιμο στάδιο της διαδικασίας του *sonification (μετατροπή δεδομένων σε ήχο)*. Επιπρόσθετα, η χρήση του ελεύθερου λογισμικού *(DAW) Audacity* από τους μαθητές, για τον ηχητικό σχεδιασμό, ενισχύει την τεχνολογική τους επάρκεια και προάγει τη χρήση ψηφιακών εργαλείων στην εκπαιδευτική διαδικασία.

Τα ευρήματα της εφαρμογής του εργαστηρίου σύνθεσης στο πλαίσιο του μαθήματος των «Μουσικών Συνόλων» και η δημοσίευση του συγκροτημένου πλάνου μαθήματος, συμβάλλουν, προωθούν και ανοίγουν δρόμους στην έρευνα της μουσικής εκπαίδευσης, εντάσσοντας τη συνθετική διαδικασία σε σχολικό πλαίσιο. Συνεπώς, το ερευνητικό εγχείρημα προτείνει μια επέκταση του προγράμματος σπουδών των «Μουσικών Συνόλων», η οποία εκτός του ότι ενισχύει τους εκπαιδευτικούς στόχους της καλλιτεχνικής έκφρασης και δημιουργίας, παρουσιάζει την σύνθεση -αυτή καθ' αυτήν- ως εκπαιδευτική μεθοδολογία που ενθαρρύνει τη δημιουργικότητα, τον ψηφιακό γραμματισμό και την τεχνική επάρκεια.

Λέξεις – κλειδιά: ψηφιακή αφήγηση, ηλεκτροακουστική σύνθεση, μουσική εκπαίδευση, ψηφιακός γραμματισμός

ΕΠΑΝΑΣΥΝΔΕΟΥΜΕ ΤΟΥΣ ΜΑΘΗΤΕΣ ΜΑΣ ΔΙΑΣΦΑΛΙΖΟΝΤΑΣ ΤΗ ΣΥΝΑΙΣΘΗΜΑΤΙΚΗ ΑΝΑΠΤΥΞΗ ΤΟΥΣ ΣΕ ΕΝΑ ΨΗΦΙΑΚΑ ΚΑΘΟΔΗΓΟΥΜΕΝΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΣΤΗΜΑ

Μαρία Καρδάμα
Καθηγήτρια Αγγλικής Γλώσσας και Φιλολογίας
1ο Επαγγελματικό Λύκειο Κάτω Αχαΐας
Πάτρα, Ελλάδα
email: mkardama@gmail.com

ΠΕΡΙΛΗΨΗ

Στο σύγχρονο εκπαιδευτικό περιβάλλον, οι μαθητές βασίζονται σε μεγάλο βαθμό στις τεχνολογίες των μέσων για τη μάθηση και την επικοινωνία και τείνουν συχνά να προτιμούν την επικοινωνία μέσω υπολογιστή από τη δια ζώσης αλληλεπίδραση. Παρότι οι ψηφιακές τεχνολογίες προσφέρουν πολυάριθμα πλεονεκτήματα, μια τέτοια μετατόπιση μπορεί να παρεμποδίσει την ανάπτυξη βασικών κοινωνικών δεξιοτήτων, όπως η δημιουργία φιλικών σχέσεων, η ομαδική εργασία και η αντιμετώπιση πραγματικών κοινωνικών ζητημάτων που απαιτούν συναισθηματική ωριμότητα και ενσυναίσθηση. Η παρούσα εισήγηση διερευνά τις πιθανές μακροπρόθεσμες επιπτώσεις της υπερβολικής εξάρτησης από την ψηφιακή τεχνολογία στην ικανότητα των μαθητών να εμπλέκονται σε προσωπική και διαπροσωπική επικοινωνία. Εξετάζεται το δίλημμα που αντιμετωπίζουν οι εκπαιδευτικοί στην προσπάθειά τους να ισορροπήσουν την ψηφιακή μάθηση με ευκαιρίες ανάπτυξης ουσιαστικών «ήπιων δεξιοτήτων» (soft skills) μέσα στην τάξη. Παράλληλα, παρουσιάζονται τρόποι ενσωμάτωσης τόσο της ψηφιακής όσο και της δια ζώσης αλληλεπίδρασης, με στόχο τη διαμόρφωση ισορροπημένων μαθητών που διαθέτουν τη συναισθηματική νοημοσύνη (Emotional Intelligence – EI) που απαιτείται για την αντιμετώπιση σύνθετων κοινωνικών καταστάσεων.

Βασισμένη σε μελέτες περίπτωσης, έρευνες και σενάρια από την καθημερινή εκπαιδευτική πράξη, η εισήγηση προσφέρει χρήσιμες προτάσεις για την προώθηση μιας ισορροπημένης προσέγγισης στη χρήση των ψηφιακών μέσων στην εκπαίδευση. Παιδαγωγικές προσεγγίσεις όπως το Μοντεσσοριανό σχολείο με περιορισμένο χρόνο οθόνης, η ανεστραμμένη τάξη (flipped classroom) με δια ζώσης συζήτηση, οι ώρες μελέτης χωρίς τεχνολογία, ο συνδυασμός ψηφιακής και έντυπης ανάγνωσης, οι ζώνες συνειδητών διαλειμμάτων (mindful break zones) και οι προκλήσεις ψηφιακής αποτοξίνωσης (digital detox challenges) αποτελούν ενδεικτικά παραδείγματα σύγχρονων πρακτικών που ενσωματώνουν την τεχνολογία, δίνοντας παράλληλα προτεραιότητα στην ανθρώπινη αλληλεπίδραση. Μέσα από τη συστηματική αναγνώριση και επιβεβαίωση των συναισθημάτων και της λογικής σκέψης των μαθητών, ενισχύεται η αυτοπεποίθηση, η δημιουργικότητα και η ανθεκτικότητά τους, οδηγώντας σε μια πιο υποστηρικτική και συμμετοχική τάξη σε σύγκριση με μια αποκλειστικά ψηφιακά βασισμένη μαθησιακή εμπειρία. Όπως επισημαίνει ο Paulo Freire: «Η εκπαίδευση πρέπει να ξεκινά με την επίλυση της αντίφασης δασκάλου–μαθητή, συμφιλιώνοντας τους δύο πόλους, έτσι ώστε και οι δύο να είναι ταυτόχρονα δάσκαλοι και μαθητές». Η θέση αυτή ενισχύει τη διαδραστική μάθηση, στην οποία η τεχνολογία οφείλει να λειτουργεί ενισχυτικά και όχι να αντικαθιστά την ανθρώπινη επαφή και την ανάπτυξη κοινωνικών δεξιοτήτων.

Ακόμη κι αν η τεχνολογία μπορεί να προσομοιώσει πραγματικά σενάρια, η επικοινωνία, η ομαδική εργασία, η ενσυναίσθηση αναπτύσσονται ουσιαστικότερα μέσα από την ανθρώπινη αλληλεπίδραση. Η παγκόσμια επάρκεια (global competency) υπερβαίνει κατά πολύ τη γλωσσική ευχέρεια. Η ουσιαστική συναισθηματική νοημοσύνη καλλιεργείται μέσα από πραγματικούς διαλόγους, συγκρούσεις και ενεργητική ακρόαση — στοιχεία που δεν μπορούν να προσφερθούν από ένα και μόνο τεχνολογικό εργαλείο. Η διδασκαλία και η μάθηση απαιτούν κοινωνικές υποχωρήσεις, διαπραγμάτευση και συλλογική λήψη αποφάσεων, διαδικασίες που λειτουργούν αποτελεσματικότερα σε πραγματικά περιβάλλοντα. Συνεπώς, η τεχνολογία χρειάζεται να υποστηρίζει —και όχι να αντικαθιστά— τις ανθρώπινες συνδέσεις που καθιστούν τη μάθηση πραγματικά ελκυστική και ουσιαστική.

Λέξεις-κλειδιά: συναισθηματική νοημοσύνη, πραγματικά σενάρια ζωής, ανθρώπινη αλληλεπίδραση, ήπιες δεξιότητες, ισορροπημένη διδακτική προσέγγιση

Ο ΡΟΛΟΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΣΤΗΝ ΑΠΟΤΕΛΕΣΜΑΤΙΚΗ ΕΦΑΡΜΟΓΗ ΤΗΣ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΜΕ ΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ

Κεραμίδα Αρετή
Σύμβουλος Εκπαίδευσης της Αγγλικής Γλώσσας
e-mail: aretikeramida@gmail.com

ΠΕΡΙΛΗΨΗ

Οι σύγχρονες θεωρίες μάθησης αναγνωρίζουν την ανάγκη για μια συμπεριληπτική εκπαιδευτική διαδικασία η οποία θα σέβεται και θα λαμβάνει υπόψη της τη διαφορετικότητα των μαθητών, σε ένα πλαίσιο διαφοροποιημένης διδασκαλίας, η οποία είναι η μεθοδολογία που βασίζεται στην υπόθεση ότι η διδακτική πράξη χρειάζεται να διαφοροποιείται και να προσαρμόζεται ανάλογα με τις εμπειρίες, τις ανάγκες, τη διαφορετικότητα του μαθητικού πληθυσμού και τα ιδιαίτερα χαρακτηριστικά της κάθε τάξης. Οι παράμετροι που διαφοροποιούνται αφορούν το περιβάλλον της μάθησης, το περιεχόμενο και τη διαδικασία της μάθησης, και το αποτέλεσμα της μάθησης.

Μια τέτοια μαθησιακή διαδικασία, η οποία αξιοποιεί με παιδαγωγικά ορθούς τρόπους τις θεωρητικές παραδοχές του οικοδομισμού και τις νέες τεχνολογίες, απαιτεί από τους εκπαιδευτικούς να αποστασιοποιηθούν από το παραδοσιακό και συντηρητικό δασκαλοκεντρικό μοντέλο διδασκαλίας, που συχνά χαρακτηρίζεται και από μια επιφυλακτική στάση έναντι στην καινοτομία στη διδασκαλία και την εκπαίδευση γενικότερα. Στο πλαίσιο του παραπάνω προβληματισμού, στην εργασία αυτή εξετάζουμε τον ρόλο του εκπαιδευτικού στη διαφοροποιημένη διδασκαλία, δηλαδή, τον τρόπο με τον οποίο θα πρέπει να σκέφτεται και να ενεργεί πριν, κατά τη διάρκεια, αλλά και μετά από την πραγματοποίηση της διδασκαλίας, όταν αναστοχάζεται και «αφουγκράζεται» την τάξη έτσι ώστε να συμβάλλει στην επιτυχή της εφαρμογή. Περιγράφουμε τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιθυμούν να εγκαταλείψουν την παραδοσιακή δασκαλοκεντρική προσέγγιση στη διδασκαλία της αγγλικής γλώσσας και να υιοθετήσουν μια προσέγγιση που θέτει στο επίκεντρο τους μαθητές τους, τα ενδιαφέροντα, τα μαθησιακά τους στυλ και τις ανάγκες τους και αξιοποιεί τις νέες τεχνολογίες.

Στη συζήτηση αυτή αποφεύγουμε «μηχανιστικές» προσεγγίσεις από την ελληνική και την ξενόγλωσση βιβλιογραφία που εστιάζονται σε «ρόλους» του εκπαιδευτικού, επειδή μια τέτοια «ανελαστική» θεώρηση δεν συνάδει με τον χαρακτήρα της διαφοροποιημένης διδασκαλίας, η οποία είναι μεν μια οργανωμένη και συστηματική διαδικασία, αλλά δεν μπορεί να βάλει τον εκπαιδευτικό σε συγκεκριμένα «καλούπια». Κατά συνέπεια, στη συγκεκριμένη εργασία, η έννοια της φράσης «ρόλος» του εκπαιδευτικού αναφέρεται στα χαρακτηριστικά που είναι χρήσιμο να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν στην πράξη τα πορίσματα ερευνών σχετικά με τη διαφοροποιημένη διδασκαλία και την αξιοποίηση των νέων τεχνολογιών.

Επειδή η εφαρμογή της διαφοροποιημένης διδασκαλία προϋποθέτει την αποδοχή μιας γενικότερης φιλοσοφίας προσέγγισης της μαθησιακής διαδικασίας, οι εκπαιδευτικοί χρειάζεται να αποδέχονται αυτή τη φιλοσοφία και τον τρόπο σκέψης για τη διδακτική πράξη, να είναι πρόθυμοι να κινηθούν έξω από τη «ζώνη άνεσής» τους και να δοκιμάσουν νέες ιδέες και πρακτικές. Είναι σημαντικό να απομακρυνθούν από την αντίληψη που έχουν για τους εαυτούς τους ως αυτοί που διαθέτουν και μοιράζουν τη γνώση και να κινηθούν προς μια θεώρηση του ρόλου τους που βρίσκεται εγγύτερα σε αυτό του «ενορχηστρωτή μαθησιακών ευκαιριών», αναλαμβάνοντας τον ρόλο του μέντορα. Επίσης, είναι απαραίτητο να παρακολουθούν και να παρατηρούν συστηματικά τους μαθητές τους κατά τη διάρκεια της ατομικής ή της ομαδικής τους εργασίας, να διαπιστώνουν τις δυσκολίες των μαθητών από πρώτο χέρι τη στιγμή που παρουσιάζονται και να παρέχουν υποστήριξη. Τέλος, με στόχο την επαγγελματική τους ανάπτυξη, είναι απαραίτητη η γνώση των θεωρητικών αρχών της διαφοροποιημένης διδασκαλίας, καθώς η γνώση αυτή θα τους βοηθήσει να εντοπίσουν τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν τη διαφοροποίηση στη διδασκαλία μέσω των νέων τεχνολογιών σε πρακτικό επίπεδο. Παράλληλα, η αναστοχαστική και κριτική μελέτη της βασικής βιβλιογραφίας θα τους ενισχύσει στην προσπάθειά τους να εφαρμόσουν στο ελληνικό σχολείο τα πορίσματα ερευνών που έχουν πραγματοποιηθεί σε διαφορετικά εκπαιδευτικά συστήματα με τα δικά τους χαρακτηριστικά και ιδιαιτερότητες.

Λέξεις – κλειδιά: διαφοροποιημένη διδασκαλία, νέες τεχνολογίες, ρόλος εκπαιδευτικών

ΔΙΔΑΚΤΙΚΗ ΠΡΟΤΑΣΗ ΑΞΙΟΠΟΙΗΣΗΣ ΤΩΝ ΠΟΛΥΓΡΑΜΜΑΤΙΣΜΩΝ ΚΑΙ ΤΗΣ ΔΗΜΙΟΥΡΓΙΚΗΣ ΓΡΑΦΗΣ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΦΗΓΗΣΗΣ

Κωσταρά Ευφροσύνη
PhD Φιλόλογος, ΕΔΙΠ Τ.Επ.Ε.Κ.Ε Πανεπιστημίου Πατρών
Πανεπιστήμιο Πατρών, Ελλάδα
e-mail: frinikostara@g.upatras.gr

Κρικέτου Θεοδώρα
MEd Φιλόλογος, Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης
Δευτεροβάθμια Εκπαίδευση Αχαΐας, Ελλάδα
e-mail: theodora.kriketou@gmail.com

ΠΕΡΙΛΗΨΗ

Το παρόν άρθρο πραγματεύεται ζητήματα που κατέχουν σημαντική θέση στα νέα Προγράμματα Σπουδών και αφορά αφενός στη διατύπωση μιας εναλλακτικής διδακτικής πρότασης για τη διδασκαλία της αφήγησης, μέσα από την αξιοποίηση των πολυγραμματισμών και της δημιουργικής γραφής, αφετέρου στη διερεύνηση των αποτελεσμάτων από την εφαρμογή της. Το διδακτικό σενάριο σχεδιάστηκε στο μάθημα της Νεοελληνικής Γλώσσας Α΄ Γυμνασίου από τη φιλόλογο και μέλος ΕΔΙΠ του Τ.Επ.Ε.Κ.Ε. Πανεπιστημίου Πατρών, κ. Ευφροσύνη Κωσταρά, και τη φιλόλογο εκπαιδευτικό της Δευτεροβάθμιας Εκπαίδευσης Αχαΐας, κ. Θεοδώρα Κρικέτου, και υλοποιήθηκε, κατά το σχολικό έτος 2024-2025, στο πλαίσιο δειγματικής διδασκαλίας, σε μαθητές/-τριες αστικού Γυμνασίου της Πάτρας. Μετά την ολοκλήρωση της διδασκαλίας, χορηγήθηκαν ερωτηματολόγια στους/στις μαθητές/-τριες και στους/στις παρατηρητές/-τριες εκπαιδευτικούς για τη διερεύνηση α) της αξιοποίησης των πολυγραμματισμών και της δημιουργικής γραφής στη διδασκαλία της αφήγησης και β) της συμβολής των πολυτροπικών κειμένων στην ανάπτυξη δεξιοτήτων δημιουργικής γραφής.

Αρχικά, παρουσιάζονται βασικά θεωρητικά στοιχεία των πολυγραμματισμών και της συμβολής της δημιουργικής γραφής στην ανάπτυξη γλωσσικών και επικοινωνιακών δεξιοτήτων των μαθητών/-τριών, καθώς και στην ενίσχυση της δημιουργικότητάς τους. Στη συνέχεια, παρουσιάζεται η εφαρμογή της διδακτικής πρότασης, βασική στόχευση της οποίας είναι η ανακάλυψη και κατανόηση από τους/τις μαθητές/-τριες της υπερδομής της αφήγησης, μέσω της αξιοποίησης ενός πολυτροπικού κειμένου (βίντεο), και η συνεργατική παραγωγή δικού τους αφηγηματικού γραπτού κειμένου σε συγκεκριμένο επικοινωνιακό πλαίσιο. Η διδακτική πρόταση περιλαμβάνει δραστηριότητες αποκωδικοποίησης των σημειωτικών τρόπων πολυτροπικών κειμένων (εικόνα, ήχος κ.ά.), με στόχο την ανάπτυξη του οπτικού και του κριτικού γραμματισμού, καθώς και την καλλιέργεια δεξιοτήτων παραγωγής συνεργατικού αφηγηματικού κειμένου. Μεθοδολογικά αξιοποιείται η ομαδοσυνεργατική διδασκαλία και η διερευνητική-ανακαλυπτική μάθηση, με εφαρμογή των τεχνικών διαλογικής συζήτησης στην ολομέλεια και στις ομάδες των μαθητών/-τριών.

Τέλος, παρατίθενται και συζητούνται τα συμπεράσματα της αποδελτίωσης των ερωτηματολογίων που χορηγήθηκαν σε μαθητές/-τριες και εκπαιδευτικούς, δομημένα σε τρεις βασικούς άξονες. Ο πρώτος άξονας αφορά στην εφαρμογή των πολυγραμματισμών, ο δεύτερος στην αξιοποίηση της δημιουργικής γραφής και ο τρίτος στα αποτελέσματα της μετάβασης από την επεξεργασία του πολυτροπικού κειμένου στη δημιουργική γραφή. Με βάση τα ευρήματα, οι μαθητές/-τριες κατανόησαν σε σημαντικό βαθμό την υπερδομή της αφήγησης μέσα από την αξιοποίηση και ενός μη γραπτού κειμένου (βίντεο) και εξοικειώθηκαν και με άλλους σημειωτικούς τρόπους (εικόνα και ήχος), οι οποίοι μπορούν να μεταφέρουν μηνύματα και να παρουσιάσουν την εξέλιξη μιας ιστορίας. Επιπλέον, η συνεργατική παραγωγή λόγου σε ομάδες τούς/τις βοήθησε να σκεφτούν περισσότερες ιδέες και να εκφράσουν συναισθήματα με πιο ελεύθερο τρόπο. Διαπιστώθηκε, τέλος, ότι τα πολυτροπικά στοιχεία του βίντεο βοήθησαν στη δημιουργία των δικών τους ιστοριών, καθώς η χρήση εικόνων συνέβαλε στη διαμόρφωση του ύφους και της ατμόσφαιρας, ενώ η μουσική και τα ηχητικά εφέ τούς/τις ενέπνευσαν ιδέες για τη συναισθηματική εξέλιξη των χαρακτήρων των ιστοριών τους.

Λέξεις – κλειδιά: πολυγραμματισμοί, πολυτροπικά κείμενα, δημιουργική γραφή, δημιουργική αφήγηση

ΜΕΤΑΣΧΗΜΑΤΙΖΟΝΤΑΣ ΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΦΥΣΙΚΗΣ: Ο ΡΟΛΟΣ ΤΗΣ ΚΡΙΤΙΚΗΣ ΠΑΙΔΑΓΩΓΙΚΗΣ ΚΑΙ ΤΩΝ ΤΠΕ

Μαγαλιού Μαρία
Εκπαιδευτικός ΠΕ04.01 (φυσικός) –Υποψήφια Διδάκτορας,
Παιδαγωγικό Τμήμα Δημοτικής Εκπαίδευσης,
Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών

ΠΕΡΙΛΗΨΗ

Η σύγχρονη διδασκαλία της φυσικής αντιμετωπίζει την πρόκληση όχι μόνο της μετάδοσης της γνώσης, αλλά και της καλλιέργειας του Κριτικού Επιστημονικού Γραμματισμού, ο οποίος περιλαμβάνει την ανάπτυξη της κριτικής σκέψης και τη σύνδεση της επιστήμης με κοινωνικά ζητήματα. Η παρούσα εργασία εξετάζει πώς η Κριτική Παιδαγωγική, σε συνδυασμό με τις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ), μπορούν να συμβάλουν στην επίτευξη αυτού του κρίσιμου στόχου. Ενώ οι ΤΠΕ προσφέρουν σημαντικές δυνατότητες για να καταστήσουν τη διδασκαλία της φυσικής πιο διαδραστική και αποτελεσματική, η επιτυχής ενσωμάτωσή τους παρεμποδίζεται από σημαντικές προκλήσεις. Η Κριτική Παιδαγωγική, με ρίζες στο έργο του Freire, παρέχει το θεμελιώδες πλαίσιο για την προώθηση του διαλόγου, του προβληματισμού και της σύνδεσης της φυσικής με κοινωνικές και τεχνολογικές εξελίξεις, βασικά συστατικά του Κριτικού Επιστημονικού Γραμματισμού, καθιστώντας το αντικείμενο πιο προσιτό και επίκαιρο. Οι ΤΠΕ συμπληρώνουν αυτή την προσέγγιση προσφέροντας διαδραστικά περιβάλλοντα, προσομοιώσεις και ευκαιρίες για συνεργατική μάθηση, ενισχύοντας έτσι την κατανόηση, ιδιαίτερα των αφηρημένων εννοιών, εντός αυτού του κριτικού πλαισίου. Η εργασία προσδιορίζει τις βασικές δυσκολίες στην ενσωμάτωση των ΤΠΕ όσον αφορά τους εκπαιδευτικούς, τους μαθητές, τις υποδομές και την παιδαγωγική. Η ανασκόπηση της βιβλιογραφίας υποδηλώνει ότι η συνδυασμένη εφαρμογή της Κριτικής Παιδαγωγικής και των ΤΠΕ προσφέρει μια ισχυρή συνέργεια που μπορεί να μεταμορφώσει τη διδασκαλία της φυσικής σε μια ενεργή, διαδραστική και κοινωνικά προσανατολισμένη διαδικασία, μετριάζοντας ενδεχομένως ορισμένες από αυτές τις εντοπισμένες προκλήσεις και προωθώντας τον Κριτικό Επιστημονικό Γραμματισμό. Οι μαθητές αναπτύσσουν κριτική σκέψη, δομούν ενεργά τη γνώση και κατανοούν τη φυσική ως μια ζωντανή επιστήμη συνδεδεμένη με την κοινωνία, διαμορφώνοντας έτσι υπεύθυνους, ενεργούς πολίτες εφοδιασμένους με Κριτικό Επιστημονικό Γραμματισμό.

Λέξεις – κλειδιά: Κβαντική φυσική, Διδακτικό σενάριο, Πείραμα διπλής σχισμήςΤεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ), Κριτική σκέψη

ΕΠΙΔΡΑΣΤΙΚΕΣ ΤΕΧΝΟΛΟΓΙΕΣ ΣΤΗ ΛΟΓΙΣΤΙΚΗ ΚΑΙ ΕΛΕΓΚΤΙΚΗ: ΕΝΑ ΜΕΤΑΚΥΛΙΟΜΕΝΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΒΑΡΟΣ

Μαγουλά Αγγελική Ελένη
Υποψήφια Διδάκτορας
Τμήμα Λογιστικής & Χρηματοοικονομικής, Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: aemagoula@uniwa.gr

Χαραμής Δημήτριος
Επίκουρος Καθηγητής
Τμήμα Λογιστικής & Χρηματοοικονομικής, Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: dcharamis@uniwa.gr

Συκιανάκης Νικόλαος
Καθηγητής
Τμήμα Λογιστικής & Χρηματοοικονομικής, Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: niksyk@uniwa.gr

ΠΕΡΙΛΗΨΗ

Η ανατρεπτική δυναμική των νέων τεχνολογιών αποτελεί πλέον καθημερινό γεγονός που επιδρά τόσο στις επαγγελματικές όσο και στις ακαδημαϊκές επιδιώξεις του ατόμου, από το επίπεδο της πρωτοβάθμιας εκπαίδευσης μέχρι και το ανώτερο επίπεδο γνώσης. Το παρόν πόνημα διερευνά αυτές τις νέες τεχνολογίες που διαφαίνεται να διαταράσσουν σε μεγάλο βαθμό τις ισορροπίες κατάκτησης της επιστημονικής γνώσης, όπως big data analytics (BDA), robotic process automation (RPA), artificial intelligence (AI), Internal of Things (IoT) and distributed ledger technologies (DLT). Αυτή η ανατρεπτική δυναμική διερευνάται από τα στοιχεία ακαδημαϊκών φορέων του τομέα λογιστικής και ελεγκτικής, καθώς οι εν δυνάμει απόφοιτοι εκτίθενται από την έναρξη της επαγγελματικής τους δραστηριοποίησης σε σωρεία τεχνολογικών μεταβολών, μειονεκτούν στην αγορά εργασίας άνευ της κατάλληλης ακαδημαϊκής προετοιμασίας και δυσχεραίνονται στην υιοθέτηση τεχνολογικών εργαλείων κατά τις συνήθεις εργασιακές τους πρακτικές.

Μέσω της παρούσας βιβλιογραφικής ανασκόπησης επιχειρείται η ευαισθητοποίηση των φορέων γνώσης στην υιοθέτηση στο μέγιστο βαθμό όλων των νέων τεχνολογιών κατά την μετάδοση της γνώσης ανεξαρτήτως πεδίου. Τα αποτελέσματα καταδεικνύουν ότι καθώς οι νέες τεχνολογίες αυξάνουν τις εργασιακές απαιτήσεις χρήσης τους από τον επαγγελματία του τομέα λογιστικής και χρηματοοικονομικής ελεγκτικής, μετακυλίεται στην τριτοβάθμια εκπαίδευση η ευθύνη της αρτιότερης προετοιμασίας των εν δυνάμει φοιτητών. Συναφώς, καταδεικνύεται το γεγονός ότι τα ακαδημαϊκά ιδρύματα αρχίζουν σταδιακά να αναγνωρίζουν την απαίτηση για ενσωμάτωση και εφαρμοστική χρήση των υπόψη τεχνολογιών με διαφορετικές μεθόδους προσέγγισης και βαθμό υιοθέτησης. Επίσης, αναδεικνύονται οι τομείς βελτίωσης και οι τάσεις απόκλισης από την τεχνολογική εξέλιξη, συνεκτιμώντας την προδιάθεση για διατήρηση της ακαδημαϊκής ισορροπίας, ενώ επισημαίνεται ο αντίκτυπος της μονοδιάστα της χρήσης των παλαιότερων, κατά τη διδασκαλία των νεότερων τεχνολογιών. Συνακολούθως, η πίεση για επικαιροποίηση της κατάρτισης επί των αναδυόμενων τεχνολογιών μετακυλίεται στην πρότερη βαθμίδα εκπαίδευσης, ως εφαλτήριο του δομημένου εγκλιματισμού σε μία διαρκή εξέλιξη. Τέλος, τα αποτελέσματα της παρούσας αναδεικνύουν την ανάγκη για επικαιροποίηση των οριζόντιων (ήπιων) δεξιοτήτων ως εργαλείο διαχείρισης των αναδυόμενων τεχνολογιών και μίας ολιστικής βελτίωσης της ακαδημαϊκής και επαγγελματικής απόδοσης των αποφοίτων.

Ολοκληρώνοντας, η παρούσα αναδεικνύει θέματα μελλοντικής έρευνας αναφορικά με τα αντικείμενα και τους τομείς ενσωμάτωσης στην Τριτοβάθμια Εκπαίδευση, καθώς και τις σχετικές εκπαιδευτικές πρακτικές.

Λέξεις – κλειδιά: Λογιστική, Ελεγκτική, Εκπαίδευση, Αναδυόμενες Τεχνολογίες.

Η ΜΕΤΑΒΑΣΗ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ ΚΑΙ Ο ΡΟΛΟΣ ΤΗΣ «ΝΕΑΣ ΠΡΟΦΟΡΙΚΟΤΗΤΑΣ» ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΔΙΑΔΙΚΑΣΙΑ ΤΩΝ ΕΦΑΡΜΟΣΜΕΝΩΝ ΤΕΧΝΩΝ

Μαστοράκος Δημήτριος
Υποψήφιος διδάκτορας, Τμήμα Φωτογραφίας και Οπτικοακουστικών Τεχνών
Σχολή Εφαρμοσμένων Τεχνών και Πολιτισμού
Πανεπιστήμιο Δυτικής Αττικής,
Αγ. Σπυρίδωνος 28, Πανεπιστημιούπολη Άλσους Αιγάλεω, 12243, Αιγάλεω
email: dmastorakos@uniwa.gr

Νταραρά Ευαγγελία
Υποψήφια διδάκτορας, Τμήμα Φωτογραφίας και Οπτικοακουστικών Τεχνών
Σχολή Εφαρμοσμένων Τεχνών και Πολιτισμού
Πανεπιστήμιο Δυτικής Αττικής,
Αγ. Σπυρίδωνος 28, Πανεπιστημιούπολη Άλσους Αιγάλεω, 12243, Αιγάλεω
email:entarara@uniwa.gr

ΠΕΡΙΛΗΨΗ

Η διερεύνηση της συνδυαστικής χρήσης της αναλογικής και της ψηφιακής τεχνολογίας στην εκπαίδευση και ειδικότερα στη διδασκαλία της φωτογραφικής πράξης αποτελεί τη βασική συνιστώσα αυτού του άρθρου. Τα ερευνητικά ερωτήματα επικεντρώνονται στη σχέση τεχνολογίας και φωτογραφικού έργου, στη μετάβαση από την αναλογική φωτογραφική τεχνολογία στην ψηφιακή και στην κατανόηση και χρήση των μέσων στην εκπαιδευτική διαδικασία. Σύμφωνα με τον Bolz, η σημασία ενός μέσου γίνεται κατανοητή μόνο μέσα από τη διάδρασή του με άλλα μέσα - σύγχρονα αλλά και παρωχημένα - και ότι τα παλαιότερα μέσα χρησιμεύουν ως μεταφορικά βοηθήματα προσανατολισμού στη ψηφιακή περιοχή (Bolz, 2008). Με βάση αυτή τη θεώρηση σχεδιάστηκε μία βιωματική δράση ως εκπαιδευτική πρακτική για τη φωτογραφία, η οποία αποτελεί τη μελέτη περίπτωσης του άρθρου. Η μεθοδολογία της δράσης συνδυάζει χαρακτηριστικά της μετασχηματίζουσας και της παράπλευρης μάθησης και στοιχεία από μελετητές του οπτικού πολιτισμού όπως η Gillian Rose. Στα πλαίσια της εποχής που διανύουμε, της «νέας προφορικότητας», όπως αναφέρει ο Ong (2015), η οποία συνδέει τις νέες τεχνολογίες με την εκπαίδευση και το ρόλο των ψηφιακών εικόνων, επιχειρείται η διασταύρωση και η αξιοποίηση θεωρητικών θέσεων και βιωματικής δράσης με στόχο την εξαγωγή συμπερασμάτων για τον σύγχρονο οπτικό πολιτισμό. Η αλληλεπίδραση των όρων και των κριτικών θεωριών αναδεικνύει τόσο τις επιρροές των παρωχημένων μέσων στο καλλιτεχνικό έργο όσο και τη δυναμική της μετάβασης στις νέες τεχνολογίες. Η δράση συνοδεύτηκε από ένα ερωτηματολόγιο του οποίου τα ευρήματα προσφέρουν χρήσιμες παρατηρήσεις για την εκπαιδευτική πρακτική και τις εφαρμογές της. Οι χρήστες στους οποίους απευθύνθηκε ήταν κυρίως σπουδαστές φωτογραφίας και αξιολογήθηκε θετικά από την πλειοψηφία, αποδεικνύοντας ότι ο ρόλος της εκπαίδευσης μέσα από βιωματικές ενέργειες έχει τη δυνατότητα να τροποποιήσει την συμπεριφορά την χρηστών ενός μέσου. Παράλληλα έδειξε την κατανόηση και τη διάκριση των συμμετεχόντων σε σχέση με διαφορετικές πρακτικές που ταυτοποιούν τα σύγχρονα μέσα. Συνολικά, αναδείχτηκε η παιγνιώδης διάσταση του μέσου και η συνδυαστική χρήση αναλογικής και ψηφιακής τεχνολογίας ως ένα αξιοποιήσιμο εκπαιδευτικό εργαλείο.

Λέξεις – κλειδιά: νέα προφορικότητα, ψηφιακή φωτογραφία, camera obscura, εκπαίδευση, βιωματική δράση

Η ΑΝΑΓΚΑΙΟΤΗΤΑ ΤΗΣ ΠΑΙΔΑΓΩΓΙΚΗΣ ΕΝΣΩΜΑΤΩΣΗΣ ΤΩΝ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ

Συγκούνα Ιωάννα
Εκπαιδευτικός, ΠΕ02-Φιλόλογος
Διευθύντρια 3ου Γυμνασίου Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: isiguna@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η εργασία εξετάζει τη μάθηση ως μια ενεργητική και δυναμική διαδικασία, όπου οι μαθητές αποκτούν γνώσεις μέσω της προσωπικής εμπλοκής και της αλληλεπίδρασης με το περιβάλλον και τα εργαλεία που υποστηρίζουν τη σκέψη και την επικοινωνία. Παρουσιάζονται βασικές θεωρητικές προσεγγίσεις όπως ο εποικοδομισμός, που τονίζει τη σημασία των εμπειριών και της κοινωνικής αλληλεπίδρασης στη μάθηση, και η θεωρία της δραστηριότητας, που προσεγγίζει τη μάθηση ως συλλογική διαδικασία επηρεαζόμενη από κοινωνικές και πολιτισμικές δομές. Ιδιαίτερη έμφαση δίνεται στον οπτικό γραμματισμό, καθώς οι εικόνες κατέχουν κεντρικό ρόλο στη σύγχρονη επικοινωνία, απαιτώντας από τους μαθητές δεξιότητες ανάλυσης και δημιουργίας οπτικού περιεχομένου. Επιπλέον, η εργασία αναδεικνύει τον μετασχηματιστικό ρόλο της τεχνολογίας στη μαθησιακή διαδικασία, με την ενσωμάτωση εργαλείων του Web 2.0 και την αξιοποίηση της ψηφιακής ταξινομίας του Bloom για την ανάπτυξη ανώτερων δεξιοτήτων σκέψης. Τέλος, τονίζεται η σημασία της παιδαγωγικής αξιοποίησης των ψηφιακών μέσων και της επιμόρφωσης των εκπαιδευτικών, ώστε να παρέχονται μαθησιακές εμπειρίες προσαρμοσμένες στις ανάγκες και τις απαιτήσεις του 21ου αιώνα.

Λέξεις – κλειδιά: ψηφιακά μέσα, παιδαγωγικές θεωρίες, μάθηση.

ΑΠΟ ΤΗ ΘΕΩΡΗΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ ΣΤΗΝ ΨΗΦΙΑΚΗ ΜΑΘΗΣΗ

Τσιφετάκη Ελπίδα
Διευθύντρια,
Γενικό Λύκειο Παναγιάς Διασέλλου,
Άρτα, Ελλάδα
e-mail: mail@lyk-panag.art.sch.gr

Κιτσάτη Ναταλία
PhD, Εκπαιδευτικός ΠΕ04.04,
Γενικό Λύκειο Παναγιάς Διασέλλου,
Άρτα, Ελλάδα
e-mail: mail@lyk-panag.art.sch.gr

Μπόκου Αικατερίνη
MSc, Εκπαιδευτικός ΠΕ02,
Γενικό Λύκειο Παναγιάς Διασέλλου,
Άρτα, Ελλάδα
e-mail: mail@lyk-panag.art.sch.gr

ΠΕΡΙΛΗΨΗ

Η παιδαγωγική ενσωμάτωση των ψηφιακών μέσων στη διδακτική πράξη αναφέρεται στη χρήση των τεχνολογιών και των ψηφιακών εργαλείων για την υποστήριξη και ενίσχυση της διδασκαλίας και της μάθησης. Η χρήση αυτών των μέσων μπορεί να προσφέρει νέες δυνατότητες για τους εκπαιδευτικούς και τους μαθητές, κάνοντάς τους να αλληλεπιδρούν με το περιεχόμενο της διδασκαλίας με καινοτόμους τρόπους.

Τα σύγχρονα προγράμματα σπουδών βασιζόμενα σε νέες θεωρίες μάθησης ενσωματώνουν ολοένα και περισσότερα ψηφιακά μέσα στη διδασκαλία τόσο των Θετικών όσο και των Θεωρητικών μαθημάτων.

Ιδιαίτερα σε απομακρυσμένα σχολεία ορεινών περιοχών όπως το Γενικό Λύκειο Π. Διασέλλου Άρτας, παρότι είναι τεχνολογικά εξοπλισμένο (διαδραστικές οθόνες αφής, ανεξάρτητο εργαστήριο Πληροφορικής) η συνδεσιμότητα είναι χαμηλή έως ανύπαρκτη.

Παρόλα αυτά ως εκπαιδευτικοί καθημερινά προσπαθούμε να ενσωματώνουμε στη διδασκαλία μας όσο περισσότερα ψηφιακά εργαλεία μπορούμε προκείμενου η μάθηση να γίνεται ενδιαφέρουσα με την εμπλοκή των μαθητών στην όλη εκπαιδευτική διαδικασία, προσανατολισμένη προς το πλαίσιο που ορίζει ο ΟΗΕ (Στόχος 4: Ποιοτική Εκπαίδευση).

Ενδεικτικά ψηφιακά εργαλεία που χρησιμοποιούμε είναι τα ακόλουθα: Mentimeter, Mozabook, Storybird, Google Forms, Canva, Kahoot. Οι μαθητές ερχόμενοι σε επαφή με τα παραπάνω μέσα ενισχύουν την ενεργό συμμετοχή τους με ευχάριστο τρόπο, δουλεύουν ομαδοσυνεργατικά, κατακτούν την νέα γνώση ολόπλευρα και είναι σε θέση να χρησιμοποιήσουν τη νέα γνώση και σε άλλα περιβάλλοντα μάθησης. Με αυτό τον τρόπο η εκπαίδευση γίνεται ποιοτικότερη τόσο για τους μαθητές όσο και για τους εκπαιδευτικούς. Εν κατακλείδι σε ένα συνεχώς μεταβαλλόμενο κόσμο η εκπαίδευση καλείται να ανταποκριθεί στο ρόλο της, πόσο μάλλον ένα σχολείο σε ημιορεινή περιοχή που καλείται να καλύψει τόσο τα μαθησιακά όσο και τεχνολογικά κενά της νέας γενιάς μαθητών. Το όλο εγχείρημα αποτελεί μια ισχυρή στρατηγική για τη συνεχιζόμενη εκπαίδευση, αλλά απαιτεί μια συντονισμένη προσέγγιση για την υπέρβαση των προκλήσεων και την αξιοποίηση των δυνατοτήτων της.

Λέξεις - κλειδιά: ψηφιακά εργαλεία, θεωρίες μάθησης, ποιοτική μάθηση, Θετικές Επιστήμες, Θεωρητικές Επιστήμες

ΘΠ3: Αξιοποίηση και Αξιολόγηση των Ψηφιακών και Τεχνολογικών Μέσων

ΨΗΦΙΑΚΟΣ ΜΕΤΑΣΧΗΜΑΤΙΣΜΟΣ ΣΤΟ ΜΟΥΣΙΚΟ ΣΧΟΛΕΙΟ ΑΜΦΙΣΣΑΣ «ΕΛΕΝΗ ΚΑΡΑΪΝΔΡΟΥ»: ΕΜΠΕΙΡΙΕΣ, ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΠΡΟΟΠΤΙΚΕΣ ΑΠΟ ΤΗΝ ΕΦΑΡΜΟΓΗ ΚΑΙΝΟΤΟΜΩΝ ΨΗΦΙΑΚΩΝ ΕΡΓΑΛΕΙΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΠΡΑΞΗ

Αθανασίου Ιωάννης
Υποψήφιος Διδάκτωρ, Πανεπιστήμιο Μακεδονίας, Εκπαιδευτικός Μουσικής Επιστήμης ΠΕ79.01
Μουσικό Σχολείο Άμφισσας «Ελένη Καραΐνδρου»
Άμφισσα, Ελλάδα
e-mail: athanasiou@uom.edu.gr

Γεωργούλα Ευαγγελία
Υποψήφια Διδάκτωρ, Πανεπιστήμιο Δυτικής Αττικής, Διευθύντρια Σχολείου, Εκπαιδευτικός Αγγλικής Γλώσσας και Φιλολογίας ΠΕ06
Μουσικό Σχολείο Άμφισσας «Ελένη Καραΐνδρου»
Άμφισσα, Ελλάδα
e-mail: georgoula.pr@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία παρουσιάζει την εμπειρία από την εφαρμογή του Σχεδίου Δράσης με τίτλο «Η Μουσική Τεχνολογία στην Εκπαιδευτική Διαδικασία: Ανακαλύπτοντας την Παραγωγικότητα μέσω της Ηχογράφησης», το οποίο εφαρμόστηκε στο Μουσικό Σχολείο Άμφισσας κατά το σχολικό έτος 2024-2025, στο πλαίσιο της Εσωτερικής Αξιολόγησης Σχολικής Μονάδας του Ινστιτούτου Εκπαιδευτικής Πολιτικής (ΙΕΠ). Ο κύριος στόχος του Σχεδίου Δράσης ήταν η ενίσχυση της μουσικής εκπαίδευσης των μαθητών μέσω της καινοτόμου χρήσης της μουσικής τεχνολογίας και της ηχογράφησης, με την υποστήριξη του προγράμματος ΕΣΠΑ «Αναβάθμιση της Μουσικής Εκπαίδευσης στα Μουσικά Σχολεία» (2023-2026). Οι ειδικοί στόχοι περιλάμβαναν την ανάπτυξη των τεχνικών δεξιοτήτων των μαθητών στην ηχογράφηση και την επεξεργασία ήχου, την καλλιέργεια της δημιουργικότητας μέσω της παραγωγής μουσικών έργων και την κατανόηση της σημασίας της τεχνολογίας στον επαγγελματικό χώρο της μουσικής. Η υλοποίηση περιλάμβανε οργανωμένα εργαστήρια ηχογράφησης και μουσικής παραγωγής, αξιοποιώντας σύγχρονο εξοπλισμό και ψηφιακό λογισμικό (Cubase, Audacity, Dorico, MuseScore). Το πρόγραμμα εφαρμόστηκε σταδιακά, με τους μαθητές να δημιουργούν ομαδικά μουσικά έργα και να αναλαμβάνουν ενεργό ρόλο σε όλα τα στάδια της παραγωγής. Η μεθοδολογία αξιολόγησης εστίασε κυρίως σε ποιοτική προσέγγιση (συνεντεύξεις, παρατήρηση, ανάλυση έργων). Το Σχέδιο Δράσης συνέβαλε άμεσα στην αποτελεσματικότερη υλοποίηση πολιτιστικών προγραμμάτων. Οι βασικές προκλήσεις αφορούσαν τη διαχείριση πόρων, τη διασφάλιση της συμμετοχής των μαθητών και την υποστήριξη των εκπαιδευτικών. Η εργασία καταλήγει αναδεικνύοντας τις προοπτικές για τη βιώσιμη χρήση των ψηφιακών τεχνολογιών στα Μουσικά Σχολεία βάσει των ευρημάτων της ολοκληρωμένης αυτής μελέτης.

Λέξεις-κλειδιά: Ψηφιακές Τεχνολογίες, Μουσική Εκπαίδευση, Δημιουργικότητα, Πολιτιστικά Προγράμματα, Ελληνικό Μουσικό Σχολείο

ΤΑ ΟΦΕΛΗ ΤΗΣ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΚΠΑΙΔΕΥΣΗΣ ΜΕΣΑ ΑΠΟ ΤΟ ΠΡΙΣΜΑ ΜΑΘΗΤΩΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΩΝ ΝΟΜΩΝ ΑΤΤΙΚΗΣ ΚΑΙ ΚΥΚΛΑΔΩΝ

Βλασσόπουλος Γεράσιμος
Postdoctoral Researcher, PhD, MSc, Εκπαιδευτικός ΠΕ82,
Πανεπιστήμιο Δυτικής Αττικής, Τμήμα Βιοϊατρικών Επιστημών – ΣΕΥΠ,
Ελλάδα, Αθήνα
e-mail: makisvlass@gmail.com

ΠΕΡΙΛΗΨΗ

Ο COVID-19 πρωτοεμφανίστηκε στην Κίνα το Δεκέμβριο του 2019. Μετά την ανακήρυξή του ως παγκόσμια πανδημία τον Μάρτιο του 2020, πολλές χώρες της Ε.Ε. έκλεισαν τα εκπαιδευτικά ιδρύματα. Στην Ελλάδα η SARS-CoV-2 παρουσιάστηκε το Φεβρουάριο του 2020. Μετά το ένατο κρούσμα, ανακοινώθηκε το κλείσιμο εκπαιδευτικών ιδρυμάτων, συγκεκριμένων νομών για 48 ώρες στις 5-6 Μαρτίου. Παρά τα αναρίθμητα αρνητικά της πανδημίας, πάρθηκαν αποφάσεις και οργανώθηκε η ψηφιακή εξέλιξη της χώρας. Το κλείσιμο των σχολείων πυροδότησε την προσπάθεια για εφαρμογή της ΕξΑΕ.

Μέσω της έρευνας διερευνήθηκαν τα οφέλη της ΕξΑΕ, μέσα από το πρίσμα των μαθητών δευτεροβάθμιας εκπαίδευσης. Εφαρμόστηκε μικτή δειγματοληψία (Στρωματοποιημένη και κατά Συστάδες). Συμμετείχαν 462 μαθητές Γυμνασίων και Λυκείων των νομών Αττικής και Κυκλάδων. Η έρευνα διεξήχθη τον 05/2020. Τα δεδομένα συλλέχθηκαν στο LimeSyrvey, αναλύθηκαν με SPSS (25). Πραγματοποιήθηκε έλεγχος αξιοπιστίας του ερωτηματολογίου με το δείκτη Cronbach’s Alpha, περιγραφική στατιστική, παραγοντική ανάλυση και η δοκιμασία Chi-square.

Το 78,1% των μαθητών ωφελήθηκαν λίγο από την ΕξΑΕ, έναντι του 6,9% των μαθητών που ωφελήθηκαν πολύ από την εφαρμογή της.

Η ΕξΑΕ στήριξε μέσω της πανδημίας το Ελληνικό εκπαιδευτικό σύστημα, σε κάθε βαθμίδα εκπαίδευσης, ωστόσο οι μαθητές Γυμνασίων και Λυκείων, κατά πλειοψηφία, δήλωσαν πως δεν ωφελήθηκαν από αυτή τη μορφή εκπαίδευσης, καθώς δεν ικανοποιήθηκαν οι αρχικές τους προσδοκίες και δεν απέκτησαν τις θεωρητικές γνώσεις που ήλπιζαν ότι θα αποκτήσουν.

Η σύγκριση των ευρημάτων με αντίστοιχα από τη διεθνή βιβλιογραφία αποκαλύπτει κοινά προβλήματα, προκλήσεις αλλά και διαφορές που σχετίζονται με τις ιδιαιτερότητες του εκάστοτε εκπαιδευτικού συστήματος, το επίπεδο τεχνολογικής υποδομής της κάθε χώρας, με τους ιδιαίτερους πολιτισμικούς και οικονομικούς παράγοντες της.

Λέξεις - κλειδιά: Εξ Αποστάσεως Εκπαίδευση, Τηλεκπαίδευση, Τεχνολογίες Πληροφοριών και Επικοινωνιών, Σύγχρονη, Ασύγχρονη. Συντομογραφίες: Απλή Τυχαία Δειγματοληψία (ΑΤΔ), Εξ Αποστάσεως Εκπαίδευση (ΕξΑΕ), Τεχνολογίες Πληροφοριών και Επικοινωνιών (ΤΠΕ)

ΔΗΜΙΟΥΡΓΙΑ ΠΟΛΙΤΙΣΤΙΚΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ ΜΕ ΤΗ ΒΟΗΘΕΙΑ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ

Γάκη Βασιλική
Χημικός, ΠΕ04.02 & Πληροφορικός, ΠΕ86
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: iliasde66@gmail.com

Γιαννούλη Σοφία
Φιλόλογος, ΠΕ02
1ο Πρότυπο Γυμνάσιο Πρέβεζας με Λυκειακές Τάξεις
Πρέβεζα, Ελλάδα
e-mail: alexandropoulosalekos@yahoo.com

Ντέντες Ηλίας
Οικονομολόγος, ΠΕ80 & Ηλεκτρονικός, ΠΕ84
1ο Γενικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: iliasde@hotmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει την επίδραση των Ελλήνων λογίων της Βυζαντινής και Μεταβυζαντινής περιόδου, όπως οι Χαλκοκονδύλης, Χρυσολωράς και Λάσκαρις, στη Φλωρεντινή Αναγέννηση, χρησιμοποιώντας ψηφιακά μέσα και τεχνολογίες πληροφορικής και επικοινωνιών. Στόχος ήταν να αναδειχθεί η καθοριστική συμβολή αυτών των σημαντικών προσωπικοτήτων στη διαμόρφωση του πνευματικού τοπίου της Αναγέννησης και να εξεταστεί πώς η μετάδοση της ελληνικής φιλοσοφίας και των αρχαίων ελληνικών κειμένων επηρέασε την ανάπτυξη της δυτικής σκέψης και τέχνης. Για την υλοποίηση της εργασίας χρησιμοποιήθηκαν ως πηγές ψηφιακά σχολικά βιβλία και επιστημονικά άρθρα. Επιπλέον για την παρουσίαση χρησιμοποιήθηκαν σύγχρονα ψηφιακά εργαλεία, όπως το PowerPoint, εικόνες, βίντεο και ηχογραφήσεις, προκειμένου να δημιουργηθεί μια πολυδιάστατη παρουσίαση, η οποία να προσφέρει μία ολοκληρωμένη κατανόηση του θέματος.

Οι μαθητές/τριες, με την καθοδήγηση των εκπαιδευτικών τους, χρησιμοποίησαν τα ψηφιακά εργαλεία για να δημιουργήσουν μια παρουσίαση που ανέδειξε τις σχέσεις μεταξύ της ελληνικής κλασικής κληρονομιάς και των καλλιτεχνικών και φιλοσοφικών εξελίξεων της Αναγέννησης. Παράλληλα, προχώρησαν στη μελοποίηση ενός ποιήματος που δημιούργησαν οι ίδιοι, εμβαθύνοντας έτσι στην καλλιτεχνική και πολιτιστική διάσταση του θέματος, συνδυάζοντας τα κείμενα με τη μουσική. Αυτή η διαδικασία βοήθησε τους μαθητές/τριες να κατανοήσουν πώς οι Έλληνες λόγιοι, με την αναβίωση των αρχαίων ελληνικών κειμένων, επηρέασαν τους Ιταλούς αναγεννησιακούς διανοούμενους και καλλιτέχνες, δημιουργώντας με αυτόν τον τρόπο έναν πολιτιστικό διάλογο που καθόρισε την πορεία του Δυτικού πολιτισμού.

Η εργασία των μαθητών/τριών παρουσιάστηκε σε διεθνές μαθητικό συνέδριο, στο οποίο συνδυάστηκε η χρήση ψηφιακών μέσων με την προσωπική παρουσίαση από τους μαθητές/τριες. Η πλατφόρμα PowerPoint αποτέλεσε το βασικό εργαλείο παρουσίασης και παράλληλα υπήρξε αλληλεπίδραση των μαθητών/τριών με το κοινό, αναλύοντας τα αποτελέσματα της εργασίας τους. Η δια ζώσης παρουσίαση επέτρεψε στους μαθητές/τριες αναπτύξουν με μεγαλύτερη σαφήνεια τις πτυχές της εργασίας τους και να ενισχύσουν την επικοινωνία με τους συμμετέχοντες.

Τα αποτελέσματα της εργασίας μας ήταν εξαιρετικά θετικά. Οι μαθητές/τριες απέκτησαν βαθιά κατανόηση της Φλωρεντινής Αναγέννησης και της συνεισφοράς των Ελλήνων λογίων στην πνευματική και πολιτιστική άνθηση της εποχής. Επιπλέον, ανέπτυξαν τις ψηφιακές τους δεξιότητες, καλλιεργώντας παράλληλα την ικανότητά τους να δημιουργούν πολυδιάστατες παρουσιάσεις. Η χρήση μουσικής και βίντεο συνέβαλε σημαντικά στην ενίσχυση της μαθησιακής διαδικασίας, δημιουργώντας μια πιο δυναμική και εντυπωσιακή εκπαιδευτική εμπειρία. Ο συνδυασμός της θεωρητικής ανάλυσης με τη σύγχρονη τεχνολογία προσέφερε στους μαθητές/τριες την ευκαιρία να αναπτύξουν μια διαπολιτισμική προσέγγιση του θέματος, ενισχύοντας τη δημιουργικότητά τους και τις επικοινωνιακές τους δεξιότητες.

Λέξεις – κλειδιά: Φλωρεντία, Αναγέννηση, Βυζαντινοί Λόγιοι, ψηφιακά και τεχνολογικά μέσα.

ΑΞΙΟΛΟΓΗΣΗ ΜΙΑΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΕΦΑΡΜΟΓΗΣ ΓΙΑ ΚΙΝΗΤΕΣ ΣΥΣΚΕΥΕΣ ANDROID, ΓΙΑ ΤΗΝ ΚΑΤΑΝΟΗΣΗ ΕΝΝΟΙΩΝ ΤΗΣ ΦΥΣΙΚΗΣ Ε' ΔΗΜΟΤΙΚΟΥ ΜΕ ΑΞΙΟΠΟΙΗΣΗ VOICE ASSISTANT

Δομουχτσής Στέργιος,
Μεταπτυχιακός φοιτητής ΠΜΣ «Επιστήμες της Αγωγής: Εφαρμογές Τεχνολογιών Πληροφορίας και Επικοινωνιών στην Εκπαίδευση και τη Διά Βίου Μάθηση»
Τμήμα Εκπαιδευτικής και Κοινωνικής Πολιτικής - Πανεπιστημιο Μακεδονιας
Θεσσαλονίκη, Ελλάδα
e-mail: stdomus@sch.gr

Λέυκος Ιωάννης
Ε.ΔΙ.Π.
Εργ. Πληροφορικής & Ρομποτικής για την Εκπ/ση & την Κοινωνία (LIRES)Τμήμα Εκπαιδευτικής & Κοινωνικής Πολιτικής - Πανεπιστημιο Μακεδονιας
Θεσσαλονίκη, Ελλάδα
e-mail: lefkos@uom.edu.gr

Δομουχτσής Νικόλαος
Εκπαιδευτικός ΠΕ83, ΕΝΕΓΥΛ Μεσολογγίου
Μεσολόγγι , Ελλάδα
e-mail: nikos_domis@hotmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη χρήση της μάθησης μέσω κινητών συσκευών στη διδασκαλία της Φυσικής στο δημοτικό σχολείο, με ιδιαίτερη έμφαση στην έννοια της Θερμότητας. Το θεωρητικό πλαίσιο βασίζεται σε πολλές θεωρίες μάθησης, όπως η θεωρία της συμπεριφορικής μάθησης, η θεωρία της ανακαλυπτικής μάθησης, ο κονστρουκτιβισμός και ο κοινωνικός κονστρουκτιβισμός, για να παράσχει μια ολιστική εξήγηση της επιστημονικής μάθησης των μαθητών. Η έρευνα διερευνά επίσης την παρούσα κατάσταση της επιστημονικής εκπαίδευσης στην Ελλάδα, δίνοντας έμφαση στις προοπτικές και τις προκλήσεις των μαθητών στην κατανόηση της έννοιας της θερμότητας. Εξετάζει τα κίνητρα, τα οφέλη και τα μειονεκτήματα της μάθησης μέσω κινητών συσκευών, αναλύοντας τις έννοιες του σχεδιασμού της κινητής μάθησης και τη διαδικασία παραγωγής εκπαιδευτικών εφαρμογών.

Η μελέτη χρησιμοποιεί έναν συνδυασμό ερευνητικών προσεγγίσεων ευχρηστίας και αποτελεσματικότητας, χρησιμοποιώντας μια μεικτή μεθοδολογική προσέγγιση. Η μελέτη ευχρηστίας εξετάζει το μέγεθος της ευκολίας και της εμπλοκής της εκπαιδευτικής εφαρμογής, ενώ η έρευνα αποτελεσματικότητας μετρά την επίδραση της εφαρμογής στην κατανόηση της Θερμότητας από τους μαθητές. Η προσέγγιση της μελέτης περίπτωσης χρησιμοποιείται για την παροχή πολύτιμων πληροφοριών σχετικά με τις μαθησιακές εμπειρίες και τα αποτελέσματα των μαθητών. Το δείγμα αποτελείται από μαθητές δημοτικού σχολείου, ενώ τα δεδομένα συλλέγονται με τεστ πριν και μετά την εφαρμογή, ερωτηματολόγια και παρατηρήσεις.

Τα ευρήματα δείχνουν ότι η χρήση εφαρμογών κινητής μάθησης μπορεί να βελτιώσει σημαντικά τη συμμετοχή των μαθητών και την κατανόηση των ιδεών της φυσικής. Η αξιολόγηση της ευχρηστίας αποκαλύπτει σημαντικά επίπεδα ευχαρίστησης και απλότητας της χρήσης, ενώ η αξιολόγηση της αποτελεσματικότητας καταδεικνύει σημαντικές βελτιώσεις στη συγκράτηση πληροφοριών και στις ικανότητες εφαρμογής των μαθητών. Η έρευνα συνεχίζεται με τη συζήτηση των αναμενόμενων πλεονεκτημάτων της μάθησης μέσω κινητών συσκευών, προσφέροντας τεκμηριωμένες προτάσεις προς τους εκπαιδευτικούς και τους υπεύθυνους χάραξης πολιτικής για τη διευκόλυνση της χρήσης της τεχνολογίας στην επιστημονική εκπαίδευση.

Λέξεις – κλειδιά: voice assistant, Android, ευχρηστία, αποτελεσματικότητα, εφαρμογή,Η Μάθηση μέσω Κινητών Συσκευών (M-Learning) στη Διδασκαλία της Φυσικής στο Δημοτικό Σχολείο

Η ΠΟΛΥΜΕΣΙΚΗ ΜΑΘΗΣΗ ΤΟΥ RICHARD MAYER ΚΑΙ Η ΔΗΜΙΟΥΡΓΙΑ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΒΙΝΤΕΟ ΣΤΑ ΣΥΓΧΡΟΝΑ ΜΟΝΤΕΛΑ ΔΙΔΑΣΚΑΛΙΑΣ

Ζαχαριάδη Βασιλική
Εκπαιδευτικός ΠΕ8901 Καλλιτεχνικών Σπουδών, MSc Δημόσιος Λόγος και Ψηφιακά Μέσα
4ο ΕΠΑΛ
Λάρισα, Ελλάδα
email: baso1010@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η ραγδαία ανάπτυξη της τεχνολογίας έχει καταστήσει το εκπαιδευτικό βίντεο βασικό εργαλείο στη διδασκαλία, ενισχύοντας τη μάθηση με διάφορα ερεθίσματα. Σύμφωνα με τη Θεωρία της Πολυμεσικής Μάθησης του Richard Mayer, η μάθηση είναι πιο αποτελεσματική όταν οι πληροφορίες παρουσιάζονται με οπτικοακουστικό τρόπο, αξιοποιώντας τόσο το οπτικό κανάλι (εικόνες, βίντεο, διαγράμματα) όσο και το ακουστικό κανάλι (ομιλία, ήχοι, μουσική). Η θεωρία αυτή βασίζεται σε τρεις θεμελιώδεις αρχές: τη διπλή επεξεργασία της πληροφορίας, τον περιορισμό της χωρητικότητας της μνήμης εργασίας και την ενεργή επεξεργασία του γνωστικού φορτίου.

Το εκπαιδευτικό βίντεο ενσωματώνεται δυναμικά σε όλα τα σύγχρονα μοντέλα μάθησης, ενισχύοντας την κατανόηση και την αφομοίωση της γνώσης. Στο ανεστραμμένο μοντέλο τάξης (Flipped Classroom), οι μαθητές μελετούν εκπαιδευτικά βίντεο πριν από το μάθημα, επιτρέποντας τον εμπλουτισμό της διά ζώσης διδασκαλίας με συνεργατικές και βιωματικές δραστηριότητες. Στο μεικτό μοντέλο μάθησης (Blended Learning), τα βίντεο λειτουργούν ως γέφυρα μεταξύ παραδοσιακής και διαδικτυακής μάθησης, προσφέροντας ευελιξία και εξατομίκευση.

Επιπλέον, το εκπαιδευτικό βίντεο αποτελεί κεντρικό εργαλείο στη διαφοροποιημένη διδασκαλία (Differentiated Instruction), καθώς μπορεί να προσαρμοστεί σε διαφορετικά επίπεδα δυσκολίας, μαθησιακές προτιμήσεις και ρυθμούς. Στη συμπεριληπτική εκπαίδευση (Inclusive Education), τα πολυμεσικά στοιχεία διευκολύνουν την πρόσβαση των μαθητών με μαθησιακές δυσκολίες, με τη χρήση υπότιτλων, αφήγησης και διαδραστικών εργαλείων. Τα εκπαιδευτικά βίντεο βοηθούν στην αύξηση της κατανόησης και στην επιτυχημένη οργάνωση του μαθήματος. Αντίστοιχα, στη διαβαθμισμένη διδασκαλία (Tiered Instruction), οι εκπαιδευτικοί δημιουργούν πολλαπλές εκδοχές του ίδιου βίντεο, προσαρμοσμένες στις δυνατότητες των μαθητών.

Η αποτελεσματική δημιουργία εκπαιδευτικών βίντεο απαιτεί την εφαρμογή αρχών της θεωρίας του Mayer, χώρου και χρόνου μεταξύ κειμένου και εικόνας, την εξάλειψη περιττών πληροφοριών (ελαχιστοποίηση γνωστικού φορτίου) και την ενεργή συμμετοχή των μαθητών μέσω ερωτήσεων και διαδραστικών στοιχείων.

Συμπερασματικά, η χρήση του εκπαιδευτικού βίντεο, βασισμένη στις αρχές της πολυμεσικής μάθησης, μπορεί να μεταμορφώσει τη διαδικασία της διδασκαλίας, καθιστώντας την περισσότερο προσαρμοσμένη, πιο εξατομικευμένη, διαδραστική και αποτελεσματική, ενισχύοντας την κατανόηση και τη συμμετοχή των μαθητών στην σύγχρονη τάξη.

Λέξεις κλειδιά: Πολυμεσική μάθηση, εκπαιδευτικό βίντεο

ΣΥΜΕΡΑΣΜΑΤΑ ΕΡΕΥΝΑΣ ΓΙΑ ΤΗ ΧΡΗΣΗ ΤΩΝ ΜΕΣΩΝ ΚΟΙΝΩΝΙΚΗΣ ΔΙΚΤΥΩΣΗΣ ΑΠΟ ΕΦΗΒΟΥΣ

Κατσαρός Κωνσταντίνος
Σύμβουλος Εκπαίδευσης Πληροφορικής ΠΕ86
Διεύθυνσης Δευτεροβάθμιας Εκπαίδευσης Αιτωλοακαρνανίας
e-mail: katsaros74@sch.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη χρήση των μέσων κοινωνικής δικτύωσης από μαθητές Δευτεροβάθμιας Εκπαίδευσης, εστιάζοντας στις συνήθειες, στους κινδύνους που μπορεί να προκύψουν από τη χρήση των μέσων αλλά και στους πιθανούς τρόπους αντιμετώπισής τους.

Για τη συλλογή των δεδομένων χρησιμοποιήθηκε ερωτηματολόγιο που διανεμήθηκε και συμπληρώθηκε από 80 μαθητές Β Λυκείου (32 αγόρια και 48 κορίτσια), ηλικίας 16-17 ετών, προερχόμενους από ένα αστικό σχολείο της Λευκάδας. Το ερωτηματολόγιο δημιουργήθηκε με στόχο να αποτυπωθούν οι συνήθειες, η συχνότητα αλλά και ο τρόπος χρήσης των κοινωνικών δικτύων, να εντοπιστούν πιθανοί κίνδυνοι (όπως διαδικτυακός εκφοβισμός, παραβίαση προσωπικών δεδομένων, εθισμός) και να εξεταστεί αν υπάρχουν διαφορές στην επίδραση αυτών των κινδύνων ανάλογα με το φύλο των μαθητών.

Τα ευρήματα επιβεβαιώνουν την εφαρμογή της θεωρίας του ψηφιακού εθισμού (Young, 1998) όσον αφορά την υπερβολική χρήση, της κοινωνικής μάθησης (Bandura, 1977) στις επιλογές πλατφορμών και συμπεριφορών, και της αντίληψης του κινδύνου (Slovic, 1987) στις διαφορές φύλου.

Σύμφωνα με τα αποτελέσματα, η πλειονότητα των μαθητών χρησιμοποιεί τα μέσα κοινωνικής δικτύωσης σε καθημερινή βάση, κυρίως στην επικοινωνία με φίλους - συγγενείς και στην ψυχαγωγία και λιγότερο στην ενημέρωση. Δημοφιλέστερες πλατφόρμες αναδεικνύονται το Instagram, το TikTok και το Snapchat ενώ λιγότερο δημοφιλής είναι η πλατφόρμα του Facebook και του X.

Είναι σημαντικό όμως να τονιστεί ότι ένα σημαντικό ποσοστό μαθητών ανέφερε ότι έχει έρθει αντιμέτωπο με κινδύνους ή έχει γνώση ότι άτομα του άμεσου περιβάλλοντός του έχουν αντιμετωπίσει καταστάσεις που τους έκαναν να αισθανθούν άβολα. Η επεξεργασία των ερωτηματολογίων ανέδειξε ότι οι μαθήτριες βιώνουν πιο συχνά περιστατικά που τις κάνουν να νοιώθουν άβολα αλλά από την άλλη αυτό τις ωθεί να ανησυχούν περισσότερο για την ασφάλεια των προσωπικών τους δεδομένων και τις κάνει επιφυλακτικότερες έναντι των μαθητών στην αντιμετώπιση και διαχείριση διαδικτυακών κινδύνων. Αντίθετα, τα αγόρια εμφανίζονται πιο επιρρεπή σε θέματα πρόληψης κινδύνων.

Η έρευνα αναδεικνύει επίσης ότι οι περισσότεροι μαθητές έχουν διδαχθεί και γνωρίζουν βασικούς τρόπους προστασίας (όπως διαχείριση κωδικών, ρυθμίσεις απορρήτου, αποκλεισμός ανεπιθύμητων χρηστών, αναζήτηση σε σχετικές ιστοσελίδες), όμως είτε από αμέλεια είτε από άλλους λόγους δεν εφαρμόζουν πάντα τους απαιτούμενους κανόνες για την ατομική τους ασφάλεια.

Η εκπαίδευση σε θέματα ψηφιακής ασφάλειας και η προώθηση ενός υγιούς διαδικτυακού περιβάλλοντος κρίνονται απαραίτητες, τόσο από τους εκπαιδευτικούς όσο και από τους γονείς. Έμφαση πρέπει να δοθεί επίσης στη διερεύνηση των αιτιών της διαφοράς που παρατηρήθηκε να υπάρχει ανάλογα με το φύλο των μαθητών.

Λέξεις – κλειδιά: διαδίκτυο, μέσα κοινωνικής δικτύωσης, εκφοβισμός, ασφάλεια

Η ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ: ΜΕΛΕΤΗ ΣΤΗΝ ΤΡΙΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ

Μπίρτσας Βασίλειος
Ακαδημαϊκός Υπότροφος
Τμήμα Βιοϊατρικών Επιστημών,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: birtsas@gmail.com

Καρκαλούσος Πέτρος
Αναπληρωτής Καθηγητής
Τμήμα Βιοϊατρικών Επιστημών,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

Μπατρίνου Ανθιμία
Επίκουρη Καθηγήτρια
Τμήμα Επιστήμης και Τεχνολογίας Τροφίμων,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

Κριεμπάρδης Αναστάσιος
Καθηγητής
Τμήμα Βιοϊατρικών Επιστημών,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

Παπαγεωργίου Ευσταθία
Καθηγήτρια
Τμήμα Βιοϊατρικών Επιστημών Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

ΠΕΡΙΛΗΨΗ

Εισαγωγή: Η αξιοποίηση των νέων τεχνολογιών στη διδακτική πράξη έχει αναδιαμορφώσει την εκπαίδευση, προσφέροντας καινοτόμα εργαλεία που ενισχύουν τη μαθησιακή εμπειρία. Οι Τεχνολογίες της Πληροφορίας και της Επικοινωνίας (ΤΠΕ) επιτρέπουν την αλληλεπίδραση, τη συνεργασία και την πρόσβαση σε εκπαιδευτικούς. Παράλληλα, προάγουν την εξατομικευμένη μάθηση και τη δημιουργικότητα, ενώ υποστηρίζουν τους εκπαιδευτικούς στην οργάνωση και παρουσίαση της γνώσης. Ωστόσο, η αποτελεσματική ενσωμάτωσή τους απαιτεί κατάλληλη εκπαίδευση, τεχνική υποστήριξη και στρατηγική προσέγγιση, ώστε να αξιοποιηθούν πλήρως οι δυνατότητές τους.

Σκοπός: Η εργασία εξετάζει τη χρήση των ΤΠΕ στην τριτοβάθμια εκπαίδευση, αναλύοντας τα οφέλη, τις προκλήσεις και το βαθμό ενσωμάτωσής τους από τους καθηγητές τριτοβάθμιας εκπαίδευσης. Παράλληλα, διερευνά τις αντιλήψεις των εκπαιδευτικών σχετικά με τη χρησιμότητα, τις προκλήσεις και τις επιπτώσεις των ΤΠΕ στη διδασκαλία και τη μάθηση.

Μέθοδος: Η μελέτη πραγματοποιήθηκε με συμπλήρωση ερωτηματολογίου από 62 καθηγητές πανεπιστημίου σχετικά με την ενσωμάτωση των ΤΠΕ στην εκπαιδευτική διαδικασία.

Αποτελέσματα: Η πλειονότητα των καθηγητών (96,8%) έχει ενσωματώσει τις ΤΠΕ στις διδακτικές πρακτικές, με θετικές αντιλήψεις για τη χρησιμότητα, το ενδιαφέρον και την ασφάλεια των τεχνολογιών αυτών. Ωστόσο, αναδείχθηκαν εμπόδια, όπως η έλλειψη τεχνικής υποστήριξης, η ανεπάρκεια κατάλληλου λογισμικού και οι περιορισμοί χρόνου, ειδικά σε συγκεκριμένες ηλικιακές ομάδες. Παρά τη συχνή χρήση βασικών εργαλείων, όπως το διαδίκτυο και οι εφαρμογές γραφείου, πιο εξειδικευμένα εργαλεία, όπως οι διαδραστικοί πίνακες και τα λογισμικά ψηφιακών τεστ, παραμένουν ανεκμετάλλευτα. Επιπλέον, καταγράφηκε ισχυρή επιθυμία για περαιτέρω επιμόρφωση, εστιάζοντας σε προχωρημένες δεξιότητες υπολογιστών, ασφάλεια στο διαδίκτυο και αξιοποίηση εργαλείων Web 2.0.

Συμπεράσματα: Η μελέτη υπογραμμίζει τη σημαντική συμβολή των ΤΠΕ στη βελτίωση της εκπαιδευτικής διαδικασίας, ενώ ταυτόχρονα αναδεικνύει τα εμπόδια που περιορίζουν την πλήρη αξιοποίησή τους. Απαιτείται πρόσθετη υποστήριξη και στοχευμένη επιμόρφωση για την ενίσχυση των δεξιοτήτων τους. Ο σχεδιασμός προγραμμάτων κατάρτισης και η προσαρμογή εκπαιδευτικών πολιτικών στις ανάγκες των καθηγητών κρίνονται αναγκαία για τη βέλτιστη ενσωμάτωση των ΤΠΕ και τη βελτίωση της συνολικής εκπαιδευτικής εμπειρίας.

Λέξεις– κλειδιά: ΤΠΕ, Διδακτική Πράξη, Επιμόρφωση, Εμπόδια και προκλήσεις.

ΜΟΝΤΕΛΟ ΠΑΡΑΚΟΛΟΥΘΗΣΗΣ ΤΗΣ ΔΙΑΤΡΟΦΙΚΗΣ ΠΡΟΣΛΗΨΗΣ, ΤΟΥ ΤΡΟΠΟΥ ΖΩΗΣ ΚΑΙ ΤΗΣ ΦΥΣΙΚΗΣ ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ ΑΣΘΕΝΩΝ ΜΕ ΤΗ ΧΡΗΣΗ ΤΕΧΝΟΛΟΓΙΩΝ ΠΛΗΡΟΦΟΡΙΚΗΣ ΚΑΙ ΕΠΙΚΟΙΝΩΝΙΩΝ

Μπισκανάκη Φανή,
PhD, MSc, Διευθύντρια Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας
Πρέβεζα, Ελλάδα
email: fani.biskan@gmail.com

Γιαννάκου Αναστασία,
PhD, MSc, Διευθύντρια 4ου Γενικού Λυκείου Ιωαννίνων «ΑΚΑΔΗΜΙΑ»
Ιωάννινα, Ελλάδα
email: giannakougeorgiou@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει τη χρήση των τεχνολογιών πληροφορικής και επικοινωνιών (ΤΠΕ) στην καθημερινή πρακτική των εκπαιδευτικών διατροφής-διατροφολογίας και φυσικής αγωγής, με έμφαση στην παρακολούθηση της διατροφικής πρόσληψης και της φυσικής δραστηριότητας των ατόμων. Η βιβλιογραφία υποδεικνύει ότι οι εφαρμογές κινητών τηλεφώνων, ειδικά όταν συνδυάζονται με φορητές συσκευές (wearables), αποτελούν αποτελεσματικά εργαλεία για την προώθηση υγιεινών διατροφικών συνηθειών και την ενίσχυση της συμμόρφωσης των ατόμων. Στο πλαίσιο της μελέτης, επιλέχθηκε η πλέον κατάλληλη εφαρμογή από τριάντα διαθέσιμες στα καταστήματα PlayStore και AppStore, η οποία αξιοποιήθηκε σε πειραματική διαδικασία με δύο ασθενείς, προκειμένου να αξιολογηθεί η πρακτική της χρησιμότητα και η συμβολή της στη διαχείριση της υγείας. Τα αποτελέσματα αναδεικνύουν την αποτελεσματικότητα των εργαλείων m-Health για την παρακολούθηση και την καθοδήγηση των ατόμων, ενώ παράλληλα υπογραμμίζουν την ανάγκη για περαιτέρω έρευνα με διαφοροποιημένα δείγματα, προκειμένου να διερευνηθούν τα μακροπρόθεσμα οφέλη και οι πιθανοί κίνδυνοι της εφαρμογής αυτών των τεχνολογιών. Συνολικά, οι ΤΠΕ προσφέρουν σημαντικές δυνατότητες τόσο για τους επαγγελματίες υγείας όσο και για τους ασθενείς, ενισχύοντας την εξατομικευμένη παρακολούθηση και υποστήριξη της υγείας.

Λέξεις κλειδιά: ΤΠΕ, m-health, εφαρμογές διατροφής, εφαρμογές σωματικής άσκησης

ΕΡΕΥΝΑ ΓΙΑ ΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΠΛΗΡΟΦΟΡΙΑΣ ΚΑΙ ΕΠΙΚΟΙΝΩΝΙΩΝ ΑΠΟ ΤΟΥΣ ΕΚΠΑΙΔΕΥΤΙΚΟΥΣ ΤΗΣ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΟΥ ΝΟΜΟΥ ΙΩΑΝΝΙΝΩΝ

Μπρίτσα Ελεονώρα
Εκπαιδευτικός Πληροφορικός ΠΕ86-Med
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης
Ιωάννινα, Ελλάδα
e-mail:eleonbritsa@gmail.com

ΠΕΡΙΛΗΨΗ

Ο σκοπός της παρούσας εργασίας ήταν η διερεύνηση της αξιοποίησης των Τεχνολογιών Πληροφορίας και Επικοινωνιών από τους εκπαιδευτικούς που υπηρετούν στις σχολικές μονάδες της δευτεροβάθμιας εκπαίδευσης του Νομού Ιωαννίνων. Μέσα από τη συμμετοχή 139 εκπαιδευτικών διαφόρων ειδικοτήτων στη διαδικτυακή συμπλήρωση σχετικού ερωτηματολογίου εξετάστηκαν ζητήματα όπως: η διαθεσιμότητα και ο τρόπος πρόσβασης στον υλικοτεχνικό εξοπλισμό, το ποσοστό χρήσης των διαθέσιμων Τ.Π.Ε., ο τύπος δραστηριοτήτων στις οποίες αξιοποιούνται οι Τ.Π.Ε., το είδος μαθησιακού και διδακτικού υλικού που χρησιμοποιείται από τους εκπαιδευτικούς, βασικοί παράγοντες που επηρεάζουν αρνητικά τη χρήση των Τ.Π.Ε., η συμμετοχή των εκπαιδευτικών σε επιμορφωτικές δράσεις για τις Τ.Π.Ε. στη διδασκαλία, καθώς και οι απόψεις και στάσεις των εκπαιδευτικών σχετικά με τις Τ.Π.Ε. κατά τη διδασκαλία και γενικότερα στα πλαίσια της σχολικής μονάδας. Η συλλογή των δεδομένων του ερωτηματολογίου διεξήχθη κατά το προτελευταίο δίμηνο του έτους 2018. Πολλά από τα αποτελέσματα της έρευνας συμφωνούν με τα αντίστοιχα της τελευταίας έρευνας του ευρωπαϊκού δικτύου European Schoolnet. Μεταξύ των σημαντικότερων συμπερασμάτων της έρευνας συγκαταλέγονται τα εξής: υφίσταται ανεπάρκεια κατάλληλου υλικοτεχνικού εξοπλισμού για τη χρήση Τ.Π.Ε. που αποτελεί και τον πιο αρνητικό παράγοντα χρήσης τους στη διδασκαλία και τη μάθηση, υπάρχει μεγαλύτερη τάση αξιοποίησης των Τ.Π.Ε., οι εκπαιδευτικοί Θεωρητικών Σπουδών δημιουργούν συχνότερα δικό τους ψηφιακό υλικό λόγω πιθανής ανεπάρκειας έτοιμου αντίστοιχου υλικού και συμβουλεύονται περισσότερο το υλικό από το σχολικό δίκτυο και τις σχολικές βάσεις δεδομένων ενώ συνάμα επιμορφώνονται περισσότερο σε προσωπικό επίπεδο για τις Τ.Π.Ε. στον ελεύθερο χρόνο τους για να μπορέσουν να ανταπεξέλθουν στις σύγχρονες απαιτήσεις, η επιμόρφωση στις Τ.Π.Ε. από προσωπικό του σχολείου είναι πολύ σπάνια, αναδεικνύεται ο σημαντικός ρόλος της επιμόρφωσης λόγω συχνής εμπλοκής των εκπαιδευτικών με τα πεδία στα οποία επιμορφώθηκαν, η σημαντικότερη θετική συνεισφορά της χρήσης των Τ.Π.Ε. είναι η ενίσχυση της συνεργασίας των μαθητών, ενώ απαιτούνται ριζικές αλλαγές στα σχολεία για την πλήρη εκμετάλλευση των Τ.Π.Ε. στη διδασκαλία και τη μάθηση.

Λέξεις-κλειδιά: Τεχνολογίες Πληροφορίας και Επικοινωνιών (Τ.Π.Ε.), Χρήση και Αξιοποίηση των Τ.Π.Ε. στη Διδασκαλία, Δευτεροβάθμια Εκπαίδευση, Απόψεις, Στάσεις, Επιμόρφωση.

ΕΦΑΡΜΟΓΗ ΤΗΣ ΑΝΑΛΥΣΗΣ ΣΥΝΑΙΣΘΗΜΑΤΟΣ ΣΤΑ ΣΧΟΛΙΚΑ ΕΓΧΕΙΡΙΔΙΑ ΙΣΤΟΡΙΑΣ: Η ΠΕΡΙΠΤΩΣΗ ΤΗΣ ΜΙΚΡΑΣ ΑΣΙΑΣ

Μπιτζένης Αριστείδης
Καθηγητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
bitzenis@uom.edu.gr

Νόσιος Μάριος
Υπ. Διδάκτωρ, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
mnosios@uom.edu.gr

Κουτσουπιάς Νικόλαος
Καθηγητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
nk@uom.edu.gr

Κόκκορης Χρήστος
Υπ. Διδάκτωρ, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
ckokkoris@uom.edu.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά το συναισθηματικό υπόβαθρο της Μικρασιατικής Καταστροφής (1922), όπως αυτό αναπαρίσταται στα επίσημα ελληνικά σχολικά εγχειρίδια ιστορίας της δευτεροβάθμιας εκπαίδευσης, μέσω λεξικογραφικής ανάλυσης συναισθημάτων. Συγκροτήθηκε ένα σώμα κειμένων που περιλαμβάνει όλα τα αποσπάσματα των σχολικών εγχειριδίων με ρητές αναφορές στη Μικρά Ασία, βάσει του οποίου επιλέχθηκαν χειροκίνητα ενότητες που αντανακλούν τόσο τις πολιτικές όσο και τις κοινωνικοπολιτισμικές διαστάσεις του γεγονότος. Η προεπεξεργασία του υλικού πραγματοποιήθηκε στην πλατφόρμα R, περιλαμβάνοντας τη μετατροπή των κειμένων σε πεζά, την αποσύνθεση σε γλωσσικά στοιχεία (tokenization) και την αφαίρεση κοινών λέξεων (stop words). Μέσω της χρήσης ενός Ελληνικού λεξικού συναισθημάτων, αποδόθηκαν τιμές πολικότητας σε μεμονωμένα γλωσσικά στοιχεία. Οι αθροιστικές, μη επεξεργασμένες τιμές συναισθηματικής φόρτισης κανονικοποιήθηκαν σε συνάρτηση με το μήκος κάθε αποσπάσματος, προκειμένου να καταστεί εφικτή η συγκριτική ανάλυση μεταξύ διαφορετικών αφηγηματικών ενοτήτων. Τα ευρήματα καταδεικνύουν ότι οι αφηγήσεις των σχολικών εγχειριδίων διατηρούν έναν ουδέτερο συναισθηματικό τόνο (84,2% των επισημάνσεων), γεγονός που υποδηλώνει μια παιδαγωγική προσέγγιση επικεντρωμένη στην αντικειμενικότητα και την τεκμηριωμένη παρουσίαση των γεγονότων. Τα αρνητικά συναισθήματα αντιστοιχούν στο 14,1% των επισημάνσεων και εντοπίζονται κυρίως σε αποσπάσματα που περιγράφουν συγκρούσεις, εκτοπισμούς και απώλειες, υπογραμμίζοντας τον τραυματικό χαρακτήρα της ιστορικής εμπειρίας. Αντιθέτως, οι θετικά φορτισμένες αναφορές είναι ελάχιστες (1,6%) και περιορίζονται σε σύντομες μνείες κοινοτικής αλληλεγγύης ή προσπαθειών ανασυγκρότησης. Η λεξικογραφική ανάλυση αναδεικνύει, επιπλέον, τη συχνή χρήση όρων όπως *ελλάδα*, *αθήνα* και της αντωνυμίας *μάς*, οι οποίοι συγκροτούν μια συλλογική εθνική προοπτική, ενώ η παρουσία χρονικών δεικτών όπως *αιώνα* και *χρόνια* ενισχύει τη χρονολογική οργάνωση της αφήγησης. Εν γένει, τα ευρήματα καταδεικνύουν ότι τα ελληνικά ιστορικά σχολικά εγχειρίδια διατηρούν έναν κατά βάση ουδέτερο, επιστημονικά προσανατολισμένο αφηγηματικό τόνο, με αισθητά μεγαλύτερη συναισθηματική ένταση σε σημεία που αναφέρονται σε τραυματικά γεγονότα και ελάχιστες αναφορές θετικής συναισθηματικής χροιάς. Η παρούσα ανάλυση υπογραμμίζει, εν τέλει, τη χρησιμότητα των υπολογιστικών μεθόδων για την εμπειρική αποτύπωση των συναισθηματικών διαστάσεων εντός των εκπαιδευτικών αφηγήσεων και συμβάλλει στη θεμελίωση πολιτισμικά ευαίσθητων, θεματικά εξειδικευμένων μοντέλων συναισθηματικής ανάλυσης στο πεδίο της ιστορικής έρευνας.

Λέξεις-κλειδιά: Ανάλυση Συναισθημάτων, Μικρά Ασία, Επεξεργασία Φυσικής Γλώσσας, Ιστορία.

ΑΝΑΠΤΥΞΗ ΠΡΩΤΟΤΥΠΟΥ ΔΙΔΑΚΤΙΚΟΥ ΥΛΙΚΟΥ ΓΙΑ ΤΗ ΓΕΡΜΑΝΙΚΗ ΩΣ ΞΕΝΗ ΓΛΩΣΣΑ ΜΕ ΧΡΗΣΗ ΛΟΓΙΣΜΙΚΟΥ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΚΑΙ ΨΗΦΙΑΚΩΝ ΕΡΓΑΛΕΙΩΝ

Δρ. Ριζοπούλου Αικατερίνη
Αναπληρώτρια Καθηγήτρια Γερμανικής Γλώσσας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Α΄ Αθήνας
Αθήνα, Ελλάδα
e-mail: krizopoulou@gmail.com

ΠΕΡΙΛΗΨΗ

Τα σχολικά διδακτικά εγχειρίδια για τη διδασκαλία και εκμάθηση της Γερμανικής γλώσσας στη δευτεροβάθμια εκπαίδευση δεν συνοδεύονται από ακουστικό υλικό. Αυτό αποτελεί ένα ιδιαίτερο πρόβλημα, ιδίως στην Α΄ Γυμνασίου, όπου το επίπεδο γλωσσομάθειας ορίζεται ως A1- (μείον A1), δηλαδή κάτω από το πρώτο επίπεδο στοιχειώδους γνώσης της γλώσσας, όπως αυτό περιγράφεται στο Κοινό Ευρωπαϊκό Πλαίσιο Αναφοράς για τις Γλώσσας (ΚΕΠΑ).

Αν και τα τελευταία χρόνια έχουν γίνει κάποιες προσπάθειες δημιουργίας ακουστικού υλικού από το ΙΕΠ ή από συναδέλφους/ισσες για τη Γερμανική ως Ξένη Γλώσσα στη δευτεροβάθμια εκπαίδευση και αυτό το ακουστικό υλικό διατίθενται ψηφιακά στο «Φωτόδεντρο» του Εθνικού Συσσωρευτή Εκπαιδευτικού Περιεχομένου, το πλήθος των ακουστικών κειμένων που αφορούν στο πολύ αρχικό επίπεδο γλωσσομάθειας της Α΄ Γυμνασίου είναι εξαιρετικά περιορισμένο, ενώ σε αρκετές περιπτώσεις το προσφερόμενο υλικό είτε ξεπερνάει κατά πολύ το προς κατάκτηση γλωσσικό επίπεδο είτε δεν ανταποκρίνεται στη θεματολογία του σχολικού διδακτικού εγχειριδίου.

Η ανεύρεση ή η προσαρμογή τόσο γερμανόφωνων ακουστικών κειμένων, όσο και κατάλληλων ακουστικών ασκήσεων για την ανάπτυξη κατανόησης προφορικού λόγου των μαθητών/τριών στα Γερμανικά αποδεικνύεται στην πράξη ένα δύσκολο εγχείρημα για τους εκπαιδευτικούς της Γερμανικής γλώσσας. Κι αν και με δυσκολία μπορούν να βρεθούν κάποια κείμενα ακουστικής κατανόησης, με μεγάλη δυσκολία μπορούν να βρεθούν ασκήσεις καλλιέργειας της ακουστικής ικανότητας των μαθητών/τριών στο πολύ αρχικό επίπεδο γλωσσομάθειας.

Η παρούσα εργασία εξετάζει, κατά πόσον οι πρόσφατες εξελίξεις στο χώρο της τεχνητής νοημοσύνης με την ανάπτυξη λογισμικού για παραγωγή text-to-speech και voice-transformation μπορεί να καλύψει αυτό το κενό για τη διδασκαλία / εκμάθηση της Γερμανικής ως ξένης γλώσσας. Έρευνες της τελευταίας δεκαετίας δείχνουν ότι διάφορα λογισμικά text-to-speech μπορούν να βοηθήσουν στην κατανόηση και εκμάθηση του λεξιλογίου και να συμβάλουν στη βελτίωση της αναγνωστικής ικανότητας των μαθητών/τριών, λειτουργώντας πρακτικά ως «αναγνώστες» μεμονωμένων λέξεων, εκφράσεων ή ακόμα και ολόκληρων κειμένων. Επίσης, έχει εμπειρικά καταδειχθεί ότι οι ξενόγλωσσοι μαθητές/τριες κυρίως της Αγγλικής γλώσσας σε αρχάριο επίπεδο δεν ενοχλούνται από την τυχόν μη-φυσική προσωδία του ακουστικού κειμένου που αναπαράγουν τα λογισμικά αυτά.

Τίθεται όμως το ερώτημα, αν με την Τεχνητή Νοημοσύνη μπορεί η ανάπτυξη της κατανόησης προφορικού λόγου στην ξένη γλώσσα να πάει ένα βήμα πέρα από την φωνητική αναπαραγωγή μεμονωμένων γραπτών λέξεων / προτάσεων. Πιο συγκεκριμένα, στην παρούσα εργασία μελετάται, αν με αντίστοιχο λογισμικό (εδώ: Murf ai) δύναται να δημιουργηθεί όσο το δυνατόν «αυθεντικό» ακουστικό υλικό για τη Γερμανική γλώσσα με όσο το δυνατόν πιο ανθρώπινα χαρακτηριστικά, ποια είναι τα υπέρ και τα κατά του όσον αφορά τη Γερμανική γλώσσα και πώς το δημιουργηθέν υλικό εμπλουτιζόμενο και από περαιτέρω ηχητικά αρχεία (όπως από βιβλιοθήκες ήχων) μπορεί να επεξεργαστεί με προγράμματα μίξης και επεξεργασίας ήχου (εδώ: audacity) και να γίνει διαθέσιμο προς χρήση (είτε ως αρχείο ήχου στην ηλεκτρονική τάξη, e-class, είτε ως ηχητικό αρχείο που συνοδεύει βίντεο δημιουργημένο από ολιστικές πλατφόρμες δημιουργίας ψηφιακών και έντυπων μέσων (εδώ: canva) είτε ως ηχητικό αρχείο που ανεβαίνει σε άλλο λογισμικό παιγνιοποίησης, εδώ: genial.ly).

Ως γενικό συμπέρασμα που μπορεί να διεξαχθεί είναι ότι οι μέχρι στιγμής εξελίξεις στο χώρο της τεχνητής νοημοσύνης καθιστούν δυνατή σε ικανοποιητικό βαθμό την αυτόνομη δημιουργία αρκετά ρεαλιστικού και προσαρμοσμένου στο γλωσσικό / μαθησιακό προφίλ της εκάστοτε τάξης ακουστικού υλικού για την ανάπτυξη / βελτίωση της ακουστικής δεξιότητας στο μάθημα της ξένης γλώσσας.

Λέξεις – κλειδιά: Γερμανικά ως ξένη γλώσσα, δευτεροβάθμια εκπαίδευση, ακουστική κατανόηση, κατανόηση προφορικού λόγου, text-to-speech, ξένες γλώσσες, τεχνητή νοημοσύνη, λογισμικά.

ΤΑ ΗΛΕΚΤΡΟΝΙΚΑ ΠΑΙΧΝΙΔΙΑ ΜΕΣΑ ΑΠΟ ΤΟ ΒΛΕΜΜΑ ΤΩΝ ΕΦΗΒΩΝ

Ελπίδα Χριστοφορίδου
Διδακτόρισσα του Τμήματος Εικαστικών Τεχνών και Τεχνών των Επιστημών, στο Πανεπιστήμιο Ιωαννίνων
Λάρισα, Ελλάδα
e-mail: mauve2310@yahoo.gr

ΠΕΡΙΛΗΨΗ

«Υπάρχουν κάποια παιχνίδια που σου διδάσκουν πώς να γίνεις καλύτερος άνθρωπος». Αυτή ήταν η δήλωση μιας δεκατριάχρονης στο πλαίσιο μιας έρευνας που πραγματοποιήθηκε μεταξύ 2021 και 2022, η οποία είχε ως βασικό σκοπό τη διερεύνηση των πολιτισμικών και κοινωνικοπολιτικών διαστάσεων της ενασχόλησης με τα ηλεκτρονικά παιχνίδια στο πλαίσιο της εφηβικής κουλτούρας.[1] Ένας από τους ερευνητικούς στόχους της μελέτης ήταν να αναζητηθούν οι απόψεις των εφήβων για την αξία των ηλεκτρονικών παιχνιδιών, ενώ επιπλέον, ένα από τα ερωτήματα που αναδείχθηκαν από την έρευνα ήταν αν και σε τι βαθμό τα ηλεκτρονικά παιχνίδια διαμορφώνουν μοντέλα δράσης και σκέψης στους νέους ανθρώπους.

Η έρευνα, στην οποία συμμετείχαν έφηβοι 12-17 ετών από την Περιφέρεια της Θεσσαλίας, χωρίστηκε σε δύο μέρη. Στο πρώτο στάδιο συγκεντρώθηκαν 485 ερωτηματολόγια από σχολεία της Δευτεροβάθμιας Εκπαίδευσης στην Περιφέρεια της Θεσσαλίας, τα οποία αναλύθηκαν μέσω του SPSS. Στο δεύτερο στάδιο πραγματοποιήθηκαν 42 ημιδομημένες συνεντεύξεις, για τις οποίες πραγματοποιήθηκε θεματική ανάλυση.

Σύμφωνα με τα αποτελέσματα της έρευνας, τα ηλεκτρονικά παιχνίδια αποτελούν μια σύγχρονη μορφή διασκέδασης για τα παιδιά, ένα μέρος συναναστροφής με φίλους, ένα σκηνικό αγχολυτικό, έναν τόπο μάθησης και ευαισθητοποίησης για διάφορα κοινωνικοπολιτικά ζητήματα, έναν τρόπο αυτοβελτίωσης. Επιπρόσθετα, για ένα μέρος των εφήβων τα ηλεκτρονικά παιχνίδια αξιολογήθηκαν ως καλλιτεχνικά δημιουργήματα ίδιας αξίας με μια ταινία, ένα μουσικό κομμάτι ή ακόμα και με ένα έργο ζωγραφικής. Κατά τη γνώμη τους, ένα βιντεοπαιχνίδι έχει αξία για διάφορους λόγους, όπως είναι οι αισθητικές του ιδιότητες (τα γραφικά, το σενάριο, η μουσική), η εντατική εργασία που προϋποθέτει η δημιουργία του, η δυνατότητά του να καλύπτει διάφορες ανάγκες (διασκέδαση, χαλάρωση, μάθηση, προσκλήσεις, δημιουργικότητα, κοινωνική αλληλεπίδραση κ.α.), η σχέση του με την πραγματικότητα και η διδαχή μαθημάτων ζωής, όπως είναι τα μαθήματα επιβίωσης. Το στοιχείο της ‘επιβίωσης’ γοητεύει τους έφηβους, και ένας λόγος της έλξης αυτής έγκειται στην ευκαιρία που τους δίνεται να δημιουργήσουν μια κοινωνία από την αρχή.

Η McGonigal (2010), σχεδιάστρια ηλεκτρονικών παιχνιδιών, υποστηρίζει ότι το ηλεκτρονικό παιχνίδι είναι μια εφευρετική πλατφόρμα για να αλλάξει ο κόσμος και ότι εντός του παιχνιδιού το παιδί γίνεται η καλύτερη εκδοχή του εαυτού του, αναπτύσσοντας έναν κοινωνικό ιστό, δομώντας αυτοπεποίθηση και κάνοντας δραστηριότητες με νόημα, οι οποίες το γεμίζουν ευχαρίστηση. Πράγματι, οι παραπάνω σκέψεις ενισχύονται από τα αποτελέσματα της έρευνάς μας. Ο κόσμος των βιντεοπαιχνιδιών αποτελεί έναν δεύτερο παράλληλο κόσμο, όπου ο έφηβος, μέλος μιας ομάδας, επιλύει προβλήματα, δημιουργεί ή/και προσπαθεί να βελτιώσει πράγματα και καταστάσεις – κάτι που δίνει νόημα στις πράξεις του –, και βιώνει, συνειδητά ή μη, διάφορες κοινωνικοπολιτικές εμπειρίες που τον ενθαρρύνουν να αλλάξει τα πράγματα προς το καλύτερο.

Λέξεις-κλειδιά: ηλεκτρονικά παιχνίδια, έφηβοι, αξία, αναπαραστάσεις.

[1] Η έρευνα πραγματοποιήθηκε στο πλαίσιο της Διδακτορικής μου Διατριβής στο Τμήμα Εικαστικών Τεχνών και Επιστημών της Τέχνης στο Πανεπιστήμιο Ιωαννίνων με καθηγητή-επιβλέποντα τον κ. Χρ. Δερμεντζόπουλο.

ΘΠ4: Ψηφιακό χάσμα και νέες ανισότητες

ΤΟ ΨΗΦΙΑΚΟ ΧΑΣΜΑ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ ΣΤΗΝ ΕΛΛΑΔΑ: ΠΡΟΚΛΗΣΕΙΣ, ΝΕΕΣ ΑΝΙΣΟΤΗΤΕΣ ΚΑΙ ΠΡΑΚΤΙΚΕΣ ΧΩΡΙΣ ΑΠΟΚΛΕΙΣΜΟΥΣ

Καστούρα Μαρία
Εκπαιδευτικός ΠΕ70
Δημοτικό Σχολείο Νέας Μεσημβρίας, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
e-mail: kastmara@yahoo.com

Μαργαρίτης Γεώργιος
Διευθυντής Δημοτικού Σχολείου, Εκπαιδευτικός ΠΕ70
Δημοτικό Σχολείο Νέας Μεσημβρίας, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
e-mail: eponymo.gmarg43@hotmail.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιοποίηση της εκπαίδευσης έχει αναδείξει ανισότητες στην πρόσβαση στην τεχνολογία, τον ψηφιακό γραμματισμό και τις εκπαιδευτικές υποδομές, ιδιαίτερα στην πρωτοβάθμια εκπαίδευση. Η παρούσα μελέτη διερευνά το ψηφιακό χάσμα στα ελληνικά δημοτικά σχολεία μέσα από βιβλιογραφική ανάλυση, εστιάζοντας στις προκλήσεις, τις νέες ανισότητες και τις συμπεριληπτικές πρακτικές που εφαρμόζονται για την άμβλυνσή του.

Η επισκόπηση της βιβλιογραφίας καταδεικνύει ότι η πρόσβαση στις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ) στα δημοτικά σχολεία της Ελλάδας είναι άνισα κατανεμημένη. Στα αστικά κέντρα, οι σχολικές μονάδες διαθέτουν περισσότερες τεχνολογικές υποδομές, ενώ τα αγροτικά σχολεία αντιμετωπίζουν σοβαρές ελλείψεις σε εξοπλισμό και συνδεσιμότητα. Ταυτόχρονα, οι μαθητές από οικογένειες χαμηλού εισοδήματος συχνά στερούνται πρόσβασης σε ηλεκτρονικές συσκευές και σταθερή σύνδεση στο διαδίκτυο, γεγονός που τους αποκλείει από σύγχρονες μαθησιακές πρακτικές.

Πέρα από την απλή πρόσβαση, η μελέτη αναδεικνύει την έννοια της "δευτερογενούς ψηφιακής ανισότητας", η οποία αφορά τις διαφορές στις δεξιότητες χρήσης της τεχνολογίας. Οι μαθητές από εύπορες οικογένειες τείνουν να αναπτύσσουν υψηλότερα επίπεδα ψηφιακού γραμματισμού, ενώ οι μαθητές από μειονεκτούντα περιβάλλοντα συχνά περιορίζονται σε στοιχειώδεις δεξιότητες, γεγονός που έχει μακροπρόθεσμες συνέπειες στην εκπαιδευτική και επαγγελματική τους πορεία.

Επιπλέον, η επιμόρφωση των εκπαιδευτικών στις ΤΠΕ παραμένει αποσπασματική και άνισα κατανεμημένη, επηρεάζοντας την αποτελεσματική ενσωμάτωση των τεχνολογικών εργαλείων στη διδασκαλία. Η έλλειψη συνεκτικής εκπαιδευτικής πολιτικής και η περιορισμένη κρατική χρηματοδότηση έχουν ως αποτέλεσμα τη χαμηλή υιοθέτηση των ΤΠΕ στην καθημερινή διδακτική πρακτική. Παρότι έχουν εφαρμοστεί προγράμματα ψηφιακής εκπαίδευσης, η εφαρμογή τους είναι συχνά αποσπασματική, με πολλά σχολεία να βασίζονται σε εξωτερικές χρηματοδοτήσεις και ιδιωτικές πρωτοβουλίες.

Για την αντιμετώπιση αυτών των προκλήσεων, αναπτύσσονται συμπεριληπτικές πρακτικές στην ελληνική πρωτοβάθμια εκπαίδευση. Τα προγράμματα επιμόρφωσης εκπαιδευτικών εστιάζουν στην ανάπτυξη ψηφιακών δεξιοτήτων, επιτρέποντας τη δημιουργία διαδραστικών και συμπεριληπτικών μαθησιακών εμπειριών. Οι σχολικές πρωτοβουλίες ψηφιακού γραμματισμού, όπως εργαστήρια κωδικοποίησης και διαδραστικά προγράμματα, συμβάλλουν στην ισότιμη πρόσβαση στην τεχνολογία. Παράλληλα, οι κοινοτικές συνεργασίες με ιδιωτικούς φορείς παρέχουν τεχνολογικό εξοπλισμό και οικονομική υποστήριξη στα σχολεία. Παρά τις θετικές πρωτοβουλίες, εξακολουθούν να υπάρχουν εμπόδια. Η απουσία ολοκληρωμένης εθνικής στρατηγικής για την ψηφιακή εκπαίδευση και η εξάρτηση από εξωτερικές χρηματοδοτήσεις εγείρουν ανησυχίες για τη βιωσιμότητα των δράσεων. Αν και οι ΤΠΕ μπορούν να βελτιώσουν τη διδασκαλία και τη μαθησιακή διαδικασία, η ελλιπής ή λανθασμένη ενσωμάτωσή τους μπορεί να διευρύνει περαιτέρω τις ανισότητες μεταξύ των μαθητών.

Συμπερασματικά, η μελέτη υπογραμμίζει την επείγουσα ανάγκη για συνολικές στρατηγικές γεφύρωσης του ψηφιακού χάσματος. Η άνιση πρόσβαση στην τεχνολογία, οι διαφοροποιήσεις στον ψηφιακό γραμματισμό και η ελλιπής υποστήριξη των εκπαιδευτικών διατηρούν τις εκπαιδευτικές ανισότητες. Ωστόσο, οι συμπεριληπτικές πρακτικές, όπως η στοχευμένη επιμόρφωση εκπαιδευτικών και τα σχολικά προγράμματα ψηφιακού γραμματισμού, μπορούν να προωθήσουν ένα πιο ισότιμο ψηφιακό μαθησιακό περιβάλλον. Για να επιτευχθεί πραγματική ψηφιακή ένταξη, απαιτείται μια συνεργατική προσέγγιση που να περιλαμβάνει εκπαιδευτικούς, πολιτικούς φορείς και την ευρύτερη κοινότητα.

Λέξεις – κλειδιά: Ψηφιακό Χάσμα, Πρωτοβάθμια Εκπαίδευση, Εκπαιδευτική Ανισότητα, Ψηφιακός Γραμματισμός, Πρόσβαση στις ΤΠΕ, Συμπεριληπτική Εκπαίδευση

ΨΗΦΙΑΚΟΣ ΜΕΤΑΣΧΗΜΑΤΙΣΜΟΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΕΥΚΑΙΡΙΕΣ, ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΑΝΑΔΥΟΜΕΝΕΣ ΑΝΙΣΟΤΗΤΕΣ ΣΤΗΝ ΕΠΟΧΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ

Μπαλωμένου Αθανασία
Περιφερειακή Επόπτρια Ποιότητας Εκπαίδευσης Δυτικής Ελλάδας, Σύμβουλος Εκπαίδευσης ΠΕ03 Αχαΐας,
Περιφερειακή Διεύθυνση Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης Δυτικής Ελλάδας,
Πάτρα, Ελλάδα
e-mail: smpalom@upatras.gr

Τσακουμάγκου Πηνελόπη
Εκπαιδευτικός ΠΕ05, Γαλλικής Φιλολογίας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Κυκλάδων
Μύκονος, Ελλάδα
e-mail: ptsak21@gmail.com

Τσακουμάγκος Ιωάννης
Χημικός Μηχανικός
Πανεπιστήμιο Πατρών
Πάτρα, Ελλάδα
e-mail: giannistsak6@gmail.com

ΠΕΡΙΛΗΨΗ

Την τελευταία δεκαετία, η εκπαίδευση παγκοσμίως τείνει να μεταμορφωθεί ριζικά λόγω της ταχείας εξέλιξης των ψηφιακών τεχνολογιών. Ο ψηφιακός μετασχηματισμός δεν περιορίζεται στην υποστήριξη των παραδοσιακών διδακτικών μεθόδων, αλλά αναδιαμορφώνει ουσιαστικά τον τρόπο με τον οποίο αποκτάται, διαμοιράζεται και βιώνεται η γνώση, καθώς και η οργάνωση και διοίκηση των εκπαιδευτικών οργανισμών. Η ενσωμάτωση καινοτομιών, όπως η τεχνητή νοημοσύνη, η μηχανική μάθηση, τα MOOCs και οι εικονικές τάξεις, έχει ανοίξει νέους δρόμους στη μάθηση, προσφέροντας μεγαλύτερη προσβασιμότητα, εξατομίκευση και επεκτασιμότητα. Ωστόσο, αυτή η εξέλιξη συνοδεύεται από σοβαρές προκλήσεις. Παρά τις ευκαιρίες, ο ψηφιακός μετασχηματισμός μπορεί να εντείνει τις υφιστάμενες κοινωνικές και οικονομικές ανισότητες, δημιουργώντας ένα νέο «ψηφιακό χάσμα». Η άνιση πρόσβαση σε ψηφιακά εργαλεία, υποδομές και οι δεξιότητες, ιδίως σε ευάλωτες κοινωνικές ομάδες ή απομακρυσμένες κοινότητες, αποτελεί βασικό εμπόδιο για την ισότιμη εκπαίδευση. Η εργασία αυτή αναλύει τον διττό χαρακτήρα του ψηφιακού μετασχηματισμού και τονίζει την ανάγκη για συμμετοχικές, δίκαιες και συμπεριληπτικές πολιτικές. Υιοθετεί τη μεθοδολογία της βιβλιογραφικής ανασκόπησης και μελέτης κειμένων πολιτικής. Αναλύει τις βασικές προκλήσεις κατά το ψηφιακό μετασχηματισμό της εκπαίδευσης και στην τελευταία ενότητα προτείνει συγκεκριμένες στρατηγικές – όπως η επένδυση σε τεχνολογικές υποδομές και η ενίσχυση των ψηφιακών δεξιοτήτων μαθητών, εκπαιδευτικών και πολιτών – ώστε η τεχνολογία να συμβάλλει ουσιαστικά στη μείωση των εκπαιδευτικών ανισοτήτων.

Λέξεις κλειδιά: ψηφιακός μετασχηματισμός, πρωτοβάθμια και δευτεροβάθμια εκπαίδευση, ψηφιακό χάσμα, ψηφιακές ανισότητες.

ΨΗΦΙΑΚΕΣ ΑΝΙΣΟΤΗΤΕΣ ΜΕ ΤΗΝ ΕΛΕΥΣΗ ΤΟΥ 21ΟΥ ΑΙΩΝΑ

Ροντογιάννης Άγγελος
Εκπαιδευτικός Πληροφορικής – Μουσικής (ΠΕ86 –ΤΕ16) MSc
Υ.παι.θ., Ελλάδα
Email: arondo@sch.gr

Δρ. Πλασκασοβίτη Αμαλία
Εκπαιδευτικός Γερμανικής Φιλολογίας (ΠΕ07)
Υ.παι.θ, Ελλάδα
Email: amaliaplaskoviti@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εστιάζεται στο ψηφιακό χάσμα (ψηφιακός αναλφαβητισμός) και τις ανισότητες που προκύπτουν και αφορά στη θεμελιώδη γνώση που σχετίζεται με τη χρήση του διαδικτύου, τη χρήση ψηφιακών εργαλείων (επεξεργασία κειμένων, αποστολή ηλεκτρονικής αλληλογραφίας κ.λπ.). Σε ένα σύγχρονο περιβάλλον υπέρ-πληροφόρησης και τεχνολογικής επανάστασης με την έλευση του 21ου αιώνα το να μην είναι σε θέση ένα άτομο να χρησιμοποιεί σωστά μια ψηφιακή συσκευή (κινητό) ή να μην μπορεί να χρησιμοποιήσει ένα ηλεκτρονικό υπολογιστή στη καθημερινότητα ακούγεται απίθανο και έρχεται σε σύγκρουση με την κοινή λογική.

Ο ψηφιακός αναλφαβητισμός είναι η αδυναμία του ατόμου να χρησιμοποιήσει την ψηφιακή τεχνολογία και τις δυνατότητες που προσφέρει μέσω των εφαρμογών της στην καθημερινότητα (εργασία, εκπαίδευση, επικοινωνία, γεγονότα που επηρεάζουν και διαμορφώνουν τη ζωή). Η αδυναμία της γνώσης των ψηφιακών τεχνολογιών και δυνατοτήτων επιφέρει σοβαρές συνέπειες σε κοινωνικό και οικονομικό επίπεδο (εκπαίδευση, εργασία, κοινωνική συμμετοχή). Αυτό ως συνέπεια έχει πρακτικό και κοινωνικό αντίκτυπο στο ψηφιακό αναλφάβητο άτομο με τη δημιουργία ανισότητας και μη ίσης αντιμετώπισης σε διάφορες πτυχές της καθημερινότητας του.

Η εργασία μας εστιάζεται στην έρευνα που υλοποιήθηκε στο σχολείο μας (2ο Πειραματικό Λύκειο Λευκάδας «Άγγελος Σικελιανός») κατά την τρέχουσα σχολική χρονιά (2024-2025) στα πλαίσια των δράσεων του ενεργού πολίτη (δράσεις ενίσχυσης της Ενεργού Πολιτειότητας του Ινστιτούτου Εκπαιδευτικής Πολιτικής – ΙΕΠ). Ο σκοπός της δράσης ήταν οι μαθητές/τριες που έχουν αναπτύξει τεχνολογικές δεξιότητες (ως ένα βαθμό) να βοηθήσουν και άλλα άτομα (γονείς, παπούδες , συγγενείς κ.λπ.) να αποκτήσουν βασικές ψηφιακές δεξιότητες (επικοινωνία με τους οικείους του, με δημόσιες υπηρεσίες και τράπεζες), οι οποίες να είναι χρήσιμες για τη ζωή τους. Επίσης οι μαθητές/τριες μέσα από τη διαδικασία της έρευνας να αντιληφθούν και οι ίδιοι / ίδιες τις μορφές, τις αιτίες και τους τρόπους μείωσης των ψηφιακών ανισοτήτων που υπάρχουν (πρόσβαση, επιρροή και δημιουργία σε περιεχόμενο και συμμετοχή, εκπαίδευση , βελτίωση υποδομών, τεχνολογικές πολιτικές).

Η μεθοδολογία της έρευνας στηρίχθηκε στα στάδια της επιλογής συμμετεχόντων από διάφορες κοινωνικές ομάδες (ηλικία, φύλο, περιοχές, οικονομικό επίπεδο, εκπαίδευση) με τη χρήση ερωτηματολογίων (διαδικτυακά ή δια ζώσης) με κλειστές ερωτήσεις, προσωπικών συναντήσεων και ανάλυση των ποσοτικών δεδομένων, καθώς και τη μελέτη δεδομένων από διάφορους οργανισμούς (Unesco, Eurostat) και δημοσίων βάσεων πληροφοριών και τη σύγκριση τους με τη έρευνα των μαθητών. Οι μαθητές/τριες συμμετείχαν σε όλες τις φάσεις υλοποίησης της εργασίας, τον καθορισμό των στόχων της δράσης μέσω της καταγραφής και ανάλυσης της υπάρχουσας κατάστασης, τη συλλογή-ανάλυση των δεδομένων, τη συμμετοχή με εμπλεκόμενους φορείς (δημόσιων αρχών και ιδιωτικού τομέα) και της ευαισθητοποίησης. Τέλος, οι μαθητές / μαθήτριες, στηριζόμενοι στα αποτελέσματα της ανάλυσης των δεδομένων για τη βελτίωση του ψηφιακού γραμματισμού και τη μείωση του ψηφιακού χάσματος διατύπωσαν και κατέγραψαν τις δικές τους προτάσεις.

Η έρευνα υπογραμμίζει τη σημασία της ανάπτυξης ψηφιακών δεξιοτήτων στους μαθητές, καθώς η τεχνολογία αποτελεί πλέον βασικό εργαλείο μάθησης και εξέλιξης. Μπορεί να εξασφαλίσει μια πιο δίκαιη κοινωνία, όπου όλα τα άτομα θα έχουν τα εργαλεία που χρειάζονται για να επιτύχουν σε έναν ψηφιακό κόσμο. Η μείωση των ψηφιακών ανισοτήτων αλλά και ταυτόχρονα η ενίσχυση της ισότιμης πρόσβασης σε ψηφιακές τεχνολογίες και ψηφιακές ευκαιρίες ενισχύει τη κοινωνική συνοχή και καινοτομία σε όλες τις κοινωνικές ομάδες.

Λέξεις–κλειδιά: Ψηφιακός γραμματισμός – αναλφαβητισμός, ψηφιακό χάσμα, ανισότητες στη χρήση της τεχνολογίας, e-skills.

ΘΠ5: Ψηφιακός-Οπτικός Γραμματισμός

Η ΣΧΟΛΙΚΗ ΒΙΒΛΙΟΘΗΚΗ ΩΣ ΚΟΜΒΟΣ ΜΑΘΗΣΗΣ: ΣΧΕΔΙΟ ΔΡΑΣΗΣ ΓΙΑ ΨΗΦΙΑΚΗ ΑΝΑΒΑΘΜΙΣΗ

Γιαννάκου Αναστασία
PhD, MSc, Διευθύντρια του 4ου Γενικού Λυκείου Ιωαννίνων «ΑΚΑΔΗΜΙΑ»
Ιωάννινα, Ελλάδα

Βούλγαρη Ιωάννα
Θεολόγος, Καθηγήτρια του 4ου Γενικού Λυκείου Ιωαννίνων «ΑΚΑΔΗΜΙΑ»
Ιωάννινα, Ελλάδα

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία παρουσιάζει αναλυτικά την υλοποίηση ενός ολοκληρωμένου σχεδίου δράσης για τον εκσυγχρονισμό της σχολικής βιβλιοθήκης, με στόχο την ενίσχυση της μάθησης, της δημιουργικότητας και του ψηφιακού αλλά και παραδοσιακού γραμματισμού ανάγνωσης. Η πρωτοβουλία δεν περιορίστηκε στην ανακαίνιση του φυσικού χώρου, αλλά εστίασε στη δημιουργία ενός πολυσύνθετου και λειτουργικού περιβάλλοντος μάθησης, όπου συνδυάζονται ψηφιακές και παραδοσιακές υποδομές, προηγμένα ψηφιακά εργαλεία και συνεργατικές παιδαγωγικές πρακτικές. Η δράση υλοποιήθηκε με ενεργή συμμετοχή μαθητών, εκπαιδευτικών και εξωτερικών φορέων, με στόχο τη μετατροπή της βιβλιοθήκης σε έναν δυναμικό κόμβο γνώσης, καινοτομίας και κοινωνικής αλληλεπίδρασης.

Τα κύρια αποτελέσματα περιλαμβάνουν την ανάπτυξη πρωτότυπου εκπαιδευτικού και οπτικοακουστικού υλικού, τη δημιουργία διαδραστικών προγραμμάτων φιλαναγνωσίας, τη σύναψη συνεργασιών με πολιτιστικούς και ακαδημαϊκούς φορείς, καθώς και την ενσωμάτωση της βιβλιοθήκης σε εθνικά και διεθνή δίκτυα ανταλλαγής καλών πρακτικών. Η αξιολόγηση πραγματοποιήθηκε μέσω συνδυασμού ποσοτικών και ποιοτικών κριτηρίων, όπως η συμμετοχή της σχολικής κοινότητας, η ποιότητα συνεργασίας, η ολοκλήρωση δραστηριοτήτων, η επισκεψιμότητα ψηφιακών πόρων και η ικανοποίηση των χρηστών. Τα αποτελέσματα ανέδειξαν τη δυναμική των σχολικών βιβλιοθηκών ως πολυδιάστατων χώρων μάθησης, ικανοποιώντας τις απαιτήσεις του 21ου αιώνα, ενισχύοντας τον ψηφιακό γραμματισμό και λειτουργώντας ως κόμβοι κοινωνικής συμμετοχής και καινοτομίας.

Λέξεις-κλειδιά: Ψηφιακός γραμματισμός, Πληροφοριακή παιδεία, Εκπαιδευτικά ψηφιακά εργαλεία, Υβριδικές βιβλιοθήκες, Διάχυση γνώσης, Τεχνολογική καινοτομία, Βιωσιμότητα πρακτικών

ΟΠΤΙΚΟΠΟΙΩΝΤΑΣ ΤΗ ΜΑΘΗΣΗ: ΣΧΕΔΙΑΣΤΙΚΕΣ ΑΡΧΕΣ, ΕΦΑΡΜΟΓΗ ΚΑΙ ΟΦΕΛΗ ΤΩΝ INFOGRAPHICS ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΜΑΘΗΣΙΑΚΗ ΔΙΑΔΙΚΑΣΙΑ

Ιωάννης Ν. Δημητρακόπουλος
MSc, Εκπαιδευτικός, κλάδου ΠΕ82
ΔΔΕ Πρέβεζας – 2ο Γυμνάσιο Πρέβεζας

ΠΕΡΙΛΗΨΗ

Το παρόν επιστημονικό άρθρο διερευνά τη συμβολή των Infographics (Πληροφοριακών Γραφημάτων) στη μαθησιακή διαδικασία, εξετάζοντας τις σχεδιαστικές αρχές, τις παιδαγωγικές εφαρμογές και τις επιπτώσεις τους στη γνωστική ανάπτυξη των μαθητών. Τα Πληροφοριακά Γραφήματα συνδυάζουν οπτικά και γλωσσικά στοιχεία, προσφέροντας έναν αποδοτικό τρόπο οργάνωσης και παρουσίασης σύνθετων πληροφοριών. Τα τελευταία χρόνια, η χρήση τους έχει αυξηθεί σημαντικά, καθώς αποδεικνύονται ιδιαίτερα αποτελεσματικά στη διευκόλυνση της κατανόησης και αφομοίωσης τόσο βασικών όσο και πολύπλοκων εννοιών, μέσα από τη δομημένη οπτική αναπαράσταση δεδομένων. Σύμφωνα με τη βιβλιογραφία, η γνωστική θεωρία μάθησης με την ενσωμάτωση πολλαπλών καναλιών πληροφόρησης ενισχύει τη μνημονική ανάκληση και προάγει τη βαθύτερη κατανόηση των εννοιών.

Ακολουθώντας ως κύριο μεθοδολογικό άξονα την βιβλιογραφική έρευνα, αναλύεται η αξιοποίησή τους στην εκπαίδευση, καθώς και οι προκλήσεις που προκύπτουν από τη χρήση τους. Μέσω της συστηματικής ανάλυσης ερευνητικών δεδομένων και θεωρητικών προσεγγίσεων, αναδεικνύεται η συμβολή τους στη μαθησιακή διαδικασία. Παράλληλα, καταγράφονται πιθανές δυσκολίες που προκύπτουν από τη χρήση τους, επισημαίνοντας ότι ο υπερβολικά μεγάλος όγκος πληροφοριών χωρίς την απαραίτητη καθοδήγηση ενδέχεται να προκαλέσουν γνωστική επιβάρυνση, επηρεάζοντας αρνητικά την επεξεργασία και την αφομοίωση της πληροφορίας.

Ιδιαίτερη έμφαση στη δημοσίευση δίνεται στη χρήση των Infographics στο διεπιστημονικό φάσμα (φυσικές επιστήμες, γλωσσική εκπαίδευση, κοινωνικές επιστήμες κ.ά.), καθώς και στη σημασία τους ως εργαλείου ανάπτυξης, δημιουργίας και εφαρμογής, μέσω της χρήσης εξειδικευμένων μεθοδολογικών εργαλείων, όπως οι πλατφόρμες Napkin και Venngage. Οι μελέτες περίπτωσης που δημιουργούνται παρέχουν συγκεκριμένα και μετρήσιμα δεδομένα σχετικά με τον τρόπο με τον οποίο τα οπτικά γραφήματα μπορούν να υποστηρίξουν τη διδασκαλία, να ενισχύσουν την κατανόηση των εννοιών και να βελτιώσουν τη μαθησιακή εμπειρία.

Άμεσος στόχος της έρευνας είναι η ανάδειξη της εκπαιδευτικής σημασίας των Infographics σε άτυπα και τυπικά εκπαιδευτικά περιβάλλοντα. Η δυνατότητά τους να μετατρέπουν σύνθετες πληροφορίες σε κατανοητά οπτικά σχήματα ενισχύει τη γνωστική εμπλοκή, τη συμπεριληπτική μάθηση, τον αναστοχασμό μέσω του οπτικού και ψηφιακού γραμματισμού. Η συμμετοχή των μαθητών στη δημιουργία τους ενισχύει δεξιότητες όπως η ανάλυση δεδομένων, η επικοινωνία και η συνεργασία.

Η εργασία αφενός απευθύνεται σε όλη την εκπαιδευτική κοινότητα και αφετέρου προκαλεί τον εκπαιδευτικό να αναπτύξει την φαντασία και τη δημιουργικότητα, με στόχο μια σύγχρονη, δομημένη και τεχνολογικά ενημερωμένη πρακτική.

Λέξεις κλειδιά: Infographics, Ψηφιακός και Οπτικός Γραμματισμός, Γραφήματα, Μάθηση

Η ΕΦΑΡΜΟΓΗ ΤΗΣ ΠΟΛΥΤΡΟΠΙΚΟΤΗΤΑΣ ΣΤΟ ΠΛΑΙΣΙΟ ΤΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΤΟΥ ΓΛΩΣΣΙΚΟΥ ΜΑΘΗΜΑΤΟΣ: ΜΙΑ ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ ΤΗΣ ΒΙΒΛΙΟΓΡΑΦΙΑΣ

Μαυραγάνης Βασίλειος
Εκπαιδευτικός ΠΕ70&ΠΕ02 ,Υποψήφιος διδάκτωρ ΤΕΕΑΠΗ Πανεπιστήμιο Πατρών
Πανεπιστήμιο Πατρών
Πάτρα, Ελλάδα
email: vmavragan@gmail.com

ΠΕΡΙΛΗΨΗ

Η πολυτροπικότητα θεωρείται μια καινοτόμος προσέγγιση στον τομέα της εκπαίδευσης, καθώς ενσωματώνει ποικιλία σημειωτικών πόρων, με στόχο να ενισχυθεί η μάθηση και η κατανόηση. Η πολυτροπικότητα παρέχει μια πιο ολοκληρωμένη προσέγγιση στη μάθηση, καθώς επιτρέπει στη μαθητική κοινότητα να αλληλεπιδρά με το εκπαιδευτικό υλικό, μέσα από πολλούς και διαφορετικούς τρόπους. Αυτή η μαθησιακή προσέγγιση δεν περιορίζεται μόνο στο γραπτό κείμενο, αλλά επεκτείνεται σε άλλες μορφές αναπαράστασης όπως είναι οι εικόνες και η ψηφιακή τεχνολογία, που αποτελούν αναπόσπαστο κομμάτι του σύγχρονου κόσμου. Μέσω της πολυτροπικότητας οι μαθητές και οι μαθήτριες μπορούν να αναπτύξουν μια βαθύτερη κατανόηση των εννοιών και να βελτιώσουν τις γλωσσικές δεξιότητές τους, ενώ ταυτοχρόνως να καλλιεργήσουν την κριτική σκέψη και τη δημιουργικότητά τους. Σκοπός της παρούσας μελέτης είναι η διερεύνηση της εφαρμογής της πολυτροπικότητας στο μάθημα της γλώσσας στην πρωτοβάθμια εκπαίδευση, μέσα από την ανάπτυξη των επιπτώσεων που επιφέρει στη μαθητική και εκπαιδευτική κοινότητα. Η έρευνα στηρίζεται σε βιβλιογραφική ανασκόπηση, η οποία πραγματοποιήθηκε μέσω της αναζήτησης πρωτογενών πηγών. Το σύνολο των επιλεγμένων πηγών που χρησιμοποιήθηκαν ήταν 33 έρευνες ποιοτικές, ποσοτικές και μικτές. Επιπροσθέτως οι έρευνες έπρεπε να είναι γραμμένες είτε στην ελληνική, είτε στην αγγλική γλώσσα και να έχουν δημοσιευθεί από το 2000 έως το 2025, ενώ οι λέξεις κλειδιά που χρησιμοποιήθηκαν στις μηχανές αναζήτησης έπρεπε να συνδέονται με τον τίτλο ή και το περιεχόμενο της έρευνας. Όσον αφορά τα κριτήρια αποκλεισμού των ερευνών, αποκλείστηκαν όσες πρωτογενείς έρευνες δεν ήταν σχετικές με το ερευνητικό θέμα, δεν είχαν σαφώς καθορισμένο ερευνητικό δείγμα, το δείγμα ήταν περιορισμένο και δεν περιλάμβαναν ποσοτικά ή ποιοτικά δεδομένα. Τα ευρήματα της έρευνας αναδεικνύουν τη θετική επίδραση της πολυτροπικότητας στη διδασκαλία της γλώσσας στην πρωτοβάθμια εκπαίδευση. Η χρήση πολυτροπικών κειμένων και διαδραστικών εργαλείων συμβάλλει σημαντικά στη βελτίωση της αναγνωστικής ικανότητας των μαθητών/-τριών, καθώς επιτρέπει την παρουσίαση πληροφοριών μέσα από διαφορετικούς τρόπους, ενισχύοντας την κατανόηση, την απομνημόνευση και τη διατήρηση της γνώσης. Οι μαθητές και οι μαθήτριες που εκτίθενται σε πολυτροπικά μέσα δείχνουν μεγαλύτερη εμπλοκή και ενδιαφέρον στη γλωσσική διδασκαλία, ενώ παράλληλα αναπτύσσουν την κριτική τους σκέψη μέσα από τη σύνθεση και την ανάλυση των πληροφοριών. Επίσης, η ενσωμάτωση πολυτροπικών στοιχείων στα σχολικά βιβλία, όπως εικόνες, διαδραστικές ιστορίες και εκπαιδευτικά λογισμικά, έχει διαπιστωθεί ότι ενισχύει τη σχέση των μαθητών/-τριών με τα γλωσσικά κείμενα, καθιστώντας τη μάθηση πιο ελκυστική, προσβάσιμη και αποτελεσματική. Παράλληλα, η έρευνα κατέδειξε ότι η εφαρμογή της πολυτροπικότητας παρουσιάζει προκλήσεις. Πολλοί εκπαιδευτικοί δε διαθέτουν την απαραίτητη κατάρτιση στη χρήση πολυτροπικών εργαλείων και λογισμικών, γεγονός που περιορίζει την αποτελεσματική τους εφαρμογή στην τάξη. Επίσης, η έλλειψη υποδομών, η αδυναμία πρόσβασης σε σύγχρονα τεχνολογικά μέσα και ο περιορισμένος χρόνος διδασκαλίας συχνά καθιστούν δύσκολη την ενσωμάτωση πολυτροπικών δραστηριοτήτων. Παρόλα αυτά, η συνεχής τεχνολογική εξέλιξη και οι νέες εκπαιδευτικές πολιτικές δείχνουν ότι η πολυτροπικότητα κερδίζει έδαφος και αναμένεται να διαδραματίσει σημαντικό ρόλο στη μελλοντική διδασκαλία της γλώσσας. Η ανάπτυξη στοχευμένων επιμορφωτικών προγραμμάτων για τους/τις εκπαιδευτικούς, η ενσωμάτωση πολυτροπικών μεθόδων στη διδακτική πράξη και η βελτίωση των πολυτροπικών λογισμικών, θεωρούνται καίρια βήματα για την αποτελεσματική εφαρμογή αυτής της προσέγγισης στην πρωτοβάθμια εκπαίδευση.

Λέξεις κλειδιά: Πολυτροπικότητα, γλωσσική διδασκαλία, πρωτοβάθμια εκπαίδευση.

ΠΟΛΥΓΡΑΜΜΑΤΙΣΜΟΙ ΣΤΗ ΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΑΞΙΟΠΟΙΩΝΤΑΣ ΨΗΦΙΑΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ ΕΝΝΟΙΟΛΟΓΙΚΗΣ ΧΑΡΤΟΓΡΑΦΗΣΗΣ

Τοτόλου Αγγελική
Εκπαιδευτικός ΠΕ70, ΠΕ78
Υποψήφια Διδάκτωρ, Ιόνιο Πανεπιστήμιο
Αργοστόλι, Ελλάδα
e-mail: antotolou@gmail.com

Ηλιάδης Γεώργιος
Αναπληρωτής Καθηγητής
Ιόνιο Πανεπιστήμιο
Αργοστόλι, Ελλάδα
e-mail: g.heliades@gmail.com

ΠΕΡΙΛΗΨΗ

Αντικείμενο της παρούσας μελέτης είναι η πραγμάτευση διαγραμματικών αναπαραστάσεων της γνώσης και ειδικότερα της εννοιολογικής χαρτογράφησης. Στην ψηφιακή εποχή τα περιβάλλοντα μάθησης μετασχηματίζονται προκειμένου να ανταποκριθούν στις νέες προκλήσεις. Η διαδικασία μάθησης αποδεσμεύεται από χωροχρονικούς περιορισμούς και εξελίσσεται διαρκώς με απώτερο στόχο την αναβάθμιση της μαθησιακής εμπειρίας. Αδιαμφισβήτητα, η διάδραση συνιστά κεντρικό ζήτημα αλλά και ζητούμενο συγχρόνως. Στο πλαίσιο αυτό, η έννοια των πολυγραμματισμών αποκτά νέες διαστάσεις και προοπτικές. Ξεκινώντας από την αξιοποίηση της εννοιολογικής χαρτογράφησης στη διδασκαλία και τη μάθηση θα παρουσιαστούν συνοπτικά τα οφέλη αυτής της προσέγγισης. Η εννοιολογική χαρτογράφηση αξιοποιείται σε διάφορα γνωστικά αντικείμενα. Το πεδίο εφαρμογής αντλείται από το μάθημα της Κοινωνικής και Πολιτικής Αγωγής, το οποίο περιλαμβάνει μεγάλο εύρος θεμάτων και εννοιών. Έμφαση δίνεται στην προώθηση της νοηματοδοτούμενης μάθησης. Επίσης, αναλύονται οι δυνατότητες αξιοποίησης της εννοιολογικής χαρτογράφησης για την επεξεργασία και σύνθεση πληροφοριών, την ανάπτυξη ιδεών και εννοιών, την κατάκτηση νέας γνώσης, την ανάπτυξη κριτικής σκέψης και δημιουργικότητας. Ιδιαίτερα σημαντικό είναι πως η εννοιολογική χαρτογράφηση προσφέρει τη δυνατότητα οπτικοποίησης σχέσεων μεταξύ εννοιών, γεγονός που συμβάλλει στην εις βάθος κατανόηση του υπό μελέτη θέματος. Ως επακόλουθο, αναδεικνύεται η εννοιολογική χαρτογράφηση, ως εκπαιδευτική στρατηγική που μπορεί να αναδείξει καινοτόμους εκπαιδευτικούς σχεδιασμούς σε ψηφιακά περιβάλλοντα μάθησης.

Λέξεις – κλειδιά: πολυγραμματισμοί, πολυτροπικότητα, εννοιολογική χαρτογράφηση, ψηφιακά μέσα.

ΘΠ6: Ψηφιακή Ηθική

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΗΘΙΚΗ: ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΛΥΣΕΙΣ

Σαμωνάς Κωνσταντίνος
Εκπαιδευτικός ΠΕ02
ΔΔΕ Πρέβεζας, Γυμνάσιο Λούρου
Πρέβεζα, Ελλάδα
e-mail: samkon@sch.gr

ΠΕΡΙΛΗΨΗ

Το παρόν άρθρο εστιάζει στη θεματική της Ψηφιακής Ηθικής και ιδιαίτερα στον τομέα της Ηθικής στην Τεχνητή Νοημοσύνη (ΤΝ) και τις προκλήσεις που ανακύπτουν από την εισαγωγή της στην εκπαίδευση. Αρχικά γίνεται μια παρουσίαση των όρων ΤΝ. Έπειτα παρουσιάζονται οι τρόποι που η ΤΝ έχει εισχωρήσει στην εκπαίδευση και τα θετικά που μπορεί να επιφέρει σε ζητήματα διοίκησης και διαχείρισης, στη διδασκαλία και στη μάθηση, όπως η προσωποποιημένη μάθηση, η δημιουργία ποιοτικού παιδαγωγικού περιεχομένου με δυνατότητα προσαρμογής στις ανάγκες των μαθητών/τριών, η έγκυρη και έγκαιρη αξιολόγηση και ανατροφοδότηση, προβλέψεις και παρεμβάσεις για μαθητές/τριες που δυσκολεύονται. Στη συνέχεια αναδεικνύονται τα πιο σημαντικά προβλήματα σχετικά με την εισαγωγή και τη χρήση της ΤΝ στην εκπαίδευση, όπως η ιδιωτικότητα, η προστασία των δεδομένων, η μεροληψία και η αδιαφάνεια των αλγορίθμων, το ψηφιακό χάσμα, ο πλαγιαρισμός και γενικότερα οι κίνδυνοι για την ακαδημαϊκή ακεραιότητα. Έπειτα, αφού παρουσιαστούν το πλαίσιο των ηθικών σχολών της δεοντολογίας, του ωφελιμισμού και των αρετών, γίνεται διερεύνηση των υφιστάμενων κανόνων δεοντολογίας με έμφαση σε εκείνους των διεθνών και διακρατικών θεσμών της UNICEF, του ΟΑΣΑ και της Ευρωπαϊκής Ένωσης, αλλά και του νομικού πλαισίου που έχει αναπτυχθεί στην Ευρωπαϊκή Ένωση (ΕΕ) -ΓΚΠΔ και Κανονισμός σχετικά με την ΤΝ-, που αναδεικνύει ότι οι κώδικες δεοντολογίας αδυνατούν να επιφέρουν τα επιδιωκόμενα αποτελέσματα για διάφορες αιτίες, όπως ο ανταγωνισμός μεταξύ εταιρειών ή κρατών και η εξάρτηση της επιστημονικής προόδου από τη χρηματοδότηση επενδυτών με πιθανόν ιδιοτελείς σκοπούς, και ότι απαιτείται η ενίσχυση της θεσμικής θωράκισης. Τέλος, γίνεται αναφορά στον ρόλο του σχολείου για την καλλιέργεια όχι μόνο γνώσεων και δεξιοτήτων που είναι απαραίτητες για τη δημιουργική αξιοποίηση της ΤΝ αλλά και την ηθική συνείδηση κατά την εφαρμογή της από τους/τις μαθητές/τριες ως ενήλικες, ώστε να περιοριστούν αρνητικές πρακτικές και αποτελέσματα που θα βλάψουν την κοινωνία, και η ανάγκη για επιμόρφωση των εκπαιδευτικών στα αντίστοιχα θέματα, ώστε να αποτελέσουν πρότυπα για τους/τις μαθητές/τριες.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Ηθική, Εκπαίδευση

ΘΠ7: Ψηφιακή πολιτειότητα (Digital Citizenship)

ΕΝΕΡΓΟΣ ΠΟΛΙΤΕΙΟΤΗΤΑ ΚΑΙ ΨΗΦΙΑΚΟΣ ΚΟΣΜΟΣ Ο ΡΟΛΟΣ ΤΗΣ ΕΚΠΑΙΔΕΥΣΗΣ ΣΤΗ ΔΙΑΜΟΡΦΩΣΗ ΕΝΕΡΓΩΝ ΜΑΘΗΤΩΝ-ΠΟΛΙΤΩΝ ΣΤΟΝ ΨΗΦΙΑΚΟ ΔΗΜΟΣΙΟ ΧΩΡΟ

Δημακοπούλου Φωτεινή
Σύμβουλος Εκπαίδευσης Κοινωνικών Επιστημών M.Ed/M.Sc
Επόπτρια Ποιότητας της Εκπαίδευσης
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας

Δημακοπούλου Μαρία
Νηπιαγωγός
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Αχαΐας

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει την έννοια της ενεργού πολιτειότητας στο σύγχρονο ψηφιακό κόσμο, εστιάζοντας στον καθοριστικό ρόλο της εκπαίδευσης στη διαμόρφωση ενεργών, υπεύθυνων και κριτικά σκεπτόμενων μαθητών-πολιτών. Μέσα από θεωρητική και εννοιολογική ανάλυση, διερευνώνται οι μετασχηματισμοί της ιδιότητας του πολίτη υπό το πρίσμα της ψηφιοποίησης, της παγκοσμιοποίησης και της πολυπολιτισμικότητας, καθώς και η ανάδυση της ψηφιακής πολιτειότητας ως βασικής διάστασης της σύγχρονης δημοκρατικής συμμετοχής. Ιδιαίτερη έμφαση δίνεται στη σύνδεση της ψηφιακής πολιτειότητας με την ψηφιακή νοημοσύνη, η οποία περιλαμβάνει γνωστικές, κοινωνικές, συναισθηματικές και ηθικές δεξιότητες απαραίτητες για την ασφαλή και υπεύθυνη συμμετοχή στον ψηφιακό δημόσιο χώρο. Η μελέτη δείχνει ότι η εκπαίδευση οφείλει να υπερβεί την απλή καλλιέργεια τεχνικών δεξιοτήτων και να υιοθετήσει μια ολιστική προσέγγιση, που ενισχύει την κριτική σκέψη, την ψηφιακή ηθική και την ενεργό συμμετοχή. Συμπερασματικά, η εκπαίδευση για την ψηφιακή πολιτειότητα αποτελεί βασική προϋπόθεση για την ενδυνάμωση της δημοκρατίας και την οικοδόμηση μιας συμπεριληπτικής και υπεύθυνης ψηφιακής κοινωνίας.

Λέξεις-κλειδιά: ενεργός πολιτειότητα, ψηφιακός πολίτης, ψηφιακή νοημοσύνη εκπαίδευση ψηφιακού πολίτη.

ΕΠΙΣΤΗΜΗ ΚΑΙ ΨΗΦΙΑΚΟΣ ΠΟΛΙΤΗΣ: ΈΝΑ ΔΙΔΑΚΤΙΚΟ ΣΕΝΑΡΙΟ ΜΕ ΕΦΑΡΜΟΓΗ ΣΤΗ ΧΗΜΕΙΑ

Μαλάμου Κωνσταντίνα
Χημικός, Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: nmalamou@gmail.com

Μαλάμου Σεβαστή
Φυσικός, Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: smalamou@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία έχει ως θέμα της ένα διδακτικό σενάριο στη Χημεία, με στόχο την κινητοποίηση και τον προβληματισμό των μαθητών πάνω σε θέματα ψευδοεπιστήμης ή παραπλάνησης του κοινού σε επιστημονικά θέματα σε έναν ψηφιακό κόσμο γεμάτο υπερπληροφόρηση, προκλήσεις και παραπλανήσεις. Βασισμένο στην ανακαλυπτική-διερευνητική και ομαδοσυνεργατική μέθοδο, χρησιμοποιώντας σύγχρονα ψηφιακά εργαλεία, το διδακτικό σενάριο έχει ως κύριο στόχο, την εκπαίδευση ενεργών και προβληματιζόμενων μαθητών-ψηφιακών πολιτών σε θέματα επιστήμης και επιστημονικής παραπλάνησης. Το παρόν διδακτικό σενάριο μπορεί να αποτελέσει οδηγό ώστε να προσαρμοστεί και σε άλλες Φυσικές Επιστήμες όπως τη Βιολογία και τη Φυσική, εξυπηρετώντας αντίστοιχους διδακτικούς στόχους για τους μαθητές της Γ Γυμνασίου και τάξεις Λυκείου.

Λέξεις κλειδιά: επιστήμη, επιστημονική παραπλάνηση, φυσικές επιστήμες, ψευδοεπιστήμη, ψηφιακός πολίτης

ΘΠ8: Συμπεριληπτική ψηφιακή εκπαίδευση

ΗΧΗΤΙΚΑ ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΜΑΘΗΜΑΤΙΚΩΝ ΓΙΑ ΜΑΘΗΤΕΣ ΜΕ ΟΠΤΙΚΗ ΑΝΑΠΗΡΙΑ: ΑΝΑΛΥΣΗ ΕΦΑΡΜΟΓΩΝ ΚΑΙ ΜΙΑ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ.

Δημάκης Ευθύμιος
Υποψήφιος Διδάκτωρ, - Μαθηματικός Ειδικής Αγωγής
Π.Τ.Δ.Ε. Πανεπιστημίου Ιωαννίνων - Δευτεροβάθμια Διεύθυνση Εκπαίδευσης Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: efdimakis@gmail.com

Αγιαννίτου Διαλεχτή
Μαθηματικός Ειδικής Αγωγής
Δευτεροβάθμια Διεύθυνση Εκπαίδευσης Λέσβου
Ιωάννινα, Ελλάδα
e-mail: dagiannitou@gmail.com@gmail.com

Σούλης Σπυρίδων - Γεώργιος
Καθηγητής Ειδικής Αγωγής, - Διευθυντής Εργαστηρίου Ειδικής Αγωγής και Εκπαίδευσης
Π.Τ.Δ.Ε. Πανεπιστημίου Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: ssoulis@uoi.gr

ΠΕΡΙΛΗΨΗ

Η εκπαίδευση των μαθητών που αντιμετωπίζουν προβλήματα όρασης αποτελεί έναν περίπλοκο και δυναμικά εξελισσόμενο τομέα, όπου απαιτούνται εξειδικευμένες προσεγγίσεις για να εξασφαλιστεί η αποτελεσματική μάθηση, η ένταξη και η ενδυνάμωση. Οι προσπάθειες για την ενσωμάτωση των μαθητών με οπτική αναπηρία στα κανονικά εκπαιδευτικά περιβάλλοντα έχουν αποκτήσει δυναμικό ώθησης. Η έρευνα υπογραμμίζει τη σημασία της προσβασιμότητας τόσο στο φυσικό όσο και στο ψηφιακό περιβάλλον. Η πολυτροπικότητα στη μάθηση αναφέρεται στο γεγονός ότι οι μαθητές επεξεργάζονται τη γνώση μέσα από διαφορετικά αισθητηριακά κανάλια. Στην περίπτωση των μαθητών με οπτική αναπηρία, το ακουστικό κανάλι αποκτά πρωταγωνιστικό ρόλο, καθώς λειτουργεί ως κύριο μέσο πρόσληψης και οργάνωσης της πληροφορίας. Επιπλέον, σύμφωνα με τον κονστρουκτιβισμό, η μάθηση δεν είναι μια παθητική διαδικασία αλλά ένα ενεργό χτίσιμο γνώσεων μέσα από αλληλεπίδραση με το περιβάλλον. Τα ψηφιακά εργαλεία ήχου δίνουν τη δυνατότητα στους μαθητές με οπτική αναπηρία να αλληλεπιδρούν με το εκπαιδευτικό υλικό, να διερευνούν έννοιες και να κατασκευάζουν τη γνώση μέσα από την ακουστική και αισθητηριακή εμπειρία. Η αξιοποίηση των ψηφιακών τεχνολογιών στη διδασκαλία μαθητών με οπτική αναπηρία έχει σημαντική συμβολή στη βελτίωση της πρόσβασής τους στη γνώση. Τα εργαλεία που βασίζονται στον ήχο, επιτρέπουν την κατανόηση μαθηματικών και άλλων επιστημονικών εννοιών μέσω ακουστικών πληροφοριών. Τα λογισμικά μετατροπής κειμένου σε ομιλία (TTS), οι ηχητικές ετικέτες και οι διαδραστικές εφαρμογές με ηχητική καθοδήγηση ενισχύουν την αυτονομία των μαθητών, ενώ τα ηχητικά διαγράμματα και οι περιγραφικές αφηγήσεις διευκολύνουν την πρόσληψη σύνθετων πληροφοριών. Επιπλέον, οι τεχνολογίες αφής σε συνδυασμό με ηχητική ανάδραση παρέχουν πολυαισθητηριακή υποστήριξη, διευκολύνοντας τη μαθησιακή διαδικασία. Η χρήση αυτών των εργαλείων προάγει τη συμπεριληπτική εκπαίδευση, επιτρέποντας την ενεργό συμμετοχή των μαθητών με οπτική αναπηρία στην τάξη και ενισχύοντας τη μαθησιακή τους εμπειρία.

Στην παρούσα εργασία, εξετάζονται σύγχρονα ηχητικά εργαλεία που ενισχύουν τη μαθησιακή διαδικασία, με έμφαση στη διδασκαλία μαθηματικών και επιστημονικών εννοιών. Παρουσιάζονται εργαλεία που κυκλοφορούν και γίνεται ιδιαιτερη αναφορά σε αυτά που μπορούν να έχουν οι μαθητές αλλά και οι εκπαιδευτικοί δωρεάν. Για την πρακτική διερεύνηση της αποτελεσματικότητας αυτών των εργαλείων πραγματοποιήθηκε και παρουσιάζεται μια μελέτη περίπτωσης. Ο μαθητής της Γ γυμνασίου Φ.Δ. με μερική απώλεια όρασης συμμετείχε σε ένα πρόγραμμα ενισχυμένης μαθηματικής διδασκαλίας με τη χρήση ψηφιακών εργαλείων. Η εκπαιδευτική προσέγγιση περιλαμβάνει τη χρήση του λογισμικού NVDA για την ανάγνωση μαθηματικών συμβόλων, Desmos για την ηχητική ανατροφοδότηση για γραφήματα συναρτήσεων, διαδραστικών εφαρμογών αφής για την κατανόηση γεωμετρικών σχημάτων και την ενσωμάτωση ηχητικών περιγραφών σε διαδραστικά μαθησιακά περιβάλλοντα. Τα αποτελέσματα καταδεικνύουν τη βελτίωση της κατανόησης και της συμμετοχής του μαθητή, υπογραμμίζοντας τη σημασία της ενσωμάτωσης τεχνολογιών προσαρμοσμένης μάθησης.

Λέξεις – κλειδιά: ειδική αγωγή, ηχητικά ψηφιακά μέσα, μελέτη περίπτωσης, οπτική αναπηρία

ΨΗΦΙΑΚΕΣ ΚΥΨΕΛΕΣ ΣΤΗΝ e-me ΓΙΑ ΤΗΝ ΕΚΜΑΘΗΣΗ ΕΛΛΗΝΙΚΩΝ ΑΠΟ ΠΑΙΔΙΑ ΠΡΟΣΦΥΓΕΣ: ΕΝΙΣΧΥΟΝΤΑΣ ΤΗΝ ΣΥΜΠΕΡΙΛΗΠΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ ΜΕΣΩ ΤΗΣ ΣΥΝΔΕΣΙΜΟΤΗΤΑΣ ΚΑΙ ΤΗΣ ΠΑΙΧΝΙΔΟΠΟΙΗΣΗΣ

Δέσποινα Ζέκα-Πάσχου
Εκπαιδευτικός Πρωτοβάθμιας Εκπαίδευσης (ΠΕ70)
Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού (ΥΠΑΙΘΑ)
Διευθύντρια, Δημοτικό Σχολείο Νέας Κερασούντας Πρέβεζας
Πρέβεζα,, Ελλάδα
e-mail: despozeka@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η ένταξη των παιδιών προσφύγων στο ελληνικό εκπαιδευτικό σύστημα απαιτεί ευέλικτες και καινοτόμες παιδαγωγικές προσεγγίσεις που αξιοποιούν ψηφιακά εργαλεία και διαδραστικές μορφές μάθησης. Παρότι η δια ζώσης διδασκαλία παραμένει ο βασικός στόχος, οι συχνές απουσίες των μαθητών, λόγω κοινωνικών και οικογενειακών παραγόντων, δημιουργούν σημαντικά μαθησιακά κενά. Για την αντιμετώπιση αυτών των προκλήσεων και με αξιοποίηση των ψηφιακών δυνατοτήτων του Πανελλήνιου Σχολικού Δικτύου, δημιουργήθηκε μια ψηφιακή Κυψέλη στην πλατφόρμα e-me, βασισμένη στις θεωρίες της Συνδεσιμότητας (Connectivism) και της Παιχνιδοποίησης (Gamification), με στόχο την ενίσχυση της συμπεριληπτικής εκπαίδευσης.

Στην Κυψέλη της e-me, οι μαθητές πρόσφυγες έχουν τη δυνατότητα συνεχούς πρόσβασης σε εκπαιδευτικό υλικό, συμμετοχής σε διαδραστικές δραστηριότητες, επικοινωνίας με τους εκπαιδευτικούς τους και συνεργασίας με τους συμμαθητές τους. Παράλληλα, η πλατφόρμα διευκολύνει τη συμμετοχή των γονέων στη μαθησιακή διαδικασία, διαμορφώνοντας ένα ψηφιακό εκπαιδευτικό οικοσύστημα που υπερβαίνει τα όρια της φυσικής σχολικής τάξης. Η παιχνιδοποίηση υλοποιείται μέσω διαδραστικών κουίζ, παιχνιδιών και προκλήσεων, τα οποία ενισχύουν τη μαθητική εμπλοκή και το κίνητρο για μάθηση. Οι δραστηριότητες αυτές, προσαρμοσμένες στις γλωσσικές ανάγκες των παιδιών προσφύγων, καθιστούν την εκμάθηση της ελληνικής γλώσσας πιο ελκυστική και προσιτή.

Μέσα από διαδραστικές ασκήσεις λεξιλογίου και γραμματικής, προσαρμοσμένες στα επίπεδα γλωσσομάθειας των μαθητών, οπτικοακουστικό υλικό, διαθέσιμα ψηφιακά λεξικά σε γλώσσες όπως τα φαρσί και τα αραβικά, καθώς και δραστηριότητες παιχνιδοποίησης, η πλατφόρμα λειτουργεί ως εργαλείο επικοινωνίας και αλληλεπίδρασης μεταξύ μαθητών, εκπαιδευτικών και γονέων. Επιπλέον, δύναται να αξιοποιηθεί και ως εργαλείο εκμάθησης της ελληνικής γλώσσας για τους γονείς των μαθητών προσφύγων.

Τα αρχικά αποτελέσματα καταδεικνύουν αυξημένη μαθητική εμπλοκή, καθώς το ψηφιακό και παιχνιδοποιημένο περιβάλλον καθιστά τη μαθησιακή διαδικασία πιο ελκυστική. Παράλληλα, παρατηρείται βελτίωση της γλωσσικής ανάπτυξης των μαθητών, χάρη στην πολυτροπική προσέγγιση και την πρόσβαση σε εξατομικευμένο εκπαιδευτικό υλικό, καθώς και ενίσχυση της έκθεσής τους στην ελληνική γλώσσα εκτός σχολικού πλαισίου.

Η παρούσα εισήγηση αναδεικνύει τον τρόπο με τον οποίο η πλατφόρμα e-me, μέσω της δημιουργίας εξειδικευμένων Κυψελών, μπορεί να λειτουργήσει ως δυναμικό εργαλείο ψηφιακής και συμπεριληπτικής εκπαίδευσης. Ο συνδυασμός της Συνδεσιμότητας και της Παιχνιδοποίησης συμβάλλει στη διαμόρφωση ενός συμμετοχικού, διαδραστικού και ελκυστικού μαθησιακού περιβάλλοντος, ενισχύοντας τη γλωσσική και κοινωνική ένταξη των παιδιών προσφύγων και καθιστώντας τη μάθηση πιο ευέλικτη, προσβάσιμη και αποτελεσματική.

Λέξεις-κλειδιά: συμπεριληπτική εκπαίδευση, εκμάθηση ελληνικής γλώσσας, παιδιά πρόσφυγες, Τάξεις Υποδοχής, ψηφιακά εργαλεία, e-me, συνδεσιμότητα, παιχνιδοποίηση

ΑΝΑΖΗΤΩΝΤΑΣ ΤΟ ΣΧΟΛΕΙΟ ΓΙΑ ΟΛΟΥΣ: ΠΟΛΥΣΗΜΙΑ, ΣΤΑΔΙΑ ΠΡΑΓΜΑΤΩΣΗΣ ΚΑΙ ΥΛΙΚΟΣ/ΨΗΦΙΑΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

Χαρούπιας Αριστείδης
Σ.Ε.Π. Τεχνολογίας στην Ειδική Εκπαίδευση
Πανεπιστήμιο Λευκωσίας
Αθήνα, Ελλάδα
email: acharoupias@gmail.com

Ημέλλου Όλγα
Σ.Ε. Ειδικής Αγωγής και Ενταξιακής Εκπαίδευσης
ΔΙ.Π.Ε. Α΄ Αθήνας
Αθήνα, Ελλάδα
email:olgimellou@sch.gr

ΠΕΡΙΛΗΨΗ

Στην ελληνική εκπαιδευτική πραγματικότητα, η μετάβαση στο νέο υπόδειγμα του σχολείου για όλους/ες τους/τις μαθητές/τριες, συχνά, εμφανίζεται να παρεμποδίζεται από ζητήματα ορολογίας. Ως κεντρικό σημείο εστίασης των εμποδίων αυτών καταγράφεται η αδιαφοροποίητη απόδοση στην ελληνική γλώσσα του όρου «inclusion». Ο όρος «inclusion», ο οποίος αποτελεί κεντρική έννοια του νέου υποδείγματος, στην ελληνική βιβλιογραφία αποδίδεται αδιαφοροποίητα με όρους όπως: ενσωμάτωση, ένταξη, συμπερίληψη, συνεκπαίδευση, κ.τ.ό., συνθήκη που καθιστά δυσχερή την επικοινωνία για σχετικά ζητήματα και, συχνά, οδηγεί σε αδιέξοδο τους/τις επαγγελματίες και τους/τις ερευνητές/τριες του πεδίου. Συνεκτιμώντας τις ραγδαίες εξελίξεις που σχετίζονται με τη δυνατότητα πρόσβασης στο διαδίκτυο μέσω σταθερών/κινητών συσκευών και την εμφάνιση και εξάπλωση της Τεχνητής Νοημοσύνης (ΤΝ) στην κοινωνία, την εργασία και την εκπαίδευση, η εκπαιδευτική κοινότητα επιδεικνύει αυξημένο ενδιαφέρον για τις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ) στο σχολικό/διδακτικό πλαίσιο. Λαμβάνοντας υπόψη: (α) τη συστηματική κατάταξη της χώρας μας κάτω από τον διεθνή μέσο όρο των χωρών που συμμετέχουν στο Πρόγραμμα Διεθνούς Αξιολόγησης Μαθητών (PISA), (β) το ψηφιακό χάσμα και (γ) την τάση ενίσχυσης της αξιοποίησης των πληροφοριών, των υπηρεσιών, της ψυχαγωγίας και της κοινωνικής αλληλεπίδρασης που προσφέρουν οι ΤΠΕ και η ΤΝ, εξετάζονται τα αναγκαία προαπαιτούμενα υλοποίησης του υλικού και του ψηφιακού σχεδιασμού στο σχολείο για όλους/ες τους/τις μαθητές/τριες, με έμφαση στη νοηματοδότηση του όρου «inclusion». Τα αποτελέσματα της βιβλιογραφικής μας έρευνας παρουσιάζονται συνθετικά και σχολιάζονται κριτικά. Η εργασία ολοκληρώνεται με συζήτηση και σχετικές προτάσεις. Η διασάφηση της πολυσημίας του όρου «inclusion» προτείνεται να πραγματοποιείται μέσα από μια προσέγγιση τεσσάρων επιπέδων/σταδίων, τα οποία προσδιορίζουν ολιστικά και περιγράφουν αναλυτικά το σχολείο για όλους/ες τους/τις μαθητές/τριες, τόσο στην υλική όσο και στην υποστηριζόμενη ψηφιακά εκδοχή του. Στην πορεία προς το 2030, η νέα πραγματικότητα καθιστά επείγουσα την προτεραιοποίηση της μετάβασης προς την εκπαίδευση για όλους/ες τους/τις μαθητές/τριες, με τη διασφάλιση επαρκών εγγυήσεων/πόρων, προκειμένου… κανείς/καμία μαθητής/τρια να μην αφεθεί πίσω. Μέσα από την προσπάθεια σχεδίασης και υλοποίησης του νέου υποδείγματος, διεκδικούνται εγγυήσεις ενσωμάτωσης στις κατευθυντήριες γραμμές των εθνικών προγραμμάτων σπουδών και στα προγράμματα κατάρτισης εκπαιδευτικών, νέων θεσμών εκπαίδευσης όπως ο θεσμός του Center for Applied Special Technology (CAST) των ΗΠΑ, οι οποίοι με κεντρική σχεδίαση και πειραματική υλοποίηση, θα έχουν τη δυνατότητα να υποστηρίζουν τη μετάβαση προς το νέο υπόδειγμα με επιλογές εύλογης χρήσης της τεχνολογίας, διαμορφωτικής/τελικής αξιολόγησης των αναγκαίων υπηρεσιών και, απαραιτήτως, αναστοχασμού προς βελτίωση του νέου αναθεωρημένου υποδείγματος.

Λέξεις – κλειδιά: Ειδική/Ενταξιακή Εκπαίδευση, inclusion, Τεχνολογίες Πληροφορίας και Επικοινωνιών, Ψηφιακό χάσμα, Τεχνητή Νοημοσύνη, CAST, PISA.

ΔΙΔΑΣΚΑΛΙΑ ΤΩΝ ΕΛΛΗΝΙΚΩΝ ΣΤΗ ΔΙΑΠΟΛΙΤΙΣΜΙΚΗ ΣΧΟΛΙΚΗ ΤΑΞΗ ΜΕ ΤΗ ΧΡΗΣΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΕΡΓΑΛΕΙΟΥ ΕΚΜΑΘΗΣΗΣ ΓΛΩΣΣΩΝ «AKELIUS LANGUAGES»

Σταυρούλα Καλαϊτζίδου
Εκπαιδευτικός ΠΕ 70 (δασκάλα)
32ο δημοτικό σχολείο Αθηνών
Αθήνα, Ελλάδα
e-mail: sk8720@windowslive.com

ΠΕΡΙΛΗΨΗ

Το μη κερδοσκοπικό ίδρυμα Akelius δημιουργήθηκε το 2007 από τον Roger Akelius, Σουηδό επιχειρηματία που ασχολήθηκε με τα μαθηματικά, τον προγραμματισμό και τη μηχανολογία. Πέρα από τη φιλανθρωπική του δράση, βοηθώντας παιδιά σε ανάγκη και παρέχοντας ιατροφαρμακευτική περίθαλψη σε προσφυγικό πληθυσμό, το ίδρυμα προσπαθεί να συμβάλει και στην εκπαίδευση, μέσω της ηλεκτρονικής πλατφόρμας «Akelius languages», η οποία ξεκίνησε τη λειτουργία της το 2018. Η ανάπτυξη της πλατφόρμας γίνεται από εξήντα προγραμματιστές σε Βερολίνο και Λευκωσία και αποτελεί μια ηλεκτρονική εφαρμογή που παρέχει μια αποτελεσματική μέθοδο εκμάθησης ξένων γλωσσών, εστιάζοντας στην κατανόηση προφορικού και γραπτού λόγου. Η πλατφόρμα αναπτύχθηκε από το ίδρυμα Akelius και τη UNICEF, με στόχο την παροχή υποστήριξης στη διδασκαλία της ελληνικής γλώσσας σε παιδιά με προσφυγικό / μεταναστευτικό υπόβαθρο, μέσα από τη χρήση ψηφιακών εργαλείων. Δίνεται έτσι η δυνατότητα στους μαθητές 6-18 ετών να κατανοήσουν τα ελληνικά πιο γρήγορα και διασκεδαστικά και να αποκτήσουν αυτοπεποίθηση, προσαρμοζόμενοι πιο ομαλά στο σχολικό περιβάλλον. Μέχρι στιγμής η πλατφόρμα είναι διαθέσιμη στα αγγλικά, τα γαλλικά, τα γερμανικά, τα ελληνικά, τα ιταλικά, τα πορτογαλικά, τα ρωσικά, τα ισπανικά και τα σουηδικά, ενώ χρησιμοποιείται σε δώδεκα χώρες, Αλβανία, Ελλάδα, Ιταλία, Πολωνία, Μεξικό, Μπουτάν, Βοσνία/ Ερζεγοβίνη, Λίβανο, Καζακστάν, Μαυριτανία, Πράσινο Ακρωτήρι και Σάο Τομέ/ Πρίνσιπε. Περιλαμβάνει γλωσσικές δραστηριότητες και κουίζ, τραγούδια, παιγνιώδεις δραστηριότητες όπως σταυρόλεξο, κρεμάλα και μπίνγκο, θεωρία για διάφορα γραμματικά φαινόμενα, ενώ, καθώς βρίσκεται ακόμα σε διαδικασία ανάπτυξης, σταδιακά εμπλουτίζεται με δραστηριότητες μαθηματικών, εικαστικών και ιστορίας.

Σύμφωνα με στοιχεία της UNICEF, χρησιμοποιείται ήδη από περισσότερα από 10.500 παιδιά πρόσφυγες στην Ελλάδα. Έως σήμερα, περίπου 1.600 δάσκαλοι σε δημόσια σχολεία και σε κέντρα μη τυπικής εκπαίδευσης έχουν εκπαιδευτεί στη χρήση της πλατφόρμας. Ειδικότερα στα ελληνικά δημόσια σχολεία έχει ενταχθεί σε τάξεις υποδοχής (ΖΕΠ) αλλά και σε γενικές τάξεις, πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης, όταν ο μαθητικός πληθυσμός αποτελείται κυρίως από μαθητές και μαθήτριες με μεταναστευτικό και προσφυγικό υπόβαθρο. Ο τρόπος με τον οποίο οι δραστηριότητες της πλατφόρμας θα συνδυαστούν με τη διδασκαλία, γίνεται με ευθύνη του εκπαιδευτικού, καθώς δεν υπάρχουν έτοιμα σχέδια μαθήματος. Ο σχεδιασμός του μαθήματος επαφίεται στην ευελιξία και τη δημιουργικότητα του εκπαιδευτικού. Οι μαθητές μπαίνουν στην πλατφόρμα χρησιμοποιώντας το προσωπικό τους τάμπλετ και ακουστικά, και ασχολούνται με τη δραστηριότητα που τους ανατίθεται, ανάλογα με το περιεχόμενο του μαθήματος της ημέρας. Ο υλικοτεχνικός εξοπλισμός παραχωρείται από το πρόγραμμα Akelius και φυλάσσεται στην εκάστοτε τάξη, όπως επίσης υπάρχει πρόβλεψη για σύνδεση στο διαδίκτυο και για έντυπο διδακτικό υλικό. Η χρήση της εφαρμογής Akelius είναι δωρεάν, δεν υπάρχει συνδρομή ούτε διαφημιστικά μηνύματα. Η πλατφόρμα λειτουργεί τόσο offline όσο και online, όμως είναι προτιμότερη η σύνδεση στο διαδίκτυο, καθώς οι μαθητές μπορούν να δημιουργήσουν τον προσωπικό τους λογαριασμό και να παρακολουθούν την πρόοδό τους.

Τα οφέλη από τη χρήση μιας τέτοιας πλατφόρμας είναι πολλαπλά, καθώς το μάθημα αποκτά διαδραστικό χαρακτήρα αλλά και εξατομικεύεται, καθώς οι μαθητές προχωρούν με τον προσωπικό τους ρυθμό, ενώ ο εκπαιδευτικός μπορεί να δώσει περισσότερη προσοχή επιλεκτικά σε συγκεκριμένους μαθητές. Ως προς τα μαθησιακά αποτελέσματα, έρευνες που έχουν γίνει από τη UNICEF σε Akelius τάξεις συγκριτικά με τάξεις με ίδιο μαθητικό πληθυσμό, αλλά χωρίς τη χρήση της πλατφόρμας, αποδεικνύουν ότι σημειώθηκε πρόοδος κατά 8% στην ακουστική κατανόηση, 9% στην ικανότητα ανάγνωσης, 25% στην προφορική έκφραση και 34% στον γραπτό λόγο. Ποιοτικές έρευνες έχουν δείξει ότι με τη χρήση της πλατφόρμας, οι μαθητές απέκτησαν αυτοπεποίθηση, κίνητρο για μάθηση, συνεργατικότητα και συνέπεια ως προς την παρουσία τους στο σχολείο. Ταυτόχρονα, υπάρχουν οφέλη και για τους εκπαιδευτικούς, σε μια εποχή που πλέον απαιτείται η χρήση ψηφιακών μέσων και νέων τεχνολογιών στη διδασκαλία. Αυτού του τύπου η μεικτή διδασκαλία αναπτύσσει τις ψηφιακές δεξιότητες των εκπαιδευτικών, συμβάλλοντας σε ένα πιο οργανωμένο και δομημένο μάθημα. Προσωπικά έχω ενταχθεί στο πρόγραμμα και χρησιμοποιώ την πλατφόρμα Akelius στη διδασκαλία της τάξης μου κατά τα σχολικά έτη 2023-2024 (Α΄ τάξη δημοτικού) και 2024-2025 (Β΄ τάξη) με μαθητές εξολοκλήρου αλλόγλωσσους. Το σχολείο βρίσκεται στο κέντρο της Αθήνας και ο μαθητικός πληθυσμός είναι σε μεγάλο ποσοστό προσφυγικός /

μεταναστευτικός. Το σχολείο αυτό, μαζί με το Γυμνάσιο διαπολιτισμικής εκπαίδευσης Αθηνών, είναι τα μοναδικά σχολεία στην Ελλάδα που κατά τη σχολική χρονιά 2023-2024 εφάρμοσαν πιλοτικά το πρόγραμμα online για πρώτη φορά.

Λέξεις – κλειδιά: ηλεκτρονική πλατφόρμα Akelius languages, διδασκαλία των ελληνικών, μαθητές με προσφυγικό / μεταναστευτικό υπόβαθρο

ΣΥΜΠΕΡΙΛΗΠΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ ΜΕ ΨΗΦΙΑΚΑ ΜΕΣΑ ΓΙΑ ΜΑΘΗΤΕΣ ΜΕ ΔΑΦ ΜΕ ΒΑΣΙΚΗ ΑΝΑΦΟΡΑ ΤΟ ΠΡΟΓΡΑΜΜΑ TEACCH.

Κραββαρίτης Χριστόφορος
Εκπαιδευτικός ΠΕ04.01.ΕΑΕ
Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο Λύκειο Μεσολογγίου

Πατρόπουλος Αθανάσιος
Εκπαιδευτικός ΠΕ86.ΕΑΕ
Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο Λύκειο Μεσολογγίου

Δομουχτσής Νίκος
Εκπαιδευτικός ΠΕ83.ΕΑΕ
Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο Λύκειο Μεσολογγίου

Κωνσταντίνου Γεώργιος
Εκπαιδευτικός ΠΕ11
Διευθυντής 1ο Δημοτικό Σχολείο Θεστιέων

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει τη Συμπεριληπτική Εκπαίδευση μαθητών με Διαταραχή Αυτιστικού Φάσματος (ΔΑΦ) μέσω της αξιοποίησης ψηφιακών μέσων, με βασικό άξονα το εκπαιδευτικό πρόγραμμα TEACCH. Στόχος είναι η διερεύνηση των προκλήσεων που αντιμετωπίζουν οι μαθητές με ΔΑΦ στο εκπαιδευτικό σύστημα και η αξιολόγηση της συμβολής των ψηφιακών εργαλείων στη βελτίωση της μαθησιακής τους εμπειρίας.

Η μεθοδολογία που ακολουθήθηκε βασίστηκε στη βιβλιογραφική ανασκόπηση και στη συλλογή ποιοτικών δεδομένων μέσω συζητήσεων με ειδικούς στον τομέα της εκπαίδευσης ατόμων με ΔΑΦ. Εξετάστηκαν οι θεμελιώδεις δυσκολίες των μαθητών, η δομή και η εφαρμογή του προγράμματος TEACCH, καθώς και η συμβολή των ψηφιακών τεχνολογιών στη διδασκαλία.

Τα αποτελέσματα της έρευνας αναδεικνύουν ότι η χρήση δομημένων εκπαιδευτικών προσεγγίσεων, όπως το TEACCH, σε συνδυασμό με ψηφιακά εργαλεία, διευκολύνει τη μαθησιακή διαδικασία και ενισχύει την κοινωνική ένταξη των μαθητών με ΔΑΦ. Συγκεκριμένα, η εφαρμογή αυτών των μεθόδων στη διδασκαλία της Ρομποτικής και των Φυσικών Επιστημών δείχνει ότι η οπτικοποίηση και η σαφής δομή των δραστηριοτήτων συμβάλλουν στη βελτίωση της κατανόησης και της αυτονομίας των μαθητών.

Η έρευνα υπογραμμίζει τη σημασία των δομημένων προσεγγίσεων στην εκπαίδευση μαθητών με ΔΑΦ, καθώς διευκολύνουν την επικοινωνία, την κοινωνική αλληλεπίδραση και τη συμπεριφορά τους. Η τεχνολογία συμβάλλει στην εξατομικευμένη μάθηση και την κοινωνική ένταξη, με τους εκπαιδευτικούς να παίζουν καθοριστικό ρόλο στην εφαρμογή προγραμμάτων όπως το TEACCH και τα ψηφιακά εργαλεία.

Στις Φυσικές Επιστήμες, οι μαθητές με ΔΑΦ επωφελούνται από σαφείς, οπτικοποιημένες οδηγίες σε πειράματα και εργαστηριακές ασκήσεις, ενώ στη Ρομποτική, η χρήση οπτικών διαγραμμάτων διευκολύνει τη συναρμολόγηση και τον προγραμματισμό. Η συνέπεια στη χρήση οπτικών εργαλείων στις δύο θεματικές ενότητες ενισχύει τη μαθησιακή εμπειρία και διευκολύνει τη γενίκευση της γνώσης.

Συμπερασματικά, η ενσωμάτωση του προγράμματος TEACCH με τις δυνατότητες που παρέχουν τα ψηφιακά μέσα αποτελεί μια αποτελεσματική προσέγγιση για την ενίσχυση της εκπαιδευτικής εμπειρίας των μαθητών με ΔΑΦ. Η τεχνολογία επιτρέπει την εξατομίκευση της διδασκαλίας, προάγει τη συνεργασία των εμπλεκόμενων φορέων (εκπαιδευτικών, γονέων, ειδικών) και διευκολύνει τη μετάβαση των μαθητών σε διαφορετικά γνωστικά αντικείμενα. Μάλιστα, δίνεται η δυνατότητα στα παιδιά με ΔΑΦ να συμμετέχουν ενεργά και να κατανοούν πολύπλοκες έννοιες μέσα από μια δομημένη ψηφιακή ή δια ζώσης προσέγγιση, ενώ παράλληλα το πρόγραμμα TEACCH συμπληρώνεται και εμπλουτίζεται εντός της τάξης, και επεκτείνεται στη συνολική καθημερινή ζωή του παιδιού μέσω του EarlyBird και Cygnet.

Λέξεις –κλειδιά: Διαταραχή Αυτιστικού Φάσματος, Συμπεριληπτική Εκπαίδευση, Ψηφιακά Μέσα, TEACCH, EarlyBird, Ολιστική Προσέγγιση

ΕΦΑΡΜΟΓΗ ΙΣΤΟΕΞΕΡΕΥΝΗΣΕΩΝ (WEBQUESTS) ΣΥΜΦΩΝΩΝ ΜΕ ΤΙΣ ΑΡΧΕΣ ΤΗΣ ΣΥΜΠΕΡΙΛΗΠΤΙΚΗΣ ΨΗΦΙΑΚΗΣ ΕΚΠΑΙΔΕΥΣΗΣ ΣΤΟ ΠΛΑΙΣΙΟ ΤΟΥ ΈΡΓΟΥ ERASMUS+ ΚΑ210 "MEDITERRANEAN DIET FOR OVERALL HEALTH"

Μυλωνά Ασπασία
Εκπαιδευτικός ΠΕ88.04
1ο ΕΠΑΛ Ναυπάκτου

Σούκου Ανθή
Εκπαιδευτικός ΠΕ88.01
2ο Εσπερινό ΕΠΑΛ Αχαρνών

Σχίζας Αριστείδης
Εκπαιδευτικός ΠΕ86
2ο Εσπερινό ΕΠΑΛ Αχαρνών

ΠΕΡΙΛΗΨΗ

Η παρούσα εισήγηση στοχεύει στην ανάδειξη της χρησιμότητας της Ιστοεξερεύνησης (webquest), ως μιας μορφής μαθήματος διερευνητικού τύπου σύμφωνου με τις Αρχές της Συμπεριληπτικής Ψηφιακής Εκπαίδευσης. Η διερεύνηση και χρήση της εν λόγω μεθόδου πραγματοποιήθηκε κατά την υλοποίηση του έργου Erasmus+ ΚΑ210 "Mediterranean Diet for Overall Health" (MedDiet4Health). Το έργο αποτελεί ένα εγκεκριμένο σχέδιο δράσης Erasmus+ ΚΑ210 μεταξύ δύο επαγγελματικών λυκείων -Ελλάδα (τομέας Γεωπονίας, Τροφίμων και Περιβάλλοντος), ενός γενικού λυκείου - Σλοβακία και μιας ΜΚΟ - Τουρκία.

Το έργο είχε διάρκεια 18 μηνών και στόχευε στη δημιουργία ενός ψηφιακού μαθήματος τριών ενοτήτων, που ενσωματώνει τη Μεσογειακή Διατροφή στην καθημερινή διδακτική πρακτική. Το μάθημα υποστηρίζει τους Στόχους Βιώσιμης Ανάπτυξης, εστιάζοντας ιδιαίτερα στον υποστόχο 4.7 και στους στόχους 2, 12, 14, 15, 17, συνεισφέροντας στην καλλιέργεια των γνώσεων και των δεξιοτήτων μαθητών/τριών, για την προώθηση της βιώσιμης ανάπτυξης/βιώσιμου τρόπου ζωής, της αναγνώρισης της πολιτιστικής ποικιλομορφίας και της συμβολής του πολιτισμού στη βιώσιμη ανάπτυξη.

Στο πλαίσιο αυτό, αναπτύχθηκαν, εφαρμόστηκαν πιλοτικά και επανασχεδιάστηκαν 60 WebQuests ευθυγραμμισμένα με τις αρχές της συμπεριληπτικής ψηφιακής εκπαίδευσης που εξερευνούν τη μεσογειακή διατροφή ως στοιχείο πολιτιστικής κληρονομιάς αλλά και τη σημασία της ως ένα αειφόρο και υγιεινό διατροφικό μοντέλο, προωθώντας την προσήλωση σε αυτή. Επίσης, σχεδιάστηκαν 20 επιπλέον για τον εορτασμό ημερών ευαισθητοποίησης σχετικών με τα προς ανάπτυξη θέματα.

Η εισήγηση περιλαμβάνει την ανάπτυξη του θεωρητικού πλαισίου, των σταδίων δημιουργίας και ανάπτυξης, υλοποίησης καθώς και των εργαλείων αξιολόγησης.

Ακολούθως, γίνεται αναφορά και κριτική προσέγγιση στις διδασκαλίες που υλοποιήθηκαν κατά την υλοποίηση του προγράμματος και παρουσιάζονται τα αποτελέσματα.

Λέξεις – κλειδιά: Ιστοεξερευνήσεις, Μεσογειακή Διατροφή, Συμπεριληπτική ψηφιακή εκπαίδευση

ΣΥΜΠΕΡΙΛΗΠΤΙΚΗ ΨΗΦΙΑΚΗ ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΠΟΛΙΤΙΣΤΙΚΗ ΚΛΗΡΟΝΟΜΙΑ: ΜΙΑ ΚΑΙΝΟΤΟΜΟΣ ΠΡΟΣΕΓΓΙΣΗ ΓΙΑ ΤΗ ΜΟΥΣΕΙΑΚΗ ΕΚΠΑΙΔΕΥΣΗ ΣΕ ΣΩΦΡΟΝΙΣΤΙΚΑ ΚΑΤΑΣΤΗΜΑΤΑ

Παπανδρίτσα Άρτεμη
Early Career Fellow in Hellenic Studies 2024-2025, CHS Harvard University
Μεταδιδακτορική Ερευνήτρια Μουσειολογίας
Τμήμα Αρχειονομίας, Βιβλιοθηκονομίας και Μουσειολογίας,
Ιόνιο Πανεπιστήμιο
email: artpapandr@yahoo.gr

Παπαϊωάννου Γεώργιος
Καθηγητής Μουσειολογίας
Τμήμα Αρχειονομίας, Βιβλιοθηκονομίας και Μουσειολογίας,
Ιόνιο Πανεπιστήμιο
email: gpapaioa@ionio.gr

ΠΕΡΙΛΗΨΗ

Η συμπεριληπτική ψηφιακή εκπαίδευση αποτελεί βασικό άξονα των σύγχρονων εκπαιδευτικών πρακτικών, καθώς στοχεύει στη διασφάλιση ισότιμης πρόσβασης στη γνώση για όλους, ανεξαρτήτως κοινωνικών ή γεωγραφικών περιορισμών (Ainscow, 2020). Στο πλαίσιο αυτό, η αξιοποίηση ψηφιακών μέσων για τη διδασκαλία σε ευάλωτες κοινωνικές ομάδες, όπως οι έγκλειστοι σε Σωφρονιστικά Καταστήματα, λαμβάνει ιδιαίτερη σημασία. Το ερευνητικό πρόγραμμα "*Museum Tours for Inmates -the ancient Greek encounters*" (*MuTourIn*), για την υλοποίηση του οποίου έχει ληφθεί Υποτροφία από το Κέντρο Ελληνικών Σπουδών του Πανεπιστημίου του Harvard, αποτέλεσε μια καινοτόμο πρωτοβουλία που αξιοποίησε την πολιτιστική κληρονομιά και την ψηφιακή τεχνολογία για την εκπαίδευση και την κοινωνική ενσωμάτωση των εγκλείστων.

Το *MuTourIn* αποτελεί συνέχεια και εξέλιξη του επιτυχημένου προγράμματος «*Μουσειακοί Ψίθυροι στο Πανοπτικόν*», το οποίο αξιοποίησε ψηφιακές πλατφόρμες για την παροχή ψηφιακών ξεναγήσεων σε μουσεία από όλο τον κόσμο. Το νέο αυτό εγχείρημα, εστίασε στη διασύνδεση της αρχαίας ελληνικής πολιτιστικής κληρονομιάς με την εκπαίδευση των εγκλείστων. Μέσα από τον συνδυασμό ψηφιακών ξεναγήσεων και διαδραστικών συζητήσεων, το MuTourIn επιδίωξε να προάγει τη γνωστική ανάπτυξη, την πολιτισμική κατανόηση και την ενίσχυση δεξιοτήτων του 21ου αιώνα, όπως η κριτική σκέψη και η επικοινωνία (Kidd, 2019). Η πρωτοβουλία αυτή ανέδειξε τον ρόλο της ψηφιακής πολιτιστικής κληρονομιάς ως εργαλείου εκπαίδευσης και κοινωνικής ενσωμάτωσης, γεφυρώνοντας το χάσμα ανάμεσα στους έγκλειστους και τον ευρύτερο πολιτιστικό και ακαδημαϊκό χώρο και βελτίωσε την πρόσβαση στην εκπαίδευση, ενισχύοντας δεξιότητες όπως η συνεργασία και η πολιτισμική κατανόηση. Ακολούθως, η ενσωμάτωση της πολιτιστικής κληρονομιάς στην εκπαίδευση των εγκλείστων προσέφερε πολλαπλά οφέλη, καθώς ενίσχυσε τη δια βίου μάθηση και δημιούργησε γέφυρες επικοινωνίας μεταξύ των μουσείων και των Σχολείων Δεύτερης Ευκαιρίας των Σωφρονιστικών Καταστημάτων (Lupo et al., 2023). Παρόλο που σχετικές έρευνες υπογραμμίζουν τη θετική επίδραση της τέχνης και της εκπαίδευσης στη διαδικασία κοινωνικής επανένταξης, η σύνδεση μουσείων, κλασικών σπουδών και σωφρονιστικών περιβαλλόντων παραμένει ένας σχετικά ανεξερεύνητος τομέας (McGregor, 2020).

Οι προκλήσεις που προέκυψαν αφορούν στην τεχνολογική υποδομή, τις παιδαγωγικές προσεγγίσεις και την ανάγκη θεσμικής υποστήριξης για τη βιώσιμη ανάπτυξη τέτοιων πρωτοβουλιών. Ωστόσο, το *MuTourIn* μέσω των ποιοτικών δεδομένων που εξήχθησαν από συνεντεύξεις εγκλείστων σε 7 από τα 12 Σχολεία -τα οποία η ερευνήτρια επισκέφθηκε δια ζώσης, ενώ στην τελευταία ξενάγηση διασυνδέθηκαν και τα 12 σχολεία- που λειτουργούν σε Σωφρονιστικά Καταστήματα στη χώρα μας και παρακολούθησαν τις εν λόγω μουσειακές ψηφιακές ξεναγήσεις, παρέχει πολύτιμα δεδομένα που μπορούν να αξιοποιηθούν για τη διαμόρφωση βιώσιμων στρατηγικών, συνδυάζοντας την ψηφιακή πολιτιστική κληρονομιά με την κοινωνική ένταξη.

Συνοψίζοντας, η χρήση ψηφιακών ξεναγήσεων και η αξιοποίηση της πολιτιστικής κληρονομιάς ως εκπαιδευτικού εργαλείου διαμορφώνουν νέες προοπτικές για τη συμπεριληπτική εκπαίδευση. Το *MuTourIn* απέδειξε πως η τεχνολογία μπορεί να λειτουργήσει ως γέφυρα ανάμεσα σε διαφορετικές κοινωνικές ομάδες, προωθώντας την εκπαίδευση και τον κοινωνικό μετασχηματισμό μέσα από την αλληλεπίδραση με τον πολιτισμό.

Λέξεις – κλειδιά: Συμπεριληπτική εκπαίδευση, πολιτιστική κληρονομιά, μουσειακές ψηφιακές ξεναγήσεις, Σωφρονιστικά Καταστήματα

ΘΠ9: Αειφόρο ψηφιακό σχολείο

ΤΟ ΑΕΙΦΟΡΟ ΨΗΦΙΑΚΟ ΣΧΟΛΕΙΟ: ΕΝΑ ΜΟΝΤΕΛΟ ΕΚΠΑΙΔΕΥΣΗΣ ΓΙΑ ΤΟΝ 21Ο ΑΙΩΝΑ

Γούναρη Νεκταρία
Φιλόλογος 1ο ΓΕΛ Σαλαμίνας, ΕΛ.Ε.ΕΤ.Π.Ε,Α.
ngounari@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιοποίηση της εκπαίδευσης και η ανάγκη για αειφορία αποτελούν δύο κρίσιμους πυλώνες για την ανάπτυξη ενός σύγχρονου εκπαιδευτικού μοντέλου. Το παρόν άρθρο προτείνει το μοντέλο του «Αειφόρου Ψηφιακού Σχολείου», το οποίο συνδυάζει την τεχνολογία με αρχές αειφορίας για την προώθηση μιας ολιστικής, συμπεριληπτικής και περιβαλλοντικά υπεύθυνης εκπαίδευσης. Μέσα από τη θεωρητική ανάλυση και την παρουσίαση πρακτικών εφαρμογών, το άρθρο διερευνά πώς η ενσωμάτωση ψηφιακών εργαλείων, η εκπαίδευση για την κλιματική αλλαγή και η συμμετοχική μάθηση μπορούν να δημιουργήσουν ένα βιώσιμο εκπαιδευτικό περιβάλλον για τον 21ο αιώνα.

Λέξεις – κλειδιά: Αειφορία, ψηφιακή εκπαίδευση, αειφόρο σχολείο, τεχνολογία στην εκπαίδευση, 21ος αιώνας.

ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΕΠΙΧΕΙΡΗΜΑΤΙΚΟΤΗΤΑ ΣΤΗΝ ΕΠΟΧΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΔΙΑΚΥΒΕΡΝΗΣΗΣ

Δρ Κλεοπάτρα Ν. Βασιλείου
Διευθύντρια στην Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Άρτας
email: kleopatravasileiou@gmail.com

Νικόλαος Σκέντος
Αν/τής Προϊστάμενος Οικονομικού Τμήματος-
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Άρτας
email: nskentos@hotmail.com

ΠΕΡΙΛΗΨΗ

Οι τεχνολογικές εξελίξεις στο πεδίο της επιχειρηματικότητας είναι ραγδαίες ως αποτέλεσμα του ψηφιακού μετασχηματισμού της οικονομίας. Οι σύγχρονες σχολικές μονάδες καλούνται να αναπροσαρμόσουν τις διδακτικές και εν γένει εκπαιδευτικές στρατηγικές τους στα πλαίσια λειτουργίας του αειφόρου σχολείου. Επιπρόσθετα το επιχειρείν αποτελεί ουσιώδη και απαραίτητη δεξιότητα για τους αυριανούς πολίτες και ωφελεί τόσο την προσωπική τους όσο και την επαγγελματική τους εξέλιξη. Η εκπαίδευση σε θέματα επιχειρηματικότητας παίζει καίριο ρόλο στην ανταγωνιστικότητα μιας χώρας και στη διαρκή ανάπτυξη της οικονομίας και της ανταγωνιστικότητας της. Η προώθηση της επιχειρηματικότητας στην εκπαίδευση ενθαρρύνει και καθοδηγεί τους μαθητές/τριες στο να αναπτύξουν επιχειρηματικό πνεύμα και να διαμορφώνουν καινοτόμες λύσεις. Η βασική ιδέα είναι η κατανόηση βασικών οικονομικών εννοιών από πλευράς των μαθητών/τριών όπως για παράδειγμα η διαχείριση χρημάτων που εντάσσεται στα πλαίσια του οικονομικού εγγραματισμού και επιχειρηματικότητας και η απόκτηση δεξιοτήτων για την δημιουργία της δικής τους ψηφιακής επιχείρησης. Η φιλοσοφία ενός οργανισμού μάθησης όπως και το σχολείο είναι να μαθαίνουμε πώς να μαθαίνουμε. Οι μαθητές/τριες εκπαιδεύονται να εργάζονται σε ομάδες, να καταθέτουν ιδέες και προτάσεις με βάση τα ενδιαφέροντα τους και να συλλαμβάνουν επιχειρηματικές ιδέες τις οποίες μέσω της συνεργασίας και της ομαδοσυνεργατικότητας μέσω χάραξης και προσομοίωσης ενός απλού και πρότυπου επιχειρηματικού σχεδίου που θα οδηγήσει στην υλοποίηση της αρχικής τους ιδέας με την χρήση σύγχρονων καινοτόμων ψηφιακών εργαλείων. Σκοπός της παρούσας έρευνας είναι η βιβλιογραφική ανασκόπηση και η δευτερογενή ανάλυση δεδομένων, βιβλιογραφίας, μέσω της επεξεργασίας υφιστάμενων ερευνών και στατιστικών που σχετίζονται με τις εξελίξεις της εφαρμογής της επιχειρηματικότητας στην εκπαίδευση στα πλαίσια της ψηφιακής διακυβέρνησης και η καταγραφή καλών πρακτικών στην θεματική Δημιουργώ και Καινοτομώ-Δημιουργική σκέψη και πρωτοβουλία, στον τομέα της επιχειρηματικότητας, τόσο σε εγχώριο όσο και σε Διεθνές επίπεδο. Το ερευνητικό κείμενο αποσκοπεί στην ανάδειξη των προκλήσεων που προκύπτουν για τα σχολεία στην εποχή της ψηφιακής διακυβέρνησης στον τομέα της επιχειρηματικότητας και της εφαρμογής της ενεργούς πολιτειότητας μέσα από δράσεις ενίσχυσης της σε συνδυασμό με τα εργαστήρια δεξιοτήτων.

Λέξεις-κλειδιά: επιχειρηματικότητα, εκπαίδευση, δημιουργική σκέψη, ψηφιακά περιβάλλοντα

Η ΠΡΑΣΙΝΗ, ΨΗΦΙΑΚΗ ΓΕΙΤΟΝΙΑ ΤΟΥ ΝΗΠΙΑΓΩΓΕΙΟΥ

Τσιγγερλιώτη Άννα
Νηπιαγωγός
Med στη «Διδακτική των Μαθηματικών» του Πανεπιστημίου Δυτικής Μακεδονίας
33ο Νηπιαγωγείο Ευόσμου
e-mail: atsiggerlioti@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία αφορά την συμμετοχή του 33ου Νηπιαγωγείου Ευόσμου στο Εκπαιδευτικό Πρόγραμμα ηλεκτρονικής μάθησης «Πράσινες γειτονιές» το οποίο υλοποιήθηκε από τη Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Δυτικής Θεσσαλονίκης, δια της Υπευθύνου Περιβαλλοντικής Εκπαίδευσης σε συνεργασία με το NOUS, Ινστιτούτο Ψηφιακής Μάθησης και Επικοινωνίας. Σκοπός του εκπαιδευτικού προγράμματος είναι η ευαισθητοποίηση των μαθητών/τριών σε θέματα που αφορούν στην ανάγκη διατήρησης και προστασίας του πράσινου στο άμεσο περιβάλλον τους, τη γειτονιά τους και η ανάπτυξη της συμμετοχής σε ενέργειες, που αποσκοπούν στη βελτίωση του περιβάλλοντος και την αναβάθμιση της ποιότητας ζωής τους. Παρουσιάζονται τα βήματα που ακολουθήθηκαν για την υλοποίηση του προγράμματος αξιοποιώντας ψηφιακά εργαλεία όπως το Google earth και το Google Lens, για την δημιουργία ενός ψηφιακού συνεργατικού χάρτη όπου απεικονίζεται από τους μαθητές/τριες η γειτονιά του σχολείου όπως θα ήθελαν να είναι αναφορικά με το πράσινο. Οι μαθητές/τριες μέσω της διερευνητικής μάθησης και της συμμετοχής σε παιγνιώδες δραστηριότητες ενθαρρύνονται να αναπτύξουν πρωτοβουλία, υπευθυνότητα και δράση για το περιβάλλον του σχολείου. Έχοντας συλλέξει τεκμήρια από την μελέτη στο πεδίο, τα παιδιά ευαισθητοποιούνται και λαμβάνουν αποφάσεις για τις ευρύτερες συνθήκες στην γειτονιά τους.

Δίνεται έμφαση στις δυνατότητες που μπορεί να παρέχει το ψηφιακό μέσο για τον εμπλουτισμό της μαθησιακής εμπειρίας, της επικοινωνίας μεταξύ των μαθητών/τριών ενώ παράλληλα διατυπώνεται η ανάγκη για μια κριτική τοποθέτηση απέναντι στα χαρακτηριστικά της αξιοποίησής του. Τα παιδιά εξοικειώνονται με την χρήση ψηφιακών εργαλείων και μέσων, επικοινωνούν τις ιδέες του με άλλα σχολεία και μοιράζονται πραγματικές εμπειρίες. Παράλληλα προάγεται η μαθησιακή εμπειρία και υποστηρίζεται η ολόπλευρη ανάπτυξη των παιδιών καθώς παρέχονται ευκαιρίες ώστε να αναπτύξουν ψηφιακές δεξιότητες και στάσεις για την χρήση της τεχνολογίας.

Το πρόγραμμα υλοποιήθηκε στο πλαίσιο μετασχηματισμού του νηπιαγωγείου σε αειφόρο σχολείο, υιοθετώντας μια ολιστική προσέγγιση σε πρακτικές σύμφωνες με τις αξίες της αειφορίας σε παιδαγωγικό, κοινωνικό και περιβαλλοντικό πεδίο.

Λέξεις – κλειδιά: ψηφιακός χάρτης, αειφόρο σχολείο, νηπιαγωγείο

ΘΠ10: Καλές πρακτικές αξιοποίησης ψηφιακών τεχνολογιών στη διδακτική πράξη

ΜΙΑ ΝΕΑ ΠΡΟΣΕΓΓΙΣΗ ΔΙΔΑΣΚΑΛΙΑΣ ΤΩΝ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΒΑΣΙΣΜΕΝΗ ΣΤΑ ΓΝΩΣΤΙΚΑ ΣΤΥΛ FI ΚΑΙ FD

Maria Chatzikyrkou
International Hellenic University
Thessaloniki, Greece
e-mail: maria.chatzikyrkou@gmail.com

Apostolos Tsagaris
International Hellenic University
Thessaloniki, Greece
e-mail: tsagaris@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα πρόταση αποσκοπεί στην ανάδειξη μιας νέας προσέγγισης για την αποτελεσματική διδασκαλία της Ρομποτικής και των Νέων Τεχνολογιών. Για τη διασφάλιση μιας επιτυχημένης διαδικασίας, προτείνεται η διάγνωση των στυλ μάθησης των μαθητευομένων και στη συνέχεια η παροχή διαφοροποιημένης διδασκαλίας που θα επιτύχει την προβλεπόμενη ένταξη και θα μεγιστοποιήσει τα μαθησιακά αποτελέσματα. Για το λόγο αυτό, θα χρησιμοποιηθεί η πιο γνωστή διπολική αντίθεση σχετικά με τα γνωστικά στυλ μάθησης, αυτή που προτάθηκε από τον Witkin και τους συνεργάτες του (1977) και διακρίνει τους μαθητευόμενους σε δύο διπολικές κατηγορίες, δηλαδή εκείνους που μαθαίνουν χωρίς να εξαρτώνται από το περιβάλλον τους (Μαθητευόμενοι Ανεξάρτητοι από το Πεδίο = FI) και εκείνους που καθιστούν τη μάθηση άμεσα εξαρτημένη από το περιβάλλον τους (Μαθητευόμενοι Εξαρτημένοι από το Πεδίο = FD).

Η έρευνα του Witkin και των συνεργατών του οδήγησε στη δημιουργία ενός διαγνωστικού εργαλείου, του Group Embedded Figures Test (GEFT - Ομαδικό Τεστ Ενσωματωμένων Σχημάτων), το οποίο μετρά την παρουσία των διπολικών χαρακτηριστικών FI/FD στους μαθητευόμενους, και ορίζει ποιοι από αυτούς τείνουν προς την πρώτη και ποιοι προς τη δεύτερη κατηγορία. Σχετικές έρευνες έχουν δείξει ότι οι μαθητευόμενοι FI προτιμούν να μαθαίνουν καλύτερα αξιοποιώντας παραδοσιακά μέσα σε σύγκριση με μαθητευόμενους που ανήκουν στην κατηγορία FD. Οι τελευταίοι επηρεάζονται περισσότερο από το κοινωνικό τους περιβάλλον παρά από τα προσωπικά τους κίνητρα, καθώς και από τον έπαινο και την κριτική σε σύγκριση με τους FI, οι οποίοι είναι πιο παραγωγικοί και εγωκεντρικοί, λύνουν προβλήματα μέσω διαίσθησης και αξιοποιούν στρατηγικές ελέγχου τύπου «σωστό-λάθος».

Το διαφορετικό Γνωστικό Στυλ Μάθησης που διαθέτει κάθε μαθητής αποτελεί μέρος της θεμελιώδους υπόθεσης ότι κάθε παιδί είναι μοναδικό, που σημαίνει με απλά λόγια, διάφορες διαφορές στη γνωστική και κοινωνική ανάπτυξη μεταξύ των παιδιών. Δεδομένου ότι αυτά τα χαρακτηριστικά επηρεάζουν τη μάθηση, ο τομέας της Διαφοροποιημένης Διδασκαλίας θεωρείται μία από τις πιο κατάλληλες εκπαιδευτικές προσεγγίσεις για τη διαχείριση όλων των μορφών διαφορετικότητας στη σύγχρονη τάξη, η οποία αποσκοπεί στην προσφορά μάθησης για κάθε παιδί ξεχωριστά, λαμβάνοντας υπόψη τις ιδιαιτερότητές του στην κατασκευή της γνώσης και της διδασκαλίας. Επομένως, η Διαφοροποιημένη Διδασκαλία είναι μια σύγχρονη, παιδοκεντρική και πολλά υποσχόμενη προσέγγιση που περιλαμβάνει πολλές καινοτόμες προσεγγίσεις και συγχρόνως μια πρόκληση για ερευνητές και εκπαιδευτικούς.

Η διδασκαλία των νέων τεχνολογιών από την άλλη πλευρά είναι απαραίτητη για την προετοιμασία των μαθητών για το μέλλον, την ανάπτυξη των δεξιοτήτων τους και τη δημιουργία μιας ψηφιακά μορφωμένης και καινοτόμου κοινωνίας. Ζώντας σε μια ψηφιακή εποχή, όπου η τεχνολογία διαπερνά κάθε πτυχή της ζωής, οι μαθητές χρειάζονται ψηφιακές δεξιότητες για να επιτύχουν στην εκπαίδευση, την εργασία και την κοινωνία και να εξοπλιστούν με τις απαραίτητες γνώσεις και δεξιότητες για να ανταποκριθούν στις απαιτήσεις του 21ου αιώνα. Εξάλλου, οι νέες τεχνολογίες προσφέρουν εργαλεία και πλατφόρμες που ενθαρρύνουν την κριτική σκέψη, την ανάλυση και την επίλυση προβλημάτων ώστε οι μαθητές να μαθαίνουν να αξιολογούν πληροφορίες, να λαμβάνουν αποφάσεις και να δημιουργούν καινοτόμες λύσεις. Τέλος, η διδασκαλία των νέων τεχνολογιών βοηθά τους μαθητές να αναπτύξουν ψηφιακό γραμματισμό, δηλαδή την ικανότητα να χρησιμοποιούν την τεχνολογία υπεύθυνα, με ασφάλεια και ηθικά και να προστατεύουν το απόρρητό τους, να αναγνωρίζουν την παραπληροφόρηση και να αποφεύγουν τους κινδύνους του διαδικτύου. Συνοψίζοντας, η παρούσα πρόταση αναλύει τα συστατικά στοιχεία δύο στυλ μάθησης, εκείνων που μαθαίνουν εξαρτώμενα από το περιβάλλον τους και εκείνων που μαθαίνουν ανεξάρτητα. Στη συνέχεια, εξηγείται η μέθοδος σχεδιασμού δραστηριοτήτων βασισμένη στη διαφοροποιημένη διδασκαλία ώστε η μαθησιακή διαδικασία να είναι αποτελεσματική.

Λέξεις-κλειδιά: Μαθητευόμενοι Ανεξάρτητοι από το Πεδίο, Μαθητευόμενοι Εξαρτημένοι από το Πεδίο, Γνωστικό Στυλ Μάθησης

Η ΑΞΙΟΠΟΙΗΣΗ ΤΟΥ ΔΙΑΔΙΚΤΥΟΥ ΣΤΗ ΓΛΩΣΣΙΚΗ ΔΙΔΑΣΚΑΛΙΑ ΣΤΗ Γ΄ΛΥΚΕΙΟΥ

Κωνσταντίνος Γκαραβέλας
Επίκουρος Καθηγητής, Τμήμα Φιλοσοφίας
Πανεπιστήμιο Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: kgkaravelas@uoi.gr

Χρίστου Θεοφανώ,
Μεταδιδακτορική ερευνήτρια, Τομέας Γλωσσολογίας, Τμήμα Φιλολογίας
Πανεπιστήμιο Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: t.christou@uoi.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία παρουσιάζει μια διδακτική πρόταση που σχεδιάστηκε στο πλαίσιο του μαθήματος της γλωσσικής διδασκαλίας σε μαθητές της Γ Λυκείου με θέμα την Έμφυλη Βία και λαμβάνοντας υπόψη τις επιταγές του νέου Αναλυτικού προγράμματος για τη γλωσσική διδασκαλία στο Λύκειο. Το εγχείρημα βασίζεται στην αξιοποίηση των ΤΠΕ στη γλωσσική διδασκαλία και υλοποιείται μέσα από μια δομημένη στο πρότυπο που προτείνει ο Dodge (1995) ιστοεξερεύνηση. Σκοπός της ιστοεξερεύνησης είναι να εκτεθούν οι μαθητές σε αυθεντικό γλωσσικό υλικό και να επεξεργαστούν συνεργατικά και δημιουργικά ένα θέμα που τους είναι οικείο και εγείρει το ενδιαφέρον τους. Πιο συγκεκριμένα σε πρώτο στάδιο παρουσιάζεται μια θεωρητική εισαγωγή για την αξιοποίηση του διαδικτύου στο μάθημα, έπεται μια σύντομη διευκρίνιση του όρου «ιστοεξερεύνση». Σε τρίτο στάδιο παρουσιάζονται τα έξι στάδια της συγκεκριμένης διδακτικής πρότασης.

Λέξεις – κλειδιά: Γλωσσική Διδασκαλία, Διαδίκτυο, Κριτικός Γραμματισμός, Ιστοεξερευνήσεις

ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΣΧΕΔΙΑΣΗ ΚΑΙ ΑΝΑΠΤΥΞΗ ΛΟΓΙΣΜΙΚΟΥ ΜΕΤΑΓΡΑΦΗΣ ΚΑΙ ΕΚΜΑΘΗΣΗΣ ΤΟΥ ΚΩΔΙΚΑ BRAILLE

Αγγέλης Αλέξανδρος
Υποψήφιος Διδάκτωρ Πανεπιστημίου Ιωαννίνων
Τμήμα Πληροφορικής και Τηλεπικοινωνιών
Άρτα, Ελλάδα
email: a.angelis@uoi.gr

Αγγέλη Καλλιόπη
Μεταπτυχιακό Πρόγραμμα Σπουδών στην Επιστήμη Δεδομένων, τη Στατιστικής και τη Λήψη Αποφάσεων
Stockholm University
Stockholm, Sweden
email: kalligeli01@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία πραγματεύεται την αρχιτεκτονική σχεδίαση και ανάπτυξη ενός λογισμικού μεταγραφής και εκμάθησης του κώδικα Braille, με στόχο την ενίσχυση της προσβασιμότητας για άτομα με αναπηρία όρασης. Το λογισμικό υποστηρίζει τη μεταγραφή ελληνικών και αγγλικών κειμένων σε Braille και ταυτόχρονα προσφέρει ένα εύχρηστο περιβάλλον εκμάθησης του κώδικα. Η μεθοδολογία βασίζεται στην Επίπεδη Αρχιτεκτονική, η οποία περιλαμβάνει: (α) το Επίπεδο Χρήστη, όπου ο χρήστης εισάγει το κείμενο, (β) το Επίπεδο Λογικής Επιχειρήσεων, όπου υλοποιούνται οι αλγόριθμοι αναγνώρισης γλώσσας και μεταγραφής, (γ) το Επίπεδο Δεδομένων, με τη χρήση πινάκων αντιστοίχισης χαρακτήρων. Κύρια ευρήματα της εργασίας αποτελούν η ανάπτυξη ενός ακριβούς και αποδοτικού εργαλείου μεταγραφής, η φιλικότητα της διεπαφής προς τους χρήστες, καθώς και η δυνατότητα μελλοντικής επεκτασιμότητας. Το τελικό προϊόν συμβάλλει ουσιαστικά στην εκπαιδευτική και κοινωνική ένταξη ατόμων με προβλήματα όρασης, προσφέροντας ένα σύγχρονο εργαλείο καθημερινής χρήσης.

Οι αλγόριθμοι εκμάθησης και μεταγραφής περιλαμβάνουν έλεγχο εγκυρότητας χαρακτήρων, αναγνώριση γλώσσας, διαχείριση ειδικών συμβόλων, και ακριβή αντιστοίχιση σε Braille. Η διεπαφή είναι σχεδιασμένη με βάση τις αρχές προσβασιμότητας και καθολικής σχεδίασης για απρόσκοπτη χρήση από άτομα με οπτική αναπηρία.

Η αξιολόγηση του συστήματος κατέδειξε υψηλή ακρίβεια μεταγραφής, γρήγορη απόκριση και θετικά σχόλια από χρήστες και εκπαιδευτικούς, ενώ προτείνονται μελλοντικές επεκτάσεις όπως η υποστήριξη μαθηματικού Braille, η ενσωμάτωση φωνητικής εξόδου και διασύνδεση με συσκευές Braille display.

Η εργασία συμβάλλει σημαντικά στην προώθηση της εκπαιδευτικής ισότητας και της κοινωνικής ένταξης μέσω καινοτόμων τεχνολογιών προσβασιμότητας.

Λέξεις – κλειδιά: Αρχιτεκτονική Λογισμικού, Κώδικας Braille, Προσβασιμότητα, Μεταγραφή Κειμένου, Εκμάθηση Υποβοηθούμενη από Υπολογιστή, Επίπεδη Αρχιτεκτονική.

"INTERNATIONAL JOINT CLASSES": ΈΝΑ ΠΑΡΑΔΕΙΓΜΑ ΑΞΙΟΠΟΙΗΣΗΣ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΕ ΔΙΕΘΝΕΣ ΠΡΟΓΡΑΜΜΑ ΣΧΟΛΕΙΩΝ

Αντωνίου Αικατερίνη
Εκπαιδευτικός Νοσηλευτικής και Γεωπονίας και Διευθύντρια Γυμνασίου Νεοχωρίου
Ημερήσιο Γυμνάσιο Νεοχωρίου, Δ.Δ.Ε. Άρτας, Ελλάδα
e-mail: katerinaaaaant@gmail.com

Γρίβα Ελευθερία
Φιλόλογος ΕΑΕ και Σύμβουλος Σχολικής Ζωής
Ημερήσιο Γυμνάσιο Νεοχωρίου, Δ.Δ.Ε. Άρτας, Ελλάδα
e-mail: elgriva@yahoo.gr

ΠΕΡΙΛΗΨΗ

Μια καλή πρακτική αξιοποίησης ψηφιακών τεχνολογιών θα παρουσιάσουμε μέσα από τη παρούσα εργασία, όπως αυτή υλοποιήθηκε στο πλαίσιο του προγράμματος με τίτλο "International Joint Classes" που διοργάνωσε το Μητροπολιτικό Γραφείο Εκπαίδευσης της Δημοκρατίας της Κορέας αξιοποιώντας τις τεχνολογίες επικοινωνίας και της εξ' αποστάσεως εκπαίδευσης με στόχο την καλύτερη κατανόηση της πολιτιστικής διαφορετικότητας και την ανάπτυξη δεξιοτήτων επικοινωνίας. Το διακρατικό, διασχολικό και συνεργατικό έργο μεταξύ τριών σχολείων (του Ημερήσιου Γυμνασίου και ΓΕΛ Νεοχωρίου Άρτας από Ελλάδα και του Yang Chung Middle School στη Σεούλ από Νότια Κορέα) ήταν μια πρωτοβουλία του πρώτου σχολείου και είχε διάρκεια από Μάιο έως Δεκέμβριο 2024. Το θέμα των εργασιών ορίστηκε «Ο Β΄ Παγκόσμιος Πόλεμος και οι επιπτώσεις του στους δύο λαούς». Υλοποιήθηκαν εξ αποστάσεως σύγχρονες διαδικτυακές συναντήσεις αλλά και ασύγχρονες εξ αποστάσεως διδακτικές ώρες αξιοποίησης του παραγόμενου υλικού.

Στο πρώτο μέρος της εργασίας παρουσιάζεται η σημασία των σύγχρονων ψηφιακών εργαλείων στην εκπαίδευση και στη διδασκαλία. Η ραγδαία ανάπτυξη των ψηφιακών και τεχνολογικών μέσων έχει επιφέρει σημαντικές αλλαγές στη μαθησιακή διαδικασία, δημιουργώντας νέες ευκαιρίες και προκλήσεις για την εκπαιδευτική κοινότητα. Ως εκ τούτου κρίνεται απαραίτητη η αξιοποίηση και η αξιολόγηση αυτών των μέσων στη σύγχρονη εκπαιδευτική πραγματικότητα, εξετάζοντας τη δυναμική και τη συμβολή των ψηφιακών εργαλείων στη βελτίωση της διδακτικής πρακτικής. Στο δεύτερο μέρος της εργασίας θα παρουσιάσουμε τις εργασίες του σχολείου μας και τα ψηφιακά εργαλεία που χρησιμοποιήθηκαν στο πλαίσιο του παραπάνω προγράμματος. Με τη βοήθεια των εργαλείων αυτών δημιουργήθηκε μια δυναμική διαδικτυακή κοινότητα μάθησης, συνεργασίας και αλληλεπίδρασης με ανταλλαγή πληροφοριών, ιστορικών πηγών και απόψεων για τα γεγονότα του Β' Παγκόσμιου Πολέμου. Να σημειωθεί ότι η γλώσσα όλων των εργασιών είναι τα αγγλικά. Τα βασικά ψηφιακά εργαλεία που αξιοποιήθηκαν ενισχύοντας έτσι τη διαδραστικότητα και την πολυτροπική προσέγγιση της μάθησης είναι:

- Padlet. Μια εύχρηστη διαδραστική πλατφόρμα συνεργατικής μάθησης. Πρόκειται για έναν διαδικτυακό εικονικό τοίχο, έναν πίνακα καρφιτσών στον οποίο μπορεί να αναρτηθεί το περιεχόμενο, τα πολυμέσα (έγγραφα, εικόνες, βίντεο, ηχητικά, κτλ) με πρόσβαση των μελών ανά πάσα στιγμή. Επιλέχθηκε ως κοινή πλατφόρμα ανάρτησης των ομαδικών εργασιών των μαθητών/μαθητριών από τα τρία σχολεία.
- Veed. Ένα απλό πρόγραμμα επεξεργασίας βίντεο. Επιλέχθηκε από την ομάδα εργασία για να μετατρέψουν ένα αρχείο ppt σε βίντεο με θέμα την παρουσίαση των μελών της ομάδας και του τόπου τους.
- Canva. Μια πλατφόρμα σχεδίασης που μας επιτρέπει να δημιουργήσουμε ένα ευρύ φάσμα διαδραστικών υλικών πολυμέσων, όπως γραφήματα, αφίσες, παρουσιάσεις, φύλλα εργασίας, κόμικς κ.ά. Αυτό το εργαλείο προτιμήθηκε από την ομάδα εργασίας για τη δημιουργία μιας αφίσας (poster) με θέμα τη σφαγή στο Κομμένο Άρτας το 1943.
- Prezi. Ένα λογισμικό πολυμέσων για ελκυστικές παρουσιάσεις. Είναι μια φιλική εφαρμογή που δεν απαιτεί προηγούμενη εμπειρία σχεδιασμού ή προγραμματισμού. Επιλέχθηκε από την ομάδα εργασίας για μια παρουσίαση με θέμα τις κύριες ημερομηνίες και σημαντικά γεγονότα του Β΄ Παγκόσμιου πολέμου στην Ελλάδα. Με το ίδιο θέμα ασχολήθηκε και μια δεύτερη ομάδα εργασίας, η οποία επέλεξε τη δημιουργία ιστοριογραμμής με το εργαλείο Preceden.
- Vocaroo. Μια πολύ εύκολη εφαρμογή εγγραφής ήχου με παραγόμενα mp3 αρχεία. Το εργαλείο επιλέχθηκε από την μαθητική ομάδα για την ηχογράφηση βασικών λέξεων σχετικών με τον Β΄ Παγκόσμιο πόλεμο.

Στο τρίτο μέρος παρουσιάζονται τα συμπεράσματα και η αξιολόγηση της εμπειρίας αυτής, η οποία ανέδειξε τη θετική συμβολή των ψηφιακών εργαλείων στη βελτίωση της κριτικής σκέψης, της συνεργασίας και της κατανόησης ιστορικών γεγονότων από διαφορετικές πολιτισμικές οπτικές γωνίες.

Λέξεις – κλειδιά: διεθνές πρόγραμμα, Β΄ Παγκόσμιος Πόλεμος, ψηφιακά εργαλεία.

ΑΠΟΦΑΣΙΖΩ ΒΑΣΗ ΔΕΔΟΜΕΝΩΝ: ΈΝΑ ΚΑΙΝΟΤΟΜΟ ΔΙΔΑΚΤΙΚΟ ΣΕΝΑΡΙΟ ΜΕ ΤΗ ΜΕΘΟΔΟ PROJECT ΣΕ ΣΧΟΛΕΙΟ ΔΕΥΤΕΡΗΣ ΕΥΚΑΙΡΙΑΣ

Αποστόλου Γεώργιος
Μαθηματικός ΠΕ03
Διεθνές Πανεπιστήμιο της Ελλάδος
email: apgeorge2004@yahoo.com

Παναγιώτου Αλεξάνδρα
Αγγλικής Φιλολογίας ΠΕ 06,
Δευτεροβάθμια Εκπαίδευση
email: apanagiotou10@hotmail.com

Μάρη Μαρία
Πληροφορικός ΠΕ 86
Δευτεροβάθμια Εκπαίδευση
email: mari.maria2@yahoo.gr

ΠΕΡΙΛΗΨΗ

Τα Σχολεία Δεύτερης Ευκαιρίας (ΣΔΕ) αποτελούν ένα σημαντικό θεσμό που απευθύνεται σε ενήλικες, που για διάφορους λόγους, δεν ολοκλήρωσαν τη βασική τους εκπαίδευση, προσφέροντάς τους μια νέα δυνατότητα εκπαίδευσης. Στόχος τους είναι η ανάπτυξη γνώσεων και δεξιοτήτων που θα επιτρέψουν στους μαθητές τους να ενταχθούν αποτελεσματικά στην αγορά εργασίας και στην κοινωνία. Στο πλαίσιο αυτό, σχεδιάστηκε και υλοποιείται ένα εκπαιδευτικό project που στοχεύει στην κατανόηση της σημασίας των δεδομένων και στη χρήση τους στη διαδικασία λήψης αποφάσεων, το οποίο αξιοποιεί τη μέθοδο Project-Based Learning (PBL), ενισχύοντας έτσι τη βιωματική μάθηση, την κριτική σκέψη και την ενεργή συμμετοχή των εκπαιδευομένων.

Οι μαθητές, εργάζονται πάνω σε ένα σύγχρονο και πρακτικό ζήτημα: πώς μπορούν να λαμβάνουν τεκμηριωμένες αποφάσεις βασισμένες σε δεδομένα και όχι σε υποκειμενικές εκτιμήσεις ή παραπλανητικές πληροφορίες. Στη σημερινή εποχή, όπου η πληροφορία είναι άφθονη αλλά συχνά αναξιόπιστη, η ικανότητα ανάλυσης και ερμηνείας δεδομένων είναι κρίσιμη. Οι συμμετέχοντες μαθαίνουν να χρησιμοποιούν εργαλεία όπως η αναζήτηση στατιστικών στο διαδίκτυο, το brainstorming, το ChatGPT, το Excel ,τη SWOT analysis, την περιγραφική στατιστική, τα control charts, προκειμένου να επεξεργάζονται και να αξιολογούν πληροφορίες από διαφορετικές πηγές. Η εκπαιδευτική διαδικασία ξεκινά με την κατανόηση της σημασίας των δεδομένων και της επιστημονικής προσέγγισης στη αναζήτηση της αλήθειας και στη λήψη αποφάσεων. Αρχικά και σε συνέχεια των μαθημάτων από τους γραμματισμούς των Μαθηματικών, της Πληροφορικής και των Κοινωνικών Επιστημών, εκπαιδεύονται στη χρήση βασικών στατιστικών μεθόδων και πρακτικών αναλύσεων που μπορούν να εφαρμόσουν σε καθημερινές καταστάσεις, στη συνέχεια, επιλέγουν ένα θέμα που τους ενδιαφέρει, συλλέγουν δεδομένα, τα οργανώνουν και τα επεξεργάζονται με τα διαθέσιμα εργαλεία. Μέσα από αυτή τη διαδικασία, μαθαίνουν να διακρίνουν αξιόπιστες από αναξιόπιστες πηγές, να εντοπίζουν μοτίβα και τάσεις στα δεδομένα και να βγάζουν συμπεράσματα βασισμένα σε αντικειμενικά στοιχεία.

Η συμμετοχή σε αυτό το project ενισχύει σημαντικά την αυτοπεποίθηση των μαθητών, καθώς τους επιτρέπει να δουν στην πράξη τη χρησιμότητα της ανάλυσης δεδομένων και της μεθοδικής προσέγγισης στη λήψη αποφάσεων. Επιπλέον, μέσα από τη συνεργασία και τη συζήτηση, αναπτύσσουν δεξιότητες ομαδικής εργασίας, επιχειρηματολογίας και αναστοχασμού. Αυτή η διδακτική προσέγγιση ξεπερνά τα στενά όρια της τάξης, δίνει στους μαθητές τα εφόδια να γίνουν πιο ενεργοί και ενημερωμένοι πολίτες. Τα πρώτα αποτελέσματα της υλοποίησης, δείχνουν έντονο ενδιαφέρον από τους μαθητές, οι οποίοι αντιλαμβάνονται την αξία της τεκμηριωμένης σκέψης τόσο στην επαγγελματική όσο και στην προσωπική τους ζωή και θα μπορούσε να αποτελέσει ένα μοντέλο εκπαιδευτικής πρακτικής που ενισχύει την κριτική σκέψη και τη λήψη αποφάσεων με επιστημονικά τεκμηριωμένο τρόπο, προσφέροντας μια ουσιαστική μαθησιακή εμπειρία προσαρμοσμένη στις ανάγκες των εκπαιδευομένων των ΣΔΕ.

Λέξεις – κλειδιά: Σχολεία Δεύτερης Ευκαιρίας, Λήψη Αποφάσεων, Σενάριο μαθήματος, project, Data.

ΤΟ ΔΑΣΟΣ …Η ΖΩΗ ΜΟΥ: ΒΙΩΜΑΤΙΚΗ ΜΑΘΗΣΗ ΜΕ ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ

Γραμματικοπούλου Σοφία
Νηπιαγωγός, Προϊσταμένη
2ο Νηπιαγωγείο Τριαδίου
Θεσσαλονίκη, Ελλάδα
e-mail: sophiagram@hotmail.com

Μαλλίδου Μαλέσσα Ευαγγελία
Νηπιαγωγός
6ο Νηπιαγωγείο Θέρμης
Θεσσαλονίκη, Ελλάδα
e-mail: lia2ms@gmail.com

ΠΕΡΙΛΗΨΗ

Τη σχολική χρονιά 2024-25 υλοποιήθηκε ένα πρόγραμμα σχετικό με το δάσος στο οποίο συμπεριλήφθηκαν και τα ψηφιακά μέσα των νέων τεχνολογιών τόσο κατά τον διδακτικό σχεδιασμό όσο και κατά την υλοποίησή του. Σκοπός ήταν τα παιδιά με βιωματικές δραστηριότητες να ανακαλύψουν τη γνώση και να ενδιαφερθούν για το δάσος ως οικοσύστημα αλλά και ως αισθητηριακή απόλαυση της φύσης, να ενισχυθεί η περιβαλλοντική τους συνείδηση και η ιδιότητα του ενεργού πολίτη. Χρησιμοποιήθηκαν διαδραστικά και ψηφιακά μέσα, αναδεικνύοντας τη δυναμική σχέση των ψηφιακών τεχνολογιών παιδαγωγικής και εκπαίδευσης. Η μεθοδολογία που ακολουθήθηκε βασίστηκε σε μια παιδοκεντρική, διερευνητική προσέγγιση, συνδυάζοντας τη διερευνητική και συνεργατική μάθηση.

Λέξεις – κλειδιά: δάσος, ενεργός πολίτης, ψηφιακές τεχνολογίες

ΕΝΣΩΜΑΤΩΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΔΙΔΑΣΚΟΝΤΑΣ ΣΤΗΝ Α' ΛΥΚΕΙΟΥ ΤΗΝ ΤΗΛΕΡΓΑΣΙΑ ΚΑΙ ΤΗΝ ΕΠΙΚΟΙΝΩΝΙΑ ΑΠΟ ΑΠΟΣΤΑΣΗ

Ευαγγελία Δημουλά
Καθηγήτρια Πληροφορικής, ΠΕ86
2ο Πρότυπο Γυμνάσιο Αθήνας
Αθήνα, Ελλάδα
e-mail: edimoula@gmail.com

Αικατερίνη Ρήγα
Διευθύντρια, Καθηγήτρια Πληροφορικής, ΠΕ86
26ο Πειραματικό ΓΕ.Λ. Αθηνών - Μαράσλειο
Αθήνα, Ελλάδα
e-mail: katsouf12@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη συστηματική ενσωμάτωση της Τεχνητής Νοημοσύνης (AI) στη διδασκαλία της Α΄ Λυκείου, εστιάζοντας στη διδακτική προσέγγιση θεμάτων σχετικών με την τηλεργασία και την επικοινωνία από απόσταση. Σκοπός της εργασίας είναι να αναδείξει πώς τα εργαλεία AI μπορούν να υποστηρίξουν την απόκτηση βασικών δεξιοτήτων εξ αποστάσεως συνεργασίας, ενισχύοντας παράλληλα την αυτονομία και τη δημιουργικότητα των μαθητών. Η ερευνητική παρέμβαση βασίστηκε σε ένα σύγχρονο εκπαιδευτικό σενάριο εκμάθησης μέσω εργασιών, ενσωματώνοντας εφαρμογές όπως το ChatGPT, συστήματα δημιουργίας αυτόματων παρουσιάσεων και πλατφόρμες συνεργατικής οργάνωσης του έργου. Παρουσιάζεται η μεθοδολογική προσέγγιση, το παιδαγωγικό πλαίσιο και τα εργαλεία τα οποία αξιοποιήθηκαν, με έμφαση στην πρακτική εφαρμογή της τηλεργασίας σε σχολικό περιβάλλον. Τα αποτελέσματα αναδεικνύουν τη σημασία της Τεχνητής Νοημοσύνης (AI) ως εργαλείου διαφοροποίησης της διδασκαλίας, υποστήριξης των μεταγνωστικών δεξιοτήτων και ενίσχυσης της συνεργασίας και της συμμετοχής των μαθητών. Η Τεχνητή Νοημοσύνη (AI) συνέβαλε στην εξατομίκευση της διδασκαλίας, στη βελτίωση της επικοινωνιακής ικανότητας και στην προώθηση της επαγγελματικής ετοιμότητας. Η εργασία προτείνει προοπτικές μελλοντικής αξιοποίησης της Τεχνητής Νοημοσύνης (AI) για τη διδασκαλία σύνθετων δεξιοτήτων, τονίζοντας τη σημασία της ανάπτυξης των παιδαγωγικών πλαισίων και των δεοντολογικών κατευθύνσεων για τη βιώσιμη ενσωμάτωσή της στην εκπαιδευτική πράξη.

Λέξεις-κλειδιά: Τεχνητή Νοημοσύνη, Τηλεργασία, Συνεργατική Μάθηση, Ψηφιακά Εργαλεία, Εκπαιδευτική Καινοτομία

Ο (ΑΝΤΙ ΠΙΝΑΚΑ) ΗΛΕΚΤΡΟΝΙΚΟΣ ΥΠΟΛΟΓΙΣΤΗΣ, ΚΛΕΙΔΙ, ΓΙΑ ΤΗΝ ΕΦΑΡΜΟΓΗ ΤΟΥ (ΕΝ ΚΥΛΚΛΩ) ΜΑΘΗΜΑΤΟΣ, ΑΠΟ ΤΟΥΣ ΙΔΙΟΥΣ ΤΟΥΣ ΜΑΘΗΤΕΣ

Καππέ Σταματία
συμβ. Εκπαιδευτικός ΠΕ08, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: stamatiakappe12@gmail.com

Δημουλάς Κωνσταντίνος
επί τιμή Α΄ Σχολικός Σύμβουλος
Φιλολόγων και επιστημονικοπαιδαγωγικής καθοδήγησης
κάθε ειδικότητας, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dimoulask@yahoo.gr

Δημουλάς Ευριπίδης
Ηλεκτρολόγος μηχανικός και μηχανικός Ηλεκτρονικών
Υπολογιστών ΠΕ18, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: euripides5@hotmail.com

Βέλλιου Έλλη
αδιόρ. Εκπαιδευτικός ΠΕ18, ΟΨΜ.ΕΤΥ*,
Λάρισα, Ελλάδα
e-mail: ellivelliou14@gmail.com

Παπαδημητρίου Θεοδώρα
συνταξ. Εκπαιδευτικός ΠΕ03, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dorapapadim@gmail.com

Κουτσαβλάκη Αγγελική
συνταξ. εκπαιδευτικός ΠΕ02, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: akoutsavlaki@yahoo.com

Βερβέρας Νικόλαος
αδιόρ. Εκπαιδευτικός ΠΕ02,ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: lyrikos@gmail.com

*** ΟΨΜ.ΕΤΥ:** Οργανισμός Ψυχοβιοαναλυτικής Μόρφωσης «ἐκ τῶν ὑστέρων»

ΠΕΡΙΛΗΨΗ

Η μετατροπή του μετωπικού συστήματος (στο οποίο τα θρανία είναι το ένα πίσω από το άλλο, απέναντι από την έδρα του δάσκαλου) σε μάθημα με τα παιδιά σε υποομάδες, δεν δίνει, στην τάξη, την (χωρίς ανταγωνισμούς, μεταξύ των παιδιών, λόγω σύσφιγξης των διατομικών σχέσεων, μέσα στην υποομάδα, για αντιμετώπιση των άλλων υποομάδων) μαθητοκεντρικότητα, που επιζητούμε, καθώς οι υποομάδες λειτουργούν, έτσι κι αλλιώς, ανταγωνιστικά, η μία προς την άλλη. Σκοπός της πρακτικής ήταν η μαθητοκεντρικότητα της τάξης ως ενός όλου, με τα θρανία σε κύκλο και (λόγω κατάργησης της έδρας) με τον δάσκαλο (από κυρίαρχος της τάξης, από την έδρα του, που ήταν), τώρα, απλά, συντονιστή του μαθήματος, που θα διεξάγεται (λόγω μετριασμού της σύσφιγξης των σχέσεων των παιδιών, που εντεινόταν, για αντιμετώπιση των παιδιών των άλλων υποομάδων, που δεν θα υπάρχουν, πια) μη ανταγωνιστικά, αλλά συναγωνιστικά, μεταξύ τους, από τα ίδια τα παιδιά. Η (εντελώς προσωπική του εμπνευστή της) πρακτική εφαρμοζόταν σε σχολικές μονάδες, δευτεροβάθμιας, κυρίως, τυπικής και άτυπης, εκπαίδευσης, από το 1979 (έτος διορισμού του ως εκπαιδευτικού) έως το 2013 (έτος αφυπηρέτησής του). Η (ως εντελώς, προσωπικής πρακτικής, προσωπική) μεθοδολογία της βασίζεται στην μετατροπή της μετωπικής, προς τον δάσκαλο, θρανιοτοποθέτησης σε κυκλική, καταργούμενης της έδρας του δασκάλου, κάνοντας τις παράλληλες, ατομικές, μονοδρομικές, από και προς τον δάσκαλο, δράσεις των μαθητών του μετωπικού συστήματος ομαδική δράση, στην οποία, τώρα, θα μπορούν, εκ των πραγμάτων, να έχουν, όλοι την ίδια ευκαιρία να είναι συνδημιουργοί του κοινού έργου της τάξης. Αρχικά, σχεδιάζεται, φανερό, κοινωνιόγραμμα, για τις σχέσεις των παιδιών, στο τμήμα, από τα παιδιά ή και τον δάσκαλο, προς όποια χρήση, από τα παιδιά και τον δάσκαλο, και ακολουθεί συζήτηση, για το καταστατικό λειτουργίας της τάξης, σύνταξη και υπογραφή του. Η συνεδρίαση διεξαγωγής του μαθήματος των παιδιών γίνεται ως εξής. Από την προηγουμένη, τα παιδιά ενημερώνονται, για το μάθημα της ημέρας, για να το επεξεργαστούν. Ύστερα από βραχύτατη αφορμησιακή εισήγηση του δασκάλου, η τάξη, δυνάμει, γίνεται, εν κύκλω, ένα απέραντο εργαστήριο. Το κάθε παιδί, έχοντας, πλήρη, εικόνα της δράσης των άλλων, μπορεί να είναι ρυθμιστής του αποτελέσματος. Το μάθημα είναι μια ενιαία (όχι ως μέρη εξέτασης και παράδοσης) πλατφόρμα συζήτησης. Ο δάσκαλος δεν έχει μόνιμη έδρα, αλλά περιφέρεται, όπου χρειάζεται, για τον καλύτερο συντονισμό του μαθήματος. Στην κυκλική τοποθέτηση των θρανίων, έχει καταργηθεί και ο πίνακας. Στην περίοδο εφαρμογής της πρακτικής, αυτός είχε αντικατασταθεί με χαρτόνια, προς επίδειξη, στους άλλους, του τι γραφόταν, σ' αυτό. Τώρα, όμως, υπερπηδάται το τελευταίο πρόβλημα, που αντιμετώπιζε η πρακτική, με την αντικατάστασή του από τόσες οθόνες υπολογιστών, για κάθε παιδί. Το κάθε παιδί θα μπορεί να γράψει ή να ζωγραφίσει ή να σχηματίσει ή ό,τι άλλο, στον υπολογιστή του, και αυτό να το βλέπουν όλα τα άλλα παιδιά, τα οποία, μάλιστα, θα μπορούν και να συμμετέχουν, σε ό,τι έκανε το παιδί αυτό, διαδραστικά, για το όποιο, κοινό, αποτέλεσμα. Το παραγόμενο προϊόν αποτυπώνεται σε (κοινόχρηστα, διαγωνισμικού τύπου, εξελισσόμενα) «βιβλία», από τα παιδιά, για κάθε μάθημα, για όλα τα ενδιαφέροντα, ως «Ελεύθερη Προαιρετική Εργασία, για το σπίτι». Καθότι τα παιδιά είναι, ως συνδημιουργοί, οι δημιουργοί του μαθήματος, αυτά είναι και που προβαίνουν στην αξιολόγησή του. Τα δελτία αξιολόγησης συλλέγονται, τέλος κάθε

εβδομάδας, μήνα, τριμήνου, τετραμήνου, εξαμήνου, έτους, για εξαγωγή του μέσου όρου βαθμολογίας, από το τμήμα, για κάθε παιδί, με τον δάσκαλο να έχει, με σύμβουλο το κοινωνιόγραμμα, την όποια (αν θα) του δίνεται δυνατότητα τροποποιητικής (στον μέσο όρο της αυτοδιασταυρωτικής, αυτής, αξιολόγησης) παρέμβασης. Τα θετικά αποτελέσματα αποτυπώνονται στην επιστημονική εξέλιξη των παιδιών, η οποία (θετικά σχόλια και τρίτων, κατατεθειμένα, στο «Αρχείο Μαθητικής Δημιουργίας» του Οργανισμού) οφειλόταν (και) στην πρακτική, αυτή. Όμως, λόγω της κόπωσης, που συνεπάγεται, για τον δάσκαλο, αν και θετικότατης αποδοχής, δεν είχε, δυστυχώς, απήχηση.

Λέξεις – κλειδιά: μάθημα χωρίς δάσκαλο, αυτορρύθμιση τάξης, αυτομάθημα, κυκλική θρανιοτοποθέτηση, συνεδριακό μάθημα, διασταυρωτική αυτοαξιολόγηση

ΛΑΝΘΑΣΜΕΝΗ ΕΡΜΗΝΕΙΑ ΜΗΝΥΜΑΤΟΣ, ΛΟΓΩ ΕΓΚΕΦΑΛΙΚΗΣ ΣΥΓΧΥΣΗΣ, ΑΠΟ ΚΑΤΑΙΓΙΣΤΙΚΗ ΠΡΟΒΟΛΗ ΕΙΚΟΝΩΝ, ΣΤΗΝ ΟΘΟΝΗ ΤΟΥ ΥΠΟΛΟΓΙΣΤΗ

Βερβέρας Νικόλαος
αδιόρ. Εκπαιδευτικός ΠΕ02,ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: lyrikos@gmail.com

Δημουλάς Κωνσταντίνος
επί τιμή Α΄ Σχολικός Σύμβουλος
Φιλολόγων και επιστημονικοπαιδαγωγικής
καθοδήγησης κάθε ειδικότητας, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dimoulask@yahoo.gr

Δημουλάς Ευριπίδης
Ηλεκτρολόγος μηχανικός και μηχανικός Ηλεκτρονικών
Υπολογιστών ΠΕ18, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: euripides5@hotmail.com

Βέλλιου Έλλη
αδιόρ. Εκπαιδευτικός ΠΕ18, ΟΨΜ.ΕΤΥ*,
Λάρισα, Ελλάδα
e-mail: ellivelliou14@gmail.com

Παπαδημητρίου Θεοδώρα
συνταξ. Εκπαιδευτικός ΠΕ03, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dorapapadim@gmail.com

Κουτσαβλάκη Αγγελική
συνταξ. εκπαιδευτικός ΠΕ02, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: akoutsavlaki@yahoo.com

Καππέ Σταματία
συμβ. Εκπαιδευτικός ΠΕ08, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: stamatiakappe12@gmail.com

* **ΟΨΜ.ΕΤΥ:** Οργανισμός Ψυχοβιοαναλυτικής Μόρφωσης «ἐκ τῶν ὑστέρων»

ΠΕΡΙΛΗΨΗ

Η εικόνα περιέχει πλήθος πληροφοριών, οι οποίες προσλαμβάνονται ως όλον, η συμπλοκότητα των σχέσεων των μερών του οποίου δυσκολεύει, με την πολυπλοκότητά του, τα μάλιστα, την ερμηνεία του. Η δυσκολία αυτή είναι μεγαλύτερη, στην περίπτωση ανάγκης να δοθεί, εσπευσμένα, μια απάντηση, σε αυτό. Η εργασία αυτή είχε σκοπό να μελετήσει την ικανότητα αναγνώρισης των συναισθηματικών εκφράσεων του προσώπου, σε καταιγιστική προβολή τους, στην οθόνη υπολογιστή, στο πλαίσιο μαθήματος, πράγμα που οφείλεται να το γνωρίζει ο δάσκαλος. Στην έρευνα την οποία παρουσιάζουμε στην εργασία αυτή συμμετείχαν (61 άντρες και 104 γυναίκες=) 165, υποκείμενα, οι οποίοι ζουν στην Ελλάδα, 25-55 χρονών, μέσου μορφωτικού επιπέδου. Χρησιμοποιήθηκε η σειρά των Ekman και Friesen 65 διαφανειών προσώπων με ένα (από ολόκληρο ή μέρος του προσώπου) ή περισσότερα συναισθήματα (F.A.S.T., 1971). Τα υποκείμενα έπρεπε, σε μια πρώτη προβολή τους, να αναγνωρίσουν ένα (οπωσδήποτε, και μόνο ένα) από τα επτά, παγκόσμια αναγνωρισμένα, συναισθήματα (ευτυχία, λύπη, φόβος, θυμός, έκπληξη, αηδία, περιφρόνηση) και, σε μια δεύτερη φάση, με την ίδια σειρά προβολής, να αποδώσουν ένα (οπωσδήποτε, και μόνο ένα) βαθμό, από το 0 (απουσία συναισθήματος) μέχρι το 8 (έντονη παρουσία συναισθήματος), στο καθένα, από τα συναισθήματα, αυτά, σε προκατασκευασμένα φύλλα απαντήσεων, και τις δύο φορές. Ο χρόνος προβολής κάθε διαφάνειας ήταν, προοδευτικά, 10΄΄-5΄΄ και 25΄΄-10΄΄ και ο ενδιάμεσος χρόνος, για την σημείωση των απαντήσεων, ήταν 5΄΄ και 10΄΄, αντίστοιχα, για τις φάσεις αυτές. Τα δεδομένα περάστηκαν σε επτά, όσα και τα συναισθήματα, συγκεντρωτικούς, πίνακες, για κάθε φύλο. Από αυτούς, βγήκαν, για κάθε διαφάνεια, η εκατοστιαία αναλογία των προτιμήσεων συναισθηματικής σημασιοδότησης και ο μέσος όρος της έντασης, που αποδόθηκε, σε αυτές, από το σύνολο των υποκειμένων. Ύστερα, με βάση τις διαφάνειες που συγκεντρώνουν το 20% και πλέον της αποδοχής των υποκειμένων των δύο ομάδων (άνδρες - γυναίκες), για την συγκεκριμένη τους, συναισθηματική, σημασιοδότηση, κατασκευάσθηκε λεξικό συναισθηματικής σημασιοδότησης, που αποδόθηκε, από κάθε ομάδα, για κάθε ομάδα. Σ' αυτό, φαίνονται οι συγκρίσιμες περιπτώσεις, ενδοομαδικά, και διαομαδικά. Η στατιστική ανάλυση (χ^2, για την ένταση, και t test, για την συχνότητα) αφορά στον έλεγχο: α) της έντασης, με βάση την βαθμολογία, που αποδόθηκε, από τα υποκείμενα, σε κάθε συναίσθημα, β) της συχνότητας της αναγνώρισης των συναισθημάτων, και, σε σύγκριση με τα διεθνή standards, γ) της έντασης των συναισθημάτων που αναγνωρίσθηκαν αληθώς, δ) της συχνότητας των συναισθημάτων που αναγνωρίσθηκαν αληθώς. Τα αποτελέσματα δείχνουν τα εξής: Η αναγνωριστική των συναισθημάτων ικανότητα είναι, γενικά, καλή, σε βαθμό συγκρίσιμο, ενδοομαδικά και διομαδικά, επιδεινούμενη, παρά την προοδευτική ευχέρεια αληθούς αναγνώρισης, που προέρχεται από την εξάσκηση, όσο μικραίνει ο χρόνος προβολής και λιγοστεύει ο διαθέσιμος χρόνος της αναγνώρισης αυτής. Οι άνθρωποι, γενικά, δεν βλέπουν πολύ διαφορετικά συναισθήματα, στο πρόσωπο, ακόμα και όταν πρόκειται για διαφορετικό φύλο. Χωρίς το άγχος της γρήγορης διαδικασίας, κάνουμε τις περισσότερες αναγνωρίσεις και αληθείς

αναγνωρίσεις συναισθημάτων, ενώ, με αυτό, η βαθμολογία, που δίνουμε, στα συναισθήματα, που αναγνωρίζουμε, είναι, συνήθως, πιο υψηλή, από την βαθμολογία, που δίνουμε, χωρίς αυτό. Η διαφορά, με τις γυναίκες να υπερέχουν, στην αναγνώριση και στην αληθή αναγνώριση συναισθημάτων, από τους άνδρες, χωρίς αυτό το άγχος, με αυτό, φαίνεται να μην υπάρχει, ουσιωδώς. Στην περίπτωση της γρήγορης διαδικασίας, με το άγχος, που υφέρπει, σε αυτή, στις μονοσήμαντες εκφράσεις, τα καταφέρνουμε καλύτερα, απ' ό,τι στις πολυσήμαντες, όπως, βέβαια, και στην αργότερη διαδικασία, χωρίς το άγχος αυτό. Γενικά, η ικανότητα αναγνώρισης συναισθημάτων είναι καλύτερη, χωρίς το άγχος της γρήγορης διαδικασίας, και, ειδικά, στις γυναίκες. Με το άγχος σπουδής, να προσλάβουμε, να διευθετήσουμε και να ερμηνεύσουμε, μέσα σε ελάχιστο, διαθέσιμο, χρόνο, ένα μεγάλο όγκο πληροφοριών, ο εγκέφαλός μας πέφτει σε σύγχυση, πράγμα, που μας δυσκολεύει στην αναγνώριση του μηνύματος, που μας εκπέμπεται, συνεπαγόμενης, πόσο, μάλλον, αν πρόκειται, όχι για στατικές, αλλά εικόνες σε κίνηση, λάθος εκτιμήσεις.

Λέξεις – κλειδιά: πληροφοριακή κόπωση, εγκεφαλική σύγχυση, ακριβής αναγνώριση μηνύματος

ΚΑΙΝΟΤΟΜΕΣ ΔΙΔΑΚΤΙΚΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ: ΕΝΙΣΧΥΣΗ ΤΗΣ ΑΥΤΟΔΥΝΑΜΗΣ ΜΑΘΗΣΗΣ ΜΕΣΩ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΚΑΙ ΜΟΥΣΙΚΗΣ

Ζώη Σοφία
Εκπαιδευτικός ΠΕ84
1ο ΕΠΑΛ Ιωαννίνων
Ιωάννινα, Ελλάδα
email: sofzoi7@sch.gr

ΠΕΡΙΛΗΨΗ

Η εμπειρία της διδασκαλίας στη βασικών εννοιών Ηλεκτροτεχνίας σε μαθητές/τριές Λυκείου ανέδειξε τις σημαντικές δυσκολίες που αντιμετωπίζουν στην κατανόηση των εννοιών του ηλεκτρισμού. Πολλοί/ές παρουσιάζουν κενά σε προαπαιτούμενες γνώσεις, δεν είναι εξοικειωμένοι/ες με τη μεθοδολογία της Φυσικής και δυσκολεύονται να αναπτύξουν δεξιότητες αυτοδύναμης μάθησης μέσω της μελέτης βιβλίων. Παράλληλα, η χρήση του κινητού τηλεφώνου για κοινωνικά δίκτυα, μουσική και παιχνίδια αποσπά την προσοχή τους από τη μαθησιακή διαδικασία. Αυτές οι παρατηρήσεις ανέδειξαν την ανάγκη για μια εναλλακτική διδακτική προσέγγιση που να συνδυάζει την ψηφιακή τεχνολογία και τις προτιμήσεις των μαθητών/τριών με τη μαθησιακή διαδικασία.

Λαμβάνοντας υπόψη τα παραπάνω, αναπτύχθηκε και εφαρμόστηκε ένα διδακτικό σενάριο που αξιοποιεί σύγχρονα εργαλεία τεχνητής νοημοσύνης και μουσικής. Ο κύριος στόχος του σεναρίου είναι να ενθαρρύνει τους μαθητές/τριές να μελετήσουν το βιβλίο, να εξοικειωθούν με τους νόμους και τις θεωρίες του φαινομένου που μελετούν, ώστε να τεθούν οι βάσεις για να αποκτήσουν την ικανότητα να τα κατανοούν αυτοτελώς, χωρίς τη χρήση βοηθητικών μεθόδων. Η προσέγγιση δεν εστιάζει αποκλειστικά στην κατανόηση των φυσικών φαινομένων, αλλά κυρίως στην ανάπτυξη της αυτονομίας στη μελέτη και στην ικανότητα των μαθητών να αναζητούν και να ερμηνεύουν τις πληροφορίες μέσα από το σχολικό βιβλίο.

Η διδακτική μεθοδολογία στηρίχθηκε στη θεωρία του Lev Vygotsky, η οποία τονίζει τη σημασία της κοινωνικής αλληλεπίδρασης στη μάθηση. Για την υλοποίηση της, χρησιμοποιείται η εφαρμογή SUNO, και επικουρικά τα λογισμικά Audacity και Openshot.

Ο/Η εκπαιδευτικός (ή ομάδα εκπαιδευτικών) δημιουργούν ένα μουσικό κομμάτι, το οποίο περιλαμβάνει στίχους σχετικούς με τις φυσικές έννοιες και ήχους σύγχρονους και χωρίς να απαιτούνται μουσικές γνώσεις. Οι μαθητές/τριες ακούν το τραγούδι και παρακολουθούν το clip. Εντοπίζουν τις αντίστοιχες πληροφορίες στο σχολικό εγχειρίδιο και τις συνδέουν με την επιστημονική ορολογία. Παράλληλα, συμπληρώνουν εννοιολογικούς πίνακες, οι οποίοι λειτουργούν ως εργαλείο οργάνωσης της γνώσης. Εξέλιξη της προηγουμένης διαδικασίας είναι οι μαθητές/τριες να δημιουργήσουν το δικό τους μουσικό κομμάτι. Χωρίζονται σε ομάδες και αφού μελετήσουν από το βιβλίο τις θεωρητικές έννοιες του νέου κεφαλαίου, δημιουργούν τους δικούς τους στίχους και το δικό τους τραγούδι. Με τη δραστηριότητα αυτή, προσδοκάται να ενισχυθεί κυρίως η δεξιότητα να κατανοούν αυτοτελώς τις επιστημονικές έννοιες όπως αυτές δίνονται στο σχολικό βιβλίο και δευτερευόντως η δημιουργικότητα και η συνεργατικότητα.

Το εν λόγω σενάριο εφαρμόστηκε στη διδασκαλία των ενοτήτων του «Βασικές έννοιες του συνεχούς ρεύματος» αρχικά και του «Ηλεκτρομαγνητισμού» στη συνέχεια, σε μαθητές της Β΄ τάξης Λυκείου. Τα ευρήματα, που προέκυψαν από την εφαρμογή, υποδηλώνουν ότι η τεχνητή νοημοσύνη και η μουσική μπορούν να λειτουργήσουν ως κίνητρα μάθησης, αυξάνοντας τη συμμετοχή των μαθητών/τριών και ενισχύοντας τη μνημονική ανάκληση των φυσικών εννοιών.

Το παρόν υπογραμμίζει τη σημασία της αξιοποίησης καινοτόμων εργαλείων στη διδασκαλία των φυσικών επιστημών, και προτείνει τη διερεύνηση παρόμοιων προσεγγίσεων στο μέλλον. Είναι δυναμικό σενάριο και χωρίς ιδιαίτερες αποκλείσεις μπορεί να αξιοποιηθεί με ευκολία και για άλλα διδακτικά αντικείμενα. Επιπροσθέτως σε πιο μικρές ηλικίες παρέχεται η ευελιξία να ακολουθηθεί μια διαθεματική προσέγγιση με ειδικότητες, όπως Φιλόλογοι, Τεχνολόγοι, Πληροφορικοί και Μουσικοί. Η ενσωμάτωση πολυμεσικών τεχνολογιών και δημιουργικών δραστηριοτήτων μπορεί να αποτελέσει μια αποτελεσματική στρατηγική για την ενίσχυση της μαθησιακής εμπειρίας και της αυτονομίας των μαθητών/τριών στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: καινοτόμες διδακτικές προσεγγίσεις, τεχνητή νοημοσύνη, μουσική, εκπαιδευτικά εργαλεία, αυτοδύναμη μάθηση, μαθησιακή εμπειρία.

ΤΕΧΝΗ ΚΑΙ ΨΗΦΙΑΚΑ ΜΕΣΑ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ : ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΣΤΟ ΕΣΠΕΡΙΝΟ ΕΠΑ.Λ. ΠΡΕΒΕΖΑΣ

Θανασάρα Ευαγγελή
Οικονομίας-Τουρισμού, ΠΕ80 & Ιταλικής Φιλολογίας, ΠΕ34
1ο Επαγγελματικό Λύκειο Καρπάθου
Κάρπαθος, Ελλάδα
e-mail: gonzalitsa@gmail.com

Γάκη Βασιλική
Χημικός, ΠΕ04.02 & Πληροφορικός, ΠΕ86
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: iliasde66@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη περίπτωσης πραγματοποιήθηκε στο πλαίσιο του μαθήματος Ερευνητική Εργασία του προγράμματος σπουδών της Α΄ τάξης του Εσπερινού ΕΠΑ.Λ. Πρέβεζας και πραγματεύεται τη χρήση της τέχνης σε συνδυασμό με ψηφιακά μέσα στην εκπαιδευτική διαδικασία μάθησης. Η ενασχόληση των μαθητών/τριών με την τέχνη ξεκίνησε με την ενημέρωση για ζωγράφους παγκοσμίου φήμης, χρησιμοποιώντας ψηφιακές παρουσιάσεις και βίντεο. Στη συνέχεια, οι μαθητές/τριες αποτύπωσαν τα χαρακτηριστικά έργα των καλλιτεχνών σε μορφή τοιχογραφιών σε μια αίθουσα διδασκαλίας με άδειους τοίχους, χωρίς καμία διακόσμηση. Για την αποτύπωση των έργων στους τοίχους χρησιμοποιήθηκε οθόνη προβολής, υπολογιστής και ψηφιακές εφαρμογές για την επεξεργασία εικόνων των έργων τέχνης. Για την υλοποίηση της δράσης απασχολήθηκαν κυρίως ενήλικοι μαθητές και μαθήτριες, οι οποίοι αποτελούν την πλειοψηφία των μαθητών του σχολείου.

Η αισθητική εμπειρία παρουσιάζει ιδιαίτερο ενδιαφέρον, εφόσον αποτελεί μια καινοτόμο μέθοδο στην εκπαιδευτική διαδικασία που μπορεί να συμβάλλει στη Μετασχηματίζουσα Μάθηση και εφαρμόζεται όχι μόνο στην εκπαίδευση ενηλίκων αλλά και σε όλες τις βαθμίδες της εκπαίδευσης τα τελευταία χρόνια. Η παρατήρηση ενός έργου τέχνης κατά τη διάρκεια μιας εκπαιδευτικής διαδικασίας προκαλεί ερεθίσματα και ενεργοποιεί τον κριτικό στοχασμό των εκπαιδευομένων. Για αυτό τον λόγο ο σκοπός αυτής της δράσης υπήρξε η αποτίμηση από την εφαρμογή της μεθόδου μάθησης μέσα από την τέχνη, η αισθητική διαμόρφωση μιας σχολικής αίθουσας με έργα τέχνης και η εξοικείωση με απλά ψηφιακά μέσα. Επιδιώκοντας την ανάδειξη ενός εναλλακτικού τρόπου διδασκαλίας σε ενήλικες μαθητές του Εσπερινού ΕΠΑ.Λ., επιχειρήθηκε η μελέτη της στάσης των μαθητών/τριών κατά τη διάρκεια υλοποίησης της δράσης και η εισφορά της χρήσης της τέχνης στην ενεργητική συμμετοχή, στην ενίσχυση του κριτικού στοχασμού και στην πιθανότητα επαναπροσδιορισμού στερεοτυπικών αντιλήψεων και παραδοχών.

Στόχος είναι η διερεύνηση του βαθμού στον οποίο οι εκπαιδευόμενοι αξιοποιούν όλες τους τις αισθήσεις, χρησιμοποιούν τη φαντασία τους, ανατρέχουν σε ήδη υπάρχουσες γνώσεις και εμπειρίες και αναπτύσσουν την ικανότητα να σκεφτούν κριτικά κατά τη διάρκεια της εκπαιδευτικής παρέμβασης με τη χρήση έργων τέχνης σε συνδυασμό με βασικά ψηφιακά μέσα.

Στη δράση συμμετείχαν 13 μαθητές ηλικίας από 18 έως 61 ετών και επιλέχθηκε ως μεθοδολογικό εργαλείο η παρατήρηση, μέσω της οποίας δίνεται η ευκαιρία συλλογής δεδομένων που απορρέουν κατά τη διάρκεια πραγματικών καταστάσεων μέσα από τα λεγόμενα των εκπαιδευομένων και αντλώντας περισσότερο προσωπικές πληροφορίες.

Η εφαρμογή της εκπαιδευτικής παρέμβασης συνετέλεσε τόσο στην εξοικείωση των εκπαιδευομένων με την τέχνη όσο και με τα ψηφιακά μέσα. Επιπλέον συνετέλεσε στη μεταξύ τους συνεργασία και στην ανταλλαγή προσωπικών εμπειριών. Κατάφεραν να επεξεργαστούν τις προηγούμενες αντιλήψεις τους, να σκεφτούν κριτικά πάνω σε αυτές και να αναθεωρήσουν σε κάποιες περιπτώσεις, αναπτύσσοντας στοχαστικό διάλογο. Η εμπλοκή των συναισθημάτων και η απελευθέρωση της σκέψης και της έκφρασης, οδήγησε σε αλλαγή στάσης απέναντι σε μια πρωτόγνωρη μαθησιακή εμπειρία που αντιμετωπίστηκε αρχικά με επιφύλαξη, αλλά στην πορεία με ευχαρίστηση και ενθουσιασμό. Η αποκόμιση θετικών εντυπώσεων και η απόκτηση νέων γνώσεων έδωσε κίνητρα για την ενασχόληση εκ νέου με την τέχνη, η οποία συντελεί στην ικανότητα αντίληψης πραγμάτων από διαφορετικές όψεις και στον πιθανό επαναπροσδιορισμό παραδοχών.

Λέξεις – κλειδιά: Εκπαίδευση Ενηλίκων, Μετασχηματίζουσα μάθηση, τέχνη, ψηφιακά μέσα, κριτικός στοχασμός.

ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΓΙΑ ΑΞΙΟΠΟΙΗΣΗ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ

Ειρήνη Καραβίτη
Εκπαιδευτικός ΠΕ79.01, Μουσικός, Διευθύντρια Γυμνασίου-Λυκειακών Τάξεων Χαλανδρίτσας Αχαΐας
Πάτρα Αχαΐας, Ελλάδα
email: renakaraviti@gmail.com

Νεκταρία Κουτσοπούλου
Εκπαιδευτικός ΠΕ06, Αγγλικής Γλώσσας, Διευθύντρια Γυμνασίου-Λυκειακών Τάξεων Φαρών Αχαΐας
Πάτρα Αχαΐας, Ελλάδα
email: riaki1981@yahoo.gr

ΠΕΡΙΛΗΨΗ

Θέμα της εργασίας αυτής είναι η παρουσίαση πέντε καινοτόμων web 2.0 εργαλείων που διαθέτουν τα εξής χαρακτηριστικά: είναι πανεύκολα στη χρήση και δεν απαιτούν ειδικές ψηφιακές δεξιότητες, παρέχονται εντελώς δωρεάν ή διαθέτουν δωρεάν έκδοση με μεγάλο εύρος δυνατοτήτων για το χρήστη και εξάπτουν το ενδιαφέρον, πράγμα που τα καθιστά κατάλληλα για ενσωμάτωση στη μαθησιακή διαδικασία. Ως εκπαιδευτικοί που αγαπούν το λειτούργημά τους και που διαρκώς στοχεύουν στη βελτίωση της ποιότητας της διδασκαλίας τους και στον εμπλουτισμό της με νέα μέσα και σύγχρονες διδακτικές μεθόδους, αναζητούμε εύχρηστα εργαλεία ώστε να δημιουργούμε κουίζ, ασκήσεις, παρουσιάσεις, νέα κειμενικά είδη και γενικά διδακτικό υλικό για τη σχολική μας τάξη. Ως εκ τούτου παρακολουθούμε διάφορα σεμινάρια και επιμορφώσεις που άπτονται των εκπαιδευτικών θεμάτων. Ανάμεσά τους ξεχωρίζουμε τα σεμινάρια etwinning, όπου παρουσιάζονται μεταξύ άλλων σύγχρονα εργαλεία για να αξιοποιηθούν ποικιλοτρόπως στη μαθησιακή διαδικασία.

Έχουμε χρησιμοποιήσει αρκετά από αυτά στα μαθήματά μας και κάποια από αυτά τα έχουμε ξεχωρίσει ιδιαίτερα για τα χαρακτηριστικά τους αλλά και για την πολύπλευρη παιδαγωγική τους αξιοποίηση στη μαθησιακή διαδικασία. Πρόκειται για το EDpuzzle, το Book Creator, το Quizziz, το Wordwall και το Artsteps. Στην εργασία μας ασχολούμαστε ξεχωριστά με καθένα από τα εργαλεία και επεξηγούμε με παραδείγματα και εικόνες πόσο εύκολη είναι η χρήση τους και πώς μπορούν να βρουν αποτελεσματική εφαρμογή στη μαθησιακή διαδικασία. Τονίζουμε τα βασικά τους χαρακτηριστικά και σχολιάζουμε πώς αξιοποιούνται παιδαγωγικά.

Λέξεις – κλειδιά: κουίζ, πολυμέσα, ψηφιακός εμπλουτισμός

ΑΞΙΟΠΟΙΩΝΤΑΣ ΤΙΣ ΔΥΝΑΤΟΤΗΤΕΣ ΤΟΥ ΗΛΕΚΤΡΟΝΙΚΟΥ ΒΙΒΛΙΟΥ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΙΣΤΟΡΙΑΣ: ΜΙΑ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΓΙΑ ΤΗΝ Γ΄ ΓΥΜΝΑΣΙΟΥ

Λεύκα Βασιλική
Εκπαιδευτικός ΠΕ02
Γυμνάσιο Μπιζανίου
Ιωάννινα, Ελλάδα
email: vlefka@sch.gr

Τσιούρη Ευθυμία
Εκπαιδευτικός ΠΕ02
Γυμνάσιο Περάματος
Ιωάννινα, Ελλάδα
email: mtsiouri@sch.gr

ΠΕΡΙΛΗΨΗ

Στο σύγχρονο εκπαιδευτικό περιβάλλον, η ενσωμάτωση των ψηφιακών μέσων και εργαλείων στην διδακτική πράξη αναδεικνύεται ως κρίσιμος παράγοντας για την ενίσχυση της μαθησιακής εμπειρίας και την προώθηση της ενεργού μάθησης. Ιδιαίτερα για τη διδασκαλία του μαθήματος της ιστορίας, τα ηλεκτρονικά βιβλία (e-books) αποτελούν μια σύγχρονη και δυναμική μορφή ψηφιακού μέσου, η οποία μπορεί να αξιοποιηθεί αποτελεσματικά και να έχει πολλαπλά οφέλη μέσω του εμπλουτισμού του διδακτικού υλικού με πολυμεσικά στοιχεία, όπως η διαδραστικότητα, η ενίσχυση της μαθητοκεντρικής μάθησης, η προώθηση της διαφοροποιημένης διδασκαλίας και η ανάπτυξη ψηφιακών δεξιοτήτων στους μαθητές. Η παρούσα ανακοίνωση προτείνει ως καλή πρακτική αξιοποίησης των ψηφιακών μέσων στην εκπαιδευτική διαδικασία τη δημιουργία και χρήση ενός πρωτότυπου ηλεκτρονικού βιβλίου (e-book) για τη συνδυαστική διδασκαλία διαφόρων ενοτήτων της ιστορίας στην Γ΄ Γυμνασίου. Συγκεκριμένα, παρουσιάζεται η περίπτωση ενός ηλεκτρονικού βιβλίου που δημιουργήθηκε[2] με την πλατφόρμα Book Creator και έχει σχεδιαστεί ειδικά για να αποτελέσει εργαλείο για τη διδασκαλία των βασικότερων ιστορικών σταθμών της διαμόρφωσης των συνόρων του ελληνικού κράτους, στο μάθημα της ιστορίας για την Γ΄ Γυμνασίου. Το ηλεκτρονικό βιβλίο αξιοποιώντας ποικίλα πολυμεσικά στοιχεία, όπως χάρτες, εικόνες, βίντεο, φωνητική αφήγηση, διαδραστικές και ομαδοσυνεργατικές δραστηριότητες έχει ως στόχο να καταστήσει τη μάθηση της ιστορίας πιο ελκυστική και αποτελεσματική για τους μαθητές. Η ευκολία χρήσης, οι ποικίλες δυνατότητες διαμόρφωσης διαδραστικού περιεχομένου και η ευελιξία προσαρμογής στις ανάγκες του μαθήματος αλλά και του μαθητή συμβάλλουν στην καλύτερη κατανόηση της ιστορικής αφήγησης, στην ανάπτυξη της ιστορικής σκέψης και στην κριτική προσέγγιση των ιστορικών πηγών από τους μαθητές, καθώς και στην ενίσχυση της αυτενέργειας του μαθητή και τον ψηφιακό του γραμματισμό. Τα συμπεράσματα από την πιλοτική εφαρμογή του ηλεκτρονικού βιβλίου στην τάξη, οι εντυπώσεις των μαθητών, η ανταπόκριση και αλληλεπίδραση τους με το βιβλίο παρέχουν σημαντικές πληροφορίες για την συνολική συμβολή του στην μαθησιακή διαδικασία, την κατανόηση του παρελθόντος και την εμπέδωση της ιστορικής γνώσης.

Λέξεις – κλειδιά: ηλεκτρονικό βιβλίο (e-book), διδασκαλία ιστορίας, ψηφιακά μέσα, Book Creator, μαθητοκεντρική μάθηση, πολυμεσικά στοιχεία

[2]Το συγκεκριμένο ηλεκτρονικό βιβλίο δημιουργήθηκε στα πλαίσια εργασίας του μεταπτυχιακού προγράμματος «Ψηφιακές και Ήπιες Δεξιότητες στις Επιστήμες της Αγωγής», του Διεθνούς Πανεπιστημίου Ελλάδος (ΔΙΠΑΕ).

ΕΞΕΡΕΥΝΩΝΤΑΣ ΤΟΝ ΚΟΣΜΟ ΜΕ ΓΕΩΓΡΑΦΙΚΑ ΠΛΗΡΟΦΟΡΙΑΚΑ ΣΥΣΤΗΜΑΤΑ (GIS): Η ΓΕΩΓΡΑΦΙΑ ΣΤΗΝ ΠΡΑΞΗ

Μπάγκου Ευαγγελία
Εκπαιδευτικός ΠΕ86, Μηχανικός Γεωπληροφορικής & Τοπογραφίας - MSc Περιβαλλοντολόγος ΑΠΘ,
3ο Πειραματικό Δημοτικό Σχολείο Ευόσμου
Θεσσαλονίκη, Ελλάδα
e-mail: li.mpagkou@gmail.com

Βασιλούδη Αγγελική
Εκπαιδευτικός ΠΕ70, Μεταπτυχιακή Φοιτήτρια
3ο Πειραματικό Δημοτικό Σχολείο Ευόσμου, Α.Π.Θ
Θεσσαλονίκη, Ελλάδα
e-mail: vasiloudia@gmail.com

ΠΕΡΙΛΗΨΗ

Η εκπαίδευση και ειδικότερα το μάθημα της Γεωγραφίας, χρειάζεται καινοτόμα προγράμματα και πρωτότυπες ιδέες. Το Νέο Πρόγραμμα Σπουδών για την Γεωγραφία στο Δημοτικό Σχολείο (2021) αναφέρει την εισαγωγή των Γεωγραφικών Πληροφοριακών Συστημάτων – ΓΣΠ (Geographic Information System –GIS) στην διδακτική πράξη, χωρίς, ωστόσο, να δίνονται στους εκπαιδευτικούς συγκεκριμένες οδηγίες για την επίτευξη αυτού του στόχου. Θέλοντας να γίνει πιο διαδραστικό το μάθημα της Γεωγραφίας, εντάξαμε τα ΓΣΠ στο μάθημα, δίνοντας στους μαθητές τη δυνατότητα να εξερευνήσουν τον κόσμο με αυτά.

Η καινοτόμος δράση αυτή, θα πραγματοποιηθεί σε 22 μαθητές/τριες της Στ΄ τάξης του 3ου Πειραματικού Δημοτικού σχολείου Ευόσμου, από τον Φεβρουάριο ως τον Ιούνιο του 2025. Ο χρόνος υλοποίησης της δράσης πραγματοποιείται εντός του σχολικού ωραρίου και συμπεριλαμβάνεται στις δράσεις των Β΄ και Γ΄ σχολικών τριμήνων. Πραγματοποιείται σε συνεργασία μεταξύ της δασκάλας του τμήματος και της εκπαιδευτικού πληροφορικής με ειδίκευση στα ΓΣΠ.

Τα G.I.S. (Geographic Information Systems) συνδυάζουν τις βάσεις δεδομένων και τα σχεδιαστικά προγράμματα, με σκοπό να επιτρέπουν την επεξεργασία της χωρικής και περιγραφικής πληροφορίας, με τελικό αποτέλεσμα τη δημιουργία δυναμικών χαρτών. Είναι σκόπιμο να αναφερθεί ότι τα GIS αποτελούν δυναμικά συστήματα πληροφοριών, τα οποία με την τεχνολογία της Πληροφορικής και τις ειδικές μαθηματικές μεθόδους διαχειρίζονται και αξιοποιούν δεδομένα από τις Γεωεπιστήμες για την παραγωγή μεταπληροφορίας (μεταδεδομένα - metadata), δηλαδή πληροφορίας υψηλότερου επιπέδου (Bagkou, 2013). Γενικά μπορούμε να πούμε ότι είναι ένα ολοκληρωμένο, σύγχρονο αλλά και πολυδιάστατο «εργαλείο» που προέρχεται και συσχετίζεται άμεσα με το χώρο της πληροφορικής (Konstantinidis, 2002). Παρέχουν την δυνατότητα συλλογής, διαχείρισης, αποθήκευσης, επεξεργασίας, ανάλυσης και οπτικοποίησης, σε ψηφιακό περιβάλλον, των δεδομένων που σχετίζονται με τον χώρο.

Σκοπός της παρούσας εργασίας είναι η παρουσίαση παραδειγμάτων δραστηριοτήτων της συγκεκριμένης καινοτόμας πρακτικής στη διδασκαλία της Γεωγραφίας. Συγκεκριμένα, οι στόχοι του καινοτόμου προγράμματος είναι α) η ενίσχυση της χωρικής αντίληψης των μαθητών/τριών μέσω της εφαρμογής των Γεωγραφικών Πληροφοριακών Συστημάτων (GIS), β) η καλλιέργεια δεξιοτήτων ανάλυσης δεδομένων και επίλυσης προβλημάτων, γ) η ανάπτυξη της συνεργασίας και της ομαδικής εργασίας μέσα από τη διερεύνηση γεωγραφικών θεμάτων και δ) η σύνδεση της γεωγραφίας με την καθημερινή ζωή και τις σύγχρονες ανάγκες.

Οι μαθητές μέσω των δραστηριοτήτων που πραγματοποιούνται (συλλογή δεδομένων, δημιουργία γραμμικών – σημειακών – πολυγωνικών αρχείων, εξαγωγή τελικών χαρτών), έρχονται σε επαφή με βασικές λειτουργίες χαρτογράφησης, εξετάζουν γεωγραφικά δεδομένα και δημιουργούν διαδραστικούς χάρτες στους οποίους απεικονίζουν τις πληροφορίες που συλλέγουν.

Τα προσδοκώμενα μαθησιακά αποτελέσματα είναι:
1. Ανάπτυξη δεξιοτήτων στη χρήση τεχνολογιών και γεωγραφικών δεδομένων.
2. Καλλιέργεια κριτικής σκέψης μέσα από την ανάλυση και τη σύνθεση πληροφοριών.
3. Ενίσχυση της χωρικής αντίληψης και της κατανόησης του φυσικού και ανθρωπογενούς περιβάλλοντος.
4. Ανάπτυξη βασικών δεξιοτήτων στα ψηφιακά σχεδιαστικά προγράμματα.

Τα θέματα που αναπτύσσονται στο πλαίσιο της συγκεκριμένης παρέμβασης περιλαμβάνουν α) τα φυσικά χαρακτηριστικά της Ελλάδας (βουνά, ποτάμια, θάλασσες), β) τις ανθρώπινες δραστηριότητες και πληθυσμιακές κατανομές και γ) τα περιβαλλοντικά ζητήματα (π.χ., πράσινοι χώροι, ρύπανση).Τέλος, οι μαθητές θα δουλεύουν σε ομάδες με καθορισμένους ρόλους.

Για την επίτευξη των στόχων του προγράμματος οι μαθητές χρησιμοποιούν το λογισμικό ArcGIS Online, σχολικά εγχειρίδια γεωγραφίας., διαδικτυακούς χάρτες και γεωγραφικές βάσεις δεδομένων καθώς και φωτογραφικό υλικό που έχουν συλλέξει οι ίδιοι οι μαθητές. Το λογισμικό ArcGIS Online επιλέχθηκε γιατί θεωρήθηκε από τους εκπαιδευτικούς ότι είναι το πιο αξιόπιστο σχεδιαστικό πρόγραμμα και μπορεί να χρησιμοποιηθεί δωρεάν για ένα συγκεκριμένο χρονικό διάστημα.

Η συγκεκριμένη δράση δεν έχει εφαρμοστεί στο παρελθόν στη σχολική μονάδα μας. Ωστόσο, βασίζεται σε διεθνώς αναγνωρισμένες πρακτικές για τη διδασκαλία της γεωγραφίας μέσω σύγχρονων τεχνολογικών εργαλείων, όπως τα Γεωγραφικά Πληροφοριακά Συστήματα (GIS). Η δράση αποτελεί πρωτοβουλία που εισάγει τους μαθητές στη χρήση καινοτόμων μεθόδων, προσαρμοσμένων στις ανάγκες της εκπαιδευτικής κοινότητας για την ανάπτυξη δεξιοτήτων.

Λέξεις – κλειδιά: Γεωγραφικά Πληροφοριακά Συστήματα (GIS), Διαδραστικοί χάρτες, καινοτόμες δράσεις, ArcGIS, Διδασκαλία Γεωγραφίας, Δημοτικό Σχολείο

Η ΧΡΗΣΗ ΤΩΝ PODCAST ΣΤΑ ΦΙΛΟΛΟΓΙΚΑ ΜΑΘΗΜΑΤΑ ΜΙΑ ΠΟΙΟΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Μπότσαρη Λαμπρινή
Εκπαιδευτικός ΠΕ02, Φιλόλογος
Πρότυπο Λύκειο Ζωσιμαίας Σχολής Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: lmpotsari@gmail.com

Αζέλη Ερασμία
Εκπαιδευτικός ΠΕ02, Φιλόλογος
Πρότυπο Λύκειο Ζωσιμαίας Σχολής Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: lmpotsari@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα ερευνητική εργασία εξετάζει τη χρήση των podcast ως σύγχρονου εκπαιδευτικού εργαλείου στη διδασκαλία των φιλολογικών μαθημάτων. Στόχος της μελέτης είναι η διερεύνηση της παιδαγωγικής αξίας των podcast, η κατανόηση του τρόπου με τον οποίο διαμορφώνουν τη μαθησιακή εμπειρία των μαθητών, καθώς επίσης και η αξιολόγηση της αποτελεσματικότητάς τους στη βελτίωση της κατανόησης και της κριτικής προσέγγισης σε θέματα λογοτεχνίας, γλώσσας και ιστορίας. Η μεθοδολογία της συγκεκριμένης έρευνας βασίζεται σε ποιοτικές μεθόδους, περιλαμβάνοντας ημιδομημένες συνεντεύξεις με φιλολόγους και μαθητές δευτεροβάθμιας εκπαίδευσης, καθώς και ανάλυση περιεχομένου επιλεγμένων εκπαιδευτικών podcast. Ιδιαίτερη έμφαση δίνεται στην αξιολόγηση της διαδραστικότητας, της αφηγηματικής προσέγγισης και του βαθμού εμπλοκής των μαθητών στη διαδικασία της μάθησης μέσω της ηχητικής εμπειρίας. Παράλληλα, διερευνώνται οι παράγοντες που επηρεάζουν την αποδοχή των podcast ως μαθησιακού μέσου, όπως η θεματολογία, η ποιότητα της παραγωγής, η γλωσσική προσαρμογή και η συνάφεια με τα σχολικά αναλυτικά προγράμματα. Τα ευρήματα της έρευνας αποκαλύπτουν ότι η χρήση των podcast στη διδασκαλία μπορεί να προσφέρει πολλαπλά οφέλη. Συγκεκριμένα, ενισχύει τη μαθησιακή ευελιξία, επιτρέποντας στους μαθητές να προσλαμβάνουν τη γνώση σε οποιαδήποτε χρονική στιγμή και από οποιοδήποτε περιβάλλον. Επιπλέον, η αφηγηματική μορφή και η χρήση ήχου δημιουργούν μια πιο ζωντανή και εμπλουτισμένη μαθησιακή εμπειρία, η οποία μπορεί να αυξήσει την προσοχή, τη συγκέντρωση και την εμπλοκή των μαθητών. Ωστόσο, καταγράφονται και προκλήσεις, όπως η απουσία οπτικών ερεθισμάτων, που είναι κρίσιμα για ορισμένες διδακτικές ενότητες, καθώς και η ανάγκη για προσεκτικά επιλεγμένο και ποιοτικά ελεγμένο περιεχόμενο. Συμπερασματικά, η έρευνα υπογραμμίζει τη δυναμική των podcast ως συμπληρωματικό εργαλείο διδασκαλίας των φιλολογικών μαθημάτων, αναδεικνύοντας την ανάγκη ένταξής τους σε οργανωμένες εκπαιδευτικές στρατηγικές. Προτείνεται η δημιουργία εξειδικευμένου εκπαιδευτικού περιεχομένου, προσαρμοσμένου στις ανάγκες των μαθητών, καθώς και η επιμόρφωση των εκπαιδευτικών στην αποτελεσματική αξιοποίησή τους. Με την κατάλληλη παιδαγωγική καθοδήγηση, τα podcast μπορούν να συμβάλουν ουσιαστικά στην καλλιέργεια της κριτικής σκέψης, της δημιουργικότητας και της ενεργητικής συμμετοχής των μαθητών στη μαθησιακή διαδικασία.

Λέξεις – κλειδιά: podcast , φιλολογικά μαθήματα, ποιοτική έρευνα

ΒΕΛΤΙΣΤΕΣ ΠΡΑΚΤΙΚΕΣ ΓΙΑ ΤΗΝ ΕΝΣΩΜΑΤΩΣΗ ΤΩΝ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ: ΜΙΑ ΟΛΙΣΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Αναστασία Παλάτσου
Φιλόλογος, M.Ed.
Διευθύντρια 1ου Γενικού Λυκείου Φιλιππιάδας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας
Πρέβεζα, Ελλάδα
email: natassapal@gmail.com

Κώστας Ασημακόπουλος
Καθηγητής
Τμήμα Διοίκησης Οργανισμών, Μάρκετινγκ και Τουρισμού
Διεθνές Πανεπιστήμιο της Ελλάδος (ΔΙ.ΠΑ.Ε.)
Θεσσαλονίκη, Ελλάδα
email: casim@ihu.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εστιάζει στις βέλτιστες πρακτικές ενσωμάτωσης των ψηφιακών τεχνολογιών στη διδακτική διαδικασία μέσα από μια ολιστική προσέγγιση. Στόχος της είναι η παρουσίαση σύγχρονων παιδαγωγικών στρατηγικών που αξιοποιούν ψηφιακά εργαλεία, η ανάδειξη των πλεονεκτημάτων και των εγγενών προκλήσεών τους, καθώς και η πρόταση συγκεκριμένων εφαρμογών τόσο στο ελληνικό όσο και στο διεθνές εκπαιδευτικό πλαίσιο. Μέσα από τη βιβλιογραφική ανασκόπηση, τη διερεύνηση καινοτόμων πρακτικών και την ανάλυση σχετικών πολιτικών και συστάσεων, η μελέτη φιλοδοξεί να αποτελέσει ένα ολοκληρωμένο σημείο αναφοράς για εκπαιδευτικούς, ερευνητές και εκπαιδευτικούς οργανισμούς.

Η μεθοδολογική προσέγγιση βασίστηκε σε εκτενή ανασκόπηση πρόσφατων ερευνών και μελετών περίπτωσης, με στόχο τον εντοπισμό σύγχρονων τάσεων και καινοτόμων παιδαγωγικών πρακτικών που αξιοποιούν ψηφιακά εργαλεία στην εκπαίδευση. Η ανάλυση οργανώθηκε θεματικά και εξέτασε την εφαρμογή των τεχνολογιών στη μεικτή και υβριδική μάθηση, τις παιδαγωγικές δυνατότητες των πολυμεσικών και διαδραστικών εργαλείων, τη χρήση Εικονικών Περιβαλλόντων Μάθησης (Virtual Learning Environments – VLEs) στη διδασκαλία, καθώς και τις πρακτικές αξιολόγησης και ανατροφοδότησης μέσω Συστημάτων Διαχείρισης Μάθησης (Learning Management Systems – LMS), με ιδιαίτερη έμφαση στον ρόλο της Τεχνητής Νοημοσύνης (Artificial Intelligence – AI) στην ενίσχυση της εξατομίκευσης και στη βελτιστοποίηση της μαθησιακής διαδικασίας.

Τα ευρήματα καταδεικνύουν ότι η σκόπιμη, στοχευμένη και παιδαγωγικά τεκμηριωμένη χρήση των ψηφιακών τεχνολογιών μπορεί να ενισχύσει ουσιαστικά την ενεργό συμμετοχή, τη συνεργασία και την αυτορρύθμιση των εκπαιδευομένων, ενώ παράλληλα βελτιώνει την ποιότητα της διδασκαλίας και καθιστά δυνατή την εξατομικευμένη αξιολόγηση και ανατροφοδότηση σε πραγματικό χρόνο. Συμπερασματικά, υποστηρίζεται ότι η συστηματική ενσωμάτωση των ψηφιακών εργαλείων στο πλαίσιο μιας ολιστικής στρατηγικής συμβάλλει στη δημιουργία ευέλικτων, προσαρμοστικών και αποτελεσματικών μαθησιακών περιβαλλόντων.

Λέξεις-κλειδιά: Ψηφιακά μαθησιακά εργαλεία, καινοτόμες παιδαγωγικές πρακτικές, Εικονικά Περιβάλλοντα Μάθησης (VLEs), Τεχνητή Νοημοσύνη, εξατομικευμένη μάθηση, ψηφιακά συστήματα αξιολόγησης.

ΑΞΙΟΠΟΙΗΣΗ ΑΙΣΘΗΤΗΡΩΝ ΥΓΡΑΣΙΑΣ ΕΔΑΦΟΥΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΠΡΑΞΗ ΜΕ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ

Καραχρήστος Χριστόφορος
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ86)
2ο ΓΕΛ Αιτωλικού
email: karachristos.x@gmail.com

Διαμαντόπουλος Μάριος
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ82)
ΕΝ.Ε.Ε.ΓΥ.-Λ. Κορωπίου
email: diamantmarios@gmail.com

Παντερμαλή Μαρία
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ88.01)
ΕΝ.Ε.Ε.ΓΥ.-Λ. Μεσολογγίου
email: mpantermali@gmail.com

Πατρόπουλος Αθανάσιος
Διευθυντής, Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ86)
ΕΝ.Ε.Ε.ΓΥ.-Λ. Μεσολογγίου
email: apatrop@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση ψηφιακών μέσων στη σύγχρονη εκπαιδευτική πραγματικότητα αποτελεί καθοριστικό παράγοντα για την αναβάθμιση της διδασκαλίας και την ανάπτυξη δεξιοτήτων STEM στους μαθητές. Παρόλο που στην Ευρωπαϊκή Ένωση δεν υπάρχει ένας συγκεκριμένος ορισμός, το STEM αναφέρεται γενικά στους τομείς της επιστήμης, της τεχνολογίας, της μηχανικής και των μαθηματικών, οι οποίοι θεωρούνται κρίσιμοι για την καινοτομία, την οικονομική ανάπτυξη και την ευημερία. Η εκπαίδευση STEM δίνει έμφαση στην κριτική σκέψη, την επίλυση προβλημάτων και τη δημιουργικότητα, συνδυάζοντας τη θεωρία με την πρακτική εφαρμογή.

Στο πλαίσιο αυτό, η παρούσα εργασία παρουσιάζει τη χρήση αισθητήρων υγρασίας εδάφους σε συνδυασμό με τεχνολογικά εργαλεία για την ενίσχυση της μαθησιακής διαδικασίας στο μάθημα "Φυτική Παραγωγή" της Β’ τάξης του Ενιαίου Ειδικού Επαγγελματικού Γυμνασίου-Λυκείου (ΕΝ.Ε.Ε.ΓΥ.-Λ.) Μεσολογγίου. Το πρόγραμμα υλοποιήθηκε από μαθητές με την καθοδήγηση των εκπαιδευτικών τους, στο πλαίσιο της εργαστηριακής διδασκαλίας του μαθήματος.

Η προσέγγιση αυτή επιτρέπει τη συλλογή, ανάλυση και οπτικοποίηση δεδομένων που αφορούν την υγρασία του εδάφους σε πραγματικό χρόνο. Οι μαθητές εμπλέκονται ενεργά στην τοποθέτηση αισθητήρων στο σχολικό κήπο, καταγράφουν δεδομένα υγρασίας μέσω ψηφιακών πλατφορμών και λογισμικού, όπως το Arduino και το Raspberry Pi, και συγκρίνουν τις μετρήσεις με παραδοσιακές αρδευτικές πρακτικές. Με τον τρόπο αυτό, αναπτύσσουν βασικές γνώσεις στη γεωπονία, την πληροφορική και τα μαθηματικά, ενισχύοντας παράλληλα την κριτική σκέψη και τις δεξιότητες επίλυσης προβλημάτων.

Επιπλέον, η διαθεματική προσέγγιση αυτής της δράσης καθιστά εφικτή τη σύνδεση της θεωρητικής γνώσης με την πρακτική εφαρμογή, καθιστώντας τη μάθηση πιο βιωματική και προσαρμοσμένη στις ανάγκες των μαθητών. Παράλληλα, η αξιοποίηση των δεδομένων επιτρέπει την ανάπτυξη περιβαλλοντικής συνείδησης και την κατανόηση της σημασίας της ορθολογικής διαχείρισης των φυσικών πόρων, όπως το νερό στην άρδευση.

Η εργασία παρουσιάζει τα στάδια σχεδιασμού και υλοποίησης του προγράμματος, καθώς και τα παιδαγωγικά οφέλη που προκύπτουν από τη χρήση των αισθητήρων υγρασίας στην εκπαιδευτική πρακτική. Επιπλέον, αναλύονται τα τεχνικά και διδακτικά εργαλεία που χρησιμοποιήθηκαν, οι προκλήσεις που αντιμετωπίστηκαν και οι προοπτικές εξέλιξης της μεθόδου στο πλαίσιο της ειδικής αγωγής και εκπαίδευσης.

Τα αποτελέσματα της εφαρμογής καταδεικνύουν ότι η ενσωμάτωση των αισθητήρων υγρασίας εδάφους και των ψηφιακών μέσων στη διδακτική διαδικασία ενισχύει τη βιωματική μάθηση, αναπτύσσει δεξιότητες STEM και ψηφιακού προγραμματισμού και βελτιώνει τη συνεργασία μεταξύ μαθητών και εκπαιδευτικών. Συνεπώς, προτείνεται η επέκταση της μεθοδολογίας και σε άλλες εκπαιδευτικές βαθμίδες, με σκοπό τη δημιουργία καινοτόμων μαθησιακών περιβαλλόντων που αξιοποιούν την τεχνολογία προς όφελος της εκπαίδευσης και της βιώσιμης ανάπτυξης.

Λέξεις – κλειδιά: Αισθητήρες υγρασίας εδάφους, ψηφιακά μέσα στην εκπαίδευση, διαθεματική μάθηση, στρατηγικές STEM

eTwinning: ΚΤΙΖΟΝΤΑΣ ΜΙΑ ΙΣΧΥΡΗ ΚΟΙΝΟΤΗΤΑ ΚΑΙΝΟΤΟΜΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ

Παρασκευάς Μιχάλης
Καθηγητής στο Πανεπιστήμιο Πελοποννήσου
Αντιπρόεδρος στο Ινστιτούτο Τεχνολογίας Υπολογιστών και Εκδόσεων «Διόφαντος»
Επικεφαλής του Εθνικού Οργανισμού Υποστήριξης eTwinning
email: mparask@cti.gr

ΠΕΡΙΛΗΨΗ

Το eTwinning είναι μια εμβληματική δράση της Ευρωπαϊκής Επιτροπής που προωθεί την εκπαιδευτική καινοτομία και την ανάπτυξη ψηφιακών δεξιοτήτων μέσω συνεργατικών προγραμμάτων. Από το 2005, στην Ελλάδα συμμετείχαν πάνω από 50.000 εκπαιδευτικοί και 14.000 σχολεία, υλοποιώντας περισσότερα από 23.000 έργα. Ο Εθνικός Οργανισμός Υποστήριξης (Ε.Ο.Υ.) eTwinning, υπό την εποπτεία του ΙΤΥΕ «Διόφαντος» και του Υπουργείου Παιδείας, ενισχύει την κοινότητα Ελλήνων eTwinners μέσω των ακόλουθων θεσμών:

Ανοικτά Διαδικτυακά Μαθήματα και MOOCs: Αφορούν σε επιμορφώσεις εστιασμένες σε ΤΠΕ, Web 2.0, διαδραστικούς πίνακες, εκπαιδευτική ρομποτική και STEM. Κάθε κύκλος περιλαμβάνει 200 ώρες επιμόρφωσης, υποστηριζόμενες από 1.000 εθελοντές επιμορφωτές. Ιδιαίτερη έμφαση δίνεται στη Τεχνητή Νοημοσύνη (ΤΝ), όπου στοχευμένα διαδικτυακά μαθήματα και MOOC βοηθούν τους εκπαιδευτικούς να την ενσωματώσουν στη δημιουργία συνεργατικών έργων. Σύμφωνα με το Selfie4Teachers της Ε.Ε., η συμμετοχή στα διαδικτυακά μαθήματα έχει βελτιώσει τις ψηφιακές δεξιότητες των εκπαιδευτικών κατά 17% και των επιμορφωτών κατά 15%. Από το 2021 έως σήμερα, πάνω από 50.000 εκπαιδευτικοί έχουν συμμετάσχει στα ανοικτά διαδικτυακά μαθήματα.

Δράση STEM eTwinning: Σήμερα, 900 σχολεία (1.000 μέχρι το τέλος 2025) διαθέτουν STEM εξοπλισμό από το eTwinning και λαμβάνουν υπηρεσίες επιμόρφωσης από οκτώ (8) διαδικτυακά μαθήματα εστιασμένα στην STEM εκπαίδευση. Επίσης, ο Ε.Ο.Υ. eTwinning διοργανώνει εθνικά και διεθνή σεμινάρια, όπως αυτό που θα διεξαχθεί στην Πύλο τον Μάιο 2025, όπου 50 εκπαιδευτικοί θα επιμορφωθούν σε εκπαιδευτική ρομποτική, προγραμματισμό και φυσικές επιστήμες μέσω Arduino, Micro:bit και STEM kits. Ως αποτέλεσμα αυτών, οι Έλληνες εκπαιδευτικοί υλοποιούν πολλά και ποιοτικά συνεργατικά έργα σε STEM και διακρίνονται σε εθνικούς και ευρωπαϊκούς διαγωνισμούς.

Δράση Initial Teacher Education (δράση ITE): Εκπαιδεύει φοιτητές παιδαγωγικών τμημάτων των Πανεπιστημίων στην εφαρμογή του eTwinning στη διδακτική πρακτική. Σήμερα συμμετέχουν 16 πανεπιστημιακά τμήματα στην Ελλάδα, ενσωματώνοντας το eTwinning στα προγράμματα σπουδών και εκπαιδεύοντας τους φοιτητές στη δημιουργία συνεργατικών έργων. Για την επιμόρφωση των συμμετεχόντων ο Ε.Ο.Υ. eTwinning παρέχει το MOOC «eTwinning ITE». Η Ελλάδα συμμετέχει επίσης ενεργά στον Ευρωπαϊκό Διαγωνισμό της δράσης ITE.

Πρεσβευτές eTwinning: Είναι ένα εθελοντικό δίκτυο 43 εκπαιδευτικών που υποστηρίζουν συναδέλφους στην υλοποίηση συνεργατικών έργων συμβάλλουν στη διάδοση καλών πρακτικών και πραγματοποιούν επιμορφώσεις. Το 2023-24 πραγματοποίησαν 300+ διαδικτυακές επιμορφώσεις με περισσότερες από 20.000 συμμετοχές εκπαιδευτικών.

Εθνικοί και Ευρωπαϊκοί Διαγωνισμοί: Η Ελλάδα διοργανώνει κάθε χρόνο με επιτυχία εθνικούς διαγωνισμούς, ενώ τα εθνικά συνέδρια eTwinning αποτελούν μια πλατφόρμα ανταλλαγής καλών πρακτικών. Έλληνες εκπαιδευτικοί και σχολεία λαμβάνουν συστηματικά διακρίσεις στους ευρωπαϊκούς διαγωνισμούς eTwinning.

Το **ηλεκτρονικό περιοδικό WELCOME**, διαθέσιμο από το 2023, αποτελεί ένα ανοικτό αποθετήριο εκπαιδευτικών πρακτικών και ερευνών με εστίαση στα συνεργατικά έργα. Στις εκδόσεις eTwinning περιλαμβάνονται επίσης και **οδηγοί καλών πρακτικών**, μεθοδολογίες και διδακτικά παραδείγματα, προσφέροντας πολύτιμο εκπαιδευτικό υλικό στην εκπαιδευτική κοινότητα.

Τέλος, ο Ε.Ο.Υ. eTwinning συνεργάζεται με θεσμικούς φορείς όπως:

- Το Ινστιτούτο Εκπαιδευτικής Πολιτικής (ΙΕΠ), για την προώθηση των Εργαστηρίων Δεξιοτήτων μέσω συνεργατικών έργων.
- Το Ίδρυμα Κρατικών Υποτροφιών (ΙΚΥ), για την ενίσχυση της συμμετοχής των σχολείων στο πρόγραμμα Erasmus+.
- Πανεπιστήμια, για την ενσωμάτωση του eTwinning στα προγράμματα σπουδών.

Συμπεράσματα

Η ελληνική κοινότητα eTwinning αναπτύσσει σύγχρονα συνεργατικά εκπαιδευτικά μοντέλα, εστιάζοντας σε ψηφιακές δεξιότητες, STEM και Τεχνητή Νοημοσύνη. Οι επιμορφώσεις, διεθνείς συνεργασίες και διαρκείς καινοτομίες καθιστούν το eTwinning μια ηγετική δύναμη στην εκπαιδευτική καινοτομία στην Ελλάδα και στην Ευρώπη.

Λέξεις – κλειδιά: eTwinning, Συνεργατική Μάθηση, Ψηφιακές Δεξιότητες, STEM Εκπαίδευση, Εκπαιδευτική Καινοτομία

Η ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΕΡΓΑΛΕΙΩΝ ΣΤΗΝ ΑΞΙΟΛΟΓΗΣΗ ΤΟΥ ΚΛΙΜΑΤΟΣ ΑΝΘΡΩΠΙΝΩΝ ΔΙΚΑΙΩΜΑΤΩΝ ΣΕ ΣΧΟΛΙΚΟ ΠΕΡΙΒΑΛΛΟΝ

Ρούσσα Μαρία
Νοσηλευτικής, ΠΕ87.02
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: roussaki2@gmail.com

Θανασάρα Ευαγγελή
Οικονομίας-Τουρισμού, ΠΕ80 & Ιταλικής Φιλολογίας, ΠΕ34
1ο Επαγγελματικό Λύκειο Καρπάθου
Κάρπαθος, Ελλάδα
e-mail: gonzalitsa@gmail.com

Γάκη Βασιλική
Χημικός, ΠΕ04.02 & Πληροφορικός, ΠΕ86
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: iliasde66@gmail.com

Ντέντες Ηλίας
Οικονομολόγος, ΠΕ80 & Ηλεκτρονικός, ΠΕ84
1ο Γενικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: iliasde@hotmail.com

Γιαννούλη Σοφία
Φιλόλογος, ΠΕ02
1ο Πρότυπο Γυμνάσιο Πρέβεζας με Λ.Τ.
Πρέβεζα, Ελλάδα
e-mail: alexandropoulosalekos@yahoo.com

Χασάνης Βασίλειος
Ηλεκτρολόγος, ΠΕ83 & Πληροφορικός, ΠΕ86
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: vasileioschasanis@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εστιάζει στην αξιολόγηση της «Θερμοκρασίας» των Ανθρωπίνων Δικαιωμάτων στην εκπαιδευτική κοινότητα, με στόχο την αποτίμηση του κλίματος σε σχέση με τα δικαιώματα του ανθρώπου και την εφαρμογή των αρχών της Οικουμενικής Διακήρυξης των Δικαιωμάτων του Ανθρώπου. Αντικείμενο της εργασίας είναι να αναδείξει τη σημασία της ισότητας, της ασφάλειας και της προστασίας των δικαιωμάτων των μαθητών και των μαθητριών.

Η μεθοδολογία που χρησιμοποιήθηκε περιλαμβάνει τη χρήση ερωτηματολογίου Google Forms, που βασίζεται σε 25 κρίσιμες δηλώσεις, οι οποίες σχετίζονται άμεσα με τα ανθρώπινα δικαιώματα, όπως η ασφάλεια, η ίση πρόσβαση στην εκπαίδευση, η συμμετοχή στις δημοκρατικές διαδικασίες και η ελευθερία της έκφρασης. Οι ερωτήσεις αξιολογούν την εφαρμογή αυτών των δικαιωμάτων στην καθημερινή σχολική ζωή, χρησιμοποιώντας κλίμακα από το 1 έως το 4, με σκοπό την ποσοτική εκτίμηση της κατάστασης των ανθρωπίνων δικαιωμάτων. Το ερωτηματολόγιο διανεμήθηκε μέσω των email των συμμετεχόντων και των ιστοσελίδων των σχολείων, εξασφαλίζοντας ευρεία πρόσβαση.

Στην αξιολόγηση συμμετείχαν 235 μαθητές/τριες από 4 σχολεία, το 1ο Γενικό Λύκειο Πρέβεζας, το Εσπερινό ΕΠΑ.Λ. Πρέβεζας, το 1ο ΕΠΑ.Λ. Καρπάθου και το 1ο ΕΠΑ.Λ. Ηρακλείου Κρήτης, με στόχο την πλήρη ανασκόπηση των αντιλήψεων και εμπειριών της σχολικής κοινότητας. Χρησιμοποιήθηκε το Excel για την επεξεργασία των απαντήσεων και την εξαγωγή στατιστικών συμπερασμάτων, καθώς και για τη δημιουργία γραφημάτων για την οπτικοποίηση των αποτελεσμάτων. Η διαδικασία αξιολόγησης είχε ως στόχο την καταγραφή του κλίματος και την ανάλυση των περιοχών που ενδεχομένως απαιτούν βελτίωση. Ειδικότερα, η εργασία επικεντρώθηκε στην αναγνώριση περιοχών διάκρισης σε σχέση με το φύλο, τη φυλή, τη σωματική και διανοητική ικανότητα, καθώς και σε ζητήματα σχετικά με τη συμμετοχή των μαθητών και της σχολικής κοινότητας στις διαδικασίες λήψης αποφάσεων.

Σημαντικός στόχος ήταν η εξασφάλιση της ίσης πρόσβασης των μελών της κοινότητας στην εκπαίδευση και η καταπολέμηση των ανισοτήτων και διακρίσεων. Η αξιολόγηση της «Θερμοκρασίας» των Ανθρωπίνων Δικαιωμάτων συνδυάστηκε με τη χρήση σύγχρονων ψηφιακών μέσων, τα οποία συνέβαλαν στην ενίσχυση της συμμετοχής και της συνεργασίας μεταξύ των μαθητών/τριών, των εκπαιδευτικών κ.λ.π.. Τα ψηφιακά μέσα που χρησιμοποιήθηκαν ήταν οι υπολογιστές, τα tablets, τα κινητά τηλέφωνα, οι προτζέκτορες, καθώς και το διαδίκτυο. Διοργανώθηκαν διαδικτυακές συναντήσεις μέσω Zoom για συζήτηση των αποτελεσμάτων και ανταλλαγή απόψεων. Αναγνωρίστηκαν, επίσης, οι προκλήσεις που σχετίζονται με τη χρήση των ψηφιακών μέσων στην εκπαιδευτική διαδικασία.

Η εργασία επισήμανε την ανάγκη για την εφαρμογή μέτρων προστασίας των προσωπικών δεδομένων και της ιδιωτικότητας στην εκπαιδευτική κοινότητα. Τα ευρήματα δείχνουν ότι η «Θερμοκρασία» των Ανθρωπίνων Δικαιωμάτων μπορεί να βελτιωθεί με τη συνεχιζόμενη εκπαίδευση και την εφαρμογή στρατηγικών που ενισχύουν την ισότητα και την

αποδοχή της διαφορετικότητας. Παράλληλα, η ενσωμάτωση των ψηφιακών μέσων στην εκπαιδευτική διαδικασία όχι μόνο ενίσχυσε τη συμμετοχή των μαθητών/τριών στις διαδικασίες, αλλά συνέβαλε και στην ενδυνάμωση της επικοινωνίας και της διαφάνειας μέσα στην κοινότητα. Χρησιμοποιήθηκε το Google Docs για τη σύνταξη ψηφιακής έκθεσης με τα ευρήματα της έρευνας, ώστε όλοι οι συμμετέχοντες από τα 4 σχολεία, να έχουν άμεση πρόσβαση. Επίσης χρησιμοποιήθηκε το PowerPoint για τη δημιουργία διαδραστικής παρουσίασης με τα κυριότερα σημεία της έκθεσης.

Συνοψίζοντας, η εργασία καταδεικνύει την ανάγκη για μια ολοκληρωμένη προσέγγιση που συνδυάζει την αξιολόγηση των ανθρωπίνων δικαιωμάτων με την εφαρμογή στρατηγικών και ψηφιακών εργαλείων. Η εργασία αναδεικνύει τη σημασία της συνεχούς προσπάθειας για την προώθηση της κοινωνικής δικαιοσύνης, της αλληλεγγύης και του σεβασμού των ανθρωπίνων δικαιωμάτων στην εκπαιδευτική κοινότητα.

Λέξεις – κλειδιά: Ανθρώπινα δικαιώματα, εκπαιδευτική κοινότητα, ψηφιακά μέσα.

ΠΑΡΟΥΣΙΑΣΗ ΚΑΛΩΝ ΠΡΑΚΤΙΚΩΝ ΑΞΙΟΠΟΙΗΣΗΣ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ ΚΑΙ ΕΦΑΡΜΟΓΗ ΔΡΑΣΤΗΡΙΟΤΗΤΩΝ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΚΑΙ ΑΞΙΟΛΟΓΗΣΗΣ ΜΕ ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ, ΣΥΜΦΩΝΑ ΜΕ ΤΟ ΝΕΟ ΠΡΟΓΡΑΜΜΑ ΣΠΟΥΔΩΝ ΤΟΥ 2023 ΓΙΑ ΤΟ ΜΑΘΗΜΑ ΤΩΝ ΓΑΛΛΙΚΩΝ

Σίτα Ντούντα Ευαγγελία
Εκπαιδευτικός ΠΕ05 Γαλλικής ΔΙ.Δ.Ε. Ιωαννίνων, Μ.Δ.Ε. ΕΑΠ
Αρτα, Ελλάδα
e-mail: evangelia.sita@gmail.com

Αγγέλη Δήμητρα
Μεταπτυχιακή Φοιτήτρια «Πολιτική, Διοίκηση και Αξιολόγηση στην Εκπαίδευση» Παι.Τ.Δ.Ε. του Ε.Κ.Π.Α, ΠΕ05 Γαλλικής ΔΙ.Π.Ε. Ιονίων Νήσων, Μ.Δ.Ε. ΕΑΠ
Αρτα, Ελλάδα
e-mail: dimoulaaggeli71@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση και αξιοποίηση των ψηφιακών τεχνολογιών στην ξενόγλωσση εκπαίδευση διαδραματίζει πρωταγωνιστικό ρόλο στην υλοποίηση των στόχων του Νέου Προγράμματος Σπουδών σε έναν συνεχώς εξελισσόμενο ψηφιακό κόσμο που βαδίζει ταχύτατα πλέον στην εποχή της τεράστιας επίδρασης των εργαλείων τεχνητής νοημοσύνης. Η παιδαγωγικά προσανατολισμένη αξιοποίηση τους στη διδασκαλία με βάση τον σχεδιασμό του μαθήματος και τα προσδοκώμενα μαθησιακά αποτελέσματα εμπλουτίζει το περιεχόμενο της με πλούσιο αυθεντικό και επίκαιρο υλικό.

Η μαθησιακή διαδικασία γίνεται πιο ελκυστική και παιγνιώδης για τους/τις μαθητές/τριες, συμμετέχοντας πλέον οι ίδιοι ενεργά με δραστηριότητες βιωματικού χαρακτήρα μέσα σε ψηφιακά περιβάλλοντα, αναπτύσσοντας με τον τρόπο αυτό δεξιότητες ψηφιακού γραμματισμού καθώς και πλήθος άλλων ήπιων και κοινωνικών δεξιοτήτων μετατρέποντας με αυτό τον τρόπο σταδιακά την τάξη σε κοινότητα δημιουργικής μάθησης.

Σκοπός της παρούσας εισήγησης είναι να αναδείξει τις δυνατότητες που προσφέρουν τα ψηφιακά εργαλεία για τη διαφοροποίηση της διδασκαλίας και της αξιολόγησης, καθώς και να παρουσιάσει συγκεκριμένες πρακτικές και παραδείγματα εφαρμογής τους στην εκπαιδευτική πράξη. Επιπλέον, επιδιώκει να εξετάσει τις προκλήσεις και τις προοπτικές που συνδέονται με την ενσωμάτωση των νέων τεχνολογιών στον διδακτικό σχεδιασμό σύμφωνα με τα Νέα Αναλυτικά Προγράμματα Σπουδών.

Πιο συγκεκριμένα, η παρουσίαση μας θα αναδείξει ότι τα ψηφιακά εργαλεία υποστηρίζουν την παροχή εξατομικευμένων μαθησιακών εμπειριών, οι οποίες ανταποκρίνονται στις ανάγκες και τα ενδιαφέροντα κάθε μαθητή, δημιουργούν ευέλικτα μαθησιακά περιβάλλοντα, τα οποία επιτρέπουν στους μαθητές να μαθαίνουν με τον δικό τους τρόπο και ρυθμό, αναπτύσσουν ψηφιακές δεξιότητες σε μαθητές/τριες και εκπαιδευτικούς.

Επιπλέον, θα αναδείξει ότι το e-portfolio, ως ένα δυναμικό αποθετήριο μαθησιακών τεκμηρίων, αναδύεται ως σημαντικό εργαλείο στη μαθησιακή αξιολόγηση. Ενσωματώνοντας αρχές της αυθεντικής αξιολόγησης, το e-portfolio επιτρέπει την ολιστική αποτύπωση της μαθησιακής πορείας, εστιάζοντας στην ανάπτυξη μεταγνωστικών δεξιοτήτων και στην ενίσχυση της αυτορρύθμισης. Μέσω της συγκέντρωσης ποικίλων artifacts, το e-portfolio προάγει την ενδοσκόπηση και την κριτική ανάλυση, διευκολύνοντας τη διαμορφωτική αξιολόγηση και παρέχοντας μια συνεχή ανατροφοδότηση για τη βελτίωση της μάθησης.

Τέλος, οι προτάσεις μας απευθύνονται σε εκπαιδευτικούς, ερευνητές, υπεύθυνους χάραξης εκπαιδευτικής πολιτικής και σε άλλους ενδιαφερόμενους, προτείνοντας δράσεις για την προώθηση της διαφοροποιημένης διδασκαλίας και αξιολόγησης με χρήση ψηφιακών εργαλείων συμβάλλοντας στην ανάπτυξη και εφαρμογή καινοτόμων διδακτικών πρακτικών, οι οποίες ανταποκρίνονται στις ανάγκες των μαθητών/τριών του 21ου αιώνα.

Λέξεις-κλειδιά: ψηφιακά εργαλεία, διαφοροποιημένη διδασκαλία, e-portfolio, νέα αναλυτικά προγράμματα σπουδών

Η ΑΞΙΟΠΟΙΗΣΗ ΔΙΕΠΑΦΩΝ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ (AI) ΩΣ ΕΡΓΑΛΕΙΟΥ ΕΝΙΣΧΥΣΗΣ ΤΗΣ ΒΙΩΜΑΤΙΚΗΣ ΜΑΘΗΣΗΣ ΣΤΟ ΝΗΠΙΑΓΩΓΕΙΟ

Τάλλου Κωνσταντίνα
Σύμβουλος Εκπαίδευσης ΠΕ60
ΔΠΕ Ιωαννίνων
Ιωάννινα, Ελλάδα
email: ktallou@sch.gr

Κασιούμη Δανάη
Βρεφονηπιοκόμος
ΔΠΕ Δωδεκανήσων
Ρόδος, Ελλάδα
email: Danai.kass@gmail.com

Kasioumi Myrto
Οικονομολόγος
QSMSRC, Budapest University of Technology and Economics,
Budapest, Hungary
email: kasioumi.myrto@gtk.bme.hu

ΠΕΡΙΛΗΨΗ

Το διδακτικό σενάριο που παρουσιάζεται σχεδιάστηκε σύμφωνα με τις Θεματικές Περιοχές και τα Προσδοκώμενα Μαθησιακά Αποτελέσματα του νέου Προγράμματος Σπουδών για την Προσχολική Εκπαίδευση, εστιάζοντας στα στάδια της ανάπτυξης των φυτών (Φυσικές Επιστήμες), ενώ παράλληλα εμπλέκει τα Θεματικά Πεδία των Κοινωνικών Επιστημών και των Τεχνολογιών Πληροφορίας και Επικοινωνίας (ΤΠΕ). Στόχος του σεναρίου είναι η αξιοποίηση διεπαφών Τεχνητής Νοημοσύνης (AI) ως εργαλείου ενίσχυσης της βιωματικής μάθησης μέσω διαδραστικών και συνεργατικών δραστηριοτήτων.

Ακολουθεί το διδακτικό μοντέλο μάθησης 5e (Engage, Explore, Explain, Elaborate, Evaluate) που προτείνει το νέο Πρόγραμμα Σπουδών για την Προσχολική Εκπαίδευση και δομείται ως εξής: η μάθηση και η διαδικασία εκκινείται με την εισαγωγή μιας διαδραστικής φωνητικής AI μέσω της οποίας μια εικονική μέλισσα εμφανίζεται στην τάξη και ζητά βοήθεια από τους μαθητές/τριες για να μάθει πώς αναπτύσσεται το φυτό. Με τον τρόπο αυτό ενεργοποιείται το ενδιαφέρον και η περιέργεια των παιδιών για το θέμα (Engage). Στη συνέχεια τα νήπια χωρίζονται σε ομάδες, αναζητούν πληροφορίες σχετικά με την ανάπτυξη των φυτών χρησιμοποιώντας εκπαιδευτικό ψηφιακό υλικό, ενώ ο ρόλος του εκπαιδευτικού είναι συντονιστικός και καθοδηγητικός, καθώς μέσα από στοχευμένες ερωτήσεις ενθαρρύνει τα παιδιά να διατυπώσουν τις αρχικές τους γνώσεις και να τις κατανοήσουν καλύτερα εμπλουτίζοντάς τες (Explore). Ακολουθεί η φάση της Ερμηνείας όπου η μέλισσα ζητά επιπλέον διευκρινήσεις και τα παιδιά αξιοποιώντας εργαλεία AI συνεργάζονται και πάλι σε μικρές ομάδες και παρουσιάζουν στην ολομέλεια το αποτέλεσμα της εργασίας τους και όσα έχουν μάθει, ενισχύοντας με αυτό τον τρόπο τη γλωσσική τους ανάπτυξη και προάγοντας την κριτική τους σκέψη (Explain). Για τη δραστηριότητα Εμπέδωσης (Elaborate) γίνεται χρήση ψηφιακών παιχνιδιών αξιολόγησης (π.χ. Wordwall, Quizizz, LearningApps) τόσο για αξιολόγηση όσο και για την επανάληψη των εννοιών με παιγνιώδη τρόπο ώστε να αποτυπωθεί η γνώση των παιδιών με φυσικό και ευχάριστο τρόπο. Έτσι τα νήπια αναπτύσσουν δεξιότητες δημιουργικής σκέψης και ψηφιακής έκφρασης. Το τελευταίο στάδιο, αυτό της Αξιολόγησης, ολοκληρώνεται με δραστηριότητες αυτοαξιολόγησης και ετεροαξιολόγησης, ώστε να καλλιεργηθούν μεταγνωστικές δεξιότητες στους μαθητές/τριες και η ικανότητά τους να αναστοχάζονται πάνω στη μαθησιακή τους πορεία.

Συμπερασματικά, το συγκεκριμένο διδακτικό σενάριο αναδεικνύει τη δυναμική της Τεχνητής Νοημοσύνης στην προσχολική εκπαίδευση, προτείνοντας μια πολυδιάστατη, διαδραστική και συνεργατική προσέγγιση στη μάθηση. Η αξιοποίηση καινοτόμων τεχνολογιών όχι μόνο ενισχύει τη μαθησιακή διαδικασία αλλά και διαμορφώνει το σχολείο του μέλλοντος, στο οποίο η ψηφιακή καινοτομία συνυπάρχει με την παιδαγωγική δημιουργικότητα.

Λέξεις – κλειδιά: Διεπαφές Τεχνητής Νοημοσύνης, διδακτικό μοντέλο 5e, ψηφιακή μάθηση, προσχολική εκπαίδευση και AI

Η ΑΞΙΟΠΟΙΗΣΗ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΧΗΜΕΙΑΣ: ΜΕΛΕΤΗ ΤΗΣ ΗΛΕΚΤΡΙΚΗΣ ΑΓΩΓΙΜΟΤΗΤΑΣ ΔΙΑΛΥΜΑΤΩΝ ΜΕΣΩ ΔΙΑΔΡΑΣΤΙΚΗΣ ΠΡΟΣΟΜΟΙΩΣΗΣ ΤΟΥ PHET COLORADO

Τζανάκη Νικολέττα
Εκπαιδευτικός Μέσης Εκπαίδευσης, Χημικός MSc
3ο Γυμνάσιο Πρέβεζας, Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: letzan@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση ψηφιακών τεχνολογιών στη διδασκαλία της Χημείας προάγει την ενεργό συμμετοχή των μαθητών και τη βαθύτερη κατανόηση επιστημονικών εννοιών. Η παρούσα εργασία παρουσιάζει μια διδακτική πρόταση για τη μελέτη της ηλεκτρικής αγωγιμότητας υδατικών διαλυμάτων, συνδυάζοντας το πραγματικό πείραμα με τη διαδραστική προσομοίωση "Διάλυμα Ζάχαρης και Αλατιού" του PhET Colorado. Η διδακτική προσέγγιση βασίζεται στη διερευνητική μάθηση (Inquiry-Based Learning - IBL) και εφαρμόστηκε σε μαθητές της Β' Γυμνασίου σε δύο διδακτικές ώρες. Στην πρώτη φάση, οι μαθητές, δουλεύοντας σε ομάδες, διατύπωσαν υποθέσεις και πραγματοποίησαν πειράματα με υδατικά διαλύματα αλατιού (NaCl) και ζάχαρης ($C_{12}H_{22}O_{11}$), καταγράφοντας και αναλύοντας τα αποτελέσματα. Στη δεύτερη φάση, χρησιμοποίησαν την προσομοίωση για να παρατηρήσουν τη διάσταση του NaCl σε ιόντα, κατανοώντας τη σχέση μεταξύ χημικής δομής και αγωγιμότητας.

Η διδακτική παρέμβαση που παρουσιάζεται διαφοροποιείται ουσιαστικά από την παραδοσιακή προσέγγιση διδασκαλίας, προωθώντας τη διερευνητική μάθηση που ενεργοποιεί τους μαθητές ως συμμετοχικά υποκείμενα της εκπαιδευτικής διαδικασίας. Σε ένα τέτοιο πλαίσιο, οι μαθητές εργάστηκαν σε ένα μαθησιακό-διαλογικό περιβάλλον, όπου ανέπτυξαν την κριτική σκέψη και την κατανόηση θεμελιωδών εννοιών της Χημείας, όπως η αγωγιμότητα και η φύση των χημικών ενώσεων. Η πορεία της παρέμβασης, που ακολουθεί το μοντέλο 5E (Engage, Explore, Explain, Elaborate, Evaluate), αποτυπώθηκε σε Φύλλα Εργασίας, με υψηλά ποσοστά σωστών απαντήσεων και ικανοποιητική χρήση επιστημονικής ορολογίας, υποδεικνύοντας εννοιολογική κατανόηση και ικανότητα εφαρμογής γνώσεων σε νέα πλαίσια.

Παράλληλα, η αξιοποίηση τόσο πραγματικών όσο και εικονικών πειραμάτων συνέβαλε στην πολυτροπική προσέγγιση της διδασκαλίας, καθιστώντας τις αφηρημένες έννοιες πιο προσιτές. Η συνδυαστική χρήση των μεθόδων αυτών ενίσχυσε τη συμμετοχή και την αυτενέργεια των μαθητών, ιδιαίτερα όσων συνήθως δυσκολεύονται. Οι μαθητές ενεπλάκησαν ενεργά στη διαδικασία, ανέπτυξαν δεξιότητες ερμηνείας, πρόβλεψης και συνεργασίας, και ανέδειξαν την ικανότητά τους να μεταφέρουν και να επεκτείνουν τη γνώση. Η παρέμβαση αναδεικνύει ότι η χρήση της διερευνητικής μάθησης και των ψηφιακών εργαλείων, όπως οι προσομοιώσεις PhET, μπορεί να μετασχηματίσει τη διδασκαλία της Χημείας σε μια δυναμική, βιωματική και ουσιαστική μαθησιακή εμπειρία.

Λέξεις – κλειδιά: ηλεκτρική αγωγιμότητα, προσομοίωση PhET Colorado, διερευνητική μάθηση (IBL), μοντέλο 5E, πολυτροπική μάθηση

ΔΙΑΘΕΜΑΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ ΣΤΗΝ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΜΗΧΑΝΙΚΗ, ΔΗΜΙΟΥΡΓΙΚΗ ΓΡΑΦΗ, ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΨΗΦΙΑΚΑ ΜΕΣΑ

Χριστίνα Τόκη
Μόνιμη εκπαιδευτικός, μηχανολόγος ΠΕ82, BEng, MSc, PhD στη μηχανική περιβάλλοντος,
1ο Επαγγελματικό Λύκειο Άρτας

Πεκλάρη Βασιλική
Μόνιμη εκπαιδευτικός, φιλόλογος ΠΕ02, MSc,
1ο Επαγγελματικό Λύκειο Άρτας

Μπαρδάκας Σταύρος
Μόνιμος εκπαιδευτικός, ηλεκτρολόγος ΠΕ83, MSc,
1ο Επαγγελματικό Λύκειο Άρτας

ΠΕΡΙΛΗΨΗ

Η διαθεματική προσέγγιση αποτελεί βασικό πυλώνα της σύγχρονης εκπαιδευτικής πρακτικής, καθώς μέσω αυτής αξιοποιούνται γνώσεις και δεξιότητες από διαφορετικούς τομείς, δημιουργώντας μια ολιστική εμπειρία μάθησης. Η παρούσα εισήγηση αποτελεί χαρακτηριστικό παράδειγμα αυτής της προσέγγισης, καθώς συνδυάζει την περιβαλλοντική μηχανική, τη δημιουργική γραφή, την τεχνητή νοημοσύνη και τα ψηφιακά μέσα σε μια ενιαία περιβαλλοντική εκπαιδευτική δράση.

Η διαθεματική προσέγγιση στην Περιβαλλοντική Εκπαίδευση συνδέει γνώσεις από διάφορα γνωστικά πεδία για την κατανόηση σύνθετων περιβαλλοντικών ζητημάτων. Σύμφωνα με πανελλαδική μελέτη (2006-2014), μόνο το 7% των εκπαιδευτικών πρωτοβάθμιας εκπαίδευσης συμμετείχε σε προγράμματα ΠΕ, ενώ η συμμετοχή μαθητών έφτανε το 16%. Παρά τα αρχικά χαμηλά ποσοστά, παρατηρήθηκε αυξητική τάση τα τελευταία χρόνια της μελέτης, ωστόσο, η έλλειψη αναλυτικών δεδομένων καθιστά δύσκολη την πλήρη αξιολόγηση της εφαρμογής και αποτελεσματικότητάς της.

Η δράση πραγματοποιήθηκε σε ΕΠΑΛ και επικεντρώθηκε στη θαλάσσια ρύπανση, ένα σημαντικό περιβαλλοντικό ζήτημα, και είχε ως στόχο την ευαισθητοποίηση των μαθητών μέσα από μια διαδικασία επιστημονικής κατανόησης και δημιουργικής έκφρασης. Ειδικότερα στο πρώτο στάδιο οι μαθητές ενημερώθηκαν για τις αιτίες και τις επιπτώσεις της θαλάσσιας ρύπανσης, αποκτώντας επιστημονικές γνώσεις που αποτέλεσαν τη βάση για τη δημιουργία των ποιημάτων τους. Στη συνέχεια αξιοποίησαν τεχνικές δημιουργικής γραφής, όπως η επιλογή λέξεων σχετικών με το θέμα, οι εικόνες ως ερέθισμα για συγγραφή και η συνειρμική γραφή, για να μετουσιώσουν τις επιστημονικές πληροφορίες σε ποιήματα. Στο τρίτο στάδιο, η τεχνητή νοημοσύνη χρησιμοποιήθηκε για τη δημιουργία εικόνων που αντικατόπτριζαν το περιεχόμενο των ποιημάτων. Τέλος, τα ποιήματα και οι εικόνες συγκεντρώθηκαν σε ένα διαδραστικό ψηφιακό βιβλίο, που ήταν αποτέλεσμα συλλογικής προσπάθειας. Αυτή η συνεργασία ανέδειξε τη σημασία της διαθεματικότητας, καθώς κάθε τομέας συμπληρώθηκε και εμπλουτίστηκε από τον άλλο, δημιουργώντας μια ολοκληρωμένη εκπαιδευτική εμπειρία.

Η δράση ανέδειξε τη δυναμική των ψηφιακών εργαλείων στη σύγχρονη εκπαίδευση, προσφέροντας στους μαθητές τη δυνατότητα να εκφραστούν δημιουργικά, να καλλιεργήσουν ψηφιακές δεξιότητες, να κατανοήσουν το θέμα μέσω της οπτικοποίησης του προβλήματος και να ενισχύσουν την περιβαλλοντική τους ευαισθησία. Παράλληλα, υπογράμμισε τη σημασία της διαθεματικής συνεργασίας, η οποία επιτρέπει στους μαθητές να αντιμετωπίσουν πολύπλοκα ζητήματα από πολλές πλευρές, ενισχύοντας την κριτική τους σκέψη. Η εισήγηση αναδεικνύει τα παιδαγωγικά οφέλη αυτής της προσέγγισης, τις προκλήσεις που προέκυψαν κατά την εφαρμογή της και τις μελλοντικές προοπτικές για περαιτέρω αξιοποίηση της τεχνολογίας στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: διαθεματική προσέγγιση, περιβαλλοντική εκπαίδευση, δημιουργική γραφή, ψηφιακά εργαλεία.

ΠΑΙΔΑΓΩΓΙΚΗ ΑΞΙΟΠΟΙΗΣΗ ΨΗΦΙΑΚΩΝ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΩΝ ΜΕΣΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΓΓΛΙΚΗΣ ΓΛΩΣΣΑΣ: ΘΕΩΡΗΤΙΚΗ ΚΑΙ ΠΡΑΚΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Τσιπλακίδης Ιάκωβος
Ειδικό Εκπαιδευτικό Προσωπικό, Τμήμα Εικαστικών Τεχνών και Επιστημών της Τέχνης, Σχολή Καλών Τεχνών, Πανεπιστήμιο Ιωαννίνων, Συνεργαζόμενο Εκπαιδευτικό Προσωπικού (Σ.Ε.Π.) στο Ε.Α.Π.
e-mail: itsiplak [at] uoi.gr

ΠΕΡΙΛΗΨΗ

Η εργασία αυτή έχει ως αντικείμενό της την ανάδειξη καινοτόμου εκπαιδευτικού σχεδιασμού με την αξιοποίηση ψηφιακών και τεχνολογικών μέσων στη διδασκαλία της Αγγλικής ως ξένης γλώσσας τα οποία παρέχουν τη δυνατότητα αναβάθμισης της διδασκαλίας και εκμάθησής της. Ειδικότερα, στο πλαίσιο αυτό, προτείνει την παιδαγωγική αξιοποίηση ψηφιακών μέσων, αυθεντικών πηγών και βίντεο από το διαδίκτυο και Web 2.0 συνεργατικών εργαλείων για την υλοποίηση ιστοεξερευνήσεων (WebQuests). Ο σχεδιασμός αυτό προτείνεται με βάση την προσωπική εμπειρία μας και τα πορίσματα ερευνών που δείχνουν ότι η ενσωμάτωσή ψηφιακών και τεχνολογικών μέσων στη διδασκαλία αφενός παρέχει πολλαπλά οφέλη και αφετέρου ότι η αποτελεσματική αξιοποίησή τους είναι εφικτή και ρεαλιστική κι όχι απλά θεωρητική.

Η παιδαγωγική αξιοποίηση ψηφιακών μέσων, συνεργατικών εργαλείων και του διαδικτύου για την υλοποίηση ιστοεξερευνήσεων αυξάνει τα κίνητρα των μαθητών, -τριών και την ενεργητική τους συμμετοχή στη μαθησιακή διαδικασία, καθώς βασίζονται σε θέματα και πεδία έρευνας που ανταποκρίνονται στα ενδιαφέροντα των μαθητών και αξιοποιούν με παιδαγωγικά ορθούς τρόπους τις εμπειρίες τους. Επίσης, η συμμετοχή σε ιστοεξερευνήσεις αυξάνει την μαθητική πρωτοβουλία, ενισχύει την αυτόνομη μάθηση και τη διαθεματική προσέγγιση στη μάθηση καταπολεμώντας την παθητικότητα και την αδιαφορία, επειδή οι ιστοεξερευνήσεις τοποθετούν τους μαθητές στο επίκεντρο της μαθησιακής διαδικασίας. Επιπλέον οφέλη αποτελούν η δυνατότητα συνεργασίας, η ανάπτυξη της κριτικής και της δημιουργικής σκέψης αλλά και της διερευνητικής μάθησης, καθώς ενθαρρύνεται η κριτική συλλογή, ανάλυση και επεξεργασία των δεδομένων, κι όχι η αποστήθιση και η απλή παράθεση πληροφοριών. Ένα περαιτέρω ευεργετικό αποτέλεσμα αφορά το γεγονός ότι προάγεται η φυσική διδασκαλία όλων των γλωσσικών δεξιοτήτων στην Αγγλική γλώσσα, κατανόησης και παραγωγής γραπτού και προφορικού λόγου, σε ένα αυθεντικό επικοινωνιακό πλαίσιο.

Ο στόχος της εργασίας αυτής είναι η πρακτική εφαρμογή των βασικών αρχών της εκπαιδευτικής θεωρίας. Στην αρχή της εργασίας επιχειρείται μια σύντομη ανασκόπηση της βιβλιογραφίας και των ερευνών που έχουν πραγματοποιηθεί σχετικά με την παιδαγωγική αξιοποίηση των ιστοεξερευνήσεων, την χρησιμοποίηση πηγών και βίντεο από το διαδίκτυο στη διδασκαλία της Αγγλικής ως ξένης γλώσσας. Στη συνέχεια, με βάση τη σχετική βιβλιογραφία, προτείνουμε μια ιστοεξερεύνηση που μπορεί να υλοποιηθεί στο πλαίσιο της διδασκαλίας της Αγγλικής για μαθητές επιπέδου γλωσσομάθειας Β1. Παρουσιάζουμε τον βασικό της σχεδιασμό, τα στάδια υλοποίησής της, και τα αναμενόμενα θετικά αποτελέσματα από την υλοποίησή της, ιδιαίτερα αυτά που σχετίζονται με την ενίσχυση της ομαδοσυνεργατικής μάθησης, της κριτικής και δημιουργικής σκέψης, της αξιοποίησης αυθεντικού υλικού, και της ανάπτυξης όλων των γλωσσικών δεξιοτήτων. Παρέχουμε, επίσης, οδηγίες για την επιτυχημένη εφαρμογή της ιστοεξερεύνησης, έτσι ώστε τα ψηφιακά και τεχνολογικά μέσα να αξιοποιηθούν αποτελεσματικά, να αποτελέσουν μια καινοτόμο προσέγγιση και να συμβάλουν θετικά στην αύξηση των κινήτρων των μαθητών και στην εκμάθηση της Αγγλικής γλώσσας. Οι εκπαιδευτικοί της Αγγλικής γλώσσας μπορούν να προσαρμόσουν τις δραστηριότητες που προτείνονται και να διευρύνουν το εύρος της προτεινόμενης ιστοεξερεύνησης, την αξιοποίηση των ψηφιακών και τεχνολογικών μέσων και των συνεργατικών εργαλείων για να ανταποκριθούν στις ανάγκες και τα χαρακτηριστικά των δικών τους μαθητών-τριών και το γενικότερο πλαίσιο της διδασκαλίας τους.

Λέξεις – κλειδιά: ψηφιακά και τεχνολογικά μέσα, ιστοεξερευνήσεις, διαδίκτυο, Αγγλική γλώσσα

«ΠΑΜΕ ΠΑΙΔΙΑ ΣΤΗΝ ΕΚΚΛΗΣΙΑ!». ΜΙΑ ΚΑΛΗ ΠΡΑΚΤΙΚΗ ΣΤΟ ΜΑΘΗΜΑ ΤΩΝ ΘΡΗΣΚΕΥΤΙΚΩΝ ΜΕ ΑΞΙΟΠΟΙΗΣΗ ΠΟΛΥΜΕΣΙΚΟΥ ΥΛΙΚΟΥ

Φακάζης Ιωάννης
Εκπαιδευτικός Θεολόγος
5ο ΓΕΛ Κέρκυρας,
Κέρκυρα, Ελλάδα
e-mail: ifakazis@sch.gr

ΠΕΡΙΛΗΨΗ

Το άρθρο αυτό αναφέρεται σε μάθημα Θρησκευτικών που έλαβε χώρα σε μαθητές Γ΄ τάξης Γυμνασίου, και πιο συγκεκριμένα στο Δέσκειο Γυμνάσιο Πάργας κατά το σχολικό έτος 2022-2023. Πιο συγκεκριμένα η θεματική ενότητα με την οποία ασχοληθήκαμε εμείς αφορούσε το κεφάλαιο «Λατρεία και τέχνη σε Ανατολή και Δύση», και ιδιαιτέρως το κομμάτι της αρχιτεκτονικής και της ζωγραφικής του ορθόδοξου χριστιανικού ναού, οπότε θεωρήσαμε πρόσφορο να αξιοποιήσουμε σχετικό λογισμικό. Κάποιοι από τους στόχους που θέσαμε ήταν: να αναγνωρίζουν σε ποιο ρυθμό ανήκει ένας χριστιανικός ναός, να γνωρίζουν βασικές πληροφορίες σχετικά με την αγιογράφηση του ναού και τους συμβολισμούς αυτής, να πληροφορηθούν σχετικά με τη λατρευτική ζωή που λαμβάνει χώρα στον ορθόδοξο ναό κ.ά. Όσον αφορά το υλικό που χρησιμοποιήσαμε ήταν το βιβλίο της Φλώρας Τζανακάκη (Tzanakaki, 2008) «Πάμε στην Εκκλησία!», το οποίο περιέχει CD με λογισμικό και δραστηριότητες.

Το λογισμικό περιλαμβάνει στο αρχικό μενού ως κύριες ενότητες: τα «Περιεχόμενα», όπου περιλαμβάνονται 18 υποενότητες με τα κύρια σημεία της παρουσίασης, για να επιλέξει κάποιος μεμονωμένα το συγκεκριμένο κομμάτι που θέλει να παρακολουθήσει· την «Έναρξη παρουσίασης», όπου ο χρήστης μπορεί να παρακολουθήσει όλες τις ενότητες ως ενιαία παρουσίαση από το avatar του λογισμικού· τις «360 μοίρες», όπου δίνεται η δυνατότητα εικονικής περιήγησης 360 μοιρών στο κέντρο του ναού· τις «Δραστηριότητες», όπου περιέχονται ψηφιακές δραστηριότητες, οι οποίες αντιστοιχούν σε κάποιες από τις ενότητες που παρουσιάζονται από το avatar στο λογισμικό.

Το μάθημα στην τάξη έλαβε χώρα σε τρεις φάσεις. Αρχικά έγινε ενημέρωση των μαθητών δίνοντας βασικές πληροφορίες σχετικά με τη θεματική και το λογισμικό που θα γινόταν χρήση. Εν συνεχεία έγινε προβολή με βιντεοπροβολέα του λογισμικού, με εικονική ξενάγηση από avatar σε εκκλησιαστικό ναό των Αθηνών, δίνοντας βασικές πληροφορίες σχετικά με την αρχιτεκτονική και τη λατρευτική ζωή στο χριστιανικό ναό. Ακολούθως προχωρήσαμε σε επίλυση ψηφιακών δραστηριοτήτων που υπάρχουν στο εν λόγω λογισμικό, σχετικές με την προβολή που έλαβε χώρα πιο πριν. Κάποιες από τις δραστηριότητες που ασχοληθήκαμε είχαν να κάνουν με: τους ρυθμούς των ναών, τον προσανατολισμό του ναού, τα μέρη του ναού, τις εικόνες του τέμπλου και την εικονογράφηση του ναού. Στις ασκήσεις αυτές συνήθως δίνονται τέσσερις εικόνες, π.χ. με τους βασικούς ρυθμούς ναών (βασιλική, βασιλική με τρούλο, σταυροειδής με τρούλο, κατακόμβη), και τέσσερα πλαίσια με τα ονόματα του κάθε ρυθμού. Ο χρήστης θα πρέπει να σύρει με τον κέρσορα κάθε εικόνα στο σωστό πλαίσιο.

Σε επόμενη φάση έγινε επίσκεψη σε τοπικό ορθόδοξο εκκλησιαστικό ναό και εκκλησιαστικό μουσείο με ξενάγηση από τον ιερέα του ναού. Οι μαθητές παρατήρησαν διά ζώσης τα εκκλησιαστικά εκθέματα, τα μέρη του ναού και τις αγιογραφίες, με δυνατότητα για ερωτήσεις και διευκρινίσεις από τον ιερέα και τον Θεολόγο τους. Σε τρίτη φάση δόθηκε φύλλο εργασίας όπου οι μαθητές συνεργαζόμενοι σε ομάδες απάντησαν σε ερωτήσεις σχετικά με το μάθημα και τη διδακτική επίσκεψη που πραγματοποιήθηκαν τις προηγούμενες ημέρες.

Όσον αφορά τους στόχους που θέσαμε θεωρούμε ότι αυτοί επιτεύχθηκαν σε ικανοποιητικό βαθμό, ενώ αυξήθηκαν και τα μαθησιακά κίνητρα των μαθητών. Τις νέες τεχνολογίες γενικά τις αξιοποιήσαμε και τις αξιοποιούμε και πριν και μετά τη σχολική χρονιά που αναφέρουμε στο άρθρο μας (π.χ. χρήση διαδραστικού πίνακα, αξιοποίηση powerpoint, βίντεο από youtube κ.ά.). Συμπερασματικά, θεωρήσαμε ότι η χρήση πολυμεσικού υλικού αποτελεί μια εναλλακτική διδακτική προσέγγιση του μαθήματος των Θρησκευτικών στο Γυμνάσιο, η οποία συμπορεύεται με τη γενικότερη ανάπτυξη των ψηφιακών μέσων στην κοινωνία αλλά και στην εκπαίδευση, και η οποία μπορεί να συμβάλλει τα μέγιστα στην καλύτερη αφομοίωση της διδακτικής ύλης από τους μαθητές.

Λέξεις κλειδιά: ορθόδοξος χριστιανικός ναός, λογισμικό, εικονική ξενάγηση, προβολή, δραστηριότητες, επίσκεψη.

ΘΠ11: Δυναμικά περιβάλλοντα μάθησης και Ψηφιακά Εκπαιδευτικά Εργαλεία

Η ΠΛΑΤΦΟΡΜΑ ESEP (ΕΥΡΩΠΑΪΚΗ ΠΛΑΤΦΟΡΜΑ ΓΙΑ ΤΗΝ ΕΚΠΑΙΔΕΥΣΗ ΣΤΑ ΣΧΟΛΕΙΑ) ΩΣ ΜΕΣΟ ΑΝΑΠΤΥΞΗΣ ΨΗΦΙΑΚΩΝ ΔΕΞΙΟΤΗΤΩΝ ΓΙΑ ΕΚΠΑΙΔΕΥΤΙΚΟΥΣ ΚΑΙ ΜΑΘΗΤΕΣ – ETWINNING & ERASMUS+

Ζαντραβέλη Βαρβάρα
Καθηγήτρια Αγγλικών - Διευθύντρια – MED - Μέλος της Εθνικής Υπηρεσίας Υποστήριξης (NSO) eTwinning
4ο Γυμνάσιο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: barbarazadraveli@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη θα επικεντρωθεί στον τρόπο με τον οποίο η πρόσφατα ενοποιημένη πλατφόρμα, **ESEP** (European School Education Platform - Ευρωπαϊκή Πλατφόρμα Σχολικής Εκπαίδευσης), μπορεί να χρησιμεύσει ως μέσο για την προώθηση, την ανάπτυξη και την καλλιέργεια των ψηφιακών δεξιοτήτων των μελών της εκπαιδευτικής κοινότητας.

Η Ευρωπαϊκή Πλατφόρμα Σχολικής Εκπαίδευσης (ESEP) αποτελεί το σημείο συνάντησης για την εκπαιδευτική κοινότητα σε ολόκληρη την Ευρώπη, συμπεριλαμβανομένου του σχολικού προσωπικού, των μαθητών, των ερευνητών και των υπευθύνων χάραξης πολιτικής. Η πλατφόρμα φιλοξενεί επίσης το **eTwinning**, την διαδικτυακή κοινότητα για τα σχολεία της Ευρώπης. Τα οφέλη για τους εκπαιδευτικούς είναι πολυάριθμα. Στοχεύει στην επαγγελματική τους ανάπτυξη παρέχοντας πρόσβαση σε μια ποικιλία προγραμμάτων συνεχούς επαγγελματικής κατάρτισης, τόσο διαδικτυακά όσο και δια ζώσης, επιτρέποντας στους εκπαιδευτικούς να ενισχύσουν τις δεξιότητές τους και να παραμένουν ενημερωμένοι για τις τελευταίες εκπαιδευτικές πρακτικές. Προσφέρει ευκαιρίες δικτύωσης μέσω της κοινότητας eTwinning, όπου οι εκπαιδευτικοί μπορούν να συνδεθούν, να συνεργαστούν και να ανταλλάξουν ιδέες με συναδέλφους από όλη την Ευρώπη, καλλιεργώντας μια κουλτούρα κοινής μάθησης και καινοτομίας. Τέλος, συμβάλλει στην ανταλλαγή πόρων, καθώς παρέχει ένα πλούσιο αποθετήριο διδακτικού υλικού, επιτρέποντας στους εκπαιδευτικούς να έχουν πρόσβαση και να συνεισφέρουν περιεχόμενο που υποστηρίζει αποτελεσματικές στρατηγικές διδασκαλίας. Αντίστοιχα, η πλατφόρμα προωθεί τη συνεργατική μάθηση μεταξύ των μαθητών. Μέσω της συμμετοχής τους σε έργα eTwinning, η ESEP επιτρέπει στους μαθητές να εμπλακούν σε κοινές δραστηριότητες με συνομηλίκους τους από διαφορετικές χώρες, προωθώντας την πολιτιστική ανταλλαγή και την ομαδική εργασία. Επιπλέον, ενισχύει τον ψηφιακό γραμματισμό εμπλέκοντας τους μαθητές σε δραστηριότητες που τους βοηθούν να αναπτύξουν βασικές ψηφιακές δεξιότητες μέσω της χρήσης διαφόρων διαδικτυακών εργαλείων και πλατφορμών για μάθηση και συνεργασία. Οι μαθητές μπορούν επίσης να λάβουν πιστοποιητικά που αναγνωρίζουν τη συμμετοχή και τα επιτεύγματά τους, ενισχύοντας το κίνητρό τους και εμπλουτίζοντας το εκπαιδευτικό τους προφίλ.

Η πλατφόρμα ESEP έχει σημαντικό αντίκτυπο στην εκπαιδευτική κοινότητα, ενισχύοντας τους δεσμούς και τη συνεργασία μεταξύ εκπαιδευτικών και μαθητών σε ευρωπαϊκό επίπεδο. Συμμετέχοντας σε προγράμματα όπως το eTwinning, οι δάσκαλοι αποκτούν πρόσβαση σε καινοτόμες διδακτικές πρακτικές, ενώ οι μαθητές εξοικειώνονται με σύγχρονα τεχνολογικά εργαλεία, αναπτύσσοντας ταυτόχρονα δεξιότητες επικοινωνίας και ομαδικής εργασίας. Επιπλέον, η πλατφόρμα διευκολύνει την ανταλλαγή εκπαιδευτικού υλικού και βέλτιστων πρακτικών, υποστηρίζοντας τη συνεχή επαγγελματική εξέλιξη των εκπαιδευτικών και προωθώντας τη δια βίου μάθηση. Μέσω αυτών των δυνατοτήτων, η ESEP διαδραματίζει κρίσιμο ρόλο στη διαμόρφωση ενός ενιαίου και δυναμικού ευρωπαϊκού εκπαιδευτικού χώρου, όπου η γνώση και η καινοτομία μοιράζονται και αξιοποιούνται προς όφελος όλων των μελών της κοινότητας. Παρά τα πλεονεκτήματά της, η χρήση της πλατφόρμας ESEP συνοδεύεται επίσης από προκλήσεις. Ένα από τα κύρια ζητήματα που αντιμετωπίζουν οι χρήστες είναι η ανάγκη εξοικείωσης με το περιβάλλον της πλατφόρμας, καθώς απαιτείται χρόνος και εκπαίδευση για την πλήρη αξιοποίησή της. Επιπλέον, η άνιση πρόσβαση στην τεχνολογία και τις ψηφιακές δεξιότητες μπορεί να αποτελέσει εμπόδιο για ορισμένους εκπαιδευτικούς και μαθητές, περιορίζοντας τη συμμετοχή τους στις διαθέσιμες δραστηριότητες. Οι γλωσσικές διαφορές μπορούν επίσης να δημιουργήσουν δυσκολίες, καθώς η επικοινωνία και η συνεργασία μεταξύ χρηστών από διαφορετικές χώρες απαιτούν επαρκή γλωσσική επάρκεια. Παρά τις δυσκολίες αυτές, η συνεχής ανάπτυξη και προσαρμογή της πλατφόρμας, μαζί με την υποστήριξη που παρέχεται στους χρήστες, μπορούν να βοηθήσουν στην αντιμετώπιση αυτών των προκλήσεων, διασφαλίζοντας ότι η ESEP παραμένει ένας πολύτιμος πόρος για την ευρωπαϊκή εκπαιδευτική κοινότητα.

Αυτή η μελέτη θα δώσει έμφαση στην καλλιέργεια των ψηφιακών δεξιοτήτων, ιδιαίτερα μέσω της περιγραφής συγκεκριμένων έργων στα οποία συμμετέχουν καθηγητές και μαθητές από το **4ο Γυμνάσιο Πρέβεζας** κατά την υλοποίηση προγραμμάτων eTwinning και Erasmus+.

Λέξεις-κλειδιά: ESEP, ψηφιακές δεξιότητες, εκπαιδευτικοί, μαθητές, eTwinning, Erasmus+

ΤΟ ΣΥΡΣΙΜΟ, ΩΣ ΜΙΑ ΔΥΝΑΜΙΚΗ ΜΟΝΤΕΛΟΠΟΙΗΣΗ ΤΟΥ ΠΑΡΑΔΟΣΙΑΚΟΥ, ΣΤΑΤΙΚΟΥ ΕΥΚΛΕΙΔΕΙΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ, ΣΕ ΔΥΝΑΜΙΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ ΓΕΩΜΕΤΡΙΑΣ

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
e-mail: alexmastr@yahoo.gr

Φραγκόπουλος Γεώργιος
Δ/ντής Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
e-mail: gfraggy@sch.gr

ΠΕΡΙΛΗΨΗ

Οι παραδοσιακές, στατικές προσεγγίσεις προσφέρουν τεχνικές κατάκτησης γεωμετρικών εννοιών, που μπορεί, σαφώς, να λειτουργούν ως «σκαλωσιές» και εργαλεία για την κατάκτηση της γνώσης. Στην ψηφιοχώρα των σημερινών, γηγενών μαθητών, όμως, καθίστανται μάλλον απαραίτητη η εισαγωγή και ενσωμάτωση, ως διδακτικών μέσων, και των τεχνολογικών, διαμεσολαβητικών εργαλείων. Οι δραστηριότητες μάθησης εφαρμόζονται και υλοποιούνται ευκολότερα με την επιστράτευση της τεχνολογίας. Πράγματι, η μάθηση της Γεωμετρίας έχει «πλεονεκτική μεταχείριση» από την Τεχνολογία, αφού με τη βοήθεια ψηφιακών εργαλείων οι μαθητές μοντελοποιούν γεωμετρικά θέματα και μέσα σε μαθησιακά περιβάλλοντα ζωτικής διάδρασης μελετούν μια πληθώρα γεωμετρικών μορφών.

Η δυναμική μοντελοποίηση του παραδοσιακού, στατικού ευκλείδειου περιβάλλοντος, μέσω του συρσίματος (drag-mode), αποτελεί το σημαντικότερο χαρακτηριστικό γνώρισμα των Δυναμικών Περιβαλλόντων Γεωμετρίας. Το σύρσιμο εισάγει τη μετακίνηση, την τροποποίηση και τον μετασχηματισμό στη στατική Ευκλείδεια Γεωμετρία, με διατήρηση, όμως, των βασικών σχέσεων και ιδιοτήτων των σχημάτων, ενώ φαίνεται ότι είναι και ένας ισχυρός πυρήνας πλούσιων διδακτικών και μαθησιακών δυνατοτήτων. Οι διερευνητικές δυνατότητες του συρσίματος αποτελούν σημαντικές, γνωστικές παροχές αλλά και ένα ισχυρό παιδαγωγικό εργαλείο υποστήριξης γεωμετρικών συλλογισμών, ιδιαίτερα κατά τον σχηματισμό υποθέσεων και εικασιών. Η κατασκευή ενός σχήματος στην οθόνη αντιπροσωπεύει μια ολόκληρη κλάση γεωμετρικών αντικειμένων, αφού για παράδειγμα, κατά τη δημιουργία ενός κύκλου, το σύρσιμο χαρίζει μιαν απειρία κύκλων, απλώς και μόνο με μιαν απλή κίνηση του ποντικιού.

Η παρούσα εργασία θα παρουσιάσει, αναλυτικά και με παραδείγματα, επτά διαφορετικούς τύπους συρσίματος, τους οποίους μετέρχονται οι μαθητές, κατά τη διάρκεια της διαδικασίας επίλυσης ανοιχτών προβλημάτων και σε σχέση με τη χρήση του ποντικιού: Το σύρσιμο περιπλάνησης, το σύρσιμο ελέγχου, το σύρσιμο λανθάνοντα γεωμετρικού τόπου, το σύρσιμο γραμμής αλλά και το δεσμευμένο, το καθοδηγούμενο και το εξαρτημένο σύρσιμο είναι οι κρίσιμες μορφές του συρσίματος, μέσω των οποίων παρουσιάζονται με «κινηματογραφική» απεικόνιση, διάφορες αναπαραστάσεις σχημάτων.

Λέξεις – κλειδιά: Σύρσιμο, Γεωμετρία, Δυναμικά Περιβάλλοντα, Συστήματα

ΧΑΡΤΟΓΡΑΦΩΝΤΑΣ ΤΟΝ ΠΟΛΙΤΙΣΜΟ ΚΑΙ ΤΟ ΠΕΡΙΒΑΛΛΟΝ: ΜΙΑ ΨΗΦΙΑΚΗ ΕΚΠΑΙΔΕΥΤΙΚΗ ΟΔΥΣΣΕΙΑ

Λάσκαρη Λεμονιά
Εκπαιδευτικός, ΠΕ04.02, MSc
1ο Πρότυπο Λύκειο «Μανόλης Ανδρόνικος», Θεσσαλονίκη
e-mail: lemilaskari@yahoo.gr

Τσιουπλή Ευγενία
Εκπαιδευτικός, ΠΕ02, PhD
1ο Πρότυπο Λύκειο «Μανόλης Ανδρόνικος», Θεσσαλονίκη
e-mail: evtsioupli@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία παρουσιάζει ένα καινοτόμο εκπαιδευτικό έργο που ενσωματώνει ψηφιακά εργαλεία για την προώθηση των πολυγραμματισμών και της βιωματικής μάθησης. Εστιάζοντας στις πολιτιστικές και περιβαλλοντικές συνδέσεις μεταξύ Θεσσαλονίκης και Κωνσταντινούπολης, το έργο επικεντρώνεται στους Στόχους Βιώσιμης Ανάπτυξης 14 (Ζωή κάτω από το νερό), 15 (Ζωή στην ξηρά) και 17 (Συνεργασίες για τους Στόχους). Χρησιμοποιώντας το λογισμικό ArcGIS, οι μαθητές δημιούργησαν έναν διαδραστικό χάρτη που εντοπίζει μια διαδρομή από ξηρά και θάλασσα, επισημαίνοντας βασικούς πολιτιστικούς, ιστορικούς και οικολογικούς χώρους. Μέσω αυτής της διαδικασίας, ανέπτυξαν τον ψηφιακό γραμματισμό, την περιβαλλοντική και πολιτισμική ευαισθητοποίηση. Το πρόγραμμα ενίσχυσε την κριτική σκέψη και τις συνεργατικές δεξιότητες των μαθητών/τριών, ενώ παράλληλα ενθάρρυνε την ενεργό συμμετοχή και τη διεπιστημονική κατανόηση. Το ArcGIS επέτρεψε τον συνδυασμό της επεξεργασίας γεωχωρικών δεδομένων με τη δημιουργική έκφραση, υποστηρίζοντας μια ολοκληρωμένη προσέγγιση στην εκπαίδευση. Τελικά, το έργο καταδεικνύει πώς η συνέργεια της τεχνολογίας, του πολιτισμού και της περιβαλλοντικής εκπαίδευσης μπορεί να ενισχύσει τη βιωσιμότητα και τη συνεργασία. Ο ψηφιακός χάρτης που δημιουργήθηκε από τους/τις μαθητές/τριες χρησιμεύει τόσο ως μαθησιακό αντικείμενο όσο και ως δημόσια πρόσκληση για την εξερεύνηση της κοινής κληρονομιάς και του μέλλοντος αυτών των δύο ιστορικών πόλεων.

Λέξεις – κλειδιά: ψηφιακά μέσα, πολυγραμματισμοί, ArcGIS, διαδραστικός χάρτης, κριτική σκέψη.

ΕΠΑΝΕΡΜΗΝΕΙΑ ΤΩΝ ΕΠΙΠΕΔΩΝ ΓΕΩΜΕΤΡΙΚΗΣ ΣΚΕΨΗΣ ΤΩΝ VAN HIELE ΥΠΟ ΤΗ ΣΥΝΗΓΟΡΙΑ ΤΩΝ ΠΛΕΟΝΕΚΤΗΜΑΤΩΝ ΤΩΝ ΔΥΝΑΜΙΚΩΝ ΠΕΡΙΒΑΛΛΟΝΤΩΝ ΓΕΩΜΕΤΡΙΑΣ

Φραγκόπουλος Γεώργιος
Δ/ντής Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
e-mail: gfraggy@sch.gr

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
e-mail: alexmastr@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η σχολική Γεωμετρία, που παρουσιάζεται αξιωματικά, υποθέτει ότι οι μαθητές σκέφτονται, μάλλον, με ένα τυπικά συμπερασματικό τρόπο. Μια άλλη θεωρία, όμως, σχετικά με την εκμάθηση της Γεωμετρίας είναι η θεωρία των van Hiele, που αποτελεί, σήμερα, παράγοντα με μεγάλη επίδραση στη σχολική Γεωμετρία, αφού παρά την τεράστια έρευνα για τη γεωμετρική σκέψη, καμία πρόταση δεν έχει προσελκύσει τόσο πολύ την προσοχή όσο η θεωρία των επιπέδων γεωμετρικής σκέψης των van Hiele. Μάλιστα, έχει αναγνωρισθεί η προστιθέμενη αξία του μοντέλου των van Hiele, κατά την περιγραφή, τη μελέτη και την ανάδειξη της γεωμετρικής σκέψης. Το μοντέλο των van Hiele απαρτίζεται από δύο κύριες πτυχές. Η πρώτη αποτελείται από μια ιεραρχική ακολουθία πέντε επιπέδων, συλλογιστικών διεργασιών και γεωμετρικής σκέψης. Το δεύτερο μέρος ενδιαφέρεται για την ανάπτυξη της διαίσθησης των μαθητών και επικεντρώνεται στις φάσεις εκμάθησης, στα μέσα, δηλαδή, τα οποία μετέρχεται ένας δάσκαλος, προκειμένου να αυξήσει την απόδοση των μαθητών του, μέσω αυτών των διάφορων επιπέδων σκέψης.

Έρευνες έχουν δείξει ότι τα Λογισμικά Δυναμικής Γεωμετρίας ενισχύουν τους μαθητές στη μελέτη των γεωμετρικών εννοιών στα παρωθητικά πλαίσια ενεργοποίησης και αξιοποίησης της θεωρίας των van Hiele. Οι δραστηριότητες που βασίζονται στα επίπεδα σκέψης των van Hiele καθίστανται ευκολότερες και αποτελεσματικότερες με την παρουσία διάφορων τεχνολογικών εργαλείων και ειδικά μέσω Δυναμικών Λογισμικών Γεωμετρίας. Η παρούσα εργασία αφού περιγράψει τη θεωρία των van Hiele επιχειρηματολογεί, ακολούθως, υπέρ των Δυναμικών Λογισμικών Γεωμετρίας ως πλεονεκτικών εργαλείων μη στατικής οπτικοποίησης, που δύνανται να προαγάγουν τη σκέψη των μαθητών και προτείνει, και μέσω παραδειγμάτων, μια επαναδιατύπωση και επανερμηνεία των πέντε επιπέδων σκέψης των van Hiele, υπό το φως των Δυναμικών Περιβαλλόντων Γεωμετρίας.

Λέξεις – κλειδιά: Γεωμετρία, Δυναμικά Περιβάλλοντα, Συστήματα, van Hiele

ΘΠ12: Διαδίκτυο των πραγμάτων και εκπαίδευση

ΤΟ ΔΙΑΔΙΚΤΥΟ ΤΩΝ ΠΡΑΓΜΑΤΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΤΕΧΝΟΛΟΓΙΚΕΣ ΕΦΑΡΜΟΓΕΣ, ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΟΠΤΙΚΕΣ ΚΑΙ ΠΡΟΚΛΗΣΕΙΣ ΥΙΟΘΕΤΗΣΗΣ

Γιούργας Άγγελος
Πανεπιστήμιο Ιωαννίνων, τμήμα Πληροφορικής και Τηλεπικοινωνιών
Μεταπτυχιακός Φοιτητής
Πρέβεζα, Ελλάδα
e-mail: pint00162@uoi.gr

ΠΕΡΙΛΗΨΗ

Στην παρούσα εργασία γίνεται διερεύνηση του θεωρητικού και τεχνολογικού υποβάθρου του IoT, καθώς και των προκλήσεων και των προοπτικών εφαρμογής του με έμφαση στην εκπαιδευτική διαδικασία.

Η εργασία βασίζεται σε υφιστάμενες ερευνητικές μελέτες, θεωρητικά μοντέλα και εμπειρικά δεδομένα σχετικά με την ενσωμάτωση του IoT στην εκπαίδευση. Αναλύεται η δομή και η λειτουργία των IoT συστημάτων στον εκπαιδευτικό τομέα, και η διασύνδεση τους με άλλες τεχνολογίες αιχμής όπως η τεχνητή νοημοσύνη (AI), το υπολογιστικό νέφος (Cloud Computing) και η μηχανική μάθηση (ML). Παρουσιάζονται οι σημαντικότερες εφαρμογές του IoT στην εκπαιδευτική διαδικασία όπως οι έξυπνες τάξεις, οι διαδραστικοί πίνακες, οι φορητές συσκευές ανίχνευσης φυσιολογικών και μαθησιακών παραμέτρων, καθώς και οι αυτοματοποιημένες πλατφόρμες ανάλυσης μαθησιακών δεδομένων.

Γίνεται επίσης αναφορά στην εξατομικευμένη μάθηση, στην αποδοτική διαχείριση πόρων και την διεύρυνση προσβασιμότητας σε εκπαιδευτικά μέσα. Ιδιαίτερη έμφαση δίνεται στην κριτική αξιολόγηση των προτερημάτων του IoT στην εκπαιδευτική διαδικασία καθώς και στις προκλήσεις που ανακύπτουν από την ευρεία χρήση του. Οι προκλήσεις που προκύπτουν από την χρήση του IoT σχετίζονται με κρίσιμα θέματα όπως η ασφάλεια και η ιδιωτικότητα των δεδομένων, το κόστος υλοποίησης των υποδομών καθώς και η προϋπόθεση για εξειδικευμένη τεχνολογική κατάρτιση των εκπαιδευτικών.

Παρουσιάζονται τέλος οι μελλοντικές εξελίξεις του IoT στην εκπαιδευτική κοινότητα υιοθετώντας το σε ένα ευρύτερο τομέα τεχνολογικών εξελίξεων που θα επηρεάζουν την διαχείριση και την αποτελεσματικότητα της εκπαιδευτικής διαδικασίας. Στον τομέα της εκπαίδευσης η αξιοποίηση του Διαδικτύου των πραγμάτων (IoT) και των ψηφιακών μέσων αναμορφώνει την μαθησιακή διαδικασία καθιστώντας την περισσότερο διαδραστική και αποτελεσματική. Το Διαδίκτυο των πραγμάτων έχει την δυνατότητα να μετασχηματίσει τις διδακτικές πρακτικές και την οργανωτική διαχείριση των εκπαιδευτικών ιδρυμάτων μέσω της συλλογής και της ανάλυσης δεδομένων σε πραγματικό χρόνο. Η εξέλιξη του IoT μπορεί να συνδυαστεί με άλλες σημαντικές τεχνολογίες όπως η επαυξημένη πραγματικότητα (AR), η εικονική πραγματικότητα (VR) και η τεχνολογία blockchain για την ασφαλή διαχείριση εκπαιδευτικών δεδομένων ώστε να αναδείξουν ένα νέο, περισσότερο ευφυές και προσαρμόσιμο εκπαιδευτικό περιβάλλον.

Η συστηματική αξιοποίηση του IoT στον εκπαιδευτικό τομέα απαιτεί την ανάπτυξη στρατηγικών πολιτικών, τη θέσπιση ηθικού και νομικού πλαισίου καθώς και την εξασφάλιση βιώσιμων τεχνολογικών υποδομών.

Λέξεις – κλειδιά: Διαδίκτυο των πραγμάτων (IoT), Έξυπνη εκπαίδευση, Τεχνητή νοημοσύνη(AI), Μηχανική Μάθηση(ML), επαυξημένη και εικονική πραγματικότητα(AR/VR), Blockchain.

ΘΠ13: Αξιοποίηση της Τεχνητής Νοημοσύνης στην Εκπαίδευση

ΔΙΔΑΣΚΟΝΤΑΣ ΤΗΝ ΗΛΙΚΙΑ ΤΗΣ ΓΗΣ ΧΡΗΣΙΜΟΠΟΙΩΝΤΑΣ ΤΟ ChatGPT

Κούζας Δημήτριος
Εκπαιδευτικός ΠΕ04.05 Γεωλόγος, ΠΕ86 Πληροφορικής,
MSc, Υποψήφιος Διδάκτορας ΤΕΑΠΗ - ΕΚΠΑ
3ο Γυμνάσιο Πρέβεζας
e-mail: dkoyzas@yahoo.gr

Αθανασίου Κυριάκος
Ομ. Καθηγητής ΤΕΑΠΗ-ΕΚΠΑ
Βιολογία και Αγωγή Υγείας
e-mail: kathanas@ecd.uoa.gr

ΠΕΡΙΛΗΨΗ

Η ραγδαία ανάπτυξη της τεχνητής νοημοσύνης (ΤΝ) και η ενσωμάτωσή της στην εκπαίδευση δημιουργεί νέες προοπτικές στη διδασκαλία των φυσικών επιστημών, προσφέροντας δυναμικά εργαλεία που ενισχύουν τη μαθησιακή διαδικασία. Στην παρούσα εργασία, διερευνάται η αξιοποίηση του ChatGPT ως εργαλείου υποστήριξης της διδασκαλίας της ηλικίας της Γης στη δευτεροβάθμια εκπαίδευση. Συγκεκριμένα, παρουσιάζεται ένα σενάριο διδασκαλίας που συνδυάζει την ενεργό διερεύνηση, τη συνεργατική μάθηση και την κριτική σκέψη, επιτρέποντας στους μαθητές να αλληλεπιδράσουν με το ChatGPT για την αναζήτηση, την επεξεργασία και την αξιολόγηση επιστημονικών πληροφοριών

Η μεθοδολογία βασίζεται σε ένα μικτό μοντέλο διδασκαλίας (blended learning), το οποίο συνδυάζει τη συμβατική διδασκαλία με την τεχνολογία, όπου οι μαθητές διατυπώνουν ερωτήσεις, αναλύουν απαντήσεις και συγκρίνουν τις πληροφορίες του ChatGPT με καθιερωμένες επιστημονικές πηγές. Παράλληλα, διερευνώνται οι προκλήσεις που προκύπτουν από τη χρήση τέτοιων εργαλείων στην εκπαίδευση, όπως η ανάγκη για ψηφιακό γραμματισμό, η αξιοπιστία των πληροφοριών και ο ρόλος του εκπαιδευτικού ως διαμεσολαβητή στη μαθησιακή διαδικασία.

Το προτεινόμενο διδακτικό σενάριο αποτελείται από τρία μέρη: 1. Εισαγωγική διδασκαλία με παρουσίαση βασικών εννοιών σχετικά με την ηλικία της Γης και τις επιστημονικές μεθόδους χρονολόγησης. 2. Αλληλεπίδραση με το ChatGPT, όπου οι μαθητές, οργανωμένοι σε ομάδες, διατυπώνουν ερωτήματα και αναζητούν απαντήσεις, αξιολογώντας τις πληροφορίες που λαμβάνουν. 3. Αξιολόγηση και ανατροφοδότηση, με σκοπό τη σύγκριση της μαθησιακής προόδου και τη διερεύνηση της εμπειρίας των μαθητών από τη χρήση του εργαλείου..

Η ποσοτική ανάλυση της έρευνας βασίστηκε στα εξής εργαλεία συλλογής δεδομένων: προ-τεστ και μετα-τεστ, για τη μέτρηση της γνωστικής εξέλιξης των μαθητών πριν και μετά τη χρήση του ChatGPT. Ερωτηματολόγια κλίμακας Likert, για την αποτύπωση της εμπειρίας των μαθητών και της αντίληψής τους σχετικά με την αξιοπιστία και τη χρησιμότητα τέτοιων εργαλείων. Στατιστική επεξεργασία δεδομένων, με σκοπό την εξαγωγή συμπερασμάτων σχετικά με την αποτελεσματικότητα της ενσωμάτωσης του ChatGPT στη διδακτική πρακτική.

Διαπιστώθηκε ότι η χρήση του ChatGPT ενίσχυσε τη μαθησιακή εμπλοκή, ενθάρρυνε τη διερευνητική προσέγγιση και την ανάπτυξη της κριτικής σκέψης των μαθητών.. Μέσω της στατιστικής ανάλυσης των δεδομένων, προέκυψε ότι βελτίωσε το γνωστικό επίπεδο και τον βαθμό κατανόησης των εννοιών Ωστόσο, αναδεικνύεται η ανάγκη για κατάλληλη παιδαγωγική καθοδήγηση και εκπαιδευτική πολιτική που θα διασφαλίσει την ορθή αξιοποίηση τέτοιων εργαλείων ΤΝ στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Εκπαίδευση 4.0, ChatGPT, Ηλικία της Γης

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΥΒΡΙΔΙΚΗ ΔΙΔΑΣΚΑΛΙΑ ΓΙΑ ΕΠΑΝΑΣΤΑΤΙΚΗ ΤΡΙΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ

Πέτρος Ι. Σταυρουλάκης
Τμήμα Ναυτιλιακών Σπουδών, Πανεπιστήμιο Πειραιώς
Πειραιάς, Ελλάδα
e-mail: pjstav@gmail.com

Περικλής Προυσάλογλου
Senec.AI
Αθήνα, Ελλάδα
e-mail: pprousaloglou@gmail.com

Μαρία-Χριστίνα Κυριακοπούλου-Ρούσσου
Ελεύθερη επαγγελματίας
Αθήνα, Ελλάδα
e-mail: maritina.roussou@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η πανδημία COVID-19 προσέφερε (μέσα στην τραγωδία της) ένα εφαλτήριο ηλεκτρονικής ύπαρξης για πολλές πτυχές και λειτουργίες της κοινωνίας. Όλα τα πιθανά συστατικά στοιχεία των επιχειρησιακών λειτουργιών, εν μέσω lockdowns και κοινωνικής αποστασιοποίησης, μετέφεραν τις δραστηριότητές τους στο διαδίκτυο. Ως εκ τούτου, και η εκπαίδευση ακολούθησε, με ένα ευρύ φάσμα εφαρμογών και αποτελεσματικότητας, που κυμάνθηκε από την ανάδυση πολλών βέλτιστων πρακτικών έως την εμφάνιση πολλών αποκλίσεων, όπως νέοι τρόποι αντιγραφής και υπολογιστές που ήταν συνδεδεμένοι σε πλατφόρμα εξ αποστάσεως εκπαίδευσης αλλά χωρίς την παρουσία του χρήστη. Η μετα-πανδημική πραγματικότητα έχει αφήσει τον κόσμο να προσπαθεί να μετριάσει και να επουλώσει πληγές από πολλές συνέπειες του κορονοϊού, αλλά ταυτόχρονα, και ειδικότερα όσον αφορά στον εκπαιδευτικό τομέα, να παραδίδει πληθώρα εργαλείων που μπορούν να αξιοποιηθούν στη διδασκαλία, αποκαλύπτοντας έτσι ένα νέο φάσμα δυνατοτήτων και ευκαιριών για την εκπαίδευση.

Πολλά πανεπιστήμια στον κόσμο όπου η συμμετοχή στην τάξη δεν είναι υποχρεωτική, καταγράφουν ιστορικά χαμηλά ποσοστά προσέλευσης, σε σημείο που δημιουργούνται δύο διακριτά τμήματα φοιτητών, οι ενεργοί και ανενεργοί. Ταυτόχρονα, η εμπειρία που αποκτήθηκε από τα ηλεκτρονικά μέσα μάθησης μπορεί να προσφέρει μια άμεσα διαθέσιμη λύση για τη συμπερίληψη και την ενίσχυση της συμμετοχής, καθώς και για τη συνέχεια της διδασκαλίας. Κατά συνέπεια, ο εκπαιδευτικός τομέας έχει τη δυνατότητα να χρησιμοποιήσει εργαλεία για τη ζωντανή μετάδοση διαλέξεων, την καταγραφή τους και τον διαμοιρασμό τους σε ιδιωτικές ή/και δημόσια προσβάσιμες πλατφόρμες βίντεο/streaming. Ωστόσο, ανακύπτει το ερώτημα του πώς μπορούν να μετριαστούν τα ζητήματα που προκύπτουν, όπως η διασφάλιση των προσωπικών δεδομένων και, ταυτόχρονα, η μεγιστοποίηση της φυσικής παρουσίας στην τάξη, καθώς οι τεχνολογίες εξ αποστάσεως και υβριδικής διδασκαλίας μπορεί να εκληφθούν ως παράγοντες που απομακρύνουν τους φοιτητές από την αίθουσα, επιβαρύνοντας έτσι την ήδη προβληματική κατάσταση της χαμηλής προσέλευσης.

Στην προσπάθεια αξιοποίησης της τεχνολογίας στην εκπαίδευση, μπορεί να χρησιμοποιηθεί πληθώρα εργαλείων, αλλά ταυτόχρονα πρέπει να διαφυλαχθεί η εκπαιδευτική αξία που διαμορφώνεται εντός της τάξης. Αυτή η κατάσταση αναδεικνύεται ως δίλημμα, καθώς από τη μία πλευρά η τεχνολογία μπορεί να διευκολύνει την παράδοση του προγράμματος σπουδών, επιτρέποντας την επίτευξη των αντίστοιχων μαθησιακών αποτελεσμάτων, από την άλλη όμως μπορεί να θεωρηθεί ως μετάβαση προς την υποβάθμιση της κουλτούρας της τάξης και της αλληλεπίδρασης, οδηγώντας ενδεχομένως σε τελική μείωση της προσέλευσης. Εδώ έγκειται το ερευνητικό κενό και η συμβολή της παρούσας εργασίας. Μετά την πανδημία, αναδύεται το εύλογο ερώτημα σχετικά με τα εργαλεία που παραμένουν αποτελεσματικά για την προώθηση της εξ αποστάσεως μάθησης, των υβριδικών τάξεων, και του branding της εκπαίδευσης, όπου πολλά εκπαιδευτικά ιδρύματα αξιοποιούν εδώ και πολλά χρόνια, ακόμη και πριν από την πανδημία. Αξιοσημείωτα παραδείγματα αποτελούν, για παράδειγμα, το MIT OpenCourseWare (με 5,63 εκατομμύρια συνδρομητές και 7,5 χιλιάδες βίντεο, όπου ολόκληρα μαθήματα έχουν ομαδοποιηθεί σε λίστες βίντεο και είναι προσβάσιμα δωρεάν), το Harvard, το Πανεπιστήμιο Brown και πολλά άλλα, τα οποία χρησιμοποιούν την τεχνολογία ως μέσο προώθησης της γνώσης και της επωνυμίας τους, ενώ ταυτόχρονα ενισχύουν και τη φυσική παρουσία στην τάξη.

Η κατανόηση των τεχνολογιών που μπορεί να φέρουν επανάσταση στη διδασκαλία θα επιτρέψει υψηλότερη αλληλεπίδραση, αλλά ταυτόχρονα πρέπει να δοθεί προσοχή ώστε να μην γίνεται κατάχρηση της τεχνολογίας. Με τη βοήθεια της τεχνητής νοημοσύνης, η παρούσα εργασία παρέχει ένα πλαίσιο αποτελεσματικών στρατηγικών που μπορούν να ενισχύσουν την προσέλευση στην τάξη σε συνδυασμό με τη χρήση της εξ αποστάσεως μάθησης και της υβριδικής διδασκαλίας. Στόχος είναι η δημιουργία μιας εργαλειοθήκης για την αξιοποίηση της τεχνολογίας στην εκπαίδευση, η οποία θα συμμορφώνεται με την ειδική νομοθεσία που διέπει τη σύγχρονη και ασύγχρονη μάθηση, θα προστατεύει τα προσωπικά δεδομένα και, ταυτόχρονα, θα ενισχύει τη φυσική παρουσία στην τάξη. Η έρευνα αυτή είναι σημαντική καθώς

παρέχει την απαραίτητη εστίαση και ανάλυση σε ένα θέμα που απαιτεί εμπλουτισμό. Η έρευνα επικεντρώνεται στην τριτοβάθμια εκπαίδευση, αλλά τα αποτελέσματά της μπορούν να αναπαραχθούν σε όλες τις βαθμίδες διδασκαλίας.

Λέξεις – κλειδιά: Τριτοβάθμια εκπαίδευση, υβριδική διδασκαλία, συμμετοχή στην εκπαίδευση, ηλεκτρονική μάθηση, παρακολούθηση μαθημάτων, συμπερίληψη στην εκπαίδευση.

ΠΡΟΩΘΗΣΗ ΤΗΣ ΕΠΙΛΥΣΗΣ ΠΡΟΒΛΗΜΑΤΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ STEM: ΑΝΙΧΝΕΥΤΗΣ ΑΕΡΙΩΝ ΜΕ ΕΝΣΩΜΑΤΩΜΕΝΗ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

Νικόλαος Γ. Αλέξης
Εκπαιδευτικός, Ερευνητής
Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού,
Ανδρέα Παπανδρέου 37, Μαρούσι, 15180, Ελλάδα
Σχολή Χημικών Μηχανικών, Εθνικό Μετσόβιο Πολυτεχνείο,
Πολυτεχνειούπολη, Ζωγράφου, Αθήνα, 15772, Ελλάδα
e-mail: nalexis@sch.gr

Ευαγγελία Παυλάτου
Καθηγήτρια ΕΜΠ
Σχολή Χημικών Μηχανικών, Εθνικό Μετσόβιο Πολυτεχνείο,
Πολυτεχνειούπολη, Ζωγράφου, Αθήνα, 15772, Ελλάδα
e-mail: pavlatou@chemeng.ntua.gr

ΠΕΡΙΛΗΨΗ

Αυτή η μελέτη ερευνά την αποτελεσματικότητα της Εκπαίδευσης Βασισμένης σε Προβλήματα (Problem Based Learning - PBL) και της Εκπαίδευσης Δημιουργών (Maker Education) στην ενίσχυση των δεξιοτήτων επίλυσης προβλημάτων μαθητών δευτεροβάθμιας εκπαίδευσης μέσω της ανάπτυξης ενός Ανιχνευτή Αερίων με ενσωματωμένη Τεχνητή Νοημοσύνη (ΤΝ). Με την ενσωμάτωση της ΤΝ στην βιωματική εκπαίδευση STEM, αυτή η έρευνα παρέχει πρακτικές γνώσεις για καινοτόμες εκπαιδευτικές προσεγγίσεις που ενθαρρύνουν την κριτική σκέψη και την τεχνική επάρκεια.

Χρησιμοποιήθηκε μια μικτή μέθοδος έρευνας, που περιλάμβανε 32 μαθητές δευτεροβάθμιας επαγγελματικής εκπαίδευσης του τομέα Ηλεκτρολογίας, Ηλεκτρονικής και Αυτοματισμού. Οι συμμετέχοντες κατηγοριοποιήθηκαν σε τρεις ομάδες: Δημιουργικής Μάθησης (πρακτικά έργα), Εικονικής Μάθησης (προσομοιώσεις) και Κλασικής Μάθησης (παραδοσιακή διδασκαλία). Η μελέτη αξιολόγησε τις στάσεις των μαθητών, πριν και μετά την διδακτική παρέμβαση, συγκεντρώνοντας ποσοτικές και ποιοτικές πληροφορίες ως προς την επίλυση προβλημάτων με χρήση ερωτηματολογίου και ημι-δομημένων συνεντεύξεων. Παρόλο που το μικρό μέγεθος δείγματος περιορίζει τη γενίκευση, τα αποτελέσματα παρέχουν σημαντικές γνώσεις για την αποτελεσματικότητα της μάθησης μέσω κατασκευών με ενσωματωμένη ΤΝ.

Τα ευρήματα δείχνουν ότι ενώ όλες οι ομάδες παρουσίασαν βελτιώσεις στις ικανότητες επίλυσης προβλημάτων, η ομάδα Δημιουργικής Μάθησης παρουσίασε την σημαντικότερη πρόοδο. Οι μαθητές παρουσίασαν υψηλό επίπεδο ενδιαφέροντος και εμπλοκής ενώ τόνισαν ότι έκριναν ως εξαιρετική την εφαρμογή των μαθησιακών τους εμπειριών στον πραγματικό κόσμο. Επιπλέον, η μελέτη εντόπισε προκλήσεις όπως οι περιορισμοί πόρων, η εκπαίδευση των εκπαιδευτικών και η ανάγκη για δομημένη ενσωμάτωση της ΤΝ σε εκπαιδευτικά περιβάλλοντα. Μια εκτενέστερη ανάλυση των δεδομένων σχεδιάζεται να ενισχύσει τα ευρήματα.

Για να ενισχυθεί η πρακτική εφαρμογή, αυτή η παρουσίαση περιλαμβάνει συγκεκριμένα παραδείγματα ενσωμάτωσης της τεχνητής νοημοσύνης στην τάξη, θα συζητήσει τις καλύτερες πρακτικές για την εφαρμογή της και θα αναδείξει πιθανές προκλήσεις σε φάση εφαρμογής ευρείας κλίμακας κατασκευών με ενσωματωμένη ΤΝ. Η συζήτηση θα παρέχει στους εκπαιδευτικούς και τους ερευνητές πρακτικές γνώσεις για την ανάπτυξη βιωματικών δραστηριοτήτων μάθησης μέσω κατασκευών με ενσωματωμένη ΤΝ σε προγράμματα σπουδών STEM, με έμφαση στην καλλιέργεια τόσο τεχνικών όσο και ήπιων δεξιοτήτων στη δευτεροβάθμια εκπαίδευση.

Λέξεις-κλειδιά: Εκπαίδευση Δημιουργών (Maker Education), Εκπαίδευση Βασισμένη σε Προβλήματα (Problem Based Learning - PBL), STEM, Τεχνητή Νοημοσύνη (ΤΝ), Ανιχνευτής Αερίων με ενσωματωμένη ΤΝ.

ΔΗΜΙΟΥΡΓΙΚΟΙ ΜΑΘΗΤΕΣ Η ΔΗΜΙΟΥΡΓΙΚΟ CHATGPT; ΟΙ ΑΝΤΙΛΗΨΕΙΣ ΜΑΘΗΤΩΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΓΙΑ ΤΗΝ ΕΠΙΔΡΑΣΗ ΤΗΣ ΓΕΝΕΤΙΚΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗ ΔΗΜΙΟΥΡΓΙΚΗ ΣΚΕΨΗ

Γιωτάκου Κωνσταντίνα
Εκπαιδευτικός ΠΕ02
2ο Πρότυπο Γυμνάσιο Βόλου
email: nadia_giotakou@yahoo.gr

ΠΕΡΙΛΗΨΗ

Βασικό χαρακτηριστικό της ανθρώπινης προσωπικότητας είναι η δημιουργική σκέψη. Παρόλο που ο άνθρωπος είναι φύσει δημιουργικό ον, ο βαθμός ανάπτυξης αυτής της ικανότητας εξαρτάται από το πόσο υποστηρικτικό είναι το κοινωνικο-πολιτισμικό πλαίσιο, συμπεριλαμβανομένης της εκπαίδευσης. Η καλλιέργειά της αποτελεί πρωταρχικό στόχο για τα περισσότερα εκπαιδευτικά συστήματα του 21ου αιώνα. Ωστόσο, τα σχολεία στην Ελλάδα φαίνεται πώς δυσκολεύονται να δημιουργήσουν τις προϋποθέσεις για να σκέφτονται οι μαθητές/τριες «έξω από το κουτί». Σύμφωνα με εμπειρικά δεδομένα, η δημιουργικότητα ενισχύεται με την εμπλοκή των μαθητών σε διαδικασίες δημιουργικής γραφής, ιδίως όταν αυτές αξιοποιούν τη γενετική τεχνητή νοημοσύνη, η οποία ανοίγει νέους δρόμους στη σύνθετη διαδικασία της συγγραφής. Ωστόσο, η τεχνολογία της τεχνητής νοημοσύνης έχει προκαλέσει και έντονο προβληματισμό με πολλούς να ανησυχούν πως προξενεί έντονη εξάρτηση και τελικά αποδυνάμωση του ανθρώπινου παράγοντα.

Σκοπός, λοιπόν, της παρούσας μελέτης είναι η διερεύνηση των αντιλήψεων των μαθητών/τριών Γυμνασίου για την επίδραση της τεχνητής νοημοσύνης στη δημιουργική σκέψη. Ειδικότερα τίθενται τα ακόλουθα ερευνητικά ερωτήματα: 1) Πώς οι μαθητές αξιολογούν την επίδραση της τεχνητής νοημοσύνης στον τομέα της δημιουργικότητας; 2) Πώς οι μαθητές αντιλαμβάνονται την ορθή χρήση της τεχνητής νοημοσύνης για την καλλιέργεια της δημιουργικής σκέψης;

Η τρέχουσα μελέτη υιοθετεί έναν διερευνητικό, ποιοτικό σχεδιασμό και τη φαινομενολογική προσέγγιση γιατί επιχειρεί την κατανόηση των προσδοκιών και της σημασίας που οι ίδιοι οι μαθητές αποδίδουν στην τεχνητή νοημοσύνη. Επιπλέον, εντάσσεται στο θεωρητικό πλαίσιο της αυτοπροσδιοριζόμενης μάθησης και της κοινωνικής θεωρίας γνωστικής ανάπτυξης του Vygotsky. Είκοσι μαθητές/τριες Γυμνασίου ασχολήθηκαν με δραστηριότητες δημιουργικής γραφής αξιοποιώντας το ChatGPT. Με δεδομένο ότι λίγα είναι γνωστά για το πώς οι μαθητές/τριες γράφουν δημιουργικά με τη χρήση των βοηθών γραφής και πώς πρέπει να είναι η διδασκαλία με τέτοια εργαλεία, το μάθημα έλαβε τη μορφή εργαστηρίου με συγκεκριμένους μαθησιακούς στόχους και δραστηριότητες, που αποσκοπούσαν στην κατάκτηση των δεξιοτήτων της ανάκλησης, κατανόησης, εφαρμογής, ανάλυσης και αναστοχασμού. Μετά την ολοκλήρωση των δραστηριοτήτων, οι συμμετέχοντες αξιολόγησαν τη δημιουργικότητα στα έργα τους με τη βοήθεια μιας ρουμπρίκας βασιζόμενης στα κριτήρια της εικόνας, της φωνής, των χαρακτήρων και της ιστορίας (Mozaffari, 2013; Zedelius et al., 2018), συμπλήρωσαν ένα ερωτηματολόγιο με ερωτήσεις ανοιχτού τύπου και συμμετείχαν σε ομάδες εστίασης.

Τα περιγραφικά δεδομένα αναλύθηκαν θεματικά και αποκάλυψαν ότι οι συμμετέχοντες αξιοποίησαν την τεχνητή νοημοσύνη σε δυσκολίες που συνάντησαν. Με τη βοήθειά της είχαν πρόσβαση σε εναλλακτικές ιδέες, οι οποίες καλλιέργησαν την αποκλίνουσα σκέψη και τη δεξιότητα επίλυσης προβλημάτων ενώ ταυτόχρονα αναπτύχθηκε και ο συναισθηματικός τομέας με την ενίσχυση ψυχολογικών αναγκών. Προέκυψε, ωστόσο, ότι δεν είχαν όλοι οι μαθητές την ικανότητα κριτικής αξιολόγησης, παραγωγής πρωτότυπων ιδεών και διατήρησης της αυθεντικής φωνής τους. Η κατανόηση των νέων δυνατοτήτων και των περιορισμών θα μπορούσε να βοηθήσει τους εκπαιδευτικούς στον προσεκτικότερο σχεδιασμό της διδασκαλίας και στην υιοθέτηση αποτελεσματικότερων στρατηγικών για την ενίσχυση της δημιουργικότητας.

Λέξεις – κλειδιά: δημιουργική σκέψη, τεχνητή νοημοσύνη, αντιλήψεις μαθητών, δευτεροβάθμια εκπαίδευση

ΚΑΛΛΙΕΡΓΕΙΑ ΤΗΣ ΗΠΙΑΣ ΔΕΞΙΟΤΗΤΑΣ ΤΗΣ ΚΡΙΤΙΚΗΣ ΣΚΕΨΗΣ ΜΕΣΩ ΤΝ ΣΤΟ ΔΗΜΟΤΙΚΟ ΣΧΟΛΕΙΟ

Θεοδώρου Μιχαήλ
ΠΕ70, Διευθυντής 9/θ Δημοτικό Σχολείο Γραικοχωρίου
ΔΠΕ Θεσπρωτίας
email: mtheodor@sch.gr

Γκιόκα Δήμητρα
ΠΕ 70, Διευθύντρια 6/θ Δημοτικό Σχολείο Ασπροκλησίου Σαγιάδας
ΔΠΕ Θεσπρωτίας
email: dgioka@sch.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά την αξιοποίηση των chatbots, στην καλλιέργεια της ήπιας δεξιότητας της κριτικής σκέψης σε μαθητές των μεγαλύτερων τάξεων του Δημοτικού Σχολείου. Σχεδιάστηκαν διδακτικά σενάρια σε πέντε γνωστικά αντικείμενα (Γλώσσα, Ιστορία, Αγωγή του Πολίτη, Γεωγραφία, Εργαστήρια Δεξιοτήτων), με τη συνδυαστική χρήση τριών δωρεάν εργαλείων: ChatGPT, Gemini 2.0 Flash και Gemini 2.0 Flash Thinking. Τα σενάρια εφαρμόστηκαν σε δύο Δημοτικά Σχολεία του νομού Θεσπρωτίας και η αποτίμηση των αποτελεσμάτων έγινε μέσω ημιδομημένων συνεντεύξεων σε πέντε εκπαιδευτικούς.

Τα ευρήματα ανέδειξαν ότι τα chatbots συνέβαλαν καθοριστικά στον σχεδιασμό δραστηριοτήτων που ενισχύουν την ανάλυση και τη σύγκριση απόψεων, την τεκμηρίωση ή την αμφισβήτηση άποψης, τον εντοπισμό έμμεσων μηνυμάτων και fake news, τη λήψη τεκμηριωμένης άποψης και την επίλυση προβλήματος. Επιπλέον, πρότειναν καινοτόμες ιδέες που υπερέβαιναν το αρχικό διδακτικό πλάνο των εκπαιδευτικών.

Ωστόσο, με το prompting παρατηρήθηκαν περιορισμοί ως προς την ακρίβεια συγκεκριμένων πληροφοριών, γεγονός που αντιμετωπίστηκε με τη συνδυαστική χρήση της διαδικτυακής αναζήτησης (searching). Συνολικά, η μελέτη επιβεβαιώνει τις προοπτικές των εργαλείων ΤΝ ως υποστηρικτικών μηχανισμών στην εκπαιδευτική πράξη, επισημαίνοντας όμως την ανάγκη για κριτικό ψηφιακό γραμματισμό τόσο από τους εκπαιδευτικούς όσο και από τους μαθητές.

Τέλος η έρευνα θέτει τη βάση για μελλοντικά προγράμματα ευρύτερης κλίμακας, ενταγμένα στο θεωρητικό πλαίσιο της Θεωρίας της Αλλαγής.

Λέξεις – κλειδιά: chatbots, καλλιέργεια κριτικής σκέψης, δημοτικό σχολείο.

E- TWINNING PROGRAM: "PHOTO MAGIC, FROM OLD PHOTOS TO AI"

Καλοκίδου Βασιλική
Εκπαιδευτικός Πρωτοβάθμιας Εκπαίδευσης ΠΕ60, Msc
23ο Νηπιαγωγείο Σταυρούπολης, Θεσσαλονίκη, Ελλάδα
e-mail: vaso.kal74@gmail.com

Ρουσσέτη Κυριακή
Εκπαιδευτικός Πρωτοβάθμιας Εκπαίδευσης ΠΕ60, Msc
2ο Νηπιαγωγείο Νέων Μαλγάρων, Θεσσαλονίκη, Ελλάδα
e-mail: krous81@gmail.com

ΠΕΡΙΛΗΨΗ

Το έργο αποτελεί ένα Ευρωπαϊκό project που εκπονήθηκε στην πλατφόρμα ESEP τη σχολική χρονιά 2024-2025. Στο έργο συμμετέχουν 19 μέλη, από την Ελλάδα, Τουρκία, Πορτογαλία, Ιταλία και Ρουμανία. Ιδρυτές του είναι το 23ο Νηπιαγωγείο Σταυρούπολης Θεσσαλονίκης και το ICS di Scandale από το San Mauro Marchesato, Ιταλία.

Το πρόγραμμα επικεντρώνεται στην παιδαγωγική αξιοποίηση της τεχνητής νοημοσύνης και την ενσωμάτωσή της σε υπάρχοντα μαθησιακά περιβάλλοντα και πλατφόρμες μάθησης. Αφόρμηση αποτελεί μία βαλίτσα που βρίσκεται τυχαία έξω από το νηπιαγωγείο, γεμάτη με παλιές φωτογραφίες και αντικείμενα μιας γυναίκας της παλιάς εποχής. Οι φωτογραφίες αποτελούν το έναυσμα για να ξεκινήσουμε το ταξίδι μας, από τις παλιές φωτογραφίες έως την Τεχνητή Νοημοσύνη. Ένα ταξίδι γνωριμίας με την ιστορία της φωτογραφίας, τις ασπρόμαυρες και έγχρωμες φωτογραφίες, τις φωτογραφίες πορτραίτα, τη φωτογραφία του δρόμου, αλλιώτικες φωτογραφίες με στόχο την καλλιέργεια ενσυναίσθησης και ευαισθησίας, σε συνδυασμό με τις δυνατότητες που προσφέρουν τα εργαλεία Τεχνητής Νοημοσύνης στη βελτίωση, δημιουργία, επεξεργασία και μετατροπή της εικόνας.

Εργαλεία ΤΝ που χρησιμοποιήθηκαν είναι τα εξής:
https://www.bing.com/images/create , https://www.remove.bg/el , https://padlet.com/ , https://deepai.org/ , https://genially.com/ , https://www.canva.com/ , https://www.artbreeder.com/ , https://ai.nero.com/ , http://vidnoz.com/ , https://en.linoit.com/ , https://www.cartoonize.net/

Λέξεις – κλειδιά: Προσχολική Αγωγή, Ευρωπαϊκά Προγράμματα, Τεχνητή Νοημοσύνη

Η ΕΝΣΩΜΑΤΩΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΠΛΕΟΝΕΚΤΗΜΑΤΑ ΚΑΙ ΜΕΙΟΝΕΚΤΗΜΑΤΑ

Δρ. Κοτταρά Χαρά
Εντεταλμένη Καθηγήτρια
Τμήμα Διοίκησης Επιχειρήσεων, Πανεπιστήμιο Δυτικής Αττικής
Θηβών 250 ΤΚ 12241 Αιγάλεω, Ελλάδα
email: hkottara@uniwa.gr

Δρ. Μαρία Λαγού
Οικονομολόγος - Διδάκτωρ Τμήματος Λογιστικής & Χρηματοοικονομικής, Πανεπιστημίου Δυτικής Αττικής
Εκπαιδευτής ενηλίκων στις ΣΑΕΚ
email: la44mar@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση και εφαρμογή της Τεχνητής Νοημοσύνης τα τελευταία χρόνια έχει αυξητική πορεία επηρεάζοντας βασικούς πυλώνες της παγκόσμιας οικονομίας. Η δυναμική της πορεία δεν άφησε ανεπηρέαστη την εκπαίδευση, αντιθέτως σήμερα υπάρχει ένα έντονο ενδιαφέρον για τη διερεύνηση της. Η παρούσα έρευνα είναι ένα βιβλιογραφικό άρθρο μέσα από το οποίο αξιοποιούνται η ήδη υπάρχουσες μελέτες, με σκοπό την εξέταση της τεχνητής νοημοσύνης στον τομέα της εκπαίδευσης και πιο συγκεκριμένα εντοπίζοντας τόσο τα πλεονεκτήματα όσο και τα μειονεκτήματα της. Κρίνεται σημαντική η διερεύνηση του υπό εξέταση πεδίου μέσα από την παρουσία εφαρμογών όπως το ChatGPT και Gemini οι οποίες χρησιμοποιούνται συχνά από τους εκπαιδευόμενους.

Τα ευρήματα της έρευνας βοηθούν τα μέλη της εκπαιδευτικής κοινότητας και τους αντίστοιχους φορείς, προκειμένου να αξιολογήσουν την αναγκαιότητα της ομαλής μετάβασης σε μια νέα κανονικότητα, διασφαλίζοντας κάθε ηθικό ζήτημα. Η ορθολογιστική χρήση του ChatGPT και Gemini είναι απαραίτητη για τη διατήρηση της ισορροπίας ανάμεσα στη δυαδική σχέση εκπαιδευτή και εκπαιδευόμενου.

Οι ερευνήτριες για τις ανάγκες της παρούσας επιστημονικής εργασίας χρησιμοποίησαν τη δευτερογενή έρευνα διαμέσου της βιβλιογραφίας, η οποία αναφέρεται σε μια συστηματική μέθοδο ανασκόπησης και κριτικής σχετικά με το υπό εξέταση επιστημονικό πεδίο, βοηθώντας στον προσδιορισμό της τρέχουσας γνώσης, των κενών και των μελλοντικών ερευνητικών κατευθύνσεων. Πραγματοποιήθηκε συστηματική αναζήτηση σε έγκριτες βάσεις δεδομένων, βιβλιοθήκες, ηλεκτρονικά αποθετήρια και άλλες επιστημονικές πηγές για την συλλογή ερευνών σχετικά με την τεχνητή νοημοσύνη στην εκπαίδευση με απώτερο στόχο την αξιολόγηση των πλεονεκτημάτων και μειονεκτημάτων της.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Εκπαίδευση, ChatGPT, Gemini

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ: ΠΑΡΑΓΩΓΗ ΓΡΑΠΤΟΥ ΛΟΓΟΥ ΣΤΗΝ ΣΤ' ΤΑΞΗ

Λαπαρίδου Κλεοπάτρα
Επαγγελματική ιδιότητα :Εκπαιδευτικός ΠΕ 70,Med
Φορέας επαγγελματικής ιδιότητας: Δημοτικό σχολείο Δρεπάνου Κοζάνης ΠΔΕ Κοζάνης
Τοποθεσία :Ελλάδα
e-mail: lapkl@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει τις εφαρμογές της Τεχνητής Νοημοσύνης (ΤΝ) στην πρωτοβάθμια εκπαίδευση ,εστιάζοντας στη βελτίωση της μαθησιακής διαδικασίας ,στην εξατομίκευση της μάθησης και στην υποστήριξη των εκπαιδευτικών. Μέσω βιβλιογραφικής επισκόπησης και ανάλυσης των υπαρχουσών εφαρμογών ,αναδεικνύονται οι βασικές χρήσεις της ΤΝ, όπως η προσωποποιημένη μάθηση, η αυτόματη αξιολόγηση, οι έξυπνοι βοηθοί και τα εκπαιδευτικά παιχνίδια**.**

Ιδιαίτερη έμφαση δίνεται στη χρήση της ΤΝ για την ανάπτυξη γλωσσικών δεξιοτήτων ,την ενσωμάτωση μαθητών με ειδικές ανάγκες και την ανάπτυξη γλωσσικών δεξιοτήτων και τη δημιουργία διαδραστικών περιβαλλόντων μάθησης. Στην παρούσα μελέτη, παρουσιάζεται ένα διδακτικό σενάριο για μαθητές/μαθήτριες ΣΤ' Δημοτικού, όπου εργαλεία ΤΝ, όπως το ChatGPT ,το LanguageTool, το Imagine AI και το Book Creator υποστηρίζουν τη διαδικασία παραγωγής γραπτού λόγου, ενισχύοντας τη δημιουργικότητα και τις ψηφιακές δεξιότητες των μαθητών/μαθητριών.

Τα αποτελέσματα δείχνουν ότι η ΤΝ συμβάλλει στη διαφοροποιημένη μάθηση, την ενίσχυση της ενεργούς συμμετοχής και την ανάπτυξη δεξιοτήτων του 21^{ου} αιώνα. Ωστόσο επισημαίνονται προκλήσεις, όπως η ηθική χρήση ,η προστασία προσωπικών δεδομένων και ο ρόλος του/της εκπαιδευτικού. Παρά τα εμπόδια, η ενσωμάτωση της ΤΝ στην εκπαίδευση προσφέρει σημαντικές ευκαιρίες για τον εκσυγχρονισμό της διδακτικής πρακτικής και την ενίσχυση της μαθησιακής εμπειρίας.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Παραγωγή Λόγου, Εκπαίδευση, Τεχνολογία

Η ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΥΠΗΡΕΣΙΑ ΑΝΤΙΜΕΤΩΠΙΣΗΣ ΤΟΥ ΣΧΟΛΙΚΟΥ ΕΚΦΟΒΙΣΜΟΥ

Μαρκολέφας Νικόλαος
Υποψήφιος Διδάκτορας Πανεπιστημίου Πελοποννήσου,
Τρίπολη, Ελλάδα
e-mail: n_markolefas@hotmail.com

Λαμπίρη Παυλίνα
Εκπαιδευτικός Κλάδου ΠΕ06 Αγγλικής Γλώσσας, MSc στο Πανεπιστήμιο του Μάντσεστερ,
Αθήνα, Ελλάδα
e-mail: pavlampiri@yahoo.com

Τζιαφέρη Στυλιανή
Αναπληρώτρια Καθηγήτρια Πανεπιστημίου Πελοποννήσου,
Τρίπολη, Ελλάδα
e-mail: stziafer@go.uop.gr

ΠΕΡΙΛΗΨΗ

Στις μέρες μας εκατομμύρια μαθητές παγκοσμίως δεν έχουν εξασφαλισμένο ένα ασφαλές σχολικό περιβάλλον, καθώς σε σχολεία ανά την υφήλιο τα παιδιά και οι έφηβοι μαθαίνουν να ζουν με τον φόβο ως συνέπεια του σχολικού εκφοβισμού. Η σχετική μελέτη αναδεικνύει τη σοβαρότητα και τη περιπλοκότητα του κοινωνικού φαινομένου που ονομάζεται σχολικός εκφοβισμός. Την τελευταία δεκαετία, κυρίως συνεπεία της γρήγορης ψηφιοποίησης, οι εφαρμογές για κινητές συσκευές και ηλεκτρονικούς υπολογιστές επηρεάζουν καθοριστικά τις ζωές των παιδιών καθώς οι μαθητές σε σημαντικό βαθμό ζουν και μαθαίνουν μέσα από αυτές. Σκοπός της παρούσας μελέτης είναι να ενισχύσει την κατανόησή μας σχετικά με τον τρόπο με τον οποίο οι έξυπνες, διαδραστικές τεχνολογίες συμβάλλουν στη μάθηση και στην ενδυνάμωση των χρηστών των εφαρμογών που στοχεύουν στην καταπολέμηση του σχολικού εκφοβισμού.

Λέξεις – κλειδιά: Σχολικός εκφοβισμός, τεχνητή νοημοσύνη, εφαρμογές κατά του σχολικού εκφοβισμού.

ΑΞΙΟΠΟΙΗΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΣΤΗΜΑ ΤΗΣ ΚΥΠΡΟΥ: ΠΑΓΚΟΣΜΙΕΣ ΤΑΣΕΙΣ ΚΑΙ ΤΟΠΙΚΕΣ ΠΡΩΤΟΒΟΥΛΙΕΣ

Μελλά Μαρία
Καθηγήτρια Μαθηματικών
Ιδιωτικός Τομέας Εκπαίδευσης στην Ελλάδα
Μεταπτυχιακή Φοιτήτρια στην Τεχνητή Νοημοσύνη
Ευρωπαϊκό Πανεπιστήμιο Κύπρου
Email: mm235312@students.euc.ac.cy

Άππιου Νικηφόρου Μαρίνα
Επίκουρη Καθηγήτρια Μαθηματικών
Ευρωπαϊκό Πανεπιστήμιο Κύπρου
Email: M.Nikiforou@euc.ac.cy

Κυπριανού Γεώργιος
Καθηγητής Πληροφορικής
Δημόσιος Τομέας Εκπαίδευσης στην Κύπρο
Επιστημονικός Συνεργάτης
Ευρωπαϊκό Πανεπιστήμιο Κύπρου
Email: G.Kyprianou@external.euc.ac.cy

ΠΕΡΙΛΗΨΗ

Η ραγδαία εξέλιξη της Τεχνητής Νοημοσύνης (ΤΝ) έχει επιφέρει σημαντικές αλλαγές στη χρήση των ψηφιακών μέσων στην εκπαιδευτική καθημερινότητα, εισάγοντας πολυάριθμες ευκαιρίες, καθώς και προκλήσεις που απαιτούν διερεύνηση σχετικά με το ρόλο της ΤΝ στην εκπαιδευτική διδασκαλία και μάθηση. Τα εργαλεία που λειτουργούν με τη χρήση της ΤΝ αναδιαμορφώνουν τις παιδαγωγικές προσεγγίσεις επιτρέποντας εξατομικευμένες μαθησιακές εμπειρίες, έξυπνα συστήματα διδασκαλίας και προσαρμοστικές αξιολογήσεις. Ωστόσο, αυτές οι εξελίξεις εγείρουν ανησυχίες αναφορικά με το απόρρητο των δεδομένων και τα ηθικά διλήμματα.

Στην Κύπρο, η ενσωμάτωση της ΤΝ στο εκπαιδευτικό σύστημα παραμένει σε πρώιμο στάδιο, παρά την αυξανόμενη επιθυμία και το έντονο ενδιαφέρον για την αναβάθμιση της εκπαιδευτικής διδασκαλίας. Η παρούσα έρευνα εξετάζει τόσο τις προοπτικές της παγκόσμιας εκπαιδευτικής κοινότητας όσο και το επίπεδο εξοικείωσης των Κύπριων εκπαιδευτικών της πρωτοβάθμιας, δευτεροβάθμιας και τριτοβάθμιας εκπαίδευσης σχετικά με την πιθανή ενσωμάτωση της ΤΝ στην εκπαιδευτική πραγματικότητα. Το ερωτηματολόγιο που συμπλήρωσαν οι συμμετέχοντες, αναδεικνύει την αντίληψη σχετικά με την έννοια της ΤΝ, το ποσοστό εξοικείωσης με τα εργαλεία της ΤΝ, τα συναισθήματα που προκαλεί μια πιθανή ενσωμάτωση, καθώς και τον βαθμό προθυμίας για την υιοθέτηση της ΤΝ στους εκπαιδευτικούς χώρους. Εμπεριέχονται, επίσης, ερωτήσεις σχετικά με τα πλεονεκτήματα και τα μειονεκτήματα των εργαλείων ΤΝ στην εκπαίδευση. Αξίζει να σημειωθεί ότι αρκετοί εκπαιδευτικοί ανησυχούν αναφορικά με το αν υπάρχει ή πόσο σύντομα θα μπορούσε να υπάρξει η κατάλληλη υποδομή για την ενσωμάτωση των αντίστοιχων εργαλείων στα εκπαιδευτικά περιβάλλοντα και το μεγαλύτερο ποσοστό αυτών επιθυμεί να έχει το δικαίωμα να αποδεχθεί ή να απορρίψει πιθανή ενσωμάτωση, καθώς οι εκπαιδευτικοί είναι οι άμεσοι μεταδότες της γνώσης.

Η ενσωμάτωση των εργαλείων Τεχνητής Νοημοσύνης στην εκπαιδευτική διαδικασία, προϋποθέτει την κατάλληλη προετοιμασία των εκπαιδευτικών, γεγονός που αναδεικνύει την επιτακτική ανάγκη διενέργειας σεμιναρίων και συνεδρίων, στα οποία οι εκπαιδευτικοί θα έχουν τη δυνατότητα να διατυπώσουν τις απόψεις τους, να ανταλλάξουν εμπειρίες και να συζητήσουν τους προβληματισμούς τους. Τα ευρήματα της παρούσας έρευνας συμβάλλουν στον ευρύτερο διάλογο για τον ψηφιακό μετασχηματισμό της εκπαίδευσης, σκιαγραφώντας στρατηγικές κατευθύνσεις για την υπεύθυνη και αποτελεσματική ενσωμάτωση της ΤΝ στο εκπαιδευτικό σύστημα.

Λέξεις – κλειδιά: ΤΝ στην εκπαίδευση, προσαρμοστική μάθηση, εκπαιδευτικό σύστημα της Κύπρου, παγκόσμια εκπαιδευτική κοινότητα, οφέλη ενσωμάτωσης ΤΝ, αναμενόμενες προκλήσεις της ΤΝ

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΜΙΑ ΒΙΒΛΙΟΜΕΤΡΙΚΗ ΑΝΑΛΥΣΗ ΤΩΝ ΤΑΣΕΩΝ ΚΑΙ ΤΩΝ ΜΕΛΛΟΝΤΙΚΩΝ ΚΑΤΕΥΘΥΝΣΕΩΝ ΤΗΣ ΕΡΕΥΝΑΣ- ΠΡΩΤΑ ΕΥΡΗΜΑΤΑ

Μαρία Μητρούλια[1]
Υποψήφια διδάκτορας
email: m.mitroulia@uoi.gr

Θωμάς Κιτσαντάς[2]
Λέκτορας

Κωσταντινιά Τσιλιγιάννη[3]
Εργαστηριακό Διδακτικό Προσωπικό

Ευάγγελος Χύτης[4]
Καθηγητής

[1,2,3,4] Πανεπιστήμιο Ιωαννίνων, Τμήμα Λογιστικής και Χρηματοοικονομικής, Ελλάδα

ΠΕΡΙΛΗΨΗ

Η Τεχνητή Νοημοσύνη (ΤΝ) στην εκπαίδευση έχει εξελιχθεί τα τελευταία χρόνια σε έναν από τους πιο ραγδαία αναπτυσσόμενους και δυναμικούς ερευνητικούς τομείς. Η αυξανόμενη ενσωμάτωσή της στις εκπαιδευτικές διαδικασίες έχει δημιουργήσει νέες ευκαιρίες για καινοτομία στη διδασκαλία και τη μάθηση, αλλά και προκλήσεις που σχετίζονται με ζητήματα δεοντολογίας, ακαδημαϊκής ακεραιότητας και παιδαγωγικής αξιοποίησης. Η παρούσα μελέτη πραγματοποιεί μια συστηματική βιβλιομετρική ανάλυση της ερευνητικής δραστηριότητας γύρω από την ΤΝ στην εκπαίδευση, με στόχο τη χαρτογράφηση των τάσεων, των θεματικών αξόνων και των μελλοντικών κατευθύνσεων του πεδίου. Το δείγμα περιλαμβάνει συναφείς δημοσιεύσεις από τη βάση δεδομένων Scopus για την περίοδο 2016–2024, οι οποίες αναλύθηκαν με τα εργαλεία Bibliometrix R και VOSviewer. Τα πρώτα αποτελέσματα αναδεικνύουν μια εκθετική αύξηση του επιστημονικού ενδιαφέροντος μετά το 2019, με κυρίαρχες θεματικές τις εφαρμογές των μεγάλων γλωσσικών μοντέλων, την ηθική της ΤΝ, τη μαθησιακή εξατομίκευση και την ακαδημαϊκή ακεραιότητα. Η έρευνα συμβάλλει στη διαμόρφωση μιας επίκαιρης εικόνας του γνωστικού πεδίου και προσφέρει χρήσιμες προτάσεις για μελλοντικές ερευνητικές και εκπαιδευτικές πρωτοβουλίες.

Λέξεις-κλειδιά: Τεχνητή νοημοσύνη, εκπαίδευση, βιβλιομετρική ανάλυση, βάση δεδομένων Scopus

ΑΝΤΙΛΗΨΕΙΣ ΜΕΛΛΟΝΤΙΚΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΩΣ ΠΡΟΣ ΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Μπασούνας Αθανάσιος
Σύμβουλος Εκπαίδευσης Πληροφορικής (ΠΕ86)
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: basounas@sch.gr

ΠΕΡΙΛΗΨΗ

Η αξιοποίηση της Τεχνητής Νοημοσύνης στην εκπαίδευση απασχολεί σε μεγάλο βαθμό τα τελευταία χρόνια εκπαιδευτικούς αλλά και ερευνητές της εκπαίδευσης. Η παρούσα εργασία ερευνά τις απόψεις μελλοντικών εκπαιδευτικών σε σχέση με τις δυνατότητες που παρέχει η ΤΝ στον εκπαιδευτικό αλλά και στον μαθητή/μαθήτρια, τα προβλήματα και τους κινδύνους που μπορεί να κρύβει η επέκταση της χρήσης της ΤΝ και τέλος για τις προϋποθέσεις και συνθήκες για τη αποτελεσματική και ωφέλιμη χρήση της τεχνολογίας αυτής σε κάθε πεδίο της μαθησιακής διαδικασίας. Η έρευνα έγινε σε σπουδαστές του Ετήσιου Προγράμματος Παιδαγωγικής Κατάρτισης (Ε.Π.ΠΑΙ.Κ.) της Α.Σ.ΠΑΙ.Τ.Ε., διάφορων ειδικοτήτων και επιπέδων διδακτικής εμπειρίας. Οι σπουδαστές αυτοί είναι εν δυνάμει μελλοντικοί εκπαιδευτικοί της πρωτοβάθμιας και κυρίως της δευτεροβάθμιας εκπαίδευσης. Για την συλλογή των δεδομένων χρησιμοποιήθηκε ανώνυμο ηλεκτρονικό ερωτηματολόγιο με ερωτήσεις κλειστού (κλίμακας Likert) αλλά και ανοιχτού τύπου. Πέρα από τα δημογραφικά στοιχεία, το ερωτηματολόγιο συλλέγει στοιχεία σε σχέση με την τεχνολογική επάρκεια των σπουδαστών, την εξοικείωσή τους με την ΤΝ και τις εφαρμογές της, τις αντιλήψεις τους σχετικά με τους τρόπους χρήσης της ΤΝ από εκπαιδευτικούς και μαθητές/μαθήτριες αλλά και τα πιθανά αρνητικά αποτελέσματα από την χρήση της.

Τα αποτελέσματα της έρευνας δείχνουν ότι οι σπουδαστές είναι σε μεγάλο βαθμό εξοικειωμένοι με την ψηφιακή τεχνολογία και ειδικά με την ΤΝ και ότι χρησιμοποιούν εφαρμογές της. Θεωρούν ότι η ΤΝ μπορεί να υποστηρίξει τους εκπαιδευτικούς, ιδίως στην προετοιμασία και σχεδίαση του μαθήματος, στην δημιουργία εκπαιδευτικού υλικού και στην προσέλκυση της προσοχής των μαθητών. Πιστεύουν ότι η ΤΝ μπορεί να βοηθήσει και τους μαθητές/μαθήτριες, αλλά σε μικρότερο βαθμό σε σχέση με τους εκπαιδευτικούς. Συγκεκριμένα, η ΤΝ μπορεί να συνεισφέρει στην εξοικείωσή τους με τη τεχνολογία αλλά και στην παροχή γνώσεων. Οι σπουδαστές αναγνωρίζουν κινδύνους και προβλήματα που μπορεί να συνοδεύουν την αξιοποίηση της ΤΝ στην εκπαιδευτική διαδικασία. Πολύ μεγάλο ποσοστό των ερωτηθέντων θεωρεί ότι υπάρχει ο κίνδυνος παρεμπόδισης και υποβάθμισης της κριτικής σκέψης των μαθητών/-τριών καθώς και ο κίνδυνος εξάρτησης από την τεχνολογία και απομόνωσής τους από το πραγματικό περιβάλλον. Σε μικρότερο βαθμό τους προβληματίζει και ο κίνδυνος λογοκλοπής και παραβίασης πνευματικής ιδιοκτησίας. Η πλειονότητα των σπουδαστών θεωρεί ότι η ΤΝ θα μπορούσε να υποβαθμίσει τον ρόλο του εκπαιδευτικού. Τέλος, η έρευνα έδειξε ότι σχεδόν όλοι οι σπουδαστές θεωρούν επιβεβλημένη την εφαρμογή πολιτικών ορθής και αποτελεσματικής χρήσης της ΤΝ στην εκπαίδευση αλλά και την συστηματική επιμόρφωση των εκπαιδευτικών σε αυτή.

Λέξεις – κλειδιά: Τεχνητή νοημοσύνη, αντιλήψεις εκπαιδευτικών, ψηφιακές τεχνολογίες στη εκπαίδευση.

ΣΥΜΒΟΥΛΕΥΤΙΚΗ ΚΑΘΟΔΗΓΗΣΗ ΚΑΙ ΨΗΦΙΑΚΑ ΜΕΣΑ: ΜΙΑ ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ ΤΗΣ ΒΙΒΛΙΟΓΡΑΦΙΑΣ (1998–2025)

Νόσιος Μάριος
Υπ. Διδάκτωρ, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
mnosios@uom.edu.gr

Μπέλλος Δημήτριος
Μεταπτυχιακός Φοιτητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
jimmyakan@gmail.com

Βενετσάνος Αντώνης
Μεταπτυχιακός Φοιτητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
myp25004@uom.edu.gr

Χάρμπα Δήμητρα
Μεταπτυχιακή Φοιτήτρια, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
dimitracharmpa@hotmail.com

Κατσαρός Απόστολος Χαράλαμπος
Μεταπτυχιακός Φοιτητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
myp25009@uom.edu.gr

Μπιτζένης Αριστείδης
Καθηγητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
bitzenis@uom.edu.gr

Κομπορόζου Μαρία
Μεταπτυχιακή Φοιτήτρια, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
myp25007@uom.edu.gr

Νικόλαος Κουτσουπιάς
Καθηγητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
nk@uom.edu.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει την ερευνητική δραστηριότητα στον τομέα της ψηφιακής επαγγελματικής καθοδήγησης και συμβουλευτικής, υιοθετώντας μια ποσοτική βιβλιομετρική προσέγγιση. Το προς ανάλυση σύνολο δεδομένων περιλαμβάνει 167 δημοσιεύσεις, οι οποίες εκτείνονται χρονικά από το 1998 έως τις αρχές του 2025. Η μελέτη αξιοποιεί περιγραφική στατιστική, τεχνικές συνύπαρξης λέξεων-κλειδιών, ανάλυση θεματικών τάσεων και θεματική χαρτογράφηση, προκειμένου να αποσαφηνιστούν η δυναμική της επιστημονικής παραγωγής, τα δίκτυα συγγραφικής συνεργασίας και οι εννοιολογικές δομές του πεδίου. Τα ευρήματα υποδεικνύουν έναν σταθερό ετήσιο ρυθμό δημοσίευσης, με μέσο όρο 10,8 αναφορές ανά εργασία και 3,7 συγγραφείς ανά δημοσίευση. Αξιοσημείωτο είναι ότι μόλις το 14,4% των άρθρων φέρει διεθνή συν-συγγραφή. Οι δημοσιεύσεις σε επιστημονικά περιοδικά συνιστούν τον κυρίαρχο δίαυλο διάχυσης της επιστημονικής γνώσης, ενώ τα πρακτικά συνεδρίων και τα κεφάλαια σε συλλογικούς τόμους διαδραματίζουν συμπληρωματικό ρόλο στην επιστημονική επικοινωνία. Η ανάλυση των θεματικών τάσεων καταδεικνύει μια διανοητική μετάβαση: από ζητήματα θεσμικού και υποδομικού χαρακτήρα (2001-2005), στην ενσωμάτωση της ηλεκτρονικής μάθησης και της υποβοηθούμενης από υπολογιστή διδασκαλίας (2005-2012), και εν συνεχεία στην εφαρμογή της ψηφιακής καθοδήγησης σε εξειδικευμένα πεδία, όπως η ιατρική εκπαίδευση (2010-2014). Το ερευνητικό ενδιαφέρον κορυφώνεται την περίοδο 2022–2023, με τη θεματική εστίαση να μετατοπίζεται σε ζητήματα συναισθηματικής νοημοσύνης, παρακίνησης και εφαρμογών τεχνητής νοημοσύνης. Η θεματική χαρτογράφηση, εντοπίζει τους όρους *άνθρωποι, καθοδήγηση* και *διαδίκτυο* ως ανεπτυγμένες και κινητήριες έννοιες, ενώ παράλληλα αποτυπώνει την ανάδυση νέων θεματικών ενοτήτων σχετικών με την τεχνητή νοημοσύνη και τα chatbots. Συνολικά, τα αποτελέσματα αποτυπώνουν έναν ώριμο και εξελισσόμενο ερευνητικό τομέα, ο οποίος χαρακτηρίζεται από μεταβαλλόμενες θεματικές προτεραιότητες. Μελλοντικές ερευνητικές κατευθύνσεις ενδείκνυται να ενισχύσουν τη διεθνή επιστημονική συνεργασία, να διερευνήσουν τις ηθικές και δεοντολογικές διαστάσεις των εργαλείων καθοδήγησης που βασίζονται στην τεχνητή νοημοσύνη και να αντιμετωπίσουν τις ψηφιακές ανισότητες στα συστήματα επαγγελματικής υποστήριξης.

Λέξεις-κλειδιά: Συμβουλευτική, Ψηφιακά Μέσα, Συστηματική Ανασκόπηση, Επιστημομετρία.

Η ΧΡΗΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΕ ΜΑΘΗΤΕΣ ΜΕ ΜΑΘΗΣΙΑΚΕΣ ΔΥΣΚΟΛΙΕΣ – ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ

Παπαλεξανδράτου Παρθενόπη
Μεταπτυχιακή Φοιτήτρια
Πανεπιστήμιο Δυτικής Αττικής – Τμήμα Δημόσιας και Κοινοτικής Υγείας
Αθήνα, Ελλάδα
e-mail: envihealth2344@uniwa.gr

Σταθοπούλου Αγάθη
Εργαστηριακό Διδακτικό Προσωπικό
Πανεπιστήμιο Δυτικής Αττικής – Τμήμα Δημόσιας και Κοινοτικής Υγείας
Αθήνα, Ελλάδα
e-mail: a.stathopoulou@uniwa.gr

Σκαναβή Κωνσταντίνα
Καθηγήτρια
Πανεπιστήμιο Δυτικής Αττικής – Τμήμα Δημόσιας και Κοινοτικής Υγείας
Αθήνα, Ελλάδα
e-mail: kskanavi@uniwa.gr

ΠΕΡΙΛΗΨΗ

Οι μαθησιακές δυσκολίες είναι μια νευροαναπτυξιακή διαταραχή που επηρεάζει σημαντικό ποσοστό μαθητών παγκοσμίως, δημιουργώντας ακαδημαϊκές και κοινωνικοσυναισθηματικές προκλήσεις που μπορεί να επηρεάσουν την ενήλικη ζωή. Παρόλο που οι μαθησιακές δυσκολίες δεν είναι πλήρως αντιμετωπίσιμες, τα άτομα που ζουν με αυτές μπορούν να ενισχύσουν σημαντικά τις ικανότητές τους, με τη βοήθεια κατάλληλων μεθόδων διδασκαλίας και υποστηρικτικών εργαλείων. Ο έγκαιρος εντοπισμός των μαθησιακών δυσκολιών και η παροχή κατάλληλης παρέμβασης είναι υψίστης σημασίας όχι μόνο για την υποστήριξη των μαθητών με μαθησιακές δυσκολίες στην αντιμετώπιση των ακαδημαϊκών αναγκών τους αλλά και για την ενίσχυση της κοινωνικής και συναισθηματικής τους ευημερίας, της σωστής ανάπτυξής τους και τη βελτίωση της ποιότητας της ζωής τους. Η τεχνητή νοημοσύνη προσφέρει καινοτόμες δυνατότητες για την υποστήριξη των μαθητών με μαθησιακές δυσκολίες, προσφέροντας εξατομικευμένα ψηφιακά εργαλεία και στρατηγικές μάθησης προσαρμοσμένα στις ιδιαίτερες εκπαιδευτικές τους ανάγκες. Σκοπός αυτής της μελέτης είναι, μέσω της συστηματικής βιβλιογραφικής ανασκόπησης, να εξετάσει τις πιο πρόσφατες εφαρμογές τεχνητής νοημοσύνης που έχουν αναπτυχθεί για την υποστήριξη των μαθητών με μαθησιακές δυσκολίες και την αποτελεσματικότητά τους στη βελτίωση των ακαδημαϊκών τους επιδόσεων. Μέσα από τη βιβλιογραφική αναζήτηση στις βάσεις δεδομένων Scopus, PubMed και Google Scholar εντοπίστηκε περιορισμένος αριθμός μελετών αναφορικά με τον ρόλο της τεχνητής νοημοσύνης στην εκπαίδευση μαθητών με μαθησιακές δυσκολίες. Εντούτοις, μέσα από αυτές τις μελέτες φάνηκε ότι η τεχνητή νοημοσύνη μπορεί να ενισχύσει την εκπαιδευτική πορεία των ατόμων με μαθησιακές δυσκολίες και να διευκολύνει τη μαθησιακή διαδικασία, βελτιώνοντας τις μαθησιακές τους επιδόσεις, μειώνοντας τις προκλήσεις και τις ανισότητες που αντιμετωπίζουν και παρέχοντας με αυτόν τον τρόπο ίσες ευκαιρίες επιτυχίας στον εκπαιδευτικό τομέα. Η συστηματική ανασκόπηση της υπάρχουσας βιβλιογραφίας, σε συνδυασμό με τα ευρήματα της μελέτης, καταδεικνύει ουσιώδη κενά και ανάγκες στην ενσωμάτωση της τεχνητής νοημοσύνης στην εκπαίδευση μαθητών με μαθησιακές δυσκολίες. Συγκεκριμένα, για την περαιτέρω ανάπτυξη της τεχνητής νοημοσύνης στην εκπαίδευση, κρίνεται απαραίτητη η δημιουργία εφαρμογών που θα καλύπτουν τις μαθησιακές ανάγκες των μαθητών με μαθησιακές δυσκολίες και όχι μόνο των φοιτητών. Επιπλέον, η έρευνα επικεντρώνεται κυρίως στη δυσλεξία, αφήνοντας άλλες μαθησιακές δυσκολίες ανεξερεύνητες, γεγονός που αναδεικνύει την ανάγκη για περαιτέρω μελέτες. Παράλληλα, η έλλειψη ερευνών σχετικά με τις αντιλήψεις των εκπαιδευτικών υπογραμμίζει την ανάγκη διερεύνησης του ρόλου τους στην ενσωμάτωση της τεχνητής νοημοσύνης στη διδασκαλία. Τέλος, προτείνεται η περαιτέρω μελέτη υφιστάμενων εφαρμογών, με στόχο τη βελτίωση των αλγορίθμων εξατομίκευσης και τη βέλτιστη απόδοσή τους στην εκπαίδευση μαθητών και φοιτητών με μαθησιακές δυσκολίες.

Λέξεις – κλειδιά: Τεχνητή νοημοσύνη, μαθησιακές δυσκολίες, εξατομικευμένη μάθηση, ψηφιακά εργαλεία, στρατηγικές μάθησης, εξατομικευμένες παρεμβάσεις.

Η ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ ΠΙΘΑΝΑ ΕΜΠΟΔΙΑ ΚΑΙ ΚΙΝΔΥΝΟΙ

Πέτσιου Χαρίκλεια
Σύμβουλος Εκπαίδευσης ΠΕ03
ΔΔΕ Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: harapetsiou@yahoo.gr

ΠΕΡΙΛΗΨΗ

Κατά την ενσωμάτωση της Τεχνητής Νοημοσύνης (ΤΝ) στο πεδίο της εκπαίδευσης, είναι πιθανό να προκύψουν διάφορες προκλήσεις και δυνητικές απειλές. Παρά τις υποσχόμενες δυνατότητες της ΤΝ, η αλόγιστη εφαρμογή της εγκυμονεί σημαντικούς κινδύνους. Οι βασικοί άξονες ανησυχίας περιλαμβάνουν διλήμματα, όπως η αλγοριθμική μεροληψία, η έλλειψη διαφάνειας, η προστασία προσωπικών δεδομένων, ο τρόπος της ανθρώπινης επικοινωνίας και η ανάπτυξη κριτικής σκέψης. Επιπλέον υπάρχουν και πρακτικά εμπόδια που σχετίζονται με την υλικοτεχνική υποδομή και την επιμόρφωση των εκπαιδευτικών.

Η ερευνητική προσέγγιση της εργασίας είναι ποιοτική και βασίζεται σε ημι-δομημένες συνεντεύξεις με 23 εκπαιδευτικούς Πρωτοβάθμιας και Δευτεροβάθμιας εκπαίδευσης από διάφορα μέρη της Ελλάδας, διαφόρων ειδικοτήτων, οι οποίοι έχουν εμπειρία με δημοφιλή AI chatbots. Αναδείχθηκαν ανησυχίες σχετικές με την παραπληροφόρηση, την αλλοίωση του ρόλου τους και την εξάρτηση των μαθητών από τα συστήματα ΤΝ. Η έρευνα καταλήγει στην ανάγκη για μία συνετή και υπεύθυνη προσέγγιση στην υιοθέτηση της ΤΝ, συνοδευόμενη από τη διαμόρφωση κατάλληλων πολιτικών και κατευθυντήριων αρχών, ώστε να μεγιστοποιηθούν τα οφέλη και να ελαχιστοποιηθούν οι αρνητικές επιπτώσεις.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, AI chatbots, Εκπαίδευση, κίνδυνοι-εμπόδια, προληπτικά μέτρα, διαχείριση λύσεων

SEARCH vs PROMPT: ΝΕΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ ΜΕ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

Ευαγγελία Δημουλά
Καθηγήτρια Πληροφορικής, ΠΕ86
2ο Πρότυπο Γυμνάσιο Αθήνας
edimoula@gmail.com

Αικατερίνη Ρήγα
Διευθύντρια, Καθηγήτρια Πληροφορικής, ΠΕ86
26ο Πειραματικό ΓΕ.Λ. Αθηνών (Μαράσλειο)
katsouf12@gmail.com

Παναγιώτα Κοντζίνου
Καθηγήτρια Μαθηματικών, ΠΕ03
26ο Πειραματικό ΓΕ.Λ. Αθηνών (Μαράσλειο)
pkontzinou11@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία αυτή διερευνά τη συγκριτική δυναμική δύο ψηφιακών προσεγγίσεων στην εκπαιδευτική διαδικασία: της παραδοσιακής αναζήτησης πληροφοριών (search) και της διατύπωσης προτροπών σε γλωσσικά μοντέλα Τεχνητής Νοημοσύνης (prompting). Εστιάζοντας στις εφαρμογές τους στη σχολική τάξη, εξετάζεται πώς οι δύο αυτές πρακτικές επηρεάζουν τη γνωστική διαδικασία, την ανάπτυξη δεξιοτήτων του 21ου αιώνα, καθώς και τη στάση μαθητών και εκπαιδευτικών απέναντι στη γνώση.

Αξιοποιώντας μελέτες περίπτωσης από τη διδασκαλία της Πληροφορικής, των Μαθηματικών και της Περιβαλλοντικής Εκπαίδευσης, αποτυπώνονται οι δυνατότητες και οι περιορισμοί κάθε μεθόδου. Η μεθοδολογία βασίστηκε σε ποιοτική ανάλυση διδακτικών σεναρίων και εκπαιδευτικών παρεμβάσεων με εργαλεία τεχνητής νοημοσύνης, σε συνδυασμό με βιβλιογραφική επισκόπηση έγκριτων ακαδημαϊκών πηγών.

Τα αποτελέσματα αναδεικνύουν ότι η αναζήτηση απαιτεί δεξιότητες φιλτραρίσματος πληροφορίας και αξιολόγησης πηγών, αλλά είναι χρονοβόρα και επιρρεπής σε παραπληροφόρηση. Το prompting, αντίθετα, παρέχει άμεσες, προσωποποιημένες και ερμηνευτικές απαντήσεις, ενισχύοντας τη διερεύνηση και τον αναστοχασμό. Ωστόσο, η υπερβολική εξάρτηση από τα γλωσσικά μοντέλα μπορεί να υπονομεύσει την αυτονομία του μαθητή.

Η εργασία καταλήγει ότι ο συνδυασμός των δύο προσεγγίσεων είναι παιδαγωγικά και διδακτικά επωφελής. Προτείνεται η ανάπτυξη μικτών μοντέλων μάθησης που ενσωματώνουν τόσο τη δεξιότητα της αναζήτησης όσο και τη δημιουργική χρήση προτροπών, στο πλαίσιο ενός στοχαστικού, ψηφιακά ενισχυμένου σχολείου.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Εκπαίδευση, Prompting, Αναζήτηση, ChatGPT, Ψηφιακός Γραμματισμός

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΓΙΑ ΤΗΝ ΑΥΤΟΜΑΤΗ ΑΞΙΟΛΟΓΗΣΗ ΤΗΣ ΕΠΙΔΟΣΗΣ ΜΑΘΗΤΩΝ: Η ΠΕΡΙΠΤΩΣΗ ΤΟΥ ΕΡΓΟΥ AISE

Φανή Μπισκανάκη
Διευθύντρια
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Νομού
Πρέβεζας, Ελλάδα

Αθανάσιος Σύψας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Νομού
Πρέβεζας, Ελλάδα

Βενέδικτος Χατζησάββας
Γ' Τεχνική και Επαγγελματική Σχολή Εκπαίδευσης και Κατάρτισης
Λεμεσού, Κύπρος

Ανδρέας Παρασκευάς
Γ' Τεχνική και Επαγγελματική Σχολή Εκπαίδευσης και Κατάρτισης
Λεμεσού, Κύπρος

Μαρία Ευριπίδου
Γ' Τεχνική και Επαγγελματική Σχολή Εκπαίδευσης και Κατάρτισης
Λεμεσού, Κύπρος

Αχιλλέας Κωστούλας
Doumag LTD
Κύπρος

Lazar Dašić
University of Kragujevac,
Serbia

Tijana Geroski
University of Kragujevac,
Serbia

Nenad Filipović
University of Kragujevac,
Serbia

Ana Orlović Kovačević
CARNET
Croatia

Θέμης Έξαρχος
Ιόνιο Πανεπιστήμιο
Κέρκυρα, Ελλάδα

Κώστας Ασημακόπουλος
Διεθνές Πανεπιστήμιο της Ελλάδος
Ελλάδα

Γιώργος Σταλίδης
Διεθνές Πανεπιστήμιο της Ελλάδος
Ελλάδα

Ognjen Pavić
University of Kragujevac,
Serbia

Jelena Pavić
City of Kragujevac, University of Kragujevac
Serbia

Daniel Štifanić, Zlatan Car
Faculty of Engineering, University of Rijeka
Croatia

ΠΕΡΙΛΗΨΗ

Το άρθρο παρουσιάζει τη μεθοδολογία, τα αποτελέσματα και τις τρέχουσες εργασίες του έργου AISE (Artificial Intelligent platform to support Students by assessing their performance skills through predictive models created from their writing skills), το οποίο χρηματοδοτείται από το πρόγραμμα Erasmus+, ΙΚΥ. Στόχος του έργου είναι η εφαρμογή προηγμένων μεθόδων Τεχνητής Νοημοσύνης, με έμφαση στη μέθοδο RAG (Retrieval-Augmented Generation) σε συνδυασμό με Μεγάλα Γλωσσικά Μοντέλα (LLMs), για την αυτόματη αξιολόγηση μαθητικών εκθέσεων σε τρεις διαστάσεις: Περιεχόμενο, Δομή και Γλώσσα. Οι εκθέσεις συλλέχθηκαν από μαθητές δευτεροβάθμιας εκπαίδευσης στην Ελλάδα, την Κύπρο, τη Σερβία και την Κροατία, επεξεργάστηκαν και αξιολογήθηκαν μέσω μιας αρθρωτής υπολογιστικής υποδομής βασισμένης στην ΤΝ. Τα αποτελέσματα δείχνουν υψηλή συμφωνία με τις βαθμολογίες των εκπαιδευτικών, ιδιαίτερα στη διάσταση του Περιεχομένου, ενώ αναδεικνύονται προκλήσεις στην αξιολόγηση των γλωσσικών λεπτομερειών. Το έργο AISE ανοίγει τον δρόμο για επεκτάσιμα, διαφανή και εξατομικευμένα συστήματα ανατροφοδότησης σε εκπαιδευτικά περιβάλλοντα.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Erasmus+, Γλωσσική Επεξεργασία, Αυτόματη Αξιολόγηση Εκθέσεων, Δευτεροβάθμια Εκπαίδευση

ΠΡΟΣΑΡΜΟΓΗ/ΔΗΜΙΟΥΡΓΙΑ ΔΡΑΣΤΗΡΙΟΤΗΤΩΝ ΜΕ ΤΗ ΒΟΗΘΕΙΑ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ (AIATAC): ΕΝΑ ΠΛΑΙΣΙΟ ΓΙΑ ΤΗΝ ΕΝΣΩΜΑΤΩΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΓΓΛΙΚΗΣ ΩΣ ΞΕΝΗΣ ΓΛΩΣΣΑΣ

Τάγκας Περικλής
Καθηγητής, Τμήμα Λογιστικής και Χρηματοοικονομικής, Πανεπιστήμιο Ιωαννίνων
Μεταπτυχιακό Πρόγραμμα Σπουδών «Διδακτική της Αγγλικής ως Ξένης/Διεθνούς Γλώσσας»
Ελληνικό Ανοικτό Πανεπιστήμιο
Πρέβεζα Ελλάδα
e-mail: ptagkas@uoi.gr

Χατζόπουλος Περικλής-Ιωάννης
Ειδικό Τεχνικό Εργαστηριακό Προσωπικό (Ε.Τ.Ε.Π.)
Τμήμα Λογιστικής και Χρηματοοικονομικής, Πανεπιστήμιο Ιωαννίνων
Πρέβεζα, Ελλάδα
e-mail: phadgop@uoi.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εστιάζει στον ρόλο της τεχνητής νοημοσύνης (ΤΝ) ως πολύτιμου εργαλείου στην εκμάθηση της αγγλικής γλώσσας, το οποίο βοηθά τους εκπαιδευτικούς στους πολύπλευρους ρόλους τους. Η παραγωγική ΤΝ μπορεί να βοηθήσει στη δημιουργία ασκήσεων λεξιλογίου/γραμματικής/προφορικών δραστηριοτήτων ή διαλόγων (σε ένα «ανοιχτό» αναλυτικό πρόγραμμα) ή στην προσαρμογή υφιστάμενων ασκήσεων (σε «κλειστά» αναλυτικά προγράμματα), με βάση την εκπαιδευτική κατάσταση και τα προφίλ των μαθητών. Ωστόσο, είναι σημαντικό να αναφερθεί ότι οι δραστηριότητες που υποστηρίζονται από την τεχνητή νοημοσύνη πρέπει να συμμορφώνονται με μεθοδολογικά κριτήρια. Το πλαίσιο AIATAC σχεδιάστηκε με αφορμή το γεγονός ότι οι εκπαιδευόμενοι καθηγητές αγγλικής γλώσσας σε επίπεδο μεταπτυχιακού προγράμματος σπουδών στο Ελληνικό Ανοικτό Πανεπιστήμιο ανέφεραν ότι χρησιμοποιούν την τεχνητή νοημοσύνη για να σχεδιάσουν φύλλα εργασιών με βελτιωμένες εικόνες, ως μέρος του σχεδιασμού των μαθημάτων τους. Πραγματοποιήθηκε ανάλυση του περιεχομένου αυτών των σχεδίων μαθήματος και τα αποτελέσματα αξιολογήθηκαν ως θετικά συσχετιζόμενα με την αύξηση της παρακίνησης και της συμμετοχής των μαθητών στην τάξη. Στη συνέχεια, το πλαίσιο AIATAC σχεδιάστηκε ως αποτέλεσμα της ρεαλιστικής ανάγκης να επεκταθεί και να εφαρμοστεί η προσαρμογή ή η δημιουργία δραστηριοτήτων με τη βοήθεια της τεχνητής νοημοσύνης, με τρόπο βασισμένο σε αρχές, σύμφωνα με τη μεθοδολογία της διδασκαλίας της αγγλικής ως ξένης γλώσσας. Το πλαίσιο AIATAC μπορεί επίσης να εφαρμοστεί στη διδασκαλία της αγγλικής γλώσσας για ειδικούς/ακαδημαϊκούς σκοπούς (ESP/EAP) ή ακόμη και στην περίπτωση της αγγλικής γλώσσας ως μέσου διδασκαλίας (EMI). Αυτή η δυνατότητα εξετάζεται επί του παρόντος στο Πανεπιστήμιο Ιωαννίνων, στο πλαίσιο της διδασκαλίας ESP στο Τμήμα Λογιστικής και Χρηματοοικονομικής, η οποία περιλαμβάνει την ενσωμάτωση της ΤΝ σε σύγχρονες (τάξη/εργαστήριο πληροφορικής) και ασύγχρονες (αυτοδιδασκαλία/ηλεκτρονική μάθηση) μορφές διδασκαλίας, χρησιμοποιώντας γενικές ή πιο εξειδικευμένες εφαρμογές ΤΝ. Το πλαίσιο AIATAC μπορεί να εφαρμοστεί πιο αποτελεσματικά σε ένα εργαστήριο με τον απαιτούμενο εξοπλισμό, προσφέροντας στους μαθητές πρόσβαση σε εφαρμογές και διαδικτυακά εργαλεία. Στην εργασία αναλύεται ο τρόπος με τον οποίο αυτό το πιλοτικό πλαίσιο μπορεί να χρησιμοποιηθεί με μεθοδολογικά κατάλληλο τρόπο.

Λέξεις-κλειδιά: Διδασκαλία της αγγλικής γλώσσας, παραγωγική ΤΝ, προσαρμογή στο πλαίσιο, δημιουργία/προσαρμογή εργασιών, πλαίσιο AIATAC.

ΘΠ14: Διδακτική Αξιοποίηση της Εκπαιδευτικής Ρομποτικής

ΣΥΓΚΡΙΤΙΚΗ ΑΞΙΟΛΟΓΗΣΗ ΤΗΣ ΧΡΗΣΤΙΚΟΤΗΤΑΣ ΣΥΣΤΗΜΑΤΩΝ ΜΗΧΑΤΡΟΝΙΚΗΣ

Απόστολος Τσαγκάρης
Διεθνές Πανεπιστήμιο της Ελλάδος
Θεσσαλονίκη, Ελλάδα
e-mail: tsagaris@gmail.com

Μαρία Χατζηκύρκου
Διεθνές Πανεπιστήμιο της Ελλάδος
Θεσσαλονίκη, Ελλάδα
e-mail: maria.chatzikyrkou@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία μελετά την αλληλεπίδραση παιδιών ηλικίας 5-12 ετών με ένα σύγχρονο μηχατρονικό σύστημα συγκρίνοντας τα αποτελέσματα που λαμβάνονται από τρία εργαλεία αξιολόγησης της χρηστικότητας. Το σύστημα μηχατρονικής είναι ένα αυτόνομο ρομποτικό όχημα που κατασκευάστηκε με τη βοήθεια του εκπαιδευτικού πακέτου Lego Mindstorms EV3 Education. Η κατασκευή χρησιμοποιείται από 100 παιδιά ηλικίας 5-12 ετών σε τρία σενάρια διαφορετικής δυσκολίας και στη συνέχεια καθένα από αυτά τα παιδιά απαντά σε τρία ερωτηματολόγια. Το πρώτο ερωτηματολόγιο που αξιολογεί τη χρηστικότητα είναι το SUS (System Usability Scale - Κλίμακα Χρηστικότητας Συστήματος) και αποτελείται από 10 ερωτήσεις, το δεύτερο είναι το USE (Usefulness, Satisfaction, Ease of Use - Χρησιμότητα, Ικανοποίηση, Ευκολία Χρήσης) το οποίο αποτελείται από 30 ερωτήσεις που χωρίζονται σε τέσσερις ενότητες και αξιολογούν τη χρησιμότητα, την ευκολία χρήσης, την ευκολία εκμάθησης και την ικανοποίηση αντίστοιχα. Το τρίτο ερωτηματολόγιο δημιουργήθηκε και υιοθετήθηκε από προηγούμενη έρευνα (Τσαγκάρης, 2023) και αποτελείται από 20 ερωτήσεις χωρισμένες σε τέσσερις ενότητες που αξιολογούν την αποτελεσματικότητα, την αποδοτικότητα, την ικανοποίηση και την ευκολία χρήσης.

Η έρευνα περιλάμβανε ένα δείγμα 100 παιδιών, ηλικίας 5-12 ετών (5-6 ετών 48%, 7-8 ετών 26%, 9-10 ετών 16%, 11-12 ετών 10%), εκ των οποίων το 84% ήταν αγόρια και το 16% κορίτσια, με το 48% να κατοικεί στη δυτική Θεσσαλονίκη και το 52% να κατοικεί εκτός Θεσσαλονίκης. Από τα αποτελέσματα του πρώτου ερωτηματολογίου (SUS), κανείς συμπεραίνει ότι η χρήση του συστήματος μηχατρονικής δημιουργεί τη διάθεση για συχνή χρήση (94% Συμφωνούν), δεν είναι περίπλοκη (80% Συμφωνούν), αποπνέει εμπιστοσύνη κατά τη χρήση (98% Συμφωνούν), είναι εύκολο να μάθει κανείς να το χρησιμοποιεί (70% Συμφωνούν), και ότι για τις μικρότερες ηλικίες των 5-6 ετών, σε αντίθεση με τα παιδιά 11-12 ετών, απαιτείται η βοήθεια ενός τεχνικού για τη χρήση του.

Σύμφωνα με τα αποτελέσματα του δεύτερου ερωτηματολογίου (USE), στην πρώτη του ενότητα που αξιολογεί τη Χρησιμότητα, το 92% συμφωνεί ότι τους βοηθά να είναι πιο αποδοτικοί, το 98% συμφωνεί ότι είναι χρήσιμο και το 98% επίσης συμφωνεί ότι κάνει όλα όσα περίμεναν να κάνει. Στη δεύτερη του ενότητα που αξιολογεί την Ευκολία Χρήσης, το 92% λέει ότι είναι εύκολο στη χρήση, το 94% συμφωνεί ότι είναι φιλικό προς το χρήστη, το 96% δηλώνει ότι είναι ευέλικτο και ότι μπορούν να ανακάμψουν από λάθη γρήγορα και εύκολα. Στην τρίτη του ενότητα που αξιολογεί την Ευκολία Εκμάθησης, το 90% θυμάται εύκολα πώς να το χρησιμοποιεί και το 80% δηλώνει ότι είναι εύκολο να μάθει κανείς και να το χρησιμοποιήσει. Η τέταρτη και τελευταία ενότητα του δεύτερου ερωτηματολογίου αξιολογεί την Ικανοποίηση, με το 100% να δηλώνει ότι είναι ευχαριστημένοι με τη διεπαφή, το 96% να λέει ότι θα το συνιστούσε σε έναν φίλο και το 98% να λέει ότι είναι υπέροχο.

Όσον αφορά το τρίτο ερωτηματολόγιο, στις πρώτες πέντε ερωτήσεις που αξιολογούν την Αποτελεσματικότητα, το 96% διαφωνεί ότι γίνονται λάθη κατά την αλληλεπίδραση, ενώ το 100% συμφωνεί ότι η διεπαφή λειτουργεί όπως αναμένεται. Στη δεύτερη του ενότητα, που αφορά την Αποδοτικότητα, το 100% συμφωνεί ότι η αλληλεπίδραση είναι εύκολη και το 92% συμφωνεί ότι υπάρχει ελευθερία κίνησης για το χρήστη. Η Ικανοποίηση είναι αυτό που αξιολογείται στην τρίτη ενότητα του ερωτηματολογίου, με το 100% να συμφωνεί ότι η λειτουργία του συστήματος δεν είναι κουραστική και ότι η αλλαγή της εντολής είναι εύκολη, ενώ στην τέταρτη ενότητα, η οποία αξιολογεί την Ευκολία Χρήσης, το 96% δηλώνει ότι είναι ευέλικτο στην επιλογή κινήσεων, το 100% ότι οι εντολές είναι αξιομνημόνευτες, και ότι η εκπαίδευση είναι εύκολη.

Λέξεις-κλειδιά: Εκπαιδευτική Ρομποτική, Συστήματα Μηχατρονικής, Αξιολόγηση Χρηστικότητας

Wedosave: FORGOTTEN BABY SYNDROME ΡΟΜΠΟΤΙΚΟ ΣΥΣΤΗΜΑ ΠΡΟΣΤΑΣΙΑΣ ΤΗΣ ΖΩΗΣ ΑΠΟ ΤΟ ΣΥΝΔΡΟΜΟ ΞΕΧΑΣΜΕΝΟΥ ΠΑΙΔΙΟΥ

Αυγουλάς Νικόλαος
Καθηγητής Πληροφορικής ΠΕ86
Υποδιευθυντής 11ου Δημοτικού Σχολείου Καλαμαριάς
e-mail: navgou11dim@gmail.com

ΠΕΡΙΛΗΨΗ

Το Wedosave:ForgottenBabySyndrome είναι μια ρομποτική εφαρμογή που κατασκευάστηκε και προγραμματίστηκε από τους μαθητές και μαθήτριες της Στ τάξη του 11ου Δημοτικού Σχολείου Καλαμαριάς που περιλαμβάνει κατάλληλους αυτοματισμούς για την πρόληψη περιστατικών του Συνδρόμου Ξεχασμένου Παιδιού.

Η χρονική διάρκεια εκπόνησης του συγκεκριμένου Project ήταν 6 εβδομάδες στις οποίες τα παιδιά ήρθαν σε επαφή με τον μικροελεγκτή MICROBIT και το περιβάλλον προγραμματισμού του, δούλεψαν σε ομάδες των τεσσάρων και ακολουθώντας στοχευμένες δραστηριότητες κατανόησης της λειτουργίας της συσκευής και των δυνατοτήτων της και ανακάλυψαν τις λειτουργίες που αυτό προσφέρει για την επίλυση του προβλήματος που τους δόθηκε.

Το Σύνδρομο Ξεχασμένου Παιδιού αφορά την περίπτωση που ο/η οδηγός αυτοκινήτου που συνοδεύει ανήλικο ειδικά σε βρεφική ηλικία, δύναται να ξεχάσει την παρουσία του παιδιού στην καμπίνα και να αποχωρήσει, αφήνοντας το σε επικίνδυνο για την υγεία του περιβάλλον, ιδίως τους καλοκαιρινούς μήνες.

Η ρομποτική διάταξη αποτελείται από αισθητήρες βάρους που προσαρμόζονται στο παιδικό καρεκλάκι και αισθητήρα για τη μέτρηση της θερμοκρασίας εντός του αυτοκινήτου. Ταυτόχρονα, υπάρχουν συσκευές ειδοποίησης του συνοδού όπως κινητό τηλέφωνο και smart watch, αλλά και ενεργοποίησης του συναγερμού του αυτοκινήτου ώστε το παιδί, με τη βοήθεια κάποιου περαστικού, να βγει από το αυτοκίνητο και να μεταφερθεί σε δροσερό περιβάλλον.

Τέλος, κατασκευάστηκε αυτόματος μηχανισμός για να ανοίγει το παράθυρο και να δροσίζεται το παιδί, μέχρι ο συνοδός ή κάποιος περαστικός να το απομακρύνει από τον κίνδυνο.
Όλες οι κατασκευές, όπως ο μηχανισμός παραθύρου, και οι συσκευές με τους αισθητήρες και τους προειδοποιητικούς μηχανισμούς, αποτελούνται από Microbit τα οποία επικοινωνούν μεταξύ τους με ραδιοκύματα.

Το Wedosave προσέφερε μαθησιακά οφέλη σε πολλαπλά επίπεδα, καθώς βασίστηκε

- στον επικοδομητισμό καθώς οι μαθητές/τριες κατέγραψαν, σχεδίασαν κατασκεύασαν και ανέλυσαν παραμέτρους της λύσης του προβλήματος ,
- την ομαδοσυνεργατική διδασκαλία χωριζόμενοι σε ομάδες των 3 και 4 ατόμων,
- τη διαθεματική προσέγγιση αφού οι μαθητές χρησιμοποίησαν τις γνώσεις τους από τη φυσική και τα ηλεκτρικά κυκλώματα αλλά και τη βιολογία και τους τρόπους με τους οποίους δροσίζεται το σώμα μας,
- τη μέθοδο project καθώς οι εργασία πέρασε από διαφορετικά στάδια (σχεδιασμός, ανάλυση, κατασκευή και παρουσίαση)
- την εξατομικευμένη μάθηση καθώς οι μαθητές/τριες μπορούσαν να επιλέξουν με ποιο κομμάτι της εργασίας θα ήθελαν να ασχοληθούν περισσότερο.

Λόγω της ιδιαίτερης απήχησης του Wedosave, εκτός από την παρουσίαση του στο Μαθητικό Συνέδριο Πληροφορικής της Περιφερειακής Δ/νσης Κεντρικής Μακεδονίας και στο Φεστιβάλ Μαθητικές Ρομποτικής του Πειραματικού Γυμνασίου Πανεπιστημίου Μακεδονίας και Φεστιβάλ Ρομποτικής Δ/νσης Β/θμιας Νομού Πέλλας, οι μαθητές είχαν την ευκαιρία να δώσουν συνεντεύξεις σε πλήθος Μέσων Μαζικής Επικοινωνίας αποκτώντας εμπειρία αλλά και αυτοπεποίθηση για τις προσπάθειές και τις δυνατότητές τους.

Λέξεις – κλειδιά: Σύνδρομο Ξεχασμένου Παιδιού, STEM, Microbit, ρομποτική, προγραμματισμός.

ΕΝΣΩΜΑΤΩΣΗ ΤΟΥ ΑΛΓΟΡΙΘΜΙΚΟΥ ΤΡΟΠΟΥ ΣΚΕΨΗΣ ΚΑΙ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΥ ΣΤΗ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ ΜΕΣΩ ΤΗΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΡΟΜΠΟΤΙΚΗΣ: ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΒΑΣΙΣΜΕΝΗ ΣΤΟ ΝΕΟ ΕΛΛΗΝΙΚΟ ΑΝΑΛΥΤΙΚΟ ΠΡΟΓΡΑΜΜΑ ΤΟΥ ΙΕΠ

Ροντογιάννης Άγγελος
Εκπαιδευτικός Πληροφορικής & Μουσικής (ΠΕ86 – ΤΕ16)
Τομέας Εκπαίδευσης στην Πληροφορική,
2ο Πειραματικό ΓΕ.Λ. Λευκάδας, Ελλάδα
email: arondo@sch.gr

ΠΕΡΙΛΗΨΗ

Το παρόν άρθρο παρουσιάζει μια μελέτη περίπτωσης που διερευνά την ενσωμάτωση του αλγοριθμικού τρόπου σκέψης και του προγραμματισμού στην ανώτερη δευτεροβάθμια εκπαίδευση μέσω της εκπαιδευτικής ρομποτικής. Η παρέμβαση βασίζεται στο νέο εθνικό αναλυτικό πρόγραμμα σπουδών Πληροφορικής που εκπονήθηκε από το Ινστιτούτο Εκπαιδευτικής Πολιτικής (ΙΕΠ), εστιάζοντας στη θεματική ενότητα «Αλγοριθμική Σκέψη – Προγραμματισμός Υπολογιστικών Συστημάτων» και ειδικότερα στην υποενότητα «Προγραμματισμός Ρομπότ και Υλικού.»

Μέσω ενός σεναρίου που βασίστηκε στη χρήση μικροελεγκτών Arduino και πλατφορμών προσομοίωσης όπως το Tinkercad, οι μαθητές καθοδηγήθηκαν στην κατασκευή και τον προγραμματισμό αυτοματοποιημένων συστημάτων. Η προσέγγιση συνδυάζει την προσομοίωση με τον φυσικό υπολογισμό, ενισχύοντας την ενασχόληση των μαθητών με εφαρμογές της τεχνολογίας στην πραγματική ζωή. Δόθηκε έμφαση στη μαθητοκεντρική και βιωματική μάθηση, στην ομαδική εργασία και στην καλλιέργεια βασικών ψηφιακών δεξιοτήτων.

Η μελέτη υλοποιήθηκε κατά τη σχολική χρονιά 2023–2024 με μαθητές της Β’ Λυκείου, αναδεικνύοντας αυξημένη συμμετοχή, βελτιωμένη ικανότητα στον προγραμματισμό, καθώς και ενισχυμένες δεξιότητες επίλυσης προβλημάτων και συνεργασίας. Τα ευρήματα δείχνουν ότι η εκπαιδευτική ρομποτική αποτελεί ένα ισχυρό μέσο διδασκαλίας βασικών εννοιών της Πληροφορικής, προάγοντας ταυτόχρονα τη δημιουργική και κριτική σκέψη.

Λέξεις-κλειδιά: Εκπαιδευτική Ρομποτική, Αλγοριθμική Σκέψη, Φυσικός Υπολογισμός, Δευτεροβάθμια Εκπαίδευση, Arduino

ΑΛΓΟΡΙΘΜΟΣ ΚΑΛΛΙΕΡΓΕΙΑΣ ΚΡΟΚΟΥ - ΕΞΕΡΕΥΝΩΝΤΑΣ ΤΑ ΒΗΜΑΤΑ ΤΗΣ ΦΥΣΗΣ ΜΕ ΤΟΝ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟ

Τσίρου Αντιγόνη
Εκπαιδευτικός Πληροφορικής, MSc
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Κοζάνης, Υπουργείο Παιδείας και Θρησκευμάτων
Κοζάνη, Ελλάδα
e-mail: tsirouant@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία με τίτλο «Αλγόριθμος Καλλιέργειας Κρόκου - Εξερευνώντας τα Βήματα της Φύσης με τον Προγραμματισμό» παρουσιάζει μια καινοτόμο διδακτική προσέγγιση για τους μαθητές της πρωτοβάθμιας εκπαίδευσης, συνδυάζοντας τον προγραμματισμό με την εξερεύνηση φυσικών φαινομένων. Η βασική εστίαση της εργασίας είναι η ανάπτυξη της αλγοριθμικής σκέψης μέσω της βιωματικής, οπτικής και απτικής μάθησης, χρησιμοποιώντας ως κεντρικό εργαλείο μια ψηφιακή μακέτα που απεικονίζει τα στάδια ανάπτυξης του φυτού Κρόκος (σαφράν Κοζάνης).

Στη μεθοδολογία της εργασίας, η εκπαιδευτικός, με βάση την εμπειρία της στην πληροφορική, έχει σχεδιάσει και εκτυπώσει μια μακέτα με εικόνες, που παρουσιάζουν διαδοχικά τα στάδια καλλιέργειας του Κρόκου. Τοποθετώντας τη μακέτα στο τραπέζι της τάξης, τα παιδιά ενθαρρύνονται να εντοπίσουν το συγκεκριμένο στάδιο που έχει υποδείξει η εκπαιδευτικός και να διαμορφώσουν τον αντίστοιχο αλγόριθμο. Προτού προχωρήσουν στον προγραμματισμό με το ρομπότ Bee-Bot, η εκπαιδευτικός παρουσιάζει κάρτες εντολών (δημιουργημένες από αυτήν) οι οποίες αντιπροσωπεύουν κινήσεις όπως «μπροστά», «πίσω», «δεξιά», «αριστερά», «παύση», «ξεκίνα» και «καθαρισμός μνήμης». Οι κάρτες τοποθετούνται σε σωστή σειρά δίπλα στη μακέτα, προσφέροντας μια οπτική αναπαράσταση της ακολουθίας ενεργειών που απαιτούνται για την καλλιέργεια του φυτού.

Η εφαρμογή της μεθοδολογίας πραγματοποιείται μέσω δραστηριοτήτων, που εμπλέκουν ενεργά τους μαθητές στην απόφαση για την κατασκευή του αλγορίθμου και την υλοποίησή του με το ρομπότ. Η δραστηριότητα αυτή, πέρα από την ενίσχυση των τεχνικών δεξιοτήτων, δίνει έμφαση στην κριτική σκέψη και τη συνεργασία μεταξύ των μαθητών. Τα κύρια ευρήματα της εργασίας υποδεικνύουν ότι η σύνδεση της θεωρητικής γνώσης με πρακτικές εφαρμογές, μέσω βιωματικής μάθησης, ενισχύει την κατανόηση των αλγοριθμικών εννοιών και προάγει την ομαδική εργασία.

Τέλος, τα αποτελέσματα δείχνουν ότι η χρήση οπτικών και απτικών εργαλείων συμβάλλει στη δημιουργία ενός ελκυστικού μαθησιακού περιβάλλοντος, όπου οι μαθητές αναπτύσσουν δεξιότητες επίλυσης προβλημάτων και ενισχύουν την αυτοπεποίθησή τους στην εφαρμογή τεχνολογικών λύσεων. Η προσέγγιση αυτή επιτρέπει στους μαθητές να συνδέσουν τις διαδικασίες της φύσης με τον προγραμματισμό, κατανοώντας έτσι τη σημασία της ακολουθίας και της δομής σε ένα πολυδιάστατο μαθησιακό πλαίσιο. Οι επιπρόσθετες παρατηρήσεις επιβεβαιώνουν τη θετική επίδραση της μεθοδολογίας στην ενίσχυση της δημιουργικότητας και των μαθησιακών αποτελεσμάτων.

Λέξεις – κλειδιά: αλγοριθμική σκέψη, προγραμματισμός, βιωματική μάθηση, οπτική μάθηση, απτική μάθηση, συνεργασία, καλλιέργεια Κρόκου.

ΘΠ15: Παιχνιδοποίηση (Gamification) στην Εκπαίδευση

ΜΕΛΕΤΗ ΤΗΣ ΑΠΟΤΕΛΕΣΜΑΤΙΚΟΤΗΤΑΣ ΚΑΙΝΟΤΟΜΩΝ ΔΙΔΑΚΤΙΚΩΝ ΠΑΡΕΜΒΑΣΕΩΝ ΓΙΑ ΤΗ ΜΑΘΗΣΗ ΤΟΥ ΑΤΟΜΙΚΟΥ ΠΡΟΤΥΠΟΥ BOHR ΚΑΙ ΤΟΥ ΠΕΡΙΟΔΙΚΟΥ ΠΙΝΑΚΑ

Αδραμερινά Αικατερίνη
Υποψήφια διδακτόρισσα
Τμήμα Χημείας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: katerinaadra@gmail.com

Κουταλάς Βασίλης
Εργαστηριακό Διδακτικό Προσωπικό
Τμήμα Χημείας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: bkoutalas@chem.auth.gr

Χαριστός Νικόλαος
Επίκουρος Καθηγητής
Τμήμα Χημείας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: nicharis@chem.auth.gr

ΠΕΡΙΛΗΨΗ

Θέματα όπως το Ατομικό Πρότυπο του Bohr και ο Περιοδικός Πίνακας, παραμένουν απαιτητικά στη διδασκαλία της Χημείας, με ιδιαίτερες δυσκολίες για τους μαθητές της Α' Λυκείου. Στο πλαίσιο αυτής της πρόκλησης, η παρούσα μελέτη διερευνά τον αντίκτυπο διαφορετικών στρατηγικών διδασκαλίας έναντι της παραδοσιακής τυπικής παράδοσης, αξιοποιώντας περιβάλλοντα ψηφιακής διάδρασης, επιτραπέζιου παιχνιδιού και χρήσης ρομποτικού συστήματος. Διερευνά πόσο συμβάλουν στην πραγματική κατανόηση του Ατομικού Προτύπου του Bohr και του Περιοδικού Πίνακα και αυξάνουν την ενεργό εμπλοκή των μαθητών. Ο σχεδιασμός και η διεξαγωγή της έρευνας αναπτύχθηκαν σε δύο φάσεις, ξεκινώντας με μια πιλοτική φάση για τη διόρθωση απαραίτητων αλλαγών και συνεχίζοντας με την κύρια φάση. Η ανάλυση των δεδομένων, τόσο ποσοτικών όσο και ποιοτικών, αποκαλύπτει ότι οι διδακτικές παρεμβάσεις που βασίζονται σε παιγνιώδεις προσεγγίσεις φαίνεται να ενισχύουν σημαντικά τόσο τη γνωστική απόδοση, όσο και την ενεργό συμμετοχή των μαθητών στη μαθησιακή διαδικασία, σε σύγκριση με την παραδοσιακή προσέγγιση, ενώ η ρομποτική παρέμβαση, αν και ελκυστική, δεν επιφέρει εξίσου υψηλές μαθησιακές αποδόσεις. Τα αποτελέσματα ενισχύουν την ανάγκη επαναπροσδιορισμού της διδασκαλίας της Χημείας με τη χρήση μοντέλων διδασκαλίας που να εκφράζουν μια πληθώρα στυλ μάθησης των εκάστοτε μαθητών. Η σύγκριση των εν λόγω παρεμβάσεων με την παραδοσιακή διδασκαλία αποκαλύπτει διαφορές στην επίδοση των μαθητών, προσφέροντας σημαντικά ερευνητικά συμπεράσματα για την αναμόρφωση της διδασκαλίας της Χημείας.

Λέξεις-κλειδιά: Χημεία, παιχνιδοποίηση, διδακτικές παρεμβάσεις, ψηφιακά μέσα, ρομποτική, Ατομικό Πρότυπο του Bohr.

ΜΑΘΑΙΝΩ ΤΟΝ ΜΑΚΕΔΟΝΙΚΟ ΑΓΩΝΑ

Κικίδου Μαρία
Δ/ντρια Σχολικής Μονάδας, Εκπαιδευτικός Αγγλικής Γλώσσας,
Α/θμια Εκπ/ση Ν. Πέλλας,
MA Bilingual Translation,
Μεταπτυχιακό Δίπλωμα Επιστήμες της Αγωγής με Ν.Τ.
Έδεσσα, Ελλάδα
Email: mkikidou@yahoo.gr

Γκιούρος Φίλιππος
Δικηγόρος
Πρόεδρος Μουσείου Γέσιου ΑΜΚΕ
Έδεσσα, Ελλάδα
Email: contact@yessiosmuseum.com

ΠΕΡΙΛΗΨΗ

Ο σχεδιασμός, η εφαρμογή και η αξιολόγηση εκπαιδευτικών μουσειοπαιδαγωγικών προγραμμάτων αποτέλεσε προτεραιότητα για την αστική μη κερδοσκοπική εταιρία «Μουσείο Γέσιου - Ο Μακεδονικός Αγώνας και η Έδεσσα ΑΜΚΕ».

Συγκεκριμένα, -μέσα σε ένα πολυαισθητηριακό περιβάλλον –στις αίθουσες του Μουσείου- και Αδιαδραστικό εκπαιδευτικό πλαίσιο, που χρησιμοποιεί και αναδεικνύει την αξία των Ν.Τ. και των web2 εργαλείων-, επιχειρήθηκε η καλλιέργεια των πολιτισμικών δεξιοτήτων των μαθητών/τριών γυμνασίων και λυκείων στα περιεχόμενα και στα εκθέματα της συλλογής του μουσείου, στην τοπική ιστορία και στον πολιτισμό.

Ο σχεδιασμός του εκπαιδευτικού προγράμματος «Μαθαίνω τον Μακεδονικό Αγώνα», για μαθητές/τριες Γυμνασίων και Λυκείων (ηλικίας 13-17 ετών) βασίστηκε σε διάφορες μεθόδους, τεχνικές,προσεγγίσεις και περιβάλλοντα. Δόθηκε ιδιαίτερη έμφαση στις αρχές της παιχνιδοκεντρικής προσέγγισης (Domnus, 2010) και έτσι σχεδιάστηκε ένα εκπαιδευτικό, ψηφιακό δωμάτιο απόδρασης - escape room, ακολουθώντας τα τρία βασικά στάδια, σύμφωνα με τα χαρακτηριστικά της δραστηριοκεντρικής προσέγγισης–προστάδιο, κύριο στάδιο, μεταστάδιο- (Willis, 1996). Στο πρόγραμμα ενσωματώθηκαν εναλλακτικοί τρόποι αξιολόγησης καταγραφής συναισθημάτων των μαθητών/τριών που συμμετέχουν.

Λέξεις - κλειδιά: παιχνιδοκεντρική προσέγγιση, μουσειοπαιδαγωγικά προγράμματα, εκπαιδευτικά δωμάτια απόδρασης, educational escape rooms

ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ ΑΝΑΠΤΥΞΗ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΕΦΑΡΜΟΓΗΣ ΕΙΚΟΝΙΚΗΣ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑΣ ΓΙΑ ΤΗΝ ΔΙΔΑΣΚΑΛΙΑ ΤΟΥ ΚΑΛΛΙΤΕΧΝΙΚΟΥ ΚΙΝΗΜΑΤΟΣ "DE STIJL"

Ναζλίδου Ιωάννα
Υποψήφια διδάκτορας
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: ionnaz@gmail.com

Ευκολίδης Νικόλαος
Αναπληρωτής Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: nefkolidis@uowm.gr

Καλαμακίδου Ιωάννα
Φοιτήτρια
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: joannakalam@gmail.com

Κυράτσης Παναγιώτης
Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: pkyratsis@uowm.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη περίπτωσης αποτελεί κομμάτι ενός ευρύτερου ερευνητικού έργου του Πανεπιστημίου Δυτικής Μακεδονίας που αφορά τον συνδυασμό καινοτόμων τεχνολογικών εργαλείων και εκπαιδευτικών μεθόδων με σκοπό τη βελτίωση των μαθησιακών αποτελεσμάτων και την ενίσχυση της διαδικασίας μάθησης.

Η έρευνα πραγματοποιήθηκε στο Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων και αφορά τον σχεδιασμό και ανάπτυξη μιας ψηφιακής εφαρμογής σε περιβάλλον εικονικής πραγματικότητας που έχει ως στόχο να αποτελέσει ένα βοηθητικό εργαλείο εκπαίδευσης για τη διδασκαλία εικαστικών και καλλιτεχνικών κινημάτων. Η προτεινόμενη εφαρμογή εισάγει την τεχνολογία εικονικής πραγματικότητας για την εκπαίδευση φοιτητών του τμήματος πάνω στο καλλιτεχνικό κίνημα του De Stijl. Η εκπαιδευτική διαδικασία ενισχύεται αξιοποιώντας στρατηγικές μάθησης που βασίζονται στο παιχνίδι εξυπηρετώντας συγκεκριμένους εκπαιδευτικούς στόχους. Η τελική μορφή της εφαρμογής προσομοιάζει με ένα παιχνίδι εικονικής πραγματικότητας που βασίζεται στη λογική ανάπτυξης ψηφιακών εκπαιδευτικών δωματίων διαφυγής. Το εκπαιδευτικό αντικείμενο ενσωματώνεται αρμονικά στο συνολικό σχεδιασμό της εφαρμογής, μέσα από τη δημιουργία ειδικά σχεδιασμένων γρίφων όπου οι χρήστες καλούνται να επιλύσουν. Τελικός στόχος είναι μέσω της αλληλεπίδρασης με αντικείμενα του εικονικού περιβάλλοντος, οι φοιτητές να γνωρίσουν και να κατανοήσουν καλύτερα βασικά ιστορικά στοιχεία, αισθητικά κριτήρια και τις κύριες σχεδιαστικές αρχές του καλλιτεχνικού κινήματος.

Η εφαρμογή σχεδιάστηκε σύμφωνα με ένα μεθοδολογικό πλαίσιο που υιοθετεί στοιχεία από την σχεδιαστική σκέψη και δημιουργική διαδικασία για την ανάπτυξη νέων προϊόντων, έχοντας ως άξονες σχεδιασμού τις δυνατότητες χρήσης της τεχνολογίας εικονικής πραγματικότητας και την αξιοποίηση της παιχνιδοποίησης ως βασική μέθοδο μάθησης.

Η δοκιμή της εφαρμογής πραγματοποιήθηκε στο Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων. Στην διαδικασία πρώιμης αξιολόγησης συμμετείχε ένα πρώτο δείγμα 8 φοιτητών του τμήματος. Η μεθοδολογία που ακολουθήθηκε αφορούσε τη συμπλήρωση ερωτηματολογίων και την απάντηση σε ερωτήσεις γνώσεων σχετικών με το εκπαιδευτικό αντικείμενο, πριν και μετά την χρήση της εφαρμογής.

Τα αποτελέσματα που προέκυψαν έδειξαν σημαντική βελτίωση στα μαθησιακά αποτελέσματα όσον αφορά την επίδοση των φοιτητών. Από ένα σύνολο 10 ερωτήσεων, ο μέσος όρος των σωστών απαντήσεων ήταν 6,63 πριν τη χρήση της εφαρμογής και 9,00 μετά τη χρήση της εφαρμογής (αύξηση 35,75%). Αύξηση επίσης σημειώθηκε και στην θετική άποψη των φοιτητών για την ενσωμάτωση της τεχνολογίας εικονικής πραγματικότητας στην διαδικασία μάθησης, πριν και μετά τη χρήση της εφαρμογής (αύξηση 15,15%) όπως και των εκπαιδευτικών παιχνιδιών (αύξηση 8,82%). Όσον αφορά τη συνολική εμπειρία τα αποτελέσματα έδειξαν ότι οι φοιτητές έκριναν πολύ θετικά την εμπειρία τους από τη χρήση της εφαρμογής με μέσο όρο αξιολόγησης σύμφωνα με την 5βάθμια κλίμακα του Likert, 4,5 (90%). Ως προς τον παράγοντα του ενθουσιασμού, η αξιολόγηση των φοιτητών ήταν 4,38 (87,50%). Ενώ στο κατά πόσο η εμπειρία τους φάνηκε παρακινητική και ενδιαφέρουσα, η αξιολόγηση ήταν 4,63 (92,50%).

Συνολικά, τα πρώτα ευρήματα της αξιολόγησης δείχνουν μια πολύ ενθαρρυντική προοπτική για τη δημιουργία μιας ελκυστικής εκπαιδευτικής εμπειρίας που παρακινεί σημαντικά το ενδιαφέρον, και τον ενθουσιασμό των φοιτητών ως προς το εκπαιδευτικό αντικείμενο.

Η παρούσα εργασία αναμένεται να συμβάλει στη συνεχιζόμενη έρευνα στον τομέα των τεχνολογικών εξελίξεων και στην εφαρμογή καινοτόμων πρακτικών σε εκπαιδευτικά περιβάλλοντα, με στόχο τη βελτιστοποίηση της μαθησιακής εμπειρίας και των μαθησιακών αποτελεσμάτων. Διερευνά και προτείνει δημιουργικούς τρόπους συνδυασμού εργαλείων τεχνολογίας εμβύθισης και μεθοδολογιών μάθησης που βασίζονται στο παιχνίδι εστιάζοντας παράλληλα σε συγκεκριμένους εκπαιδευτικούς στόχους.

Λέξεις – κλειδιά: Μεθοδολογίες εκπαίδευσης, τεχνολογίες εμβύθισης, εικονική πραγματικότητα, παιχνιδοποίηση, σχεδιασμός προϊόντων.

ΟΤΑΝ Η ΙΣΤΟΡΙΑ ΓΙΝΕΤΑΙ ΠΑΙΧΝΙΔΙ: ΑΞΙΟΠΟΙΩΝΤΑΣ ΤΗΝ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΤΗΝ ΠΑΙΧΝΙΔΟΠΟΙΗΣΗ ΣΤΟ ΜΑΘΗΜΑ ΤΗΣ ΙΣΤΟΡΙΑΣ.

Δρ. Ευάγγελος Σίτας
Εκπαιδευτικός ΠΕ02
1ο Γυμνάσιο Νεοχωρίου - ΔΔΕ Αιτωλοακαρνανίας, Ελλάδα
e-mail: vagsit@gmail.com

ΠΕΡΙΛΗΨΗ

Ανέκαθεν η πλειονότητα των μαθητών υποστηρίζει ότι η Ιστορία είναι ένα δύσκολο μάθημα και πως η επιτυχία έρχεται μέσα από την αποστήθιση της διδακτέας ύλης. Στην παρούσα εργασία προτείνεται ένας νέος τρόπος προσέγγισης που έχει ως στόχο να βελτιώσει την εμπλοκή των μαθητών απελευθερώνοντας τους από τα δεσμά της μετωπικής αφήγησης και της αποστήθισης. Θα προτείνουμε μεθόδους για την ενσωμάτωση της ΤΝ σε παιχνιδοποιημένες δραστηριότητες διδασκαλίας και θα εξετάσουμε κατά πόσο η χρήση αυτών των μηχανισμών μπορεί να βελτιώσει την εμπλοκή των μαθητών και τη γνωστική τους απόδοση σε σύγκριση με παραδοσιακές μεθόδους διδασκαλίας.

Αρχικά, αναλύθηκαν οι ανάγκες των μαθητών και καθορίστηκαν οι εκπαιδευτικοί στόχοι. Έπειτα σχεδιάστηκαν οι παιχνιδοποιημένες δραστηριότητες. Με τη βοήθεια της τεχνητής νοημοσύνης προσαρμόσαμε και βελτιώσαμε τις υπάρχουσες δραστηριότητες. Δυο ομάδες μαθητών συμμετείχαν στην έρευνα και ο διαχωρισμός τους σε πειραματική ομάδα και ομάδα ελέγχου έγινε τυχαία. Συγκρίναμε τα αποτελέσματα των ομάδων με χρήση διαγνωστικών και τελικών αξιολογήσεων. Η πιλοτική εφαρμογή έδειξε αυξημένη εμπλοκή και βελτιωμένη απόδοση των μαθητών σε σύγκριση με παραδοσιακές μεθόδους.

Τα τελευταία χρόνια, η παιχνιδοποίηση έχει αναδειχθεί ως μια σύγχρονη παιδαγωγική προσέγγιση, που στην πιο απλή της εκδοχή, χρησιμοποιώντας δηλαδή προκλήσεις, ανταμοιβές και πίνακες κατάταξης, έχει αποδειχθεί ότι μπορεί να βελτιώσει την μαθησιακή εμπειρία. Σήμερα, η τεχνητή νοημοσύνη συνιστά ίσως μια από τις μεγαλύτερες τάσεις στο χώρο της ψηφιακής τεχνολογίας και ολοένα εξελίσσεται ως η τεχνολογία του μέλλοντος φέρνοντας επανάσταση τόσο στον τρόπο που διδάσκουμε όσο και στον τρόπο που μαθαίνουμε. Ο συνδυασμός αυτών των δύο μπορεί να προσφέρει σημαντικά οφέλη στην εκπαίδευση γενικότερα και στην διδασκαλία της ιστορίας ειδικότερα..

Λέξεις – κλειδιά: παιχνιδοποίηση, τεχνητή νοημοσύνη, διδασκαλία ιστορίας, καινοτόμες παιδαγωγικές προσεγγίσεις.

ΠΑΙΧΝΙΔΟΠΟΙΗΣΗ ΚΑΙ ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΩΣ ΕΡΓΑΛΕΙΑ ΓΙΑ ΤΗΝ ΔΗΜΙΟΥΡΓΙΑ ΔΡΑΣΤΗΡΙΟΤΗΤΩΝ ΑΝΙΧΝΕΥΣΗΣ ΕΛΛΕΙΜΜΑΤΩΝ ΠΡΑΓΜΑΤΟΛΟΓΙΑΣ ΓΙΑ ΠΑΙΔΙΑ

Κοσκερίδου Μαρίνα
Προπτυχιακή Φοιτήτρια, Τμήμα Λογοθεραπείας
Πανεπιστήμιο Ιωαννίνων,
Πανεπιστημιούπολη Β', 45500 Ιωάννινα
e-mail: slt01263@uoi.gr

Τόκη Ευγενία
Καθηγήτρια, Τμήμα Λογοθεραπείας
Πανεπιστήμιο Ιωαννίνων
e-mail: toki@uoi.gr

ΠΕΡΙΛΗΨΗ

Οι πραγματολογικές δεξιότητες αποτελούν θεμέλιο λίθο για την κοινωνική αλληλεπίδραση και την ακαδημαϊκή επιτυχία των παιδιών. Τα παραδοσιακά εργαλεία ανίχνευσης συχνά δεν προσελκύουν το ενδιαφέρον των παιδιών, γεγονός που έχει οδηγήσει στην αναζήτηση εναλλακτικών ψηφιακών και παιγνιωδών προσεγγίσεων. Η παρούσα μελέτη διερευνά τη σκοπιμότητα αξιοποίησης ψηφιακών δραστηριοτήτων, που συνδυάζουν στοιχεία παιχνιδοποίησης και ψηφιακής αφήγησης, ως μέσου ανίχνευσης ελλειμμάτων πραγματολογικών δεξιοτήτων σε παιδιά δημοτικού.

Σχεδιάσαμε και αναπτύξαμε διαδραστικές ψηφιακές δραστηριότητες με τη χρήση του PowerPoint, ενσωματώνοντας αφηγηματικά στοιχεία και μηχανισμούς παιχνιδιού για την αξιολόγηση διαφόρων πτυχών της πραγματολογικής ικανότητας. Στη μελέτη συμμετείχαν έξι παιδιά ηλικίας 8–12 ετών, με τη γραπτή συγκατάθεση των γονέων τους. Οι ατομικές συνεδρίες πραγματοποιήθηκαν σε υποστηρικτικά περιβάλλοντα, ενώ η χρηστικότητα, η εμπλοκή και η συνολική εμπειρία αξιολογήθηκαν μέσω δομημένων συνεντεύξεων.

Τα παιδιά ανταποκρίθηκαν θετικά στις ψηφιακές δραστηριότητες, εκφράζοντας υψηλό επίπεδο ενδιαφέροντος και συμμετοχής. Οι περισσότεροι βρήκαν το περιβάλλον εύχρηστο και τις δραστηριότητες ευχάριστες, με ιδιαίτερη προτίμηση στο διαδραστικό σκέλος διαλόγου. Μικρά τεχνικά ή λειτουργικά ζητήματα εντοπίστηκαν σε μεμονωμένες περιπτώσεις, χωρίς όμως να επηρεάσουν ουσιαστικά τη συνολική εμπειρία.

Τα αρχικά ευρήματα της μελέτης υποδηλώνουν ότι η αξιοποίηση ψηφιακών δραστηριοτήτων μπορεί να αποτελέσει μια φιλική προς το παιδί και ελκυστική προσέγγιση για την προκαταρκτική ανίχνευση πραγματολογικών δεξιοτήτων. Ως μελέτη σκοπιμότητας, με μικρό και μη κλινικό δείγμα, απαιτείται περαιτέρω έρευνα με μεγαλύτερο και πιο ετερογενές πληθυσμό, ώστε να διαπιστωθεί η εγκυρότητα της και να επεκταθεί η εφαρμογή της σε εκπαιδευτικά και κλινικά περιβάλλοντα.

Λέξεις-κλειδιά: Πραγματολογία, διαδραστική ανίχνευση, μελέτη σκοπιμότητας, παιχνιδοποίηση, ψηφιακή αφήγηση, παιδιά

ΠΑΙΧΝΙΔΟΠΟΙΗΣΗ (GAMIFICATION) ΣΤΗ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ: ΟΦΕΛΗ, ΕΦΑΡΜΟΓΗ ΚΑΙ ΕΜΠΟΔΙΑ ΥΛΟΠΟΙΗΣΗΣ

Χατζηαντωνάκης Δημήτριος
Καθηγητής Δευτεροβάθμιας Εκπαίδευσης Π.Ε 82, Ms, Med.
1Ο ΕΠΑΛ Νέας Ιωνίας Βόλου, Μαγνησία, Ελλάδα
e-mail: dxatzh@gmail.com

ΠΕΡΙΛΗΨΗ

Ο σύγχρονος εκπαιδευτικός αναζητά διαρκώς καινοτόμες διδακτικές προσεγγίσεις που ενισχύουν τη μαθησιακή διαδικασία και κινητοποιούν τους μαθητές. Μία από τις πλέον διαδεδομένες τεχνικές είναι η παιχνιδοποίηση (Gamification), η οποία αξιοποιεί στοιχεία, μηχανισμούς και χαρακτηριστικά των παιχνιδιών σε μη παιγνιώδη περιβάλλοντα. Μέσω της χρήσης σημάτων (badges), πόντων, πινάκων κατάταξης και προκλήσεων, η παιχνιδοποίηση επιδιώκει να αυξήσει τη συμμετοχή των μαθητών, να ενισχύσει τα κίνητρα και να βελτιώσει τη διαδραστικότητα στην εκπαιδευτική διαδικασία. Στη Δευτεροβάθμια Εκπαίδευση, η εφαρμογή της παιχνιδοποίησης μπορεί να συμβάλει στη δημιουργία ενός πιο ελκυστικού μαθησιακού περιβάλλοντος, ενισχύοντας τόσο την εμπλοκή των μαθητών όσο και την αποτελεσματικότητα της διδασκαλίας. Παράλληλα, οι εκπαιδευτικοί εμφανίζονται θετικοί ως προς την εφαρμογή της, αναγνωρίζοντας τα οφέλη που προκύπτουν από την αξιοποίησή της.

Η παρούσα μελέτη εστιάζει στις **εφαρμογές της** παιχνιδοποίησης στη Δευτεροβάθμια Εκπαίδευση στην Ελλάδα**,** εξετάζοντας τόσο τα **οφέλη** όσο και τις **προκλήσεις** που προκύπτουν από την υλοποίηση της. Αρχικά, μέσω βιβλιογραφικής ανασκόπησης, μελετήθηκαν έρευνες και άρθρα που παρουσιάζουν εφαρμογές της παιχνιδοποίησης στη Δευτεροβάθμια εκπαίδευση, τόσο στη γενική όσο και στην ειδική αγωγή, αναδεικνύοντας τα οφέλη και τις δυνατότητές της σε διαφορετικά μαθησιακά περιβάλλοντα. Τα αποτελέσματα δείχνουν ότι η παιχνιδοποίηση συνδέεται με αυξημένη μαθητική συμμετοχή, υψηλότερα κίνητρα μάθησης και βελτιωμένη αλληλεπίδραση μεταξύ μαθητών και εκπαιδευτικών.

Στη συνέχεια, πραγματοποιήθηκε ποσοτική έρευνα μέσω ερωτηματολογίου με τη συμμετοχή 45 εκπαιδευτικών διαφόρων ειδικοτήτων της Δευτεροβάθμιας Εκπαίδευσης από τις ΔΔΕ Μαγνησίας και Λάρισας. Στόχος της έρευνας ήταν η καταγραφή των βασικών προκλήσεων που αντιμετωπίζουν οι εκπαιδευτικοί στην εφαρμογή της παιχνιδοποίησης. Τα ευρήματα καταδεικνύουν ότι, παρά τη θετική στάση των εκπαιδευτικών, υπάρχουν σημαντικά εμπόδια που περιορίζουν την υιοθέτηση της τεχνικής. Συγκεκριμένα, τα κυριότερα εμπόδια που αναδείχθηκαν είναι η έλλειψη επιμόρφωσης των εκπαιδευτικών, η ανεπαρκής υλικοτεχνική υποδομή, το μέγεθος της τάξης και ο περιορισμένος διαθέσιμος διδακτικός χρόνος.

Η εργασία καταλήγει στο συμπέρασμα ότι η επιτυχημένη ενσωμάτωση της παιχνιδοποίησης στη Δευτεροβάθμια εκπαίδευση απαιτεί θεσμική υποστήριξη, αναβάθμιση των σχολικών υποδομών και στοχευμένη επιμόρφωση των εκπαιδευτικών, ώστε να αξιοποιηθεί πλήρως το δυναμικό της τεχνικής αυτής προς όφελος της μαθησιακής διαδικασίας.

Λέξεις – κλειδιά: Παιχνιδοποίηση, Δευτεροβάθμια Εκπαίδευση, Οφέλη, Εμπόδια, Εμπλοκή Μαθητών

THE USE OF DIGITAL GAMES FOR TEACHING READING IN MULTILINGUAL GREEK PRIMARY SCHOOL CLASSROOMS: THE CASE OF D_READ-NARRATE

Christou Theophano
Post-Doctoral Researcher
Linguistics Division, Department of Philology, University of Ioannina
Ioannina, Greece
e-mail: t.christou@uoi.gr

Mastropavlou Maria
Associate Professor
Linguistics Division, Department of Philology, University of Ioannina
Ioannina, Greece
e-mail: mmastrop@uoi.gr

Prentza Alexandra
Teaching Fellow
Linguistics Division, Department of Philology, University of Ioannina
Ioannina, Greecee-mail: aprentza@uoi.gr

ABSTRACT

This paper presents an innovative educational software, D_Read-Narrate, designed to support the language, reading and narrative skills of monolingual but mainly bilingual children (8-12 years old) attending Greek public primary schools. As part of the D_Read-Narrate project, software was developed using parts of iRead, an already developed software (https://iread-project.eu/) under the Horizon 2020 funding program to promote the reading skills of students with dyslexia, beginning readers and students learning English as a foreign language. Our aim is to present the design of the software and how it works and to analyze an exemplary lesson plan for its use in educational practice. This software was developed in the framework of the project: "Digital applications for teaching reading and narrative skills in multilingual Greek primary school classes D_READ-NARRATE". This project is carried out within the framework of the National Recovery and Resilience Plan Greece 2.0, funded by the European Union – NextGenerationEU (Implementation body: HFRI). It aims to develop a set of educational web applications that improve the language skills of primary school students learning Greek as a second language (L2). The software includes educational tools (digital classrooms, assessment, assignment of tasks), language assessment software before, during and after use, and student profiles with stored performance data and personalized feedback. From March 2025, the software will be used in public primary schools with reception classes and in schools with many bilingual pupils (e.g. schools for intercultural education) to evaluate its effectiveness.

Keywords: Smart Games, reading, bilinguals, language skills

VIRTUAL ALGOLAB: ΑΝΑΠΤΥΞΗ VR ΠΑΙΧΝΙΔΙΟΥ ΓΙΑ ΔΟΜΕΣ ΔΕΔΟΜΕΝΩΝ ΚΑΙ ΑΛΓΟΡΙΘΜΟΥΣ

Αναγνώστου Παύλος
Προπτυχιακός φοιτητής
Τμήμα Μηχανικών Η/Υ & Πληροφορικής
Πανεπιστήμιο Ιωαννίνων, Ελλάδα
e-mail: cs05440@uoi.gr

Ντερμάρης Νικόλαος
Προπτυχιακός φοιτητής
Τμήμα Μηχανικών Η/Υ & Πληροφορικής
Πανεπιστήμιο Ιωαννίνων, Ελλάδα
e-mail: cs05477@uoi.gr

Χρόνη Μαρία
Ε.ΔΙ.Π.
Τμήμα Μηχανικών Η/Υ & Πληροφορικής
Πανεπιστήμιο Ιωαννίνων, Ελλάδα
e-mail: mchroni@uoi.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία επικεντρώνεται στην υποστήριξη της διδασκαλίας βασικών εννοιών των Δομών Δεδομένων και Αλγορίθμων, μέσω της ανάπτυξης ενός διαδραστικού εκπαιδευτικού περιβάλλοντος εικονικής πραγματικότητας (Virtual Reality – VR). Στόχος είναι η ενίσχυση της εννοιολογικής κατανόησης μέσω βιωματικής και πειραματικής αλληλεπίδρασης, αξιοποιώντας τις δυνατότητες της VR τεχνολογίας.

Το Virtual AlgoLab, είναι ένα εκπαιδευτικό VR παιχνίδι, υλοποιημένο στην πλατφόρμα Unity, το οποίο περιλαμβάνει έναν εικονικό χώρο με τέσσερα ανεξάρτητα παιχνίδια (minigame). Κάθε παιχνίδι (minigame) έχει σχεδιαστεί ώστε να αποτυπώνει και να αναδεικνύει μία θεμελιώδη έννοια της Πληροφορικής: συνδεδεμένες λίστες, κόμβους, κύκλους Hamilton και δυαδική αναζήτηση. Η δομή του περιβάλλοντος χρήστη είναι εργονομική και απλοποιημένη, με στόχο την υποστήριξη της πλοήγησης από αρχάριους χρήστες χωρίς προηγούμενη εμπειρία σε VR συστήματα.

Η λειτουργικότητα του παιχνιδιού εστιάζει στην ενεργή εμπλοκή των χρηστών μέσω πλοήγησης, επιλογής, και αλληλεπίδρασης με αντικείμενα και έννοιες που αντιστοιχούν σε αλγοριθμικές διαδικασίες ή δομές δεδομένων. Η σχεδίαση βασίστηκε σε παιδαγωγικές αρχές ενεργητικής μάθησης και εννοιολογικής μεταφοράς σε ψηφιακά περιβάλλοντα.

Για την αποτίμηση της αποτελεσματικότητας του παιχνιδιού στην επίτευξη του σκοπού του, πραγματοποιήθηκαν δοκιμές με μαθητές δημοτικού, και φοιτητές. Παρατηρήθηκε πως το VR Algolabs καταφέρνει με επιτυχία να ελκύσει το ενδιαφέρον όλων των ηλικιακών ομάδων, ενώ οι χρήστες που το αξιολόγησαν δεν παρουσίασαν ιδιαίτερη δυσκολία στην κατανόηση του στόχου και του θεωρητικού υπόβαθρου από κάθε minigame.

Λέξεις-Κλειδιά: Virtual Reality, AlgoLab, εκπαιδευτικό παιχνίδι, Δομές Δεδομένων, Αλγόριθμοι, Unity.

ΘΠ16: Εικονική, Επαυξημένη και Μικτή Πραγματικότητα στην Εκπαίδευση

ΕΙΚΟΝΙΚΑ ΕΡΓΑΣΤΗΡΙΑ ΣΤΗ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ STEM

Αθανάσιος Σύψας
Συνεργαζόμενο Εκπαιδευτικό Προσωπικό, Σχολή Θετικών Επιστημών και Τεχνολογίας
Ελληνικό Ανοικτό Πανεπιστήμιο, Ελλάδα
e-mail: athanasios.sypsas@ac.eap.gr

Βασίλης Ζαφειρόπουλος
Συνεργαζόμενο Εκπαιδευτικό Προσωπικό, Σχολή Θετικών Επιστημών και Τεχνολογίας
Ελληνικό Ανοικτό Πανεπιστήμιο, Ελλάδα
e-mail: vasiliszaf@eap.gr

Ευγενία Παξινού
Συνεργαζόμενο Εκπαιδευτικό Προσωπικό, Σχολή Ανθρωπιστικών Σπουδών
Ελληνικό Ανοικτό Πανεπιστήμιο, Ελλάδα
e-mail: paxinou.evgenia@ac.eap.gr

Δημήτρης Καλλές
Καθηγητής
Ελληνικό Ανοικτό Πανεπιστήμιο, Ελλάδα
e-mail: kalles@eap.gr

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση των εικονικών εργαστηρίων (Virtual Laboratories) στη δευτεροβάθμια εκπαίδευση STEM (Επιστήμη, Τεχνολογία, Μηχανική και Μαθηματικά) μεταμορφώνει τις παραδοσιακές διδακτικές πρακτικές, προσφέροντας διαδραστικά, οικονομικά και ευέλικτα μαθησιακά περιβάλλοντα. Η παρούσα μελέτη εξετάζει τις διδακτικές προσεγγίσεις, τα οφέλη, τις προκλήσεις και τις προοπτικές των VLs στην ενίσχυση της επιστημονικής μάθησης. Τα εικονικά εργαστήρια προσομοιώνουν πραγματικά εργαστηριακά περιβάλλοντα, επιτρέποντας στους μαθητές να διεξάγουν ψηφιακά πειράματα, να μεταβάλλουν παραμέτρους και να οπτικοποιούν σύνθετα φαινόμενα ενισχύοντας την εμπλοκή, την παρακίνηση και τη μάθηση μέσω διερεύνησης. Παρά τα πλεονεκτήματά τους, εξακολουθούν να υφίστανται περιορισμοί, όπως η απουσία απτικής εμπειρίας, η ανάγκη επιμόρφωσης των εκπαιδευτικών, η εναρμόνιση με το αναλυτικό πρόγραμμα και οι ανισότητες στην ψηφιακή πρόσβαση. Συνιστάται μια μικτή προσέγγιση μάθησης που συνδυάζει φυσικά και εικονικά εργαστήρια, ώστε να διασφαλίζεται η ολόπλευρη ανάπτυξη δεξιοτήτων. Με την εμφάνιση τεχνολογιών όπως η τεχνητή νοημοσύνη, η επαυξημένη πραγματικότητα και οι συνεργατικές διαδικτυακές πλατφόρμες, το μέλλον των VLs στη δευτεροβάθμια STEM εκπαίδευση διαγράφεται ελπιδοφόρο. Συνολικά, τα εικονικά εργαστήρια μπορούν να διαδραματίσουν κρίσιμο ρόλο στην προετοιμασία των μαθητών για την ανώτερη εκπαίδευση STEM, καλλιεργώντας εννοιολογική κατανόηση και βασικές δεξιότητες του 21ου αιώνα.

Λέξεις – κλειδιά: Εικονικά εργαστήρια, Δευτεροβάθμια εκπαίδευση, STEM.

ΘΠ17: Διαδικτυακά εκπαιδευτικά περιβάλλοντα για την ενίσχυση της μικτής και της εξ αποστάσεως εκπαίδευσης

ΠΡΟΕΤΟΙΜΑΖΟΝΤΑΣ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΞΕΤΑΣΕΙΣ ΤΗΝ ΕΠΟΧΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ. ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ: ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ ΕΚΠΑΙΔΕΥΣΗ & ΤΕΧΝΟΛΟΓΙΕΣ ΣΕ ΣΥΣΤΗΜΑΤΑ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΔΙΔΑΣΚΑΛΙΑΣ ΚΑΙ ΜΑΘΗΣΗΣ-ΕΠΙΣΤΗΜΕΣ ΤΗΣ ΑΓΩΓΗΣ (ΕΤΑ-ΕΑΠ)

Ευαγγελία Μανούσου
Επίκουρη καθηγήτρια
Ελληνικό Ανοικτό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: manousoug@eap.gr

Γιάννης Γκιόσος
Αναπληρωτής Καθηγητής, Διευθυντής ΠΜΣ ΕΤΑ
Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών
Αθήνα, Ελλάδα
e-mail: gkiosos.ioannis@ac.eap.gr

Αντωνία Μαρία Χαρτοφύλακα
ΣΕΠ ΕΑΠ, Βοηθός διευθυντή προγράμματος Σπουδών
Ελληνικό Ανοικτό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: chartofylaka.antonia@ac.eap.gr

Κυριακή Ρασσιά
Υποψήφια Διδάκτορας
Ελληνικό Ανοικτό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: kyriaki.rassia@ac.eap.gr

Μαρία Κουτσούμπα
Καθηγήτρια, Συντονίστρια ΕΤΑ52
Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών
Αθήνα, Ελλάδα
e-mail: makouba@phed.uoa.gr

ΠΕΡΙΛΗΨΗ

Οι εξ αποστάσεως εξετάσεις, που καθιερώθηκαν κατά την περίοδο της πανδημίας και παραμένουν σε χρήση στο Ελληνικό Ανοικτό Πανεπιστήμιο (ΕΑΠ), αποτελούν μια διαδικασία που απαιτεί συνεχή επαναπροσδιορισμό. Και αυτό διότι οι εξετάσεις αυτής της μορφής όχι μόνο εισάγουν νέες προκλήσεις, αλλά και απαιτούν διαφορετικές στρατηγικές αξιολόγησης για τη διασφάλιση της εγκυρότητας και αξιοπιστίας των αποτελεσμάτων. Σημαντικά ζητήματα που εγείρονται περιλαμβάνουν τις διαδικασίες ταυτοποίησης και επιτήρησης των φοιτητών/τριών, την επιλογή θεμάτων εξετάσεων (μορφή, περιεχόμενο κ.ά.), καθώς και την εξασφάλιση της ευθυγράμμισης αυτών με τους εκπαιδευτικούς στόχους.

Στο πλαίσιο αυτό, η τεχνολογία έχει διαδραματίσει καίριο ρόλο σε αυτή τη μεταμόρφωση, ενσωματώνοντας εργαλεία όπως το λογισμικό ανίχνευσης ομοιότητας (Turnitin) και εξειδικευμένα λογισμικά επιτήρησης. Παράλληλα, η εμφάνιση της Τεχνητής Νοημοσύνης ενισχύει τις προκλήσεις, καθώς απαιτείται μια πιο σύνθετη και στοχευμένη προσέγγιση για την ανάπτυξη θεμάτων που αποτρέπουν τη μη αυθεντική συμμετοχή των φοιτητών/τριών. Για παράδειγμα, οι εξετάσεις με ανοικτά βιβλία, βασική επιλογή στο υπό μελέτη Πρόγραμμα Μεταπτυχιακών Σπουδών (ΠΜΣ) «Εκπαίδευση & Τεχνολογίες σε Συστήματα Εξ Αποστάσεως Διδασκαλίας και Μάθησης - Επιστήμες της Αγωγής (ΕΤΑ)» του ΕΑΠ της παρούσας εργασίας, αναδεικνύουν την κριτική σκέψη ως τον πρωταρχικό παράγοντα αξιολόγησης. Η εστίαση στη δεξιότητα αυτή αποτελεί ακρογωνιαίο λίθο της εκπαιδευτικής διαδικασίας και αντανακλά τις απαιτήσεις της σύγχρονης εποχής.

Στη βάση αυτή, η εργασία αυτή στοχεύει στη συστηματική παρουσίαση και ανάλυση των διαδικασιών που εφαρμόστηκαν στις εξ αποστάσεως εξετάσεις του ΠΜΣ ΕΤΑ του ΕΑΠ κατά την πενταετία (2020-2025), καταδεικνύοντας τα οφέλη και τις προκλήσεις. Επιπλέον, συζητείται η εξέλιξη των μεθόδων αξιολόγησης, με έμφαση στη διασφάλιση ότι οι φοιτητές/τριες εμπλέκονται ουσιαστικά και αποδεικνύουν τη γνώση και τις δεξιότητες που ανέπτυξαν κατά τη διάρκεια των Θεματικών Ενοτήτων.

Ως προς τη μεθοδολογία της, η παρούσα εργασία εστιάζει στο σύνολο των διαδικασιών των εξ αποστάσεως εξετάσεων και πρακτικών αξιολόγησης που εφαρμόστηκαν στο ΠΜΣ «ΕΤΑ» του ΕΑΠ στη διάρκεια 11 εξαμήνων. Εξετάζεται η ανάπτυξη θεμάτων εξετάσεων και πρακτικών αξιολόγησης και κατά πόσο αυτές ευθυγραμμίζονται με τις τεχνολογικές και παιδαγωγικές εξελίξεις. Μελετάται ο τρόπος με τον οποίο οι διδάσκοντες/ουσες προσαρμόζονται στην ενσωμάτωση εργαλείων όπως το Turnitin, για την αποτροπή φαινομένων λογοκλοπής, και της Τεχνητής Νοημοσύνης, για την πρόκληση αυθεντικής εμπλοκής των φοιτητών/τριών στις εξετάσεις. Διερευνάται η εφαρμογή κάποιων από τις πρακτικές που υιοθετήθηκαν στο πλαίσιο της μορφής αυτών των εξ αποστάσεως εξετάσεων.

Λέξεις κλειδιά: εξ αποστάσεως εκπαίδευση, τεχνολογία, ψηφιακές εξετάσεις, εγκυρότητα, αξιοπιστία, αυθεντική αξιολόγηση, κριτική σκέψη

ΨΗΦΙΑΚΑ ΜΕΣΑ ΚΑΙ ΕΙΔΙΚΕΣ ΜΑΘΗΣΙΑΚΕΣ ΔΥΣΚΟΛΙΕΣ (ΕΜΔ): ΕΥΚΑΙΡΙΕΣ, ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΠΡΟΟΠΤΙΚΕΣ ΓΙΑ ΜΙΑ ΙΣΟΤΙΜΗ ΕΚΠΑΙΔΕΥΣΗ

Τσίτσικας Ευθύμιος
Υποψήφιος Διδάκτορας Πανεπιστημίου Αιγαίου
Τμήμα Μεσογειακών Σπουδών: Αρχαιολογία, Γλωσσολογία, Διεθνείς Σχέσεις
Εκπαιδευτικός, Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού
Ρόδος & Άρτα, Ελλάδα
msd21007@aegean.gr

Φραντζή Κατερίνα Θ.
Καθηγήτρια Πανεπιστήμιου Αιγαίου
Τμήμα Μεσογειακών Σπουδών: Αρχαιολογία, Γλωσσολογία, Διεθνείς Σχέσεις
Ρόδος, Ελλάδα
frantzi@aegean.gr

Τριβιζά Χρυσούλα
Εκπαιδευτικός, Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού
Πύργος, Ελλάδα
siliatrv@gmail.com

ΠΕΡΙΛΗΨΗ

Οι Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ) αποτελούν νευροαναπτυξιακές διαταραχές που επηρεάζουν βασικές ακαδημαϊκές δεξιότητες, καθιστώντας αναγκαία την εφαρμογή εξατομικευμένων και συμπεριληπτικών εκπαιδευτικών προσεγγίσεων. Η ενσωμάτωση των ψηφιακών τεχνολογιών στη σύγχρονη εκπαιδευτική πραγματικότητα, ιδιαίτερα κατά και μετά την πανδημία COVID-19, ανέδειξε νέες δυνατότητες υποστήριξης των μαθητών/τριών με ΕΜΔ, αλλά παράλληλα κατέστησε εμφανείς υφιστάμενες ανισότητες ως προς την πρόσβαση και την παιδαγωγική αξιοποίηση των τεχνολογικών μέσων.

Σκοπός της παρούσας μελέτης είναι η διερεύνηση της αποτελεσματικότητας των ψηφιακών εργαλείων στην υποστήριξη μαθητών/τριών με ΕΜΔ, καθώς και η κριτική αποτίμηση των προκλήσεων που σχετίζονται με την ψηφιακή προσβασιμότητα και την εκπαιδευτική συμπερίληψη. Σε μεθοδολογικό επίπεδο, η έρευνα βασίζεται σε συστηματική επισκόπηση και δευτερογενή ανάλυση δεδομένων από διεθνείς εκθέσεις οργανισμών, όπως η UNESCO, ο OECD και η Ευρωπαϊκή Επιτροπή, για την περίοδο 2020–2023, με έμφαση στη συγκριτική ανάλυση της χρήσης ψηφιακών τεχνολογιών ανά κατηγορία ΕΜΔ.

Τα ευρήματα της μελέτης καταδεικνύουν υψηλότερα επίπεδα υιοθέτησης και τεχνολογικής ωριμότητας για παρεμβάσεις που αφορούν τη δυσλεξία, σε σύγκριση με άλλες μαθησιακές δυσκολίες, όπως η δυσαριθμησία. Παράλληλα, αναδεικνύεται η ύπαρξη σημαντικού ψηφιακού χάσματος και ελλείψεων στην εξειδικευμένη επιμόρφωση των εκπαιδευτικών στην Ελλάδα σε σύγκριση με άλλες χώρες του δυτικού κόσμου. Η μελέτη καταλήγει στην ανάγκη διαμόρφωσης μιας ολιστικής ψηφιακής στρατηγικής που θα στηρίζεται στις αρχές της Καθολικής Σχεδίασης για τη Μάθηση, με στόχο τη διασφάλιση της ισότιμης πρόσβασης και της ουσιαστικής εκπαιδευτικής συμπερίληψης όλων των μαθητών/τριών με ΕΜΔ.

Λέξεις-κλειδιά: Ειδικές Μαθησιακές Δυσκολίες, ψηφιακά μέσα, ψηφιακό χάσμα, εξ αποστάσεως εκπαίδευση, συμπερίληψη

ΘΠ18: Κοινωνικά δίκτυα και εκπαίδευση

ΚΟΙΝΩΝΙΚΑ ΔΙΚΤΥΑ ΚΑΙ ΕΚΠΑΙΔΕΥΣΗ

Κούλης Ιωάννης
Διευθυντής 9ου Δημοτικού Σχολείου Άρτας
Διεύθυνση Πρωτοβάθμιας Εκπαιδευσης Άρτας
Ελλάδα
e-mail: janniskoulis@gmail.com

ΠΕΡΙΛΗΨΗ

Τα κοινωνικά δίκτυα έχουν γίνει αναπόσπαστο κομμάτι της σύγχρονης ζωής, επηρεάζοντας σχεδόν όλους τους τομείς, συμπεριλαμβανομένης και της εκπαίδευσης. Η χρήση τους στην εκπαιδευτική διαδικασία έχει ανοίξει νέους ορίζοντες, αλλά ταυτόχρονα θέτει και σημαντικές προκλήσεις. Η παρούσα εργασία αποσκοπεί στο να εξετάσει τη σχέση αυτή, να αναλύσει τη σχετική νομοθεσία και να προτείνει κατευθύνσεις για την ορθή χρήση των κοινωνικών δικτύων στο εκπαιδευτικό περιβάλλον. Αναλυτικότερα, τα κοινωνικά δίκτυα έχουν γίνει αναπόσπαστο κομμάτι της σύγχρονης ζωής, επηρεάζοντας σχεδόν όλους τους τομείς, συμπεριλαμβανομένης και της εκπαίδευσης. Η ραγδαία εξέλιξη της τεχνολογίας και η διείσδυση των ψηφιακών πλατφορμών στην καθημερινότητά μας, έχουν μεταβάλει τον τρόπο με τον οποίο μαθαίνουμε, επικοινωνούμε και συνεργαζόμαστε. Στο πλαίσιο της εκπαίδευσης, τα κοινωνικά δίκτυα έχουν ανοίξει νέους ορίζοντες, προσφέροντας ευκαιρίες για διαδραστική μάθηση, συνεργασία και πρόσβαση σε πλούσιους εκπαιδευτικούς πόρους. Ωστόσο, η χρήση τους δεν υφίσταται χωρίς προκλήσεις. Ζητήματα όπως η προστασία της ιδιωτικής ζωής, η ασφάλεια των δεδομένων, ο κυβερνοεκφοβισμός και η ανάγκη για ψηφιακή παιδεία αποτελούν σημαντικές ανησυχίες που απαιτούν προσοχή και αντιμετώπιση. Για τούτο, θα προσπαθήσουμε να εξετάσουμε τη σχέση αυτή, αναλύοντας τόσο τις ευκαιρίες όσο και τις προκλήσεις που προκύπτουν από τη χρήση των κοινωνικών δικτύων στο εκπαιδευτικό περιβάλλον. Στόχος είναι να κατανοήσουμε πώς αυτές οι πλατφόρμες μπορούν να ενισχύσουν την εκπαιδευτική διαδικασία, να διευκολύνουν την επικοινωνία μεταξύ μαθητών και εκπαιδευτικών και να προωθήσουν την καινοτομία στη διδασκαλία. Παράλληλα, θα εξεταστούν οι νομικές και ηθικές διαστάσεις της χρήσης των κοινωνικών δικτύων, με έμφαση στην προστασία των δεδομένων και των δικαιωμάτων των μαθητών. Η συζήτηση θα επικεντρωθεί και στην ορθή χρήση των κοινωνικών δικτύων, προτείνοντας κατευθύνσεις και καλές πρακτικές που μπορούν να υιοθετηθούν από εκπαιδευτικούς και εκπαιδευτικούς φορείς. Θα αναλυθούν τα πλεονεκτήματα της ψηφιακής παιδείας, η σημασία της ευαισθητοποίησης των μαθητών για τους κινδύνους του διαδικτύου και ο ρόλος των εκπαιδευτικών ως μεντόρων στην ψηφιακή εποχή. Επιπλέον, θα διερευνηθεί πώς τα κοινωνικά δίκτυα μπορούν να συμβάλλουν στη δημιουργία ενός πιο συμπεριληπτικού και δίκαιου εκπαιδευτικού συστήματος, παρέχοντας πρόσβαση σε γνώση και πόρους σε μαθητές από διαφορετικά κοινωνικά και γεωγραφικά πλαίσια.

Τέλος η παρούσα εργασία στοχεύει να προσφέρει μια ολοκληρωμένη προσέγγιση στη σχέση μεταξύ κοινωνικών δικτύων και εκπαίδευσης, συνδυάζοντας θεωρητική ανάλυση, πρακτικές εφαρμογές και νομικές προοπτικές. Μέσα από τη συλλογική συζήτηση και την ανταλλαγή ιδεών, επιδιώκεται να διαμορφωθεί ένας οδικός χάρτης για την ασφαλή, υπεύθυνη και αποτελεσματική χρήση των κοινωνικών δικτύων στην εκπαίδευση, προς όφελος τόσο των μαθητών όσο και της εκπαιδευτικής κοινότητας στο σύνολό της.

Λέξεις – κλειδιά: Κοινωνικά δίκτυα, εκπαίδευση, διδασκαλία, συμπερίληψη.

ΘΠ19: Διαδικτυακές Κοινότητες Μάθησης

ΕΡΕΥΝΩΝΤΑΣ ΤΗΝ ΚΑΙΝΟΤΟΜΙΑ ΤΗΣ ΔΙΑΔΙΚΤΥΑΚΗΣ ΚΟΙΝΟΤΗΤΑΣ ΜΑΘΗΣΗΣ «OUT OF EDEN LEARN» ΤΟΥ HARVARD: ΜΙΑ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΞΕΝΟΓΛΩΣΣΗ ΑΓΓΛΙΚΗ ΤΑΞΗ

Δερμιτζάκη Κυριακή
Εκπαιδευτικός Αγγλικής Γλώσσας, M.Ed.
4ο Δημοτικό Σχολείο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: kdermitz@gmail.com

ΠΕΡΙΛΗΨΗ

Η ανάδειξη των νέων τεχνολογιών και οι άπειρες εφαρμογές τους σε όλες τις πτυχές της ζωής μας, έχουν επηρεάσει τα εκπαιδευτικά συστήματα παγκοσμίως. Στο Ελληνικό δημόσιο σχολικό περιβάλλον πολλοί εκπαιδευτικοί αισθάνονται ότι ήρθε η ώρα να αγκαλιάσουν τις παιδαγωγικές εφαρμογές των Νέων Τεχνολογιών , όχι απλώς ως τεχνολογικό εργαλείο, αλλά σαν όχημα για να βελτιώσουν τις διδακτικές τους προσεγγίσεις, προωθώντας τη συνεχή επαγγελματική ανάπτυξη των εκπαιδευτικών και τις δεξιότητες του 21ου αιώνα για τους μαθητές τους, μέσα από την εμπνευσμένη συνεργασία τους σε κοινότητες πρακτικής και μάθησης. Η παρούσα μελέτη πραγματεύεται τον σχεδιασμό, εφαρμογή και αξιολόγηση της συμμετοχής μας στα πλαίσια του μαθήματος της Αγγλικής Γλώσσας στο 4ο Δημοτικό Σχολείο Πρέβεζας στην μοναδική διαδικτυακή κοινότητα μάθησης του “Out of Eden Learn” (OOEL) του Οργανισμού Project Zero της Παιδαγωγικής Σχολής του Πανεπιστήμιου Harvard. Πιο συγκεκριμένα, τα αποτελέσματα της συμμετοχής μας στα διάφορα μαθησιακά ταξίδια, σχεδιασμένα από την ερευνητική ομάδα του Harvard, από την αρχική πιλοτική εφαρμογή των Εργαστηρίων Δεξιοτήτων το 2020 σε εθνικό επίπεδο και οι διεθνείς μας συνεργασίες τα επόμενα χρόνια, ανέδειξαν πολύ θετικά αποτελέσματα σχετικά με την εσωτερική κινητοποίηση των μαθητών μας καθώς και την προώθηση των πολυγραμματισμών και των συμπεριληπτικών, ψηφιακών, δεξιοτήτων κριτικής σκέψης σε ένα διασυνδεδεμένο, πολιτισμικά και γλωσσικά πλούσιο, μαθησιακό περιβάλλον.

Λέξεις – κλειδιά: Διαδικτυακές Κοινότητες Μάθησης, Δεξιότητες του 21ου αιώνα, Ρουτίνες σκέψης, “Out of Eden Learn” , Ψηφιακή μάθηση, Πολυγραμματισμοί

ΘΠ20: Ηλεκτρονική Μάθηση Δεύτερης Γενιάς (Learning 2.0)

ΘΠ21: Κινητή Μάθηση (Mobile learning, BYOD)

ΘΠ22: Ανοικτοί εκπαιδευτικοί πόροι

ΘΠ23: Ελεύθερος και ανοικτός κώδικας λογισμικού για την εκπαίδευση

ΑΝΑΛΥΣΗ ΚΕΙΜΕΝΩΝ ΜΕ ΕΡΓΑΛΕΙΑ ΑΝΟΙΚΤΟΥ ΛΟΓΙΣΜΙΚΟΥ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΣΥΜΒΟΥΛΕΥΤΙΚΗ: ΜΕΛΕΤΗ ΣΥΝΕΔΡΙΩΝ ΜΑΘΗΤΩΝ-ΣΥΜΒΟΥΛΩΝ

Κουτσουπιάς Νικόλαος
Καθηγητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
nk@uom.edu.gr

Νόσιος Μάριος
Υπ. Διδάκτωρ, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
mnosios@uom.edu.gr

Χαλιώτου Αικατερίνη
ΠΕ Διοικητικού-Οικονομικού
D.E.A. Ανθρωπιστικών και Κοινωνικών Επιστημών
Universite Paris 8
haliotou@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει την εφαρμογή του RQDA, ενός λογισμικού ανοιχτού κώδικα για ποιοτική ανάλυση κειμένων, στη συστηματική ανάλυση συνεδριών εκπαιδευτικής συμβουλευτικής. Οκτώ ηχογραφημένες συνεδρίες, διάρκειας περίπου μίας ώρας η καθεμία, απομαγνητοφωνήθηκαν, εισήχθησαν στο RQDA και οργανώθηκαν μέσω του περιβάλλοντος εργασίας που παρέχει. Η επαγωγική θεματική κωδικοποίηση παρήγαγε πέντε τύπους οπτικοποιήσεων: ραβδογράμματα συχνότητας κωδικών, θεματικούς χάρτες, δίκτυα συνύπαρξης κωδικών, λεκτικά δενδροδιαγράμματα και συννεφόλεξα. Από την ποιοτική θεματική ανάλυση προέκυψε ότι τα τμήματα που αφορούσαν την εφαρμογή σχεδίου δράσης, την παροχή πληροφοριών και την έγκαιρη ανταπόκριση αντιστοιχούσαν σε πάνω από το 85% του συνόλου των κωδικοποιήσεων, αναδεικνύοντας την κυρίαρχη έμφαση στην πρακτική καθοδήγηση και την υποστήριξη σε πραγματικό χρόνο. Κωδικοί με μικρότερη συχνότητα, όπως οι δεξιότητες ακρόασης, η οικοδόμηση σχέσεων και η συναισθηματική καθησύχαση, ανέδειξαν δευτερεύουσες συναισθηματικές διαστάσεις. Τα δίκτυα συνύπαρξης επιβεβαίωσαν ισχυρές σχέσεις μεταξύ του σχεδιασμού δράσης και της ανταλλαγής πληροφοριών, ενώ οι οπτικοποιήσεις λέξεων αποκάλυψαν επαναλαμβανόμενα γλωσσικά μοτίβα συνεργατικής λήψης αποφάσεων. Τα αποτελέσματα αναδεικνύουν τη συμβολή του RQDA στην ενίσχυση της διαφάνειας και της επαναληψιμότητας της ποιοτικής ανάλυσης, καθώς και στη λειτουργική του ένταξη σε ποσοτικές διαδικασίες στο πλαίσιο σύνθετων ερευνητικών σχεδιασμών. Εφεξής, η αξιοποίηση συνδυαστικών μεθοδολογιών που ενσωματώνουν ποιοτικά δεδομένα σε ποσοτικά μοντέλα δύναται να προσφέρει βαθύτερη κατανόηση των συμβουλευτικών διεργασιών και να ενισχύσει τη συνολική μεθοδολογική εγκυρότητα.

Λέξεις-κλειδιά: RQDA, Ποιοτική Ανάλυση, Εργαλεία Λογισμικού Ανοιχτού Κώδικα, Εκπαιδευτική Συμβουλευτική

ΘΠ24: Διδασκαλία και ψηφιακά μέσα

ΑΠΕΙΚΟΝΙΣΗ ΦΥΣΙΚΩΝ ΜΕΓΕΘΩΝ ΗΛΕΚΤΡΟΣΤΑΤΙΚΟΥ ΠΕΔΙΟΥ, ΧΩΡΟΧΡΟΝΙΚΩΝ ΜΕΤΑΒΟΛΩΝ ΚΥΜΑΤΩΝ, ΑΤΟΜΙΚΩΝ ΤΡΟΧΙΑΚΩΝ ΚΑΙ ΕΥΡΕΣΗ ΛΕΙΤΟΥΡΓΙΚΩΝ ΧΑΡΑΚΤΗΡΙΣΤΙΚΩΝ ΚΥΚΛΩΜΑΤΩΝ ΜΕΣΩ ΛΟΓΙΣΜΙΚΩΝ.

Βαρσάμης Αγησίλαος
Καθηγητής Φυσικός –Ρ/Η, (M.Sc., Ph.D.), Υ.Σ.Ε.Φ.Ε.
6ο Γενικό Λύκειο Λάρισας
Λάρισα, Ελλάς
e-mail: avars@sch.gr

ΠΕΡΙΛΗΨΗ

Ο σκοπός της παρούσης εργασίας είναι να καταδείξει την χρησιμότητα των επιστημονικών λογισμικών στην κατανόηση, στον υπολογισμό και στην εμβάθυνση των εννοιών των φυσικών επιστημών, μέσω συνδυαστικών και κινούμενων απεικονίσεων. Είναι μάλιστα ιδιαίτερα σημαντική για φυσικά μεγέθη και έννοιες, οι οποίες είναι αφηρημένες, και δεν υπάρχει άμεση εποπτεία σε αυτές (π.χ. τα μεγέθη των πεδίων, τα ατομικά και κυματικά φαινόμενα). Όλα τα παραπάνω γίνονται με την βοήθεια των λογισμικών MAPLE και MATHCAD. Επίσης, μέσω του λογισμικού προσομοίωσης TINA, δίνεται μία ισχυρή εναλλακτική πρόταση μελέτης ηλεκτρικών κυκλωμάτων σε σχέση με την κλασσική εργαστηριακή και καταδεικνύεται η αποτελεσματικότητα της, ιδιαίτερα σε περιπτώσεις, όπου η εργαστηριακή δραστηριότητα δεν μπορεί να πραγματοποιηθεί λόγω ενδογενών προβλημάτων.

Στο πρώτο μέρος της εργασίας δημιουργούνται και απεικονίζονται τα χαρακτηριστικά φυσικά μεγέθη του ηλεκτροστατικού πεδίου, όπως η ένταση, οι ισοδυναμικές καμπύλες ή επιφάνειες, οι δυναμικές γραμμές σε δύο και τρείς διαστάσεις για ένα μεμονωμένο φορτίο, όπως επίσης και για συνδυασμό φορτίων.

Στο δεύτερο μέρος της εργασίας, παρουσιάζονται κυματικά φαινόμενα στο επίπεδο και στον χώρο, όπως η χωροχρονική διάδοση ενός κύματος σταθερού πλάτους, αλλά και με απόσβεση, χωροχρονική παραγωγή στάσιμου κύματος, χωροχρονική παραγωγή και εξέλιξη διακροτήματος και συμβολής κυμάτων.

Στο τρίτο μέρος της εργασίας, γίνεται παραγωγή και σχεδίαση ατομικών τροχιακών. Απεικονίζονται τα ατομικά τροχιακά s, p, d, f, καθώς και το υβριδικό sp^2 στο επίπεδο και στον χώρο, όπως επίσης, διαγράμματα πυκνότητας και διάφορες τομές τους στον χώρο.

Στο τελευταίο μέρος της εργασίας, παρουσιάζεται η μελέτη ηλεκτρικών και κατ’ επέκταση ηλεκτρονικών κυκλωμάτων, μέσω της δυνατότητας POSTPROCESSING του λογισμικού προσομοίωσης ηλεκτρικών και ηλεκτρονικών κυκλωμάτων TINA.

Λέξεις – κλειδιά: Ηλεκτροστατικό Πεδίο, Κύματα, Ατομικά Τροχιακά, Ηλεκτρικά Κυκλώματα.

ΜΙΚΡΑΣΙΑΤΙΚΗ ΚΑΤΑΣΤΡΟΦΗ ΚΑΙ ΜΙΚΡΑΣΙΑΤΙΚΑ ΜΝΗΜΕΙΑ : ΕΚΠΑΙΔΕΥΤΙΚΗ ΠΡΩΤΟΒΟΥΛΙΑ ΜΕ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΕΡΓΑΛΕΙΩΝ

Γιαννούλη Σοφία
Φιλόλογος, ΠΕ02
1ο Πρότυπο Γυμνάσιο Πρέβεζας με Λυκειακές Τάξεις
Πρέβεζα, Ελλάδα
e-mail: alexandropoulosalekos@yahoo.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει την εκπαιδευτική πρωτοβουλία του μαθητικού ομίλου Ιστορίας με τίτλο «Μικρασιατική Καταστροφή και Μικρασιατικά Μνημεία», η οποία υλοποιήθηκε στο 1ο Πρότυπο Γυμνάσιο Πρέβεζας κατά το σχολικό έτος 2022-2023. Σκοπός της πρωτοβουλίας ήταν η συνδυασμένη εμβάθυνση στην ιστορική γνώση και μνήμη της Μικρασιατικής Καταστροφής, μέσω της ενσωμάτωσης καινοτόμων ψηφιακών εργαλείων στην εκπαιδευτική διαδικασία. Η εργασία αναλύει πώς η χρήση της τεχνολογίας ενίσχυσε την κατανόηση των ιστορικών γεγονότων, επιτρέποντας στους μαθητές να προσεγγίσουν και να παρουσιάσουν την ιστορία με σύγχρονο και διαδραστικό τρόπο.

Η μεθοδολογία που ακολουθήθηκε περιλάμβανε τη χρήση ψηφιακών πλατφορμών για την αναζήτηση, ανάλυση και επεξεργασία ιστορικών πηγών, όπως επίσης και την εκπόνηση εργασιών και δημιουργία παρουσιάσεων μέσω λογισμικών παρουσίασης (π.χ. PowerPoint). Παράλληλα, χρησιμοποιήθηκαν ψηφιακά εργαλεία για τη συγκέντρωση φωτογραφικού υλικού, τη δημιουργία ψηφιακών αφισών και την οργάνωση ψηφιακών εκδηλώσεων. Ένα σημαντικό στάδιο του προγράμματος ήταν η δημιουργία ενός τραγουδιού, το οποίο μελοποιήθηκε με τη χρήση μουσικών λογισμικών παραγωγής (όπως το GarageBand και το FL Studio), καθώς και η δημιουργία ψηφιακού ραδιοφωνικού προγράμματος, όπου οι μαθητές παρουσίασαν ιστορικά δεδομένα μέσω ενός σύγχρονου μέσου επικοινωνίας.

Τα κύρια ευρήματα της εργασίας υποδεικνύουν τη θετική επίδραση της χρήσης ψηφιακών εργαλείων στην ενίσχυση της συνεργασίας και της δημιουργικότητας των μαθητών. Η αξιοποίηση των τεχνολογικών εργαλείων επέτρεψε στους μαθητές να συμμετέχουν ενεργά σε όλες τις φάσεις του έργου, ενισχύοντας την κριτική σκέψη και την ικανότητά τους να παράγουν ψηφιακό περιεχόμενο. Ιδιαίτερα, η δημιουργία του τραγουδιού και του ψηφιακού ραδιοφωνικού προγράμματος αποτέλεσε μια κορυφαία στιγμή της μαθησιακής διαδικασίας, καθώς συνδύασε τη μουσική και την ιστορική μνήμη με την τεχνολογία, προσφέροντας στους μαθητές τη δυνατότητα να εκφραστούν δημιουργικά.

Τα αποτελέσματα καταδεικνύουν ότι η συνδυασμένη χρήση παραδοσιακών μεθόδων διδασκαλίας και ψηφιακών εργαλείων ενισχύει την εκπαιδευτική διαδικασία, προσφέροντας στους μαθητές πολύτιμες δεξιότητες για τη σύγχρονη εποχή. Οι μαθητές ανέπτυξαν τις δεξιότητές τους στην κριτική σκέψη, την έκφραση και τη συνεργασία σε ψηφιακό περιβάλλον, αποκτώντας εμπειρίες που ενισχύουν την ικανότητά τους να προσεγγίζουν ιστορικά θέματα με δημιουργικό και σύγχρονο τρόπο.

Λέξεις – κλειδιά: Μικρασιατική Καταστροφή, ιστορική μνήμη, ψηφιακά εργαλεία.

ΔΙΔΑΣΚΑΛΙΑ ΤΟΥ ΜΑΘΗΜΑΤΟΣ ΤΗΣ ΙΣΤΟΡΙΑΣ ΜΕ ΤΗ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ: ΠΑΡΟΥΣΙΑΣΗ ΣΧΕΔΙΟΥ ΔΙΔΑΣΚΑΛΙΑΣ

Ζιάγκου Μάνθα
Εκπαιδευτικός ΠΕ 71
Δημοτικό Σχολείο Ξηρολόφου – Αρχαία Ελέα
mziagkoy@gmail.com

Μακάριος Λάμπρος
Εκπαιδευτικός ΠΕ 70
Δημοτικό Σχολείο Ξηρολόφου – Αρχαία Ελέα
lamprosmakarios88@gmail.com

ΠΕΡΙΛΗΨΗ

Η διδασκαλία της Ιστορίας αποτελεί μία ιδιαίτερη παιδαγωγική πρόκληση, απαιτώντας την ενεργοποίηση της κριτικής σκέψης, την ερμηνεία ιστορικών πηγών και τη σύνδεση παρελθόντος και παρόντος. Η αξιοποίηση των ψηφιακών μέσων παρέχει νέες δυνατότητες προς αυτή την κατεύθυνση, καθιστώντας την ιστορική γνώση περισσότερο διαδραστική και προσιτή στους μαθητές.

Η ενσωμάτωση της τεχνολογίας στην ιστορική εκπαίδευση περιλαμβάνει τη χρήση διαδραστικών χαρτών, εικονικών αναπαραστάσεων, πολυμεσικού υλικού, ψηφιακών αρχείων και εκπαιδευτικών πλατφορμών. Τα εργαλεία αυτά επιτρέπουν στους μαθητές να εξερευνούν ιστορικά γεγονότα μέσω οπτικοποιημένων δεδομένων, να αναλύουν πρωτογενείς πηγές και να συμμετέχουν σε βιωματικές δραστηριότητες. Για παράδειγμα, οι γεωγραφικά πληροφοριακά συστήματα (GIS) και εφαρμογές όπως το Google Earth επιτρέπουν την ιστορική χαρτογράφηση, διευκολύνοντας την κατανόηση του χωροχρονικού πλαισίου των γεγονότων. Επιπλέον, οι τεχνολογίες εικονικής και επαυξημένης πραγματικότητας (VR/AR) δίνουν τη δυνατότητα «ψηφιακών επισκέψεων» σε ιστορικούς χώρους, ενισχύοντας την εμπειρική προσέγγιση της Ιστορίας.

Το πολυμεσικό υλικό, όπως ντοκιμαντέρ, διαδραστικά βίντεο και ιστορικά αρχεία, προσφέρει μια πολυτροπική διδακτική προσέγγιση που ανταποκρίνεται στις διαφοροποιημένες μαθησιακές ανάγκες. Παράλληλα, η ψηφιακή αφήγηση (digital storytelling) ενισχύει τη δημιουργική συμμετοχή των μαθητών, επιτρέποντάς τους να κατασκευάζουν τις δικές τους ιστορικές αφηγήσεις, συνδυάζοντας πηγές, εικόνες και βίντεο.

Η παιγνιοποίηση (gamification) αποτελεί έναν ακόμη καινοτόμο διδακτικό μηχανισμό, καθώς ενσωματώνει στοιχεία πρόκλησης, ανταμοιβής και συνεργασίας. Πλατφόρμες όπως το Kahoot!, το Quizizz και το Mission US επιτρέπουν την αφομοίωση ιστορικών γνώσεων μέσω διαδραστικών δραστηριοτήτων, αυξάνοντας το ενδιαφέρον των μαθητών.

Παρά τις δυνατότητες που προσφέρει η τεχνολογία, προκύπτουν προκλήσεις που απαιτούν προσεκτική διαχείριση. Η αξιοπιστία των ψηφιακών πηγών, η ανάπτυξη κριτικής προσέγγισης στην πληροφορία και η επιμόρφωση των εκπαιδευτικών στη χρήση ψηφιακών εργαλείων συνιστούν βασικούς παράγοντες επιτυχούς ενσωμάτωσης της τεχνολογίας στην ιστορική διδασκαλία.

Συμπερασματικά, η αξιοποίηση των ψηφιακών μέσων στη διδασκαλία της Ιστορίας δεν αποτελεί απλώς έναν τεχνολογικό εκσυγχρονισμό, αλλά μια παιδαγωγική αναβάθμιση που ενισχύει την κριτική σκέψη, τη βιωματική μάθηση και τη βαθύτερη κατανόηση του ιστορικού παρελθόντος. Με τη σωστή χρήση των εργαλείων αυτών, η Ιστορία καθίσταται πιο προσιτή και ελκυστική, διαμορφώνοντας ενεργούς και συνειδητοποιημένους πολίτες.

Η παρούσα εργασία εξετάζει τον ρόλο των ψηφιακών τεχνολογιών στη διδασκαλία της Ιστορίας, εστιάζοντας σε σύγχρονες μεθόδους που αξιοποιούν διαδραστικούς χάρτες, εικονικές αναπαραστάσεις, πολυμεσικό υλικό και εργαλεία παιχνιδοποίησης μέσα από την παρουσίαση ενός σχεδίου διδασκαλίας δύο ωρών, στο μάθημα της Ιστορίας της Στ΄ τάξης, στην ενότητα: «Η δεύτερη πολιορκία και η έξοδος του Μεσολογγίου».

Η ενσωμάτωση ψηφιακών τεχνολογιών στη διδασκαλία της ενότητας συνέβαλε καθοριστικά στην ενίσχυση της ιστορικής σκέψης και της ενεργού συμμετοχής των μαθητών. Η χρήση διαδραστικών χαρτών και εικονικών αναπαραστάσεων διευκόλυνε την κατανόηση του χωροχρονικού πλαισίου των γεγονότων, ενώ το πολυμεσικό υλικό και

η ψηφιακή αφήγηση προήγαγαν τη βιωματική και δημιουργική μάθηση. Επιπλέον, η αξιοποίηση παιχνιδοποιημένων δραστηριοτήτων ενίσχυσε το ενδιαφέρον και την αφομοίωση του περιεχομένου. Παράλληλα, οι μαθητές ανέπτυξαν δεξιότητες κριτικής ανάλυσης ψηφιακών πηγών. Ωστόσο, αναδείχθηκαν προκλήσεις σχετικές με τη διαχείριση του διδακτικού χρόνου και την ανάγκη συστηματικής επιμόρφωσης των εκπαιδευτικών στη χρήση ψηφιακών μέσων.

Λέξεις - κλειδιά: διδασκαλία Ιστορίας, ψηφιακά μέσα, διαδραστική μάθηση, εικονικές αναπαραστάσεις, παιχνιδοποίηση, τεχνολογία στην εκπαίδευση

ΤΟ ΒΙΝΤΕΟΜΑΘΗΜΑ ΩΣ ΜΕΣΟ ΔΙΔΑΣΚΑΛΙΑΣ ΚΑΙ ΑΞΙΟΛΟΓΗΣΗΣ ΣΤΗΝ ΕΠΑΓΓΕΛΜΑΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ. ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ ΥΛΟΠΟΙΗΣΗ ΒΙΝΤΕΟΜΑΘΗΜΑΤΟΣ ΣΕ ΜΑΘΗΜΑΤΑ ΤΟΥ ΕΠΑΓΓΕΛΜΑΤΙΚΟΥ ΛΥΚΕΙΟΥ

Θεοφάνους Ιωάννης
Εκπαιδευτικός ΠΕ82
1ο ΕΠΑ.Λ. Πρέβεζας
Πρέβεζα, Ελλάς
e-mail: igtheofanous@gmail.com

Μουράνου Σοφία
Εκπαιδευτικός ΠΕ87, ΠΕ02
1ο ΕΠΑ.Λ. Πρέβεζας
Πρέβεζα, Ελλάς
e-mail: mouranou@yahoo.gr

ΠΕΡΙΛΗΨΗ

Αυτή η εργασία προσφέρει μια ολοκληρωμένη εξέταση του βιντεομαθήματος ως ζωτικής σημασίας ψηφιακού εργαλείου διδασκαλίας και αξιολόγησης στην επαγγελματική εκπαίδευση. Υποστηρίζει την ενσωμάτωσή του από τους εκπαιδευτικούς επαγγελματικής κατάρτισης, υπογραμμίζοντας τη δυνατότητά τους να ενισχύσουν τις υπάρχουσες εκπαιδευτικές πρακτικές.

Προτείνει διάφορες επιλογές λογισμικού για τη δημιουργία βιντεομαθημάτων, επισημαίνοντας τις ευέλικτες εφαρμογές και τα παιδαγωγικά οφέλη τους, ενώ παράλληλα αντιμετωπίζει προκλήσεις όπως πιθανές τεχνικές δυσκολίες και την ανάγκη απαιτούμενης κατάρτισης. Η διαδικασία ανάπτυξης ενός βιντεομαθήματος υλοποιείται μέσω της πλατφόρμας Ted Ed, η οποία επιτρέπει στους εκπαιδευτικούς να δημιουργούν διαδραστικά μαθήματα, ενσωματώνοντας ερωτήσεις και εκπαιδευτικούς πόρους απευθείας στο περιεχόμενο του βίντεο.

Η μελέτη αναλύει δύο βιντεομαθήματα για μαθητές Επαγγελματικού Λυκείου, το ένα με θέμα τη «Στοματική Υγιεινή» και το άλλο με θέμα τα «Συστήματα Ψύξης Κινητήρων Αυτοκινήτων». Αυτή η προσέγγιση επιτρέπει στους εκπαιδευτικούς να αξιολογούν την πρόοδο και τη συμμετοχή των μαθητών, επιτρέποντας παράλληλα την αυτοαξιολόγηση από τους ίδιους τους μαθητές. Η ανατροφοδότηση προέκυψε μέσω ερωτηματολογίου που συμπλήρωσαν οι μαθητές μετά τη διδασκαλία, παρέχοντας πληροφορίες σχετικά με την αποτελεσματικότητα της συγκεκριμένης μορφής διδασκαλίας και τους τομείς βελτίωσής της. Τα συμπεράσματα υπογραμμίζουν τη σημασία του βιντεομαθήματος στην επαγγελματική εκπαίδευση και επιβεβαιώνουν την αποτελεσματικότητά τους ως διδακτικό εργαλείο.

Λέξεις – κλειδιά: Βιντεομάθημα, TedEd, ανεστραμμένη τάξη, Αγωγή Υγείας, Θερμοδυναμική, ΕΠΑ.Λ.

Η ΕΠΙΔΡΑΣΗ ΤΟΥ CHARLES BAUDELAIRE ΣΤΑ ΠΟΙΗΜΑΤΑ : «ΙΘΑΚΗ» ΤΟΥ Κ.Π. ΚΑΒΑΦΗ ΚΑΙ «ΤΑΞΙΔΙ ΣΤΑ ΚΥΘΗΡΑ» ΤΟΥ ΚΩΣΤΑ ΟΥΡΑΝΗ ΜΕΣΩ ΤΗΣ ΨΗΦΙΑΚΗΣ ΑΦΗΓΗΣΗΣ

Δρ. Κοψάρης Κοσμάς
Διευθυντής 2ου Γυμνασίου Πρέβεζας
e-mail: kkopsaris@hotmail.com

ΠΕΡΙΛΗΨΗ

Στόχος της συγκεκριμένης εισήγησης αποτελεί η ανίχνευση και η αποτύπωση των διακειμενικών όψεων της μπωντλαιρικής ποίησης σε επιγενόμενους Έλληνες ποιητές μέσω της ψηφιακής αφήγησης. Αρχικά, θα αποδοθεί η σημασία της αφήγησης, η συμβολή της στην εκπαιδευτική διαδικασία, καθώς και τα βασικά στοιχεία που διέπουν την αφηγηματολογία. Θα εξεταστούν οι βασικές αρχές της ψηφιακής αφήγησης, τα στάδια δημιουργίας της σε συσχέτιση με τα μαθησιακά οφέλη σε επίπεδο πρόσληψης. Θα παρατεθούν μεθοδολογικά εργαλεία αξιοποίησης της ψηφιακής αφήγησης με βασικότερο στόχο οι μαθητές να αποκτήσουν μια διασταλτική οπτική και αντίληψη της λογοτεχνίας σε συγκριτολογικό και σε διακειμενικό επίπεδο. Θα δοθεί έμφαση στην επιλογή των κατάλληλων ψηφιακών εργαλείων που να αναδεικνύουν την ιδέα του ταξιδιού στην ουτοπία ως ένα βασικό μέσο εικονοπλαστικής αφήγησης με έντονες κινηματογραφικές συνηχήσεις. Η έννοια του ταξιδιού είναι καταλυτική ως μοτίβο ενεργοποίησης της δημιουργικής φαντασίας. Σε αυτή τη βάση, η μπωντλαιρική ποίηση εξαπέλυσε ανιχνευτές εδάφους στην ενεργοποίηση των αόρατων μηχανισμών που συνέχουν την κοσμική τάξη. Ο σταθερός απόηχος του Μπωντλαίρ είναι εμφανής στην μοντέρνα και στην μεταμοντέρνα νεοελληνική ποίηση σε ζητήματα που σχετίζονται με την απόδραση στο επέκεινα ως ένα μη-τόπο, συνιστώντας ένα δυνητικό πεδίο εναλλακτικής βίωσης του είναι. Ο Μπωνλαίρ σηματοδότησε ποιητικά την αέναη μετάβαση μέσα στο πλήθος. Επικαθόρισε το πεπρωμένο του σύγχρονου ανθρώπου, καταδικασμένου μέσα στην σθεναρή πάλη αντίρροπων δυνάμεων, στο μεταίχμιο ανάμεσα στο φως και στο σκοτάδι, στην αναζήτηση της εσωτερικής πληρότητας και του κενού, στη διεκδίκηση ενός λειασμένου αύριο που να αντιπαρέρχεται την καταβαράθρωση στα έγκατα της ύπαρξης. Μέσω της ψηφιακής αφήγησης στην λογοτεχνία, οι μαθητές θα είναι σε θέση να αφομοιώσουν με άκρως δημιουργικό τρόπο τη σημασία του ταξιδιού ως μέσου εσωτερικής αναζήτησης και παράλληλα εξοικείωσης σε επίπεδο εξωτερικής πραγματικότητας με αδιερεύνητα μέχρι στιγμής πεδία. Η επενέργεια της ψηφιακής αφήγησης στην ποίηση σηματοδοτεί την ενεργοποίηση στο έπακρο της μαγείας των ποιητικών εικόνων δημιουργώντας μια ιδιοσύστατη ποιητική της τεχνολογίας. Οι προσδοκώμενοι στόχοι της συγκεκριμένης εισήγησης σχετίζονται με την καλλιέργεια μιας ευρυγώνιας οπτικής των μαθητών και παράλληλα με την εξοικείωσή τους με την ποίηση ως διαχρονικό πεδίο έμπνευσης.

Λέξεις – κλειδιά: ψηφιακή αφήγηση, αφηγηματολογία, εικονοπλαστική αφήγηση.

Η ΕΦΑΡΜΟΓΗ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ ΓΙΑ ΤΗΝ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΔΙΔΑΣΚΑΛΙΑ ΤΕΧΝΙΚΩΝ ΜΑΘΗΜΑΤΩΝ: ΜΕΛΕΤΗ ΕΦΑΡΜΟΓΗΣ ΓΙΑ ΤΟ ΜΑΘΗΜΑ ΣΧΕΔΙΑΣΜΟΥ ΟΔΙΚΩΝ ΕΡΓΩΝ

Παναγιώτης Λεμονάκης
Επίκουρος Καθηγητής, Τμήμα Πολιτικών Μηχανικών, Τομέας Μεταφορών και Διαχείρισης Έργων, Εργαστήριο Οδοποιίας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης, Θεσσαλονίκη, Ελλάδα
email: plemo@civil.auth.gr

Γεώργιος Καλιαμπέτσος
Διδάκτωρ, Τμήμα Πολιτικών Μηχανικών, Πανεπιστήμιο Θεσσαλίας, Βόλος, Ελλάδα
email: gekalia@uth.gr

Φωτεινή Κεχαγιά
Καθηγήτρια, Τμήμα Πολιτικών Μηχανικών, Τομέας Μεταφορών και Διαχείρισης Έργων, Εργαστήριο Οδοποιίας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης, Θεσσαλονίκη, Ελλάδα
email: fkehagia@civil.auth.gr

ΠΕΡΙΛΗΨΗ

Η εξ αποστάσεως διδασκαλία αλλά και η εξέταση των μαθημάτων της τριτοβάθμιας εκπαίδευσης αποτελεί πρόκληση τόσο για τους διδάσκοντες όσο και για τους φοιτητές αυτών. Τα ποιοτικά αλλά και ποσοτικά χαρακτηριστικά της πληροφορίας που θα πρέπει να επικοινωνηθεί καθιστούν την αναζήτηση και χρήση των πλέον πρόσφορων ψηφιακών μέσων απαραίτητα. Επιπρόσθετα η μειωμένη έως και ανύπαρκτη πολλές φορές αλληλεπίδραση μεταξύ διδασκόντων και φοιτητών και η περιορισμένη ως εκ τούτου ανατροφοδότηση καθόλη τη διάρκεια της εκπαιδευτικής διαδικασίας απαιτούν την εφαρμογή καινοτόμων διαδικασιών διδασκαλίας. Η πρόσφατη υποχρεωτική πραγματοποίηση του συνόλου των διδακτικών δραστηριοτήτων στην τριτοβάθμια και όχι μόνο εκπαίδευση εξαιτίας της πανδημίας, ανέδειξε την αδυναμία του συστήματος διδασκόντων και ψηφιακών μέσων ώστε να διατηρηθεί ένα επίπεδο σπουδών εφάμιλλο με αυτό που επικρατούσε στην προ πανδημίας εποχή. Παράλληλα όμως αποτέλεσε και ευκαιρία ιδιαίτερα εξαιτίας της παρατεταμένης διάρκειας της εξ αποστάσεως εκπαίδευσης να αναπτυχθούν εργαλεία και διαδικασίες που θα είναι ικανά να προσφέρουν αυξημένο επίπεδο γνώσης ανά πάσα στιγμή. Άλλωστε η πραγματοποίηση της εξ αποστάσεως εκπαίδευσης στη δευτεροβάθμια εκπαίδευση σε περίπτωση έκτακτου ή απρόβλεπτου γεγονότος έχει προσφάτως νομοθετηθεί από το Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού όπως και η δυνατότητα εξ αποστάσεως κατάρτισης στις Σχολές Ανώτερης Επαγγελματικής Κατάρτισης (πρώην ΙΕΚ). Στην τριτοβάθμια εκπαίδευση η εξ αποστάσεως αξιολόγηση των φοιτητών υπό προϋποθέσεις ισχύει εδώ και τρία έτη κάτι που εσχάτως εφαρμόστηκε σε πολλά πανεπιστημιακά ιδρύματα κατά τις τελικές εξετάσεις του χειμερινού εξαμήνου του ακαδημαϊκού έτους 2023-2024. Είναι συνεπώς πιθανό η εξ αποστάσεως εκπαίδευση να επαναληφθεί μελλοντικά και άρα είναι αναγκαία η αναζήτηση μεθόδων που θα προσφέρουν το προσδοκώμενο αποτέλεσμα.

Στην παρούσα εργασία περιγράφεται ο τρόπος με τον οποίο καλύφθηκε η εκπαιδευτική διαδικασία, συμπεριλαμβανομένης και της τελικής αξιολόγησης των φοιτητών, στα πλαίσια ενός μαθήματος τριτοβάθμιας εκπαίδευσης που διδάσκεται στο τμήμα Πολιτικών Μηχανικών του Πανεπιστημίου Θεσσαλίας και αφορά τον γεωμετρικό σχεδιασμό οδικών έργων. Το συγκεκριμένο μάθημα μάλιστα περιλαμβάνεται στους οδηγούς σπουδών των τμημάτων Πολιτικών και Αγρονόμων και Τοπογράφων μηχανικών τόσο στην Ελλάδα όσο και στο εξωτερικό. Αναλύονται τόσο τα τεχνικά μέσα όσο και η μεθοδολογία που εφαρμόστηκε καθόλη τη διάρκεια των ακαδημαϊκών εξαμήνων ενώ παρουσιάζονται στατιστικά στοιχεία για τις επιδόσεις των φοιτητών πριν και κατά τη διάρκεια της περιόδου της εξ αποστάσεως εκπαιδευτικής διαδικασίας. Αξίζει να σημειωθεί πως στα πλαίσια του εν λόγω μαθήματος οι φοιτητές εκπόνησαν ένα ιδιαίτερα απαιτητικό θέμα που αφορούσε την ολοκληρωμένη μελέτη ενός οδικού έργου με εβδομαδιαίες διορθώσεις και αυστηρές ενδιάμεσες καταληκτικές ημερομηνίες προόδου με τη χρήση ενός σχεδιαστικού προγράμματος.

Η έρευνα κατέδειξε πως κατά τη διάρκεια της εξ αποστάσεως διδασκαλίας, το αρχικό ενδιαφέρον για την εκπόνηση του εξαμηνιαίου θέματος ήταν μεγάλο όμως λιγότεροι φοιτητές συγκριτικά με άλλες χρονιές το ολοκλήρωσαν. Επιπλέον κατά τη διάρκεια της πρώτης εξ αποστάσεως εξεταστικής περιόδου το ποσοστό των επιτυχόντων φοιτητών ήταν ιδιαίτερα υψηλό κάτι που μειώθηκε στα φυσιολογικά προ πανδημίας επίπεδα στις επόμενες εξεταστικές περιόδους.

Η εργασία φιλοδοξεί, μεταξύ άλλων, να συνεισφέρει σε όσους συναδέλφους εκπαιδευτικούς αναζητούν μια αποτελεσματική διαδικασία εξ αποστάσεως παράδοσης μαθημάτων και διενέργειας εξετάσεων με τη χρήση ψηφιακών μέσων. Αυτό που άλλωστε φάνηκε στα πλαίσια της έρευνας είναι πως με τα διαθέσιμα ψηφιακά μέσα στα πανεπιστημιακά ιδρύματα, τα επίπεδα της προσφερόμενης γνώσης τόσο ποιοτικά όσο και ποσοτικά κατά τη διάρκεια της εξ αποστάσεως

και της δια ζώσης διδασκαλίας και εξέτασης του εν λόγω μαθήματος αλλά και άλλων με παρόμοιες απαιτήσεις και τρόπο διδασκαλίας, με κριτήριο το ποσοστό των φοιτητών που έλαβαν προβιβάσιμο βαθμό, μπορεί να είναι παραπλήσια.

Λέξεις – κλειδιά: Εξ αποστάσεως διδασκαλία, εξ αποστάσεως αξιολόγηση, εκπόνηση θέματος, ψηφιακά μέσα.

ΟΡΓΑΝΩΝΟΝΤΑΣ ΤΟ ΜΑΘΗΜΑ ΤΗΣ ΜΟΥΣΙΚΗΣ ΜΕ ΤΟ PADLET

Μιχαηλίδου Ματίνα
Εκπαιδευτικός Μουσικής Επιστήμης (ΠΕ79.01)
6ο Γυμνάσιο Κοζάνης
Κοζάνη, Ελλάδα
email: tiniomi22@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση των ψηφιακών τεχνολογιών στη διδακτική πράξη αποτελεί αναπόσπαστο κομμάτι της σύγχρονης εκπαιδευτικής πραγματικότητας, προσφέροντας νέες δυνατότητες για την οργάνωση και τον εμπλουτισμό της μαθησιακής διαδικασίας. Στο πλαίσιο αυτό, η παρούσα εργασία εστιάζει στη χρήση της ψηφιακής πλατφόρμας Padlet ως εργαλείου διαχείρισης και ενίσχυσης της διδασκαλίας της Μουσικής στη δευτεροβάθμια εκπαίδευση.

Το Padlet είναι μια διαδραστική διαδικτυακή εφαρμογή που επιτρέπει τη δημιουργία συνεργατικών ψηφιακών πινάκων, στους οποίους εκπαιδευτικοί και μαθητές μπορούν να αναρτούν πολυμεσικό περιεχόμενο όπως κείμενα, εικόνες, βίντεο και αρχεία ήχου. Η ευελιξία του το καθιστά ιδιαίτερα κατάλληλο για το μάθημα της Μουσικής, καθώς επιτρέπει τη δημιουργία συλλογικών εργασιών, την ανάρτηση μαθητικών ηχογραφήσεων, την εξερεύνηση μουσικών ειδών και τη συνεργασία σε συνθετικές ή αναλυτικές μουσικές δραστηριότητες.

Συγκεκριμένα, η εργασία παρουσιάζει καλές πρακτικές αξιοποίησης του Padlet στη διδασκαλία της Μουσικής, με έμφαση στη δημιουργία διαδραστικών δραστηριοτήτων (διαδραστικοί χάρτες μουσικών ειδών, ανάρτηση ηχογραφήσεων και ανταλλαγή απόψεων, συνεργατική σύνθεση μουσικής, ερευνητικές εργασίες για συνθέτες και μουσικά κινήματα, δημιουργία διαδραστικών κουίζ και παιχνιδιών, ανάλυση μουσικών έργων και ακροάσεις με σχολιασμό, ψηφιακά portfolios μουσικών εργασιών, δημιουργία ηλεκτρονικής τάξης), οι οποίες ενισχύουν τη μαθησιακή εμπειρία.

Οι προϋποθέσεις για τη δημιουργία ενός Padlet από τον εκπαιδευτικό περιλαμβάνουν τη δημιουργία λογαριασμού στην πλατφόρμα (μέσω email ή λογαριασμού Google/Microsoft), την επιλογή του κατάλληλου πλάνου (δωρεάν ή συνδρομητικό), τη σύνδεση με τους μαθητές (πρόσβαση μέσω κωδικού πρόσκλησης, συνδέσμου ή ενσωμάτωσης σε σύστημα διαχείρισης μάθησης όπως το Google Classroom ή το Microsoft Teams), τη ρύθμιση των επιλογών απορρήτου και συνεργασίας (δημόσιο, με κωδικό ή ιδιωτικό), καθώς και την προσαρμογή της διάταξης (διάφορες μορφές όπως πλέγμα, χρονολόγιο, χάρτης) ανάλογα με τις ανάγκες του μαθήματος.

Η χρήση του Padlet στη μουσική τάξη προσφέρει μια δυναμική και συνεργατική προσέγγιση της μάθησης, ενισχύει τη συμμετοχή των μαθητών και καλλιεργεί τη δημιουργικότητα και την κριτική σκέψη. Επιπλέον, η χρήση πολυτροπικού περιεχομένου διευκολύνει την προσαρμογή της διδασκαλίας σε διαφορετικά μαθησιακά στυλ, συμβάλλοντας στη διαφοροποίηση και εξατομίκευση της εκπαιδευτικής διαδικασίας.

Η εργασία παρουσιάζει τα Padlet που δημιουργήθηκαν τα τελευταία χρόνια για τις ανάγκες του μαθήματος της Μουσικής και για τις τρεις τάξεις του Γυμνασίου. Κάθε σχολική χρονιά, κάθε τμήμα διαθέτει το δικό του Padlet, στο οποίο αναρτώνται δεδομένα που σχετίζονται με το ετήσιο project αλλά και με το εβδομαδιαίο διδακτικό περιεχόμενο.

Το Padlet αποτελεί ένα ιδιαίτερα χρήσιμο ψηφιακό εργαλείο για την οργάνωση του μαθήματος της Μουσικής, καθώς επιτρέπει την ανάπτυξη μιας περισσότερο συμμετοχικής και δημιουργικής εκπαιδευτικής εμπειρίας. Μέσα από την παρουσίαση αυτών των καλών πρακτικών, αναδεικνύεται η σημασία της ένταξης των ψηφιακών τεχνολογιών στη διδακτική πράξη, συμβάλλοντας στη διαμόρφωση ενός σύγχρονου και αποτελεσματικού μαθησιακού περιβάλλοντος.

Λέξεις – κλειδιά: διδασκαλία, μάθημα Μουσικής, ψηφιακά εργαλεία, Padlet

Η ΣΟΦΟΚΛΕΙΑ ΑΝΤΙΓΟΝΗ ΣΤΗΝ ΠΡΟΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΚΑΙ ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ.

Παπαγεωργίου Φωτεινή
Παιδαγωγός Πρώιμης Παιδικής Ηλικίας, MSc
Όγδοος βρεφονηπιακό σταθμός Ιωαννίνων

Νταμάνη Αικατερίνη
Εκπαιδευτικός ΠΕ 60, MSc, Phd
Σύμβουλος Εκπαίδευσης Πρωτοβάθμιας Άρτας

ΠΕΡΙΛΗΨΗ

Οι Αρχαίες Τραγωδίες στην προσχολική εκπαίδευση δύνανται να αποτελέσουν σημαντικό εργαλείο διδασκαλίας. Οι εκπαιδευτικοί οφείλουν να τις εντάξουν στην εκπαιδευτική καθημερινότητα και να τις ενσωματώσουν στο πρόγραμμα σπουδών. Τα οφέλη του Δράματος, ως μεθόδου διδασκαλίας, είναι πολλαπλά. Πρωτίστως, το Δράμα μπορεί να προσφέρει τη δυνατότητα στους εκπαιδευτικούς να προσεγγίσουν μαθητές, οι οποίοι δυσκολεύονται να παρακολουθήσουν την εκπαιδευτική διαδικασία, η οποία στηρίζεται σε παραδοσιακές μεθόδους, αυξάνοντας το ενδιαφέρον τους για όσα διαδραματίζονται εντός της σχολικής τάξης. Επιπλέον, έχει αναδειχθεί ότι συνδέει τους μαθητές με τον εαυτόν τους και τους άλλους, μεταμορφώνει το παραδοσιακό περιβάλλον μάθησης και προκαλεί τους μαθητές να προσεγγίσουν και εκείνοι τις γνώσεις με έναν διαφορετικό τρόπο, πολυαισθητηριακό, ο οποίος εντάσσει τους μαθητές ως ολότητα εντός της εκπαιδευτικής διαδικασίας και αξιοποιεί γνώσεις, εμπειρίες, βιώματα και συναισθήματα σε όλη τη διαδικασία. Το συναίσθημα, το οποίο βρίσκεται στην καρδιά του δράματος, συχνά αγνοείται στην εκπαίδευση. Ωστόσο μια εκπαιδευτική διαδικασία, η οποία στηρίζεται μόνο στη λογική και απομονώνει το συναίσθημα, δεν μπορεί να προσφέρει στους μαθητές μια ολιστική γνωστική πράξη και κατ' επέκταση ολιστική μόρφωση.

Η παρούσα εργασία εστιάζει στη διερεύνηση του ρόλου που μπορεί να διαδραματίσει η προσέγγιση της Σοφόκλειας Αντιγόνης στην Προσχολική Εκπαίδευση, αξιοποιώντας ψηφιακά εργαλεία για την ενίσχυση της μαθησιακής εμπειρίας. Στόχος είναι η ανάδειξη των αξιών του έργου – Ελεύθερη Βούληση, Θρησκεία και η σχέση της με την Πόλη, Άγραφοι Θεϊκοί Νόμοι, Δικαιοσύνη, Καθήκον, Αγάπη – και η αναζήτηση διδακτικών πρακτικών για τη διδασκαλία τους σε παιδιά προσχολικής ηλικίας. Η μεθοδολογία της εργασίας βασίζεται στη χρήση ψηφιακών εργαλείων, όπως διαδραστικές παρουσιάσεις με εικόνες, βίντεο και ήχο, ψηφιακά παιχνίδια που ενισχύουν την κατανόηση των αξιών του έργου, καθώς και εφαρμογές όπως το Puppet Pals και το Toontastic, οι οποίες επιτρέπουν στα παιδιά να δημιουργήσουν και να αφηγηθούν δικές τους εκδοχές της ιστορίας. Επιπλέον, η ψηφιακή σχεδίαση αξιοποιείται ως εργαλείο έκφρασης και αναστοχασμού, δίνοντας στα παιδιά τη δυνατότητα να αποτυπώσουν εικαστικά τις ιδέες και τα συναισθήματά τους. Τα ευρήματα της εργασίας δείχνουν ότι η ενσωμάτωση ψηφιακών εργαλείων στη διδασκαλία της Αντιγόνης στην προσχολική εκπαίδευση ενισχύει την ενεργό συμμετοχή των παιδιών, προάγει τη δημιουργική σκέψη και διευκολύνει την κατανόηση αφηρημένων εννοιών. Τα αποτελέσματα υπογραμμίζουν τη σημασία της διαδραστικής μάθησης και της αξιοποίησης της τεχνολογίας στη διαμόρφωση ενός ελκυστικού και παιδαγωγικά αποτελεσματικού περιβάλλοντος διδασκαλίας.

Λέξεις κλειδιά: Δράμα, Σοφοκλής, Αντιγόνη, Αξίες, Προσχολική Εκπαίδευση, Ψηφιακά εργαλεία, Παιδαγωγικές Προσεγγίσεις.

Η ΣΥΣΧΕΤΙΣΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΓΡΑΜΜΑΤΙΣΜΟΥ ΜΕ ΤΙΣ ΕΠΙΚΟΙΝΩΝΙΑΚΕΣ ΓΛΩΣΣΙΚΕΣ ΕΝΕΡΓΕΙΕΣ ΣΤΟ ΜΑΘΗΜΑ ΤΗΣ ΞΕΝΗΣ ΓΛΩΣΣΑΣ. ΓΕΡΜΑΝΙΚΗ ΓΛΩΣΣΑ:ΠΑΡΑΔΕΙΓΜΑΤΑ ΑΠΟ ΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ ΣΕ ΜΑΘΗΤΕΣ/-ΤΡΙΕΣ ΔΗΜΟΤΙΚΟΥ

Δρ. Παπαδημητρίου Ευαγγελία
Senior Fellow / Εκπαιδευτικός
Πανεπιστήμιο Θεσσαλίας
Βόλος, Ελλάδα
email: evpap@uth.gr

Χαρμαντά Αργυρούλα-Αριέττα
Εκπαιδευτικός Γερμανικής Γλώσσας στην Πρωτοβάθμια Εκπαίδευση
Χαλκίδα, Εύβοια
email: ariettaharma@gmail.com

ΠΕΡΙΛΗΨΗ

Η διδασκαλία των ξένων γλωσσών έχει μετεξελιχθεί και εμπλουτιστεί σημαντικά από το Ευρωπαϊκό Πλαίσιο Αναφοράς για τις Γλώσσες (CEFR), το οποίο αποτελεί ένα διεθνές πλαίσιο, που διακρίνει την επάρκεια γλώσσας σε τρία βασικά επίπεδα: Α (βασικός χρήστης), Β (ανεξάρτητος χρήστης) και C (ικανός χρήστης), δίνοντας έμφαση στα μαθησιακά αποτελέσματα στο τέλος κάθε μαθησιακής διαδικασίας.

Κατά συνέπεια, οι εκπαιδευτικοί ξένων γλωσσών μπορούν να δομήσουν τη διδασκαλία τους εστιάζοντας στους μαθησιακούς στόχους , στις στρατηγικές μάθησης και στην αξιολόγηση, τα οποία ορίζονται από περιγραφητέες επικοινωνιακών δραστηριοτήτων σε κάθε επίπεδο γλωσσομάθειας . Σύμφωνα με το Ευρωπαϊκό Πλαίσιο Αναφοράς για τις Γλώσσες, που δίνει προτεραιότητα στην επίτευξη των μαθησιακών αποτελεσμάτων και στις ποικίλες μεθοδολογικές προσεγγίσεις, οι εκπαιδευτικοί ξένων γλωσσών έχουν την ευελιξία να ανανεώνουν και να εμπλουτίζουν συνεχώς το περιεχόμενο των μαθημάτων τους, εστιάζοντας στην καθημερινή επικοινωνία και στα ενδιαφέροντα, τις ανάγκες και τα επιτεύγματα των μαθητών.

Έτσι, τα τελευταία χρόνια, η ενσωμάτωση του ψηφιακού γραμματισμού στην καθημερινή επικοινωνιακή και γλωσσική δραστηριότητα έχει γίνει απαραίτητη. Το αναθεωρημένο CEFR (2020) περιλαμβάνει μαθησιακά αποτελέσματα που σχετίζονται με ψηφιακές δεξιότητες. Δεδομένου ότι τα ψηφιακά εργαλεία δεν συμπληρώνουν απλώς τη διδασκαλία, αλλά συνδιαμορφώνουν στις μέρες μας το καθημερινό, το κοινωνικό και το μαθησιακό περιβάλλον των μαθητών/-τριών, θα πρέπει να εξετάσουμε ,ανάμεσα σε άλλα, και τα ακόλουθα ερωτήματα:

- Πώς συμβάλλει η ενσωμάτωση ψηφιακών εργαλείων στη συσχέτιση των ψηφιακών δραστηριοτήτων με τους μαθησιακούς στόχους και την ανάπτυξη της εξατομικευμένης μάθησης στη διδασκαλία ξένων γλωσσών;
- Πώς μπορούν τα ψηφιακά εργαλεία (π.χ. εκπαιδευτικές πλατφόρμες, διαδραστικά παιχνίδια ή άλλες εφαρμογές με φυσικούς ομιλητές) να προωθήσουν μεταγνωστικές δεξιότητες όπως η αυτορυθμιζόμενη μάθηση ή η αυτοαξιολόγηση; Πώς μπορούν οι εκπαιδευτικοί ξένων γλωσσών να αξιοποιήσουν αυτά τα εργαλεία για να στηρίξουν αποτελεσματικά την διαφοροποιημένη διδασκαλία ή την μικτή και εξ αποστάσεως εκπαίδευση;
- Με ποιους τρόπους μπορεί ο ψηφιακός γραμματισμός να αυξήσει την αλληλεπίδραση, τη συνεργατική μάθηση και την επικοινωνία στη διδασκαλία ξένων γλωσσών;

Η εισήγηση θα ολοκληρωθεί με συγκεκριμένα παραδείγματα από τη διδακτική πράξη, στα οποία αξιοποιούνται ψηφιακές εφαρμογές κατά τη διδασκαλία της Γερμανικής Γλώσσας σε μαθητές/-τριες της Ε' Δημοτικού – επίπεδο Γλωσσομάθειας Α' (Αρχαρίων).

Λέξεις-κλειδιά: German language, primary school, digital literacy, communicative language activities, digital competencies, differentiated instruction

ΨΗΦΙΑΚΕΣ ΔΙΑΔΡΟΜΕΣ ΠΡΟΣ ΤΗΝ ΑΡΧΑΙΟΤΗΤΑ: ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΡΧΑΙΑΣ ΕΛΛΗΝΙΚΗΣ ΜΕΣΩ ΤΗΣ ΕΠΙΓΡΑΦΙΚΗΣ ΚΑΙ ΤΗΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

Ρωσίδου Δήμητρα
Φιλόλογος, ΜΑ. Διδακτικής των Γλωσσών και Νέες Τεχνολογίες στη Γλωσσική Επικοινωνία και ΜΑ. Αρχαίας Ελληνικής Φιλολογίας. Μέλος του ερευνητικού προγράμματος DiGIA
Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης.
Θεσσαλονίκη, Ελλάδα
email: rosidoudimitra@gmail.com

ΠΕΡΙΛΗΨΗ

Τα τελευταία χρόνια παρατηρείται έντονο ερευνητικό ενδιαφέρον για τη διερεύνηση των στάσεων εκπαιδευτικών και μαθητών απέναντι στις Κλασικές Σπουδές, καθώς και για την επίδραση της χρήσης τεχνολογικών μέσων —όπως εκπαιδευτικές εφαρμογές, ψηφιακά παιχνίδια, λογισμικά και άλλες ψηφιακές πλατφόρμες— στη διδασκαλία των φιλολογικών μαθημάτων. Η ανάγκη αυτή προκύπτει από τη διαπίστωση ότι οι μαθητές και οι μαθήτριες εμφανίζουν συχνά μειωμένο κίνητρο για την εκμάθηση της Αρχαίας Ελληνικής. Είναι γνωστό, ήδη εδώ και πέντε δεκαετίες, ότι η ενσωμάτωση των *Τεχνολογιών Πληροφορίας και Επικοινωνίας* (ΤΠΕ) στο εκπαιδευτικό σύστημα προσφέρει πολλαπλά οφέλη, τα οποία όμως συνοδεύονται ταυτόχρονα και από σημαντικές προκλήσεις.

Το θεωρητικό υπόβαθρο της παρούσας έρευνας στηρίζεται στην παραδοχή ότι το ελκυστικό περιβάλλον των ψηφιακών παιχνιδιών και τα ευέλικτα μαθησιακά περιβάλλοντα, που αναδύονται μέσα από την επιτυχημένη ενσωμάτωση των παραπάνω μέσων, μπορούν να λειτουργήσουν ως πηγές κινήτρου για μάθηση.

Η εργασία εστιάζει στη διερεύνηση της δυνατότητας αξιοποίησης των ψηφιακών μέσων στη διδασκαλία της αρχαίας ελληνικής γλώσσας, με στόχο την εξοικείωση των μαθητών με τη γλώσσα και τον πολιτισμό μέσω της μελέτης των αρχαίων ελληνικών επιγραφών. Χωρίς αυτές, η κατανόηση του αρχαίου ελληνικού πολιτισμού θα ήταν ελλιπής και ενδεχομένως στρεβλή, καθώς τα λογοτεχνικά και ιστορικά κείμενα δεν επαρκούν για την πλήρη αποτύπωση του αρχαίου κόσμου.

Οι επιγραφές, ως πρωτογενείς και άμεσες πηγές, προσφέρουν ανεκτίμητες πληροφορίες και σώζονται συχνά σε καλύτερη κατάσταση σε σύγκριση με άλλα γραπτά τεκμήρια, χάρη στην ανθεκτικότητα των υλικών τους. Η ελληνική επιγραφική, συγκεκριμένα, μελετά επιγραφές που έχουν χαραχθεί στην ελληνική γλώσσα και αλφαβητική γραφή πάνω σε σκληρά υλικά όπως πέτρα, μάρμαρο, πήλινα αγγεία, ξύλο, οστά ή μέταλλο.

Σκοπός της παρούσας μελέτης είναι να αναδείξει πώς τα ψηφιακά εργαλεία μπορούν να διευκολύνουν την πρόσβαση και ερμηνεία των επιγραφών, ενισχύοντας με αυτόν τον τρόπο την επαφή των μαθητών με την αρχαία ελληνική γλώσσα και τον αρχαίο κόσμο ευρύτερα.

Η μεθοδολογία βασίζεται σε μία πολυδιάστατη προσέγγιση που συνδυάζει θεωρητική έρευνα και πρακτική εφαρμογή. Αρχικά, πραγματοποιήθηκε βιβλιογραφική ανασκόπηση για τη διδασκαλία της αρχαίας ελληνικής και τη χρήση ψηφιακών μέσων. Στη συνέχεια, σχεδιάστηκε και εφαρμόστηκε ένα εκπαιδευτικό πρόγραμμα που μεταξύ άλλων εστιάζει στη δημιουργία ψηφιακών μαθησιακών αντικειμένων, όπως είναι η *Φρασίκλεια*, τα οποία μπορούν να αξιοποιηθούν από μαθητές όλων των τάξεων του σχολείου -με τις κατάλληλες προσαρμογές-, ακόμη και σε φοιτητές και φοιτήτριες Τμημάτων Φιλολογίας. Μάλιστα, αυτές οι δραστηριότητες πραγματοποιούνται στο πλαίσιο του ερευνητικού προγράμματος DiGIA, που υλοποιείται στο Τμήμα Φιλολογίας του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης.

Μέσα από τη διαδραστική ενασχόληση, οι μαθητές και οι μαθήτριες αναπτύσσουν την κριτική τους σκέψη και τις γλωσσικές τους δεξιότητες, ενώ αποκτούν βαθύτερη κατανόηση της ιστορικής και πολιτισμικής αξίας των επιγραφών. Παράλληλα, η άμεση επαφή με αυθεντικό επιγραφικό υλικό προσφέρει νέες διδακτικές δυνατότητες, καθιστώντας το μάθημα των Αρχαίων Ελληνικών πιο προσιτό και ελκυστικό.

Λέξεις – κλειδιά: αρχαία ελληνική επιγραφική, αρχαία ελληνική γλώσσα, ψηφιακό μαθησιακό αντικείμενο

ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΕΡΓΑΛΕΙΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Σαρκατζή Βασιλική
Μαθηματικός ΠΕ03, Πληροφορικός ΠΕ86, Med, Msc
Διευθύντρια 3ου ΓΕΛ ΤΡΙΚΑΛΩΝ « ΟΔΥΣΣΕΑΣ ΕΛΥΤΗΣ»
Τρίκαλα, Ελλάδα
Email: sarkatzikiki@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία αναφέρεται στην ενσωμάτωση των ψηφιακών εργαλείων στην εκπαίδευση και πώς αυτά επηρεάζουν τη διδασκαλία και τη μάθηση. Στην εισαγωγή, επισημαίνεται η χρήση ψηφιακών εργαλείων όπως εκπαιδευτικές πλατφόρμες (π.χ. Google Classroom), διαδραστικά μαθήματα (π.χ. Kahoot!), εκπαιδευτικά βίντεο (π.χ. YouTube), και εργαλεία συνεργασίας (π.χ. Microsoft Teams). Αυτά τα εργαλεία ενισχύουν τη μάθηση, διευκολύνουν την επικοινωνία και την συνεργασία, και επιτρέπουν προσωποποιημένες εμπειρίες μάθησης για κάθε μαθητή.

Στη βιβλιογραφική ανασκόπηση, η εργασία αναλύει τον ρόλο της Πληροφορικής και των ΤΠΕ στην εκπαίδευση. Αναφέρεται στην ανάγκη οι μαθητές να αποκτήσουν βασικές γνώσεις γύρω από την τεχνολογία και τις ΤΠΕ, ενώ ταυτόχρονα να αναπτύξουν δεξιότητες κριτικής σκέψης και κοινωνικής συμπεριφοράς. Παρά την εξοικείωση των μαθητών με τις ψηφιακές τεχνολογίες, ερευνητικά δεδομένα δείχνουν ότι οι μαθητές δεν αξιοποιούν πλήρως τις δυνατότητες των ΤΠΕ στη μαθησιακή διαδικασία. Επομένως, η εκπαίδευση πρέπει να ενσωματώνει δραστηριότητες που ενισχύουν την κριτική σκέψη και την ικανότητα επίλυσης προβλημάτων.

Η εργασία επίσης εξετάζει τις θεωρίες μάθησης που επηρεάζουν την ενσωμάτωση των ΤΠΕ στην εκπαιδευτική διαδικασία, όπως ο συμπεριφορισμός και ο εποικοδομητισμός.. Επίσης, παρατίθεται η εξέλιξη της ένταξης των ΤΠΕ στην εκπαίδευση, από τη χρήση μέσων μαζικής ενημέρωσης μέχρι την πλήρη ενσωμάτωσή τους στην εκπαιδευτική διαδικασία

Ένα σημαντικό μέρος της εργασίας αφορά την κινητή μάθηση (m-learning), η οποία χρησιμοποιεί φορητές συσκευές όπως κινητά τηλέφωνα και ταμπλέτες για την υποστήριξη της μάθησης, ενώ επισημαίνεται η σημασία της συνεργασίας, της κριτικής σκέψης και της δια βίου μάθησης. Χαρακτηρίζεται από διαδραστικά στοιχεία, προσωπική προσαρμογή και άμεση ανατροφοδότηση, ενισχύοντας την αποτελεσματικότητα και την αλληλεπίδραση στη διαδικασία της μάθησης. Τέλος, η εργασία αναφέρεται στη χρήση της Τεχνητής Νοημοσύνης (AI) στην εκπαίδευση, η οποία προσφέρει εξατομικευμένες μαθησιακές εμπειρίες και υποστηρίζει την εκπαιδευτική διαδικασία με τη βοήθεια αλγορίθμων και νευρωνικών δικτύων.

Συνολικά, η ενσωμάτωση των ψηφιακών εργαλείων και της ΤΠΕ στην εκπαίδευση προσφέρει πολλές δυνατότητες για τη βελτίωση της διδασκαλίας και της μάθησης, απαιτώντας όμως μια προσεκτική προσέγγιση για την αποτελεσματική αξιοποίησή τους.

Λέξεις κλειδιά: Ψηφιακά εργαλεία, Τεχνητή Νοημοσύνη, Κινητή Μάθηση, εκπαίδευση

Η ΑΞΙΟΠΟΊΗΣΗ ΑΥΤΟΜΑΤΟΠΟΙΗΜΈΝΩΝ ΠΕΡΙΛΉΨΕΩΝ ΕΚΠΑΙΔΕΥΤΙΚΏΝ ΒΊΝΤΕΟ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΉ ΔΙΑΔΙΚΑΣΊΑ

Χασάνης Βασίλειος
ΠΕ 83 Ηλεκτρολόγος & ΠΕ 86 Πληροφορικός
Εσπερινό ΕΠΑΛ Πρέβεζας
Πρέβεζα, Ελλάδα
email: vasileioschasanis@gmail.com

Γάκη Βασιλική
ΠΕ 04.02 Χημικός & ΠΕ 86 Πληροφορικός
Εσπερινό ΕΠΑΛ Πρέβεζας
Πρέβεζα, Ελλάδα
email: iliasde66@gmail.com

Χασάνης Κωνσταντίνος
ΠΕ 03 Μαθηματικός
Γυμνάσιο Μύρινας Λήμνου
Λήμνος, Ελλάδα
email: kxasanis@gmail.com

ΠΕΡΙΛΗΨΗ

Η αυξανόμενη χρήση εκπαιδευτικών βίντεο στη διδασκαλία δημιουργεί νέες προκλήσεις και ευκαιρίες για τη βελτίωση της μαθησιακής διαδικασίας. Οι αυτοματοποιημένες περιλήψεις εκπαιδευτικών βίντεο, βασισμένες σε αλγορίθμους μηχανικής μάθησης, προσφέρουν ένα καινοτόμο εργαλείο που μπορεί να αξιοποιηθεί για την ενίσχυση της κατανόησης, της αυτοαξιολόγησης των μαθητών και της ανατροφοδότησης από τους εκπαιδευτικούς. Η παρούσα εργασία διερευνά τους τρόπους με τους οποίους η αυτοματοποιημένη σύνοψη εκπαιδευτικών βίντεο μπορεί να συμβάλει στην αποτελεσματικότερη οργάνωση της εκπαιδευτικής διαδικασίας.

Η ενσωμάτωση εκπαιδευτικών βίντεο στη διδασκαλία μπορεί να έχει βοηθήσει τους εκπαιδευτικούς· ωστόσο, η κατανόησή τους μπορεί να είναι απαιτητική ορισμένες φορές, ιδιαίτερα όταν το περιεχόμενο είναι τεχνικό ή μεγάλης διάρκειας. Η αυτοματοποιημένη περίληψη ενός βίντεο δύναται να παρέχει στους μαθητές μια σύντομη και περιεκτική παρουσίαση των κύριων σημείων του, διευκολύνοντας την απορρόφηση πληροφοριών και μειώνοντας τον γνωστικό φόρτο. Επιπλέον, οι μαθητές μπορούν να χρησιμοποιούν τις περιλήψεις για προεπισκόπηση του περιεχομένου πριν από τη θέαση ή για γρήγορη ανασκόπηση μετά την ολοκλήρωση του βίντεο, ενισχύοντας έτσι την κατανόηση και την απομνημόνευση βασικών εννοιών. Μην ξεχνάμε ότι οι μαθητές ζούνε στην εποχή της ραγδαίας εξέλιξης της τεχνολογίας και στην εποχή της «ταχύτητας» όπου βομβαρδίζονται καθημερινά από δεκάδες «σύντομες» πληροφορίες τύπου κειμένου (twitter) και βίντεο (shorts, tik tok). Μία σχετικά σύντομη περίληψη ενός εκπαιδευτικού βίντεο εκτός από την εκπαιδευτική του χροιά δείχνει να ταιριάζει καλύτερα στο μοτίβο της πληροφορίας που δέχονται καθημερινά οι μαθητές, κάτι που την κάνει πιο προσιτή και ελκυστική σε σχέση με ένα βίντεο μεγάλης διάρκειας.

Βασικά οφέλη των μαθητών αποτελούν η γρήγορη ανασκόπηση του υλικού καθώς και η καλύτερη κατανόηση των κύριων σημείων. Η σύγκριση μίας αυτοματοποιημένης σύνοψης με τη σύνοψη που έχουν κάνει οι μαθητές πάνω στην ίδια ενότητα μπορεί να τους βοηθήσει να εντοπίσουν τυχόν παραβλέψεις, παρανοήσεις ή ελλείψεις στην κατανόησή τους. Η διαδικασία αυτή ενισχύει τις μεταγνωστικές τους δεξιότητες και τους βοηθά να γίνουν πιο αυτόνομοι στη μάθησή τους. Επίσης, μπορούν να αξιοποιούν τις περιλήψεις για να επαναλαμβάνουν γρήγορα τα βασικά σημεία ενός κεφαλαίου πριν από τις εξετάσεις.

Από την πλευρά των εκπαιδευτικών, οι αυτοματοποιημένες περιλήψεις μπορούν να αξιοποιηθούν ως εργαλείο ανατροφοδότησης ή και εξατομίκευσης της διδασκαλίας. Οι εκπαιδευτικοί μπορούν να ελέγχουν τις συνόψεις που παράγονται για να εντοπίζουν ποια σημεία του βίντεο δυσκολεύουν τους μαθητές και να προσαρμόζουν ανάλογα τη διδακτική τους προσέγγιση. Επιπλέον, η δυνατότητα παραγωγής περιλήψεων διαφορετικού επιπέδου λεπτομέρειας επιτρέπει τη διαφοροποίηση της διδασκαλίας, ώστε να ανταποκρίνεται στις ανάγκες μαθητών με διαφορετικά επίπεδα κατανόησης, διαφορετικό επίπεδο ετοιμότητας, διαφορετικά ενδιαφέροντα και γενικότερα διαφορετικά μαθησιακά προφίλ.

Μία ακόμα σημαντική εφαρμογή αφορά την προσβασιμότητα. Οι αυτοματοποιημένες περιλήψεις μπορούν να υποστηρίξουν μαθητές με μαθησιακές δυσκολίες ή εκείνους που προτιμούν τη γραπτή πληροφορία έναντι της ακουστικής, εφόσον το βίντεο είναι ξενόγλωσσο και μπορούν να ενσωματωθούν υπότιτλοι στη σύνοψη. Παρέχοντας μια συνοπτική εκδοχή του εκπαιδευτικού περιεχομένου, οι μαθητές μπορούν να κατανοήσουν καλύτερα τα βασικά σημεία, ακόμα και αν δυσκολεύονται στην άμεση επεξεργασία προφορικού λόγου. Επιπλέον, οι μαθητές και οι εκπαιδευτικοί

μπορούν να εντοπίζουν γρήγορα τα πιο σημαντικά σημεία ενός βίντεο, εξοικονομώντας χρόνο και βελτιώνοντας τη μαθησιακή εμπειρία.

Για την εξαγωγή των περιλήψεων χρησιμοποιήθηκε λογισμικό (Chasanis et al., 2014), πάνω σε εκπαιδευτικά βίντεο του Τομέα Ηλεκτρολογίας και του Τομέα Υγείας, και η συνολική αποδοχή από τους μαθητές ξεπέρασε το 80%.

Συμπερασματικά, η αυτοματοποιημένη δημιουργία περιλήψεων εκπαιδευτικών βίντεο αποτελεί ένα ισχυρό εργαλείο που μπορεί να ενισχύσει την εκπαιδευτική διαδικασία σε πολλαπλά επίπεδα. Βοηθά τους μαθητές να οργανώνουν τη γνώση, να αυτοαξιολογούνται και να βελτιώνουν τις δεξιότητές τους, ενώ παράλληλα προσφέρει στους εκπαιδευτικούς ένα χρήσιμο μέσο ανατροφοδότησης και διαφοροποίησης της διδασκαλίας. Η ενσωμάτωση αυτών των εργαλείων στη σύγχρονη εκπαίδευση μπορεί να οδηγήσει σε ένα πιο ευέλικτο, αποτελεσματικό και προσβάσιμο μαθησιακό περιβάλλον.

Λέξεις – κλειδιά: Περίληψη βίντεο, Εκπαιδευτικό βίντεο, Αυτοαξιολόγηση

ΘΠ25: Η ψηφιακή αφήγηση στη διδακτική πράξη

Η ΣΥΜΒΟΛΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΑΦΗΓΗΣΗΣ ΣΤΗΝ ΛΟΓΟΤΕΧΝΙΑ ΣΤΗΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ: Η ΠΕΡΙΠΤΩΣΗ ΤΗΣ ΠΛΑΤΩΝΙΚΗΣ ΑΛΛΗΓΟΡΙΑΣ ΤΟΥ ΣΠΗΛΑΙΟΥ

Δρ. Κοψάρης Κοσμάς
Διευθυντής 2ου Γυμνασίου Πρέβεζας
e-mail: kkopsaris@hotmail.com

ΠΕΡΙΛΗΨΗ

Στόχος της συγκεκριμένης εισήγησης αποτελεί η απόδοση των καταλυτικών εννοιών που συνέχουν την αλληγορία του σπηλαίου μέσω της ψηφιακής αφήγησης. Αρχικά, θα γίνει μια επισκόπηση της σημασίας της λογοτεχνικής εκπαίδευσης κατά τον 21ο αιώνα, καθώς και της βαρύτητας της λογοτεχνίας στην σύγχρονη εποχή ως μέσο αξιοποίησης των νέων γραμματισμών. Θα γίνει αναφορά στο κατά πόσο η ψηφιακή αφήγηση μπορεί να συντελέσει καταλυτικά στην εξοικείωση, στη δημιουργική εμβάθυνση και στην αφομοίωση θεματικών που διέπονται από έντονες εννοιολογικές διχοστασίες, όπως γνώση-άγνοια, φως-σκοτάδι, δεσμά-ελευθερία, θεωρητικός βίος στον αντίποδα του ενεργού-πρακτικού βίου. Θα τονιστεί ο ρόλος των μαθητών στο σχεδιασμό και στην επιτυχή πραγμάτωση του συγκεκριμένου εκπαιδευτικού σεναρίου. Ο πλατωνικός μύθος του σπηλαίου συνιστά μια αστείρευτη δεξαμενή έμπνευσης για τους σύγχρονους δημιουργούς. Μεθοδολογικά, γίνεται εφαρμογή της ψηφιακής αφήγησης κατά την φάση της ανάγνωσης της αλληγορίας και σε ένα δεύτερο επίπεδο στην φάση ύστερα από την ανάγνωση ώστε να προβούν οι μαθητές σε σύνθετους κριτικούς συσχετισμούς και σε διακειμενικές προσεγγίσεις. Για μια διαγνωστική προσέγγιση μέσω της ψηφιακής αφήγησης, ανατέθηκαν εργασίες στους μαθητές, όπως για παράδειγμα η κατασκευή μιας χρονογραμμής αποτύπωσης των σταδίων αποδέσμευσης με τη χρήση του διαδικτυακού εργαλείου timerime ή της δημιουργίας μιας πολυμεσικής αφίσας με τη χρήση των διαδικτυακών εργαλείων popplet ή glogster.

Σε αυτή τη βάση, η εξιστόρηση της πλατωνικής αλληγορίας του σπηλαίου μέσω των εργαλείων της ψηφιακής αφήγησης συνέβαλε σημαντικά στην κατανόηση των δύσκολων φιλοσοφικών εννοιών της από τους μαθητές, καθιστώντας την φιλοσοφική αφήγηση περισσότερο εύληπτη και συντελώντας ώστε να εμπεδωθεί η έννοια της αναπαράστασης στη λογοτεχνία, καθώς και των ειδικότερων αφηγηματικών μέσων και τεχνικών, όπως ο διάλογος ή η μίμηση.

Παράλληλα, η ψηφιακή αξιοποίηση μέσα από τη συγκεκριμένη περίπτωση είναι χρήσιμη για την κατανόηση των βαθύτερων και συμπαντικών νοημάτων που ενέχει η αλληγορία του σπηλαίου του Πλάτωνα ως λογοτεχνικό είδος που επικοινωνεί με πλήθος έργων της σύγχρονης λογοτεχνίας. Ως εκ τούτου, ο πλατωνικός απόηχος σχετίζεται με τη δυνατότητα της αυτοπραγμάτωσης όταν η εκάστοτε τρέχουσα πραγματικότητα συνθλίβει την αυτενέργεια και ετεροκαθορίζει το άτομο. Μέσω μιας ψηφιακής αφήγησης οι μαθητές, όπως και κάθε αναγνώστης, έχουν τη δυνατότητα να μυηθούν στα άδυτα του πλατωνικού σπηλαίου, ακολουθώντας τους δεσμώτες στον ανηφορικό δρόμο προς την ελευθερία της ύπαρξης. Αυτό συνεπάγεται ότι μέσω μιας ψηφιακής αποτύπωσης οι μαθητές είναι σε θέση να εσωτερικεύσουν και να εμπεδώσουν πλήρως ένα θεωρητικό μοντέλο που μπορεί να τους φανεί ιδιαίτερα δύσκολο και απρόσιτο.

Συνοψίζοντας, μέσω των ψηφιακών εργαλείων οι μαθητές γίνονται ενεργοί δείκτες μιας αναπαριστώμενης ιστορίας, προσλαμβάνουν βιωματικά την πλατωνική αλληγορία, έχοντας την αίσθηση μιας προσωπικής συμβολής στην μετάβαση των δεσμωτών από το σκοτάδι στο φως. Το φιλοσοφικό ταξίδι έτσι τρέπεται σε ένα προσωπικό οδοιπορικό στην πλήρη γνώση του κοσμικού μηχανισμού ως ελλείπον σημείο και συνάμα απώτερος στόχος της πλατωνικής αλληγορίας του σπηλαίου.

Λέξεις – κλειδιά: ψηφιακή αφήγηση, πλατωνική αλληγορία

Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΩΣ ΚΡΙΣΙΜΟ ΠΑΙΔΑΓΩΓΙΚΟ ΠΛΑΙΣΙΟ ΑΝΑΔΕΙΞΗΣ ΤΗΣ ΛΕΙΤΟΥΡΓΙΚΗΣ ΔΙΑΧΕΙΡΙΣΗΣ ΦΙΛΙΚΩΝ ΣΧΕΣΕΩΝ ΣΕ ΜΑΘΗΤΕΣ ΕΙΔΙΚΟΥ ΔΗΜΟΤΙΚΟΥ ΣΧΟΛΕΙΟΥ

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
email: alexmastr@yahoo.gr

Τσακίρη Γεωργία
``Εκπαιδευτικός ΠΕ70.50
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
email: gogoulini17@windowslive.com

Κατσιώπη Παρασκευή
Δ/ντρια Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
email: voulakats@gmail.com

ΠΕΡΙΛΗΨΗ

Η αφήγηση αποτελεί κρίσιμη διάσταση του ανθρώπινου πολιτισμού. Είναι ένας φυσικός τρόπος επικοινωνίας και οργάνωσης των εμπειριών σε βάθος χρόνου. Η ισχύς της συνίσταται στο συναισθηματικό αποτέλεσμα, επειδή εμπνέει τη φαντασία, προσελκύοντας περισσότερο και καλύτερα το ενδιαφέρον από οποιαδήποτε άλλη μορφή πληροφοριών. Ιδιαίτερα στο εκπαιδευτικό συγκείμενο, οι ιστορίες βοηθούν τους μαθητές να εκφραστούν καλύτερα, να αναπτύξουν τη φαντασία και το λεξιλόγιό τους, αλλά και να εξωτερικεύουν τα συναισθήματα τους, να βελτιώσουν την ενσυναίσθηση, την κριτική σκέψη και τις κοινωνικές τους δεξιότητες.

Η ψηφιακή αφήγηση χρησιμοποιεί εφαρμογές πολυμέσων, όπως κείμενο, ήχους, μουσική, κόμικς και βίντεο. Στο χρονικό διάστημα των τελευταίων τουλάχιστον 25 ετών, έχει εξελιχθεί σε ένα εξαιρετικά ισχυρό γνωστικό εργαλείο και μέσο διδασκαλίας. Αξιοποιώντας την πανάρχαια τέχνη της αφήγησης και συνδέοντάς την με την τεχνολογία, η ψηφιακή αφήγηση παρέχει ένα πολυαισθητηριακό περιβάλλον μάθησης. Ειδικά, στην Ειδική Αγωγή, η ψηφιακή αφήγηση συμβάλλει στην ενεργοποίηση του ενδιαφέροντος και στη διευκόλυνση της επίτευξης των μαθησιακών στόχων, αποτελώντας μια σημαντική διδακτική και μαθησιακή εξάρτυση, ιδίως στα γλωσσικά μαθήματα.

Η παρούσα εργασία επικεντρώνεται σε μια διδακτική πρόταση βασισμένη σε ένα ψηφιακό παραμύθι με τίτλο «Δύο φίλοι μα τι φίλοι!», το οποίο σχεδιάστηκε και γράφτηκε από εκπαιδευτικό Ειδικού Σχολείου, για μαθητές με αναπηρία ή/και ειδικές εκπαιδευτικές ανάγκες. Μέσω της μελέτης της συγκεκριμένης ιστορίας, οι μαθητές μπορεί να αναπτύξουν τη γλωσσική και την κοινωνική τους συναίσθηση, αλλά και να μάθουν για τον αληθινό ανθρώπινο πλούτο, με την ανάδειξη των υψηλών αξιών της φιλίας, της αποδοχής και της αλληλοϋποστήριξης. Δεδομένου ότι οι μαθητές Ειδικών Σχολείων δυσκολεύονται να κάνουν φίλους, τέτοιες παρεμβάσεις θεωρούνται απαραίτητες για την ένταξή τους, την υγιή κοινωνική τους εξέλιξη, καθώς και για τη συνολική τους ανάπτυξη ως ενεργών και ισότιμων πολιτών.

Λέξεις – κλειδιά: Ψηφιακή αφήγηση, φιλία, Ειδικό Σχολείο

Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΩΣ ΕΡΓΑΛΕΙΟ ΚΑΛΛΙΕΡΓΕΙΑΣ ΚΡΙΤΙΚΗΣ ΣΚΕΨΗΣ ΣΤΟΥΣ ΜΑΘΗΤΕΣ

Δρ Ντόκα Αγλαΐα
Επόπτρια Ποιότητας της Εκπαίδευσης ΔΙ.Π.Ε. Άρτας, Σύμβουλος Εκπαίδευσης ΠΕ70 Ιωαννίνων
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Άρτας
Άρτα, Ελλάδα
email: tepopt-peart@sch.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα βιβλιογραφική ανασκόπηση εξετάζει διεξοδικά τη σχέση ανάμεσα στην ψηφιακή αφήγηση και την ανάπτυξη της κριτικής σκέψης στους μαθητές. Στόχος της παρούσας μελέτης είναι να αναδείξει πώς η δημιουργία, η ανάλυση και η αξιολόγηση ψηφιακών αφηγήσεων μπορούν να ενισχύσουν ουσιαστικά την ικανότητα των μαθητών/-τριών να αξιολογούν πληροφορίες με κριτικό πνεύμα, να διατυπώνουν έγκυρα επιχειρήματα και να επιλύουν σύνθετα προβλήματα με δημιουργικό τρόπο.

Η μεθοδολογία που ακολουθήθηκε βασίζεται σε συστηματική βιβλιογραφική ανασκόπηση, με κριτήρια επιλογής που περιλαμβάνουν τη συνάφεια με το αντικείμενο της ψηφιακής αφήγησης και της κριτικής σκέψης, τη δημοσίευση σε έγκριτα επιστημονικά περιοδικά και τη χρονολογική εγγύτητα των ερευνών (τελευταία δεκαετία). Οι πηγές περιλαμβάνουν θεωρητικά άρθρα, εμπειρικές μελέτες και μετα-αναλύσεις που εστιάζουν στις εκπαιδευτικές εφαρμογές της ψηφιακής αφήγησης.

Η ανασκόπηση αυτή καλύπτει ένα ευρύ φάσμα ερευνητικών εργασιών και εξετάζει τις εφαρμογές της ψηφιακής αφήγησης σε διάφορα εκπαιδευτικά πλαίσια, από την Πρωτοβάθμια έως την Τριτοβάθμια εκπαίδευση. Εμβαθύνει στις προκλήσεις και τις ευκαιρίες που αναδύονται κατά την ενσωμάτωση της ψηφιακής αφήγησης στην εκπαιδευτική πρακτική, καθώς και στις επιπτώσεις της στην ανάπτυξη Δεξιοτήτων του 21ου αιώνα, όπως η συνεργασία, η επικοινωνία και η δημιουργικότητα.

Μεταξύ των κύριων θεματικών ενοτήτων που αναλύονται, περιλαμβάνονται ο ακριβής ορισμός και τα βασικά χαρακτηριστικά της ψηφιακής αφήγησης, τα θεωρητικά πλαίσια που συνδέουν την αφήγηση με την κριτική σκέψη, οι συγκεκριμένες εφαρμογές της ψηφιακής αφήγησης στην εκπαίδευση, τα εργαλεία και οι τεχνικές που χρησιμοποιούνται για τη δημιουργία και την ανάλυση ψηφιακών ιστοριών, καθώς και τα αποτελέσματα της ψηφιακής αφήγησης στην ανάπτυξη δεξιοτήτων κριτικής σκέψης. Επιπλέον, διερευνώνται οι προκλήσεις και οι προτάσεις για την αποτελεσματική ενσωμάτωση της ψηφιακής αφήγησης στην εκπαιδευτική διαδικασία.

Η συμβολή της παρούσας ανασκόπησης έγκειται στην ανάδειξη τόσο των κύριων ευρημάτων της υπάρχουσας έρευνας όσο και των υφιστάμενων κενών. Ειδικότερα, διαπιστώνεται ότι η ψηφιακή αφήγηση έχει θετική επίδραση στην κριτική σκέψη, αλλά απαιτούνται περισσότερες εμπειρικές μελέτες που να εξετάζουν τη μακροπρόθεσμη επίδρασή της και την προσαρμογή της σε διαφορετικά εκπαιδευτικά περιβάλλοντα.

Συνοψίζοντας, η βιβλιογραφική ανασκόπηση καταλήγει ότι η ψηφιακή αφήγηση αποτελεί ένα πολλά υποσχόμενο εργαλείο για την καλλιέργεια της κριτικής σκέψης στους μαθητές. Η δημιουργία και η ανάλυση ψηφιακών ιστοριών μπορούν να ενισχύσουν σημαντικά την ενεργό μάθηση, την συνεργασία και την ανάπτυξη δεξιοτήτων που είναι απαραίτητες για την επιτυχία στον σύγχρονο ψηφιακό κόσμο. Η αποτελεσματική ενσωμάτωση της ψηφιακής αφήγησης στην εκπαίδευση απαιτεί την κατάλληλη εκπαίδευση και υποστήριξη των εκπαιδευτικών, την πρόσβαση σε σύγχρονα τεχνολογικά εργαλεία και τη δημιουργία ενός υποστηρικτικού μαθησιακού περιβάλλοντος που ενθαρρύνει την καινοτομία και τη δημιουργικότητα.

Λέξεις – κλειδιά: Ψηφιακή αφήγηση, κριτική σκέψη, ανάπτυξη δεξιοτήτων

Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΣΤΗΝ ΠΡΟΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΤΗΝ ΕΙΔΙΚΗ ΑΓΩΓΗ. ΤΑ ΠΑΙΔΙΑ ΔΗΜΙΟΥΡΓΟΥΝ ΨΗΦΙΑΚΕΣ ΙΣΤΟΡΙΕΣ.

Παναγιωτίδου Ευαγγελία
Νηπιαγωγός ΠΕ 60
Μ. Δ. Ε. : «Εκπαίδευση στη Διαπολιτισμική Ετοιμότητα», ΔΠΘ
litspan@hotmail.com

Βέλλιος Λάμπρος
Εκπαιδευτικός Τμήματος Ένταξης ΠΕ 70
Μ.Β.Α: « Διοίκηση Επιχειρήσεων & Οργανισμών», Π.Ι
vellioslam@yahoo.gr

Μανούση Μαριάνθη
Εκπαιδευτικός Ειδικής Αγωγής ΠΕ71
Μ. Δ. Ε. : «Εκπαίδευση στη Διαπολιτισμική Ετοιμότητα», ΔΠΘ
maniaman246@gmail.com

Μανούση Δήμητρα Παναγιώτα
Εκπαιδευτικός ΠΕ60ΕΑΕ
Μ.Δ.Ε.: «Ειδική Αγωγή και Εκπαίδευση», Πανεπιστήμιο Λευκωσίας
Dimitra2man@gmail.com

ΠΕΡΙΛΗΨΗ

Τα σημερινά παιδιά ζουν σ' έναν ψηφιακό κόσμο και οι νέες τεχνολογίες αποτελούν ένα σημαντικό στοιχείο της παιδικής κουλτούρας. Ο Prensky (2006) χρησιμοποίησε τον όρο «ψηφιακοί αυτόχθονες»(digital natives), για να αναφερθεί στα σημερινά παιδιά που μιλούν την ψηφιακή γλώσσα των υπολογιστών, των βιντεοπαιχνιδιών και του διαδικτύου. Σε αντίθεση, εκείνοι που δεν γεννήθηκαν στην ψηφιακή εποχή θεωρούνται «ψηφιακοί μετανάστες» (digital immigrants), επειδή έχουν υιοθετήσει πολλές πλευρές των ΤΠΕ, ακριβώς όπως όσοι μαθαίνουν μια δεύτερη γλώσσα αργότερα στη ζωή τους .(Nikolopoulou, 2018).

Στο πλαίσιο της εκπαίδευσης τονίζονται ιδιαίτερα τα οφέλη της ψηφιακής τεχνολογίας, καθώς οι υπολογιστές προσφέρουν στα παιδιά πρόσβαση σε νέους, άγνωρους κόσμους και διεγείρουν τη δίψα τους για μάθηση.

Μια ιδιαίτερη θέση στον τομέα της προσχολικής εκπαίδευσης και της Ειδικής Αγωγής κατέχει η αφήγηση, η οποία συμβάλλει αποτελεσματικά στη μάθηση. Άλλωστε η μάθηση είναι αποτελεσματική, όταν προσφέρεται στα παιδιά πολυτροπικά, με έναν ευχάριστο και διασκεδαστικό τρόπο.

Με την εμφάνιση των νέων τεχνολογιών δημιουργήθηκε μια νέα μορφή αφήγησης, η ψηφιακή αφήγηση (Digital Story telling), από την οποία τα παιδιά αποκομίζουν πολλά οφέλη, αποκτούν περαιτέρω δεξιότητες και όχι μόνο μια απλή γνωριμία κι εξοικείωση με τους ηλεκτρονικούς υπολογιστές. Αλληλοεπιδρούν με τους συμμαθητές τους, δημιουργώντας σχέσεις οικειότητας κι εμπιστοσύνης, εκφράζονται δημιουργικά και αποκτούν ψηφιακές δεξιότητες.

Λέξεις κλειδιά: Νέες Τεχνολογίες, Ψηφιακή Αφήγηση, Προσχολική Εκπαίδευση, Ειδική Αγωγή

ΘΠ26: Εκπαιδευτική αξιολόγηση με τη χρήση ψηφιακών μέσων και εργαλείων

Η ΧΡΗΣΗ ΤΕΧΝΟΛΟΓΙΑΣ EYE-TRACKING ΓΙΑ ΤΗΝ ΑΞΙΟΛΟΓΗΣΗ ΠΡΑΓΜΑΤΟΛΟΓΙΚΩΝ ΔΕΞΙΟΤΗΤΩΝ ΣΕ ΠΑΙΔΙΑ: ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ

Γαργάλα Βασιλεία
Υποψήφια Διδάκτωρ,
Τμήμα Λογοθεραπείας,
Πανεπιστήμιο Ιωαννίνων
Πανεπιστημιούπολη Β', 45500, Ιωάννινα, Ελλάδα
e-mail: v.gargala@uoi.gr

Τόκη Ευγενία
Καθηγήτρια,
Τμήμα Λογοθεραπείας,
Πανεπιστήμιο Ιωαννίνων,
Πανεπιστημιούπολη Β', 45500, Ιωάννινα, Ελλάδα
e-mail: toki@uoi.gr

ΠΕΡΙΛΗΨΗ

Η πραγματολογική ικανότητα αποτελεί κρίσιμο στοιχείο της κοινωνικής επικοινωνίας, ιδίως κατά την παιδική ηλικία. Παιδιά με Πραγματολογική Διαταραχή (ΠΔ) ή άλλες Νευροαναπτυξιακές Διαταραχές (ΝαΔ) συχνά εμφανίζουν ελλείμματα που επηρεάζουν την κοινωνική τους ενσωμάτωση. Η τεχνολογία eye-tracking προσφέρει ένα καινοτόμο και αντικειμενικό εργαλείο αξιολόγησης, που επιτρέπει την καταγραφή και ανάλυση των οφθαλμικών κινήσεων και της εστίασης της προσοχής κατά την επικοινωνία. Η παρούσα συστηματική ανασκόπηση, βάσει PRISMA 2020, αναλύει 43 σχετικές μελέτες (2019–2025) από την PubMed, με στόχο την αξιολόγηση της εφαρμογής του eye-tracking στην ανίχνευση πρώιμων πραγματολογικών δεικτών. Τα αποτελέσματα αυτής της εργασίας δείχνουν ότι η τεχνολογία eye-tracking μπορεί να ανιχνεύσει πρώιμες διαφοροποιήσεις στις κοινωνικές-επικοινωνιακές δεξιότητες των παιδιών, συμβάλλοντας στην έγκαιρη διάγνωση. Η μειωμένη διάρκεια κοινωνικού βλέμματος και η περιορισμένη χρήση χαμόγελου κατά την κοινωνική αλληλεπίδραση συνδέονται με αυξημένα συμπτώματα σε παιδιά με αυτισμό και δυσκολίες επεξεργασίας κοινωνικών μηνυμάτων. Η χρήση eye-tracking ενισχύει την εγκυρότητα των διαγνώσεων, υποστηρίζει την πρώιμη παρέμβαση και προτείνεται ως εργαλείο ενσωματωμένο σε θεραπευτικά και εκπαιδευτικά προγράμματα. Η τεχνολογία αυτή δίνει νέες προοπτικές στη βελτίωση της ποιότητας ζωής παιδιών με ΝαΔ μέσω στοχευμένης και τεκμηριωμένης παρέμβασης.

Λέξεις – κλειδιά: eye-tracking, πραγματολογικές δεξιότητες, νευροαναπτυξιακές διαταραχές, πρώιμη διάγνωση, λογοθεραπεία, εκπαιδευτική παρέμβαση

ΘΠ27: Διοίκηση Εκπαίδευσης και ψηφιακές τεχνολογίες

ΟΙ Τ.Π.Ε ΩΣ ΕΡΓΑΛΕΙΑ ΔΙΟΙΚΗΣΗΣ ΚΑΙ ΒΕΛΤΙΩΣΗΣ ΤΗΣ ΑΠΟΔΟΣΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Χασιώτης Νικόλαος
Σύμβουλος Εκπαίδευσης Ηλεκτρονικών Π.Ε.84 Ηπείρου
Γραφείο Συμβούλων, Δ.Δ.Ε. Ιωαννίνων
Βέροια, Ελλάδα
email: nikoshasi@gmail.com

ΠΕΡΙΛΗΨΗ

Η οργανωτική και η διοικητική ανασυγκρότηση της σύγχρονης Ελληνικής σχολικής μονάδας έχει ως κυρίαρχο στόχο την εύρυθμη και αποδοτική λειτουργία της, στο εσωτερικό πλαίσιο λειτουργίας της, αλλά και στο ευρύτερο κοινωνικό ιστό που υπάρχει και εξελίσσεται. Η χρήση των Τεχνολογιών Πληροφορίας και Επικοινωνιών,(Τ.Π.Ε.) αποτελεί μια επαναλαμβανόμενη πραγματικότητα και μπορεί να προσφέρει, μέσα από πρακτικές και σύγχρονα τεχνολογικά εργαλεία αποδοτικότερες και αποτελεσματικότερες επιδόσεις του ανθρώπινου δυναμικού. Δίχως να επηρεάζει ποιο θα είναι το είδος του οργανισμού, δηλαδή εάν εξυπηρετεί ένα σχολείο ή μια εταιρεία, ένα αποδοτικό και αξιόπιστο πληροφοριακό σύστημα διοίκησης, (Π.Σ.) αποτελεί πάντα μια σπουδαία επένδυση για τον οργανισμό. Η αξιολόγησή του σε τακτά χρονικά διαστήματα ώστε να κρίνεται η αποδοτικότητα της επένδυσης αυτής είναι αναγκαία.

Ένας ουσιαστικός ρόλος των Εκπαιδευτικών Πληροφοριακών Συστημάτων είναι να περιορίσουν, στη φάση του σχεδιασμού των επιμέρους μέτρων της εκπαιδευτικής πολιτικής, την έλλειψη σιγουριάς μέσω της τροφοδοσίας πληροφοριών, οι οποίες μπορούν να αξιοποιηθούν ώστε να παρθούν με σωστό τρόπο οι σωστές αποφάσεις. Δηλαδή τα οφέλη που συνεπάγονται από τη χρήση των εκπαιδευτικών πληροφοριακών συστημάτων, συνδέονται με την αύξηση της αποδοτικότητας και της αποτελεσματικότητας της διοίκησης και του εκπαιδευτικού προσωπικού κάθε σχολικού οργανισμού. Η αποδοτικότητα (efficiency) σχετίζεται με την ικανότητα να παίρνονται οι αποφάσεις σωστά. Η αποτελεσματικότητα (effectiveness) αναφέρεται στην ικανότητα να παίρνονται οι σωστές αποφάσεις. Συνεπώς, το να λαμβάνει κάποιος μια απόφαση σωστά, δε σημαίνει ότι παίρνει και τη σωστή απόφαση.

Τα Εκπαιδευτικά Πληροφοριακά Συστήματα δεν παρέχουν άμεσα τυποποιημένες αποφάσεις στους χρήστες, ούτε προτείνουν προσχεδιασμένο τρόπο λήψης αποφάσεων που εξασφαλίζει επιτυχία. Εξυπηρετούν τα πρόσωπα που εμπλέκονται με τα εκπαιδευτικά θέματα στη διαδικασία λήψης των αποφάσεων, προσφέροντας μια σειρά από επίλεκτες πληροφορίες που είναι οι εκροές της επεξεργασίας των κατάλληλων δεδομένων τα οποία καταχωρήθηκαν στον Η/Υ. Συνεπώς, το άτομο που θα κριθεί να λάβει κάποιες σημαντικές αποφάσεις, από το χώρο της εκπαίδευσης, θα βασισθεί όχι μόνο στις πληροφορίες με τις οποίες θα του παρέχει το πληροφοριακό σύστημα, αλλά και στην εμπειρία, στην κρίση και τη διαίσθησή του. Τέλος ένα ζήτημα που πρέπει να εξετάζεται είναι η λειτουργικότητα του υπάρχοντος πληροφοριακού συστήματος και η ανάγκη ανακατασκευής του ή επέκτασής του.

Στόχος της συγκεκριμένης εργασίας είναι να παρουσιάσει τις δυνατότητες των πληροφοριακών συστημάτων ώστε να προσφέρουν έναν παραγωγικό και αποδοτικό τρόπο για την εξυπηρέτηση των αναγκών των σχολικών δομών. Αποτελούν ένα χρήσιμο εργαλείο στα χέρια της Διοίκησης, καθώς έχουν τη δυνατότητα να γνωρίζουν κάθε φορά τον προγραμματισμό που έχει πραγματοποιηθεί όπως και όλες τις σημαντικές πληροφορίες που σχετίζονται με αυτόν.

Λέξεις Κλειδιά: Τεχνολογία της Πληροφορίας, Ψηφιακή ανασυγκρότηση, Εκπαιδευτικά πληροφοριακά συστήματα.

Η ΣΥΜΒΟΛΗ ΤΩΝ ΠΛΗΡΟΦΟΡΙΑΚΩΝ ΣΥΣΤΗΜΑΤΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΑΞΙΟΛΟΓΗΣΗ ΑΠΟΤΕΛΕΣΜΑΤΙΚΟΤΗΤΑΣ ΤΟΥ MYSCHOOL

Κοτζαμουράτογλου Γεώργιος
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης, Ηλεκτρολόγος Μηχανικός και Οικονομολόγος
1ο Εργαστηριακό Κέντρο (Ε.Κ.) Πρέβεζας, Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας
Πρέβεζα, Ελλάδα
email: kotzamou@sch.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιακή εποχή και η ένταξη πληροφοριακών συστημάτων σε οργανισμούς οδήγησε σε σημαντικές αλλαγές και στη διαχείριση των εκπαιδευτικών δομών, με τα πληροφοριακά συστήματα να παίζουν κρίσιμο ρόλο στη διοίκηση της εκπαίδευσης. Αυτή η εργασία αξιολογεί τη συμβολή του πληροφοριακού συστήματος Myschool στην Ελληνική εκπαίδευση, την αποτελεσματικότητά του, τα πλεονεκτήματά και μειονεκτήματά του, καθώς επίσης και προτάσεις βελτίωσής του, βασιζόμενη σε βιβλιογραφική ανασκόπηση που πραγματοποιήθηκε.

Το Myschool είναι ένα ολοκληρωμένο σύστημα που επιτρέπει την κεντρική διαχείριση των πληροφοριών για υλικοτεχνική υποδομή, μαθητές, εκπαιδευτικούς και των διαδικασιών της σχολικής μονάδας. Η εφαρμογή του βελτίωσε σημαντικά τη διοίκηση της εκπαίδευσης, μειώνοντας τη γραφειοκρατία, αυξάνοντας τη διαφάνεια και βοηθώντας στη λήψη αποφάσεων. Τα κυριότερα οφέλη από τη χρήση του περιλαμβάνουν την αποτελεσματική διαχείριση των αρχείων των μαθητών, τη μείωση του φόρτου εργασίας και την άμεση πρόσβαση σε δεδομένα παρακολούθησης, βαθμολογίας και φοίτησης. Η ψηφιοποίηση επιτάχυνε την επεξεργασία και αποθήκευση των πληροφοριών, παρέχοντας μια συνολική εικόνα της εκπαιδευτικής κατάστασης σε κάθε σχολική μονάδα. Το Myschool βελτιώνει επίσης την επικοινωνία μεταξύ εκπαιδευτικών, γονέων και διοικητικών υπαλλήλων, προσφέροντας συνεχή ενημέρωση για την πρόοδο των μαθητών.

Παρά τα θετικά, υπάρχουν ζητήματα για περισσότερη απλοποίηση, διευκόλυνση και αυτοματοποίηση των εργασιών στην πλατφόρμα Myschool. Πολλοί εκπαιδευτικοί και διοικητικοί υπάλληλοι δυσκολεύονται να το χρησιμοποιήσουν σωστά λόγω έλλειψης εκπαίδευσης. Αυτό δείχνει ότι η διεπαφή και οι λειτουργίες του χρειάζονται βελτίωση για να είναι πιο φιλικές στον χρήστη. Η έλλειψη βοήθειας και επιμόρφωσης οδηγεί σε μειωμένη αποτελεσματικότητα και λιγότερη χρήση των δυνατοτήτων του συστήματος. Περισσότερη αυτοματοποίηση στην διαδικασία καταχώρισης και ενημέρωσης των δεδομένων θα βοηθήσει να μειωθεί ο φόρτος εργασίας εκπαιδευτικών και στελεχών. Η δυνατότητα άντλησης στοιχείων σε συγκεκριμένη μορφή από άλλα προγράμματα (Excel, timetable, κ.α.) θα βοηθούσε στην ταχύτερη εισαγωγή μεγάλου όγκου δεδομένων που μπορεί να προϋπήρχαν (εργαστηριακός εξοπλισμός, κ.α.) ή την ευκολότερη καταχώρηση του ωρολογίου προγράμματος που δημιουργείται με κάποιο άλλο πρόγραμμα. Ιδανικά, καλό θα ήταν το Myschool να έχει την δυνατότητα δημιουργίας ωρολογίου προγράμματος. Δυνατότητες καταγραφής των πρακτικών ή η αυτόματη αποτύπωση των αναγκών σε εκπαιδευτικούς (κενά – πλεονάσματα) θα βοηθούσε στον καλύτερο προγραμματισμό για την επόμενη χρονιά.

Η διασύνδεση επίσης με άλλες κρατικές πλατφόρμες, μπορεί να κάνει πιο εύκολες και σύντομες τις εργασίες, μειώνοντας την ανάγκη για πολλαπλές εισαγωγές δεδομένων και επιτρέποντας τον άμεσο έλεγχο των δεδομένων. Το σύστημα φαίνεται να μην είναι τόσο ικανό στην ανάλυση δεδομένων σε σχέση με άλλα διεθνή συστήματα. Από τη σύγκριση του Myschool με συστήματα όπως το SIMS (Ηνωμένο Βασίλειο) και το PowerSchool (ΗΠΑ),και από την εξέταση μελετών που έχουν γίνει, φάνηκε ότι το Ελληνικό σύστημα υστερεί στην ανάλυση δεδομένων και στην προσαρμογή στις ανάγκες των σχολείων.

Για να βελτιωθεί το Myschool, προτείνονται αλλαγές όπως η προσθήκη εργαλείων ανάλυσης δεδομένων, η σύνδεση με άλλες πλατφόρμες και η δημιουργία ενός περιβάλλοντος που να είναι πιο εύκολο στη χρήση. Επίσης, η συνεχής εκπαίδευση των χρηστών, η ενίσχυση των μηχανισμών ασφαλείας και η δυνατότητα άντλησης στοιχείων από άλλες εφαρμογές, είναι σημαντικά για να χρησιμοποιείται καλύτερα το σύστημα. Επιπρόσθετα, η διαβαθμισμένη πρόσβαση εκπαιδευτικών, μαθητών και γονέων μπορούν να βελτιώσουν το ρόλο του Myschool.

Συνοψίζοντας, το Myschool έχει παίξει σημαντικό ρόλο στον εκσυγχρονισμό της Ελληνικής παιδείας, προσφέροντας νέα μέσα για τη διαχείριση και την ανάλυση εκπαιδευτικών πληροφοριών. Όμως, για να προσφέρει ακόμα περισσότερα είναι απαραίτητη η διαρκής εξέλιξη του συστήματος, η προσαρμογή στις απαιτήσεις των χρηστών, η εκπαίδευσή τους και η ενίσχυση της προστασίας και της άντλησης των δεδομένων. Η μελλοντική ανάπτυξη του Myschool μπορεί να βοηθήσει ουσιαστικά στη βελτίωση της αποτελεσματικότητας και της ποιότητας της διοίκησης της ελληνικής εκπαίδευσης και στη βελτίωση της διδασκαλίας.

Λέξεις κλειδιά: Πληροφοριακά συστήματα, Εκπαιδευτική διοίκηση, Myschool, Ψηφιακή διαχείριση δεδομένων.

ΑΞΙΟΛΟΓΗΣΗ ΤΗΣ ΠΛΑΤΦΟΡΜΑΣ MYSCHOOL: ΑΠΟΨΕΙΣ ΕΚΠΑΙΔΕΥΤΙΚΩΝ, ΠΡΟΒΛΗΜΑΤΑ ΚΑΙ ΣΤΡΑΤΗΓΙΚΕΣ ΒΕΛΤΙΩΣΗΣ

Γάκη Βασιλική
Χημικός, ΠΕ04.02 & Πληροφορικός ΠΕ86
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
email: iliasde66@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα έρευνα επικεντρώνεται στη χρήση της πλατφόρμας MySchool από τους εκπαιδευτικούς και αναλύει τις απόψεις τους σχετικά με τη λειτουργικότητά της, την επίδρασή της στη σχολική διοίκηση και τα προβλήματα που αντιμετωπίζουν κατά τη χρήση της. Στόχος της είναι να διερευνήσει τη χρήση της πλατφόρμας από τους εκπαιδευτικούς, να αξιολογήσει τη λειτουργικότητά της, καθώς και να εντοπίσει τα προβλήματα και τις ανάγκες που ανακύπτουν κατά τη χρήση της. Σκοπός της είναι να κατανοήσει πώς αντιλαμβάνονται οι εκπαιδευτικοί τη συμβολή της πλατφόρμας στην εκπαιδευτική και διοικητική διαδικασία του σχολείου, να αναδείξει τις διαφοροποιήσεις στις απόψεις μεταξύ νέων και έμπειρων εκπαιδευτικών, καθώς και των διευθυντών, και να προτείνει στρατηγικές για την ενίσχυση της λειτουργικότητας και την επίλυση των τεχνικών ζητημάτων που αντιμετωπίζουν.

Η έρευνα, η οποία πραγματοποιήθηκε σε πανελλήνιο επίπεδο, είναι μέρος της διπλωματικής μου εργασίας, στο πλαίσιο του προγράμματος μεταπτυχιακών σπουδών «Διοίκηση Επιχειρήσεων και Οργανισμών» του τμήματος Λογιστικής και Χρηματοοικονομικής του Πανεπιστημίου Ιωαννίνων. Η έρευνα βασίζεται σε δείγμα 143 εκπαιδευτικών, από τους οποίους 75 είναι γυναίκες και 68 άνδρες. Η πλειονότητα των συμμετεχόντων είναι ηλικίας 36-50 ετών, κατέχει μεταπτυχιακό τίτλο σπουδών, εργάζεται σε γυμνάσια και δεν έχει εκπαιδευτεί στο πληροφοριακό σύστημα Myschool αλλά ούτε έχει εμπειρία χρήσης άλλων πληροφοριακών συστημάτων.

Τα αποτελέσματα δείχνουν ότι οι απόψεις των εκπαιδευτικών σχετικά με την πλατφόρμα MySchool είναι γενικά θετικές, καθώς οι περισσότεροι θεωρούν τη χρήση της εύκολη και την εμπειρία θετική. Ωστόσο, εντοπίζονται διαφοροποιήσεις στην αξιολόγηση της πλατφόρμας, που εστιάζονται κυρίως σε τεχνικά προβλήματα, όπως η δυσχέρεια στη συμβατότητα με άλλα συστήματα. Παρά τις δυσκολίες αυτές, οι εκπαιδευτικοί αναγνωρίζουν ότι το MySchool συμβάλλει σημαντικά στη διαχείριση σχολικών δεδομένων και στην εκτέλεση διοικητικών εργασιών, αν και από την έρευνα προκύπτει ότι δεν έχει περιορίσει σημαντικά τον διοικητικό φόρτο τους.

Οι εκπαιδευτικοί εκφράζουν την ανάγκη για νέες λειτουργίες στην πλατφόρμα, όπως η δυνατότητα ηλεκτρονικής αίτησης πιστοποιητικών και η αποστολή ειδοποιήσεων σε πραγματικό χρόνο, οι οποίες θα διευκόλυναν σημαντικά την καθημερινή τους εργασία.

Η έρευνα καταλήγει στην ανάγκη για τεχνικές βελτιώσεις στην πλατφόρμα και τη συνένωσή της με άλλες ψηφιακές εφαρμογές και συστήματα, προκειμένου να ενισχυθεί η συνολική λειτουργικότητά της και να εξυπηρετήσει καλύτερα τις ανάγκες των εκπαιδευτικών και της σχολικής κοινότητας. Προτάσεις για τη βελτίωση του MySchool περιλαμβάνουν την ανάπτυξη νέων εργαλείων και τη βελτιστοποίηση των υπαρχόντων, ώστε να ενισχυθεί η αποδοτικότητα και η ευχρηστία της πλατφόρμας στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: Myschool, έρευνα, λειτουργικότητα, αντιλήψεις χρηστών.

ΨΗΦΙΑΚΟΣ ΜΕΤΑΣΧΗΜΑΤΙΣΜΟΣ ΚΑΙ ΕΚΠΑΙΔΕΥΣΗ: Η ΣΥΜΒΟΛΗ ΤΩΝ ΠΛΗΡΟΦΟΡΙΑΚΩΝ ΣΥΣΤΗΜΑΤΩΝ ΔΙΟΙΚΗΣΗΣ- MYSCHOOL

Γάκη Βασιλική
Χημικός, ΠΕ04.02 & Πληροφορικός ΠΕ86
Εσπερινό Επαγγελματικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: iliasde66@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία επικεντρώνεται στη μελέτη και ανάλυση των Πληροφοριακών Συστημάτων Διοίκησης στον τομέα της εκπαίδευσης, με ιδιαίτερη έμφαση στο σύστημα MySchool στην Ελλάδα. Σκοπός της είναι να εξετάσει τον ρόλο αυτών των συστημάτων στην αποτελεσματική διαχείριση και αποθήκευση δεδομένων των σχολικών μονάδων και τη συνεισφορά τους στον ψηφιακό μετασχηματισμό του εκπαιδευτικού συστήματος. Η εργασία αναδεικνύει τη σημασία των Πληροφοριακών Συστημάτων Διοίκησης, όπως το Σύστημα Πληροφοριών Μαθητών, το Σύστημα Διαχείρισης Μάθησης, το Σύστημα Υποστήριξης Αποφάσεων κ.α., στην ενίσχυση των διοικητικών και ακαδημαϊκών διαδικασιών, την υποστήριξη της στρατηγικής λήψης αποφάσεων και την επίτευξη μεγαλύτερης διαφάνειας και αποτελεσματικότητας στα εκπαιδευτικά ιδρύματα.

Η μεθοδολογία που χρησιμοποιήθηκε περιλαμβάνει ανασκόπηση της βιβλιογραφίας σχετικά με τα Πληροφοριακά Συστήματα Διοίκησης στην εκπαίδευση, την ανάλυση του ελληνικού συστήματος MySchool, καθώς και την αναφορά σε διεθνείς μελέτες και παραδείγματα από άλλες χώρες. Εκεί αξιολογούνται οι προκλήσεις που συνδέονται με την εφαρμογή αυτών των συστημάτων, όπως η αντίσταση στην αλλαγή, η έλλειψη εξειδικευμένου προσωπικού και οι τεχνολογικοί περιορισμοί.

Από τα ευρήματα της μελέτης προκύπτει ότι τα Πληροφοριακά Συστήματα Διοίκησης, όπως το MySchool, συμβάλλουν σημαντικά στην καλύτερη διαχείριση των δεδομένων των μαθητών και των σχολικών μονάδων, καθώς και στη διευκόλυνση των διοικητικών διαδικασιών. Παράλληλα, η ενοποίηση των διάσπαρτων συστημάτων σε μία ενιαία πλατφόρμα ενισχύει τη διαφάνεια και την αποτελεσματικότητα, επιτρέποντας τη συνεχιζόμενη παρακολούθηση των μαθησιακών επιδόσεων, την αξιολόγηση των εκπαιδευτικών και τη βελτίωση των στρατηγικών αποφάσεων. Στη διάρκεια της πανδημίας COVID-19, το MySchool συνέβαλε στην υποστήριξη της ηλεκτρονικής επικοινωνίας, αποδεικνύοντας την αναγκαιότητα της ψηφιακής τεχνολογίας στην εκπαίδευση.

Συνολικά, η εργασία υπογραμμίζει τη σημασία των Πληροφοριακών Συστημάτων Διοίκησης στην εκπαιδευτική διαδικασία, αναγνωρίζοντας τα πλεονεκτήματα τους στην ανάπτυξη των εκπαιδευτικών συστημάτων και την στρατηγική λήψη αποφάσεων, ενώ επισημαίνει και τις προκλήσεις που συνδέονται με την εφαρμογή τους. Η επιτυχία αυτών των συστημάτων εξαρτάται από την κατάλληλη υποστήριξη, την εκπαίδευση και την προσαρμογή τους στις σύγχρονες ανάγκες της εκπαίδευσης.

Λέξεις – κλειδιά: Ψηφιακός μετασχηματισμός, MySchool, εκπαίδευση.

ΑΠΟΛΟΓΙΣΜΟΣ ΤΗΣ ΠΡΩΤΗΣ ΕΞΑΜΗΝΗΣ ΕΜΠΕΙΡΙΑΣ ΑΠΟ ΤΗΝ ΕΦΑΡΜΟΓΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΒΙΒΛΙΟΥ ΠΡΑΞΕΩΝ ΣΥΛΛΟΓΟΥ ΔΙΔΑΣΚΟΝΤΩΝ ΣΤΙΣ ΣΧΟΛΙΚΕΣ ΜΟΝΑΔΕΣ: ΑΠΟ ΤΙΣ ΠΑΓΙΩΜΕΝΕΣ ΔΙΟΙΚΗΤΙΚΕΣ ΣΧΕΣΕΙΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ, ΣΤΗΝ ΕΜΠΕΔΩΣΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΓΡΑΦΕΙΟΚΡΑΤΙΑΣ

Χρήστου Νικόλαος
Διευθυντής 1ου ΓΕΛ Άρτας, Πληροφορικός
ΔΙΔΕ Άρτας, Ελλάδα
email: nchristou@sch.gr

Κοτσιφάκος Δημήτριος
Διευθυντής 1ου Εργαστηριακού Κέντρου Αγίου Δημητρίου,
ΔΙΔΕ Δ΄ Αθήνας,
Post – Doc, τμήματος Διοίκησης Επιχειρήσεων,
Πανεπιστημίου Δυτικής Αττικής, Αθήνα, Ελλάδα,
email: dkotsifakos@uniwa.gr

Ψαρομήλιγκος Ιωάννης
Καθηγητής τμήματος Διοίκησης Επιχειρήσεων,
Πανεπιστημίου Δυτικής Αττικής, Αθήνα, Ελλάδα,
email: yannis.psaromiligkos@uniwa.gr

ΠΕΡΙΛΗΨΗ

Η ψήφιση του νόμου περί εισαγωγής του «Ψηφιακού Βιβλίου Πράξεων Συλλόγου Διδασκόντων» (Αριθμ. 3446/16-05-2024 – ΦΕΚ 2988/Β/28-05-2024) στις 28 Μαΐου του 2024, και η εφαρμογή τον Σεπτέμβριο του 2024 στις σχολικές μονάδες, σηματοδότησε σημαντικές ποιοτικές και ποσοτικές αλλαγές στη διοίκηση των σχολικών μονάδων. Για όσες σχολικές μονάδες υλοποίησαν και εφάρμοσαν τον νόμο, και τον ενσωμάτωσαν ως εργαλείο «ψηφιακής διαχείρισης» εντός των διοικητικών διαδικασιών, διαπίστωσαν υποβόσκουσες αντιθέσεις και συγκρούσεις χρόνων, αντιφάσεις κατά την υλοποίηση, αλλά και προκλήσεις από τα οφέλη. Η εφαρμογή του συγκεκριμένου νόμου σηματοδότησε μία μετάβαση από τις παγιωμένες τυποποιημένες πρακτικές των διαδικασιών των Συλλόγων σε μία νέα ρυθμιστική πραγματικότητα, η οποία εισήγαγε στοιχεία και χαρακτηριστικά ψηφιακού μετασχηματισμού στην σχολική μονάδα, τα οποία αναγνωρίστηκαν από όλους/-ες τους/τις εκπαιδευτικούς. Το παρόν άρθρο εντασσόμενο στον γόνιμο ακαδημαϊκό διάλογο του Συνεδρίου για μία δυναμική σχέση ψηφιακών μέσων, διοικητικής μέριμνας και εκπαιδευτικού έργου, κατατίθεται με την μορφή «απολογισμού» και αποτυπώνει εμπειρίες, δυσκολίες και προοπτικές από αυτήν την νέα πραγματικότητα. Η εισήγηση, από την πλευρά της διοίκησης και του διαχειριστικού ελέγχου των σχολικών μονάδων δεν αποσιωπά, ειδικά εκείνα τη σημεία της εφαρμογής του νόμου για το «Ψηφιακό Βιβλίο Πράξεων Συλλόγου Διδασκόντων», τα οποία λειτούργησαν ως εμπόδιο στην ομαλή υλοποίηση του διοικητικού έργου, αλλά ούτε και την δυσοίωνη προοπτική της εδραίωσης των συναδελφικών σχέσεων σε υπαγωγικές και ιεραρχικές σχέσεις που ενισχύουν την ψηφιακή γραφειοκρατία, αντί της διευκόλυνσης της άσκησης του διοικητικού έργου. Περισσότερο όμως από όλα δεν αποσιωπά ότι τελικά για τον ψηφιακό μετασχηματισμό των σχολικών μονάδων δεν αρκεί μία επίπλαστη πληροφοριακή ενημέρωση, αλλά απαιτείται μία επένδυση στον ψηφιακό εγγραμματισμό όλων των μελών της σχολικής μονάδας χωρίς αποκλεισμούς και χωρίς μονομέρειες. Αυτό όμως δεν είναι υπόθεση ενός νόμου αλλά μίας συνολικής αυθεντικής μετασχηματίζουσας διοικητικής πολιτικής για όλες τις σχολικές μονάδες.

Λέξεις – κλειδιά: Διοίκηση Εκπαίδευσης και ψηφιακές τεχνολογίες, Ψηφιακού βιβλίου πράξεων Συλλόγου Διδασκόντων, διοικητικές σχέσεις των εκπαιδευτικών, ψηφιακή γραφειοκρατία

ΠΟΙΟΤΙΚΗ ΑΞΙΟΛΟΓΗΣΗ ΤΟΥ ΠΛΗΡΟΦΟΡΙΑΚΟΥ ΣΥΣΤΗΜΑΤΟΣ ΟΠΣΥΔ ΩΣ ΣΥΣΤΗΜΑ ΗΛΕΚΤΡΟΝΙΚΗΣ ΔΙΑΚΥΒΕΡΝΗΣΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Μπάγκα Κωνσταντίνα
Διοικητικό Προσωπικό - Πληροφορικός
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: dinabaga@sch.gr

Σύριου Αναστασία
Εκπαιδευτικός Β/θμιας Εκπαίδευσης
Τρίπολη, Ελλάδα
e-mail: ansiriou@gmail.com

Σκαρτσίλη Βασιλική
Διοικητικό Προσωπικό
Κέντρο Εξυπηρέτησης Πολιτών (ΚΕΠ)
Καλαμάτα, Ελλάδα
e-mail: vasilikiskartsili8@gmail.com

Κουλογεωργίου Δήμητρα
Διοικητικό Προσωπικό Vodafone
Τρίπολη, Ελλάδα
e-mail: dimitrakoulo.sar90@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα ποιοτική μελέτη αξιολογεί το ΟΠΣΥΔ (Ολοκληρωμένο Πληροφοριακό Σύστημα Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης), ένα σύστημα ηλεκτρονικής διακυβέρνησης που αποτελεί βασικό εργαλείο για τη διαχείριση του προσωπικού στην Ελληνική Πρωτοβάθμια και Δευτεροβάθμια Εκπαίδευση. Το ΟΠΣΥΔ, που χαρακτηρίζεται ως πληροφοριακό σύστημα διαχείρισης ανθρώπινου δυναμικού, επιτρέπει αμφίδρομη αλληλεπίδραση μεταξύ εκπαιδευτικών και περιφερειακών Διευθύνσεων Εκπαίδευσης, δίνοντας τη δυνατότητα ηλεκτρονικής υποβολής αιτήσεων, ανέβασμα εγγράφων και διαχείρισης αιτημάτων. Η έρευνα, η οποία διεξήχθη από τον Φεβρουάριο έως τον Ιούνιο του 2024 μέσω δομημένων συνεντεύξεων στις περιοχές της Ηπείρου και της Πελοποννήσου, περιελάμβανε 15 μη μόνιμους εκπαιδευτικούς και 7 διοικητικούς υπαλλήλους από περιφερειακές διευθύνσεις εκπαίδευσης. Στόχος των συνεντεύξεων ήταν η καταγραφή των τρόπων αλληλεπίδρασης, ο εντοπισμός δυσκολιών και η συλλογή προτάσεων βελτίωσης των διοικητικών διαδικασιών.

Τα βασικά ευρήματα δείχνουν ότι οι κύριοι προβληματισμοί δεν σχετίζονται με τεχνικά ζητήματα του ίδιου του ΟΠΣΥΔ, αλλά κυρίως με δυσκολίες που προκύπτουν από τις διοικητικές διαδικασίες και τον τρόπο εφαρμογής τους, ιδίως λόγω της χρήσης πολλαπλών πληροφοριακών συστημάτων με παρόμοιους σκοπούς. Οι διοικητικοί υπάλληλοι ανέφεραν σημαντική σπατάλη χρόνου λόγω επαναλαμβανόμενης καταχώρησης δεδομένων σε διαφορετικά συστήματα όπως MySchool, eDataCenter και Μητρώο Ανθρώπινου Δυναμικού, τα οποία δεν επικοινωνούν μεταξύ τους για αυτόματο συγχρονισμό δεδομένων.

Η μελέτη καταλήγει ότι ο σχεδιασμός και η υλοποίηση λύσεων διαλειτουργικότητας μεταξύ των υφιστάμενων πληροφοριακών συστημάτων είναι επιβεβλημένα, ώστε να επιτρέπεται η μαζική εισαγωγή και ο αυτόματος συγχρονισμός δεδομένων, μειώνοντας τους χρόνους διεκπεραίωσης και επιτρέποντας στο προσωπικό να εστιάσει σε ουσιαστικά καθήκοντα. Προτείνεται επίσης η βελτίωση των δυνατοτήτων επικοινωνίας ώστε να επιτυγχάνεται έγκαιρη διόρθωση λαθών από τους αιτούντες. Οι προτάσεις περιλαμβάνουν την αποσύνδεση της ενημέρωσης των δικαιολογητικών στο ΟΠΣΥΔ από τις προκηρύξεις, επιτρέποντας τη συνεχή υποβολή, και την ενσωμάτωση υποστηριζόμενων από τεχνητή νοημοσύνη chatbots, υπό επίβλεψη ανθρώπινων ειδικών, για την καθοδήγηση των αιτούντων. Επιπλέον, η ενσωμάτωση της εξειδικευμένης γνώσης για την απόδοση εκπαιδευτικών ειδικοτήτων στο σύστημα eDiplomas θα διασφαλίσει την αυτόματη και ακριβή ενημέρωση των ειδικοτήτων απευθείας από τα πανεπιστήμια.

Λέξεις – κλειδιά: ΟΠΣΥΔ, Ηλεκτρονική Διακυβέρνηση, Διαχείριση Ανθρώπινου Δυναμικού, Διοίκηση Εκπαίδευσης, Διοικητικές Διαδικασίες, Διαλειτουργικότητα

ΕΚΠΑΙΔΕΥΤΙΚΗ ΗΓΕΣΙΑ ΣΤΗΝ ΨΗΦΙΑΚΗ ΕΠΟΧΗ: ΠΡΟΚΛΗΣΕΙΣ, ΚΑΙΝΟΤΟΜΙΕΣ ΚΑΙ ΜΕΤΑΣΧΗΜΑΤΙΣΤΙΚΕΣ ΠΡΑΚΤΙΚΕΣ

Μπούτσιου Ευαγγελία
Διευθύντρια Δημοτικού Σχολείου, Εκπαιδευτικός ΠΕ70
1ο Δημοτικό Σχολείο Σταυρούπολης, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: eboutsiou@gmail.com

Μαργαρίτης Γεώργιος
Διευθυντής Δημοτικού Σχολείου, Εκπαιδευτικός ΠΕ70
Δημοτικό Σχολείο Νέας Μεσημβρίας, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: gmarg43@hotmail.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιακή μετάβαση στην εκπαίδευση έχει επαναπροσδιορίσει ριζικά τον ρόλο των εκπαιδευτικών ηγετών, οι οποίοι καλούνται να διαχειριστούν πολύπλοκες συνθήκες, να αναπτύξουν νέες δεξιότητες και να διαμορφώσουν στρατηγικές που ανταποκρίνονται στις απαιτήσεις του 21ου αιώνα. Η εργασία αυτή εξετάζει τις βασικές προκλήσεις, τις αναδυόμενες καινοτομίες και τις μετασχηματιστικές πρακτικές που επανακαθορίζουν την εκπαιδευτική ηγεσία στη σύγχρονη ψηφιακή εποχή.

Κεντρική πρόκληση αποτελεί το ψηφιακό χάσμα, που δημιουργεί ανισότητες στην πρόσβαση σε τεχνολογικές υποδομές και ψηφιακές ευκαιρίες μάθησης. Παράλληλα, οι αυξανόμενες ανησυχίες για την προστασία των προσωπικών δεδομένων απαιτούν την εφαρμογή αυστηρών πολιτικών και την ανάληψη ευθύνης από υπεύθυνους προστασίας δεδομένων εντός των σχολικών μονάδων. Η ανάγκη συνεχούς επαγγελματικής ανάπτυξης αναδεικνύεται ως κρίσιμος παράγοντας για την επιτυχή ενσωμάτωση της τεχνολογίας στη διδασκαλία, ενώ η αξιοποίηση νέων τεχνολογιών, όπως η τεχνητή νοημοσύνη, το cloud computing και τα μεγάλα δεδομένα, απαιτεί στρατηγικό σχεδιασμό και στοχοθετημένη επιμόρφωση.

Στην προσπάθεια αντιμετώπισης αυτών των προκλήσεων, οι εκπαιδευτικοί ηγέτες υιοθετούν καινοτόμες προσεγγίσεις, όπως η λήψη αποφάσεων βάσει δεδομένων, που ενισχύει την αποτελεσματικότητα των εκπαιδευτικών παρεμβάσεων και των πολιτικών. Η προσαρμοστική και μετασχηματιστική ηγεσία προωθεί την ευελιξία, τη συλλογικότητα και τη δημιουργία διαφανούς, συνεργατικού εκπαιδευτικού περιβάλλοντος. Παράλληλα, εργαλεία όπως οι διαδικτυακές πλατφόρμες μάθησης και τα μικρο-πιστοποιητικά αξιοποιούνται για την ενίσχυση του ψηφιακού γραμματισμού των εκπαιδευτικών και την υποστήριξη της επαγγελματικής τους ανέλιξης.

Ιδιαίτερη έμφαση δίνεται σε μετασχηματιστικές πρακτικές, όπως η εξατομικευμένη μάθηση, η οποία αξιοποιεί την τεχνολογία για να προσαρμόσει το μαθησιακό περιεχόμενο στις ανάγκες και τα ενδιαφέροντα των μαθητών, ενισχύοντας τη συμμετοχή και την επίδοσή τους. Εξίσου σημαντική είναι η συνεργατική λήψη αποφάσεων, η οποία προωθεί τη συμμετοχή όλων των εμπλεκόμενων μερών —εκπαιδευτικών, μαθητών, γονέων— στη διαμόρφωση της στρατηγικής του σχολείου, ενδυναμώνοντας το αίσθημα εμπιστοσύνης και συνιδιοκτησίας. Η εργασία αναδεικνύει παραδείγματα εφαρμογής καινοτόμων προσεγγίσεων σε σχολικές μονάδες και εκπαιδευτικά δίκτυα, αναδεικνύοντας τη δυναμική των σύγχρονων μοντέλων ηγεσίας.

Συμπερασματικά, η εκπαιδευτική ηγεσία στην ψηφιακή εποχή απαιτεί επαναπροσδιορισμό στρατηγικών, ενίσχυση του επαγγελματισμού και υιοθέτηση μιας κουλτούρας συνεχούς μάθησης και προσαρμογής. Οι εκπαιδευτικοί ηγέτες καλούνται να ηγηθούν με όραμα, συνδυάζοντας τεχνογνωσία, συνεργασία και τεχνολογική ενσωμάτωση, προκειμένου να ανταποκριθούν στις απαιτήσεις της σύγχρονης εκπαίδευσης. Η εργασία προσφέρει ένα εννοιολογικό πλαίσιο και ένα σύνολο πρακτικών εργαλείων που συμβάλλουν στον επιστημονικό και επαγγελματικό διάλογο για την εκπαίδευση στην εποχή της ψηφιακής μετάβασης.

Λέξεις – κλειδιά: Ηγεσία στην Εκπαίδευση, Ψηφιακός Μετασχηματισμός, Διοίκηση Σχολικών Μονάδων, Εκπαιδευτική Καινοτομία, Λήψη Αποφάσεων βάσει Δεδομένων, Επαγγελματική Ανάπτυξη

ΕΚΠΑΙΔΕΥΤΙΚΗ ΨΗΦΙΟΠΟΙΗΣΗ : ΠΡΟΚΛΗΣΕΙΣ, ΕΥΚΑΙΡΙΕΣ ΚΑΙ Η ΣΗΜΑΣΙΑ ΤΗΣ ΓΙΑ ΤΟΝ ΕΚΣΥΓΧΡΟΝΙΣΜΟ ΚΑΙ ΤΗΝ ΙΣΟΤΗΤΑ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΔΙΑΔΙΚΑΣΙΑ

Ντέντες Ηλίας
Οικονομολόγος, ΠΕ80 & Ηλεκτρονικός, ΠΕ84
1ο Γενικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
email: iliasde@hotmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει την ψηφιοποίηση στην εκπαίδευση, εστιάζοντας στην κατανόηση των βασικών εννοιών, της ιστορικής της εξέλιξης, των παγκόσμιων τάσεων, της σημασίας της και της εφαρμογής της στη δημόσια εκπαίδευση, όπως αποτυπώνεται στη σχετική διεθνή βιβλιογραφία. Στόχος της είναι να προσφέρει μια σφαιρική εικόνα για τις διάφορες διαστάσεις της ψηφιοποίησης στην εκπαίδευση, καθώς και για τις προκλήσεις και τις ευκαιρίες που προκύπτουν από τη χρήση τεχνολογιών στις εκπαιδευτικές διαδικασίες. Επιπλέον, σκοπός της είναι να αναδείξει τη σημασία της ψηφιοποίησης για τον εκσυγχρονισμό της εκπαίδευσης και την ενίσχυση των δεξιοτήτων των μαθητών, ενώ παράλληλα εξετάζει τις επιπτώσεις της στην ισότητα και την προσβασιμότητα στην εκπαίδευση.

Αρχικά, η εργασία εξετάζει τον ορισμό και το πεδίο εφαρμογής της ψηφιοποίησης στην εκπαίδευση. Ορισμένα από τα κύρια χαρακτηριστικά της ψηφιοποίησης περιλαμβάνουν την ενσωμάτωση ψηφιακών εργαλείων και πόρων, όπως οι ηλεκτρονικές πλατφόρμες, τα ψηφιακά βιβλία και οι διαδικτυακές πλατφόρμες μάθησης, που επιτρέπουν τη διδασκαλία και τη μάθηση σε διάφορα περιβάλλοντα και μορφές. Η ψηφιοποίηση εκτείνεται σε πολλές περιοχές, όπως η αποθήκευση και διανομή υλικού, η αλληλεπίδραση μεταξύ μαθητών και δασκάλων και η δυνατότητα προσαρμοσμένων μαθησιακών διαδρομών για τους μαθητές.

Η διαδικασία της ψηφιοποίησης ξεκίνησε με την εισαγωγή υπολογιστών στις σχολικές αίθουσες, ενώ σταδιακά εξελίχθηκε με τη χρήση διαδικτυακών εργαλείων και πλατφορμών. Σήμερα, η ψηφιοποίηση προάγει την ανάπτυξη νέων παιδαγωγικών μοντέλων, τα οποία συνδυάζουν τη διαδραστικότητα και την εξατομίκευση της μάθησης, επιτρέποντας στους μαθητές να αλληλεπιδρούν με το διδακτικό υλικό και να συμμετέχουν ενεργά στην εκπαιδευτική διαδικασία. Μέσω αυτών των εργαλείων, επιτυγχάνεται τόσο η καλύτερη οργάνωση και παρακολούθηση της εκπαιδευτικής πορείας, όσο και η εύρυθμη λειτουργία των σχολικών μονάδων.

Ένα καθοριστικό στοιχείο της εργασίας συνιστά η ανάλυση της ψηφιοποίησης στην εκπαίδευση, η οποία ενδυναμώνει τις δεξιότητες ψηφιακής παιδείας των μαθητών, προετοιμάζοντας τους για τις απαιτήσεις του 21ου αιώνα και τη σύγχρονη αγορά εργασίας. Η ανάπτυξη δεξιοτήτων, όπως η κριτική σκέψη, η δημιουργικότητα και η ικανότητα επίλυσης προβλημάτων, καθίσταται πλέον επιτακτική προκειμένου να εξασφαλιστεί η ομαλή ένταξη των μαθητών στην κοινωνία της πληροφορίας και της τεχνολογίας. Επιπλέον, η ψηφιοποίηση προσφέρει τη δυνατότητα αποτελεσματικής διαχείρισης του εκπαιδευτικού περιβάλλοντος, τόσο σε διοικητικό όσο και σε παιδαγωγικό επίπεδο, καθιστώντας τις εκπαιδευτικές διαδικασίες πιο αποδοτικές, ευέλικτες και προσαρμοσμένες στις σύγχρονες ανάγκες.

Η παρούσα εργασία ακολούθως εστιάζει στην ενίσχυση της ισότητας στην εκπαίδευση, διασφαλίζοντας την προσβασιμότητα των εκπαιδευτικών πόρων σε όλους τους μαθητές, ανεξαρτήτως κοινωνικοοικονομικής κατάστασης ή γεωγραφικής τοποθεσίας. Η πανδημία COVID-19 επέσπευσε τη διαδικασία αυτή, καθιστώντας τις ψηφιακές λύσεις απαραίτητες για την εξασφάλιση της αδιάλειπτης εκπαίδευσης υπό δύσκολες συνθήκες. Η αυξημένη εξάρτηση από τις ψηφιακές τεχνολογίες κατά την περίοδο της πανδημίας ανέδειξε τη θεμελιώδη σημασία τους για την προσαρμογή και την αποτελεσματικότητα του εκπαιδευτικού συστήματος σε καταστάσεις έκτακτης ανάγκης. Σήμερα, η ψηφιοποίηση αναγνωρίζεται ως κρίσιμο στοιχείο για τον εκσυγχρονισμό και την εξέλιξη της εκπαίδευσης, συμβάλλοντας στη μετατροπή της εκπαιδευτικής διαδικασίας στην εποχή του ψηφιακού μετασχηματισμού.

Λέξεις – κλειδιά: Ψηφιοποίηση, εκπαίδευση, εκσυγχρονισμός.

ΘΕΩΡΗΤΙΚΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ ΓΙΑ ΤΗΝ ΑΝΤΙΛΗΨΗ ΤΩΝ ΧΡΗΣΤΩΝ ΠΛΗΡΟΦΟΡΙΑΚΩΝ ΣΥΣΤΗΜΑΤΩΝ ΔΙΑΧΕΙΡΙΣΗΣ ΕΚΠΑΙΔΕΥΣΗΣ

Ντέντες Ηλίας
Οικονομολόγος, ΠΕ80 & Ηλεκτρονικός, ΠΕ84
1ο Γενικό Λύκειο Πρέβεζας
Πρέβεζα, Ελλάδα
email: iliasde@hotmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία αποσκοπεί στην ανάλυση των θεωρητικών προσεγγίσεων που σχετίζονται με την αποδοχή και την υιοθέτηση νέων τεχνολογιών στον τομέα της εκπαίδευσης, με ιδιαίτερη αναφορά στα Πληροφοριακά Συστήματα Διαχείρισης Εκπαίδευσης. Ο κύριος σκοπός της είναι η διερεύνηση των παραμέτρων που επηρεάζουν τη χρήση αυτών των συστημάτων από τους χρήστες τους, όπως οι εκπαιδευτικοί, οι διευθυντές σχολείων και άλλοι αρμόδιοι εκπαιδευτικοί φορείς, καθώς και η ανάλυση των θεωρητικών εννοιών που σχετίζονται με τη χρήση τους, μέσω του Μοντέλου Αποδοχής Τεχνολογίας, της Ενοποιημένης Θεωρίας Αποδοχής και Χρήσης της Τεχνολογίας και της Θεωρίας Διάχυσης Καινοτομιών του Rogers.

Ο στόχος της εργασίας είναι η κατανόηση των παραμέτρων που επηρεάζουν την αποδοχή των Πληροφοριακών Συστημάτων Διαχείρισης Εκπαίδευσης από τους χρήστες τους, καθώς και η διερεύνηση των στρατηγικών που απαιτούνται για την ενίσχυση της αποτελεσματικότητας αυτών των συστημάτων στον εκπαιδευτικό τομέα. Η εργασία εστιάζει στην εξέταση της εφαρμογής των Πληροφοριακών Συστημάτων Διαχείρισης Εκπαίδευσης σε διάφορα εκπαιδευτικά περιβάλλοντα, αναλύοντας τις δυσκολίες και τις προκλήσεις που αντιμετωπίζουν οι χρήστες τους, καθώς και τις επιπτώσεις που αυτές οι προκλήσεις ενδέχεται να επιφέρουν στην υιοθέτηση και στην αποτελεσματικότητά τους.

Η μεθοδολογία που ακολουθείται αποσκοπεί στη διερεύνηση των θεωρητικών προσεγγίσεων και στην αξιολόγηση της εφαρμογής τους σε πρακτικό επίπεδο. Επιπλέον, η εργασία επιδιώκει να προσδιορίσει τα εμπόδια που αντιμετωπίζουν οι χρήστες κατά την εφαρμογή των Πληροφοριακών Συστημάτων Διαχείρισης Εκπαίδευσης και να αναλύσει στρατηγικές που θα μπορούσαν να ενισχύσουν την υιοθέτησή τους. Κεντρική θέση καταλαμβάνει η ανάγκη για αποτελεσματική υποστήριξη και εκπαίδευση των χρηστών των συστημάτων αυτών, καθώς και η βελτίωση των υποδομών που απαιτούνται για την επιτυχή εφαρμογή τους.

Η εργασία επικεντρώνεται στην ανάλυση των παραμέτρων που συνδέονται με τις θετικές ή αρνητικές επιπτώσεις των αντιλήψεων των χρηστών σχετικά με την ευχρηστία και τη χρησιμότητα των Πληροφοριακών Συστημάτων Διαχείρισης Εκπαίδευσης. Επίσης, εξετάζεται η σημασία της κοινωνικής επιρροής και των συνθηκών διευκόλυνσης για την αποδοχή αυτών των τεχνολογιών.

Η παρούσα έρευνα παρουσιάζει σημαντικά ευρήματα και προτάσεις για τη βελτίωση των Πληροφοριακών Συστημάτων Διαχείρισης Εκπαίδευσης, προκειμένου να ενισχυθεί η αποτελεσματικότητα και η ισότητα στον τομέα της εκπαίδευσης μέσω της χρήσης νέων τεχνολογιών.

Λέξεις – κλειδιά: Πληροφοριακά Συστήματα Διαχείρισης Εκπαίδευσης, μεθοδολογία, χρήστες.

ΟΙ ΣΤΑΣΕΙΣ ΚΑΙ ΟΙ ΑΝΤΙΛΗΨΕΙΣ ΤΩΝ ΣΤΕΛΕΧΩΝ ΠΡΩΤΟΒΑΘΜΙΑΣ ΚΑΙ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΣΤΟ ΕΛΛΗΝΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΣΤΗΜΑ, ΣΧΕΤΙΚΑ ΜΕ ΤΗ ΔΙΟΙΚΗΣΗ ΤΗΣ ΕΚΠΑΙΔΕΥΣΗΣ ΚΑΙ ΤΙΣ ΚΑΙΝΟΤΟΜΙΕΣ ΠΟΥ ΕΦΑΡΜΟΖΟΝΤΑΙ

Πασχοδήμας Γεώργιος
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης
Πρέβεζα , Ελλάδα
email: g.paschodimas@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η έρευνα αυτή υλοποιήθηκε για τις ανάγκες συγγραφής της Διπλωματικής Εργασίας του εκπαιδευτικού στο πλαίσιο ολοκλήρωσης του Μεταπτυχιακού Προγράμματος Σπουδών με τίτλο «Διοίκηση & Οργάνωση Εκπαιδευτικών Μονάδων» στο Διεθνές Πανεπιστήμιο της Ελλάδος που ολοκληρώθηκε τον Ιούνιο του 2024.

Η μελέτη παρουσιάζει σημαντικά ευρήματα σχετικά: με το προφίλ, τις αντιλήψεις των στελεχών-εκπαιδευτικών για την διοίκηση της εκπαίδευσης, τις ανάγκες και τις προκλήσεις που αντιμετωπίζουν, καθώς και τις προτεραιότητες για τη βελτίωση του εκπαιδευτικού συστήματος.

Για τις ανάγκες δημοσιοποίησης στοιχείων της έρευνας στο 1ο Διεθνές Επιστημονικό Συνέδριο Πρέβεζας με τίτλο**: «Ψηφιακά Μέσα στη Σύγχρονη Εκπαιδευτική Πραγματικότητα. Θέσεις, Αντιθέσεις, Προκλήσεις και Προοπτικές»** αναζητήθηκαν αποτελέσματα της μελέτης που πραγματεύονται την αξιολόγηση της χρήσης ψηφιακών μέσων ως καινοτόμων πρακτικών στην εκπαιδευτική διοίκηση, με στόχο την αναβάθμιση των διοικητικών διαδικασιών και τη βελτίωση της επικοινωνίας εντός του εκπαιδευτικού οργανισμού.

Στην μελέτη αυτή διερευνήθηκε, εκτός των άλλων, ο τρόπος με τον οποίο η ψηφιακή μετάβαση μπορεί να συμβάλει στη μείωση της γραφειοκρατίας, στην εξοικονόμηση χρόνου και πόρων, καθώς και στην ενίσχυση της διαφάνειας και της συλλογικής λήψης αποφάσεων. Για την υλοποίηση της έρευνας χρησιμοποιήθηκε ποσοτική μεθοδολογία, με τη συλλογή δεδομένων μέσω δομημένων ερωτηματολογίων που διανεμήθηκαν σε εκπαιδευτικούς και διοικητικά στελέχη από διάφορα επίπεδα του εκπαιδευτικού συστήματος. Το δείγμα επιλέχθηκε με σκοπιμότητα, ώστε να διασφαλιστεί η αντιπροσωπευτικότητα του πληθυσμού και να καταγραφούν διαφορετικές προοπτικές όσον αφορά τη χρήση των ψηφιακών μέσων στην καθημερινή διοικητική πρακτική. Η ανάλυση των δεδομένων πραγματοποιήθηκε με στατιστικές μεθόδους, επιτρέποντας την εξαγωγή συμπερασμάτων για τις επιδράσεις και τις προκλήσεις που συνοδεύουν την ενσωμάτωση της ψηφιακής τεχνολογίας.

Λέξεις – κλειδιά: ψηφιακά μέσα, εκπαιδευτική διοίκηση, καινοτομία, ψηφιακή μετάβαση, επαγγελματική κατάρτιση.

ΨΗΦΙΑΚΑ ΜΕΣΑ ΚΑΙ ΔΙΟΙΚΗΣΗ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΜΟΝΑΔΩΝ

Χαλβαντζής Βασίλειος, ΠΕ79.01
Διευθυντής Μουσικού Σχολείου Πρέβεζας
Πρέβεζα, Ελλάδα
email: billchalv@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση των ψηφιακών μέσων στη διαχείριση εκπαιδευτικών μονάδων έχει αλλάξει σημαντικά τον τρόπο λειτουργίας των σχολείων και των ακαδημαϊκών ιδρυμάτων. Με την ταχεία πρόοδο της τεχνολογίας, τα ψηφιακά εργαλεία έχουν γίνει απαραίτητα για τους διευθυντές σχολείων, τους δασκάλους και το διοικητικό προσωπικό, ενισχύοντας την επικοινωνία, τη λήψη αποφάσεων και τη συνολική αποτελεσματικότητα. Αυτή η εισήγηση διερευνά τον ρόλο των ψηφιακών μέσων στη διαχείριση εκπαιδευτικών μονάδων, επισημαίνοντας τα οφέλη, τις προκλήσεις και τις βέλτιστες πρακτικές για αποτελεσματική εφαρμογή.

Τα ψηφιακά μέσα περιλαμβάνουν ένα ευρύ φάσμα τεχνολογικών εργαλείων, όπως οι πλατφόρμες κοινωνικών μέσων, τα συστήματα διαχείρισης μάθησης (LMS), τα εργαλεία συνεργασίας που βασίζονται σε σύννεφο και το λογισμικό ανάλυσης δεδομένων. Πλατφόρμες όπως το Google Workspace for Education και το Microsoft 365 Education επιτρέπουν τη συνεργασία σε πραγματικό χρόνο, τη διαχείριση εγγράφων και την οργάνωση εργασιών, προσφέροντας μια ολοκληρωμένη λύση για τη διοίκηση των σχολικών μονάδων.

Ένα από τα βασικά πλεονεκτήματα των ψηφιακών μέσων στη διαχείριση του σχολείου είναι η ικανότητά τους να διευκολύνουν την άμεση και διαφανή επικοινωνία. Εφαρμογές όπως το Zoom, Microsoft Teams και Google Meet υποστηρίζουν διαδικτυακές συναντήσεις, διασφαλίζοντας την απρόσκοπτη αλληλεπίδραση μεταξύ σχολικού προσωπικού, μαθητών και γονέων. Επιπλέον, πλατφόρμες κοινωνικής δικτύωσης, όπως το Facebook, Twitter και LinkedIn, βοηθούν τα εκπαιδευτικά ιδρύματα να επικοινωνούν με τις κοινότητές τους, να μοιράζονται ενημερώσεις και να προωθούν τις δραστηριότητές τους.

Τα συστήματα διαχείρισης μάθησης (LMS), όπως το Moodle, Google Classroom και Blackboard, έχουν φέρει επανάσταση στη διαχείριση της εκπαίδευσης απλοποιώντας τη διαχείριση μαθημάτων, την παρακολούθηση και την κοινή χρήση πόρων. Οι εκπαιδευτικοί μπορούν να οργανώνουν σχέδια μαθημάτων, να διανέμουν εργασίες και να παρακολουθούν την πρόοδο των μαθητών μέσω αυτών των εργαλείων, καθιστώντας τη διαδικασία πιο διαφανή και αποδοτική.

Η ανάλυση δεδομένων παίζει καθοριστικό ρόλο στη σύγχρονη εκπαιδευτική διαχείριση. Εργαλεία όπως το Google Forms, Microsoft Forms και Power BI επιτρέπουν στους διαχειριστές να συλλέγουν και να αναλύουν δεδομένα που σχετίζονται με την απόδοση των μαθητών, τη συμμετοχή, την αποτελεσματικότητα των εκπαιδευτικών και την κατανομή των πόρων. Χρησιμοποιώντας προγνωστικά αναλυτικά στοιχεία, οι διευθυντές σχολείων μπορούν να εντοπίσουν τάσεις, να αντιμετωπίσουν προληπτικά προκλήσεις και να βελτιώσουν τα ακαδημαϊκά αποτελέσματα.

Επιπλέον, τα ψηφιακά μέσα υποστηρίζουν τη συμμετοχική διακυβέρνηση ενθαρρύνοντας τη συνεργασία μεταξύ εκπαιδευτικών, μαθητών και ενδιαφερόμενων μερών. Εργαλεία όπως το Slack, Trello και Asana προσφέρουν πλατφόρμες για αποτελεσματική διαχείριση έργων, συντονισμό εργασιών και βελτίωση της ομαδικής εργασίας.

Παρά τα πολυάριθμα πλεονεκτήματά τους, η υιοθέτηση των ψηφιακών μέσων στη διαχείριση εκπαιδευτικών μονάδων παρουσιάζει αρκετές προκλήσεις. Η ασφάλεια των δεδομένων και το απόρρητο αποτελούν σημαντικές ανησυχίες, γι' αυτό απαιτούνται λύσεις όπως τα GDPR Compliance Tools (OneTrust, TrustArc) για τη διαχείριση προσωπικών δεδομένων. Επιπλέον, το ψηφιακό χάσμα αποτελεί πρόβλημα, καθώς δεν έχουν όλα τα εκπαιδευτικά ιδρύματα ίση πρόσβαση σε τεχνολογικούς πόρους. Η αντίσταση στην αλλαγή μεταξύ των εκπαιδευτικών και των διαχειριστών μπορεί επίσης να εμποδίσει την επιτυχή εφαρμογή των ψηφιακών εργαλείων.

Η παροχή επαρκούς κατάρτισης και προγραμμάτων επαγγελματικής ανάπτυξης είναι ζωτικής σημασίας για να ξεπεραστούν αυτά τα εμπόδια. Επενδύοντας σε προγράμματα επιμόρφωσης και τεχνολογικές λύσεις, οι εκπαιδευτικές μονάδες μπορούν να αξιοποιήσουν πλήρως τα ψηφιακά μέσα, διασφαλίζοντας την αποτελεσματική και βιώσιμη ενσωμάτωσή τους στη σχολική διοίκηση.

Συμπερασματικά, τα ψηφιακά μέσα έχουν φέρει επανάσταση στη διαχείριση εκπαιδευτικών μονάδων βελτιώνοντας την επικοινωνία, ενισχύοντας τη λήψη αποφάσεων και εξορθολογίζοντας τα διοικητικά καθήκοντα. Ενώ εξακολουθούν να υπάρχουν προκλήσεις όπως η ασφάλεια των δεδομένων, το ψηφιακό χάσμα και η αντίσταση στην αλλαγή, η υιοθέτηση στρατηγικών πολιτικών και η επένδυση στην επαγγελματική ανάπτυξη μπορούν να εξασφαλίσουν την επιτυχή ενσωμάτωση των ψηφιακών εργαλείων στην εκπαίδευση. Καθώς η τεχνολογία συνεχίζει να εξελίσσεται, τα εκπαιδευτικά ιδρύματα πρέπει να αγκαλιάσουν τον ψηφιακό μετασχηματισμό για να δημιουργήσουν πιο αποτελεσματικά, περιεκτικά και προσαρμοστικά περιβάλλοντα μάθησης.

Λέξεις – κλειδιά: Ψηφιακά μέσα, διοίκηση εκπαιδευτικών μονάδων.

ΘΠ28: Επαγγελματική ανάπτυξη εκπαιδευτικών με την αξιοποίηση νέων τεχνολογιών

ΑΥΤΟΕΠΙΜΟΡΦΩΣΗ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΜΕ ΑΞΙΟΠΟΙΗΣΗ ΤΟΥ E- LEARNING - LAMAP ΣΤΟ ΓΑΛΛΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΣΤΗΜΑ

Γριβόπουλος Κωνσταντίνος
Φυσικός, Δρ. Διδακτικής Φυσικών Επιστημών
Γενικό Λύκειο Νεοχωρίου Δήμου Ι.Π. Μεσολογγίου
Μεσολόγγι, Ελλάδα
e-mail: kgrivop@gmail.com

ΠΕΡΙΛΗΨΗ

Για τις επιμορφωτικές ανάγκες των Γάλλων εκπαιδευτικών στη διδασκαλία των φυσικών επιστημών δημιουργήθηκε το ψηφιακό μέσο e-learning-Lamap. Οι διαχειριστές και οι επιμορφωτές της πλατφόρμας προσφέρουν σε νηπιαγωγούς, δασκάλους και καθηγητές Γυμνασίων μια σειρά ωριαίων βιντεοπαρουσιάσεων (tutoriels) για την εκμάθηση και εμπέδωση της επιστημονικής - διερευνητικής μεθόδου. Ωστόσο, σε αυτόν τον ψηφιακό πόρο προσεγγίζεται και θεματολογία ευρύτερου ενδιαφέροντος, προσαρμοσμένη στη σχολική βαθμίδα για την οποία κάθε χρήστης - εκπαιδευτικός ενδιαφέρεται. Ειδικότερα, η σελίδα για την ψηφιακή αυτοεπιμόρφωση « démarches d'investigation » συμβάλλει στην προετοιμασία των εκπαιδευτικών στη μαθητοκεντρική διδασκαλία των φυσικών επιστημών με εφαρμογή της διερευνητικής μεθόδου, εξοικειώνοντάς τους με τα επιμέρους στάδια αυτής. Οι χρήστες της πλατφόρμας έχουν τη δυνατότητα ελεύθερης πρόσβασης σε επιστημονικό και παιδαγωγικό υλικό. Επιπρόσθετα, αλληλεπιδρούν με συναδέλφους τους για ανταλλαγή εμπειριών, απόψεων, ιδεών κλπ., μέσα από προβλεπόμενα φόρουμ που οργανώνονται ανά θεματολογία. Έτσι, οι εκπαιδευτικοί καλλιεργούν εξ' αποστάσεως επαγγελματικές δεξιότητες σε χρόνο της δικής τους επιλογής και με τους προσωπικούς τους ρυθμούς.

Το κείμενο διαρθρώνεται ως εξής: η εισαγωγή ακολουθείται από τη διασάφηση των εννοιών αυτοεπιμόρφωση, κοινότητες μάθησης και επιστημονική - διερευνητική μέθοδος διδασκαλίας. Κατόπιν, παρουσιάζεται η αρχιτεκτονική της πλατφόρμας e - learning - Lamap και ο τρόπος λειτουργίας της στην αυτοεπιμόρφωση και διάδραση των εκπαιδευτικών.

Λέξεις-κλειδιά: Αυτοεπιμόρφωση, επιστημονική - διερευνητική μέθοδος διδασκαλίας, ψηφιακό μέσο e-learning-Lamap.

Η ΕΜΦΥΛΗ ΔΙΑΣΤΑΣΗ ΣΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΚΑΙ ΧΡΗΣΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΤΕΧΝΟΛΟΓΙΑΣ (ΑΠΟ ΤΟΥΣ/ΤΙΣ ΕΚΠΑΙΔΕΥΤΙΚΟΥΣ) ΣΤΗ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ

Ευσταθιάδου Άννα
Εκπαιδευτικός ΠΕ02 Φιλολόγων
1ο ΓΕΛ Πτολεμαΐδας
Κοζάνη, Ελλάδα
email: annitaefkoz@gmail.com

ΠΕΡΙΛΗΨΗ

Από τη δεκαετία του 1980, δεκαετία κατά την οποία οι Νέες Τεχνολογίες κάνουν, σταδιακά, εμφανή την παρουσία τους σε πολλούς τομείς της ανθρώπινης δραστηριότητας- στην εργασία, στην εκπαίδευση, στην επιστήμη, στην πολιτική- έως και σήμερα, παρατηρούνται έμφυλες διαφορές στην πρόσβαση, χρήση αλλά και αξιοποίηση των Τεχνολογιών της Πληροφορίας. Η ποιοτική βελτίωση των εκπαιδευτικών συστημάτων, η ισότιμη παροχή ψηφιακών δεξιοτήτων, η αναδιαμόρφωση του εκπαιδευτικού συστήματος μέσω του ψηφιακού μετασχηματισμού αποτελεί στόχο στρατηγικής σημασίας για την Ευρωπαϊκή Ένωση και, φυσικά, για την Ελλάδα.

Σύγχρονες έρευνες δείχνουν ότι το φύλο, ως κοινωνική κατασκευή, εξακολουθεί να αποτελεί σημαντικό παράγοντα ανισότητας **και** στο πεδίο της ψηφιακής τεχνολογίας. Κι αυτό διότι στερεοτυπικές αντιλήψεις που αφορούν τη σχέση των φύλων με τις νέες τεχνολογίες αντανακλούν την πολύ διαδεδομένη άποψη ότι οι ψηφιακές δεξιότητες αποτελούν ανδρικό πεδίο δράσης περισσότερο παρά αντικείμενο ενασχόλησης και εξειδίκευσης των γυναικών. Οι ίδιοι οι εκπαιδευτικοί, τόσο οι άνδρες όσο και οι γυναίκες, θεωρούν τους μαθητές τους ικανότερους από τις μαθήτριες τους στη χρήση και αξιοποίηση των δυνατοτήτων της ψηφιακής τεχνολογίας. Οι γυναίκες εκπαιδευτικοί έχουν χαμηλότερες προσδοκίες και περιορισμένη εμπιστοσύνη στην ικανότητά τους να εντάξουν και να χρησιμοποιήσουν την ψηφιακή τεχνολογία στην καθημερινή διδακτική πρακτική.

Στην παρούσα εργασία επιχειρείται βιβλιογραφική επισκόπηση των έμφυλων διαφορών αναφορικά με το βαθμό αξιοποίησης και χρήσης της ψηφιακής τεχνολογίας από τους/τις εκπαιδευτικούς δευτεροβάθμιας εκπαίδευσης στην εκπαιδευτική διαδικασία κατά τις δύο, κυρίως, τελευταίες δεκαετίες, με την ολοκληρωτική «διείσδυση» και επικράτηση των ΤΠΕ σε όλους τους τομείς της ανθρώπινης δραστηριότητας και έκφρασης, ιδιαίτερα μάλιστα μετά την περίοδο της πανδημίας. Η επιδημική κρίση της νόσου COVID-19, είχε σοβαρές συνέπειες στην εκπαίδευση και την κατάρτιση και δημιούργησε νέα δεδομένα στην εκπαιδευτική πραγματικότητα.

Συγκεκριμένα εξετάζονται οι διαφορές φύλου ως προς τις στάσεις και τις αντιλήψεις των γυναικών εκπαιδευτικών απέναντι στην ολοένα αυξανόμενη χρήση της τεχνολογίας στην εκπαίδευση, την κατανόηση της αδήριτης ανάγκης απόκτησης ψηφιακών δεξιοτήτων για την πιο αποτελεσματική προσαρμογή στα σύγχρονα εκπαιδευτικά δεδομένα, τις ψηφιακές δεξιότητες που κατέχουν οι γυναίκες εκπαιδευτικοί συγκριτικά με τους άντρες συναδέλφους τους, τις γνώσεις τους για τα ψηφιακά εργαλεία (λογισμικά, πλατφόρμες, εφαρμογές), το βαθμό αξιοποίησης ενός ευρέως φάσματος ψηφιακών τεχνολογιών στη μαθησιακή διαδικασία και τυχόν αλλαγές που έχουν προκύψει με το πέρασμα των δεκαετιών.

Λέξεις κλειδιά: έμφυλες διαφορές, ψηφιακή τεχνολογία, εκπαιδευτικοί δευτεροβάθμιας εκπαίδευσης, ψηφιακές δεξιότητες, ψηφιακός γραμματισμός

Η ΕΠΑΓΓΕΛΜΑΤΙΚΗ ΚΑΙ ΕΠΙΣΤΗΜΟΝΙΚΗ ΑΝΑΒΑΘΜΙΣΗ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΩΣ ΚΡΙΣΙΜΗ ΔΙΑΣΤΑΣΗ ΚΑΙ ΠΡΟΟΠΤΙΚΗ ΤΩΝ ΔΥΝΑΤΟΤΗΤΩΝ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
e-mail: alexmastr@yahoo.gr

Πασσά Σοφία
Επόπτρια Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: sofipassa@gmail.com

Κατσιώπη Παρασκευή
Δ/ντρια Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
e-mail: voulakats@gmail.com

ΠΕΡΙΛΗΨΗ

Η επιμόρφωση των εκπαιδευτικών αποτελεί κλειδί για την ουσιαστική αναβάθμιση της ποιότητας της εκπαίδευσης. Ένας επιμορφωμένος εκπαιδευτικός μπορεί να βελτιώσει σημαντικά τις παιδαγωγικές και διδακτικές του δεξιότητες, να αυξήσει την επιστημονική αυτογνωσία του, την επαγγελματική του αυτοπεποίθηση και τον ενθουσιασμό του, ώστε να δημιουργήσει τις συνθήκες εκείνες που θα του επιτρέψουν να ανταποκρίνεται πληρέστερα και επιτυχέστερα στην ποικιλομορφία και την ετερογένεια των αναγκών των μαθητών του. Η συνεχής επιστημονική και επαγγελματική αναβάθμιση των εκπαιδευτικών θεωρείται απαραίτητη όχι μόνο για τους νέους αλλά και για τους έμπειρους εκπαιδευτικούς, αφού πέραν των άλλων ενισχύει και το πάθος τους αλλά και την αποτελεσματικότητα του πολυδύναμου και πολυσύνθετου ρόλου τους. Μολονότι έχουν παρατηρηθεί δυσκολίες στην αλλαγή των διδακτικών πρακτικών και των πεποιθήσεων των εκπαιδευτικών, είναι αναγνωρισμένη η αξία στοχευμένων προγραμμάτων επιμόρφωσης υπό την προϋπόθεση, βέβαια, ότι αυτά θα γεφυρώνουν το χάσμα μεταξύ της θεωρίας και της πράξης, όπως ήδη είχε επισημάνει, από το 1914, ο μεγάλος John Dewey.

Στη σημερινή ψηφιακή εποχή, η επιμόρφωση των εκπαιδευτικών είναι περισσότερο αναγκαία από ποτέ, καθώς πέραν της ενίσχυσης και του βέλτιστου μετασχηματισμού των διαδικασιών, των μεγεθών και των διαστάσεων της διδασκαλίας και της μάθησης, μπορεί να αναδείξει και να προσφέρει νέες παιδαγωγικές δεξιότητες στους μάχιμους εκπαιδευτικούς, απαραίτητες για τη δημιουργία αλληλεπιδραστικών και εποικοδομιστικών περιβαλλόντων μάθησης τα οποία θα ανταποκρίνονται στις σύγχρονες κοινωνικοοικονομικές και τεχνολογικές συνθήκες. Προς αυτή την προκλητική σύγχρονη εκπαιδευτική απαίτηση, η αξιοποίηση της Τεχνητής Νοημοσύνης (ΤΝ) στην επιμόρφωση των εκπαιδευτικών προβάλλει ως μία εκ των ων ουκ άνευ ψηφιακή διαμεσολάβηση, καθώς μπορεί να προσφέρει καινοτόμες και ριζοσπαστικές δυνατότητες υποστήριξης της επαγγελματικής και επιστημονικής αναβάθμισής τους. Η ΤΝ μπορεί να παρέχει πλούσιες ευκαιρίες μικρομάθησης και δια βίου μάθησης στους εκπαιδευτικούς, να αναλύει πληθώρα εκπαιδευτικών δεδομένων, να προτείνει στοχευμένες διδακτικές και παιδαγωγικές παρεμβάσεις, να δημιουργεί εξατομικευμένα και διαφοροποιημένα σχέδια διδασκαλίας αλλά και ρεαλιστικά σενάρια, όπως και να παρέχει συνεχή και αντικειμενική ανατροφοδότηση. Η ΤΝ, από τώρα και στο εξής, θα διεκδικεί σημαντικό ρόλο και μερίδιο στην οικοδόμηση ενός αποτελεσματικού μοντέλου επιμόρφωσης, το οποίο θα είναι ικανό να υποστηρίζει τον εκπαιδευτικό στον απαιτητικό και πληθωρικό ρόλο του, ώστε, τελικά, να ενισχύεται η συνολική ποιότητα του εκπαιδευτικού έργου, αλλά και να παγιώνεται το θετικό αποτύπωμα της μαθησιακής εμπειρίας των μαθητών.

Προς την κατεύθυνση αυτή, η παρούσα εργασία θα παρουσιάσει πρακτικές εφαρμογές της ΤΝ, οι οποίες μπορούν να υποστηρίξουν την επαγγελματική και επιστημονική ανάπτυξη των εκπαιδευτικών και να συμβάλουν σημαντικά στην αναμόρφωση της εκπαιδευτικής διαδικασίας, καθώς και στη διαρκώς επιζητούμενη βελτίωση της ποιότητας της εκπαίδευσης.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, επιμόρφωση, αναβάθμιση, εκπαιδευτικός

ΨΗΦΙΑΚΗ ΕΠΙΜΟΡΦΩΣΗ & ΕΚΠΑΙΔΕΥΣΗ: Ο ΕΚΠΑΙΔΕΥΤΙΚΟΣ ΣΤΗΝ ΕΠΟΧΗ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

Πούλιος Χρήστος
Σύμβουλος Εκπαίδευσης ΠΕ81, ME.d,MSc,
ΔΔΕ Ιωαννίνων

ΠΕΡΙΛΗΨΗ

Η επαγγελματική ανάπτυξη των εκπαιδευτικών αποτελεί αναπόσπαστο στοιχείο της ποιοτικής εκπαίδευσης, ενώ οι ραγδαίες τεχνολογικές εξελίξεις δημιουργούν νέες δυνατότητες και προκλήσεις. Η παρούσα εργασία εξετάζει τη συμβολή της ψηφιακής επιμόρφωσης στην ενίσχυση της διδακτικής πρακτικής των εκπαιδευτικών, μέσα από τη χρήση καινοτόμων εργαλείων, όπως η εξ αποστάσεως εκπαίδευση, οι διαδικτυακές πλατφόρμες επιμόρφωσης, οι κοινότητες πρακτικής και η τεχνητή νοημοσύνη. Η ανάλυση βασίζεται σε βιβλιογραφική επισκόπηση και παρουσίαση επιλεγμένων παραδειγμάτων εφαρμογής από την ευρωπαϊκή και κυπριακή εκπαιδευτική πραγματικότητα.

Λέξεις-κλειδιά: Ψηφιακή επιμόρφωση, εκπαιδευτικοί, εξ αποστάσεως εκπαίδευση, τεχνητή νοημοσύνη, επαγγελματική ανάπτυξη.

ΑΝΤΙΛΗΨΕΙΣ ΚΑΙ ΑΠΟΨΕΙΣ ΕΝ ΔΥΝΑΜΕΙ ΛΟΓΟΘΕΡΑΠΕΥΤΩΝ ΓΙΑ ΤΗΝ ΧΡΗΣΗ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ ΤΗΣ ΟΦΘΑΛΜΟΚΙΝΗΣΗΣ ΣΤΙΣ ΔΕΞΙΟΤΗΤΕΣ ΑΝΑΓΝΩΣΗΣ

Πεκλάρη Βασιλική
Μόνιμη εκπαιδευτικός, φιλόλογος ΠΕ02 ΕΑΕ, MSc,
Υποψήφια Διδάκτωρ,
Τμήμα Λογοθεραπείας
Πανεπιστήμιο Ιωαννίνων,
Πανεπιστημιούπολη Β', 45500 Ιωάννινα
e-mail: vpeklari@uoi.gr

Τόκη Ευγενία
Καθηγήτρια,
Τμήμα Λογοθεραπείας
Πανεπιστήμιο Ιωαννίνων
Πανεπιστημιούπολη Β', 45500 Ιωάννινα
e-mail: toki@uoi.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη χρήση της τεχνολογίας οφθαλμοκίνησης (eye-tracking) για τη διάγνωση και την παρέμβαση σε αναγνωστικές δυσκολίες, εστιάζοντας στις αντιλήψεις των φοιτητών/τριών του Τμήματος Λογοθεραπείας του Πανεπιστημίου Ιωαννίνων. Σκοπός της έρευνας είναι να καταγράψει σε ποιον βαθμό οι φοιτητές/τριες αντιλαμβάνονται τα οφέλη αυτής της τεχνολογίας, ποια είναι η στάση τους ως προς την ενσωμάτωσή της στην κλινική πράξη της Λογοθεραπείας και ποιες δυσκολίες ενδέχεται να συναντήσουν κατά την εφαρμογή της. Το δείγμα της έρευνας αποτελείται από 49 προπτυχιακούς φοιτητές/τριες (Α:5, Γ:44) που επέλεξαν να συμμετέχουν απαντώντας σε ανώνυμο ερωτηματολόγιο. Τα αποτελέσματα υποδεικνύουν ότι οι φοιτητές αναγνωρίζουν τη σημαντική συμβολή της τεχνολογίας στην ενίσχυση της διαγνωστικής ακρίβειας και στην ανάπτυξη εξατομικευμένων θεραπευτικών παρεμβάσεων. Ωστόσο, εντοπίζονται προκλήσεις όπως το υψηλό κόστος εξοπλισμού, η ανάγκη εξειδικευμένης εκπαίδευσης και η δυσκολία ενσωμάτωσης της τεχνολογίας σε καθιερωμένες παρεμβατικές πρακτικές. Προτείνεται από τους εν δυνάμει λογοθεραπευτές η μελλοντική έρευνα να εστιάσει στη διερεύνηση της ένταξης της τεχνολογίας οφθαλμοκίνησης στην εκπαίδευση Λογοθεραπευτών ή/και άλλων συναφών ειδικοτήτων, με στόχο την ενίσχυση των κλινικών δεξιοτήτων των μελλοντικών επαγγελματιών αλλά και την αποτελεσματική αξιοποίησή της στην πρώιμη ανίχνευση και παρέμβαση σε δυσκολίες που επηρεάζουν τη δεξιότητα της ανάγνωσης.

Λέξεις-κλειδιά: Τεχνολογία οφθαλμοκίνησης, αξιολόγηση αναγνωστικών δυσκολιών, παρακολούθηση οφθαλμικών κινήσεων, διάγνωση και παρέμβαση, λογοθεραπεία και τεχνολογία.

Πλήρεις Εργασίες Συνεδρίου

ΘΠ1: Έρευνα για την ανάπτυξη, εφαρμογή και χρήση σύγχρονων τεχνολογιών στο σύγχρονο σχολείο, στην εκπαίδευση και τη μάθηση

STOP MOTION: ΕΝΑ ΣΧΕΔΙΑΣΤΙΚΟ ΕΡΓΑΛΕΙΟ ΓΙΑ ΤΗΝ ΠΑΡΑΓΩΓΗ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΥΛΙΚΟΥ

Τζιαρού Αθηνά
Μηχανικός Σχεδίασης Προϊόντων και Συστημάτων
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: athinatziarou@gmail.com

Ευκολίδης Νικόλαος
Αναπληρωτής Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: nefkolidis@uowm.gr

Κυράτσης Παναγιώτης
Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: pkyratsis@uowm.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία ερευνά την εφαρμογή της τεχνικής Stop Motion ως εργαλείο για τη δημιουργία εκπαιδευτικού υλικού, παρουσιάζοντας τη συμβολή του στην ενεργητική μάθηση και στην ανάπτυξη γνωστικών, κοινωνικών και τεχνικών δεξιοτήτων. Το Stop Motion ενδείκνυται για παιδαγωγικές εφαρμογές, που προάγουν τη βιωματική και δημιουργική μάθηση, ενισχύοντας την προσωπική έκφραση, τη συνεργασία και την αφηγηματική ικανότητα των μαθητών. Μέσω της χρήσης φυσικών υλικών εργαλείων και τεχνολογικών μέσων, οι μαθητές αποκτούν εμπειρική επαφή με τη μάθηση, αναλαμβάνουν ρόλους δημιουργών και αφηγητών, και μαθαίνουν πώς να οργανώνουν και να υλοποιούν σύνθετα έργα με παιδαγωγικό περιεχόμενο.

Η εργασία εξετάζει τόσο τη θεωρητική θεμελίωση της μεθόδου, όσο και την εφαρμογή της. Επιπλέον, παρουσιάζονται τα οφέλη και οι προκλήσεις που σχετίζονται με την ενσωμάτωση του Stop Motion στην τάξη, καθώς και προτάσεις για την αποτελεσματική αξιοποίησή του από τους εκπαιδευτικούς. Τέλος, τονίζεται η διαθεματική και συμπεριληπτική δυναμική της τεχνικής, που επιτρέπει την προσαρμογή της στις ανάγκες των μαθητών, προάγοντας την παιδαγωγική καινοτομία και την ενεργή συμμετοχή όλων. Η προσέγγιση αυτή αντανακλά τις σύγχρονες διδακτικές προσεγγίσεις, όπου ο μαθητής τοποθετείται στο επίκεντρο της μαθησιακής διαδικασίας και η τεχνολογία λειτουργεί υποστηρικτικά προς την ανάπτυξη της δημιουργικότητας και της συνεργατικής κουλτούρας.

Λέξεις – κλειδιά: stop motion, εκπαιδευτικό υλικό, ψηφιακή αφήγηση, βιωματική μάθηση, δημιουργικότητα, συνεργατική μάθηση, τεχνολογία στην εκπαίδευση, πρωτοτυποποίηση, project-based learning (PBL), συμπερίληψη, συναισθηματική ενδυνάμωση

ΕΙΣΑΓΩΓΗ

Η δυναμική της σύγχρονης εκπαίδευσης δεν ορίζεται πλέον από την απλή μετάδοση γνώσεων από τον δάσκαλο στον μαθητή, αλλά από την ικανότητά της να ενεργοποιεί τη δημιουργικότητα, την κριτική σκέψη και την ενεργή συμμετοχή του μαθητή στην διαδικασία της γνώσης. Οι σημερινοί μαθητές δεν είναι πλέον παθητικοί δέκτες, αλλά αναμένεται να είναι ενεργοί ερευνητές και δημιουργοί στο πλαίσιο ενός πιο ανοικτού και συμμετοχικού σχολείου. Η ένταξη πολυμέσων και ψηφιακών τεχνολογιών στις καθημερινές διδακτικές πρακτικές έχει διαμορφώσει ένα νέο μαθησιακό περιβάλλον, όπου η καινοτομία, η αναπαράσταση της γνώσης με πολλαπλούς τρόπους και η συναισθηματική εμπλοκή του μαθητή κατέχουν κυρίαρχη θέση.

Μέσα σε αυτό το πλαίσιο, η τεχνική του Stop Motion προσφέρει μια ευκαιρία για την ανάδειξη της δημιουργικότητας των μαθητών και την ενίσχυση της βιωματικής μάθησης. Το Stop Motion βασίζεται στη λήψη διαδοχικών φωτογραφιών αντικειμένων, φιγούρων ή σχεδίων που μετακινούνται σταδιακά. Όταν οι εικόνες αυτές προβάλλονται σε γρήγορη ταχύτητα, παράγεται η ψευδαίσθηση της κίνησης, δίνοντας ζωή σε στατικά αντικείμενα. Πέρα από το αισθητικό και τεχνικό του ενδιαφέρον, το Stop Motion λειτουργεί ως παιδαγωγικό εργαλείο, καθώς επιτρέπει στους μαθητές να εκφράσουν ιδέες, να αφηγηθούν ιστορίες και να αναπαραστήσουν αφηρημένες έννοιες μέσω οπτικοακουστικών τρόπων.

Η δημιουργία τέτοιων έργων ενισχύει τη μάθηση με τρόπο βιωματικό και δημιουργικό. Η παιδαγωγική σημασία του Stop Motion δεν περιορίζεται στην τελική παραγωγή ενός βίντεο, αλλά εστιάζει στη διαδικασία: από τον σχεδιασμό και τη συνεργασία μέχρι την επίλυση προβλημάτων, την αφήγηση και την τεχνολογική δεξιότητα. Αποτελεί δηλαδή ένα πολυτροπικό και διαθεματικό εργαλείο που ενδυναμώνει τον μαθητή, επιτρέποντάς του να εμπλακεί πλήρως με το περιεχόμενο του μαθήματος, να δημιουργήσει και να στοχαστεί.

Η εργασία που ακολουθεί εξετάζει διεξοδικά τη χρήση του Stop Motion ως εκπαιδευτικού εργαλείου. Αρχικά, παρατίθεται το θεωρητικό υπόβαθρο που το καθιστά παιδαγωγικά έγκυρο. Στη συνέχεια, αναλύονται η μεθοδολογία εφαρμογής στην τάξη, παραδείγματα από εκπαιδευτικά σενάρια και η εμπειρική τεκμηρίωση των αποτελεσμάτων. Τέλος, συζητούνται οι προκλήσεις και οι περιορισμοί, ενώ προτείνονται τρόποι για την ενίσχυση της εφαρμογής του στην ελληνική και διεθνή εκπαιδευτική πραγματικότητα.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η αποτελεσματική ενσωμάτωση ενός εργαλείου στην εκπαιδευτική διαδικασία δεν είναι ζήτημα τεχνικής επιλογής, αλλά παιδαγωγικής τεκμηρίωσης. Η θεωρία της μάθησης αποτελεί την βάση για την αξιολόγηση της παιδαγωγικής αξίας του Stop Motion. Στην περίπτωση αυτή, το εργαλείο αυτό δεν επιτελεί απλώς αισθητική ή τεχνολογική λειτουργία, αλλά ανταποκρίνεται σε ουσιώδεις παιδαγωγικές αρχές που προέρχονται από διαφορετικά θεωρητικά ρεύματα.

Η κατασκευαστική θεωρία της μάθησης, όπως αυτή θεμελιώθηκε από τον Jean Piaget, δίνει έμφαση στην ενεργητική οικοδόμηση της γνώσης από το ίδιο το υποκείμενο. Ο μαθητής δεν απομνημονεύει, αλλά αλληλεπιδρά με το περιβάλλον, διερευνά, κάνει υποθέσεις και κατασκευάζει τη γνώση του. Η δημιουργία ενός stop motion έργου αποτελεί ακριβώς μια τέτοια διαδικασία: ο μαθητής καλείται να οργανώσει πληροφορίες, να επιλέξει αναπαραστατικά μέσα, να διαμορφώσει αφηγηματική δομή και να εφαρμόσει τεχνικές υλοποίησης. Η ίδια η δημιουργική διαδικασία είναι η μάθηση (Jean Piaget, 1952).

Σύμφωνα με τον Vygotsky, η μάθηση είναι κοινωνική και οικοδομείται στο πλαίσιο της «ζώνης επικείμενης ανάπτυξης», εκεί όπου ο μαθητής υποστηρίζεται από άλλους, συχνά πιο έμπειρους, μέσα σε περιβάλλοντα συνεργασίας. Το Stop Motion ως ομαδική δραστηριότητα επιτρέπει στους μαθητές να συνεργαστούν, να μοιραστούν ρόλους (σκηνοθέτης, φωτογράφος, αφηγητής, δημιουργός αντικειμένων), να αλληλεπιδράσουν δημιουργικά και να επιλύσουν προβλήματα συλλογικά. Η ενσωμάτωση της γλώσσας τόσο προφορικής όσο και γραπτής στην αφήγηση, ενισχύει επιπλέον την ανάπτυξη της μεταγλωσσικής επίγνωσης και της επικοινωνιακής ικανότητας . (Vygotsky, L. S., 1978).

Ο Papert υποστήριξε με την θεωρία Constructionism ότιι μαθητές μαθαίνουν καλύτερα όταν κατασκευάζουν κάτι που έχει προσωπικό νόημα για εκείνους και είναι κοινωνικά επικοινωνίσιμο — όπως ένα ψηφιακό αντικείμενο, μια ιστορία, ένα πρόγραμμα. Το Stop Motion ενσωματώνει αυτή τη λογική, αφού κάθε παραγόμενο βίντεο αποτελεί υλοποίηση ενός γνωστικού ή αφηγηματικού στόχου μέσω υλικών και τεχνολογικών μέσων. Εδώ, ο υπολογιστής ή η συσκευή δεν αποτελεί το κέντρο της διδασκαλίας, αλλά τον «συνεργάτη» στην κατασκευή της γνώσης (Papert, S., 1980).

Τέλος, η θεωρία των multiliteracies (New London Group, 1996) εισάγει μια πιο σύγχρονη διάσταση: τη δυνατότητα του μαθητή να διαχειρίζεται και να εκφράζεται μέσα από ποικίλα μέσα και μορφές αναπαράστασης. Στη σύγχρονη κοινωνία, η γλωσσική ικανότητα δεν είναι μόνο λεκτική ή γραπτή, αλλά και οπτική, ψηφιακή, χωρική. Το stop motion επιτρέπει ακριβώς αυτή τη δυνατότητα: ενσωματώνει λόγο, εικόνα, ήχο και κίνηση, επιτρέποντας στους μαθητές να αναπτύξουν δεξιότητες πολυτροπικού εγγραμματισμού και να εκφραστούν με τρόπο αυθεντικό και σύνθετο (New London Group, 1996).

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα εργασία ακολουθεί μια θεωρητικο-πρακτική μεθοδολογική προσέγγιση, με σκοπό να διερευνήσει και να αναδείξει τις δυνατότητες του Stop Motion ως εργαλείου σχεδιασμού εκπαιδευτικού υλικού. Δεν βασίζεται σε ποσοτική ή ποιοτική έρευνα με δείγμα μαθητών, αλλά σε κριτική ανάλυση του παιδαγωγικού πλαισίου της τεχνικής και παρουσίαση της διαδικασίας παραγωγής υλικού στο πλαίσιο ενός εκπαιδευτικού σχεδιασμού.

Η προσέγγιση οργανώνεται γύρω από τη μελέτη της τεχνικής του Stop Motion ως σχεδιαστικού εργαλείου για την παραγωγή σύντομων οπτικοακουστικών βίντεο που μπορούν να χρησιμοποιηθούν στην εκπαιδευτική πράξη. Η μεθοδολογία περιλαμβάνει την ανάλυση των χαρακτηριστικών της τεχνικής, τα στάδια παραγωγής, τις τεχνολογικές απαιτήσεις και τις παιδαγωγικές δυνατότητες, όπως αναδεικνύονται μέσα από θεωρητικά πρότυπα και παραδείγματα χρήσης.

Η εργασία βασίστηκε στην αξιοποίηση υλικών χαμηλού κόστους για την παραγωγή πειραματικού υλικού, χωρίς τη συμμετοχή μαθητών. Συγκεκριμένα, κατασκευάστηκε ένα δείγμα βίντεο με την τεχνική του Stop Motion, με στόχο να αναδειχθούν οι τεχνικές, χρονικές και δημιουργικές απαιτήσεις του μέσου. Η παραγωγή αυτή λειτούργησε ως εφαρμοσμένο παράδειγμα για τη διερεύνηση της μεθοδολογίας, των εργαλείων και της εν δυνάμει εκπαιδευτικής αξιοποίησης της τεχνικής.

Συνοπτικά, η μεθοδολογία οργανώνεται ως εξής:

1. Θεωρητική διερεύνηση του Stop Motion ως εργαλείου ψηφιακής αφήγησης.
2. Καταγραφή της τεχνικής διαδικασίας παραγωγής (σχεδιασμός, κατασκευή υλικών, φωτογράφιση, ψηφιακή επεξεργασία).
3. Παραγωγή ενδεικτικού βίντεο που τεκμηριώνει τη διαδικασία (Εικόνα 1).
4. Σχολιασμός των ευρημάτων, προβληματισμών και δυνατοτήτων που προέκυψαν από την πρακτική υλοποίηση.

Εικόνα 1.
Αυτοσχέδιο studio παραγωγής Stop Motion



Η εργασία αποσκοπεί όχι στην εμπειρική αποτίμηση της αποτελεσματικότητας της τεχνικής στη μαθησιακή επίδοση, αλλά στην τεκμηρίωση των μεθοδολογικών βημάτων που απαιτούνται για την αξιοποίησή της από τον εκπαιδευτικό, καθώς και στην ανάδειξη της παιδαγωγικής δυναμικής της.

Εφαρμογή παραδείγματος

- Στόχος: Η παρουσίαση μιας απλής ιστορίας που θέλει να περάσει ένα μήνυμα. Έτσι, δημιουργήθηκαν 4 θεματικά δωμάτια, με σκοπό να παρουσιαστεί η καθημερινή ζωή ενός ανθρώπου που αλληλοεπιδρά με τα έπιπλα.
- Μελέτη: Σε αυτό το στάδιο ερευνήθηκαν τα υλικά, τα εργαλεία και η διαστασιολόγιση
- Υλοποίηση: Για την δημιουργία των δωματίων, οι χώροι και τα έπιπλα κατασκευάστηκαν εξ ολοκλήρου στο χέρι. Με την χρήση μια έτοιμης μαριονέτας, ενός smartphone και της εφαρμογής STOP MOTION™ APP, ενός τρίποδα και ενός προβολέα πραγματοποιήθηκε η φωτογράφιση.
- Ολοκλήρωση: Με την βοήθεια της εφαρμογής που καταγράφηκαν τα στιγμιότυπα δημιουργήθηκαν τα τελικά βίντεο.
- Αποτέλεσμα: Ένας «άνθρωπος» κινείται μέσα στον χώρο και χρησιμοποιεί τα έπιπλα. Ο στόχος επιτεύχθηκε (Εικόνα 2).

Εικόνα 2.
Φωτογραφίες από την παραγωγή Stop Motion



ΠΑΙΔΑΓΩΓΙΚΗ ΕΦΑΡΜΟΓΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Η ενσωμάτωση του Stop Motion στην εκπαιδευτική διαδικασία προσφέρει δυνατότητες όχι μόνο αισθητικής έκφρασης, αλλά και ουσιαστικής ενδυνάμωσης της μάθησης. Πρόκειται για ένα εργαλείο που επιτρέπει τις μαθητές, να γίνουν αφηγητές, σκηνοθέτες και ερευνητές, ενισχύοντας την αυτενέργεια και την αυτορρύθμιση. Η εκπαιδευτική χρήση του Stop Motion υπερβαίνει τα όρια του τεχνολογικού εργαλείου και μετατρέπεται σε μέσο πολυτροπικής έκφρασης, οργάνωσης νοήματος και μετασχηματισμού τις γνώσης (Robin, B., 2008).

Καθώς η δημιουργία του βίντεο Stop Motion απαιτεί συνεργασία, σχεδιασμό, κατασκευή, αφήγηση, τεχνική δεξιότητα και στοχαστική παρουσίαση, αποτελεί μια σύνθετη διαδικασία που εντάσσεται σε μοντέλα ενεργούς μάθησης. Η διαδικασία αυτή συνδέεται άμεσα με το project-based learning (PLB), τις δημιουργικές δραστηριότητες STEAM (Science Technology Engineering Art Mathematics), τις βιωματικές στρατηγικές και τις πρακτικές διαφοροποιημένης διδασκαλίας (Thomas, L., & Knezek, G., 2015 & Van Joolingen, W., et al., 2020).

Η υλοποίηση μπορεί να προσαρμοστεί σε διαφορετικές ηλικίες και γνωστικά αντικείμενα, αναδεικνύοντας τη διαθεματική φύση του εργαλείου. Στην πρωτοβάθμια εκπαίδευση, η τεχνική μπορεί να ενσωματωθεί σε γλωσσικά μαθήματα για τη δημιουργία παραμυθιών, σε φυσικές επιστήμες για την απεικόνιση φυσικών φαινομένων, και στα μαθηματικά για την οπτικοποίηση γεωμετρικών εννοιών. Στη δευτεροβάθμια εκπαίδευση, το Stop Motion μπορεί να λειτουργήσει ως εργαλείο για την παρουσίαση ιστορικών γεγονότων, τη μοντελοποίηση βιολογικών διαδικασιών, ή ακόμη και για τη δημιουργία εκπαιδευτικών βίντεο ευαισθητοποίησης (Wishart, J. 2017).

ΣΥΝΑΙΣΘΗΜΑΤΙΚΗ ΚΑΙ ΨΥΧΟΠΑΙΔΑΓΩΓΙΚΗ ΔΙΑΣΤΑΣΗ

Η δημιουργία ενός Stop Motion έργου προσφέρει πολύ περισσότερα από την κατανόηση ενός σχολικού περιεχομένου. Ενεργοποιεί τη φαντασία, ενισχύει την αυτοεκτίμηση και παράγει μια ισχυρή αίσθηση συμμετοχής και ιδιοκτησίας της γνώσης. Οι μαθητές βιώνουν ένα αποτέλεσμα που τους ανήκει, το οποίο δημιούργησαν από το μηδέν και μπορούν να το μοιραστούν με την κοινότητα (Robin B, 2008 & Thomas, L., & Knezek, G., 2015).

Ιδιαίτερα σημαντική είναι η συμβολή του Stop Motion στη εκφραστική ανάπτυξη. Οι μαθητές που δυσκολεύονται στη λεκτική έκφραση, βρίσκουν στο μέσο αυτό μια δίοδο εξωλεκτικής επικοινωνίας. Το γεγονός ότι το τελικό έργο παράγεται σε ομάδα ενισχύει τις κοινωνικές δεξιότητες, την ανοχή στη διαφορετικότητα και την αποδοχή (Jitsupa N. et al., 2012 & Robin B, 2008) . Η οπτικοποίηση μέσω εικόνας και ήχου ενισχύει την ενσυναίσθηση, ιδιαίτερα όταν τα θέματα αφορούν κοινωνικά ζητήματα όπως η φιλία, ο ρατσισμός ή ο σχολικός εκφοβισμός (Robin, B., 2008) .

ΑΠΟΤΕΛΕΣΜΑΤΑ ΚΑΙ ΟΦΕΛΗ

Ερευνητικές εργασίες καταδεικνύουν ότι η χρήση του Stop Motion αυξάνει την εμπλοκή των μαθητών, ιδιαίτερα όσων δυσκολεύονται με παραδοσιακές μορφές μάθησης. Η χρήση της τεχνικής αναπτύσσει την επιμονή, την υπευθυνότητα, την οργανωτική σκέψη και την ακρίβεια. Παράλληλα, διευκολύνει τη μεταγνωστική λειτουργία, αφού οι μαθητές είναι υποχρεωμένοι να σχεδιάσουν, να αξιολογήσουν και να αναπροσαρμόσουν τις δημιουργίες τους μέσα από συνεχείς κύκλους αναστοχασμού (Thomas & Knezek, 2015).

Η μαθησιακή πρόοδος δεν εκδηλώνεται μόνο στο περιεχόμενο, αλλά και στις δεξιότητες διαδικασίας: η κατανόηση πώς κάτι γίνεται, πώς σχεδιάζεται, πώς τεκμηριώνεται. Αυτά τα χαρακτηριστικά συνάδουν με τις αρχές της εκπαίδευσης για τη βιώσιμη ανάπτυξη και της μάθησης μέσω σχεδιασμού (Design-Based Learning - DBL), ενισχύοντας την ικανότητα για ανάληψη πρωτοβουλιών.

ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΠΕΡΙΟΡΙΣΜΟΙ

Παρά τα οφέλη, η εφαρμογή του Stop Motion ενέχει δυσκολίες. Ο πρώτος και προφανής περιορισμός είναι η απαίτηση χρόνου. Η δημιουργία ενός λεπτού Stop Motion βίντεο μπορεί να απαιτεί αρκετές ώρες εργασίας. Αυτό καθιστά αναγκαίο τον επανασχεδιασμό του χρόνου εντός της τάξης και την ενσωμάτωση του project σε μεσοπρόθεσμο πλάνο.

Δεύτερον, απαιτείται κατάλληλος εξοπλισμός, όπως κάμερες, σταθερά τρίποδα και φωτισμός. Ωστόσο, με την ανάπτυξη των κινητών συσκευών και των φιλικών προς τον χρήστη εφαρμογών, ο παράγοντας κόστους περιορίζεται σημαντικά.

Τρίτον, απαιτείται επιμόρφωση του εκπαιδευτικού όχι μόνο σε τεχνικό επίπεδο, αλλά και στη διαχείριση ομαδοσυνεργατικών δραστηριοτήτων, στον διδακτικό σχεδιασμό πολυτροπικών projects και στην αξιολόγηση μη γραμμικών προϊόντων.

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΤΑΣΕΙΣ

Το Stop Motion είναι ένα πολυδιάστατο εργαλείο μάθησης. Δεν είναι απλώς μια αισθητική ή τεχνολογική δραστηριότητα· είναι μέσο δημιουργίας, συνεργασίας, νοηματοδότησης και ενσυναίσθησης. Ενσωματώνεται οργανικά στη φιλοσοφία της σύγχρονης εκπαίδευσης που εστιάζει στον μαθητή ως φορέα δράσης και έκφρασης.

Η αξιοποίηση της τεχνικής σε όλα τα γνωστικά αντικείμενα αποτελεί πρόκληση αλλά και ευκαιρία. Μπορεί να λειτουργήσει ενισχυτικά στην εξ αποστάσεως εκπαίδευση, να ενσωματωθεί σε σχέδια εργασίας, αλλά και να μετατραπεί σε εργαλείο συμπερίληψης σε τάξεις με ποικιλία μαθησιακών προφίλ. Για να επιτευχθεί αυτό, απαιτείται συστηματική επιμόρφωση, δημιουργία ανοιχτών εκπαιδευτικών πόρων, ενίσχυση της συνεργασίας μεταξύ εκπαιδευτικών διαφορετικών ειδικοτήτων και αναγνώριση της καλλιτεχνικής έκφρασης ως ισότιμου φορέα μάθησης.

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ΤΟ ΜΕΛΛΟΝ ΤΗΣ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΚΠΑΙΔΕΥΣΗΣ ΜΕΣΑ ΑΠΟ ΤΟ ΠΡΙΣΜΑ ΜΑΘΗΤΩΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΩΝ ΝΟΜΩΝ ΑΤΤΙΚΗΣ ΚΑΙ ΚΥΚΛΑΔΩΝ

Βλασσόπουλος Γεράσιμος
PostDoc Researcher, PhD, MSc, Εκπαιδευτικός ΠΕ82,
Πανεπιστήμιο Δυτικής Αττικής, τμήμα Βιοϊατρικών Επιστημών – ΣΕΥΠ,
Ελλάδα, Αθήνα
e-mail: makisvlass@gmail.com

ΠΕΡΙΛΗΨΗ

Σε περιόδους κρίσεων επέρχονται ριζικές αλλαγές της κοινωνίας. Στην Ελλάδα ο Covid-19 παρουσιάστηκε τον 02/2020 με το κλείσιμο των σχολείων και την εφαρμογή της εξ αποστάσεως εκπαίδευσης.

Μέσω της έρευνας διερευνήθηκε το μέλλον της ΕξΑΕ, μέσα από το πρίσμα των μαθητών δευτεροβάθμιας εκπαίδευσης. Εφαρμόστηκε μικτή δειγματοληψία (Στρωματοποιημένη και κατά Συστάδες). Συμμετείχαν 462 μαθητές Γυμνασίων και Λυκείων των νομών Αττικής και Κυκλάδων. Η έρευνα διεξήχθη τον 05/2020. Τα δεδομένα συλλέχθηκαν στο LimeSyrvey, αναλύθηκαν με SPSS (25), ακαδημαϊκή άδεια. Πραγματοποιήθηκε έλεγχος αξιοπιστίας του ερωτηματολογίου με τον δείκτη Cronbach's alpha, περιγραφική στατιστική, παραγοντική ανάλυση και η δοκιμασία Chi-square.

Η ανάλυση Chi-square έδειξε ότι το 76,2% των μαθητών δεν επιθυμούσε μελλοντικά την εφαρμογή της ΕξΑΕ, ενώ μόλις το 13% τη θεωρούσε σημαντική ως μορφή εκπαίδευσης και επιθυμούσε τη μελλοντική εφαρμογή της.

Εν κατακλείδι, η ΕξΑΕ δεν οργανώθηκε με μεθοδικότητα βάσει παιδαγωγικών μεθόδων και τεχνικών με αποτέλεσμα να μη γίνει αποδεκτή από την εκπαιδευτική κοινότητα. Οι απόψεις των μαθητών Γυμνασίων και Λυκείων (ΓΕΛ - ΕΠΑΛ) επηρεάστηκαν αρνητικά με αποτέλεσμα να μην επιθυμούν μια ενδεχόμενη μελλοντική εφαρμογή της, δεδομένης της μη εφαρμογής των αρχών που διέπουν την ΕξΑΕ.

Λέξεις - κλειδιά: Εξ Αποστάσεως Εκπαίδευση, Τηλεκπαίδευση, Τεχνολογίες Πληροφοριών και Επικοινωνιών, Σύγχρονη, Ασύγχρονη.

Συντομογραφίες: Απλή Τυχαία Δειγματοληψία (ΑΤΔ), Εξ Αποστάσεως Εκπαίδευση (ΕξΑΕ), Τεχνολογίες Πληροφοριών και Επικοινωνιών (ΤΠΕ)

ΕΙΣΑΓΩΓΗ

Μετά την ανακήρυξή του Covod-19 ως παγκόσμια πανδημία το Μάρτιο του 2020, πολλές χώρες της Ε.Ε. άρχισαν να κλείνουν τα εκπαιδευτικά ιδρύματα για να περιορίσουν την εξάπλωση του. Ο ρόλος των παιδιών στη μετάδοση της νόσου παρέμενε ασαφής, ειδικά στο πλαίσιο παραμονής τους στο σχολικό περιβάλλον. Τα διαθέσιμα στοιχεία της περιόδου παρουσίαζαν πως τα παιδιά μολύνονταν και μετέφεραν τον ιό στα μέλη της οικογένειας (European Centre for Disease Prevention and Control [ECDC], 2021),

Το κλείσιμο των σχολείων πυροδότησε την προσπάθεια για εφαρμογή της ΕξΑΕ (Sofos et al., 2015). Οι ανάγκες ήταν μεγάλες. Οι μαθητές της τελευταίας τάξης του Λυκείου έπρεπε να συνεχίσουν την προετοιμασία τους για τις Πανελλαδικές Εξετάσεις, ενώ οι υπόλοιπες τάξεις χρειάζονταν την καθοδήγηση των καθηγητών για να μη χαθεί η επαφή των μαθητών με τα μαθήματα. Η ΕξΑΕ ξεκίνησε στις 16/03/2020 σε πιλοτική φάση σε τρεις νομούς (AlfaVita, 2020) και επεκτάθηκε μία εβδομάδα αργότερα στο σύνολο των Λυκείων της χώρας. Προτεραιότητα δόθηκε στους μαθητές Λυκείου. Εντυπωσιακή θεωρείται η ανταπόκριση μαθητών και εκπαιδευτικών στην ΕξΑΕ. Είναι γεγονός ότι στην περίοδο της πανδημίας, η εφαρμογή ΤΠΕ με τη χρήση σύγχρονης και ασύγχρονης ΕξΑΕ στήριξε σε παγκόσμιο επίπεδο την εκπαιδευτική κοινότητα σε κάθε εκπαιδευτική βαθμίδα.

Για το άνοιγμα των σχολείων πάρθηκαν παγκοσμίως τα απαραίτητα υγειονομικά μέτρα (Naftemporiki, 2020 · McAuley, 2020 · Wires,2020 · Godin, 2020 · Barr, 2020 · Bretan, 2020). Στην Ελλάδα οι αποφάσεις που πάρθηκαν αφορούσαν αποστάσεις θρανίων, μέγιστος αριθμός μαθητών, κ.ά, (Ministerial Decision 63314/ΓΔ4/2020). Ωστόσο, παρά τα αναρίθμητα αρνητικά της πανδημίας οργανώθηκε η ψηφιακή εξέλιξη της χώρας που κάτω από κανονικές συνθήκες θα απαιτούνταν χρόνια.

Η παγκόσμια ανησυχία, σύμφωνα με τη διεθνή βιβλιογραφία (Cao et al., 2020 · Daniel, 2020 · Dhawan, 2020 · Anouti & Naim El Rouadi, 2020), οδήγησε στην ανάγκη περαιτέρω διερεύνησης αυτής της νέας εκπαιδευτικής κατάστασης

ΜΕΘΟΔΟΣ ΤΗΣ ΕΡΕΥΝΑΣ

Το Δείγμα της Μελέτης

Η έρευνα διεξήχθη το Μάιο - Ιούνιο του 2020. Επιλέχτηκαν σχολεία με μικτό πληθυσμό αγοριών – κοριτσιών. Το τελικό δείγμα αποτελούνταν από αντιπροσωπευτικό και ομοιογενή αριθμό μαθητών, με σκοπό την αξιοπιστία και την εγκυρότητα της έρευνας (Farmakis, 2015). Τον πληθυσμό της έρευνας αποτέλεσαν μαθητές Γυμνάσιων και Λυκείων. Οι περιοχές που διεξήχθη η έρευνα ήταν σχολεία της Αθήνας και της Πάρου. Στην έρευνα συμμετείχαν 3 Γυμνάσια, 3 Λύκεια από την Αττική και 3 Γυμνάσια, 3 Λύκεια από τις Κυκλάδες. Αναλυτικότερα, το δείγμα αποτελούνταν από 12 σχολεία που το κάθε ένα είχε τρεις διαφορετικές τάξεις (Α', Β', Γ').

Κατά το δειγματοληπτικό σχεδιασμό αποφασίστηκε η συμμετοχή 500 μαθητών, οι 300 φοιτούσαν σε Γυμνάσια, (50 ανά σχολείο), ενώ οι 200 σε Λύκεια, (34 ανά σχολείο). Ο τελικός αριθμός των συμμετεχόντων της έρευνας ήταν 462 μαθητές, Πίνακας 2, αριθμός ικανοποιητικός για την αμερόληπτη και χωρίς προκαταλήψεις κατάθεση των απόψεων τους (Cohen et al., 2017).

Η Μέθοδος της Δειγματοληψίας

Κατά το δειγματοληπτικό σχεδιασμό αποφασίστηκε η εφαρμογή μικτής δειγματοληψίας, ως η καταλληλότερη μέθοδος, για αντιπροσωπευτικότερο δείγμα του πληθυσμού (Collins et al, 2007 · Sharp et al., 2011).

Επιλέχθηκαν για την έρευνα οι νομοί Αττικής και Κυκλάδων (στρωματοποιημένη δειγματοληψία). Κάθε ένας εξ αυτών αποτέλεσε διαφορετικό στρώμα της έρευνας. Η ιδιαιτερότητα της συγκεκριμένης μελέτης ήταν η συμμετοχή πληθυσμών από αστικές και ημιαστικές (νησιωτικές) περιοχές.

Στη συνέχεια εφαρμόστηκε η κατά συστάδες απλή τυχαία δειγματοληψία πολλών σταδίων ίσου μεγέθους (Kamalu et al., 2024). Η δειγματοληψία ήταν τυχαία διότι στα διάφορα στάδια της, οι σύνθετες μονάδες επιλέχθηκαν με απλή τυχαία δειγματοληψία (Chalkikias et al., 2015). Τα μέλη του πληθυσμού προσεγγίστηκαν με έμμεσο τρόπο, μέσω μεγαλύτερων ομάδων στις οποίες ανήκει το κάθε μέλος. Επιλέχθηκαν ισομεγέθη δείγματα των πληθυσμών της έρευνας.

Αναλογικός καταμερισμός μεταξύ δειγμάτων και πληθυσμών δεν εφαρμόστηκε διότι, προέκυπταν δείγματα μαθητών των Κυκλάδων πολύ μικρά για να διεξαχθούν συμπεράσματα (Zafiropoulos, 2010). Η κατά συστάδες

δειγματοληψία πραγματοποιείται σε διάφορα στάδια, ώστε να εξυπηρετηθούν οι ανάγκες της έρευνας (Farmakis, 2015). Κατά το δειγματοληπτικό σχεδιασμό η δειγματοληψία εφαρμόστηκε σε 4 στάδια:

- 1ο στάδιο, με ΑΠΔ, πραγματοποιήθηκε η επιλογή της πρωτογενούς δειγματοληπτικής μονάδας. Από τις περιφέρειες του νομού Αττικής επιλέχθηκε με κλήρωση η Δ' Αθήνας. Από τις περιφέρειες του νομού Κυκλάδων επιλέχθηκε η Δ' Κυκλάδων.
- 2ο στάδιο, με ΑΠΔ, επιλέχθηκε η δευτερογενής δειγματοληπτική μονάδα που αφορούσε τα σχολεία της έρευνας.
- 3ο στάδιο, από τα σχολεία της έρευνας επιλέχθηκαν τα προς μελέτη τμήματα.
- 4ο στάδιο, από τα τμήματα των σχολείων επιλέχθηκαν οι μαθητές. Η επιλογή του δείγματος πραγματοποιήθηκε σε επίπεδο μεμονωμένων μελών του πληθυσμού (Papageorgiou, 2015).

Πίνακας 1.
Δομή ερωτηματολογίου

Τμήματα	Είδος ερωτήσεων	Πλήθος ερωτήσεων
Πρώτο	Δημογραφικά στοιχεία	3
Δεύτερο	Μέλλον της ΕξΑΕ	17

Η Δομή του Ερωτηματολογίου

Πραγματοποιήσαμε ποσοτική έρευνα με χρήση κατάλληλα δομημένων ερωτηματολογίων (Iseris, 2016). Μοιράστηκαν ερωτηματολόγια και στις τρεις τάξεις (Α', Β', Γ') κάθε σχολείου. Στη σύνταξη του ερωτηματολογίου, χρησιμοποιήθηκαν σαφείς ερωτήσεις κλειστού τύπου, με χρήση απλής γλώσσας και ύπαρξης κατάλληλων επεξηγήσεων. Το ερωτηματολόγιο αποτελούνταν από δύο μέρη. Οι ερωτήσεις ήταν διαβαθμισμένης κλίμακας τύπου Likert με τρεις διαβαθμισμένες απαντήσεις «λίγο», «αρκετά», «πολύ». Ο χρόνος συμπλήρωσης των ερωτηματολογίων διαρκούσε 10 λεπτά. Η δομή του ερωτηματολογίου παρουσιάζεται στον **Πίνακα 1.**

Η Στατιστική Ανάλυση των Δεδομένων

Κατά τη στατιστική ανάλυση πραγματοποιήθηκε:

- Περιγραφική στατιστική ανάλυση
- Έλεγχος αξιοπιστίας του ερωτηματολογίου με το δείκτη Cronbach's Alpha.
- Παραγοντική ανάλυση
- Chi-square test για να διερευνηθούν οι σημαντικότερες συσχετίσεις μεταξύ των μεταβλητών που απαρτίζουν το ερευνητικό ερώτημα, «βαθμός επιθυμίας για μελλοντική εφαρμογή της ΕξΑΕ».

Οι Περιορισμοί της Μελέτης

Παρουσιάστηκαν μεθοδολογικοί περιορισμοί που αφορούσαν το μέγεθος του δείγματος, την έλλειψη προηγούμενης έρευνας, καθώς επίσης χρονικοί περιορισμοί και περιορισμοί μεροληψίας και φόβου λόγω πανδημίας (Alex, 2023).

Πίνακας 2
Συμμετέχοντες στην έρευνα.

Φύλο	**Πλήθος συμμετοχών**	**Ποσοστό**
Κορίτσια	240	52,06%
Αγόρια	222	47,94%
Σχολεία	**Πλήθος συμμετοχών**	**Ποσοστό**
Γυμνάσια(6)	288	62,47%
Λύκεια (6)	174	37,53%
Συμμετέχοντες στην έρευνα	468	100%
Σύνολο ερωτηματολογίων	462	97,72%

ΑΠΟΤΕΛΕΣΜΑΤΑ ΤΗΣ ΕΡΕΥΝΑΣ

Περιγραφική Στατιστική

Στον **Πίνακα 2** φαίνονται οι συμμετέχοντες στην έρευνα. Οι μαθήτριες (52,06%) που έλαβαν μέρος στην έρευνα ήταν ελαφρώς περισσότερες από τους μαθητές (47,94%), ενώ οι μαθητές των Γυμνασίων (62,47%) ήταν περισσότεροι από των Λυκείων (37,53%).

Πίνακας 3
Chi-square μεταξύ του βαθμού που ταιριάζει στους μαθητές η ΕξΑΕ και της επιθυμίας για μελλοντική εφαρμογή της. Η διαφορά είναι στατιστικά σημαντική, (p<0,001).

		Βαθμός που ταιριάζει στους μαθητές η ΕξΑΕ			
		Λίγο	**Αρκετά**	**Πολύ**	**Σύνολο**
Επιθυμία για μελλοντική εφαρμογή της ΕξΑΕ	**Λίγο**	61% (282)	10,4% (48)	4,8% (22)	76,2% (352)
	Αρκετά	6,3% (29)	2,8% (13)	1,7% (8)	10,8% (50)
	Πολύ	5,4% (25)	3,5% (16)	4,1% (19)	13% (60)
	Σύνολο	72,7% (336)	16,7% (77)	10,6% (49)	100% (462)

Πίνακας 4
Απαντήσεις των μαθητών επί των σημαντικότερων ερωτημάτων που αφορούν το ερευνητικό ερώτημα «ποιό είναι το μέλλον της ΕξΑΕ».

A/A	**Προφίλ μαθητών**		**Επιθυμία για ΕξΑΕ στο μέλλον**				
		Συνολικά Ποσοστά ικανοποίησης μαθητών	**Λίγο**	**Αρκετά**	**Πολύ**	**Σύνολο**	**Τιμή p Chi-square**
	Μεταβλητές		76,2% (352)	10,8% (50)	13% (60)	100% (462)	
1	**Επέδειξαν μεγάλη ικανοποίηση από την ΕξΑΕ.**	Λίγο 45,2% Πολύ 33,5%	22,7% (105)	3,9% (18)	6,9% (32)	462, 100%	<0,001
2	**Η ΕξΑΕ τους ταιριάζει σε μεγάλο βαθμό.**	Λίγο 72,7% Πολύ 10,6%	4,8% (22)	1,7% (8)	4,1% (19)		<0,001
3	**Ενισχύθηκε σημαντικά η συμβατική διδασκαλία με την ΕξΑΕ.**	Λίγο 70,3% Πολύ 11,9%	5,4% (25)	1,9% (9)	4,5% (21)		<0,001
4	**Βελτιώθηκαν σημαντικά οι θεωρητικές γνώσεις συγκριτικά με τη διδασκαλία στην αίθουσα.**	Λίγο 78,1% Πολύ 6,9%	2,6% (12)	1,5% (7)	2,8% (13)		<0,001
5	**Μεγάλη επιθυμία πραγματοποίησης μαθημάτων από καθηγητές που Υπουργείου ελλείψει των εκπαιδευτικών του σχολείου.**	Λίγο 76% Πολύ 11,5%	6,1% (28)	1,1% (5)	4,3% (20)		<0,001
6	**Μεγάλη ευελιξία χώρου.**	Λίγο 43,5% Πολύ 29,7%	18,6% 86	4,5% 21	6,5% 30		<0,001
7	**Μεγάλη ευελιξία χρόνου.**	Λίγο 50,4% Πολύ 23,6%	15,4% 71	2,8% 13	5,4% 25		<0,001

Έλεγχος Αξιοπιστίας

Προσδιορίστηκε ο συντελεστής αξιοπιστίας Cronbach's Alpha για να ελεγχθεί εάν οι ερωτήσεις παρουσιάζουν υψηλή μεταξύ τους συνοχή (Markos, 2012). Ο συντελεστής είχε τιμή: a = 0,807.

Παραγοντική Ανάλυση

Πριν από κάθε ερευνητικό ερώτημα, αναλύθηκαν οι μεταβλητές με τη μεθοδολογία της ανάλυσης παραγόντων. Σκοπός ήταν να δούμε την αλληλεπίδραση των μεταβλητών ως προς την μεταξύ τους συνδιακύμανση, ώστε να επικεντρωθούμε σε λίγες μόνο μεταβλητές – ερωτήσεις όπου οι απαντήσεις τους παίζουν καθοριστικό ρόλο στην ερμηνεία του ερευνητικού ερωτήματος. Από τις 17 ερωτήσεις που συνδέονταν με το ερευνητικό ερώτημα (επιθυμία μελλοντικής εφαρμογής της ΕξΑΕ) οι 7 είχαν τη μεγαλύτερη σχέση μεταξύ τους με τιμή Extraction του Factor Analysis μεγαλύτερη από 0,6 και τιμή του στατιστικού κριτηρίου Kaiser Meyer Olkin αρκετά υψηλή 0,769.

Εφαρμογή της Δοκιμασίας Chi-Square

Για κάθε σημαντική μεταβλητή του ερευνητικού ερωτήματος μελετήθηκε η σχέση της με τη μεταβλητή «βαθμός επιθυμίας για μελλοντική εφαρμογή της ΕξΑΕ». Για το σκοπό αυτό φτιάχτηκαν ξεχωριστοί πίνακες για κάθε ζεύγος μεταβλητών, ένας εκ των οποίων είναι ο Πίνακας 3.

Στον **Πίνακα 3** φαίνεται πως οι μαθητές δεν επιθυμούσαν την εφαρμογή της ΕξΑΕ στο μέλλον καθώς δεν τους ταιριάζει ως μορφή εκπαίδευσης. Με την εφαρμογή παρόμοιων πινάκων δημιουργήθηκε ο **Πίνακας 4**.

Η ανάλυση Chi-square έδειξε ότι το 76,2% των μαθητών δεν επιθυμεί μελλοντικά την εφαρμογή της ΕξΑΕ, ενώ μόλις το 13% τη θεωρεί σημαντική ως μορφή εκπαίδευσης, (**Πινάκας 3, Πίνακας 4**).

ΣΥΜΠΕΡΑΣΜΑΤΑ

- Το 76,2% των μαθητών ΔΕΝ επιθυμούσε μελλοντικά την εφαρμογή της ΕξΑΕ

  Από όλους όσοι ΔΕΝ επιθυμούσαν τη μελλοντική εφαρμογή της ΕξΑΕ:
  1. το 22,7% επέδειξε ικανοποίηση από την εφαρμογή της κατά την διάρκεια της πανδημίας, (p<0,001).
  2. το 4,8% ανέφερε πως τους ταιριάζει απολύτως ως μορφή εκπαίδευσης, (p<0,001).
  3. το 5,4% ανέφερε πως η συμβατική διδασκαλία ενισχύεται από την ΕξΑΕ, (p<0,001).
  4. το 2,6% θεωρούσε πως βελτιώθηκαν σημαντικά οι θεωρητικές τους γνώσεις συγκριτικά με τη διδασκαλία στην αίθουσα, (p<0,001).
  5. το 6,1% επιθυμούσε την πραγματοποίηση μαθημάτων από εκπαιδευτικούς του Υπουργείου ελλείψει εκπαιδευτικών του σχολείου τους, (p<0,001).
  6. το 18,6% επιθυμούσε τη διεξαγωγή των μαθημάτων πέραν του σχολείου, (p<0,001).
  7. το 15,4% επιθυμούσε την ελευθερία χρόνου που προσέφερε η ΕξΑΕ, (p<0,001).

- Το 13% των μαθητών επιθυμούσε μελλοντικά την εφαρμογή της ΕξΑΕ

  Από όλους όσοι επιθυμούσαν τη μελλοντική εφαρμογή της ΕξΑΕ:
  1. το 6,9% επέδειξε ικανοποίηση από την εφαρμογή της, κατά τη διάρκεια της πανδημίας, (p<0,001).
  2. το 4,1% ανέφερε πως ταιριάζει στους ίδιους τους μαθητές ως μορφή εκπαίδευσης, (p<0,001).
  3. το 4,5% ανέφερε πως η συμβατική διδασκαλία ενισχύεται σημαντικά από την ΕξΑΕ, (p<0,001).
  4. το 2,8% θεωρούσε πως βελτιώθηκαν σημαντικά οι γνώσεις τους συγκριτικά με τη δια ζώσης διδασκαλία, (p<0,001).
  5. το 4,3% επιθυμούσε την πραγματοποίηση μαθημάτων από εκπαιδευτικούς του Υπουργείου ελλείψει των εκπαιδευτικών του σχολείου τους, (p<0,001).
  6. το 6,5% επιθυμούσε τη διεξαγωγή των μαθημάτων πέραν του σχολείου, (p<0,001).
  7. το 5,4% επιθυμούσε την ελευθερία χρόνου που προσέφερε, (p<0,001).

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ΠΑΡΑΓΟΝΤΕΣ ΠΟΥ ΕΠΗΡΕΑΣΑΝ ΤΗ ΣΥΜΜΕΤΟΧΗ ΤΩΝ ΜΑΘΗΤΩΝ ΣΤΗΝ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΔΙΔΑΣΚΑΛΙΑ ΚΑΤΑ ΤΗΝ ΠΑΝΔΗΜΙΑ

Ζιώγα Στυλιανή
ΠΕ 86, 1ο ΓΕΛ Ιωαννίνων
Ιωάννινα Ελλάδα
email: ziogastella68@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία αυτή ερευνά την εμπειρία των μαθητών Λυκείου από την εξ αποστάσεως εκπαίδευση κατά την πανδημία, εξετάζοντας τους παράγοντες που επηρέασαν την ανταπόκρισή τους. Στόχος ήταν να διερευνηθεί το ενδιαφέρον των μαθητών και οι τεχνολογικοί και παιδαγωγικοί παράγοντες που επηρέασαν τη συμμετοχή τους, να αναλυθούν οι αντιλήψεις τους σχετικά με την υποστήριξη, την αλληλεπίδραση, το εκπαιδευτικό υλικό και την ποιότητα των συστημάτων διαχείρισης μάθησης και τον ρόλο της οικογένειας. Η έρευνα πραγματοποιήθηκε τον Οκτώβριο του 2020 σε 100 μαθητές Α' και Β' Λυκείου από τα Ιωάννινα, με τη χρήση ψηφιακού ερωτηματολογίου 12 ερωτήσεων κλειστού τύπου και πολλαπλής επιλογής. Τα αποτελέσματα έδειξαν ότι η εξάρτηση από την τεχνολογία δημιούργησε προβλήματα (εξοπλισμός, σύνδεση), επηρεάζοντας αρνητικά τη συμμετοχή των μαθητών, ενώ οι εκπαιδευτικοί χρειάστηκε να αναπτύξουν νέους ρόλους. Οι μαθητές αντιμετώπισαν τεχνικά προβλήματα που επιλύθηκαν σχετικά γρήγορα, αλλά η κουλτούρα της συμβατικής εκπαίδευσης δυσκόλεψε την προσαρμογή στην εξ αποστάσεως εκπαίδευση. Εξέφρασαν αρνητικές αντιλήψεις για την επικοινωνία και την υποστήριξη από τους εκπαιδευτικούς, καθώς και για την ποιότητα του εκπαιδευτικού υλικού, ενώ η οικογένεια διαδραμάτισε σημαντικό ρόλο στην υποστήριξή τους.

Λέξεις - κλειδιά: εξ αποστάσεως διδασκαλία, πανδημία, υποστήριξη, αλληλεπίδραση

ΕΙΣΑΓΩΓΗ

Η εκπαίδευση στην Ελλάδα γνώρισε διάφορες αλλαγές στην πορεία της κατά την πάροδο των χρόνων, που επηρέασαν τον προσανατολισμό της. Η πανδημία επέβαλε την καθολική εφαρμογή της εξ αποστάσεως διδασκαλίας χωρίς τα εκπαιδευτικά ιδρύματα να μπορούν να ανταποκριθούν στο αίτημα της αναγκαιότητας αυτής. Το ενδιαφέρον εστιάζεται, κυρίως, στους μαθητές και στους παράγοντες εκείνους, τεχνολογικούς και παιδαγωγικούς, που υπαγορεύουν την εκδήλωση της δυσαρέσκειας ή τη θετική ανταπόκρισή τους στα διαδικτυακά περιβάλλοντα μάθησης από απόσταση.

Η επίδραση της εξ αποστάσεως εκπαίδευσης έκτακτης ανάγκης στη λειτουργία της συμβατικής εκπαίδευσης είναι ιδιαίτερα σημαντική, όμως προκύπτουν προβλήματα εξαιτίας της φύσης του μοντέλου της εξ αποστάσεως εκπαίδευσης κατά την εφαρμογή του από τις συμβατικές δομές εκπαίδευσης. Ο ρόλος του εκπαιδευτικού στην εξ αποστάσεως εκπαίδευση δεν αφορά μόνο στη μετάδοση γνώσεων αλλά είναι καθοδηγητικός και συμβουλευτικός. Το διδακτικό υλικό αποτελεί τη βάση της μαθησιακής διαδικασίας γι' αυτό ο σχεδιασμός και η δημιουργία του είναι ιδιαίτερης σημασίας. Ο εκπαιδευτικός στις περισσότερες περιπτώσεις δεν γνωρίζει ούτε έχει εκπαιδευτεί πώς να το δημιουργήσει, καθώς στην διδακτική πράξη αξιοποιούσε κυρίως το σχολικό εγχειρίδιο. Η εξοικείωση των εκπαιδευτικών, συχνά, με τις νέες τεχνολογίες είναι δύσκολη, επειδή δεν μπορούν να αλληλοεπιδρούν άμεσα, όπως στη δια ζώσης διδασκαλία. Ο μαθητοκεντρικός χαρακτήρας της μάθησης δυσχεραίνει το έργο εκπαιδευτικών, οι οποίοι έχουν μάθει να εφαρμόζουν δασκαλοκεντρικές προσεγγίσεις. Η απομόνωση που νιώθουν εκπαιδευτικοί και μαθητές δημιουργεί προβλήματα στην επικοινωνία μεταξύ τους αλλά και στην αλληλεπίδραση τους. Οι βασικοί παράγοντες που επηρεάζουν την συμμετοχή του μαθητή στην ηλεκτρονική μάθηση περιλαμβάνουν την υποστήριξη, το εκπαιδευτικό υλικό και την ποιότητα του συστήματος διαχείρισης μάθησης.

Μορφές της εξ αποστάσεως εκπαίδευσης

Η εξ αποστάσεως εκπαίδευση έκτακτης ανάγκης, όπως εφαρμόστηκε κατά την περίοδο της πανδημίας, δεν ταυτίζεται με την παραδοσιακή εξ αποστάσεως εκπαίδευση. Σύμφωνα με τους Bozkurt και Sharma (2020), αυτή η εξ αποστάσεως διδασκαλία ήταν μια προσωρινή λύση για τη συνέχιση της εκπαιδευτικής διαδικασίας κατά τη διάρκεια της κρίσης και χαρακτηρίζεται από συγκεκριμένες διαφορές σε σχέση με τη συστηματική και οργανωμένη εκπαίδευση από απόσταση.

Η εξ αποστάσεως εκπαίδευση διακρίνεται σε τρεις κύριες κατηγορίες: ασύγχρονη, σύγχρονη και μικτή μάθηση (Anastasiades, 2014). Η σύγχρονη εκπαίδευση από απόσταση, σύμφωνα με τους Arkorful και Abaidoo (2014), περιλαμβάνει την ταυτόχρονη πρόσβαση εκπαιδευτικών και μαθητών μέσω διαδικτύου, επιτρέποντας την αλληλεπίδραση σε πραγματικό χρόνο. Αυτό επιτυγχάνεται μέσω εργαλείων όπως οι τηλεδιασκέψεις και οι αίθουσες συνομιλίας, προσφέροντας τη δυνατότητα άμεσης ανατροφοδότησης και συζήτησης μεταξύ των συμμετεχόντων. Σημαντικό πλεονέκτημα της είναι η ευελιξία ως προς τον χρόνο και τον τόπο συμμετοχής, που επιτρέπει στους μαθητές και στους εκπαιδευτικούς να συμμετέχουν από διαφορετικά γεωγραφικά σημεία χωρίς να έχουν φυσική παρουσία σε έναν συγκεκριμένο χώρο (Anastasiades, 2014).

Από την άλλη πλευρά, η ασύγχρονη εξ αποστάσεως εκπαίδευση επιτρέπει στους εκπαιδευτικούς και τους μαθητές να αλληλεπιδρούν χωρίς να έχουν την ταυτόχρονη παρουσία τους στο διαδίκτυο. Οι συμμετέχοντες μπορούν να δημοσιεύουν ανακοινώσεις και να ανταλλάσσουν μηνύματα σε διαφορετικές χρονικές στιγμές, χρησιμοποιώντας εργαλεία όπως φόρουμ, ηλεκτρονικό ταχυδρομείο κ.α. Αυτό το μοντέλο μάθησης παρέχει μεγαλύτερη ευελιξία, καθώς οι μαθητές μπορούν να διαχειρίζονται τον ρυθμό και τον χρόνο της μάθησής τους, προσαρμόζοντας τη διαδικασία στις προσωπικές τους ανάγκες και συνθήκες. Ωστόσο η ασύγχρονη εκπαίδευση παρουσιάζει ορισμένα μειονεκτήματα, όπως η έλλειψη άμεσης ανατροφοδότησης και η αίσθηση απομόνωσης που μπορεί να βιώνουν οι μαθητές λόγω των περιορισμένων αλληλεπιδράσεων με συμμαθητές και εκπαιδευτικούς (Anastasiades, 2014). Η μικτή μάθηση, αναφέρεται στον συνδυασμό παραδοσιακής διδασκαλίας δια ζώσης και διαδικτυακής μάθησης. Σύμφωνα με τους Dziuban et al. (2004), αποτελεί μια παιδαγωγική προσέγγιση που εκμεταλλεύεται τα πλεονεκτήματα και των δύο μορφών εκπαίδευσης.

Η ασύγχρονη μάθηση, σύμφωνα με τον Kumi-Yeboah (2013), μπορεί να χρησιμοποιηθεί είτε μέσω διαδικτύου είτε εκτός σύνδεσης, και περιλαμβάνει μια ποικιλία δραστηριοτήτων, από την παρακολούθηση βιντεοσκοπημένων διαλέξεων έως τη συμμετοχή σε φόρουμ συζητήσεων. Έτσι προσφέρει στους μαθητές την ελευθερία να αλληλεπιδρούν με το υλικό και τους άλλους συμμετέχοντες χωρίς να δεσμεύονται από συγκεκριμένα ωράρια. Ωστόσο, η έλλειψη άμεσης αλληλεπίδρασης μπορεί να αποτελέσει εμπόδιο για την άμεση επίλυση αποριών και την πιο βαθιά κατανόηση του υλικού. Στη σύγχρονη μάθηση, η τηλεδιάσκεψη αποτελεί το βασικότερο μέσο επικοινωνίας, επιτρέποντας την άμεση οπτικοακουστική επικοινωνία μεταξύ εκπαιδευτικών και μαθητών, όμως απαιτεί ειδικές γνώσεις από εκπαιδευτικούς και μαθητές (Armakolas & Panagiotakopoulos, 2020). Χρειάζεται οι εκπαιδευτικοί να αναπτύξουν νέες στρατηγικές και να

προσαρμόσουν τις μεθόδους διδασκαλίας στις ανάγκες των μαθητών, λαμβάνοντας υπόψη την απόσταση και την έλλειψη φυσικής παρουσίας.

Η εξ αποστάσεως εκπαίδευση όταν χρησιμοποιείται για αντικατάσταση της παραδοσιακής διδασκαλίας, θέτει προκλήσεις που απαιτούν την ανάπτυξη νέων δεξιοτήτων και τη μετάβαση από την παθητική στη συμμετοχική μάθηση. Οι εκπαιδευτικοί πρέπει να διαθέτουν συνδυασμό τεχνολογικών και παιδαγωγικών δεξιοτήτων για να εφαρμόσουν αποτελεσματική διδασκαλία. Η απόσταση και η έλλειψη άμεσης επαφής δυσχεράνει την ανάπτυξη σχέσεων μεταξύ εκπαιδευτικών και μαθητών, καθιστώντας την επικοινωνία και την αλληλεπίδραση πιο απαιτητικές. Σύμφωνα με τον García-Aretio (2017), η ποιότητα της εκπαίδευσης από απόσταση μπορεί να συγκριθεί με αυτήν της παραδοσιακής εκπαίδευσης, όταν σχεδιάζεται και δημιουργείται με τα κατάλληλα παιδαγωγικά εργαλεία και τεχνικές για να επιτύχει ισάξια ή και καλύτερα αποτελέσματα σε σχέση με την παραδοσιακή εκπαιδευτική διαδικασία.

Εκπαιδευτικό υλικό

Η ποιότητα του συστήματος αφορά τη σχεδίαση και την εργονομία της πλατφόρμας ηλεκτρονικής μάθησης που χρησιμοποιείται, διασφαλίζοντας ότι η πλατφόρμα είναι εύχρηστη και λειτουργική. Το εκπαιδευτικό υλικό αναφέρεται στην παραγωγή μαθημάτων υψηλής ποιότητας, με σαφές και περιεκτικό περιεχόμενο που είναι καλά οργανωμένο και δομημένο. Η υποστήριξη, από την άλλη πλευρά, αφορά την παροχή τεχνικής βοήθειας στους μαθητές, ώστε να μην επιλυθούν τυχόν προβλήματα που προκύπτουν κατά τη διάρκεια της εκμάθησης, και μπορεί να παρέχεται είτε από τεχνικούς είτε από εκπαιδευτικούς (Cidral et al., 2018).

Στη συμβατική εκπαίδευση χρησιμοποιείται ο όρος «σχολικό εγχειρίδιο», ενώ στην εξ αποστάσεως εκπαιδευτικό υλικό. Το σχολικό εγχειρίδιο περιλαμβάνει το διδακτικό εγχειρίδιο (βασικό βιβλίο μελέτης), το βιβλίο εργασιών και ασκήσεων, το βιβλίο του εκπαιδευτικού, λεξικά κ.α.. Όλα αυτά λειτουργούν συνδυαστικά ως μέσα με ποικίλες διδακτικές λειτουργίες για τη στήριξη της σχολικής δια ζώσης εκπαίδευσης. Κατ΄ αναλογία, ένα εκπαιδευτικό πακέτο μπορεί να περιέχει έντυπο, οπτικοακουστικό και ηλεκτρονικό αλληλεπιδραστικό υλικό. Το υλικό αυτό είναι διαμορφωμένο με ειδική διδακτική μεθοδολογία και λειτουργεί ως προπαρασκευασμένη διδασκαλία. Μπορεί να περιέχει ηλεκτρονικά κείμενα, οπτικοακουστικό υλικό, αλληλεπιδραστικό υλικό, διαδραστικές δυνατότητες (συνομιλίες, τηλεδιάσκεψη κ.ά.). Η ποικιλία των στοιχείων που περιέχει ένα μαθησιακό περιβάλλον, έγκειται στο γεγονός ότι κάθε ένα από αυτά αναλαμβάνει συγκεκριμένες λειτουργίες στο πλαίσιο της δια ζώσης ή της εξ αποστάσεως εκπαίδευσης προκειμένου να δημιουργηθούν συνθήκες ενεργής μάθησης.

Το ψηφιακό εκπαιδευτικό υλικό διαδραματίζει κρίσιμο ρόλο στην εξ αποστάσεως εκπαίδευση, καθώς οι μαθητές συχνά εργάζονται ατομικά, και το περιεχόμενο πρέπει να αντισταθμίζει την έλλειψη προσωπικής επικοινωνίας. Το υλικό πρέπει να οργανώνεται και να παρουσιάζεται σύμφωνα με τις βασικές παιδαγωγικές αρχές, ώστε να διευκολύνεται η αλληλοεπίδραση του μαθητή με το μαθησιακό περιεχόμενο (Sofos et al., 2015). Η οργάνωση και η παρουσίαση του μαθησιακού περιεχομένου είναι θεμελιώδεις παράμετροι για κάθε εκπαιδευτικό που δημιουργεί εκπαιδευτικό υλικό, καθώς αυτές οι παράμετροι καθορίζουν την επιτυχία της εξ αποστάσεως εκπαίδευσης και διαφέρουν σημαντικά από τα παραδοσιακά σχολικά εγχειρίδια.

Τύποι Αλληλεπίδρασης

Στην εξ αποστάσεως εκπαίδευση πυρήνας της αλληλεπίδρασης είναι ο μαθητής, κατά συνέπεια η αλληλεπίδραση, εξαρτάται από τις ανάγκες του εκπαιδευόμενου. Επομένως, μπορούμε να ορίσουμε την αλληλεπίδραση ως έναν τρόπο που οδηγεί τη γνώση σε επαφή με τον μαθητή ή έναν τρόπο που βοηθά τον μαθητή να έχει πρόσβαση στη γνώση μέσω του περιεχομένου από μόνος του. Το 1989, ο Moore ορίζει τρεις τύπους αλληλεπίδρασης: μαθητές και εκπαιδευτικοί, μαθητές και περιεχόμενο και μεταξύ μαθητών. Στη συνέχεια οι Hillman et al. (1994), πρόσθεσαν έναν τέταρτο τύπο αλληλεπίδρασης, που αφορά τον μαθητή και το περιβάλλον διεπαφής, δηλαδή αλληλεπίδραση του μαθητή με το τεχνολογικό μέσο.

Οι τρεις πρώτοι τύποι αλληλεπίδρασης πραγματοποιούνται επίσης και σε παραδοσιακά εκπαιδευτικά περιβάλλοντα με φυσική παρουσία. Παρόλο που θεωρείται ότι ο τέταρτος τύπος αλληλεπίδρασης, δηλαδή η αλληλεπίδραση μεταξύ μαθητών και διεπαφών υπάρχει κυρίως στα ηλεκτρονικά μαθήματα, έχει παρατηρηθεί επίσης και σε περιβάλλοντα δια ζώσης μάθησης. Η αλληλεπίδραση μεταξύ μαθητών και διεπαφών είναι η διαδικασία χειραγώγησης διαφόρων εργαλείων για την επίτευξη μιας εργασίας που τελικά επιτρέπει στους μαθητές να φτάσουν στη γνώση χρησιμοποιώντας τις αισθήσεις τους προκειμένου να αποθηκεύσουν πληροφορίες σε αισθητήρια συστήματα. Λόγω των τεχνολογικών εξελίξεων οι τύποι αλληλεπιδράσεων αναπτύσσονται με τα αισθητήρια συστήματα των φορητών

συσκευών. Η εξέλιξη της τεχνολογίας και η εφαρμογή της εξ αποστάσεως εκπαίδευσης προσθέτει νέους τύπους αλληλεπίδρασης.

Μεθοδολογία έρευνας

Σκοπός της έρευνας ήταν να διερευνηθούν οι παράγοντες που επηρέασαν τη συμμετοχή των μαθητών Λυκείου στην επείγουσα εξ αποστάσεως διδασκαλία που εφαρμόστηκε στο πρώτο lockdown (Μάρτιος – Μάιος 2020), στην Ελλάδα. Η έρευνα υλοποιήθηκε τον Οκτώβριο του 2020 με 100 μαθητές Α΄ και Β΄ Γενικού Λυκείου των Ιωαννίνων που είχαν παρακολουθήσει εξ αποστάσεως μαθήματα το σχ. έτος 2019-2020. Για τη συλλογή των δεδομένων δημιουργήθηκε ένα ψηφιακό ερωτηματολόγιο με 12 ερωτήσεις κλειστού τύπου και πολλαπλής επιλογής. Η εγκυρότητα της έρευνας διασφαλίστηκε μέσω βιβλιογραφικής επισκόπησης μέχρι το 2020.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Ερώτημα 1. Οι παράγοντες που επηρέασαν την παραμονή των μαθητών στα μαθήματα ήταν:

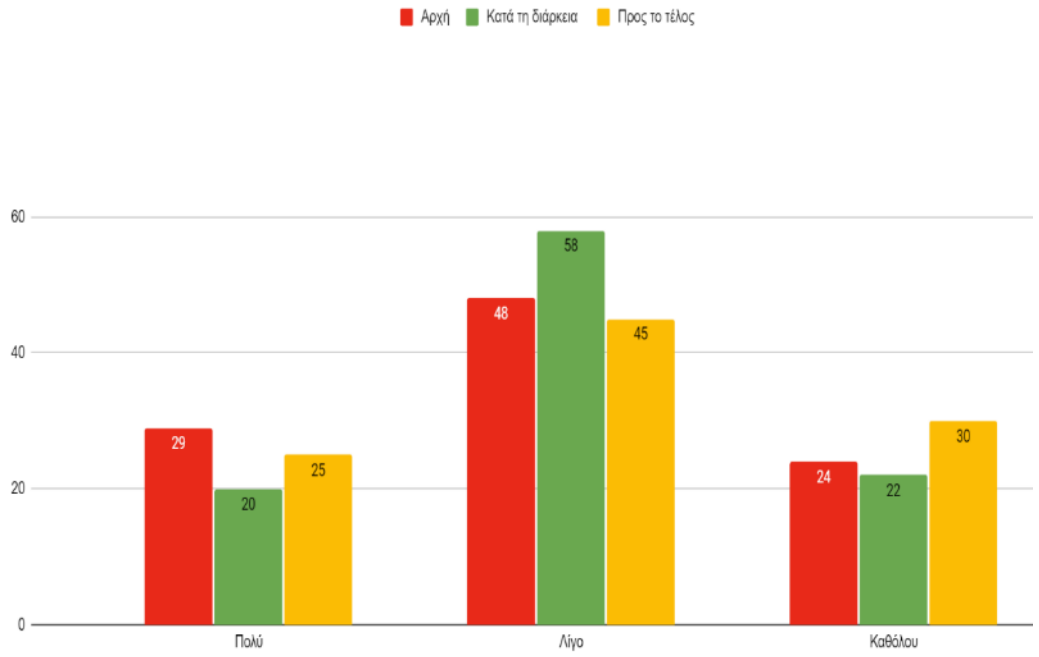
Εικόνα 1
Αποτελέσματα ερώτημα 1



Σύμφωνα με την Εικόνα 1, οι σημαντικότεροι λόγοι ήταν τα τεχνικά προβλήματα (57 απαντήσεις) που αφορούσαν διακοπές ηλεκτρικού ρεύματος αλλά κυρίως έλλειψη πρόσβασης στο διαδίκτυο, καθώς και τεχνικά προβλήματα με την πλατφόρμα eclass (47 απαντήσεις) η οποία ήταν το βασικό μέσο διδασκαλίας. Ενώ ο κυριότερος λόγος που καθόρισε τη συνέχιση της παρακολούθησης ήταν ότι αποτελούσε για αυτούς μια υποχρεωτική μορφή εκπαίδευσης και όφειλαν να συμμετέχουν (46 απαντήσεις). Επίσης, 38 μαθητές επέλεξαν ως έναν από τους λόγους για την παρακολούθηση των μαθημάτων τον σχεδιασμό του μαθήματος, ενώ 31 μαθητές έδωσαν ως απάντηση την αλληλεπίδραση που είχαν με τους εκπαιδευτικούς, οι 27 μαθητές θεώρησαν ότι είχαν καλές επιδόσεις και οι 23 μαθητές επηρεάστηκαν από την ποικιλία των εργασιών. Στις χαμηλότερες προτιμήσεις των μαθητών είναι η αντίληψη ότι τα καταφέρνουν στα ηλεκτρονικά μαθήματα (20 απαντήσεις), η ευκολία στη διαχείριση των διαδικτυακών μαθημάτων (19 απαντήσεις) και η άνεση στη χρήση των πλατφόρμων (19 απαντήσεις). Συμπερασματικά τα αίτια που απέτρεψαν τους μαθητές να συνεχίσουν τα μαθήματα σχετίζονταν με τα τεχνικά προβλήματα που αντιμετώπιζαν εξαιτίας του διαδικτύου ή εξαιτίας της πλατφόρμας, ενώ ο βασικότερος λόγος για τη συνέχιση ήταν η υποχρεωτικότητα αυτής της μορφής εκπαίδευσης. Επίσης, η οργάνωση των μαθημάτων και η αλληλεπίδραση με τους εκπαιδευτικούς διαδραμάτισαν κάποιους επιπρόσθετους παράγοντες για την παραμονή των μαθητών στα διαδικτυακά μαθήματα.

Ερωτήματα 2. Το ενδιαφέρον των μαθητών για τα μαθήματα στην αρχή, κατά τη διάρκεια και προς το τέλος της εξ αποστάσεως διδασκαλίας ήταν:

Εικόνα 2
Αποτελέσματα ερώτημα 2



Από τις απαντήσεις των μαθητών (Εικόνα 2) γίνεται εμφανές ότι το ενδιαφέρον των μαθητών για τα ηλεκτρονικά μαθήματα σε όλη την διάρκεια ήταν περιορισμένο, καθώς οι απαντήσεις για την επιλογή «λίγο» κυμαίνονται από 48%, 58% και 45%. Οι μισοί σχεδόν μαθητές δεν ενδιαφέρονται για την εξ αποστάσεως εκπαίδευση παρότι συμμετείχαν σε αυτή. Το μεγαλύτερο ενδιαφέρον έδειξαν στην αρχή των ηλεκτρονικών μαθημάτων (29% πολύ) και το μικρότερο ενδιαφέρον στο τέλος των μαθημάτων (30% καθόλου).

Ερώτημα 3. Για την εγγραφή στα διαδικτυακά μαθήματα οι μαθητές είχαν υποστήριξη από:

Εικόνα 3
Αποτελέσματα ερώτημα 3

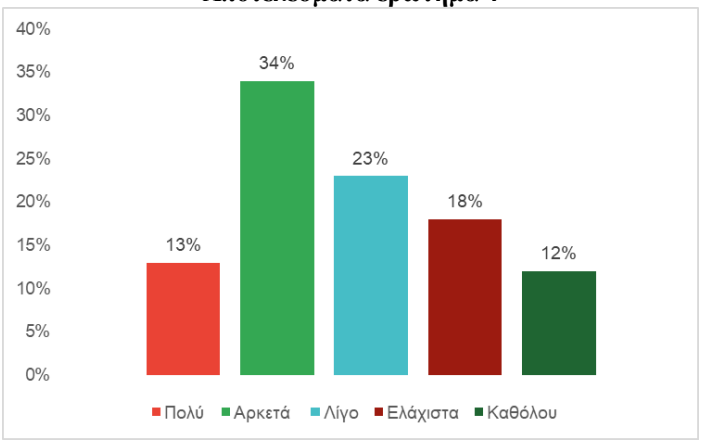


Σύμφωνα με την Εικόνα 3 για την εγγραφή τους οι μισοί μαθητές (50%) υποστηρίχθηκαν από την οικογένεια τους, καθώς η ενημέρωση από το σχολείο έγινε στους γονείς τους και η εγγραφή τους στο Πανελλήνιο σχολικό δίκτυο έγινε από αυτούς. Ορισμένοι από τους μαθητές (21%) όμως, έκαναν την εγγραφή μόνοι τους, λόγω μη εξοικείωσης των γονέων με την τεχνολογία, ενώ όλοι οι μαθητές έχουν τέτοιου είδους εμπειρίες στην καθημερινότητα τους κάνοντας

εγγραφές σε διάφορους ιστότοπους. Ελάχιστοι μαθητές θεωρούν ότι βοηθήθηκαν από τη διεύθυνση του σχολείου (10%), τους εκπαιδευτικούς (9%) και τους συμμαθητές τους (10%). Το σχολείο δεν καθίσταται υποστηρικτικό ούτε μέσω της διεύθυνσης ούτε μέσω των εκπαιδευτικών, καθώς οι περισσότεροι από αυτούς δεν διέθεταν τις απαιτούμενες γνώσεις.

Ερώτημα 4. Οι εκπαιδευτικοί ανταποκρίνονταν απαντώντας σε email ή μηνύματα εντός 48 ωρών στα ερωτήματα ή τις εργασίες των μαθητών.

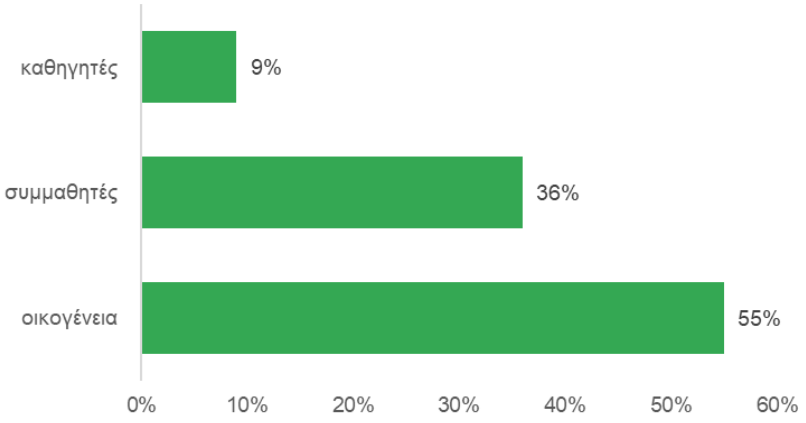
Εικόνα 4
Αποτελέσματα ερώτημα 4



Από τις απαντήσεις των μαθητών (Εικόνα 4) παρατηρούμε ότι το 47 % από αυτούς θεωρεί πως οι εκπαιδευτικοί απαντούσαν άμεσα, το 41% πιστεύει πως οι εκπαιδευτικοί καθυστερούσαν αλλά απαντούσαν, ενώ το 12% υποστηρίζει ότι οι εκπαιδευτικοί δεν είχαν συνέπεια/αδυνατούσαν να ανταποκριθούν.

Ερώτημα 5. Κατά τη διάρκεια των μαθημάτων στις δυσκολίες που αντιμετώπισαν οι μαθητές είχαν υποστήριξη από τους:

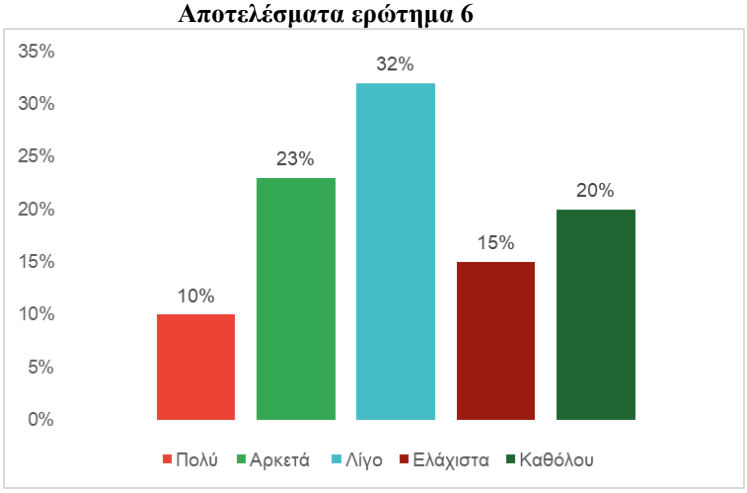
Εικόνα 5
Αποτελέσματα ερώτημα 5



Σύμφωνα με την Εικόνα 5 οι μαθητές στις δυσκολίες που αντιμετώπισαν είχαν υποστήριξη από την οικογένεια τους (55%) που τους βοηθούσε να ξεπεράσουν τα προβλήματα. Οι μαθητές που δεν μπορούσαν να στηριχθούν στην οικογένεια τους λόγω έλλειψης γνώσεων ζητούσαν συμβουλές και βοήθεια από τους συμμαθητές τους (36%). Μόνο το 9% των μαθητών υποστηρίζει ότι δέχθηκε τη βοήθεια και την καθοδήγηση από τους εκπαιδευτικούς του σχολείου.

Ερώτημα 6. Οι εκπαιδευτικοί έδιναν παράταση στις προθεσμίες, όταν τις ζητούσαν οι μαθητές

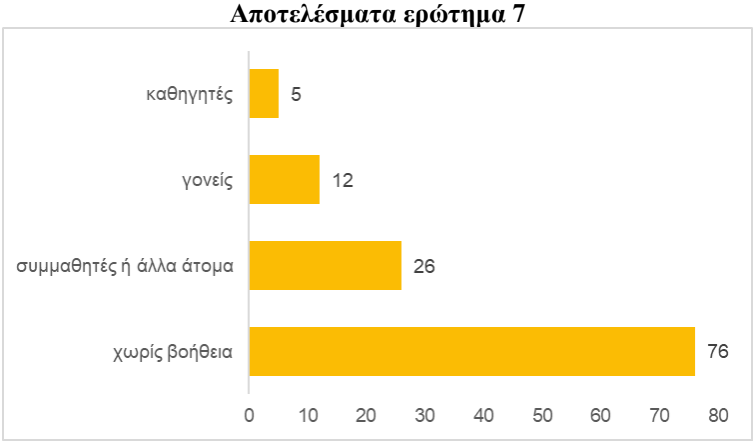
Εικόνα 6
Αποτελέσματα ερώτημα 6



Οι εκπαιδευτικοί δεν έδιναν παράταση προθεσμίας στους μαθητές για παράδοση εργασιών. Μόνο το 10% θεωρεί ότι έδιναν σε μεγάλο βαθμό και το 23% μαθητών πιστεύει σε ικανοποιητικό βαθμό. Αντίθετα, η πλειοψηφία των μαθητών το 67% αντιμετώπισε μια άρνηση από τους εκπαιδευτικούς. Η εξ αποστάσεως εκπαίδευση ως μια νέα μορφή εκπαίδευσης για τους εκπαιδευτικούς δημιουργεί απαιτήσεις και δυσκολίες με αποτέλεσμα να μην μπορούν να κατανοήσουν τις δυσκολίες που αντιμετώπιζαν οι μαθητές για να λειτουργήσουν υποστηρικτικά απέναντι σε αυτούς (Εικόνα 6).

Ερώτημα 7. Όταν οι εργασίες ήταν πολύ απαιτητικές οι μαθητές ζητούσαν βοήθεια από:

Εικόνα 7
Αποτελέσματα ερώτημα 7

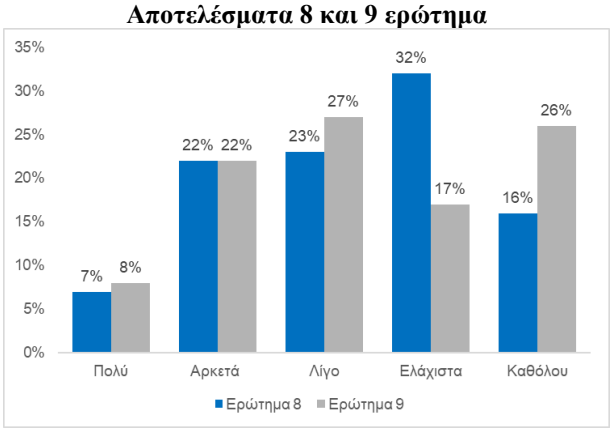


Σύμφωνα με την Εικόνα 7 η πλειονότητα των μαθητών διεκπεραίωνε τις περισσότερες εργασίες χωρίς βοήθεια (76 απαντήσεις), καθώς οι εργασίες αφορούσαν ύλη που την είχαν διδαχθεί στη δια ζώσης διδασκαλία. Σε ορισμένες εργασίες οι μαθητές απάντησαν ότι έλαβαν τη βοήθεια των συμμαθητών τους (26 απαντήσεις), ενδεχομένως σε περιπτώσεις που είχαν αδυναμία και ελλείψεις. Από το σύνολο των μαθητών, 12 από αυτούς απάντησαν ότι έλαβαν βοήθεια για την διεκπεραίωση των εργασιών από τους γονείς τους, οπωσδήποτε αυτοί οι μαθητές είχαν γονείς που είχαν το γνωστικό υπόβαθρο και μπορούσαν να συνδράμουν τα παιδιά τους, ενώ αξιοσημείωτο αποτελεί το αποτέλεσμα ότι μόνο 5 από τους 100 μαθητές έλαβαν βοήθεια για την υλοποίηση των εργασιών από εκπαιδευτικούς. Αυτό το αποτέλεσμα εγείρει ερωτήματα σχετικά με τον βαθμό επικοινωνίας και συνεργασίας μεταξύ εκπαιδευτικών και μαθητών.

Ερώτημα 8. Με τα διαδικτυακά μαθήματα οι μαθητές θεωρούν ότι υπήρχε αλληλεπίδραση και επικοινωνία με τους εκπαιδευτικούς, όπως στη δια ζώσης διδασκαλία (στην τάξη)

Ερώτημα 9. Κατά τη διάρκεια του μαθήματος οι μαθητές θεωρούν ότι υπήρχε συνεργασία και αλληλεπίδραση με τους συμμαθητές τους στην εξ αποστάσεως εκπαίδευση

Εικόνα 8
Αποτελέσματα 8 και 9 ερώτημα

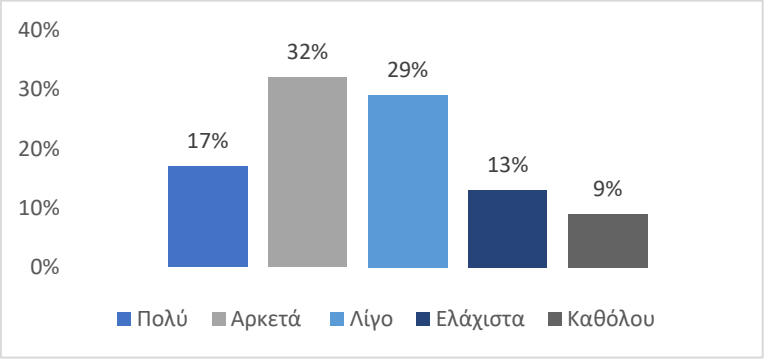


Τα ερωτήματα 8 και 9 παρουσιάζουν ενδιαφέρον να εξεταστούν συνδυαστικά, καθώς παρατηρείται κοινή αντιμετώπιση από τους μαθητές σε αυτά. Με τα παραπάνω ερωτήματα διερευνούμε τις αντιλήψεις των μαθητών σχετικά με την επικοινωνία και την αλληλεπίδραση τους με τους εκπαιδευτικούς καθώς και με τους συμμαθητές τους. Σύμφωνα με το Εικόνα 8 τα ποσοστά 7% και 8% σχεδόν ταυτίζονται για τα δύο ερωτήματα όσων μαθητών δίνουν την απάντηση «πολύ» και ταυτίζονται τα αντίστοιχα ποσοστά (22%), για όσους απαντούν «αρκετά», ενώ συγκεντρωτικά τα ποσοστά αυτά είναι 29% και 30% αντίστοιχα για τα ερωτήματα 8 και 9. Επομένως, μόνο 3 στους 10 μαθητές πιστεύουν ότι με την εξ αποστάσεως εκπαίδευση μπορούσαν να αλληλοεπιδράσουν με τους εκπαιδευτικούς και τους συμμαθητές τους κατά την εκπαιδευτική διαδικασία.

Συγκεντρωτικά, τα ποσοστά για τις απαντήσεις «λίγο», «ελάχιστα» και «καθόλου» τείνουν να ταυτίζονται με 71% για το ερώτημα 8 και 70% για το ερώτημα 9. Κατά συνέπεια οι 7 στους 10 μαθητές πιστεύουν ότι δεν υπήρχε αλληλεπίδραση, επικοινωνία και συνεργασία αφενός με τους εκπαιδευτικούς και αφετέρου με τους υπόλοιπους μαθητές που συμμετείχαν από κοινού στα μαθήματα. Το ποσοστό των μαθητών που απαντά ότι είχε λίγη επικοινωνία με τους εκπαιδευτικούς είναι κατά 4% μικρότερο από το αντίστοιχο για τους συμμαθητές. Το 32% των μαθητών είχε την ελάχιστη επικοινωνία με τους εκπαιδευτικούς, ενώ το αντίστοιχο ποσοστό για τους συμμαθητές είναι 17%, ενώ καμιά επικοινωνία απάντησε το 26% δεν είχε με τους συμμαθητές ενώ το αντίστοιχο ποσοστό για τους συμμαθητές είναι 16%. Σε γενικές γραμμές οι μαθητές επιλέγουν να έχουν στα διαδικτυακά μαθήματα την ελάχιστη και μικρότερη επικοινωνία με τους εκπαιδευτικούς παρά με τους συμμαθητές τους.

Ερώτημα 10. Οι μαθητές θεωρούν ότι η ενεργοποίηση της συνομιλίας στην πλατφόρμα ασύγχρονης εκπαίδευσης θα διευκόλυνε την επίλυση των αποριών στο μάθημα

Εικόνα 9
Αποτελέσματα ερώτημα 10

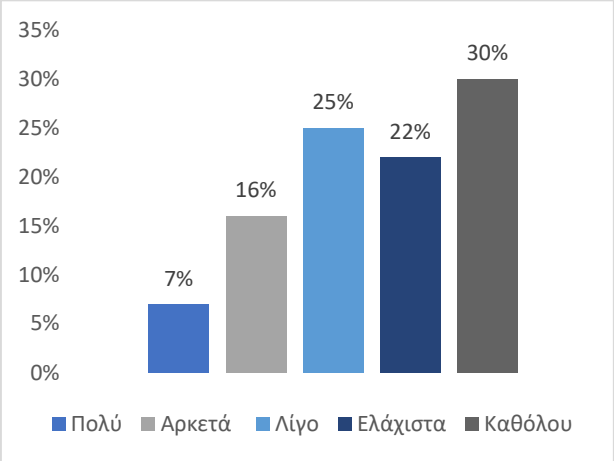


Σύμφωνα με την Εικόνα 9 οι μαθητές σε ποσοστό 17% απάντησαν ότι η ενεργοποίηση της συνομιλίας στην πλατφόρμα θα διευκόλυνε την επίλυση των αποριών στα μαθήματα και τις εργασίες ενώ το 32% αυτών θεωρεί ότι σε ικανοποιητικό βαθμό θα λειτουργούσε αυτή η επιλογή υποστηρικτικά για τους ίδιους. Συγκεντρωτικά το 49% εκφράζει τη θετική αντίληψη για αυτόν τον τρόπο αλληλεπίδρασης με τους εκπαιδευτικούς και τους συμμαθητές. Η συνομιλία θα έδινε λύσεις σε απορίες και εμπόδια που αντιμετώπιζαν οι μαθητές κατά την διεκπεραίωση των εργασιών, καθώς μέσω αυτής θα μπορούσαν να επικοινωνήσουν με τους εκπαιδευτικούς είτε οι ίδιοι είτε άλλοι μαθητές, να θέτουν ερωτήματα κοινοποιημένα προς όλους και να δίνονται απαντήσεις. Αυτή η μορφή επικοινωνίας θα ήταν μια καλή λύση επικοινωνίας κυρίως για τους μαθητές που ένιωθαν ανασφάλεια, ντροπή ή φόβο να κάνουν ερωτήσεις στους εκπαιδευτικούς, χωρίς να χρειάζεται οι ίδιοι να εκθέσουν τις απορίες αλλά κάποιοι άλλοι συμμαθητές τους.

Το 29% των μαθητών υποστηρίζει ότι η συνομιλία θα βοηθήσει στην επίλυση αποριών σε μικρότερο βαθμό, ενώ το 13% αυτών δίνει την απάντηση «ελάχιστα» και τέλος το 9% δίνει την απάντηση «καθόλου». Συγκεντρωτικά το 51% των μαθητών που συμμετείχαν στην έρευνα υποστηρίζει ότι δεν θεωρεί τη συνομιλία έναν τρόπο που θα διευκόλυνε την επίλυση αποριών στα μαθήματα. Κατά συνέπεια παρατηρώντας τα ποσοστά των θετικών και των αρνητικών αντιλήψεων διαπιστώνουμε ότι οι αντιλήψεις των μαθητών διχάζονται. Η αιτία πιθανόν είναι ότι η συνομιλία είναι ένας τρόπος επικοινωνίας, ο οποίος δεν έχει εφαρμοστεί και έτσι οι μαθητές δεν γνωρίζουν κατά πόσο είναι αποτελεσματική.

Ερώτημα 11. Η πλατφόρμα τηλεδιάσκεψης ευνοεί τη δημιουργία ενός συναισθηματικού δεσμού με τον εκπαιδευτικό σε όλη τη διάρκεια των μαθημάτων

Εικόνα 10
Αποτελέσματα ερώτημα 11

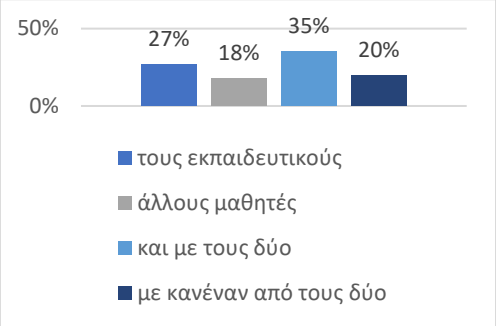


Από την Εικόνα 10 που απεικονίζει τις απαντήσεις των μαθητών παρατηρούμε ότι το μικρότερο ποσοστό των μαθητών (7%) απαντά «πολύ», το 16% απαντά «αρκετά». Από τα ποσοστά αυτά συμπεραίνουμε ότι λίγοι μαθητές θεωρούν ότι έχουν θετικές αντιλήψεις για τη συμβολή της πλατφόρμας σύγχρονης εκπαίδευσης στην επαφή και επικοινωνία με τους εκπαιδευτικούς. Το 77% των μαθητών δεν πιστεύει ότι η πλατφόρμα αυτή μπορεί να ευνοήσει τη δημιουργία συναισθηματικού δεσμού με τους εκπαιδευτικούς. Αναλυτικά παρατηρούμε ότι το 22% απαντά «ελάχιστα», το 25% απαντά «λίγο» και τέλος το μεγαλύτερο ποσοστό των μαθητών (30%) απαντά «καθόλου». Αδιαμφισβήτητα και ξεκάθαρα η πλειονότητα των μαθητών έχει αρνητικές αντιλήψεις και απόψεις για την πλατφόρμα Webex ως μέσο επικοινωνίας και επαφής. Η πιο πιθανή αιτία είναι ότι η πλειονότητα των μαθημάτων έγιναν με ασύγχρονη μορφή και η χρήση της σύγχρονης εκπαίδευσης ήταν εξαιρετικά περιορισμένη και σπάνια.

Ερώτημα 12. Η εξ αποστάσεως εκπαίδευση έδωσε τη δυνατότητα στους μαθητές να επικοινωνούν διαδικτυακά την περίοδο της καραντίνας με:

Σύμφωνα με την Εικόνα 11 των 35% των μαθητών που είναι το μεγαλύτερο ποσοστό υποστηρίζει ότι είχε τη δυνατότητα να επικοινωνεί τόσο με τους εκπαιδευτικούς, όσο και με τους συμμαθητές τους στα μαθήματα. Το 27% αυτών απαντά ότι επικοινωνούσε με τους εκπαιδευτικούς, ενώ το 20% με κανέναν από αυτούς. Τέλος το 18% των μαθητών θεωρεί ότι επικοινωνούσε με συμμαθητές τους. Παρατηρούμε ότι η επικοινωνία των μαθητών με συμμαθητές ήταν περιορισμένη, κυρίως επεδίωκαν να επικοινωνήσουν ταυτόχρονα με συμμαθητές και εκπαιδευτικούς καθώς επίσης μόνο με τους εκπαιδευτικούς. Σημαντικό είναι και το ποσοστό των μαθητών που θεωρούν ότι δεν υπήρχε καμιά επικοινωνία με κανέναν.

Εικόνα 11
Αποτελέσματα ερώτημα 12



ΣΥΜΠΕΡΑΣΜΑΤΑ

Η εξάρτηση της εξ αποστάσεως εκπαίδευσης από την τεχνολογία δημιούργησε τεχνολογικά προβλήματα (δυσλειτουργία εξοπλισμού, κακή σύνδεση) που επηρέασαν αρνητικά τους συμμετέχοντες. Σε πολλές περιπτώσεις οι εκπαιδευτικοί αδυνατούσαν να ολοκληρώσουν με επιτυχία τη διδασκαλία νιώθοντας έτσι ανασφάλεια και απροθυμία να αξιοποιήσουν την τεχνολογία στη μαθησιακή διαδικασία. Η στάση τους απέναντι στην εξ αποστάσεως εκπαίδευση επηρέασε σε μεγάλο βαθμό την επιτυχία της παρεχόμενης εκπαίδευσης. Η εξ αποστάσεως εκπαίδευση προσέφερε ευελιξία στους μαθητές ωστόσο δημιούργησε αυξημένες απαιτήσεις στους εκπαιδευτικούς (δημιουργία μαθημάτων, ανάρτηση ψηφιακού υλικού, διορθώσεις εργασιών, απαντήσεις στα emails). Επιπλέον οι εκπαιδευτικοί έπρεπε να είναι εξοπλισμένοι με τεχνολογικές δεξιότητες και να προσαρμόσουν τη διδασκαλία τους ώστε να ανταποκρίνεται στις ανάγκες των μαθητών. Όλα τα παραπάνω απαιτούν κατάρτιση και δαπάνη χρόνου από τη μεριά των διδασκόντων ενώ υπήρχε απουσία κινήτρων.

Η πρόσβαση στο διαδίκτυο και τα τεχνικά προβλήματα επηρέασαν σε μεγάλο βαθμό αρνητικά τις αντιλήψεις των μαθητών για την εξ αποστάσεως εκπαίδευση. Στην παρούσα έρευνα η πλειοψηφία των μαθητών αντιμετώπισε τεχνικά προβλήματα, τα οποία όμως δεν επηρέασαν σε μεγάλο βαθμό την ικανότητα παρακολούθησης του μαθήματος και επιλύθηκαν σχετικά άμεσα. Η εξ αποστάσεως εκπαίδευση είναι μια μορφή εκπαίδευσης, η οποία είναι άρρηκτα συνδεδεμένη με την τεχνολογία και τη χρήση ψηφιακών εργαλείων και μέσων από άλλους τρόπους διδασκαλίας και μάθησης, με αποτέλεσμα οι τεχνικές δυσκολίες να δημιουργούν συναισθήματα αβεβαιότητας στους μαθητές. Όλοι οι μαθητές αναγκάστηκαν να παρακολουθήσουν την εξ αποστάσεως εκπαίδευση ενώ είχαν συνηθίσει τη δια ζώσης εκπαίδευση με κυρίαρχα χαρακτηριστικά τον βιβλιοκεντρισμό, την απομνημόνευση, την μετωπική διδασκαλία. Αυτή η κουλτούρα της συμβατικής εκπαίδευσης δημιουργεί ιδιαίτερες δυσκολίες στους μαθητές που καλούνται να εξοικειωθούν και να υιοθετήσουν την αντίληψη της ανοικτής εξατομικευμένης μάθησης, καθώς έπρεπε να διαμορφώσουν το δικό τους ρυθμό μάθησης.

Στην εξ αποστάσεως εκπαίδευση οι δυνατότητες συνεργασίας, αλληλεπίδρασης και επικοινωνίας προβλημάτισαν αρκετά τους εκπαιδευόμενους, καθώς ήταν περιορισμένες σύμφωνα με την έρευνα. Οι προκλήσεις δεν αφορούσαν μόνο τον διαφορετικό ρόλο του εκπαιδευτικού αλλά, κυρίως, τις δεξιότητες που πρέπει να έχει αναπτύξει ώστε η επικοινωνία μεταξύ αυτού και των μαθητών του να είναι ουσιαστική. Από τα αποτελέσματα της παρούσας έρευνας διαπιστώθηκε ότι οι μαθητές έχουν αρνητικές αντιλήψεις σχετικά με την επικοινωνία και αλληλεπίδραση από τους διδάσκοντες. Η στάση των εκπαιδευτικών μέσα από τις αντιλήψεις των μαθητών παρουσιάζεται ως ουδέτερη. Παρατηρούμε να μην έχουν αναλάβει ρόλο ενεργητικό οι εκπαιδευτικοί που να τους επιτρέπει να επικοινωνούν και να αλληλεπιδρούν με τους μαθητές τους. Σύμφωνα με τον Αναστασιάδη (Anastasiades,2020) η εξ αποστάσεως εκπαίδευση απαιτεί από τους εκπαιδευτικούς να αναλάβουν νέους διευρυμένους ρόλους εστιάζοντας, εκτός από τη διδασκαλία, στη συμβουλευτική υποστήριξη των μαθητών, προκειμένου να αλληλεπιδράσουν με το εκπαιδευτικό υλικό μέσω ειδικά σχεδιασμένων δραστηριοτήτων. Επίσης, να αφιερώσουν χρόνο για τον σχεδιασμό δραστηριοτήτων, να ενθαρρύνουν, να υποστηρίζουν συναισθηματικά και ψυχολογικά τους μαθητές για να μπορέσουν να οικοδομήσουν τις γνώσεις και να επιτύχουν τους στόχους τους.

Στη δια ζώσης διδασκαλία ο εκπαιδευτικός χρησιμοποιεί το σχολικό εγχειρίδιο με στόχο την κάλυψη της διδακτέας ύλης βάση του αναλυτικού προγράμματος σπουδών. Την παιδαγωγική προσέγγιση την καλύπτει ο εκπαιδευτικός μέσω της δια ζώσης διδασκαλίας του. Στη διαμόρφωση του εκπαιδευτικού υλικού κεντρικό ρόλο διαδραματίζει η διδακτική ικανότητα του εκπαιδευτικού με τη συνδυαστική χρήση περισσότερων μέσων και μορφών

παρουσίασης των περιεχομένων. Το εκπαιδευτικό υλικό στην εξ αποστάσεως εκπαίδευση εκτός από την αρτιότητα του γνωστικού περιεχομένου χρειάζεται να διαθέτει μια σειρά από παιδαγωγικά και τεχνικά χαρακτηριστικά, που έχουν σκοπό να υποστηρίξουν και να εμψυχώσουν τους εκπαιδευόμενους στη μελέτη τους. Ανάλογα με το μοντέλο και την προσέγγιση της διδασκαλίας ο εκπαιδευτικός μπορεί να αναπλαισιώσει τη λειτουργία των ηλεκτρονικών μέσων στην εκπαιδευτική διαδικασία (Sofos et al., 2015).

Από την έρευνα προκύπτει ότι το εκπαιδευτικό υλικό που παρείχαν οι εκπαιδευτικοί δεν ήταν επαρκώς κατάλληλο, ενδιαφέρον και ολοκληρωμένο για τους μαθητές. Έτσι, δεν καταφέρνει να τους κινητοποιήσει ή να λειτουργήσει ως σημείο έλξης. Στην εξ αποστάσεως εκπαίδευση, το διδακτικό υλικό αποτελεί βασικό εργαλείο μάθησης, απαιτώντας προσεκτικό σχεδιασμό, καθώς ο μαθητής χρειάζεται υψηλό βαθμό αυτονομίας. Στο πλαίσιο της ασύγχρονης μάθησης, το υλικό πρέπει να ενσωματώνει χαρακτηριστικά που να το καθιστούν ελκυστικό, καθοδηγητικό, επεξηγηματικό και αποτελεσματικό για να επιτευχθούν οι μαθησιακοί στόχοι. Για να είναι λειτουργικό, οφείλει να ενεργοποιεί διδακτικές διαδικασίες όπως η καθοδήγηση στη μελέτη, η ενίσχυση της αλληλεπίδρασης με το περιεχόμενο, η ανατροφοδότηση, η σαφήνεια στα δύσκολα σημεία, η αξιολόγηση της προόδου, καθώς και η ενίσχυση και η ενθάρρυνση του μαθητή. Είναι σημαντικό ο μαθητής να γνωρίζει τι πρέπει να μάθει, να μπορεί να αξιολογήσει την πρόοδό του και να εντοπίζει τυχόν αδυναμίες μέσω δραστηριοτήτων αυτοαξιολόγησης, οι οποίες θα παρέχουν ουσιαστική ανατροφοδότηση (Nikolaou, 2020).

Η έρευνα αναδεικνύει τη σημαντική συμβολή στην εξ αποστάσεως εκπαίδευση της οικογένειας, η οποία παρέχει υλική, τεχνολογική και συναισθηματική υποστήριξη στα παιδιά. Αρχικά, εξασφαλίζει κατάλληλο χώρο μελέτης, όπου αυτό είναι εφικτό, καθώς και τον απαραίτητο εξοπλισμό και σύνδεση στο διαδίκτυο. Παράλληλα, στηρίζει τους μαθητές σε τεχνικά ζητήματα, διευκολύνει την εγγραφή τους στα μαθήματα και, όταν μπορεί, βοηθά στη μαθησιακή διαδικασία. Η πλειονότητα των οικογενειών είναι παρούσα σε όλα τα στάδια της εξ αποστάσεως εκπαίδευσης, ενισχύοντας τα παιδιά γνωστικά, συναισθηματικά και ψυχολογικά. Ο ρόλος του γονέα είναι ιδιαίτερα σημαντικός, καθώς αποτελεί τον βασικό υποστηρικτή της εκπαιδευτικής διαδικασίας στο σπίτι. Τα ευρήματα της έρευνας συμφωνούν με προηγούμενες μελέτες (Kelekidou et al., 2017· Anastasiades, 2020), που επιβεβαιώνουν τον καθοριστικό ρόλο της οικογένειας, ειδικά στην πρωτοβάθμια εκπαίδευση. Με την εγγραφή των παιδιών στο Πανελλήνιο Σχολικό Δίκτυο, τη διασύνδεσή τους με τις εκπαιδευτικές πλατφόρμες και την τεχνολογική υποστήριξη, οι οικογένειες συνέβαλαν ουσιαστικά στη συμμετοχή τους στα μαθήματα από απόσταση.

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ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΦΥΣΙΚΗ ΑΓΩΓΗ. ΔΙΕΡΕΥΝΗΣΗ ΓΝΩΣΕΩΝ ΤΩΝ ΚΑΘΗΓΗΤΩΝ Φ.Α ΠΡΩΤΟΒΑΘΜΙΑΣ ΚΑΙ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ

Ζούγρας Διονύσιος
Εκπαιδευτικός Φυσικής Αγωγής, Μεταπτυχιακός Φοιτητής
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
email: zougras77@yahoo.gr

Καμπάση Αικατερίνη
Καθηγήτρια Πανεπιστημίου, Κοσμήτορας της Σχολής Περιβάλλοντος
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
e-mail: kkabassi@ionio.gr

Φλάμπουρας Νιέτος Ηλίας
Διευθυντής 1ου Δημοτικού Ζακύνθου, Διδάκτορας
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
e-mail: hflabouras@yahoo.gr

Φλάμπουρα Νιέτου Υακίνθη
Φοιτήτρια ΤΕΦΑΑ Αθηνών
Εθνικό και καποδιστριακό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: yakinthinietou@gmail.com

ΠΕΡΙΛΗΨΗ

Η συγκεκριμένη εργασία εξετάζει την εφαρμογή της Τεχνητής Νοημοσύνης (ΤΝ) στον τομέα της Φυσικής Αγωγής, με έμφαση στις γνώσεις των εκπαιδευτικών. Η χρήση της ΤΝ στην εκπαίδευση έχει επεκταθεί ραγδαία τα τελευταία χρόνια, με ιδιαίτερες δυνατότητες για την προσαρμογή και ενίσχυση της εκπαιδευτικής εμπειρίας. Στη Φυσική Αγωγή, ωστόσο, η υιοθέτηση της παραμένει περιορισμένη, κυρίως λόγω έλλειψης γνώσης και επιμόρφωσης. Η έρευνα αυτή στοχεύει στη διερεύνηση του βαθμού κατανόησης και αποδοχής της από τους εκπαιδευτικούς, εστιάζοντας στις προοπτικές ενσωμάτωσής της στη διδασκαλία.

Η μεθοδολογία της έρευνας ακολούθησε ποσοτική ερευνητική προσέγγιση και περιλάμβανε τη συλλογή δεδομένων μέσω ηλεκτρονικών ερωτηματολογίων, τα οποία διανεμήθηκαν σε καθηγητές Φυσικής Αγωγής από όλη την Ελλάδα. Το δείγμα περιλάμβανε 250 συμμετέχοντες, οι οποίοι εργάζονται τόσο στην πρωτοβάθμια όσο και στη δευτεροβάθμια εκπαίδευση. Η ανάλυση των δεδομένων πραγματοποιήθηκε με τη χρήση περιγραφικών και επαγωγικών στατιστικών τεχνικών, μέσω του λογισμικού SPSS.

Η έρευνα ανέδειξε ότι οι γνώσεις των εκπαιδευτικών σχετικά με την ΤΝ είναι γενικά περιορισμένες. Το 23,6% δήλωσε ότι δεν είναι καθόλου εξοικειωμένο ενώ το 37,2% ανέφερε χαμηλό επίπεδο εξοικείωσης. Μόνο το 32,4% δήλωσε μέτρια εξοικείωση, ενώ τα ποσοστά των εκπαιδευτικών που αισθάνονται υψηλό επίπεδο εξοικείωσης είναι πολύ χαμηλά (Πολύ: 6,0%, Πάρα πολύ: 0,8%).Η εξοικείωση με τις βασικές αρχές, όπως η λειτουργία και οι τύποι της είναι επίσης περιορισμένη, με ορισμένους να αναγνωρίζουν μόνο τις πιο διαδεδομένες εφαρμογές της τεχνολογίας. Βρέθηκε θετική συσχέτιση μεταξύ της επιμόρφωσης στις ΤΠΕ και της επιμόρφωσης στην ΤΝ ($\rho=0.176, p=0.005$). Οι εκπαιδευτικοί που έχουν λάβει επιμόρφωση στις ΤΠΕ είναι πιο πιθανό να έχουν εμπειρία ή ενδιαφέρον και για επιμόρφωση στην ΤΝ. Αυτό υποδεικνύει ότι η προηγούμενη εκπαίδευση στις τεχνολογίες γενικά αυξάνει το ενδιαφέρον για πιο εξειδικευμένους τομείς. Σχετικά με την εμπειρία τους στη χρήση της, οι περισσότεροι εκπαιδευτικοί δήλωσαν ότι δεν έχουν χρησιμοποιήσει την τεχνολογία αυτή είτε στο εκπαιδευτικό πλαίσιο είτε σε άλλους τομείς.

Τα αποτελέσματα της έρευνας ανέδειξαν έντονη την ανάγκη για επιμόρφωση των εκπαιδευτικών Φυσικής Αγωγής στον τομέα της Τεχνητής Νοημοσύνης, ενώ οι συμμετέχοντες αναγνώρισαν τη σημασία και τη χρησιμότητα τέτοιων πρωτοβουλιών για την εκπαιδευτική διαδικασία. Παρά τη σχετική έλλειψη εξοικείωσης που αναδείχθηκε στα αποτελέσματα η πλειονότητα των συμμετεχόντων αξιολόγησε την επιμόρφωση ως πολύ χρήσιμη, εύρημα που υπογραμμίζει την ανάγκη για επαγγελματική ανάπτυξη στον τομέα αυτό.

Λέξεις - κλειδιά: Τεχνητή νοημοσύνη, Φυσική Αγωγή, Γνώσεις, Εκπαίδευση.

ΠΛΑΙΣΙΟ ΚΑΙ ΣΗΜΑΣΙΑ ΤΗΣ ΕΡΕΥΝΑΣ

Η Τεχνητή Νοημοσύνη αποτελεί έναν από τους πλέον καινοτόμους τομείς της τεχνολογίας, με ευρεία εφαρμογή σε πολλούς κλάδους, μεταξύ των οποίων και η εκπαίδευση. Τα τελευταία χρόνια, η τεχνητή νοημοσύνη έχει αναδειχθεί ως ένα ισχυρό εργαλείο που προσφέρει τη δυνατότητα μετασχηματισμού της μαθησιακής εμπειρίας, προσδίδοντας νέα διάσταση στη διδασκαλία και τη μάθηση. Μέσα από τη χρήση προηγμένων τεχνολογιών, όπως η μηχανική μάθηση, η ανάλυση δεδομένων και οι προσαρμοστικοί αλγόριθμοι, η τεχνητή νοημοσύνη υπόσχεται να ενισχύσει την αποτελεσματικότητα και την αποδοτικότητα της εκπαιδευτικής διαδικασίας (L. Chen, Chen, & Lin, 2020).

Η εφαρμογή της στην εκπαίδευση δεν περιορίζεται σε θεωρητικό επίπεδο, αλλά ήδη χρησιμοποιείται ευρέως σε πολλά πεδία. Για παράδειγμα, προσαρμοστικές πλατφόρμες μάθησης, όπως το DreamBox και το Smart Sparrow, επιτρέπουν την εξατομίκευση της μαθησιακής εμπειρίας, προσαρμόζοντας το περιεχόμενο στις ανάγκες του κάθε μαθητή (Olusanya, 2023). Ταυτόχρονα, εργαλεία αξιολόγησης, όπως το Gradescope, διευκολύνουν την αυτοματοποιημένη βαθμολόγηση, εξοικονομώντας χρόνο για τους εκπαιδευτικούς (Xu, 2024). Παράλληλα, εφαρμογές ανάλυσης δεδομένων, όπως το Tableau, επιτρέπουν την καλύτερη κατανόηση της προόδου των μαθητών μέσα από την ερμηνεία μεγάλων όγκων δεδομένων (Batt, Grealis, Harmon, & Tomolonis, 2020).

Στον πυρήνα της εφαρμογής της στην εκπαίδευση βρίσκεται η δυνατότητά της να ενισχύσει τη μάθηση μέσω εξατομικευμένων προσεγγίσεων. Οι αλγόριθμοι τεχνητής νοημοσύνης μπορούν να εντοπίζουν τις ατομικές ανάγκες και προτιμήσεις των μαθητών, διαμορφώνοντας μοναδικές διαδρομές μάθησης που ανταποκρίνονται στις ιδιαιτερότητές τους. Επιπλέον, η αυτοματοποιημένη αξιολόγηση επιτρέπει την άμεση ανατροφοδότηση, προωθώντας τη βελτίωση των μαθησιακών αποτελεσμάτων. Η δυνατότητα παροχής διαρκούς υποστήριξης μέσω ψηφιακών βοηθών, όπως τα chatbots, ενισχύει την αυτονομία των μαθητών, καθιστώντας τη μάθηση πιο ενεργητική και προσανατολισμένη στις ανάγκες τους (X. Chen, Zou, Xie, Cheng, & Liu, 2022).

Η Φυσική Αγωγή, ένας τομέας που συχνά θεωρείται λιγότερο συμβατικός όσον αφορά την υιοθέτηση τεχνολογιών, διαθέτει ιδιαίτερες δυνατότητες ενσωμάτωσης της τεχνητής νοημοσύνης. Εφαρμογές ανάλυσης κίνησης, όπως το Dartfish, επιτρέπουν την ακριβή αξιολόγηση της τεχνικής των μαθητών, βοηθώντας τους να βελτιώσουν τις επιδόσεις τους. Παράλληλα, συστήματα προσαρμοσμένων προγραμμάτων άσκησης, όπως το Myzone, παρέχουν εξατομικευμένες ασκήσεις και δραστηριότητες βασισμένες στα επίπεδα φυσικής κατάστασης κάθε μαθητή. Επιπλέον, μπορούν να χρησιμοποιηθούν για την παρακολούθηση της προόδου των μαθητών, προσφέροντας στους εκπαιδευτικούς πολύτιμες πληροφορίες για τη βελτίωση της διδασκαλίας (H. S. Lee & Lee, 2021). Η ενσωμάτωση της βέβαια δεν αφορά μόνο τη βελτίωση των μαθησιακών αποτελεσμάτων, αλλά και τη δημιουργία μιας περισσότερο συμπεριληπτικής και εξατομικευμένης εμπειρίας. Η ικανότητα της να ανταποκρίνεται στις διαφορετικές ανάγκες των μαθητών, ανεξαρτήτως επιπέδου ή δεξιοτήτων, μπορεί να διαμορφώσει ένα εκπαιδευτικό περιβάλλον που προάγει τη συμμετοχικότητα και τη διαρκή εξέλιξη. Με αυτόν τον τρόπο, δεν αποτελεί απλώς ένα εργαλείο, αλλά μια πλατφόρμα που ανοίγει νέους ορίζοντες στη διδασκαλία της Φυσικής Αγωγής, καθιστώντας την πιο δυναμική και αποτελεσματική.

ΑΝΑΓΚΑΙΟΤΗΤΑ ΤΗΣ ΕΡΕΥΝΑΣ

Η σύγχρονη εκπαίδευση βρίσκεται σε μια μεταβατική περίοδο, όπου οι τεχνολογικές εξελίξεις επαναπροσδιορίζουν τις πρακτικές διδασκαλίας και μάθησης. Η Τεχνητή Νοημοσύνη αναδύεται ως ένας κρίσιμος παράγοντας μετασχηματισμού, προσφέροντας δυνατότητες εξατομικευμένης μάθησης και αξιολόγησης. Στο πλαίσιο της Φυσικής Αγωγής, ο ρόλος της είναι πολλά υποσχόμενος, ωστόσο η υιοθέτησή της δεν έχει ακόμη εδραιωθεί. Η Φυσική Αγωγή αποτελεί ένα βασικό κομμάτι για τη συνολικής ανάπτυξης των μαθητών αφού προάγει τη σωματική ευεξία, την κοινωνική αλληλεπίδραση και την πειθαρχία. Παράλληλα, η Τεχνητή Νοημοσύνη έχει αποδείξει ότι μπορεί να ενισχύσει σημαντικά τη διδασκαλία και τη μάθηση μέσω προηγμένων εργαλείων που παρέχουν εξατομικευμένη καθοδήγηση και ανατροφοδότηση. Η σύνδεση τους μπορεί να προσφέρει καινοτόμες προσεγγίσεις που ενισχύουν την εμπειρία των μαθητών, ενώ διευκολύνουν την παρακολούθηση και αξιολόγηση της προόδου τους.

Η τεχνητή νοημοσύνη μέσω συστημάτων ανάλυσης κίνησης, μπορεί να αξιολογήσει με ακρίβεια την απόδοση των μαθητών και να αναγνωρίσει τυχόν αδυναμίες στις κινήσεις ή τις τεχνικές τους. Επιπλέον, άλλες εφαρμογές της μπορούν να δημιουργήσουν εξατομικευμένα προγράμματα εκγύμνασης, λαμβάνοντας υπόψη τις ιδιαίτερες ανάγκες, τις φυσικές δυνατότητες και τους στόχους κάθε μαθητή. Για παράδειγμα, ένα μαθησιακό σύστημα βασισμένο σε μια τέτοια τεχνολογία μπορεί να παρέχει ανατροφοδότηση σε πραγματικό χρόνο κατά την εκτέλεση ασκήσεων, προτείνοντας διορθωτικές ενέργειες για τη βελτίωση της τεχνικής. Εκτός από την εξατομίκευση, η τεχνητή νοημοσύνη μπορεί να συμβάλει και στη συλλογή δεδομένων για τη φυσική δραστηριότητα των μαθητών, τα οποία μπορούν να αναλυθούν για να προκύψουν πολύτιμες πληροφορίες σχετικά με την απόδοση και την υγεία τους. Παράλληλα, οι δυνατότητες της

μπορούν να ενισχύσουν τη διδασκαλία και τη μάθηση, προάγοντας μια πιο διαδραστική και αποτελεσματική εμπειρία για τους μαθητές.

Σκοπός της εργασίας είναι η διερεύνηση των γνώσεων και η καταγραφή του βαθμού εξοικείωσης των καθηγητών Φυσικής Αγωγής στην πρωτοβάθμια και την δευτεροβάθμια εκπαίδευση σχετικά με τη χρήση της Τεχνητής Νοημοσύνης στο μάθημα τους. Μέσα από την έρευνα, θα κατανοήσουμε αν οι εκπαιδευτικοί έχουν επαρκή γνώση για τις βασικές αρχές και τις εφαρμογές της ΤΝ και αν θεωρούν ότι η ΤΝ μπορεί να συμβάλει στην προώθηση της διδασκαλίας. Επίσης, θα διερευνήσουμε τις προτιμήσεις τους για τρόπους εκπαίδευσης και τις εκπαιδευτικές ανάγκες τους. Τα αποτελέσματα της έρευνας φιλοδοξούν να υποστηρίξουν τη διαμόρφωση εκπαιδευτικών πολιτικών και πρακτικών που θα επιτρέψουν την ομαλή ενσωμάτωση της Τεχνητής Νοημοσύνης στη διδασκαλία της Φυσικής Αγωγής, διασφαλίζοντας την αποτελεσματικότητα και την αποδοχή της από την εκπαιδευτική κοινότητα και να αποσαφηνιστούν οι προοπτικές αυτής της τεχνολογίας στο μάθημα της γυμναστικής.

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

Η Τεχνητή Νοημοσύνη αποτελεί ένα από τα πιο σημαντικά και πολυσυζητημένα πεδία της σύγχρονης τεχνολογίας, με ευρύ φάσμα εφαρμογών που επηρεάζουν κάθε πτυχή της ανθρώπινης ζωής. Στον πυρήνα της, ορίζεται ως η ικανότητα των μηχανών να προσομοιώνουν πτυχές της ανθρώπινης νοημοσύνης, όπως η μάθηση, η λογική, η επίλυση προβλημάτων, η αντίληψη και η γλώσσα. Αυτή η δυνατότητα έχει ως στόχο να επιτρέψει στις μηχανές να "σκέφτονται" και να "λειτουργούν" με τρόπο παρόμοιο με τους ανθρώπους και να παρέχουν λύσεις σε προβλήματα αλλά και να εκτελούν εργασίες που παραδοσιακά απαιτούσαν ανθρώπινη νοημοσύνη (Helm et al., 2020).

Βασικά ορίζεται από πολλούς ειδικούς ως η επιστήμη και η μηχανική της δημιουργίας έξυπνων συστημάτων, τα οποία μπορούν να συλλέγουν δεδομένα, να τα επεξεργάζονται και να λαμβάνουν αποφάσεις με βάση αυτά. Ο όρος "Τεχνητή Νοημοσύνη" πρωτοχρησιμοποιήθηκε το 1956 από τον John McCarthy κατά τη διάρκεια του συνεδρίου στο Dartmouth, όπου τέθηκαν οι βάσεις για το πεδίο (McCarthy, 1981). Στον πυρήνα της, επικεντρώνεται στην αναπαραγωγή πτυχών της ανθρώπινης νοημοσύνης, όπως:

- Μάθηση: Οι μηχανές μπορούν να "μαθαίνουν" από δεδομένα μέσω διαδικασιών όπως η μηχανική μάθηση και η βαθιά μάθηση όπου οι αλγόριθμοι αναλύουν τεράστια ποσά δεδομένων για να βελτιώσουν την απόδοσή τους (Helm et al., 2020).
- Λογική και επίλυση προβλημάτων: Επιδιώκει να αναπαραγάγει τη λογική σκέψη ώστε να επιτρέπει στις μηχανές να βρίσκουν λύσεις σε πολύπλοκα προβλήματα.
- Αντίληψη: Έχει τη δυνατότητα να "κατανοεί" τον κόσμο μέσω της επεξεργασίας αισθητηριακών δεδομένων, όπως εικόνες και ήχοι.
- Γλώσσα: Ένα από τα πιο ενδιαφέροντα πεδία της είναι η κατανόηση και η παραγωγή φυσικής γλώσσας, όπως φαίνεται στις εφαρμογές γλωσσικών μοντέλων και συστημάτων αυτόματης μετάφρασης (Natale & Ballatore, 2020).

Είναι σημαντικό να τη διαχωρίσουμε από άλλες σχετικές τεχνολογίες, όπως οι αυτοματισμοί οι οποίοι βασίζονται σε προγραμματισμένες οδηγίες και λειτουργούν μέσα σε σαφώς καθορισμένα όρια. Αντίθετα με αυτό η τεχνητή νοημοσύνη έχει την ικανότητα να μαθαίνει και να προσαρμόζεται σε νέα δεδομένα και καταστάσεις, χωρίς να απαιτείται εκ νέου προγραμματισμός (Saghiri, Vahidipour, Jabbarpour, Sookhak, & Forestiero, 2022). Η διαφορά αυτή καθιστά την τεχνητή νοημοσύνη ιδιαίτερα ισχυρή για την επίλυση προβλημάτων που δεν μπορούν να αντιμετωπιστούν εύκολα μέσω παραδοσιακών μεθόδων. Για παράδειγμα, οι αυτοματισμοί σε μια γραμμή παραγωγής εκτελούν τις ίδιες κινήσεις ξανά και ξανά, ενώ ένα σύστημα τεχνητής νοημοσύνης μπορεί να βελτιώσει τις διαδικασίες παραγωγής με ανάλυση των δεδομένων σε πραγματικό χρόνο και να προσαρμόζει τη λειτουργία του ανάλογα με τις συνθήκες (Jha, Doshi, Patel, & Shah, 2019).

Η βάση της σύγχρονης τεχνητής νοημοσύνης είναι η μηχανική μάθηση η οποία στην ουσία επιτρέπει στις μηχανές να "μαθαίνουν" από δεδομένα χωρίς να είναι σαφώς προγραμματισμένες. Η βαθιά μάθηση άλλος ένας όρος που ακούγεται συχνά, αποτελεί εξέλιξη της μηχανικής μάθησης και είναι βασισμένη σε νευρωνικά δίκτυα που μιμούνται τον τρόπο λειτουργίας του ανθρώπινου εγκεφάλου. Αυτή η τεχνολογία έχει οδηγήσει σε εντυπωσιακά επιτεύγματα, όπως η αναγνώριση προσώπων, η αυτόνομη οδήγηση και οι αυτόματες διαγνώσεις στην υγειονομική περίθαλψη (Dimiduk, Holm, & Niezgoda, 2018). Η κατανόηση του τι είναι η τεχνητή νοημοσύνη είναι απαραίτητο για να αντιληφθούμε τις δυνατότητες και τους περιορισμούς της. Ως πολυδιάστατη τεχνολογία, όχι μόνο αλλάζει τον τρόπο που ζούμε, αλλά θέτει και ηθικές προκλήσεις που πρέπει να αντιμετωπιστούν καθώς συνεχίζουμε να την εξελίσσουμε.

ΦΥΣΙΚΗ ΑΓΩΓΗ

Η Φυσική Αγωγή αποτελεί έναν θεμέλιο λίθο της εκπαίδευσης αφού συνδέει τη σωματική άσκηση με τη συνολική ανάπτυξη του ανθρώπου. Από την αρχαιότητα ακόμα έως και τη σύγχρονη εποχή, η Φυσική Αγωγή έχει διαμορφωθεί μέσα από πολιτισμικές, κοινωνικές και πολιτικές αλλαγές και αντικατοπτρίζει τις εκάστοτε αντιλήψεις για την υγεία, την εκπαίδευση και τον ρόλο του σώματος. Στη σύγχρονη εποχή δεν περιορίζεται μόνο στη σωματική δραστηριότητα, αλλά προάγει τη λεγόμενη ολιστική προσέγγιση για την υγεία και την ευεξία. Μέσα από τη χρήση καινοτόμων τεχνολογιών πλέον, όπως τα συστήματα παρακολούθησης φυσικής δραστηριότητας και τα εξατομικευμένα προγράμματα άσκησης, κατέχει ένα σημαντικό ρόλο στην καλλιέργεια υγιών συνηθειών και την εκπαίδευση για τη δια βίου άσκηση. Έχει εξελιχθεί σε ένα πολυδιάστατο πεδίο που συνδυάζει επιστημονική γνώση, κοινωνικές πρωτοβουλίες και διεθνή συνεργασία. Ο ρόλος της πλέον ξεπερνά την παραδοσιακή διδασκαλία σωματικών δεξιοτήτων, επικεντρώνοντας στην ολιστική ανάπτυξη του ανθρώπου, την κοινωνική δικαιοσύνη και τη βιωσιμότητα.

Η διδασκαλία της Φυσικής Αγωγής έχει υποστεί σημαντικές αλλαγές τις τελευταίες δεκαετίες αντικατοπτρίζοντας τις ραγδαίες εξελίξεις στην τεχνολογία, τις κοινωνικές ανάγκες και τα επιστημονικά δεδομένα (Collins, 2011). Ενώ παλαιότερα επικεντρωνόταν κυρίως στη φυσική δραστηριότητα και την καλλιέργεια της φυσικής κατάστασης, σήμερα η προσέγγισή της είναι πολυδιάστατη, με έμφαση στην ολιστική ανάπτυξη του ατόμου. Η UNESCO, ως ο κορυφαίος διεθνής οργανισμός για την εκπαίδευση, την επιστήμη και τον πολιτισμό, έχει διαδραματίσει καθοριστικό ρόλο στην προώθηση και ενίσχυση της φυσικής αγωγής κατά τον 21ο αιώνα. Αναγνωρίζοντας τη σημασία της φυσικής αγωγής για την ολόπλευρη ανάπτυξη του ανθρώπου, έχει αναλάβει πρωτοβουλίες που στοχεύουν στη βελτίωση της ποιότητας, της προσβασιμότητας και της ένταξης της φυσικής αγωγής σε παγκόσμιο επίπεδο (Uhlenbrock & Meier, 2018).

Παράλληλα, οι κοινωνικές αλλαγές έχουν συμβάλει στη διαμόρφωση νέων στόχων και προτεραιοτήτων αφού οι αυξημένες απαιτήσεις για ενσωμάτωση και ίσες ευκαιρίες στην εκπαίδευση έχουν οδηγήσει στην ανάπτυξη πρακτικών που ενθαρρύνουν τη συμμετοχή όλων των μαθητών, ανεξάρτητα από τις φυσικές ή κοινωνικοοικονομικές τους συνθήκες. Σημαντική είναι και η έμφαση στη βιωσιμότητα και την περιβαλλοντική συνείδηση που έχει επίσης φέρει τη φύση στο επίκεντρο προωθώντας δραστηριότητες που ενισχύουν τη σύνδεση των μαθητών με το φυσικό περιβάλλον.

Τέλος, τα ερευνητικά δεδομένα έχουν παίξει καθοριστικό ρόλο στην αναμόρφωση της διδασκαλίας της γυμναστικής. Για παράδειγμα επιστημονικές μελέτες έχουν αποδείξει τη σημασία της φυσικής δραστηριότητας για τη σωματική, ψυχική και κοινωνική υγεία και έχουν οδηγήσει στη διαμόρφωση προγραμμάτων που βασίζονται σε τεκμήρια και έχουν σχεδιαστεί για να ανταποκρίνονται στις ανάγκες των μαθητών. Η συνεργασία ανάμεσα σε ερευνητές και εκπαιδευτικούς έχει οδηγήσει στη δημιουργία καινοτόμων μεθόδων διδασκαλίας που προάγουν τη βιωματική μάθηση, την ανάπτυξη δεξιοτήτων ζωής και την καλλιέργεια αξιών.

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΦΥΣΙΚΗ ΑΓΩΓΗ

Η Τεχνητή Νοημοσύνη έχει φέρει επανάσταση στη Φυσική Αγωγή, με τα συστήματα ανάλυσης κίνησης να αποτελούν ένα από τα πιο προηγμένα εργαλεία που έχουν ενσωματωθεί στον τομέα αυτό. Τα συστήματα ανάλυσης κίνησης αξιοποιούν τεχνολογίες τεχνητής νοημοσύνης, όπως επεξεργασία εικόνας, μηχανική μάθηση και αισθητήρες, για να παρακολουθούν, να αναλύουν και να βελτιώνουν την ανθρώπινη κίνηση. Ο στόχος αυτών των συστημάτων είναι να παρέχουν ακριβείς και λεπτομερείς πληροφορίες για την απόδοση, να εντοπίζουν αδυναμίες και να βοηθούν στην πρόληψη τραυματισμών, βελτιώνοντας έτσι την ποιότητα της φυσικής αγωγής και της αθλητικής απόδοσης (H. S. Lee & Lee, 2021). Τα συστήματα ανάλυσης κίνησης βασίζονται σε προηγμένες τεχνολογίες καταγραφής δεδομένων. Η διαδικασία ξεκινά με τη συλλογή δεδομένων από αισθητήρες ή κάμερες που τοποθετούνται σε στρατηγικά σημεία του σώματος ή του περιβάλλοντος. Οι αισθητήρες αυτοί, όπως το επιταχυνσιόμετρο και το γυροσκόπιο, καταγράφουν πληροφορίες για την ταχύτητα, την επιτάχυνση, τη γωνία κίνησης και άλλες παραμέτρους. Οι κάμερες, από την άλλη, χρησιμοποιούν τεχνολογίες όπως τα συνελικτικά νευρωνικά δίκτυα (CNNs) για την αναγνώριση και παρακολούθηση σημείων κίνησης στο σώμα. Έπειτα, τα δεδομένα αυτά επεξεργάζονται από αλγορίθμους, οι οποίοι εντοπίζουν μοτίβα, μετρούν αποκλίσεις από τις ιδανικές κινήσεις και παρέχουν αναλυτικά αποτελέσματα (Y. Wang, Han, & Wang, 2022).

Στον σχεδιασμό και την παρακολούθηση προγραμμάτων άσκησης η Τεχνητή Νοημοσύνη έχει επιφέρει σημαντικές αλλαγές στον τομέα της Φυσικής Αγωγής, αφού την κάνει πιο εξατομικευμένη και αποτελεσματική. Μέσω προηγμένων αλγορίθμων, πλατφόρμες μπορούν να συλλέγουν και να αναλύουν δεδομένα από διάφορες πηγές, όπως φορητές συσκευές, αισθητήρες και εφαρμογές, και να προσαρμόζουν τα προγράμματα άσκησης στις μοναδικές ανάγκες κάθε ατόμου. Η διαδικασία αυτή περιλαμβάνει τη συλλογή δεδομένων, την ανάλυση προτύπων, τη δημιουργία

κατάλληλων προγραμμάτων άσκησης και τη συνεχή παρακολούθηση της προόδου (T. Zhou, Wu, Wang, Wang, & Zhang, 2024). Οι πλατφόρμες που χρησιμοποιούνται για αυτόν τον σκοπό συνδυάζουν τεχνολογίες μηχανικής μάθησης, αναγνώρισης προτύπων και ανάλυσης δεδομένων σε πραγματικό χρόνο. Εφαρμογές όπως το MyFitnessPal και το Strava χρησιμοποιούν δεδομένα δραστηριότητας, όπως βήματα, απόσταση και καρδιακό ρυθμό, για να παρέχουν στο χρήστη εξατομικευμένα σχέδια φυσικής δραστηριότητας. Αυτές οι εφαρμογές αξιοποιούν δεδομένα που συλλέγονται από φορητές συσκευές, όπως έξυπνα ρολόγια και fitness trackers, και παρέχουν πληροφορίες για την απόδοση, καθώς και προτάσεις για την επίτευξη συγκεκριμένων στόχων φυσικής κατάστασης (Farrokhi, Farahbakhsh, Rezazadeh, & Minerva, 2021).

Τα παραπάνω διευκολύνουν τους εκπαιδευτικούς να παρακολουθούν τις επιδόσεις των μαθητών, να εντοπίζουν αδυναμίες και να προσαρμόζουν τις ασκήσεις στις ανάγκες κάθε ατόμου. Παράλληλα, τα δεδομένα που συλλέγονται από αυτούς τους μαθητές μπορούν να αποθηκευτούν και να χρησιμοποιηθούν για την κατανόηση της συνολικής προόδου μιας τάξης, παρέχοντας στους εκπαιδευτικούς πολύτιμα στατιστικά στοιχεία. Η ανάλυση δεδομένων παίζει επίσης ρόλο στη βελτιστοποίηση αυτών των προγραμμάτων. Μέσα από την επεξεργασία δεδομένων απόδοσης, όπως η μέγιστη κατανάλωση οξυγόνου (VO2 max), η καρδιακή συχνότητα και η δύναμη των μυών, τα συστήματα μπορούν να προσδιορίσουν τις πιο αποτελεσματικές στρατηγικές εκπαίδευσης όπως περισσότερο χρόνο αποκατάστασης μεταξύ των ασκήσεων ή ότι οι ασκήσεις ευλυγισίας πρέπει να έχουν προτεραιότητα (Chase, 2020).

ΜΕΘΟΔΟΛΟΓΙΑ

Το δείγμα της παρούσας έρευνας αποτελείται από 250 εκπαιδευτικούς Φυσικής Αγωγής, οι οποίοι εργάζονται στην πρωτοβάθμια και δευτεροβάθμια εκπαίδευση. Περιλαμβάνει εκπαιδευτικούς από ένα ευρύ ηλικιακό φάσμα από 22 έως 60+ ετών. Βέβαια η πλειονότητα των συμμετεχόντων ανήκει στις ηλικιακές ομάδες 41-50 ετών και 51-60 ετών, γεγονός που αντανακλά την εμπειρία των εκπαιδευτικών Φυσικής Αγωγής, καθώς πρόκειται κυρίως για άτομα με πολυετή προϋπηρεσία. Υπάρχει σχεδόν ισοκατανομή στα δύο φύλα με 131 άντρες και 118 γυναίκες γεγονός που συμβάλλει στην αντιπροσωπευτικότητα του δείγματος όσον αφορά την εκπροσώπηση των ανδρών και γυναικών στον χώρο της Φυσικής Αγωγής. Αντίστοιχη ισοκατανομή υπάρχει και στη συμμετοχή από πρωτοβάθμια και δευτεροβάθμια εκπαίδευση. Όσον αφορά το μορφωτικό επίπεδο, το δείγμα μας πάλι θεωρείται αντιπροσωπευτικό αφού οι μισοί σχεδόν είναι κάτοχοι πτυχίου, και οι άλλοι μισοί κατέχουν μεταπτυχιακό δίπλωμα, ενώ ένα μικρό ποσοστό διαθέτει διδακτορικό τίτλο. Η παρουσία υψηλού ποσοστού εκπαιδευτικών με μεταπτυχιακή και διδακτορική εκπαίδευση υποδηλώνει έναν καλά καταρτισμένο πληθυσμό εκπαιδευτικών, στοιχείο που ενισχύει την εγκυρότητα των απόψεων και των γνώσεων τους σχετικά με τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση.

Η επιλογή της ποσοτικής μεθόδου για την παρούσα έρευνα βασίστηκε στην ανάγκη να προσεγγιστεί το ερευνητικό ζήτημα με αντικειμενικό και μετρήσιμο τρόπο. Ο κύριος στόχος της μελέτης μας είναι να καταγράψουμε τις γνώσεις των εκπαιδευτικών Φυσικής Αγωγής σχετικά με τη χρήση της τεχνητής νοημοσύνης στο εκπαιδευτικό τους έργο. Τα ερωτήματα της έρευνας μας απαιτούν μια μεθοδολογική προσέγγιση που να εξασφαλίζει τη συλλογή δεδομένων από μεγάλο δείγμα συμμετεχόντων, την εξαγωγή γενικεύσιμων συμπερασμάτων και τη δυνατότητα σύγκρισης αποτελεσμάτων και η ποσοτική μέθοδος ανταποκρίνεται ιδανικά σε αυτές τις απαιτήσεις. Η συγκεκριμένη μέθοδος μας επέτρεψε να μετρήσουμε με ακρίβεια τις γνώσεις των εκπαιδευτικών μέσω δομημένων ερωτηματολογίων, τα οποία είναι σχεδιασμένα ώστε να εξασφαλίζουν τη συνέπεια και τη στατιστική αξιοπιστία των απαντήσεων.

Πίνακας 1
Δείκτης Αξιοπιστίας Cronbach's Alpha

Στάδιο	Cronbach's Alpha	M.T Κλίμακας	T.A	Χαμηλότερη Corrected Item-Total Correlation
Αρχή	0.86	3.85	0.72	0.35
Τέλος	0.88	3.87	0.7	0.42

Το ερωτηματολόγιο που χρησιμοποιήθηκε στην παρούσα έρευνα σχεδιάστηκε με στόχο τη συλλογή δεδομένων που να αντικατοπτρίζουν τις γνώσεις των εκπαιδευτικών Φυσικής Αγωγής σχετικά με τη χρήση της τεχνητής νοημοσύνης στη διδασκαλία. Ο σχεδιασμός του ακολούθησε μια συστηματική μεθοδολογία, ώστε να διασφαλιστεί η εγκυρότητα, η αξιοπιστία και η σαφήνεια των ερωτήσεων, αλλά και η συνάφεια τους με τους στόχους της έρευνας. Για τη συλλογή δεδομένων στην παρούσα έρευνα χρησιμοποιήθηκε συνδυασμός δειγματοληψίας ευκολίας και στοχευμένης δειγματοληψίας, δύο μεθόδων που ενσωματώθηκαν για να εξασφαλίσουν τόσο την πρακτικότητα όσο και τη στόχευση του πληθυσμού που μας ενδιέφερε. Για την αξιολόγηση της αξιοπιστίας του ερωτηματολογίου, πραγματοποιήσαμε έλεγχο εσωτερικής συνέπειας μέσω του δείκτη Cronbach's Alpha (Πίνακας 1). Ο αρχικός Cronbach's Alpha για όλη την κλίμακα ήταν 0,86, υποδεικνύοντας ικανοποιητική εσωτερική συνοχή. Εξετάσαμε τις "Corrected Item-Total

Correlations" για κάθε ερώτηση. Μια συγκεκριμένη ερώτηση παρουσίαζε χαμηλότερη συσχέτιση (0,35), κάτι που υποδείκνυε ότι δεν ευθυγραμμιζόταν πλήρως με την υπόλοιπη κλίμακα. Αφαιρώντας την ερώτηση αυτή, ο δείκτης Cronbach's Alpha αυξήθηκε από 0,86 σε 0,88, βελτιώνοντας περαιτέρω τη συνοχή του εργαλείου.

ΑΠΟΤΕΛΕΣΜΑΤΑ

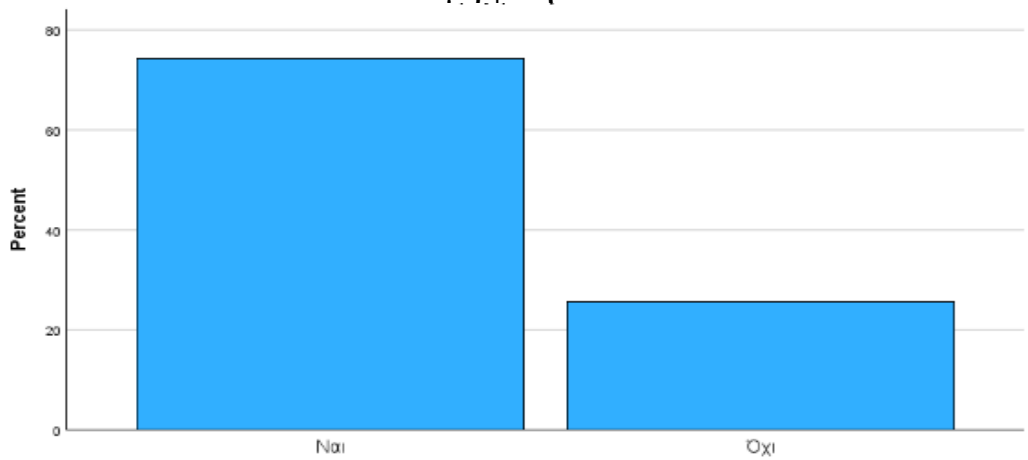
Στο πλαίσιο της παρούσας έρευνας, τα δεδομένα συλλέχθηκαν μέσω ηλεκτρονικών ερωτηματολογίων με το εργαλείο Google Forms, τα οποία συμπληρώθηκαν από τους συμμετέχοντες. Οι απαντήσεις εξήχθησαν σε αρχείο Excel, όπου πραγματοποιήθηκε η αρχική επεξεργασία και κωδικοποίηση των δεδομένων. Αφού ολοκληρώθηκε η κωδικοποίηση, τα δεδομένα εισήχθησαν στο στατιστικό λογισμικό SPSS (Statistical Package for the Social Sciences), το οποίο αποτελεί ένα από τα πιο ευρέως χρησιμοποιούμενα εργαλεία για την ανάλυση κοινωνικών επιστημών.

Όσον αφορά την ηλικιακή κατανομή, η πλειονότητα των συμμετεχόντων, σε ποσοστό 49,6%, ανήκει στην ηλικιακή ομάδα 51-60 ετών, γεγονός που υποδηλώνει ότι το δείγμα περιλαμβάνει κυρίως εκπαιδευτικούς με πολυετή εμπειρία. Η δεύτερη μεγαλύτερη ομάδα είναι οι 41-50 ετών με ποσοστό 25,6%. Οι νεότερες ηλικιακές ομάδες, 31-40 ετών και 22-30 ετών, αποτελούν μικρότερα ποσοστά, 12% και 4,8% αντίστοιχα. Τέλος, το 8% του δείγματος ήταν μεγαλύτεροι από 60 ετών. Η κατανομή του φύλου αντίθετα ήταν αρκετά ισορροπημένη. Οι άνδρες αποτελούν την πλειονότητα με ποσοστό 52,4%, ενώ οι γυναίκες ακολουθούν με ποσοστό 47,2%. Μόλις 1 άτομο από το σύνολο των συμμετεχόντων δήλωσε διαφορετική ταυτότητα φύλου. Η ανάλυση της επαγγελματικής εμπειρίας δείχνει μια σημαντική διαφοροποίηση στο δείγμα. Το 46,4% των συμμετεχόντων έχουν περισσότερα από 21 χρόνια προϋπηρεσίας, κάτι που επιβεβαιώνει την εμπειρία και τη σταθερότητα του εκπαιδευτικού προσωπικού στο δείγμα όπως το υποθέσαμε από τα αποτελέσματα στην ηλικία. Αντίθετα, το 19,6% έχει 0-5 χρόνια προϋπηρεσίας, ενώ τα ποσοστά μειώνονται για τις ενδιάμεσες κατηγορίες: 6-10 χρόνια (15,6%), 16-20 χρόνια (10%) και 11-15 χρόνια (8,4%). Όσον αφορά το μορφωτικό επίπεδο, η πλειονότητα των εκπαιδευτικών διαθέτει υψηλό επίπεδο εκπαίδευσης. Συγκεκριμένα, το 48% των συμμετεχόντων κατέχει μόνο πτυχίο, το 46,8% έχει ολοκληρώσει μεταπτυχιακές σπουδές, ενώ ένα μικρότερο ποσοστό, 5,2%, κατέχει διδακτορικό τίτλο. Τα δεδομένα αυτά δείχνουν μια σημαντική εκπαιδευτική βάση στο δείγμα.

Σχετικά με το σχολείο που εργάζονται, η πλειονότητα εργάζεται σε δημόσια σχολεία, με ποσοστό 92%, ενώ μόνο το 8% εργάζεται σε ιδιωτικά σχολεία. Αν και στο ελληνικό εκπαιδευτικό σύστημα η δημόσια εκπαίδευση κυριαρχεί, από την κατανομή συμπεραίνουμε πως δεν είναι γενικεύσιμο για τα ιδιωτικά σχολεία. Όσο αφορά τη βαθμίδα εκπαίδευσης, το 57,2% των συμμετεχόντων εργάζεται στην πρωτοβάθμια εκπαίδευση, ενώ το 42,8% εργάζεται στη δευτεροβάθμια. Σε αντίθεση με το προηγούμενο, αυτή η κατανομή υποδηλώνει ότι το δείγμα αντιπροσωπεύει επαρκώς και τις δύο βαθμίδες του εκπαιδευτικού συστήματος.

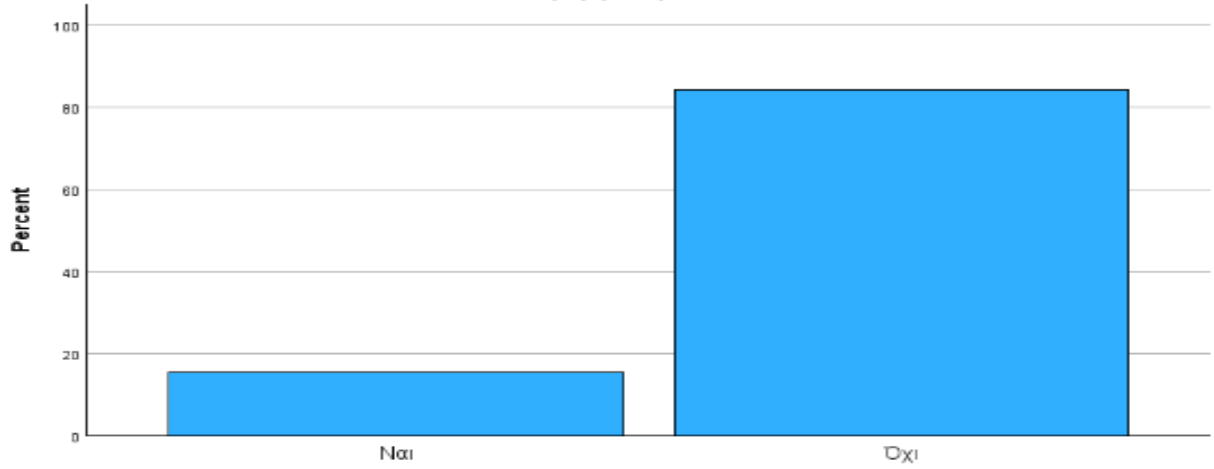
Επιμορφώσεις που έχουν παρακολουθήσει οι συγκεκριμένοι εκπαιδευτικοί. Σημαντική πλειονότητα των συμμετεχόντων, σε ποσοστό 74,4%, δήλωσαν ότι έχουν παρακολουθήσει κάποια επιμόρφωση στις ΤΠΕ (Διάγραμμα 1), υποδεικνύοντας την ευρεία διάδοση τέτοιων εκπαιδευτικών πρωτοβουλιών ενώ το ¼ 25,6% δεν έχει συμμετάσχει σε τέτοιες επιμορφώσεις.

Διάγραμμα 1
Επιμόρφωση ΤΠΕ



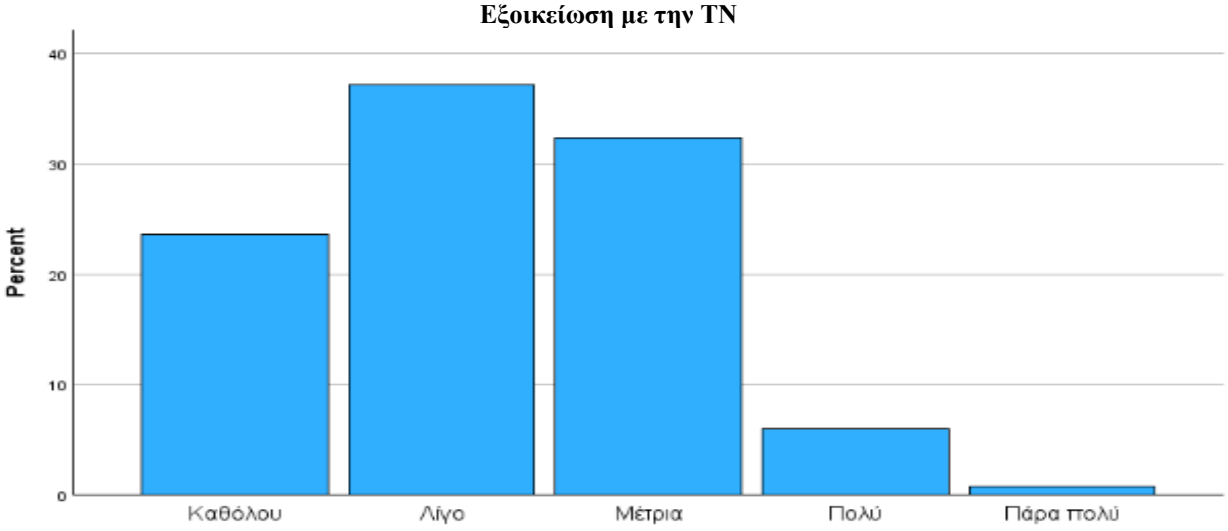
Σε αντίθεση μόνο το 15,6% των συμμετεχόντων έχουν παρακολουθήσει επιμόρφωση πάνω στην Τεχνητή Νοημοσύνη (Διάγραμμα 2), ενώ το 84,4% δήλωσαν ότι δεν έχουν λάβει τέτοιου είδους εκπαίδευση. Αυτό το εύρημα υποδηλώνει την περιορισμένη διάδοση εκπαιδευτικών πρωτοβουλιών σχετικών με την Τεχνητή Νοημοσύνη, παρά τη διαρκώς αυξανόμενη σημασία της στον εκπαιδευτικό τομέα.

Διάγραμμα 2
Επιμόρφωση ΤΝ



Το επίπεδο εξοικείωσης των συμμετεχόντων με την Τεχνητή Νοημοσύνη εμφανίζεται σχετικά χαμηλό (Διάγραμμα 3). Συγκεκριμένα το 23,6% δήλωσε ότι δεν είναι καθόλου εξοικειωμένο ενώ το 37,2% ανέφερε χαμηλό επίπεδο εξοικείωσης (Λίγο). Μόνο το 32,4% δήλωσε μέτρια εξοικείωση, ενώ τα ποσοστά των εκπαιδευτικών που αισθάνονται υψηλό επίπεδο εξοικείωσης είναι πολύ χαμηλά (Πολύ: 6,0%, Πάρα πολύ: 0,8%). Η γενική εικόνα υποδηλώνει ότι η εξοικείωση των εκπαιδευτικών φυσικής αγωγής είναι περιορισμένη, με την πλειονότητα των συμμετεχόντων να έχει μικρή ή καμία επαφή με αυτές τις έννοιες. Αυτό αναδεικνύει την ανάγκη για εκπαιδευτικές πρωτοβουλίες που θα ενισχύσουν τη γνώση και την εξοικείωση με αυτήν την τεχνολογία.

Διάγραμμα 3
Εξοικείωση με την ΤΝ

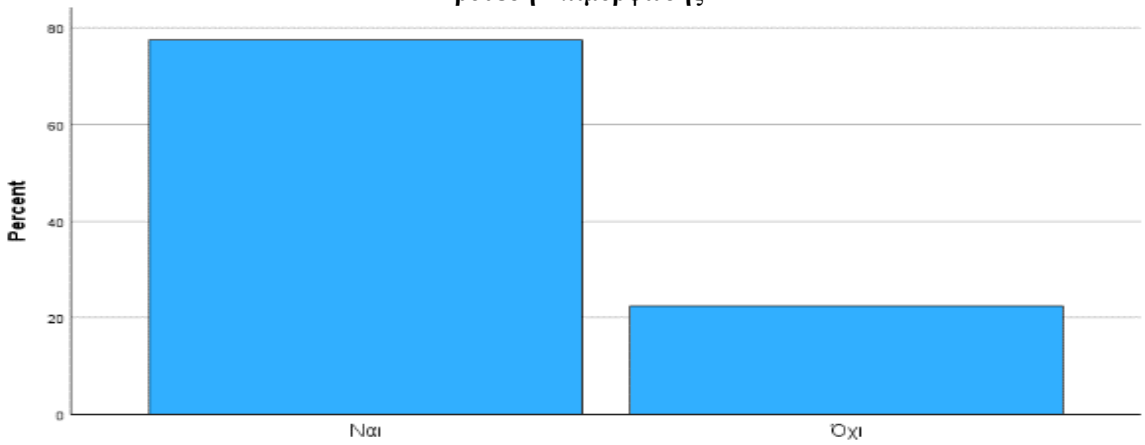


Το θετικό είναι πως η διάθεση για εκπαίδευση σε αυτό το νέο εργαλείο είναι έντονη. Το 77,6% των συμμετεχόντων θα ενδιαφερόταν να παρακολουθήσει ένα σχετικό πρόγραμμα εκπαίδευσης ή σεμινάριο (Διάγραμμα 4) και μόνο το 22,4% δήλωσε ότι δεν ενδιαφέρεται.

Σχετικά με τις πηγές πληροφόρησης τους, η πλειονότητα των συμμετεχόντων (54,4%) βασίζεται στο διαδίκτυο και τα μέσα κοινωνικής δικτύωσης (Διάγραμμα 5). Τα ειδησεογραφικά μέσα, όπως η τηλεόραση, οι εφημερίδες και τα περιοδικά, αποτελούν πηγή πληροφόρησης για το 18% των συμμετεχόντων, ενώ μόλις το 2,8% αντλεί πληροφορίες από

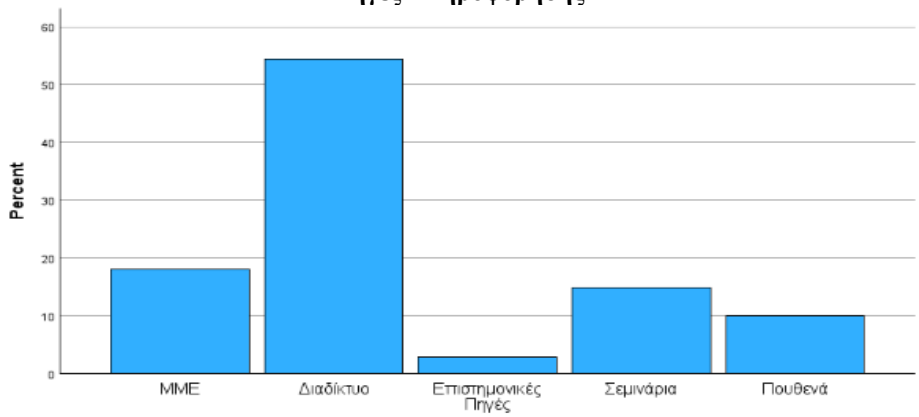
επιστημονικά άρθρα ή βιβλία. Επιπλέον, το 14,8% των συμμετεχόντων ενημερώνεται μέσω σεμιναρίων και εκπαιδευτικών προγραμμάτων, ενώ το 10% δήλωσε ότι δεν έχει λάβει καμία πληροφορία για την TN. Η επικράτηση του διαδικτύου και των μέσων κοινωνικής δικτύωσης υποδηλώνει ότι οι πληροφορίες είναι εύκολα προσβάσιμες, αλλά ενδέχεται να μην είναι πάντα επαρκώς τεκμηριωμένες ή αξιόπιστες. Η χαμηλή χρήση επιστημονικών πηγών αναδεικνύει την ανάγκη για πρόσβαση σε ποιοτικότερη πληροφόρηση.

Διάγραμμα 4
Πρόθεση Επιμόρφωσης



Ένας τρόπος να εντοπίσουμε αν γνωρίζουν αυτή τη νέα τεχνολογία ήταν η ερώτηση που τους ζητούσε να επιλέξουν αν γνωρίζουν διάφορα είδη τεχνητής νοημοσύνης. Η Ανάλυση Εικόνας αναδείχθηκε ως η πιο γνωστή τεχνολογία, καθώς το 52% των συμμετεχόντων την αναγνώρισε. Ακολουθεί η Παραγωγική TN, με το 40,8% να δηλώνει εξοικείωση, και η Μηχανική Μάθηση, που αναγνωρίστηκε από το 31,2%. Αντίθετα, η Βαθιά Μάθηση, μια πιο εξειδικευμένη τεχνολογία, είναι γνωστή μόνο στο 8,8% των συμμετεχόντων. Παράλληλα, ένα ποσοστό 9,6% δήλωσε ότι δεν έχει καμία γνώση για τις παραπάνω τεχνολογίες. Τα δεδομένα δείχνουν ότι το 61,2% των συμμετεχόντων δεν έχει ακούσει για την εφαρμογή της TN στη Φυσική Αγωγή, ενώ μόνο το 38,8% δήλωσε εξοικείωση. Αυτό υποδηλώνει ότι η περιορισμένη γνώση για τα υπάρχοντα εργαλεία αποτελεί σημαντικό εμπόδιο για την αποδοχή και την υιοθέτησή τους.

Διάγραμμα 5.
Πηγές Πληροφόρησης



Σχετικά με την εξοικείωση με κάποια από τα διαθέσιμα εργαλεία τεχνητής νοημοσύνης που μπορούν να χρησιμοποιηθούν στη Φυσική Αγωγή παρατηρήσαμε πως είναι περιορισμένη. Το εργαλείο Mirror αναγνωρίστηκε από το 31,2% των συμμετεχόντων, ακολουθούμενο από το Athos, το οποίο ήταν γνωστό στο 30,8%. Το Onyx καταγράφηκε ότι το γνώριζαν στο 20,8%, ενώ το Tonal είχε μικρότερη εξοικείωση, με το 16,8% των συμμετεχόντων να το γνωρίζουν. Παράλληλα, ένα 18,8% δήλωσε ότι δεν γνωρίζει κανένα από τα παραπάνω εργαλεία. Σημαντικό είναι πως στην επιλογή άλλο δεν καταγράφηκε καμία άλλη εφαρμογή.

Τα δεδομένα μας δεν πληρούν τις προϋποθέσεις κανονικότητας, και ως εκ τούτου χρησιμοποιήσαμε μη παραμετρικά τεστ για τις περαιτέρω αναλύσεις από τα οποία προέκυψαν οι παρακάτω συσχετίσεις.

Επιμόρφωση στις ΤΠΕ και Επιμόρφωση στην ΤΝ

Υπάρχει θετική συσχέτιση μεταξύ της Επιμόρφωσης στις ΤΠΕ και της Επιμόρφωσης στην ΤΝ (ρ=0.176,p=0.005). Οι εκπαιδευτικοί που έχουν λάβει επιμόρφωση στις ΤΠΕ είναι πιο πιθανό να έχουν εμπειρία ή ενδιαφέρον και για επιμόρφωση στην ΤΝ. Αυτό υποδεικνύει ότι η προηγούμενη εκπαίδευση στις τεχνολογίες γενικά αυξάνει το ενδιαφέρον για πιο εξειδικευμένους τομείς.

Πίνακας 2.
Επιμόρφωση στις ΤΠΕ και στην ΤΝ.

Συσχετιζόμενες Μεταβλητές	ρ	p
Επιμόρφωση στις ΤΠΕ - Επιμόρφωση στην ΤΝ	0.176	0.005

Διαδίκτυο για Ιδέες και Εξοικείωση με την ΤΝ

Η χρήση του Διαδικτύου για Ιδέες σχετίζεται θετικά με την Εξοικείωση με την ΤΝ (ρ=0.192,p=0.002). Οι εκπαιδευτικοί που ανατρέχουν συχνά στο διαδίκτυο για ιδέες διδασκαλίας φαίνεται να είναι πιο εξοικειωμένοι με την τεχνητή νοημοσύνη. Το διαδίκτυο προσφέρει πολλές πηγές πληροφόρησης και για αυτή τη τεχνολογία, γεγονός που μπορεί να ενισχύει την εξοικείωση.

Πίνακας 3.
Διαδίκτυο και Εξοικείωση με την ΤΝ

Συσχετιζόμενες Μεταβλητές	ρ	p
Διαδίκτυο για Ιδέες - Εξοικείωση με την ΤΝ	0.192	0.002

Εξοικείωση με την ΤΝ και Στάση Ενσωμάτωσης

Η Εξοικείωση με την ΤΝ συσχετίζεται θετικά με τη Στάση Ενσωμάτωσης (ρ=0.303,p<0.001). Όσο πιο εξοικειωμένοι είναι οι εκπαιδευτικοί με την τεχνητή νοημοσύνη, τόσο πιο θετικά αξιολογούν την ενσωμάτωσή της στη διδασκαλία. Αυτή η συσχέτιση δείχνει ότι η εξοικείωση μειώνει τον φόβο ή την επιφυλακτικότητα και προάγει θετικές στάσεις.

Πίνακας 4.
Εξοικείωση με ΤΝ και Στάση Ενσωμάτωσης

Συσχετιζόμενες Μεταβλητές	ρ	p
Εξοικείωση με την ΤΝ - Στάση Ενσωμάτωσης	0.303	<0.001

ΣΥΝΟΨΙΖΟΝΤΑΣ ΤΑ ΕΥΡΗΜΑΤΑ

Η έρευνα ανέδειξε ότι οι γνώσεις των εκπαιδευτικών σχετικά με την τεχνητή νοημοσύνη είναι γενικά περιορισμένες. Μόνο ένα μικρό ποσοστό των συμμετεχόντων δήλωσε ότι έχει μέτρια ή υψηλή εξοικείωση, ενώ η πλειονότητα εμφανίζει χαμηλό επίπεδο γνώσεων ή πλήρη άγνοια. Η εξοικείωση με τις βασικές αρχές, όπως η λειτουργία και οι τύποι της (π.χ., μηχανική μάθηση, βαθιά μάθηση, ανάλυση εικόνας), είναι επίσης περιορισμένη, με ορισμένους να αναγνωρίζουν μόνο τις πιο διαδεδομένες εφαρμογές της τεχνολογίας.

Οι πηγές πληροφόρησης που χρησιμοποιούν οι εκπαιδευτικοί για να ενημερωθούν σχετικά περιλαμβάνουν κυρίως το διαδίκτυο και τα μέσα κοινωνικής δικτύωσης, τα οποία αναφέρονται από την πλειονότητα των συμμετεχόντων. Ωστόσο, αυτή η εξάρτηση από ανεπίσημες πηγές πληροφόρησης εγείρει ερωτήματα για την ποιότητα και την εγκυρότητα των πληροφοριών που λαμβάνουν. Παράλληλα, παρατηρείται χαμηλή χρήση επιστημονικών πηγών, όπως άρθρα, βιβλία ή εξειδικευμένα εκπαιδευτικά προγράμματα. Αυτή η τάση δείχνει την έλλειψη πρόσβασης ή ενδιαφέροντος για πιο τεκμηριωμένη και ποιοτική πληροφόρηση.

Σχετικά με την εμπειρία τους στη χρήση της, οι περισσότεροι εκπαιδευτικοί δήλωσαν ότι δεν έχουν χρησιμοποιήσει την τεχνολογία αυτή είτε στο εκπαιδευτικό πλαίσιο είτε σε άλλους τομείς. Ορισμένοι ανέφεραν εμπειρία από τη χρήση εφαρμογών σε προσωπικό επίπεδο, όπως εφαρμογές παρακολούθησης φυσικής κατάστασης ή υγείας, αλλά αυτή η εμπειρία δεν φαίνεται να έχει μεταφερθεί στη διδακτική πράξη.

ΠΕΡΙΟΡΙΣΜΟΙ

Παρά τη σημαντική συμβολή της στην κατανόηση των γνώσεων των εκπαιδευτικών Φυσικής Αγωγής, η παρούσα έρευνα συνοδεύεται από ορισμένους περιορισμούς που ενδέχεται να επηρεάζουν τη γενίκευση και την ερμηνεία των αποτελεσμάτων.

Η αντιπροσωπευτικότητα του δείγματος είναι περιορισμένη όσον αφορά την κατανομή μεταξύ ιδιωτικών και δημόσιων σχολείων. Με μόνο το 8% των συμμετεχόντων να προέρχεται από ιδιωτικά σχολεία, τα αποτελέσματα ενδέχεται να μην αντικατοπτρίζουν πλήρως τις προκλήσεις και τις ευκαιρίες στον ιδιωτικό τομέα της εκπαίδευσης.

Η έρευνα διεξήχθη σε συγκεκριμένο χρονικό πλαίσιο, γεγονός που δεν επιτρέπει τη διερεύνηση δυναμικών αλλαγών στις στάσεις και τις γνώσεις των εκπαιδευτικών για την Τεχνητή Νοημοσύνη. Μια διαχρονική προσέγγιση θα μπορούσε να αναδείξει τις εξελίξεις σε βάθος χρόνου.

ΠΡΟΤΑΣΕΙΣ ΜΕΛΛΟΝΤΙΚΗΣ ΕΡΕΥΝΑΣ

Η παρούσα έρευνα ανέδειξε σημαντικά ευρήματα σχετικά με τις γνώσεις των εκπαιδευτικών Φυσικής Αγωγής ως προς την Τεχνητή Νοημοσύνη. Τα ευρήματα αυτά ανοίγουν νέους δρόμους για περαιτέρω έρευνα, ώστε να εμβαθύνουμε στη δυναμική και στις προοπτικές του πεδίου.

Είναι απαραίτητη η διεξαγωγή μελετών που θα επικεντρωθούν σε εκπαιδευτικούς του ιδιωτικού τομέα. Η χαμηλή συμμετοχή αυτής της ομάδας στην παρούσα έρευνα καθιστά αναγκαία τη στοχευμένη διερεύνηση των ιδιαίτερων χαρακτηριστικών, προκλήσεων και ευκαιριών που αντιμετωπίζουν οι εκπαιδευτικοί σε ιδιωτικά σχολεία, καθώς και τη σύγκριση με τους συναδέλφους τους στον δημόσιο τομέα.

Επιπλέον, είναι σημαντικό να διερευνηθούν οι επιπτώσεις εκπαιδευτικών προγραμμάτων επιμόρφωσης στην Τεχνητή Νοημοσύνη. Μελέτες που θα εξετάσουν την αλλαγή των γνώσεων των εκπαιδευτικών πριν και μετά από εξειδικευμένα προγράμματα επιμόρφωσης θα μπορούσαν να αναδείξουν τις πιο αποτελεσματικές μεθόδους κατάρτισης. Παράλληλα, η έρευνα θα μπορούσε να επεκταθεί σε άλλες εκπαιδευτικές βαθμίδες, προκειμένου να διερευνηθεί η διαφοροποίηση στις ανάγκες και τις προκλήσεις ενσωμάτωσης της σε ποικίλα μαθησιακά περιβάλλοντα.

Τέλος, προτείνεται η διεξαγωγή διαχρονικών μελετών (longitudinal studies) για την καταγραφή των μεταβολών στις γνώσεις των εκπαιδευτικών απέναντι στην Τεχνητή Νοημοσύνη, καθώς και των αλλαγών στην εκπαιδευτική πρακτική, με την πάροδο του χρόνου και την πρόοδο της τεχνολογίας.

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VIVLIOTHINKY: ΕΝΑ PROJECT ΣΥΝΕΡΓΑΤΙΚΗΣ ΜΑΘΗΣΗΣ ΓΙΑ ΤΗΝ ΑΝΑΠΤΥΞΗ ΤΩΝ ΚΟΙΝΩΝΙΚΩΝ ΚΑΙ ΨΗΦΙΑΚΩΝ ΔΕΞΙΟΤΗΤΩΝ ΒΑΣΙΣΜΕΝΟ ΣΤΗΝ ΥΠΗΡΕΣΙΑ E-GRAFIS ΤΟΥ ΠΣΔ

Κρητικάκης Μάρκος
Εκπαιδευτικός ΠΕ86
Β/θμια εκπαίδευση Γ' Αθήνας
Αθήνα, Ελλάδα
e-mail: hp2221203@hua.gr

Σοφιανοπούλου Χρύσα
Καθηγήτρια Τμήμα Πληροφορικής και Τηλεματικής
Χαροκόπειο Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: csofian@hua.gr

ΠΕΡΙΛΗΨΗ

Τα νέα Προγράμματα Σπουδών έχουν ως αφετηρία τα μαθησιακά αποτελέσματα, δηλαδή όλα όσα χρειάζεται να γνωρίζουν, να κατανοούν και να μπορούν να εφαρμόσουν οι μαθητές και οι μαθήτριες μετά την ολοκλήρωση κάθε μαθησιακής διαδικασίας μετακινώντας το κέντρο βάρους της έμφασης από το γνωστικό αντικείμενο, τους/τις διδάσκοντες/ουσες και τη διδακτική διαδικασία προς τους/τις μαθητές/τριες και τα προσδοκώμενα αποτελέσματα μάθησης. Στον πυρήνα της διδακτικής μεθοδολογίας βρίσκονται η δημιουργία περιβαλλόντων καθοδηγούμενης μάθησης, η αυτενέργεια, η συνεργατική δράση σε ομάδες, η διερευνητική μάθηση, η βιωματική προσέγγιση, η συνεργατική επίλυση προβλήματος, η επικοινωνιακή προσέγγιση, και η μετασχηματιστική λογική.

Το παρόν διδακτικό σενάριο, έχει ως θέμα την «ψηφιακή» οργάνωση της σχολικής βιβλιοθήκης και εφαρμόσθηκε στα πλαίσια πολιτιστικού προγράμματος με τη συμμετοχή μαθητών και μαθητριών ενός Ημερήσιου Γυμνασίου της Αττικής ενισχύοντας τη συνεργατική μάθηση με τη βοήθεια των ΤΠΕ και επιτυγχάνοντας γνωστικούς διδακτικούς στόχους σχετικούς με τα υπολογιστικά φύλλα, τα συνεργατικά έγγραφα και τις ιστοεξερευνήσεις. Η υλοποίησή του βασίστηκε στη χρήση της υπηρεσίας e-grafis που παρέχεται από το Πανελλήνιο Σχολικό Δίκτυο και έχει ως απαραίτητη προϋπόθεση τη δημιουργία και χρήση Μαθητικών Λογαριασμών για όλους/ες τους/τις συμμετέχοντες/ουσες. Ο σχεδιασμός του σεναρίου περιλαμβάνει τέσσερις φάσεις υλοποίησης, γνωστικούς και ψυχοσυναισθηματικούς στόχους, ανατροφοδότηση πριν από κάθε νέα φάση, αξιολόγηση στο τέλος και αναστοχασμό των πεπραγμένων.

Για το σχεδιασμό και την υλοποίηση του εκπαιδευτικού σεναρίου εφαρμόσθηκε η μέθοδος project και οι στρατηγικές διδασκαλίας που ακολουθήθηκαν ήταν η άμεση διδασκαλία και η ανακαλυπτική μάθηση. Κατά την εφαρμογή του σεναρίου παρατηρήθηκε ότι η συνεργατική μάθηση με τη βοήθεια των υπολογιστών προωθεί την καλλιέργεια κοινωνικών δεξιοτήτων όπως η επικοινωνία και η συνεργασία και την καλλιέργεια ψηφιακών δεξιοτήτων με κυριότερη τη διαχείριση συνεργατικών περιβαλλόντων υλοποίησης δραστηριοτήτων. Παράλληλα διαπιστώθηκε ότι η αξιοποίηση των Ψηφιακών Μέσων σε πολιτιστικά προγράμματα ή στα εργαστήρια δεξιοτήτων μπορεί να ενισχύσει τη δυναμική της διδασκαλίας, να τονώσει το ενδιαφέρον των μαθητών, να βελτιώσει το μαθησιακό κλίμα και να ενισχύσει την αποτελεσματικότητα της εκπαιδευτικής διαδικασίας. Το θέμα του project και η καθοδήγηση από τον/την εκπαιδευτικό αναφέρθηκαν ως οι κυριότεροι θετικοί παράγοντες ενώ η ώρα διεξαγωγής ως ο σημαντικότερος αρνητικός παράγοντας. Τέλος, η διαφορετική ταχύτητα με την οποία εργάζονται τα μέλη μιας ομάδας αναφέρθηκε ως το σημαντικότερο πρόβλημα της συνεργατικής δράσης.

Λέξεις κλειδιά: συνεργατική μάθηση, e-grafis, ιστοεξερεύνηση, ΤΠΕ, εκπαιδευτικό σενάριο, πρόγραμμα σπουδών, πολιτιστικό πρόγραμμα

ΕΙΣΑΓΩΓΗ

Ένα σχολείο με κοινωνικοπαιδαγωγικό προσανατολισμό οραματίζεται να εκπαιδεύσει, όχι μόνο τους μαθητές και τις μαθήτριες αλλά όλα τα άτομα και τις ομάδες που σχετίζονται με τη σχολική κοινότητα, να αγωνίζονται, επιδιώκοντας καθ' όλη τη διάρκεια της ζωής τους την προσωπική τους πολύπλευρη ανάπτυξη, με στόχο να γίνουν ικανοί να ζήσουν μια αυτεξούσια ζωή, με ευκαιρίες, αξιοσύνη, αίσθηση καθήκοντος, θετικές σχέσεις με τους άλλους, προσφορά και πληρότητα (Mylonakou - Keke, 2019:430). Στα πλαίσια του οράματος αυτού και πέρα απο τις οδηγίες του Αναλυτικού Προγράμματος Σπουδών στα διδακτικά αντικείμενα, σχεδιάζονται εκπαιδευτικές δράσεις ολιστικού χαρακτήρα που υλοποιούνται με διαφορετικούς τρόπους ανάλογα με τη φύση τους και το σχεδιασμό τους.

Εκπαιδευτικές δράσεις όπως τα εργαστήρια δεξιοτήτων και τα πολιτιστικά προγράμματα σε ορισμένες περιπτώσεις και ανάλογα με τη θεματολογία τους, τοποθετούν τον εκπαιδευτικό σε θέση καθοδηγητή, συνδιερευνητή και βοηθού που δίνει ελευθερίες στους μαθητές και τις μαθήτριες, καλλιεργεί την αντιληπτική τους εγρήγορση και ενισχύει την ικανότητα τους να ερευνούν, να συνεργάζονται και να δημιουργούν (Daskalakis, 2017:227-228). Παράλληλα, ενθαρρύνουν και προάγουν την ομαδική και συνεργατική μάθηση η οποία σύμφωνα με ορισμένους εκπαιδευτικούς και πολλούς γονείς έχει τη μορφή εξαίρεσης και απόκλισης από τα «κανονικά» μαθήματα (Raptis & Galanoudaki-Rapti 2017:494), ειδικά όταν εντάσσουν τις ΤΠΕ στην εκπαιδευτική διαδικασία η οποία λειτουργεί μετασχηματιστικά και ενισχυτικά όσον αφορά τις πρακτικές διδασκαλίας και μάθησης (Tzimogiannis, 2019:58). Συγχρόνως η οργάνωση των νέων διδακτικών σεναρίων αναβαθμίζει το ρόλο του εκπαιδευόμενου, ο οποίος γίνεται συν-σχεδιαστής του μαθησιακού περιβάλλοντος με τον γραμμικό και εξωτερικά ελεγχόμενο σχεδιασμό να δίνει τη θέση του στην επαναληπτική, αυτορυθμιζόμενη και συστημική διαδικασία (Lowyck et al., 2001:515).

Η ΣΥΝΕΡΓΑΤΙΚΗ ΜΑΘΗΣΗ

Με τον όρο συνεργατική μάθηση (collaborative learning) περιγράφεται ένα ευρύ φάσμα εκπαιδευτικών προσεγγίσεων, όπου οι μαθητές απαιτείται και ενθαρρύνονται να συνεργαστούν για την επίλυση προβλημάτων ή την υλοποίηση μαθησιακών δραστηριοτήτων και εργασιών (Tzimogiannis, 2017:142-143) . Η συνεργασία φέρνει ορισμένα οφέλη, π.χ. ανταλλαγή γνώσεων, συνδυασμό ειδικών δεξιοτήτων ή διανομή εργασίας, αλλά επίσης εισάγει δυσκολίες μέσω κακής επικοινωνίας, απωλειών συντονισμού και πιθανών συγκρούσεων στόχων (Griffin et al., 2018:42). Στον πυρήνα της υλοποίησης της εκπαιδευτικής δράσης βρίσκεται η συνεργασία και η συλλογικότητα. Συνεργασία είναι δυνατόν να υπάρχει ανάμεσα σε άτομα που αναλαμβάνουν ξεχωριστό κομμάτι ενός συνολικού έργου επιδιώκοντας ένα κοινό σκοπό, ενώ η συλλογικότητα προϋποθέτει μεγαλύτερο βαθμό αλληλεξάρτησης, διαπραγμάτευσης και διάχυσης ιδεών, καθώς και ταύτισης με το στόχο ή την επιτυχία ολόκληρης της ομάδας ή και όλων των μελών ξεχωριστά (Raptis & Galanoudaki-Rapti 2017:498). Ωστόσο, έχει παρατηρηθεί (Le et al., 2018:117) : α) ότι ο κοινός στόχος για τη δημιουργία ενός ομαδικού «προϊόντος» μπορεί να οδηγήσει στην υποτίμηση των λιγότερο ικανών μαθητών και την αποποίηση της ευθύνης-συμμετοχής, β) ότι όταν οι εκπαιδευτικοί δεν επικεντρώνονται στη διδασκαλία των δεξιοτήτων συνεργασίας, οι μαθητές δυσκολεύονται να συμμετάσχουν σε συνεργατικές εργασίες και γ) ότι όταν οι εκπαιδευτικοί επικεντρώνονται κατά κύριο λόγο στην παραγωγικότητα της ομάδας χωρίς να αξιολογούν ταυτόχρονα τη συνεργατική απόδοση, τα μέλη της ομάδας μπορεί να μην παροτρύνονται να ενισχύσουν την κοινωνική αλληλεπίδραση και την αλληλοβοήθεια προκειμένου να επωφεληθούν όλοι από τη συνεργασία.

ΤΟ ΕΡΓΑΛΕΙΟ E-GRAFIS

Τα Συνεργατικά Έγγραφα είναι μια νέα υπηρεσία του Πανελλήνιου Σχολικού Δικτύου για την online διαχείριση εγγράφων με ασφαλή τρόπο και υποστηρίζουν τη διαχείριση και την αποθήκευση ηλεκτρονικών εγγράφων μέσω του διαδικτύου. Είναι χρήσιμα εργαλεία για την εκπαίδευση, τόσο για τις διευθύνσεις και τα σχολεία, όσο και για τους εκπαιδευτικούς και τους μαθητές και τις μαθήτριες, επειδή υποστηρίζουν τη συνεργατικότητα και τον ασφαλή διαμοιρασμό πληροφοριών. Η υπηρεσία «Συνεργατικών Εγγράφων ΠΣΔ» e-grafis παρέχει δωρεάν και με απόλυτη πιστοποίηση των χρηστών της, παρόμοια λειτουργικότητα με ανάλογες εμπορικές υπηρεσίες Dropbox, Google Drive, Microsoft Onedrive, κλπ. και για τη χρήση της απαιτείται από τους μαθητές και τις μαθήτριες το άνοιγμα μέσω φυλλομετρητή Ιστού (web browser) της σελίδας http://grafis.sch.gr και η είσοδος με τους κωδικούς που διαθέτουν από το ΠΣΔ. Συνοπτικά, μέσα από αυτή την υπηρεσία Συνεργατικών Εγγράφων παρέχονται στα μέλη του ΠΣΔ οι δυνατότητες της δημιουργίας νέων εγγράφων και αρχείων, της επεξεργασίας υπαρχόντων εγγράφων σε πραγματικό χρόνο, της κατηγοριοποίησης, οργάνωσης και αποθήκευσης εγγράφων και αρχείων, της εισαγωγής εγγράφων και αρχείων από εξωτερικές πηγές καθώς και της εξαγωγή τους, της αναζήτησης εγγράφων και αρχείων, της προσθήκης πολυμέσων σε έγγραφα (π.χ. φωτογραφίες, video κλπ.), της αναζήτησης εγγράφων και αρχείων, της καταχώρισης αρχείου μέσω ειδικής διεπαφής από οποιονδήποτε υπολογιστή με σύνδεση στο διαδίκτυο, της οργάνωσης και ανάθεσης εργασιών με τη χρήση ημερολογίων και της οργάνωσης προσωπικών επαφών.

ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΕΝΑΡΙΟ

Σκοποί

Οι εκπαιδευτικοί σκοποί προέρχονται συνήθως από τις τρεις ακόλουθες πηγές: το παιδί, την κοινωνία ή τις επιστήμες (Jacobsen et al., 2011:114). Η εκπαιδευτική δράση που αναλύεται στην παρούσα εργασία αντλεί τους σκοπούς της από τους μαθητές και τις μαθήτριες (παιδί) καθώς και από το νέο αναλυτικό πρόγραμμα του μαθήματος της Πληροφορικής στο Γυμνάσιο (επιστήμες).

Ο σκοπός της συνεργατικής μάθησης, της αρμονικής συνύπαρξης και της αποτελεσματικής μαθησιακά αλληλεπίδρασης αποτελεί τον πρώτο σκοπό της εκπαιδευτικής δράσης. Η επίτευξη του σκοπού αναπτύσσει κοινωνικό κεφάλαιο δημιουργώντας ένα ανθρώπινο δίκτυο, που παράγει πόρους μέσα από κοινά αποδεκτές αξίες και κανόνες, την αίσθηση του καθήκοντος, το επίπεδο εμπιστοσύνης, κατανόησης, αλληλουποστήριξης και αλληλεπίδρασης διευκολύνοντας τη συνεργατική δράση είτε μέσα στην ομάδα είτε και ανάμεσα σε ομάδες (Mylonakou - Keke, 2019:145). Ο κοινός στόχος μετατρέπει τα ζεύγη των ομάδων σε μια κοινότητα εργασίας, τα μέλη της οποίας εξαρτώνται αμοιβαία μεταξύ τους και αναπτύσσουν με την πάροδο του χρόνου ένα αίσθημα αμοιβαίας ευθύνης και προσφοράς για το κοινό έργο (Tzimogiannis, 2017:145).

Ο δεύτερος σκοπός της εκπαιδευτικής δράσης πηγάζει από το νέο αναλυτικό πρόγραμμα σπουδών του μαθήματος της Πληροφορικής στο Γυμνάσιο, έχει δύο σκέλη και παραπέμπει στην καλή γνώαη των συνεργατικών εγγράφων (λογιστικά φύλλα) και στην εξοκείωση με το διαδίκτυο και τις ιστοεξερευνήσεις. Η αξιοποίηση των λογιστικών φύλλων δεν αποτελεί προτεραιότητα των εκπαιδευτικών διότι θεωρείται ότι δεν εμπλέκουν στη μαθησιακή διαδικασία πολλούς τομείς της νόησης, όπως η λανθάνουσα και η διαισθητική γνώση, η φαντασία κ.α., αλλά και γιατί οι εκπαιδευτικοι είτε δεν έχουν εκπαιδευτεί αρκετά στο αντικείμενό τους, είτε έχουν μικρή εμπειρία στις πρακτικές χρήσης του, είτε θεωρούν ότι δεν αποτελούν γνώση για το επίπεδο της χαμηλής και της μεσαίας εκπαιδευτικής βαθμίδας (Raptis & Galanoudaki-Rapti 2017:360). Απ την άλλη πλευρά τα αλληλεπιδραστικά χαρακτηριστικά των σύγχρονων τεχνολογιών του Ιστού μπορούν να υποστηρίξουν νέες εκπαιδευτικές πρακτικές παιδαγωγικής συνεργατικης οικοδόμησης της γνώσης (Tzimogiannis, 2019:57) ενώ η παιδαγωγική αξιοποίηση του διαδικτύου στην εκπαιδευτική διαδικασία προσφέρει ανεξάντλητες ποσότητες πληροφοριών για οποιοδήποτε θέμα και δυνατότητες επικοινωνίας και συνεργασίας (Daskalakis, 2017:453).

Στόχοι

Οι στόχοι δημιουργούν κίνητρα εστιάζοντας την προσοχή των μαθητών στην ασυμφωνία μεταξύ του τρέχοντος και του ιδανικού επιπέδου επίτευξής τους (O' Donnell et al., 2021:534) και μπορούν σύμφωνα με τους Jacobsen et al. (2011:114) να ταξινομηθούν σε τρεις μεγάλες περιοχές: τη γνωστική που αναφέρεται στο νοητικό πεδίο, τη συναισθηματική (ωρίμανση των στάσεων και των αξιών) και την ψυχοκινητική (ανάπτυξη μυϊκών δεξοτήτων και συντονισμού).

Οι στόχοι του εκπαιδευτικού σεναρίου είναι οι εξής: α) η αποτελεσματική συνεργασία για τη μάθηση (ψυχοκινητικός στόχος), β) η αναζήτηση πληροφοριών σε ένα λογιστικό φύλλο που λειτουργεί ως βάση δεδομένων (γνωστικός στόχος) και γ) η αναζήτηση πληροφοριών στο διαδίκτυο (γνωστικός στόχος). Οι γνωστικοί στόχοι συνδέονται άμεσα με το νέο πρόγραμμα σπουδών για το μάθημα της Πληροφορικής στο Γυμνάσιο και συγκεκριμένα με την ενότητα 5 (Γνωρίζω το Διαδίκτυο και επικοινωνώ) του βιβλίου της Α Γυμνασίου, με την ενότητα 3 (Ανάλυση δεδομένων με Υπολογιστικά Φύλλα) του βιβλίου της Β Γυμνασίου και με την ενότητα 5 (Συνεργάζομαι σε διαδικτυακά περιβάλλοντα) του βιβλίου της Γ Γυμνασίου. Ο συνδυασμός διδακτικών αντικειμένων διαφορετικών τάξεων, καθιστά το σενάριο εφαρμόσιμο στα πλαίσια ενός πολιτιστικού προγράμματος ή των εργαστηρίων δεξιοτήτων.

Στρατηγικές

Οι στρατηγικές διδασκαλίας που ακολουθούνται είναι δύο: η άμεση διδασκαλία και η ανακαλυπτική μάθηση. Η άμεση διδασκαλία εφαρμόζεται πριν και κατά τη διάρκεια της πρώτης φάσης του σεναρίου καθώς και στην τρίτη φάση όπου παρουσιάζονται με ακρίβεια οι στόχοι και οι δεξιότητες που καλούνται οι μαθητές να αποκτήσουν χωρίς πάρ' αυτα να στερούνται της παροχής αρκετών ευκαιριών για αλληλεπίδραση με τον εκπαιδευτικό μέσω ερωταποκρίσεων, ανακεφαλαιώσεων, πρακτικών εξάσκησης και διόρθωσης των λαθών τους (Τριλιανός, 2013:184). Η ανακαλυπτική μάθηση, συχνά προϋποθέτει κάποιο είδος καθοδήγησης ή υποστήριξης από έναν εκπαιδευτικό, ώστε κατά κάποιο τρόπο να αποτελεί ουσιαστικά καθοδηγούμενη ανακάλυψη (O' Donnell et al., 2021:114) και εφαρμόζεται με αυτό τον τρόπο στη δεύτερη φάση της υλοποίησης του εκπαιδευτικού σεναριου.

Εποπτικά μέσα

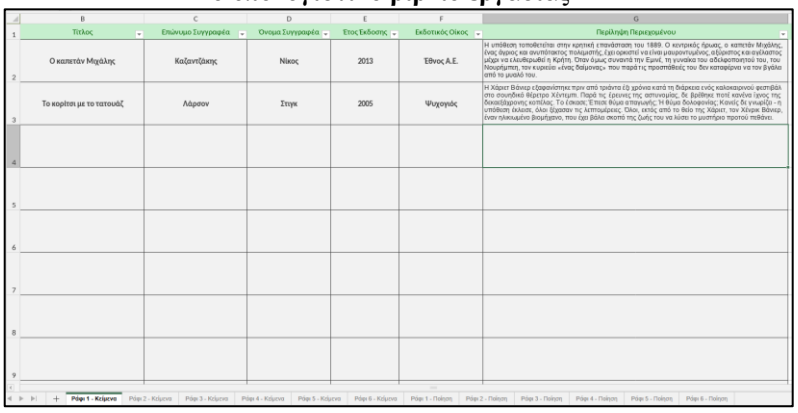
Τα εποπτικά μέσα που χρησιμοποιήθηκαν για την υλοποίηση της εκπαιδευτικής δράσης είναι τα εξής: α) τα λογοτεχνικά έργα της σχολικής βιβλιοθήκης, β) ο εξοπλισμός του εργαστηρίου (11 υπολογιστές) και γ) το λογισμικό (λογιστικά φύλλα του e-γραφις, Insight Teacher, φυλλομετρητές).

Φάσεις υλοποίησης

Η διάρκεια της εκπαιδευτικής δράσης παραπέμπει σε ένα μακροπρόθεσμο σχεδιασμό που σύμφωνα με τους Jacobsen et al. (2011:198) διαμορφώνεται βάσει τριών παραγόντων: α) τα χαρακτηριστικά των μαθητών (ικανότητες, ανάγκες, ενδιαφέροντα, προηγούμενες εμπειρίες), β) το φυσικό περιβάλλον (διαρρρύθμιση σχολικής αίθουσας και διαμόρφωση θετικού κλίματος) και γ) τη διαχείριση της τάξης (κανόνες και διαδικασίες). Αρχικά οργανώνεται μια συνάντηση γνωριμίας, ενημέρωσης, καθορισμού των ομάδων και ανάθεσης καθηκόντων. Η προσοχή εστιάζεται στη δημιουργία ομάδων και στη σαφήνεια των οδηγιών προς αυτές. Όσον αφορά τη σύνθεση των ομάδων το βάρος πέφτει στη επιλογή των καταλληλότερων ζευγών με βάση την προσδοκόμενη αποτελεσματικότητα. Σε ένα περιβάλλον συνεργατικής μάθησης, όλα τα μέλη της ομάδας είναι υπεύθυνα τόσο για τη δική τους ατομική μάθηση όσο και για την αλληλο-διδασκαλία μεταξύ τους που συμβάλλει στην ατομική ανάπτυξη και στην ενίσχυση της συλλογικής γνώσης (Tzimogiannis, 2019:242). Οι ικανοί μαθητές αποτελούν σύμφωνα με τους O' Donnell et al. (2021:153-154) ιδανικούς συνεργάτες γιατί καταλαβαίνουν εξαιρετικά καλά τη ζώνη εγγύτερης ανάπτυξης των αρχαρίων και εστιάζουν την καθοδήγησή τους σε αυτές ακριβώς τις ανάγκες, παραδοχή με γνώμονα την οποία επιδιώκεται η σύνθεση των ομάδων εργασίας.

Στην πρώτη φάση (2-4 διδακτικές ώρες) δίνονται οδηγίες βάσει των οποίων θα καταχωρηθούν οι απαραίτητες πληροφορίες στο συνεργατικό λογιστικό φύλλο (Εικόνα 1) ενώ αυτό που προέχει είναι η αρμονική συνεργασία των μελών κάθε ομάδας ώστε να διαφαλισθεί η αποτελεσματική συνύπαρξη και συνεργασία των μελών της. Αρχικά οι ομάδες ενημερώνονται για τα φύλλα εργασίας στα οποία έχουν δικαίωμα να εργάζονται και στη συνέχεια παρουσιάζονται παραδείγματα σύμφωνα με τα οποία γίνεται ο χωρισμός των λογοτεχνικών έργων στις κατηγορίες της πεζογραφίας και της ποίησης για να ακολουθήσει η καταχώρηση των απαραίτητων πληροφοριών (τίτλος, ονοματεπώνυμο συγγραφέα, αριθμός σελίδων) στο κοινόχρηστο λογιστικό φύλλο. Με τη δραστηριότητα αυτή καθορίζεται με ακρίβεια η φύση της δεξιότητας που πρόκειται να γίνει αντικείμενο μάθησης και γνώσης, διαιρείται σε τμήματα το έργο και προσδιορίζεται η λογική σειρά των ενεργειών που πρέπει να κάνουν ο μαθητές για να φτάσουν στο επιθυμητό αποτέλεσμα (Τριλιανός, 2013:186). Η διάρκεια της φάσης αυτής εξαρτάται από τον αριθμό των λογοτεχνικών έργων που διαθέτει το σχολείο και από τον αριθμό των μαθητών και των μαθητριών που συμμετέχουν στην εκπαιδευτική δράση.

Εικόνα 1
Το υπολογιστικό βιβλίο εργασίας



Η ενημέρωση-καθοδήγηση στην δεύτερη φάση (2-4 διδακτικές ώρες) περιλαμβάνει οδηγίες και ένα παράδειγμα ιστοεξερεύνησης στο οποίο αναζητείται μια σύντομη περίληψη ενός λογοτεχνικού έργου στο διαδίκτυο ώστε να καταχωρηθεί στο πεδίο «Περίληψη» για την οποία θέσαμε ως όριο τις 50 λέξεις. Οι μαθητές και οι μαθήτριες καλούνται να συνθέσουν σύντομες περιλήψεις των λογοτεχνικών έργων που καταχώρησαν στη βάση δεδομένων (κοινόχρηστο υπολογιστικό φύλλο) αναζητώντας πληροφορίες για το περιεχόμενο τους στο διαδίκτυο.

Στην τρίτη φάση (1 διδακτική ώρα) οι μαθητές διδάσκονται-μαθαίνουν να αναζητούν πληροφορίες στο υπολογιστικό φύλλο με απλή αναζήτηση ή χρήση των φίλτρων της εφαρμογής των υπολογιστικών φύλλων. Στη συνέχεια τους δίνεται ένα φύλλο δραστηριοτήτων για να διαπιστωθεί ο βαθμός κατανόησης των ιστοεξερευνήσεων.

Η τέταρτη φάση του σεναρίου (1 διδακτική ώρα) χαρακτηρίζεται ως αξιολογική για το Πρόγραμμα. Οι μαθητές και οι μαθήτριες καλούνται ατομικά να συμπληρώσουν ένα ερωτηματολόγιο ώστε να διαπιστώθει ο βαθμός επίτευξης του ψυχοκινητικού στόχου Α σε συνδυασμό με την παρατήρηση του εκπαιδευτικού καθ' όλη τη διάρκεια υλοποίησης της δράσης η οποία λειτουργεί συμπληρωματικά για την εξαγωγή ασφαλέστερων συμπερασμάτων. Συγχρόνως καταγράφονται οι στάσεις τους (διάθεση, ενδιαφέρον κ.α.), τα κίνητρα συμμετοχής, η διάθεση συμμετοχής σε μελλοντικές εκπαιδευτικές δράσεις κ.α.

Ανατροφοδότηση

Η ανατροφοδότηση παρέχεται στο τέλος κάθε φάσης και αποτελεί σημαντική παράμετρο σύνδεσης της συναισθηματικής ικανοποίησης των μαθητών και των μαθητρών με την επίδοση ανά φάση υλοποίησης με την προϋπόθεση ότι θα δοθεί έγκαιρα (O' Donnell et al., 2021:57). Περιλαμβάνει την ενημέρωση για τα αποτελέσματα της προηγούμενης φάσης, τις όποιες επιπλέον ενέργειες πρέπει να γίνουν συμπληρωματικά από την κάθε ομάδα ξεχωριστά και τις οδηγίες για την επίτευξη των στόχων της επόμενης φάσης ως την τελευταία.

Αξιολόγηση

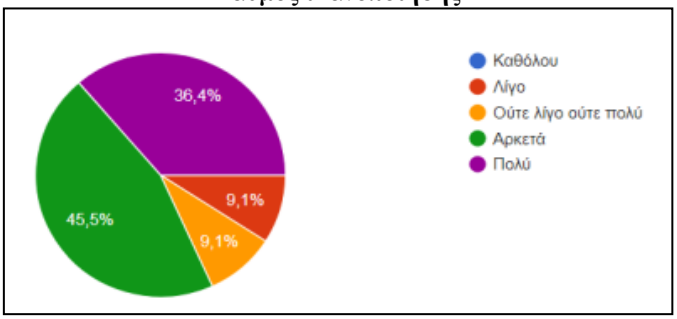
Ως αξιολόγηση ορίζεται η εκτίμηση του βαθμού ανταπόκρισης που παρουσιάζει ένα πρόσωπο, ένα αντικείμενο ή μια κατάσταση σε σχέση προς μια αξία (Daskalakis, 2017:244). Η αξιολόγηση σύμφωνα με τους O' Donnell et al. (2021:688) εχει δύο μορφές, την διαμορφωτική κατά την οποία θα αναζητηθουν στοιχεία που αφορούν τη μάθηση και πως αυτή θα ενισχυθεί και την αθροιστική κατά την οποία θα «μετρηθούν» το γνωστικό επίπεδο και οι δεξιότητες που απέκτησαν οι μαθητές.

Η αξιολόγηση των γνωστικών στόχων έγινε με το διαμοιρασμό στους μαθητές και στις μάθητριες ενός φύλλου δραστηριοτήτων. Το εργαλείο αξιολόγησης κατασκευάστηκε με κριτήριο την αξιοπιστία που καθορίζεται με τη διαίρεση του σε δύο μισά και τη σύγκριση των αποτελεσμάτων τους και την εγκυρότητα περιεχομένου η οποία βασίζεται στη σύνδεση των διδακτικών στόχων με τη διδακτέα ύλη (Τριλιανός, 2013:431).

ΑΠΟΤΙΜΗΣΗ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΔΡΑΣΗΣ

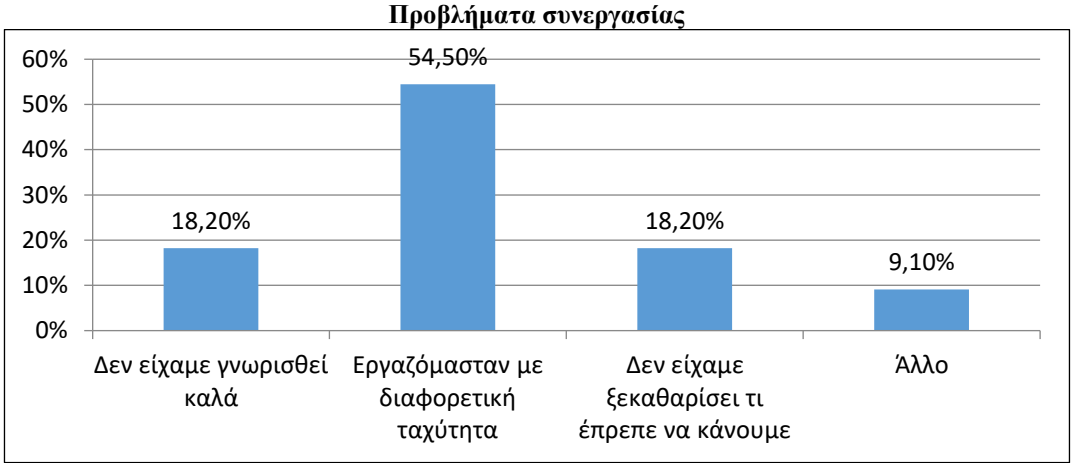
Η εκπαιδευτική δράση υλοποιήθηκε στα πλάισια ενός πολιτιστικού προγράμματος στο οποίο συμμετείχαν ένδεκα μαθητές και μαθήτριες της Α τάξης ενός Ημερήσιου Γυμνασίου της Αττικής και επί της ουσίας αποτελεί μια μελέτη περίπτωσης. Πέρα από την αξιολόγηση της υλοποίησης των διδακτικών στόχων με τη βοήθεια των φύλλων εργασίας. για τη συνολική αποτίμηση χρησιμοποιήθηκε ένα ερωτηματολόγιο στάσεων που συμπληρώθηκε από τους/τις συμμετέχοντες/ουσες μαθητές/τριες μετά το τέλος του προγράμματος.

Εικόνα 2
Βαθμός ικανοποίησης

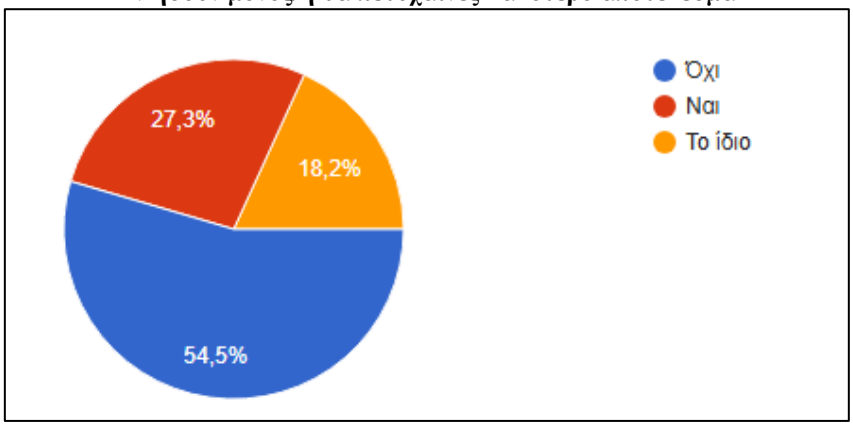


Για την αξιολόγηση του ψυχοσυναισθηματικού στόχου της αποτελεσματικής συνεργασίας, (πέρα από το παραγόμενο αποτέλεσμα και το φύλλο εργασίας) οι μαθητές και οι μαθήτριες ερωτήθηκαν για το βαθμό ικανοποίησης και τα προβλήματα συνεργασίας που αντιμετώπισαν. Η πλειοψηφία (αθροιστικά 81,9%) δήλωσε ότι έμειναν ικανοποιημένοι (Αρκετά ή Πολύ) από τη συνεργασία που είχαν (Εικόνα 2) ενώ ως μεγαλύτερο πρόβλημα, σε ποσοστό 54,5%, αναφέρθηκε η διαφορετική ταχύτητα με την οποία εργάζονταν τα μέλη της ομάδας (Εικόνα 3).

Εικόνα 3
Προβλήματα συνεργασίας

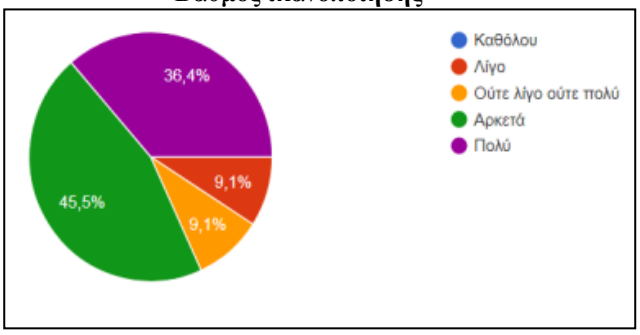


Εικόνα 4
Αν ήσουν μόνος/η θα πετύχαινες καλύτερο αποτέλεσμα

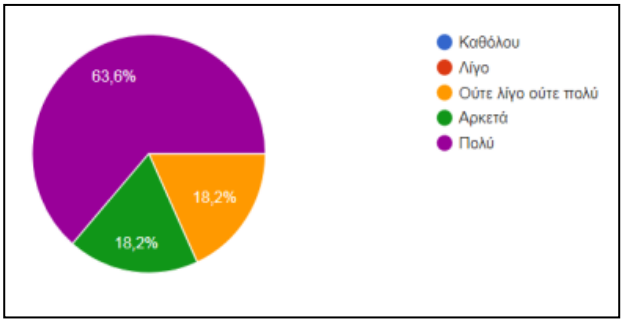


Στην ερώτηση «Αν ήσουν μόνος/η θα πετύχαινες καλύτερο αποτέλεσμα;» (Εικόνα 4) η πλειοψηφία (54,5%) απάντησε Όχι, το 27,3% απάντησε Ναι ενώ το 18,2% απάντησε Το ίδιο

Εικόνα 5
Βαθμός ικανοποίησης

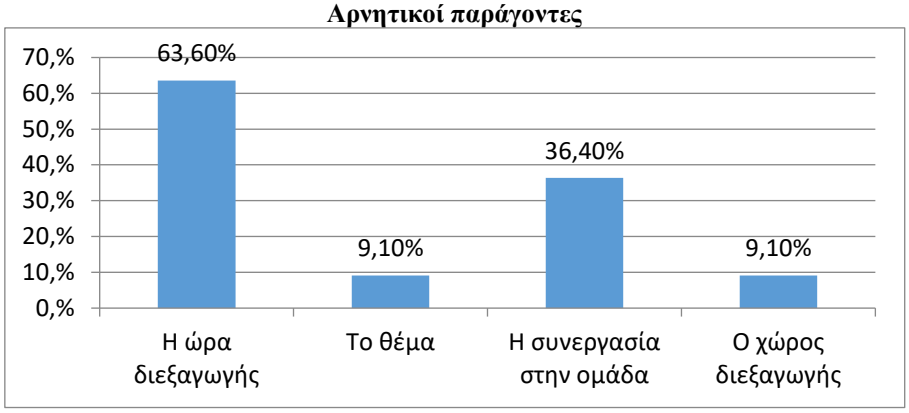


Εικόνα 6
Βαθμός ενδιαφέροντος

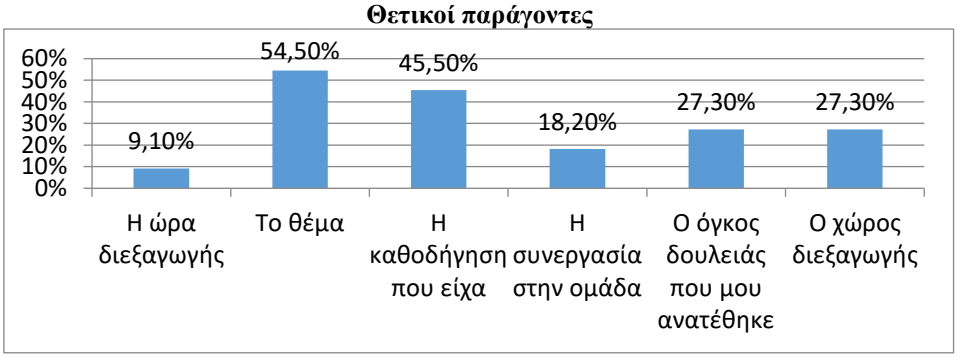


Ο βαθμός ικανοποίησης από τη συμμετοχή στο Πολιτιστικό πρόγραμμα (Αρκετά ή Πολύ) μετρήθηκε αθροιστικά στο 81,9% (Εικόνα 5) όπως και ο βαθμός ενδιαφέροντος (Εικόνα 6).

Εικόνα 7
Αρνητικοί παράγοντες

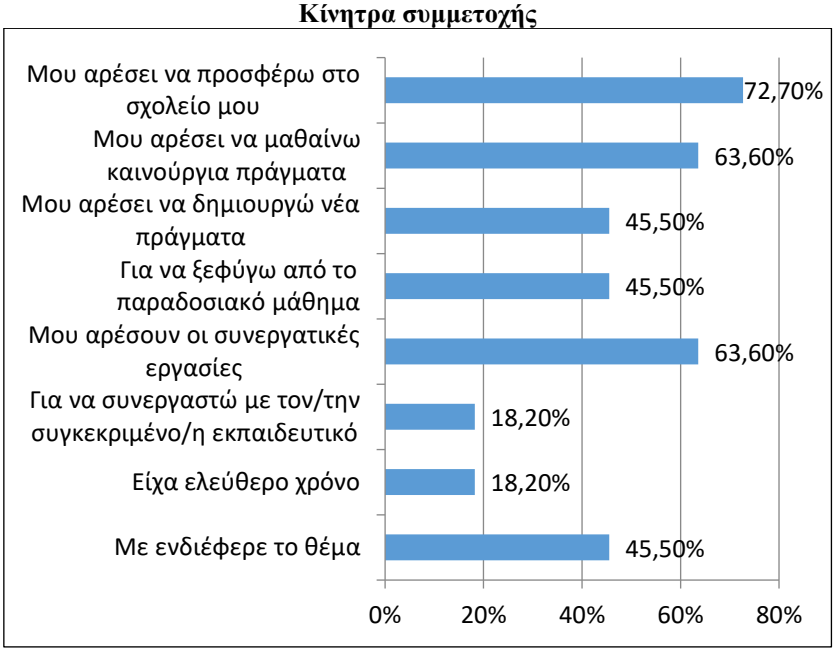


Εικόνα 8
Θετικοί παράγοντες



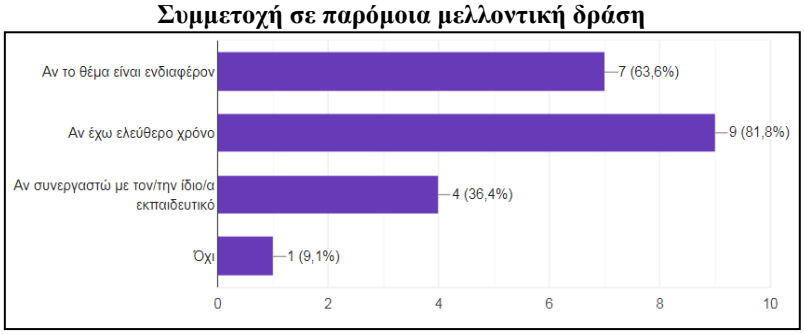
Ως πιο αρνητικός παράγοντας του προγράμματος (Εικόνα 7) αναφέρθηκε η ώρα διεξαγωγής με ποσοστό 63,6% και ως πιο θετικός (Εικόνα 8) το θέμα με ποσοστό 54,5%.

Εικόνα 9
Κίνητρα συμμετοχής



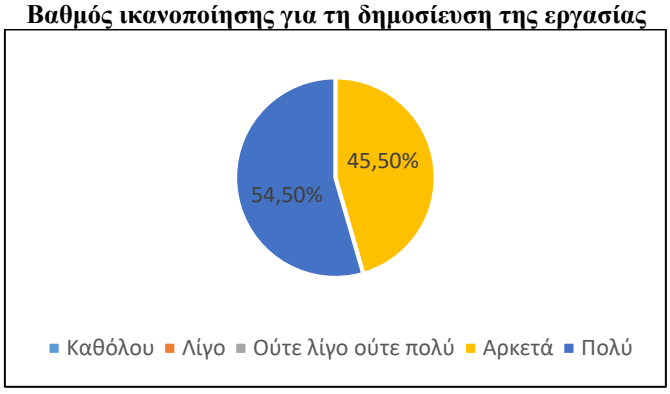
Ως σημαντικότερα κίνητρα συμμετοχής (Εικόνα 9) αναφέρθηκαν η διάθεση για προσφορά στο σχολείο με ποσοστό 72,7%, η διάθεση για μάθηση νέων πραγμάτων με ποσοστό 63,6% και ο συνεργατικός χαρακτήρας της εργασίας με ποσοστό 63,6%.

Εικόνα 10
Συμμετοχή σε παρόμοια μελλοντική δράση



Στην ερώτηση για πιθανή συμμετοχή σε παρόμοια μελλοντική εκπαιδευτική δράση (Εικόνα 10), ο ελεύθερος χρόνος αναφέρθηκε σε ποσοστό 81,8% ως η βασική προϋπόθεση με το 9,1% να απαντά ότι δεν θα συμμετείχε.

Εικόνα 11
Βαθμός ικανοποίησης για τη δημοσίευση της εργασίας



Τέλος, στην ερώτηση για το βαθμό ικανοποίησης από τη δημοσίευση της εργασίας στην ιστοσελίδα του σχολείου (Εικόνα 11), το 45,5% απάντησε Αρκετά και το 54,5% Πολύ.

ΑΝΑΣΤΟΧΑΣΜΟΣ

Σύμφωνα με τους O' Donnell et al. (2021:64) ο αναστοχασμός συνδέεται με τη διερεύνηση των γεγονότων που συνέβησαν στην τάξη καθώς και των αιτίων και των συνεπειών τους, με την αναζήτηση και τον προσδιορισμό των αντιδράσεων και των αλλαγών που θα προκαλέσει η διαφοροποίηση στη διδασκαλία και εν τέλει με τη διασφάλιση ότι η επόμενη διδασκαλία θα είναι περισσότερο αποτελεσματική από τη σημερινή. Ο αναστοχασμός πεπραγμένων της δράσης με βάση τις απαντήσεις των μαθητών στο ερωτηματολόγιο, τις παρατηρήσεις κατά τη διάρκεια υλοποίησης του σεναρίου και τις επιδόσεις των μαθητών και των μαθητριών στις δραστηριότητες αξιολόγησης οδήγησε στα εξής συμπεράσματα: α) οι μαθητές και οι μαθήτριες θα λειτουργήσουν ακόμα καλύτερα (διάθεση και απόδοση) αν τους δοθούν περισσότερα εσωτερικά κίνητρα (δημοσιοποίηση της εργασίας τους, συνεργασία με άλλα σχολεία κ.α.), β) η σύνθεση των ομάδων θα πρέπει να γίνεται με τρόπο τέτοιο ώστε να επιτυγχάνεται το βέλτιστο αποτέλεσμα από τη συνεργασία των μελών της ομάδας γεγονός που καθιστά τις προσυνεργατικές δραστηριότητες και την αξιολόγηση των ικανοτήτων των μαθητών και των μαθητριών σύμφωνα με τον Τριλιανό (2013:314) απαραίτητες πριν τη συστηματική ομαδοποίηση τους και γ) η συμμετοχή των μαθητών σε εκπαιδευτικές δράσεις επηρεάζεται από τη σχέση και την εικόνα που έχουν οι μαθητές και οι μαθήτριες για τον/την εκπαιδευτικό-συντονιστή γεγονός που καθιστά το κτίσιμο καλών διαπροσωπικών σχέσεων ως θεμέλιο της υλοποίησης και της επιτύχιας εκπαιδευτικών δράσεων τέτοιου τύπου.

ΕΠΕΚΤΑΣΕΙΣ

Η βάση δεδομένων (υπολογιστικό φύλλο) μπορεί να αποτελέσει χρήσιμο εκπαιδευτικό εργαλείο στα χέρια όσων εκπαιδευτικών θελήσουν να οργανώσουν δραστηριότητες που σχετίζονται άμεσα με τη μελέτη λογοτεχνικών κειμένων. Μέσα από την ηλεκτρονική τάξη ή την ιστοσελίδα του σχολείου όπου και θα έχει αναρτηθεί, οι μαθητές και οι μαθήτριες μπορούν να έχουν πρόσβαση στη σχολική βιβλιοθήκη και να επιλέγουν τα λογοτεχνικά έργα «πάνω» στα οποία θα εργασθούν. Έτσι επιτυγχάνεται η άμβλυνση των ποικίλων στεγανών ανάμεσα στους γνωστικούς τομείς και στη θεωρία και τη μάθηση με τους μαθητές και τις μαθήτριες να μαθαίνουν και να αναπτύσσονται όσο το δυνατόν ολόπλευρα μέσα

από τις διαθεματικές εργασίες τις οποίες θα κληθούν να υλοποίησουν (Raptis & Galanoudaki-Rapti 2017:512-515). Παράλληλα, το κοινωνικό κεφάλαιο μπορεί να αυξηθεί σε επίπεδο σχολικής μονάδας αν δοθεί η δυνατότητα δανεισμού βιβλίων από τους γονείς και τους κηδεμόνες των μαθητών και των μαθητριών ή από μαθητές και μαθήτριες όμορων σχολείων.

Το διδακτικό σενάριο μπορεί να εφαρμοσθεί και στις τελευταίες τάξεις του Δημοτικού μιας και στις επιδιώξεις και τους προσανατολισμούς του προγράμματος σπουδών για τις ΤΠΕ και την Πληροφορική στο Δημοτικο περιλαμβάνεται η ψηφιακή ικανότητα η οποία μεταξύ άλλων προωθεί τη γνώση στη διαχειριση λογιστικών φύλλων και την αποτελεσματική αναζήτηση των κατάλληλων και έγκυρων δεδομένων στο διαδίκτυο. Εναλλακτικά η εφαρμογή του μπορεί να γίνει στα Εργαστήρια Δεξιοτήτων.

Τέλος η βάση δεδομένων μπορεί να χρησιμοποιηθεί για τη δημιουργία με τη βοήθεια του App Invertor μιας εφαρμογής για φορητές συσκευές που διαχειρίζεται δεδομένα που βρίσκονται σε ένα «δημόσιο» υπολογιστικό φύλλο, εκπαιδευτική δραστηριότητα η οποία μπορεί να υλοποιηθεί στα πλάισια της διδασκαλίας της ενότητας 2 (Προγραμματιστικά περιβάλλοντα -Δημιουργία εφαρμογών) του μαθήματος Εφαρμογές Πληροφορικής της Α’ Λυκείου.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Τέσσερις από τις σημαντικότερες δεξιότητες του 21ου αιώνα είναι η επίλυση προβλημάτων, η συνεργατική επίλυση προβλημάτων, ο πληροφορικός και ψηφιακός γραμματισμός και η παγκόσμια πολιτειότητα (Griffin et al., 2018:22). Η υπηρεσία e-grafis του ΠΣΔ μέσω του διαμοιρασμού και της ταυτόχρονης επεξεργασίας αρχείων καθώς και της συνεργασίας με άλλα μέλη του ΠΣΔ παρέχει τη δυνατότητα στους μαθητές και τις μαθήτριες να εξασκηθούν στη συνεργατική υλοποίηση δραστηριοτήτων αναπτύσσοντας δεξιότητες συνεργατικής μάθησης και επίλυσης προβλημάτων με τη βοήθεια του υπολογιστή. Η δεξιότητα της συνεργατικής επίλυσης προβλημάτων συνδέεται άμεσα με τη συνεργατική μάθηση χωρίς όμως η ομαδοκεντρική διδασκαλία να εκλαμβάνεται πάντα ως πανάκεια στη διδακτική πράξη για το λόγο ότι δεν είναι δυνατόν να εφαρμοσθεί σε οποιαδήποτε μαθησιακή ύλη και ότι παραμένει πάντοτε μια απαιτητική για τον εκπαιδευτικό μέθοδος (Τριλιανός, 2013:186). Στην ιδανική της εκδοχή, οι μαθητές ενθαρρύνονται να συμμετέχουν αμοιβαία σε μια συντονισμένη προσπάθεια για να υλοποιήσουν μια εργασία και να αναπτύξουν νέες γνώσεις και δεξιότητες (Tzimogiannis, 2019:241).

Η αλληλεπίδραση μεταξύ των θεωριών της συνεργατικής μάθησης, των τηλεπικοινωνιών και της εκπαίδευσης που έχει χαρακτηριστικά κοινότητας έχει ανοίξει το δρόμο για το σχεδιασμό και την οργάνωση πιο υβριδικών, συνεργατικών περιβαλλόντων μάθησης, που ενσωματώνουν διαφορετικές και νέου τύπου λειτουργίες επικοινωνίας με παιδαγωγικό τρόπο (Lowyck et al., 2001:514). Στην παρούσα εργασία διαπιστώθηκε ότι η συνεργατική μάθηση με τη βοήθεια των υπολογιστών προωθεί την καλλιέργεια κοινωνικών δεξιοτήτων όπως η επικοινωνία και η συνεργασία και την καλλιέργεια ψηφιακών δεξιοτήτων με κυριότερη τη διαχείριση συνεργατικών περιβαλλόντων υλοποίησης δραστηριοτήτων. Ωστόσο η παραγωγικότητα μιας ομάδας δε συμβαδίζει εξ ολοκλήρου με το βαθμό ικανοποίησης των μελών της γεγονός που καθιστά της αξιολόγηση της συνεργατικής απόδοσης εξίσου σημαντική με αυτή της παραγωγικότητας. Τέλος, σημαντικό ρόλο για την επιτυχία εκπαιδευτικών δράσεων τέτοιου τύπου, σύμφωνα με την αποτίμηση της εκπαιδευτικής δράσης από τους μαθητές και τις μαθήτριες, διαδραματίζουν η σχέση που έχουν με τον/την συντονιστή/τρια εκπαιδευτικό καθώς και τα εσωτερικά κίνητρα που τους δίνονται (δημοσίευση της εργασίας, συνεργασία με άλλα σχολεία κ.α.).

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ΣΤΑΣΕΙΣ ΚΑΙ ΠΕΠΟΙΘΗΣΕΙΣ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΓΙΑ ΤΗ ΧΡΗΣΗ ΕΡΓΑΛΕΙΩΝ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Τόλη Γεωργία
Διευθύντρια ΓΕΛ Νεοχωρίου Άρτας, Δρ Φυσικός

Καρδαράς Ιωάννης
Διευθυντής ΓΕΛ Πύλης Τρικάλων, Δρ Φυσικός

Κούτσικος Αθανάσιος
Αν. Διευθυντής Π.ΕΠΑ.Λ. Βελεστίνου, ΜΔΕ Φυσικός

ΠΕΡΙΛΗΨΗ

Όσο η εξέλιξη των εργαλείων που βασίζονται στην Τεχνητή Νοημοσύνη (Τ.Ν.) προχωρά και η χρήση τους στη διδασκαλία των Φυσικών Επιστημών διευρύνεται, καθίσταται φανερό ότι δημιουργεί πολλές ευκαιρίες βελτίωσης της διδασκαλίας και συνακολούθως των μαθησιακών αποτελεσμάτων. Επιπλέον, η μελέτη των πεποιθήσεων και των στάσεων των εκπαιδευτικών στην ενσωμάτωση της Τ.Ν. στην εκπαιδευτική διαδικασία αναδεικνύεται ως ένα σημαντικό ζήτημα. Τα αποτελέσματα πολλών μελετών στη διδασκαλία των Φυσικών Επιστημών (Φ.Ε.) αναφέρουν τους ποικίλους και επικείμενους ρόλους της τεχνητής νοημοσύνης στην εκπαίδευση. Παρόλα αυτά, οι εκπαιδευτικοί Φ.Ε., αντιμετωπίζουν, την τελευταία δεκαετία, μια ιδιαίτερα μεγάλη πρόκληση, τη χρήση της Τ.Ν. στη σχολική τάξη χωρίς όμως να έχει υπάρξει ένας σημαντικός κεντρικός σχεδιασμός που να τους υποστηρίζει.

Η παρούσα μελέτη ερευνά τις στάσεις και πεποιθήσεις 40 εκπαιδευτικών Φ.Ε. Δευτεροβάθμιας εκπαίδευσης, της Θεσσαλίας και της Ηπείρου, απέναντι στην ενσωμάτωση των υπαρχόντων εργαλείων Τ.Ν., στην τάξη τους. Ειδικότερα, η έρευνα αυτή μελετά τις απόψεις των εκπαιδευτικών σχετικά με τα εργαλεία Τ.Ν., όπως το Gemini, το πρόγραμμα για την περίληψη αρχείων pdf με τεχνητή νοημοσύνη, το Gamma.app, τα οποία κατέχουν δυναμικό ρόλο στη βελτίωση παιδαγωγικών πρακτικών. Για τη συλλογή των δεδομένων της έρευνας σχετικά με την αξιολόγηση των στάσεων και πεποιθήσεων των εκπαιδευτικών, σχεδιάστηκε και διανεμήθηκε σε αυτούς ένα ερωτηματολόγιο 19 ερωτήσεων κλειστού τύπου και οι απαντήσεις δόθηκαν στην τετραβάθμια κλίμακα Likert.

Από τα αποτελέσματα των απαντήσεων προκύπτει ότι οι εκπαιδευτικοί παρόλο που στην πλειονότητά τους είναι εξοικειωμένοι με τη χρήση των ηλεκτρονικών υπολογιστών και στη χρήση των διαδραστικών πινάκων στη καθημερινή τους διδασκαλία, αισθάνονται σε μεγάλο βαθμό επιφυλακτικοί απέναντι στη χρήση των εργαλείων της Τ.Ν. και επιπλέον δηλώνουν ότι έχουν ελλιπή γνώση αυτών καθώς και ότι πιστεύουν ότι είναι ανέτοιμοι να προχωρήσουν στη χρήση αυτών των εργαλείων αποτελεσματικά στη σχολική τάξη, Τα αποτελέσματα καταδεικνύουν την ανάγκη δημιουργίας επιμορφωτικών σεμιναρίων για την αποτελεσματική γνωστική υποστήριξη των εκπαιδευτικών.

Λέξεις – κλειδιά: εκπαιδευτικοί, ερωτηματολόγιο, τεχνητή νοημοσύνη

ΘΕΩΡΗΤΙΚΗ ΕΙΣΑΓΩΓΗ

Αρκετές έρευνες τα τελευταία χρόνια εστιάζουν στην κατανόηση, την ανάλυση αλλά και την πρόβλεψη της επίδρασης που έχει η Τ.Ν. στην εκπαίδευση. Η Τ.Ν. έχει πολλαπλούς και ιδιαίτερα σημαντικούς ρόλους στις διδακτικές και μαθησιακές διαδικασίες και σε όλες τις συνιστώσες αυτών και έχει δυναμικό ρόλο όχι μόνο στο παρόν αλλά και στο μέλλον των μαθητών (Mahmoud, 2020). Το αυξημένο ενδιαφέρον των ερευνητών οφείλεται στην επιτακτική ανάγκη των εκπαιδευτικών να προσαρμοστούν στα νέα δεδομένα του ψηφιακού τοπίου του 21ου αιώνα. Η προσαρμογή και μετάβαση καθορίζει εκ νέου όχι μόνο τους ρόλους των εκπαιδευτικών, αλλά και των μαθητών και είναι προφανώς μεγίστης σημασίας για την εκπαιδευτική διαδικασία, όχι μόνο από τεχνολογική αλλά και από παιδαγωγική άποψη.

Ενδεικτικά αναφέρουμε έρευνες όπως αυτές των Fahimirad και Kotamjani (2018) αλλά και των Tapalova και Zhiyenbayeva (2022), τα ευρήματα των οποίων τονίζουν τα πλεονεκτήματα της χρήσης εργαλείων Τ.Ν. και τη συμβολή τους στην βελτίωση των μαθησιακών αποτελεσμάτων. Ωστόσο, στη διάρκεια των τελευταίων ετών εγείρονται ζητήματα που αφορούν τις στάσεις και τις αντιλήψεις των εκπαιδευτικών σε σχέση με τη χρήση των εργαλείων Τ.Ν. Τα αποτελέσματα των ερευνών σε σχέση με το παραπάνω ζήτημα ποικίλουν. Πιο συγκεκριμένα σε έρευνα των Sutcu και Sutcu, (2023), οι εκπαιδευτικοί φαίνεται να αισθάνονται αισιοδοξία σε σχέση με τη χρήση της ΤΝ και υποστηρίζουν ότι δημιουργεί ευνοϊκό περιβάλλον μάθησης. Στην έρευνα των Aghaziarati et al. (2023) τονίζεται η ανάγκη για επιμόρφωση των εκπαιδευτικών που θα έχει ως στόχο την κατανόηση και την ορθή χρήση της Τ.Ν., έτσι ώστε να έχει τα επιθυμητά μαθησιακά αποτελέσματα.

Στον ελληνικό χώρο η έρευνα στον τομέα διερεύνησης των στάσεων και αντιλήψεων των εκπαιδευτικών είναι πιο περιορισμένη. Ενδεικτικά αναφέρουμε την εργασία της Varmazi (2022) που αφορά τους εκπαιδευτικούς πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης και αυτή της Petropoulou (2024), που αφορά τους εκπαιδευτικούς δευτεροβάθμιας. Σε σχέση τώρα με τις αντιλήψεις και τις στάσεις των εκπαιδευτικών, στο χώρο των Φυσικών Επιστημών στον διεθνή χώρο, έχουν υλοποιηθεί πολυάριθμες έρευνες (Darayseh, 2023˙ Hebert et al., 2021˙ United Nations Educational, Scientific and Cultural Organization, 2019˙ Tallvid, 2016). Τα αποτελέσματα αυτών των μελετών καταδεικνύουν ότι σεβαστό ποσοστό εκπαιδευτικών παρόλο που αναγνωρίζει τις δυνατότητες της Τ.Ν. δεν αισθάνονται προετοιμασμένοι στο να εντάξουν τα διαθέσιμα εργαλεία με αποτέλεσμα να εμμένουν σε παραδοσιακούς τρόπους διδασκαλίας, μιας και με αυτόν τον τρόπο αισθάνονται πιο ασφαλείς και αποτελεσματικοί στη διδασκαλία τους. Αυτό που απασχόλησε τους ερευνητές δεν ήταν μόνο το αν χρησιμοποιούν οι εκπαιδευτικοί την Τ.Ν. αλλά και τους παράγοντες που επηρεάζουν τις στάσεις και τις αντιλήψεις απέναντι στην Τ.Ν., όπως π.χ. το άγχος και η αυτοαποτελεσματικότητα.

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα εργασία έχει ως σκοπό τη διερεύνηση των στάσεων και των αντιλήψεων τω εκπαιδευτικών Φυσικών Επιστημών Δευτεροβάθμιας εκπαίδευσης καθώς και ποια εργαλεία χρησιμοποιούνται από αυτούς. Συγκεκριμένα τα ερευνητικά ερωτήματα είναι τα εξής:

- Ποιες είναι οι αντιλήψεις και οι στάσεις των εκπαιδευτικών Φ.Ε. σχετικά με τη χρήση εργαλείων Τ.Ν.; Το ερώτημα αυτό στοχεύει στη διερεύνηση του πως οι εκπαιδευτικοί αντιλαμβάνονται την Τ.Ν., ποιες είναι οι προσδοκίες τους και αν τυχόν υπάρχουν επιφυλάξεις ή ανησυχίες.
- Ποια εργαλεία Τ.Ν. χρησιμοποιούν οι εκπαιδευτικοί Φ.Ε. στη διδασκαλία τους και με ποιους τρόπους τα ενσωματώνουν; Αυτό το ερώτημα στοχεύει να καταγράψει τα συγκεκριμένα εργαλεία που χρησιμοποιούν οι εκπαιδευτικοί καθώς και τις μεθόδους και τις στρατηγικές που ακολουθούν για την ενσωμάτωσή τους στη διδασκαλία.

Το δείγμα της παρούσας έρευνας αποτέλεσαν 40 εκπαιδευτικοί του κλάδου ΠΕ04 που υπηρετούν σε σχολεία δευτεροβάθμιας εκπαίδευσης από τις Περιφέρειες Θεσσαλίας και Ηπείρου Για την επεξεργασία των ερωτημάτων δόθηκε στους εκπαιδευτικούς ερωτηματολόγιο το οποίο αποτελείται από 18 ερωτήσεις κλειστού τύπου και είναι χωρισμένο σε 3 μέρη. Στο 1ο μέρος ζητήθηκαν ατομικά στοιχεία τα οποία αφορούσαν.

a) Ηλικία
b) Έτη υπηρεσίας
c) Σπουδές πέραν του βασικού πτυχίου
d) Ειδικότητα (Φυσικός, Χημικός, Βιολόγος, Γεωλόγος)

Ακολουθεί το 2ο μέρος που αποτελούνταν από 8 ερωτήσεις οι οποίες διερευνούσαν τις αντιλήψεις και στάσεις εκπαιδευτικών σχετικά με τη χρήση της ΤΝ.

1) Πιστεύω ότι η Τ.Ν. είναι ένα χρήσιμο εργαλείο που βοηθάει στη βελτίωση της διδασκαλίας των Φ.Ε.
2) Πιστεύω ότι η χρήση εργαλείων Τ.Ν. είναι απαραίτητη στην προετοιμασία των μαθητών κατά τον 21ο αιώνα

3) Πιστεύω ότι η Τ.Ν. μπορεί να κάνει πιο ελκυστικά τα μαθήματα για τους μαθητές
4) Ανησυχώ για την ηθική διάσταση της χρήσης Τ.Ν. στην εκπαίδευση
5) Ανησυχώ ότι η χρήση Τ.Ν. θα αντικαταστήσει το ρόλο του εκπαιδευτικού στην τάξη
6) Αισθάνομαι άνετα να ενσωματώσω εργαλεία Τ.Ν. στην διδασκαλία μου
7) Πιστεύω ότι η χρήση Τ.Ν. στην εκπαίδευση απαιτεί επιπλέον επιμόρφωση και κατάρτιση των εκπαιδευτικών
8) Πιστεύω ότι οι όποιες αντιρρήσεις στη χρήση εργαλείων Τ.Ν. στη διδασκαλία οφείλονται κυρίως σε έλλειψη ενημέρωσης και εκπαίδευσης σχετικά με το θέμα.

Πίνακας 1
Αποτελέσματα σε σχέση με το 1ο μέρος του ερωτηματολογίου.

Κατηγορίες	Υποκατηγορίες	Συχνότητα
Φύλο	Άνδρες	22
	Γυναίκες	18
Ηλικιακή ομάδα	<35	4
	35-44	10
	45-55	16
	>55	10
Έτη προϋπηρεσίας	0-4 έτη	0
	5-10 έτη	5
	11-20 έτη	26
	Πάνω από 20 έτη	19
Σπουδές	Βασικό πτυχίο	8
	Δεύτερο πτυχίο	2
	Μεταπτυχιακό	26
	Διδακτορικό	4
Ειδικότητα	Φυσικός	22
	Χημικός	9
	Βιολόγος	7
	Γεωλόγος	2

Στο 3ο μέρος ζητήθηκε από τους εκπαιδευτικούς να δηλώσουν ποια εργαλεία χρησιμοποιούν, μέσω των ακόλουθων ερωτήσεων:

1) Χρησιμοποιώ εργαλεία Τ.Ν. για την προετοιμασία της διδασκαλίας μου για τη δημιουργία εκπαιδευτικού υλικού
2) Χρησιμοποιώ εργαλεία Τ.Ν. στη διάρκεια της διδασκαλία μου

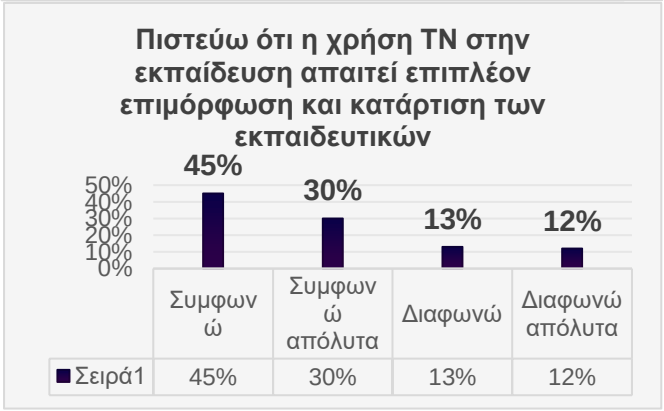
3) Χρησιμοποιώ εργαλεία Τ.Ν. για την αξιολόγηση των μαθητών
4) Χρησιμοποιώ κυρίως το ChatGPT ή/και το Gemini στη διδασκαλία μου
5) Χρησιμοποιώ κυρίως εκπαιδευτικές πλατφόρμες βασισμένες στην Τ.Ν.
6) Γνωρίζω εργαλεία Τ.Ν. που μπορούν να χρησιμοποιηθούν στην διδασκαλία των Φ.Ε.

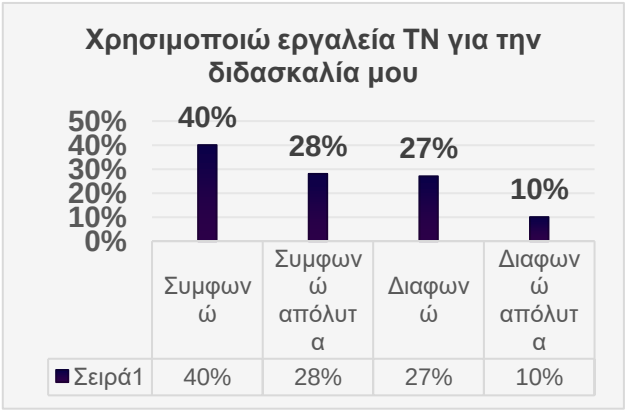
ΑΠΟΤΕΛΕΣΜΑΤΑ - ΣΤΑΤΙΣΤΙΚΗΣ ΑΝΑΛΥΣΗΣ - ΣΧΟΛΙΑΣΜΟΣ ΑΠΟΤΕΛΕΣΜΑΤΩΝ

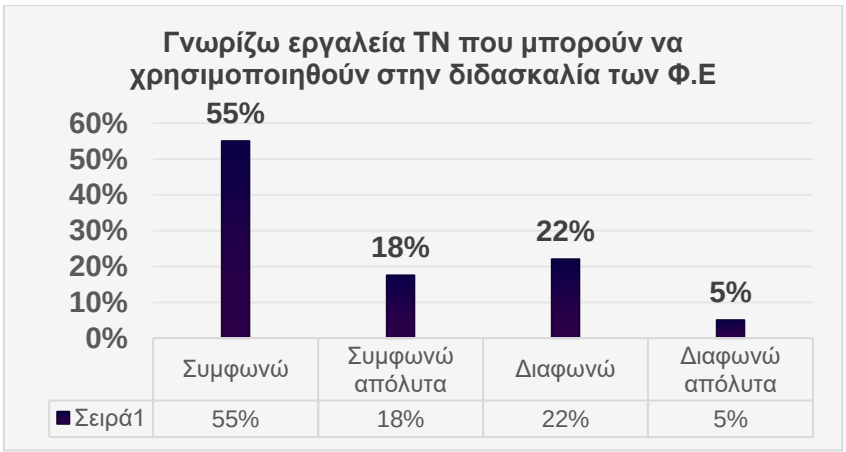
Για να ελεγχθεί η αξιοπιστία του ερωτηματολογίου υπολογίστηκε ο συντελεστής α Cronbach α=0,73. Η στατιστική ανάλυση έγινε με το πρόγραμμα SPSS. Χρησιμοποιήθηκε 4-βάθμια κλίμακα Likert με τις επιλογές Διαφωνώ απόλυτα, Διαφωνώ, Συμφωνώ, Συμφωνώ απόλυτα. Στον παρακάτω ΠΙΝΑΚΑ 1 παρουσιάζονται τα αποτελέσματα σε σχέση με το 1ο μέρος του ερωτηματολογίου.

Στα παρακάτω διαγράμματα παρουσιάζονται τα ποσοστά από τις απαντήσεις των εκπαιδευτικών σε μέρος των ερωτήσεων του ερωτηματολογίου.

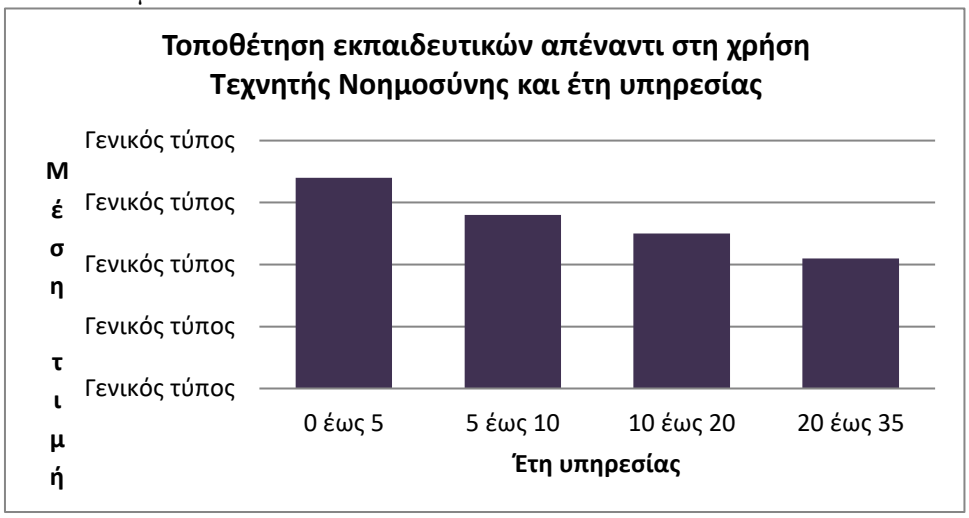








Επιπροσθέτως υπολογίσαμε το μέσο όρο όλων των ερωτήσεων που αφορούν τη στάση των εκπαιδευτικών απέναντι στη χρήση της T.N., σε σχέση με τα έτη προϋπηρεσίας τους. Στο παρακάτω συγκεντρωτικό διάγραμμα παρουσιάζουμε τα αποτελέσματα.



Η τοποθέτηση των εκπαιδευτικών στην 4-βαθμια κλίμακα τύπου Likert ήταν θετική με τους εκπαιδευτικούς που έχουν 0-5 έτη υπηρεσίας να εμφανίζουν τη μεγαλύτερη μέση τιμή 3,4 (±0,3) και την ομάδα των εκπαιδευτικών 20-35 έτη υπηρεσίας να έχουν τη χαμηλότερη μέση τιμή 2,1 (±0,2).

Διερευνήθηκε επίσης εάν υπάρχει θετική συσχέτιση μεταξύ της ηλικίας των εκπαιδευτικών και της άποψης ότι η χρήση T.N. στην εκπαίδευση απαιτεί επιπλέον επιμόρφωση και κατάρτιση των εκπαιδευτικών μέσω του συντελεστή Pearson, ο οποίος υπολογίστηκε ίσος με ($r(38) = .68$, $p<.05$

Θετική συσχέτιση υπήρχε επίσης μεταξύ των ετών υπηρεσίας των εκπαιδευτικών και της ανησυχίας για την ηθική διάσταση της χρήσης TN στην εκπαίδευση μεPearson ($r(38) = .73$, $p<.05$.

Σε σχέση με τη χρησιμότητα της T.N. ως εργαλείο διδασκαλίας η πλειοψηφία των εκπαιδευτικών (περίπου 50%) συμφωνεί ότι η T.N. αποτελεί χρήσιμο εργαλείο που βοηθάει στη βελτίωση της διδασκαλίας των Φυσικών Επιστημών. Επιπλέον, περίπου 30% συμφωνεί απόλυτα με αυτή τη δήλωση. Αντίθετα, μόνο 15% διαφωνεί και λιγότερο από 5% διαφωνεί απόλυτα. Παρατηρούμε δηλαδή συνολικά μια θετική στάση των εκπαιδευτικών προς τη χρησιμότητα της T.N., με ποσοστό συμφωνίας που φτάνει το 80%.

Σχετικά με το κρίσιμο θέμα της ηθικής διάστασης της χρήσης της T.N. στην εκπαίδευση, σημαντικό ποσοστό (περίπου 52%) των εκπαιδευτικών εκφράζει ανησυχία παρόλη τη θετική αποδοχή της χρησιμότητάς της. Επιπλέον, περίπου 18% συμφωνεί απόλυτα με αυτή την ανησυχία. Συνολικά 70% των εκπαιδευτικών εκφράζει προβληματισμούς σχετικά με τις ηθικές επιπτώσεις της T.N., ενώ μόνο 30% διαφωνεί με αυτές τις ανησυχίες (περίπου 22% διαφωνεί και 8% διαφωνεί απόλυτα).

Αναφορικά με την ανάγκη επιμόρφωσης και κατάρτισης, η πλειοψηφία των εκπαιδευτικών (περίπου 45%) συμφωνεί ότι η χρήση T.N. στην εκπαίδευση απαιτεί επιπλέον επιμόρφωση και κατάρτιση των εκπαιδευτικών. Περίπου 30% συμφωνεί απόλυτα με αυτή την άποψη. Αντίθετα, μόνο 13% διαφωνεί και 12% διαφωνεί απόλυτα. Συνολικά, το 75% των εκπαιδευτικών αναγνωρίζει την ανάγκη περαιτέρω επιμόρφωσης για την αποτελεσματική αξιοποίηση της T.N. στη διδασκαλία.

Σχετικά με τη γνώση εργαλείων T.N. που μπορούν να χρησιμοποιηθούν στη διδασκαλία των Φ.Ε., περίπου 55% των εκπαιδευτικών συμφωνεί ότι γνωρίζει τέτοια εργαλεία, ενώ περίπου 18% συμφωνεί απόλυτα. Περίπου 22% διαφωνεί και μόνο 5% διαφωνεί απόλυτα. Συνολικά, το 73% των εκπαιδευτικών δηλώνει ότι γνωρίζει εργαλεία T.N. που μπορούν να αξιοποιηθούν στη διδασκαλία των Φυσικών Επιστημών.

Όσον αφορά την τρέχουσα χρήση εργαλείων T.N. στη διδασκαλία, περίπου 40% των εκπαιδευτικών συμφωνεί ότι χρησιμοποιεί τέτοια εργαλεία, ενώ περίπου 28% συμφωνεί απόλυτα. Αντίθετα, περίπου 27% διαφωνεί και 10% διαφωνεί απόλυτα. Συνολικά, το 68% των εκπαιδευτικών δηλώνει ότι ήδη χρησιμοποιεί εργαλεία T.N. στη διδασκαλία του, γεγονός που υποδηλώνει σημαντική διείσδυση της τεχνολογίας αυτής στην εκπαιδευτική πρακτική.

ΣΥΜΠΕΡΑΣΜΑΤΑ – ΠΡΟΤΑΣΕΙΣ

Τα αποτελέσματα της παρούσας έρευνας καταδεικνύουν μια γενικά θετική στάση των εκπαιδευτικών Φυσικών Επιστημών απέναντι στη χρήση της Τεχνητής Νοημοσύνης ως εργαλείου διδασκαλίας. Η πλειοψηφία των εκπαιδευτικών αναγνωρίζει τη χρησιμότητα της T.N. και δηλώνει εξοικειωμένη με σχετικά εργαλεία, με σημαντικό ποσοστό να αναφέρει ότι ήδη τα χρησιμοποιεί στην πράξη.

Ωστόσο, παράλληλα με την αποδοχή της τεχνολογίας, οι εκπαιδευτικοί εκφράζουν σημαντικές ανησυχίες σχετικά με την ηθική διάσταση της χρήσης T.N. στην εκπαίδευση. Αυτό υποδηλώνει την ανάγκη για περαιτέρω συζήτηση και έρευνα σχετικά με τις ηθικές προεκτάσεις της εφαρμογής της T.N. στο εκπαιδευτικό περιβάλλον.

Επιπλέον, η έρευνα αναδεικνύει τη σαφή ανάγκη για επιπλέον επιμόρφωση και κατάρτιση των εκπαιδευτικών στη χρήση της T.N., γεγονός που υπογραμμίζει τη σημασία της συνεχούς επαγγελματικής ανάπτυξης στον τομέα αυτό.

Είναι ενδιαφέρον ότι οι θετικές στάσεις απέναντι στην T.N. και η τρέχουσα χρήση της παρατηρούνται σε ένα δείγμα όπου κυριαρχούν εκπαιδευτικοί με σημαντική εμπειρία (10-35 έτη) και ηλικίες 45-54 ετών. Αυτό ενδεχομένως αντικρούει την υπόθεση ότι οι μεγαλύτερης ηλικίας και εμπειρίας εκπαιδευτικοί είναι λιγότερο δεκτικοί σε νέες τεχνολογίες.

Συμπερασματικά, η έρευνα αναδεικνύει μια δυναμική σχέση μεταξύ των εκπαιδευτικών Φυσικών Επιστημών και της Τεχνητής Νοημοσύνης, με σημαντική αποδοχή και ενσωμάτωση της τεχνολογίας αυτής στη διδακτική πρακτική. Παράλληλα, αναδεικνύονται προκλήσεις που σχετίζονται με ηθικά ζητήματα και την ανάγκη επιμόρφωσης.

Προτείνεται η περαιτέρω έρευνα για τη διερεύνηση των ηθικών διαστάσεων της χρήσης T.N. στην εκπαίδευση καθώς και ο σχεδιασμός στοχευμένων προγραμμάτων επιμόρφωσης για εκπαιδευτικούς Φυσικών Επιστημών. Επιπλέον, θα ήταν χρήσιμη η μελέτη συγκεκριμένων εφαρμογών T.N. στη διδασκαλία των Φυσικών Επιστημών και η αξιολόγηση της αποτελεσματικότητάς τους στη μαθησιακή διαδικασία.

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ΕΚΠΑΙΔΕΥΤΙΚΕΣ ΔΡΑΣΕΙΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΑ: Ο ΚΡΟΚΟΣ ΚΟΖΑΝΗΣ ΚΑΙ ΤΟ BEEBOT ΩΣ ΔΙΔΑΚΤΙΚΑ ΕΡΓΑΛΕΙΑ

Τσίρου Αντιγόνη
Εκπαιδευτικός Πληροφορικής, MSc
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Κοζάνης, Υπουργείο Παιδείας και Θρησκευμάτων
Κοζάνη, Ελλάδα
e-mail: tsirouant@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα έρευνα διερευνά την αποτελεσματικότητα της δράσης «Κρόκος Κοζάνης» σε συνδυασμό με τη χρήση του ρομπότ Bee-Bot σε μεικτές ομάδες της πρωτοβάθμιας εκπαίδευσης στην περιοχή της Κοζάνης. Η εργασία εστιάζει στη σύνδεση του τοπικού πολιτισμού, των παραδόσεων και της οικονομικής σημασίας του κρόκου με την εκπαιδευτική διαδικασία, ενώ παράλληλα αξιοποιεί την καινοτόμο τεχνολογία της ρομποτικής για την ενίσχυση της ομαδικής μάθησης και των δεξιοτήτων προγραμματισμού.

Στο πλαίσιο της έρευνας, δημιουργήθηκε ένα ηλεκτρονικό ερωτηματολόγιο (Google Forms), το οποίο διανεμήθηκε σε 32 εκπαιδευτικούς μετά την ολοκλήρωση εκπαιδευτικών δράσεων για τον Κρόκο Κοζάνης. Οι εκπαιδευτικοί απάντησαν ανώνυμα, ενώ τα δεδομένα συλλέχθηκαν και επεξεργάστηκαν αυτόματα, επιτρέποντας μια συστηματική ανάλυση των απόψεων τους για τη σύνδεση του διδακτικού θέματος με την πραγματική ζωή και τη χρήση του ρομπότ Bee-Bot στην τάξη.

Η μεθοδολογία περιλάμβανε την καταγραφή δημογραφικών στοιχείων (φύλο, ηλικία, μορφωτικό επίπεδο, χρόνια υπηρεσίας), που υποδεικνύουν ένα δείγμα έμπειρων εκπαιδευτικών με κυρίαρχη παρουσία γυναικών και σημαντική επαγγελματική προϋπηρεσία. Τα αποτελέσματα της έρευνας αποκαλύπτουν ότι οι εκπαιδευτικοί θεωρούν το θέμα του Κρόκου άρρηκτα συνδεδεμένο με την καθημερινή ζωή των μαθητών, επισημαίνοντας την αξία του για την τοπική κουλτούρα, τα έθιμα και την οικονομία της περιοχής.

Παράλληλα, η χρήση του ρομπότ Bee-Bot ενίσχυσε την ομαδοσυνεργατική μάθηση, προωθώντας την αμοιβαία αλληλεπίδραση, την κριτική και δημιουργική σκέψη, καθώς και την πρακτική εξοικείωση με βασικές αρχές προγραμματιστικής σκέψης. Οι εκπαιδευτικοί παρατήρησαν ιδιαίτερα οφέλη όσον αφορά τη συμμετοχή όλων των μαθητών, συμπεριλαμβανομένων των «αδύναμων», και την ενίσχυση των κοινωνικο-συναισθηματικών δεξιοτήτων.

Τα συνολικά συμπεράσματα επιβεβαιώνουν τη θετική διάθεση για την ενσωμάτωση καινοτόμων πρακτικών στη διδασκαλία, επισημαίνοντας την ανάγκη για περαιτέρω επιμόρφωση στη χρήση ρομποτικών εργαλείων. Η παρούσα περίληψη προσφέρει μια συνοπτική εικόνα της έρευνας, προσκαλώντας τον αναγνώστη να ανακαλύψει σε βάθος τις λεπτομέρειες της μεθοδολογίας και των ευρημάτων, τα οποία συμβάλλουν στη βελτίωση της εκπαιδευτικής πρακτικής.

Η μελέτη αυτή παρουσιάζει όχι μόνο την άμεση επίδραση των καινοτόμων μεθόδων στη μάθηση, αλλά και τις προοπτικές για μελλοντικές εφαρμογές που μπορούν να ενισχύσουν την ποιότητα της εκπαιδευτικής διαδικασίας.

Λέξεις-κλειδιά: Κρόκος Κοζάνης, Bee-Bot , διαφοροποιημένη διδασκαλία, ομαδική συνεργασία, ρομποτική, βιωματική μάθηση.

ΕΙΣΑΓΩΓΗ

Η παρούσα έρευνα διεξήχθη στο πλαίσιο της εκπαιδευτικής δράσης με θέμα τον Κρόκο Κοζάνης και τη χρήση του ρομπότ Bee-Bot στην πρωτοβάθμια εκπαίδευση. Στόχος της ήταν η διερεύνηση των απόψεων των εκπαιδευτικών σχετικά με τη σύνδεση της διδασκαλίας με την τοπική πραγματικότητα και τη συμβολή της ρομποτικής στην ενίσχυση της μαθησιακής διαδικασίας.

Για τη συλλογή των δεδομένων χρησιμοποιήθηκε ηλεκτρονικό ερωτηματολόγιο, στο οποίο ανταποκρίθηκαν 32 εκπαιδευτικοί. Η πλειονότητα των συμμετεχόντων ήταν γυναίκες με πολυετή εκπαιδευτική εμπειρία, γεγονός που προσδίδει ιδιαίτερη βαρύτητα στις απαντήσεις. Οι ερωτήσεις επικεντρώθηκαν τόσο στη θεματολογία της δράσης όσο και στην εφαρμογή της εκπαιδευτικής ρομποτικής με το ρομπότ Bee-Bot , εξετάζοντας την επίδρασή τους στη συνεργατική μάθηση, τη συμμετοχή όλων των μαθητών και την ανάπτυξη βασικών δεξιοτήτων.

Η ανάλυση των απαντήσεων παρέχει πολύτιμα ευρήματα για τη δυναμική αξιοποίηση τοπικών θεματικών και καινοτόμων τεχνολογιών στην εκπαιδευτική πράξη, ενισχύοντας τη βιωματική, διαθεματική και διαφοροποιημένη προσέγγιση της διδασκαλίας.

ΔΙΔΑΚΤΙΚΗ ΚΑΙΝΟΤΟΜΙΑ ΚΑΙ ΤΟΠΙΚΗ ΠΟΛΙΤΙΣΜΙΚΉ ΤΑΥΤΟΤΗΤΑ

Η σύνδεση της εκπαιδευτικής διαδικασίας με στοιχεία της τοπικής πολιτισμικής ταυτότητας αποτελεί μια σύγχρονη και ουσιαστική διδακτική πρακτική, που ενισχύει τη βιωματική και ουσιαστική μάθηση. Η εστίαση σε θεματικές που σχετίζονται με την καθημερινότητα, την ιστορία και την οικονομική ζωή του τόπου συμβάλλει όχι μόνο στην καλύτερη κατανόηση των μαθησιακών αντικειμένων, αλλά και στην καλλιέργεια πολιτιστικής συνείδησης και κοινωνικής ενσυναίσθησης στους μαθητές.

Η δράση με θέμα τον Κρόκο Κοζάνης αξιοποίησε ένα τοπικό προϊόν με διεθνή αναγνώριση, δημιουργώντας ένα πλούσιο και αυθεντικό μαθησιακό περιβάλλον. Μέσα από τη συγκεκριμένη θεματολογία, οι μαθητές είχαν την ευκαιρία να γνωρίσουν τα ήθη, τα έθιμα και την οικονομική σημασία του κρόκου, συνδέοντας έτσι τη σχολική γνώση με την πραγματική ζωή.

Εικόνα 1.
Μακέτα που χρησιμοποιήθηκε σε δράσεις και απεικονίζει τα στάδια του φυτού Κρόκος Κοζάνης (σαφράν) το ρομπότ Bee-Bot. (Το υλικό σχεδιάστηκε & δημιουργήθηκε από την Τσίρου Αντιγόνη)



Παράλληλα, η χρήση του εκπαιδευτικού ρομπότ Bee-Bot ενίσχυσε τη διαθεματική και διαφοροποιημένη διδασκαλία, προάγοντας τη συνεργατική μάθηση και τη συμμετοχή όλων των μαθητών. Η εισαγωγή της εκπαιδευτικής ρομποτικής στην πρωτοβάθμια εκπαίδευση αποτέλεσε έναν καινοτόμο άξονα της δράσης, προσφέροντας ευκαιρίες για

την ανάπτυξη της υπολογιστικής σκέψης και την ενεργό εμπλοκή των μαθητών σε δραστηριότητες εξερεύνησης, επίλυσης προβλημάτων και δημιουργίας.

Η παρούσα έρευνα επιχείρησε να αποτυπώσει τις απόψεις των εκπαιδευτικών για την αποτελεσματικότητα αυτής της σύνθεσης τοπικού πολιτισμικού περιεχομένου και εκπαιδευτικής τεχνολογίας. Μέσα από τη συστηματική ανάλυση των απαντήσεών τους, αναδεικνύεται η δυναμική της τοπικής θεματολογίας ως εργαλείο ενδυνάμωσης της μαθησιακής εμπειρίας, καθώς και η θετική αποδοχή της ρομποτικής ως παιδαγωγικού μέσου καινοτομίας.

Εικόνα 2.
Μακέτα που χρησιμοποιήθηκε σε δράσεις και απεικονίζει τα στάδια του φυτού Κρόκος Κοζάνης (σαφράν) με το ρομπότ Bee-Bot και ειδικά ζάρια.
(Το υλικό σχεδιάστηκε & δημιουργήθηκε από την Τσίρου Αντιγόνη)



ΜΕΛΕΤΗ ΚΑΙ ΑΝΑΛΥΣΗ ΑΠΟΤΕΛΕΣΜΑΤΩΝ ΤΗΣ ΕΡΕΥΝΑΣ ΓΙΑ ΤΗ ΔΡΑΣΗ ΜΕ ΤΟ ΦΥΤΟ «ΚΡΟΚΟΣ ΚΟΖΑΝΗΣ» ΚΑΙ ΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΤΟΥ ΡΟΜΠΟΤ BEE-BOT

Στην παρούσα μελέτη παρουσιάζονται και αναλύονται τα δεδομένα από ερωτηματολόγιο που διανεμήθηκε σε 32 εκπαιδευτικούς στην Α/θμια Εκπ/ση, με στόχο τη διερεύνηση των απόψεών τους για:

- Τη σύνδεση του διδασκόμενου θέματος (Κρόκος Κοζάνης) με την πραγματική ζωή.
- Την αξιοποίηση της ρομποτικής (Bee-Bot) σε ομάδες μεικτής δυναμικότητας και την επίδρασή της στη μαθησιακή διαδικασία.

Παρακάτω γίνεται συστηματική παρουσίαση των βασικών αξόνων της έρευνας και των αποτελεσμάτων, συνοδευόμενη από ερμηνείες και συμπεράσματα.

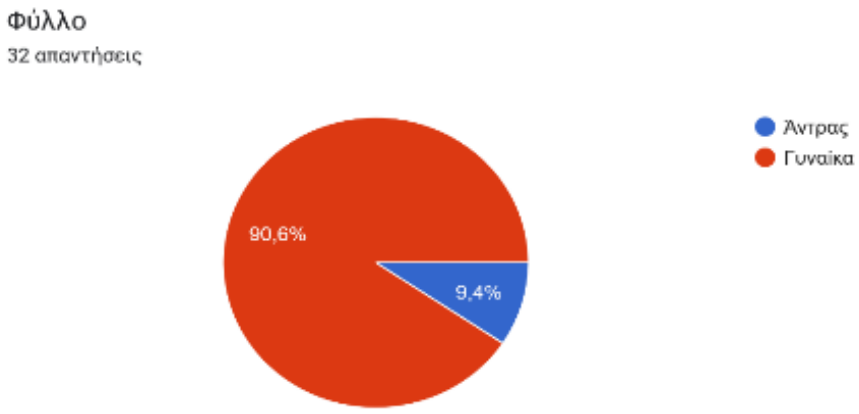
ΔΗΜΟΓΡΑΦΙΚΑ ΣΤΟΙΧΕΊΑ ΣΥΜΜΕΤΕΧΟΝΤΩΝ

Φύλο: Από το σύνολο των 32 συμμετεχόντων, οι 29 είναι γυναίκες και οι 3 είναι άντρες.
Συνεπώς, το δείγμα είναι κατά πλειοψηφία γυναικείο (περίπου 90,6% γυναίκες, 9,4 % είναι άνδρες).

Ηλικιακή Κατανομή: Υπάρχουν συμμετέχοντες στις ηλικιακές ομάδες 31-40 (6%), 41-50 (25%), 51-60 (66%) και 60+ (3%). Η πλειονότητα των εκπαιδευτικών (πάνω από τους μισούς) βρίσκονται στην ομάδα 51-60 ετών, ενώ ακολουθούν οι ηλικίες 41-50. Αυτό υποδηλώνει ότι το δείγμα έχει κυρίως έμπειρους εκπαιδευτικούς, μεγαλύτερης ηλικίας, με πολλά χρόνια υπηρεσίας.

Μορφωτικό Επίπεδο: Όλοι οι εκπαιδευτικοί είναι απόφοιτοι τριτοβάθμιας εκπαίδευσης (Πανεπιστημιακό πτυχίο). Μερικοί από αυτούς κατέχουν και Μεταπτυχιακό τίτλο (13%), (εντοπίζονται αρκετές περιπτώσεις κατόχων Μεταπτυχιακού). Λίγοι δήλωσαν επιπλέον τίτλους (3%) (π.χ. Παιδαγωγική Ακαδημία).

Εικόνα 3.
Δημογραφικά στοιχεία/Φύλο



Χρόνια Υπηρεσίας & Σχέση Εργασίας: Η μεγάλη πλειονότητα των συμμετεχόντων (ιδίως όσοι είναι 51-60 ετών) έχουν πάνω από 20 χρόνια υπηρεσίας (69%). Στις υπόλοιπες ηλικιακές ομάδες εμφανίζονται συχνά οι κατηγορίες 10-20 χρόνια υπηρεσίας (31%). Όλοι οι εκπαιδευτικοί είναι μόνιμοι στη δημόσια εκπαίδευση (100%).

Το 1ο ερευνητικό ερώτημα προς τους εκπαιδευτικούς αφορά την **Σύνδεση του Θέματος «Κρόκος Κοζάνης» με την Πραγματική Ζωή**: Στο ερωτηματολόγιο περιλαμβάνονταν ερωτήσεις σχετικές με το εάν το διδασκόμενο θέμα, δηλαδή ο Κρόκος Κοζάνης, είχε «απόλυτη σύνδεση με την πραγματική ζωή».

Σύνδεση με ήθη-έθιμα: Οι 30 εκπαιδευτικοί απάντησαν **«Ναι»** (94%) στην ερώτηση για τη σύνδεση του θέματος με την πραγματική ζωή (2 εκπαιδευτικοί - 6% δεν απάντησαν).

Οικονομία του τόπου: Οι 30 εκπαιδευτικοί απάντησαν **«Ναι»** (94%) στην ερώτηση για τη σύνδεση του θέματος με την πραγματική ζωή (2 εκπαιδευτικοί - 6% απάντησαν όχι).

Αναφέρουν ότι οι μαθητές ήρθαν σε επαφή με την **τοπική κουλτούρα**, **τα ήθη και τα έθιμα**, αλλά και την **οικονομική σημασία** του Κρόκου για την περιοχή της Κοζάνης. Ορισμένοι τονίζουν ότι οι μαθητές συνειδητοποίησαν τη σπουδαιότητα του φυτού για τους παραγωγούς και την **αγροτική-οικονομική δραστηριότητα**.

Σύνδεση παρελθόντος-παρόντος-μέλλοντος: Οι περισσότεροι συμμετέχοντες θεωρούν ότι το θέμα προσφέρει μια χρονολογική σύνδεση (πώς καλλιεργούνταν, πώς χρησιμοποιείται σήμερα, ποιες είναι οι προοπτικές στο μέλλον). Το 85 % δηλαδή 27 εκπαιδευτικοί απάντησαν Ναι και μικρή μειοψηφία (3 εκπαιδευτικοί το 10% απάντησαν όχι και 2 εκπαιδευτικοί δεν απάντησαν) ότι η σύνδεση με το μέλλον δεν ήταν τόσο σαφής.

Το 2ο ερευνητικό ερώτημα: Οι εκπαιδευτικοί ρωτήθηκαν αν η χρήση της ρομποτικής Bee-Bot : **Βοήθησε στην Ομαδοσυνεργατική Μάθηση**: Πολλές απαντήσεις κυμαίνονται από «Πολύ» απάντησαν 7 εκπαιδευτικοί δηλαδή το 22% έως «Παρά πολύ» 20 εκπαιδευτικοί δηλαδή το 62% θετικές. Λίγοι εκπαιδευτικοί δήλωσαν «Ικανοποιητικά», 5 εκπαιδευτικοί δηλαδή το 16% χωρίς όμως να αρνούνται τη χρησιμότητα του. Γενικά, οι εκπαιδευτικοί παρατήρησαν ότι το ρομπότ Bee-Bot προκάλεσε μεγάλο ενδιαφέρον και συνεργασία μεταξύ των μαθητών, καθώς οι ομάδες έπρεπε να σχεδιάσουν διαδρομές, να συζητήσουν, να διορθώσουν λάθη κ.λπ.

Το 3ο ερευνητικό ερώτημα για το αν **Υπήρχε αμοιβαία αλληλεπίδραση του ρομπότ (Bee-Bot) με τον μαθητή:** Η συντριπτική πλειονότητα απάντησε «Πολύ» 10 εκπαιδευτικοί δηλαδή το 31% , «Παρά πολύ» 20 εκπαιδευτικοί δηλαδή το 63% και 2 εκπαιδευτικοί απάντησαν ικανοποιητικά. Εκπαιδευτικοί ανέφεραν ότι οι μαθητές

«διασκέδασαν» με τον προγραμματισμό, ένιωσαν ότι καθοδηγούν το ρομπότ και ταυτόχρονα «έβλεπαν» τις συνέπειες των εντολών τους σε πραγματικό χρόνο.

Το 4ο ερευνητικό ερώτημα για το αν **Καλλιέργησε την κριτική και δημιουργική σκέψη των μαθητών η διδασκαλία με τα Bee-Bot** : Σχεδόν όλοι απάντησαν «Ναι» 29 εκπαιδευτικοί δηλαδή το 91% και 3 δηλαδή 9% εκπαιδευτικοί απάντησαν όχι ή κάποιο θετικό βαθμό συμφωνίας. Οι εκπαιδευτικοί σημείωσαν ότι η διαδικασία επίλυσης προβλημάτων (programming – debugging – τροποποίηση εντολών) κινητοποίησε τη δημιουργικότητα και τη λογική σκέψη των παιδιών.

Το 5ο ερευνητικό ερώτημα προς τους εκπαιδευτικούς ήταν: Στο ερωτηματολόγιο υπήρχε πεδίο όπου οι εκπαιδευτικοί κλήθηκαν να επιλέξουν ή να αναφέρουν (από 2 προτάσεις) συγκεκριμένα οφέλη που παρατήρησαν. Οι πιο συχνές αναφορές ήταν: **«Οι μαθητές αφηγήθηκαν φανταστικές ή πραγματικές ιστορίες μετά την περιήγηση με το ρομπότ στη μακέτα»**: Κάποιοι εκπαιδευτικοί παρατήρησαν ότι το Bee-Bot ενίσχυσε και την **αφηγηματική ικανότητα** των παιδιών, καθώς τα παιδιά εμπνεύστηκαν από τη διαδρομή/μακέτα για να δημιουργήσουν ιστορίες απάντησαν 5 εκπαιδευτικοί (16,7%).

«Οι μαθητές κατανόησαν τη σπουδαιότητα του φυτού για τους ανθρώπους που εργάζονται για την παραγωγή του»: Εμφανίζεται πολύ συχνά, τονίζοντας ότι τα παιδιά εκτίμησαν την εργασία των παραγωγών και τη διαδικασία παραγωγής του κρόκου. απάντησαν 12 εκπαιδευτικοί (40%).

«Οι μαθητές ανακάλυψαν τη χρησιμότητα του φυτού στην υγεία και τη διατροφή»: Πολλές φορές υπογραμμίζεται η διάσταση της διατροφής/υγείας και το ενδιαφέρον των παιδιών για τα ευεργετικά στοιχεία του κρόκου απάντησαν 17 εκπαιδευτικοί (56,7%)

«Οι μαθητές ανέπτυξαν ικανότητες προγραμματισμού»: Πάρα πολλοί εκπαιδευτικοί σημείωσαν ρητά ότι τα παιδιά εξοικειώθηκαν με βασικές αρχές προγραμματιστικής σκέψης (αλγοριθμική λογική, βήμα προς βήμα εκτέλεση, διορθωτικές κινήσεις) απάντησαν 26 εκπαιδευτικοί (86,7%).

Εικόνα 4.
Γράφημα από τις απαντήσεις στην ερώτηση αν καλλιέργησε την κριτική και δημιουργική σκέψη των μαθητών η διδασκαλία με τα Bee-Bot /απάντηση Ναι

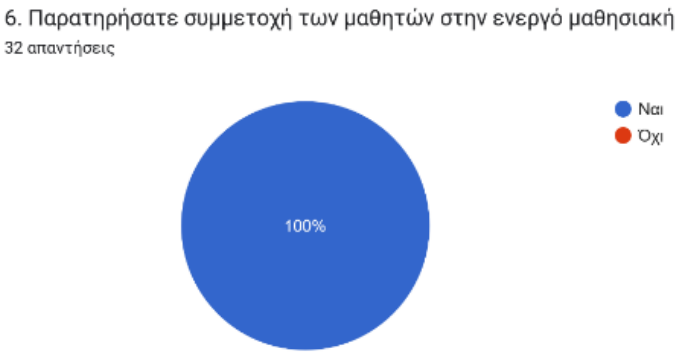


Το 6ο ερευνητικό ερώτημα προς τους εκπαιδευτικούς ήταν**: Παρατηρήσατε συμμετοχή των μαθητών στην ενεργό μαθησιακή διαδικασία:** Η συντριπτική πλειονότητα απάντησε **«Ναι»** ποσοστό 100% στην ερώτηση αν παρατηρήθηκε **ενεργή συμμετοχή** των μαθητών. Η χρήση του Bee-Bot προκάλεσε **ενθουσιασμό** και **περιέργεια**, με αποτέλεσμα τα παιδιά να θέλουν να συνεργαστούν.

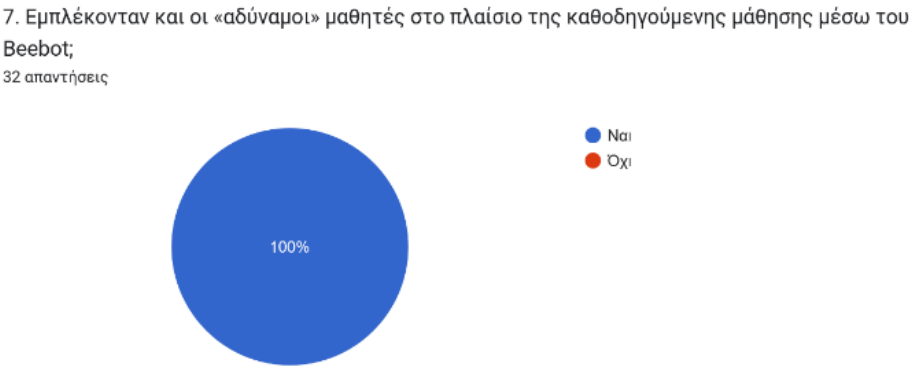
Το 7ο ερευνητικό ερώτημα προς τους εκπαιδευτικούς ήταν: **Εμπλέκονταν και οι «αδύναμοι» μαθητές στο πλαίσιο της καθοδηγούμενης μάθησης μέσω του Bee-Bot .** Επίσης, όλοι οι εκπαιδευτικοί δήλωσαν Ναι δηλαδή ποσοστό 100% ότι οι «αδύναμοι» μαθητές εντάχθηκαν πιο εύκολα στη δραστηριότητα. Οι εκπαιδευτικοί εστιάζουν στο

ότι το Bee-Bot δίνει **πρακτική, χειροπιαστή διάσταση** στη μάθηση, με αποτέλεσμα μαθητές που δυσκολεύονται θεωρητικά, να συμμετέχουν ενεργά στον σχεδιασμό, στην κίνηση του ρομπότ κ.ο.κ.

Εικόνα 5.
Γράφημα από τις απαντήσεις αν παρατηρήσατε συμμετοχή των μαθητών στην ενεργό μαθησιακή διαδικασία



Εικόνα 6.
Γράφημα από τις απαντήσεις στην ερώτηση αν Εμπλέκονταν και οι «αδύναμοι» μαθητές στο πλαίσιο της καθοδηγούμενης μάθησης μέσω του Bee-Bot .



Το 8ο ερευνητικό ερώτημα προς τους εκπαιδευτικούς ήταν: **Πιστεύετε ότι μέσα από τις ομάδες μεικτής δυναμικότητας αναπτύχθηκε η αρμονική συνεργασία, η ανταλλαγή ιδεών και η αλληλοβοήθεια μεταξύ των μαθητών σας.** Όλοι οι εκπαιδευτικοί απάντησαν 100% «Ναι» στο ότι οι ομάδες μεικτής δυναμικότητας βοήθησαν στην αρμονική συνεργασία, ανταλλαγή ιδεών και αλληλοβοήθεια.

Σε Ποιους Τομείς Παρεμβαίνει η Διαφοροποιημένη Διδασκαλία με το Bee-Bot :

Στο 9ο ερευνητικό ερώτημα: Οι συμμετέχοντες κλήθηκαν να επιλέξουν έως τρεις τομείς (από μια λίστα) όπου θεωρούν ότι η χρήση του Bee-Bot ασκεί τη μεγαλύτερη επιρροή. Οι κατηγορίες ήταν:

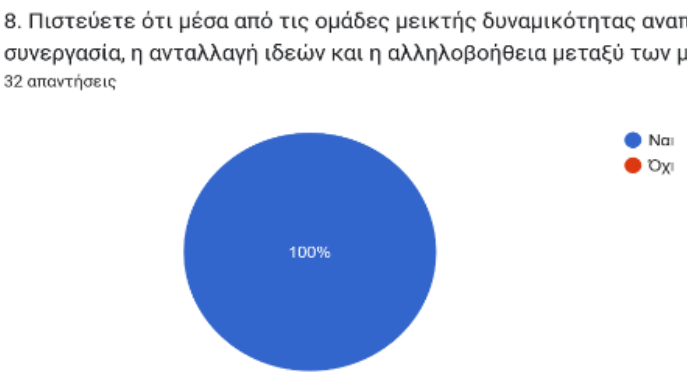
Νοητικές ικανότητες (π.χ. κριτική σκέψη, αλγοριθμική λογική): Απάντησαν 25 εκπαιδευτικοί δηλαδή το 26% .Σχεδόν όλοι συμφώνησαν ότι το Bee-Bot ενισχύει την **ανάπτυξη νοητικών δεξιοτήτων**.

Ελλειμματική προσοχή: Οι εκπαιδευτικοί που το επέλεξαν είναι 8 και ποσοστό 8%, καθώς θεώρησαν ότι η δια δραστικότητα του ρομπότ **βοηθά στην προσήλωση** και περιορίζει την απόσπαση προσοχής.

Προφορικός λόγος: Οι εκπαιδευτικοί που το επέλεξαν είναι 20 δηλαδή το 21%, ειδικά σε όσους χρησιμοποίησαν δραστηριότητες αφήγησης (φανταστικές ιστορίες κ.λπ.).

Γραπτός λόγος - Ορθογραφία - Μηχανισμός ανάγνωσης: Οι εκπαιδευτικοί που το επέλεξαν είναι 18 δηλαδή το 18%. Για την ορθογραφία είναι 12 εκπαιδευτικοί δηλαδή το 12%. Ο μηχανισμός ανάγνωσης είναι 15 εκπαιδευτικοί δηλαδή το 15%. Αυτές οι δεξιότητες επιλέχθηκαν λιγότερο σε σύγκριση με τις «νοητικές ικανότητες» ή την «προφορική έκφραση», αλλά ορισμένοι εκπαιδευτικοί σημείωσαν ότι, στο πλαίσιο διαθεματικών δραστηριοτήτων, μπορεί να υποστηριχθεί και ο γραπτός λόγος.

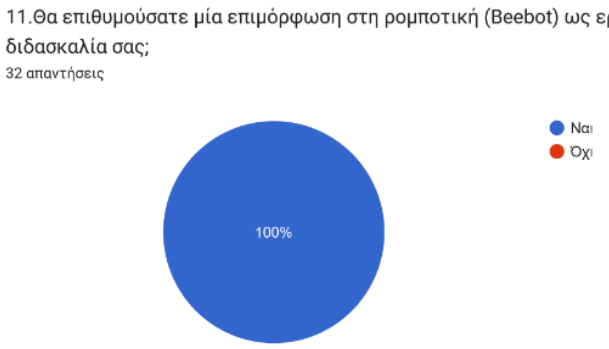
Εικόνα 7.
Γράφημα από τις απαντήσεις στην ερώτηση αν Πιστεύετε ότι μέσα από τις ομάδες μεικτής δυναμικότητας αναπτύχθηκε η αρμονική συνεργασία, η ανταλλαγή ιδεών και η αλληλοβοήθεια μεταξύ των μαθητών σας.



Εικόνα 8.
Γράφημα από τις απαντήσεις στην ερώτηση αν η διαφοροποιημένη διδασκαλία με το ρομπότ Bee-Bot κατά τη γνώμη σας σε ποιους τομείς παρεμβαίνει; (επιλέξτε 3)



Εικόνα 9.
Γράφημα από τις απαντήσεις στην ερώτηση αν θα επιθυμούσατε μία επιμόρφωση στη ρομποτική (Bee-Bot) ως εργαλείο μάθησης στην διδασκαλία σας.



Στο 10ο ερευνητικό ερώτημα: **Βάση των προ αξιολογικών και μεταξιολογικών συζητήσεων που έγιναν με τους μαθητές η διδασκαλία με τα Bee-Bot επιτυγχάνει τους μακροπρόθεσμους στόχους.**

Οι εκπαιδευτικοί κλήθηκαν να απαντήσουν εάν, βάσει προ αξιολογικών και μεταξιολογικών συζητήσεων, η διδασκαλία με το ρομπότ Bee-Bot επιτυγχάνει μακροπρόθεσμους στόχους. Η πλειονότητα απάντησε «Ναι» 30 εκπαιδευτικοί 94% απάντησαν ναι και 2 όχι 6% , κρίνοντας ότι η βιωματική και συνεργατική φύση του εργαλείου αφήνει θετικό αποτύπωμα στους μαθητές και μπορεί να συμβάλει στη διαρκή τους εξέλιξη.

Στο 11ο ερευνητικό ερώτημα: **Θα επιθυμούσατε μία επιμόρφωση στη ρομποτική (Bee-Bot) ως εργαλείο μάθησης στην διδασκαλία σας.**

Επίσης, η συντριπτική πλειονότητα δηλώνει ότι **θα επιθυμούσε περαιτέρω επιμόρφωση** για την αξιοποίηση του Bee-Bot στη διδασκαλία 100%. Αυτό επιβεβαιώνει το γενικά θετικό κλίμα και την ανάγκη υποστήριξης, ώστε οι εκπαιδευτικοί να ενσωματώνουν μεθοδικά τη ρομποτική στην τάξη.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η ερευνητική αποτίμηση της δράσης με θέμα τον Κρόκο Κοζάνης και την παράλληλη χρήση του ρομπότ Bee-Bot στην πρωτοβάθμια εκπαίδευση ανέδειξε σημαντικά παιδαγωγικά οφέλη, τόσο σε επίπεδο περιεχομένου όσο και σε επίπεδο μεθοδολογίας. Η πλειονότητα των εκπαιδευτικών αναγνώρισε τη θεματική του κρόκου ως πλήρως συνδεδεμένη με την πραγματική ζωή, επιβεβαιώνοντας την αξία της τοπικής ταυτότητας ως εργαλείο διδασκαλίας. Η εστίαση σε ένα προϊόν που φέρει πολιτιστικό, ιστορικό και οικονομικό φορτίο ενίσχυσε τη βιωματικότητα της μάθησης και ενδυνάμωσε τη σχέση των μαθητών με τον τόπο τους.

Η εισαγωγή του Bee-Bot ως εργαλείου εκπαιδευτικής ρομποτικής αποτιμήθηκε θετικά από το σύνολο σχεδόν των συμμετεχόντων, με ιδιαίτερη έμφαση στην ενίσχυση της συμμετοχής όλων των μαθητών, περιλαμβανομένων και όσων αντιμετωπίζουν μαθησιακές δυσκολίες. Οι εκπαιδευτικοί διαπίστωσαν ότι η χρήση του ρομπότ προήγαγε την ομαδοσυνεργατική μάθηση, την ανταλλαγή ιδεών, την αλληλοβοήθεια και την ανάπτυξη κοινωνικο-συναισθηματικών δεξιοτήτων. Το Bee-Bot θεωρήθηκε ως εργαλείο που διευκολύνει τη συνεργασία, καλλιεργεί την κριτική και δημιουργική σκέψη και εμπλέκει ενεργά όλους τους μαθητές, ενώ μέσω της διαφοροποιημένης διδασκαλίας και της ομαδικής εργασίας παρατηρήθηκε ενίσχυση του ομαδικού πνεύματος και ανάπτυξη κοινωνικών και συναισθηματικών δεξιοτήτων.

Αξιοσημείωτο είναι το γεγονός ότι το 100% των εκπαιδευτικών δήλωσε πως θα επιθυμούσε επιμόρφωση στη ρομποτική, στοιχείο που αποκαλύπτει τη θετική τους στάση απέναντι στην εκπαιδευτική καινοτομία και την ανάγκη για ενίσχυση των επαγγελματικών τους δεξιοτήτων. Το ενδιαφέρον αυτό αποτελεί ισχυρή ένδειξη για την αναγκαιότητα σχεδιασμού στοχευμένων προγραμμάτων επιμόρφωσης και ενσωμάτωσης της ρομποτικής σε περισσότερα διδακτικά αντικείμενα.

Συνοψίζοντας, η μελέτη επιβεβαιώνει τη δυναμική της σύνδεσης τοπικών θεματικών με καινοτόμες παιδαγωγικές προσεγγίσεις. Η αξιοποίηση της πολιτισμικής ταυτότητας σε συνδυασμό με τη ρομποτική μπορεί να προσφέρει πλούσιες μαθησιακές εμπειρίες και να συμβάλει ουσιαστικά στην ποιοτική αναβάθμιση της διδασκαλίας στην πρωτοβάθμια εκπαίδευση.

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ΕΞΕΡΕΥΝΗΣΗ ΤΗΣ ΔΥΝΑΜΙΚΗΣ ΤΩΝ ΔΙΚΤΥΩΝ ΦΙΛΙΑΣ ΑΞΙΟΠΟΙΩΝΤΑΣ ΑΛΓΟΡΙΘΜΟΥΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ: ΜΙΑ ΜΕΛΕΤΗ ΣΕ ΕΙΔΙΚΟ ΣΧΟΛΕΙΟ

Τσώνη Ροζίτα
Εκπαιδευτικός, Καθηγήτρια Σύμβουλος, Ελληνικό Ανοικτό Πανεπιστήμιο
Ηγουμενίτσα, Ελλάδα
tsoni.rodanthi@ac.eap.gr

Τσιρώνης Θωμάς
Εκπαιδευτικός, Διευθυντής ΕΝΕΕΓΥΛ Ηγουμενίτσας
Ηγουμενίτσα, Ελλάδα
thomatsironis@gmail.com

Βερύκιος Σ. Βασίλειος
Καθηγητής, Ελληνικό Ανοικτό Πανεπιστήμιο
Πάτρα, Ελλάδα
verykios@eap.gr

ΠΕΡΙΛΗΨΗ

Η φιλία αποτελεί βασική συνθήκη για την υγιή ανάπτυξη των ατομικών και κοινωνικών σχέσεων, ιδίως κατά την ευαίσθητη περίοδο της εφηβείας. Ενώ κατά βάση η φιλία θεωρείται αμοιβαία και αμφίδρομη, συχνά στο πλαίσιο της ειδικής αγωγής, η διάκριση μεταξύ φιλίας, συνοδείας και φροντίδας συχνά συγχέεται. Αυτή η ασάφεια μπορεί να οδηγήσει σε φιλίες που στερούνται αμοιβαίας δυναμικής η οποία παρατηρείται στα τυπικά σχολεία, δημιουργώντας αισθήματα απογοήτευσης, απομόνωσης και κοινωνικής περιθωριοποίησης.

Η παρούσα εργασία επιχειρεί να αναδείξει τη δυναμική των σχέσεων φιλίας σε ένα μικρό σχολείο ειδικής αγωγής δευτεροβάθμιας εκπαίδευσης, χρησιμοποιώντας την ανάλυση κατευθυνόμενων δικτύων. Μέσω της ανάλυσης κοινωνικών δικτύων, υπολογίζονται μετρικές, μερικές εκ των οποίων βασίζονται σε αλγόριθμους τεχνητής νοημοσύνης, ώστε να αναδειχθούν σημαντικοί ρόλοι και δομικές ιδιαιτερότητες του δικτύου φιλίας των μαθητών. Αυτές οι μετρικές, αποκαλύπτουν κρυφά μοτίβα και δυναμικές που δεν είναι άμεσα ορατές, προσφέροντας πολύτιμες πληροφορίες για την κατανόηση των κοινωνικών αλληλεπιδράσεων τους.

Στόχος της έρευνας είναι να παράσχει στους εκπαιδευτικούς και τους ειδικούς επαγγελματίες ένα εργαλείο για την ενίσχυση των κοινωνικών σχέσεων, την καταπολέμηση της απομόνωσης και την πρόληψη του εκφοβισμού. Στην ανάλυση χρησιμοποιήθηκαν ανωνυμοποιημένα δεδομένα από 22 ενεργούς μαθητές, με κάθε μαθητή να συνδέεται με 3 έως 5 φίλους.

Λέξεις – κλειδιά: Ειδική Αγωγή, Φιλία, Κοινωνικά Δίκτυα, Ανάλυση Συνδέσεων

ΕΙΣΑΓΩΓΗ

Η φιλία στην εφηβεία αποτελεί έναν από τους σημαντικότερους παράγοντες κοινωνικοποίησης, επηρεάζοντας τόσο την ψυχολογική ανάπτυξη όσο και την εκπαιδευτική πορεία των μαθητών (Bagwell & Schmidt, 2011). Οι σχέσεις φιλίας συνεισφέρουν στην αίσθηση του ανήκειν, στη διαμόρφωση ταυτότητας, στις δεξιότητες συνεργασίας και στη συναισθηματική ανάπτυξη. Στα γενικά σχολεία, η αμοιβαιότητα στη φιλία συνήθως θεωρείται δεδομένη, όμως σε περιβάλλοντα ειδικής αγωγής η εικόνα είναι συχνά πιο περίπλοκη. Οι μαθητές με σοβαρές μαθησιακές δυσκολίες ή/και αναπηρία συχνά αντιμετωπίζουν δυσκολία στην επικοινωνία ή στη δημιουργία δεσμών, γεγονός που καθιστά τη χαρτογράφηση των κοινωνικών τους σχέσεων κρίσιμη για τη υποστήριξή τους (Rose & Asher, 2017).

Στην εποχή της ψηφιακής εκπαίδευσης και της τεχνητής νοημοσύνης, η ανάλυση κοινωνικών δικτύων (Social Network Analysis – SNA) μπορεί να αποτελέσει πολύτιμο εργαλείο για την κατανόηση και την ενίσχυση της κοινωνικής δυναμικής στα σχολεία (Wasserman & Faust, 1994). Οι αλγόριθμοι Τεχνητής Νοημοσύνης (ΤΝ) δίνουν τη δυνατότητα να επεξεργαζόμαστε πολύπλοκες δομές δεδομένων και να εξάγουμε πρακτικά συμπεράσματα για την καθημερινή εκπαιδευτική πράξη (Russell & Norvig, 2021). Επιπλέον, η διερεύνησης της φιλίας ως ένα δίκτυο σχέσεων μπορεί να φωτίζει πτυχές οι οποίες δεν είναι δυνατό να γίνουν εύκολα αντιληπτές χρησιμοποιώντας απλές μετρικές της ποσοτικής κοινωνικής έρευνας.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η ανάλυση κοινωνικών δικτύων προσφέρει ένα συστηματικό πλαίσιο για τη μελέτη των κοινωνικών σχέσεων ως δομών από κόμβους (μαθητές) και ακμές (φιλίες) (Wasserman & Faust, 1994; Borgatti, Everett, & Johnson, 2013). Στο σχολικό πλαίσιο, η ανάλυση κοινωνικών δικτύων συμβάλλει στην ανάδειξη προτύπων ενδεικτικών της ένταξη, επιρροής αλλά και μεσολάβησης που δεν είναι άμεσα ορατά από τις τυπικές παρατηρήσεις (Gest, 2010). Σε περιβάλλοντα ειδικών συνθηκών και κοινωνικές ομάδες μεγαλύτερου πλήθους όπως για παράδειγμα ένα σχολείο πολλών μαθητών ή μια δομή ειδικής αγωγής, η χαρτογράφηση των αυτού του είδους των σχέσεων μπορεί να αποκαλύψει «κρυφούς» ρόλους και να κατευθύνει στοχευμένες παρεμβάσεις ένταξης (Carter et al., 2015; Koster, Pijl, Nakken, & Van Houten, 2010). Αντίστοιχες έρευνες που αξιοποιούν την ανάλυση κοινωνικών δικτύων έχουν πραγματοποιηθεί σε όλες τις βαθμίδες εκπαίδευσης (Cairns et al., 1995; Currarini et al., 2010; Garrote et al., 2023; Kasari et al., 2011; Kindermann, 1993; Moody, 2001; Pijl et al., 2011; Schwab et al., 2022; Tsoni & Verykios, 2019; Tsoni et al., 2019, 2021, 2022, 2024) με αποτελέσματα πολύ βοηθητικά όσον αφορά τις δυνατότητες παρέμβασης και βελτίωσης των κοινωνικών σχέσεων των μαθητών. Άλλωστε, ο κοινωνικός χαρακτήρας της μάθησης έχει τονιστεί από σημαντικούς διανοητές της εκπαίδευσης ήδη από τις αρχές του προηγούμενου αιώνα (Dewey, 1916; Durkheim, 1956; Mead, 1934; Vygotsky, 1978, 1986).

Οι δομικές ιδιότητες των δικτύων παρουσιάζουν χαρακτηριστικά εύκολα ερμηνεύσιμα στην κοινωνική έρευνα. Κλασικές ιδιότητες όπως το φαινόμενο του μικρού κόσμου (small-world) ή η τοπική συσσώρευση κόμβων (clustering) επηρεάζουν τη διάχυση πληροφοριών και προτύπων συμπεριφοράς στην τάξη (Watts & Strogatz, 1998). Η ομοφιλία εκφράζει την τάση των ανθρώπων να συνδέονται με έχοντες όμοια χαρακτηριστικά με αυτούς. Βιβλιογραφικά αποδεικνύεται ότι το χαρακτηριστικό της ομοφιλίας επηρεάζει ισχυρά τη διαμόρφωση των δικτυών φιλίας (McPherson, Smith-Lovin, & Cook, 2001) και σχετίζεται με την αποδοχή μαθητών με μαθησιακές δυσκολίες (Koster et al., 2010). Η τριαδική σύγκλειση και η μεταβατικότητα (triadic closure/transitivity) αφορούν χαρακτηριστικά δικτύων ενδεικτικά της σταθερότητας των ομάδων (Holland & Leinhardt, 1971), ενώ η κοινοτική δομή (Community structure) αποτυπώνεται με πολυπλοκότερες μετρικές όπως το modularity το οποίο δείχνει την τάση ενός δικτύου να διαχωρίζεται σε συνεκτικές υποομάδες (Newman & Girvan, 2004; Blondel, Guillaume, Lambiotte, & Lefebvre, 2008).

Οι πιο χαρακτηριστικές μετρικές ως προς τους ρόλους που διαδραματίζουν οι κόμβοι ενός δικτύου (στην προκειμένη περίπτωση οι μαθητές) είναι οι μετρικές κεντρικότητας. Προσφέρουν διαφορετικές οπτικές για το πόσο πρωταγωνιστικός είναι ο ρόλος ενός μαθητή. Εν ολίγοις, ο βαθμός (Degree) αποτυπώνει δημοφιλία, η εγγύτητα (closeness) την προσβασιμότητα, η ενδιάμεση κεντρικότητα (betweenness) τη μεσολάβηση (Freeman, 1977, 1978; Borgatti, 2005). Η ιδιοδιανυσματική κεντρικότητα και το PageRank καταγράφουν την επιρροή ενός κόμβου με βάση την επιρροή των γειτόνων (Bonacich, 1987; Brin & Page, 1998), ενώ ο HITS διαχωρίζει ρόλους «hubs» και «authorities» (Kleinberg, 1999). Αναλυτικότερα, ο βαθμός ενός κόμβου σε ένα δίκτυο αναφέρεται στον αριθμό των συνδέσεων (ή ακμών) που έχει αυτός ο κόμβος με άλλους κόμβους. Σε ένα κατευθυνόμενο δίκτυο ο εισερχόμενος βαθμός (in-degree) είναι ίσος με τον αριθμό των ακμών που κατευθύνονται προς τον κόμβο, ενώ ο εξερχόμενος βαθμός (out-degree) είναι ο αριθμός των ακμών που ξεκινούν από τον κόμβο προς άλλους κόμβους. Η κεντρικότητα εγγύτητας δείχνει πόσο γρήγορα ένας κόμβος μπορεί να φτάσει σε όλους τους άλλους κόμβους μέσω των συνδέσεων του. Ουσιαστικά, σε ένα δίκτυο γνωριμιών, αποτυπώνει ποιοι είναι οι πιο "προσβάσιμοι" άνθρωποι. Σε ένα δίκτυο φιλίας ένα άτομο με υψηλή κεντρικότητα εγγύτητας μπορεί να επικοινωνήσει πιο γρήγορα με όλους τους άλλους, ακόμα κι αν δεν έχει μεγάλο αριθμό φίλων. Η ενδιάμεση κεντρικότητα δείχνει πόσο συχνά ένας κόμβος βρίσκεται στις συντομότερες διαδρομές μεταξύ άλλων

κόμβων σε ένα δίκτυο. Αντικατοπτρίζει τον ρόλο του κόμβου ως "διαμεσολαβητή" στη ροή πληροφοριών. Ένας κόμβος με υψηλή ενδιάμεση κεντρικότητα μπορεί να είναι ένας συνδετικός κρίκος μεταξύ διαφορετικών ομάδων ανθρώπων. Η ιδιοδιανυσματική κεντρικότητα αποτελεί ένα πιο πολύπλοκο και εκλεπτυσμένο μέτρο δικτύου. Αποδίδει την σημασία ενός κόμβου σε ένα δίκτυο, λαμβάνοντας υπόψη όχι μόνο τον αριθμό των συνδέσεών του αλλά και τη σημαντικότητα των γειτόνων του. Δύο κόμβοι με τον ίδιο αριθμό συνδέσεων μπορεί να έχουν πολύ διαφορετική ιδιοδιανυσματική κεντρικότητα, αν οι γείτονές τους έχουν διαφορετική επιρροή στο δίκτυο. Στο δίκτυο φιλίας, τα άτομα με υψηλή ιδιοδιανυσματική κεντρικότητα μπορεί να είναι ηγέτες ή άτομα επιρροής, δηλαδή άτομα που μπορούν να συνδέσουν διαφορετικές κοινωνικές ομάδες και να επηρεάσουν τις αλληλεπιδράσεις και τη διασπορά πληροφοριών ή απόψεων. Η εκκεντρότητα από την άλλη μεριά, δείχνει την απόσταση μεταξύ ενός κόμβου και του πιο απομακρυσμένου από αυτόν, κόμβου στο δίκτυο. Ένα άτομο με υψηλή εκκεντρότητα μπορεί να έχει λιγότερους φίλους ή να μην είναι τόσο συνδεδεμένο, γεγονός που μπορεί να το καθιστά πιο ευάλωτο σε κοινωνική απομόνωση. Αυτά τα άτομα μπορεί να χρειάζονται περισσότερη υποστήριξη και να είναι πιο ευαίσθητα σε κοινωνικές αλλαγές.

Πέραν των βασικών μετρικών στα δίκτυα χρησιμοποιούνται αλγόριθμοι με μεγαλύτερη πολυπλοκότητα που έχουν την δυνατότητα να ανιχνεύουν πιο πολύπλοκες σχέσεις μεταξύ τω κόμβων ενός δικτύου. Ο αλγόριθμος PageRank που αρχικά δημιουργήθηκε για την κατάταξη των ιστοσελίδων βάσει σημαντικότητας μπορεί να χρησιμοποιηθεί και η σημασία του να επεκταθεί και σε άλλων μορφών δίκτυα ΄πως είναι τα δίκτυα φιλίας. Η τιμή του εξαρτάται από τον αριθμό των άλλων κόμβων που τον συνδέουν και από το PageRank αυτών των κόμβων. Δηλαδή, ένας κόμβος που συνδέεται με άλλους σημαντικούς κόμβους (που έχουν ήδη υψηλό PageRank) θεωρείται και αυτός σημαντικός. Το PageRank υπολογίζεται επαναληπτικά μέσω αναδρομικών σχέσεων μέχρι να επιτευχθεί ένα σταθερό αποτέλεσμα. Άτομα με υψηλό PageRank είναι κεντρικά, επιδραστικά και σημαντικά στο κοινωνικό δίκτυο, με μεγαλύτερη ικανότητα επιρροής και διασύνδεσης με άλλες κοινωνικές ομάδες. Το PageRank ενισχύει την κατανόηση των κοινωνικών ιεραρχιών και της κοινωνικής κινητικότητας σε ένα δίκτυο φιλίας. Ένας αντίστοιχης σημασίας αλγόριθμός είναι ο αλγόριθμος HITS (Hyperlink-Induced Topic Search). Σε αυτή τη μέθοδο ανάλυσης δικτύων αποδίδονται δύο χαρακτηριστικά: το Hub που αποτυπώνει πόσο σημαντικούς κόμβους δείχνει ένας κόμβος και το Authority που δείχνει πόσο αξιόπιστος ή σημαντικός είναι ένας κόμβος. Οι κόμβοι με υψηλό hub σε ένα δίκτυο φιλίας είναι συνήθως οι μεσολαβητές, αυτοί που γνωρίζουν πολλούς ανθρώπους και τους συνδέουν μεταξύ τους. Οι κόμβοι με υψηλό Authority είναι τα άτομα που θεωρούνται πιο σεβαστά και έχουν τη δύναμη να επηρεάζουν τη γνώμη ή τις αποφάσεις άλλων ατόμων στο δίκτυο, επειδή είναι συνδεδεμένα με σημαντικά hubs. Αυτά τα άτομα μπορούν να είναι εκείνα που προάγουν νέες ιδέες ή μοιράζονται πληροφορίες σε άλλους κόμβους.

Τέλος, η αμοιβαιότητα σε ένα δίκτυο υπολογίζεται συνήθως ως το ποσοστό των αμφίδρομων συνδέσεων ενός κόμβου συγκριτικά με τις συνολικές συνδέσεις στο δίκτυο. Στην περίπτωση ενός δικτύου φιλίας, η αμοιβαιότητα αναφέρεται στο ποσοστό των σχέσεων που είναι αμφίδρομες. Η αμοιβαιότητα στις κατευθυνόμενες σχέσεις συνδέεται με σταθερότερες φιλίες και πιο ικανοποιητικές σχέσεις και των δύο μερών (Garlaschelli & Loffredo, 2004). Η ένταση των δεσμών, δηλαδή κατά πόσον είναι ισχυροί ή ασθενείς, επηρεάζει την πρόσβαση σε πόρους και ευκαιρίες (Granovetter, 1973). Σχολικά δίκτυα με πλούσιες εγκάρσιες συνδέσεις δημιουργούν κοινωνικό κεφάλαιο που ενισχύει τη μάθηση και την ένταξη (Coleman, 1988; Putnam, 2000).

Οι ισορροπημένες φιλικές σχέσεις στην εφηβεία συνδέονται με ευημερία, βελτιωμένη ακαδημαϊκή επίδοση και ανάπτυξη δεξιοτήτων αυτορρύθμισης (Bagwell & Schmidt, 2011; Wentzel, 2015). Σε περιβάλλοντα ειδικής αγωγής, οι μαθητές με αναπηρίες παρουσιάζουν συχνά μειωμένα δίκτυα φίλων και αυξημένο κίνδυνο απομόνωσης (Locke, Ishijima, Kasari, & London, 2016, Carter et al., 2015). Παρεμβάσεις που βασίζονται στην αξιοποίηση αναλύσεων κοινωνικών δικτύων έχουν συμβάλει στην βελτίωση στη συμμετοχή και την αποδοχή από συνομηλίκους (Carter et al., 2015). Επιπλέον, η ενσωμάτωση αλγορίθμων τεχνητής νοημοσύνης στην ανάλυση κοινωνικών δικτύων διευκολύνει την αυτοματοποιημένη εξαγωγή μετρικών, την ανίχνευση προτύπων και την παραγωγή προγνωστικών δεικτών για στενευμένες παρεμβάσεις (Russell & Norvig, 2021). Στο πεδίο της εξόρυξης εκπαιδευτικών δεδομένων, οι αλγόριθμοι χρησιμοποιούνται για τον εντοπισμό μαθησιακών αλλά κοινωνικών κινδύνων, τη μοντελοποίηση αλληλεπιδράσεων και την υποστήριξη αποφάσεων (Baker & Inventado, 2014; Romero & Ventura, 2020). Η ενσωμάτωση μετρικών όπως PageRank και HITS σε σχολικές μελέτες επιτρέπει την ανάδειξη χαρακτηριστικών ρόλων, όπως για παράδειγμα ηγετών ή διαμεσολαβητών, με μεγαλύτερη ακρίβεια.

Ωστόσο, η χαρτογράφηση κοινωνικών σχέσεων μαθητών μπορεί να εγείρει ζητήματα ιδιωτικότητας και δεοντολογίας. Η αρχή της «συμφραζόμενης ακεραιότητας» (contextual integrity) υποδεικνύει ότι η χρήση δεδομένων πρέπει να ευθυγραμμίζεται με τις προσδοκίες του κοινωνικού πλαισίου (Nissenbaum, 2010). Η ανωνυμοποίηση, η ελαχιστοποίηση δεδομένων και η συμμετοχική συναίνεση είναι κρίσιμες πρακτικές στην εκπαιδευτική έρευνα. Συνολικά, το θεωρητικό πλαίσιο δικαιολογεί την επιλογή πολλαπλών μετρικών ανάλυσης κοινωνικών δικτύων και αλγοριθμικών εργαλείων για την ανάδειξη ρόλων, την κατανόηση της αμοιβαιότητας και την υποστήριξη παρεμβάσεων ένταξης στο ειδικό σχολείο.

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα έρευνα πραγματοποιήθηκε σε ένα Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο–Λύκειο με 22 μαθητές ηλικίας 13 έως 22 ετών κατά τη διάρκεια του σχολικού έτους 2024-2025. Οι μαθητές κλήθηκαν να αναφέρουν 3–5 φίλους από το σχολείο, ιεραρχώντας τις επιλογές τους. Σε αυτές τις επιλογές αποδόθηκε βαρύτητα (5 = καλύτερος φίλος, 1 = λιγότερο σημαντικός φίλος). Στη συνέχεια δημιουργήθηκε ένας κατευθυνόμενος γράφος όπου κάθε μαθητής αντιπροσωπεύεται από έναν κόμβο και κάθε ακμή υπονοεί φιλία μεταξύ των κόμβων που ενώνει. Η κατεύθυνση της ακμής υποδηλώνει και την κατευθυντηκότητα της σχέσης. Δηλαδή, όταν ο μαθητής Α δηλώνει ως φίλο του τον μαθητή Β τότε η ακμής κατευθύνεται από το Α στο Β. Αυτό σημαίνει ότι ο εισερχόμενος βαθμός ενός κόμβου δείχνει τον αριθμό των μαθητών που δήλωσαν τον συγκεκριμένο μαθητής ως φίλο, ενώ ο εισερχόμενος βαθμός δείχνει τον αριθμό των φίλων που δηλώθηκαν από τον μαθητή. Δεδομένου ότι οι μαθητές είχαν την οδηγία να δηλώσουν ως 5 φίλους, ο ανώτατος εξερχόμενος βαθμός ήταν 5.

Η διαδικασία της ανάλυσης περιλάμβανε τον υπολογισμό των βασικών μετρικών και την χρήση των αλγορίθμων που περιεγράφηκαν στην προηγούμενη ενότητα. Επιπλέον έγιναν πολλαπλές οπτικοποιήσεις του δικτύου, λαμβάνοντας υπόψιν τα αποτελέσματα διαφορετικών μετρικών ώστε να αποτυπωθεί και οπτικά ο διαφορετικός ρόλος του κάθε μαθητή στην σχολική κοινότητα.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Αρχικά υπολογίστηκαν δείκτες που αφορούν το δίκτυο συνολικά (Πίνακας 1). Ο μέσος βαθμός δείχνει ότι οι μαθητές δήλωσαν κατά μέσο όρο 4,13 φίλους. Η διάμετρος του δικτύου ισούται με 6 που είναι ένας αρκετά μεγάλος αριθμός για ένα τόσο μικρό δίκτυο. Ένα λάβουμε υπόψη την θεωρία του “six degrees of separation” που σημαίνει ότι δύο οποιοιδήποτε άνθρωποι στο δίκτυο συνδέονται μέσω το πολύ 6 ενδιάμεσων γνωριμιών, καταλήγουμε στο συμπέρασμα ότι οι δύο πιο απομακρυσμένοι μαθητές δεν έχουν αλληλοεπιδράσει καθόλου. Στον αντίποδα, η πυκνότητα του είναι 0.92, αυτό σημαίνει ότι το δίκτυο έχει 92% των πιθανών ακμών που θα μπορούσε να έχει, δηλαδή είναι σχεδόν πλήρες (πλησιάζει πολύ σε ένα complete graph, όπου κάθε κόμβος συνδέεται με όλους τους άλλους). Αυτό δείχνει ότι οι κόμβοι είναι πολύ έντονα συνδεδεμένοι μεταξύ τους, με ελάχιστους να μην έχουν καμία απευθείας σύνδεση. Τα δύο αυτά, εκ πρώτης όψεως αντικρουόμενα αποτελέσματα δείχνουν ότι η μεγάλη διάμετρος οφείλεται σε ιδιαίτερες περιπτώσεις μαθητών οι οποίοι δεν επιδιώκουν φιλικούς δεσμούς ενώ γενικά η σχολική κοινότητα είναι αρκετά δεμένη, με ισχυρούς δεσμούς και πολλαπλές συνδέσεις. Η χαμηλή κοινοτική δομή δείχνει χαμηλή τάση δημιουργίας υποομάδων. Το μέσο μήκος διαδρομής που είναι πολύ κοντά στο 2 σημαίνει ότι κάθε μαθητής χρειάζεται μόνο 2 ενδιάμεσους φίλους για να φτάσει σε οποιονδήποτε άλλο μαθητή.

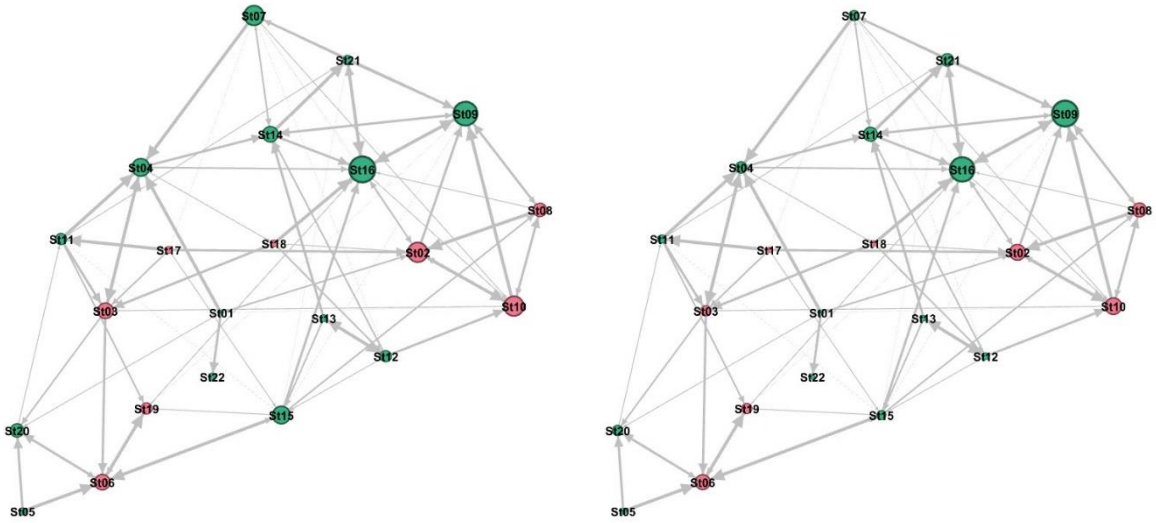
Πίνακας 1
Μετρικές Δικτύου

Μετρική	Τιμή
Μέσος βαθμός	4,13
Διάμετρος δικτύου	6,0
Πυκνότητα δικτύου	0,92
Κοινοτική δομή (modularity)	0,30
Μέσο μήκος διαδρομής	2,30
Συνολική αμοιβαιότητα	0,50

Η ανάλυση ανέδειξε ένα δίκτυο ιδιαίτερα συνεκτικό. Παρά το μικρό μέσο μήκος διαδρομής, η αμοιβαιότητα αποδείχθηκε χαμηλότερη από την αναμενόμενη, με τις μισές σχέσεις να μην είναι αμφίδρομες. Αυτό δείχνει ότι η κοινωνική αποδοχή και η φιλία δεν είναι πάντα ισόρροπες. Οι μετρικές PageRank και ιδιοδιανυσματικής κεντρικότητας εντόπισαν μαθητές με υψηλή επιρροή. Αυτοί οι μαθητές λειτουργούσαν ως άτυποι ηγέτες, με τη δύναμη να επηρεάζουν την κοινότητα Στην εικόνα 1 παρουσιάζονται δύο απεικονίσεις του δικτύου των μαθητών. Το χρώμα των κόμβων αντιπροσωπεύει το φύλο (με πράσινο απεικονίζονται τα αγόρια και με πορτοκαλί τα κορίτσια). Το μέγεθος των κόμβων

στον πρώτο γράφο είναι ανάλογο του συνολικού βαθμού κάθε κόμβου. Αυτό σημαίνει ότι όσο μεγαλύτερος είναι κάθε κόμβος, τόσο περισσότερους φίλους έχει ο μαθητής. Στον δεύτερο γράφο το μέγεθος των κόμβων αντιπροσωπεύει το PageRank κάθε κόμβου. Η διαφορά της πληροφορίας που δίνουν τα δύο διαγράμματα αναδεικνύεται σε κάποιες χαρακτηριστικές περιπτώσεις όπως είναι η περίπτωση του κόμβου που αντιστοιχεί στον μαθητή st15 που ενώ έχει αρκετούς φίλους επειδή οι φίλοι του δεν είναι μεγάλης «σημαντικότητας» για το δίκτυο (χαμηλό PageRank) η δική του «σημαντικότητα» είναι μικρή. Στον αντίποδα, ο μαθητής st21 έχει λιγότερους φίλους αλλά μεγάλης «σημαντικότητας» άρα ή «σημαντικότητα» του στο δίκτυο αυξάνεται.

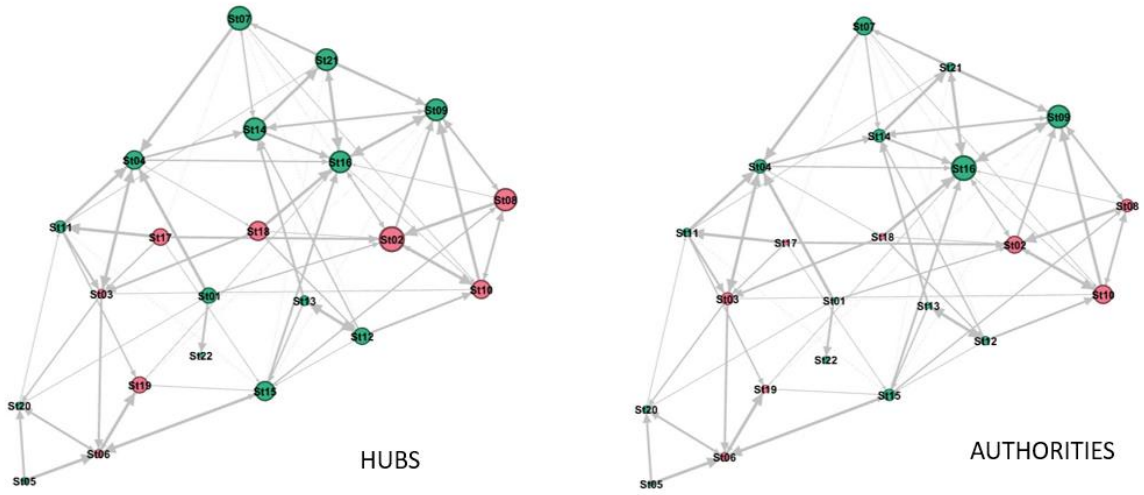
Εικόνα 1.
Το δίκτυο των μαθητών (Βαθμός vs PageRank)



Βαθμός PageRank

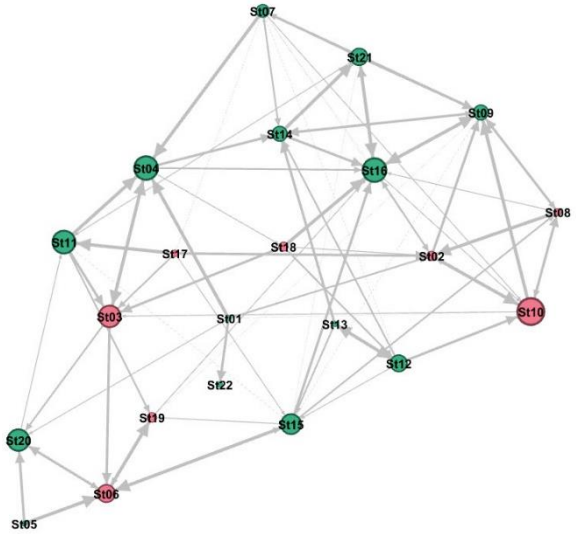
Στην επόμενη απεικόνιση (Εικόνα 2) έχει χρησιμοποιηθεί ο αλγόριθμος HITS ώστε να τροποποιηθεί το μέγεθος των κόμβων βάσει του δείκτη hub (αριστερά) και authority (δεξιά). Αυτό σημαίνει ότι κόμβοι μεγάλου μεγέθους στον αριστερό γράφο είναι μαθητές που δρουν ως συνδετικοί κρίκοι με «σημαντικούς» ή δημοφιλείς μαθητές. Αντίστοιχα, κόμβοι μεγάλου μεγέθους στον δεξί γράφο αντιπροσωπεύουν δημοφιλείς μαθητές που κατέχουν σημαντικό ρόλο στο δίκτυο.

Εικόνα 2.
Το δίκτυο των μαθητών (HITS)



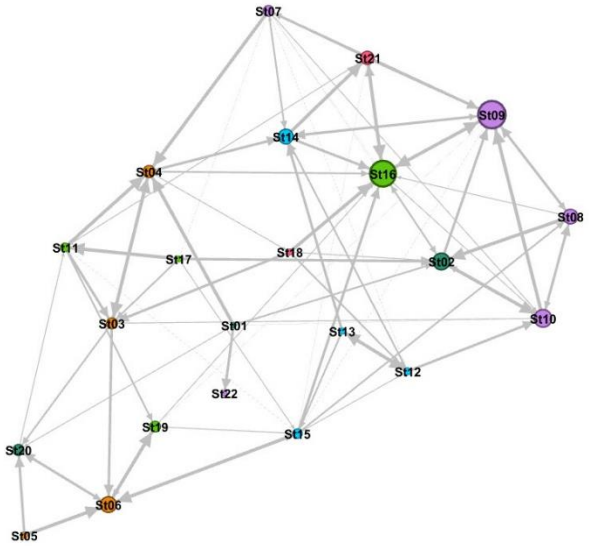
Όπως προαναφέρθηκε, εκτός από τους προφανείς πρωταγωνιστές του δικτύου φιλίας που είναι οι δημοφιλείς, κεντρικοί μαθητές και όσοι συνδέονται άμεσα με αυτούς, σημαντικός αν και όχι τόσο άμεσα ορατός είναι ο ρόλος των μαθητών που λειτουργούν συνδετικά στο δίκτυο. Πρόκειται για μαθητές με υψηλή ενδιάμεση κεντρικότητα στους οποίους οφείλεται κυρίως η συνεκτικότητα του δικτύου (Εικόνα 3). Επιπλέον, μαθητές με υψηλή ενδιάμεση κεντρικότητα έπαιζαν ρόλο συνδετικών κρίκων, διασφαλίζοντας τη συνοχή του δικτύου. Ενδιαφέρον παρουσιάζει το εύρημα ότι μαθητές που δεν θεωρούνταν «δημοφιλείς» βάσει βαθμού είχαν κομβική σημασία για την ένωση διαφορετικών υποομάδων.

Εικόνα 3.
Το δίκτυο των μαθητών (Betweenness Centrality)



Στην Εικόνα 4, κάθε κόμβος είναι χρωματισμένος σύμφωνα με το τμήμα στο οποίο ανήκει ο μαθητής που αναπαριστά. Η κατανομή των χρωμάτων εμφανίζεται διάσπαρτη στον γράφο, χωρίς σαφή συγκέντρωση ώστε να σχηματίζονται συγκεκριμένα υποσύνολα, στοιχείο που υποδηλώνει ότι οι δεσμοί φιλίας δεν εξαρτώνται σε σημαντικό βαθμό από το τμήμα.

Εικόνα 4.
Το δίκτυο των μαθητών ανά τμήμα



Σημαντική πληροφορία παρέχεται από τον υπολογισμό της αμοιβαιότητας στο δίκτυο. Πέραν της συνολικής αμοιβαιότητας που όπως αναφέρθηκε παραπάνω είναι αρκετά χαμηλή (0,5, υπολογίστηκε η αμοιβαιότητα για κάθε μαθητή ξεχωριστά. Η τιμή κυμαίνεται στο [0,1]: είναι 1 όταν όλα τα άτομα που ο μαθητής έχει δηλώσει ως φίλους τον

έχουν επίσης δηλώσει ως φίλο, και 0 όταν κανένα από τα άτομα που έχει δηλώσει ως φίλους δεν τον έχει δηλώσει ως φίλο. Χαμηλές τιμές αμοιβαιότητας παρατηρούνται συχνότερα σε μαθητές με αυξημένες υποστηρικτικές ανάγκες, όπου οι δεσμοί τείνουν να είναι ανομοιοβαρείς (σχέση τύπου φροντιστή–φροντιζόμενου).

Εικόνα 6.
Κατάταξη μαθητών ανά μετρική

Σταθμισμένος Βαθμός	Κεντρικοτητα Εγγυτητας	Ενδιάμεση Κεντρικότητα	Ιδιοδιανυσματική Κεντρικότητα	PageRank	Authority (Επιρροή)	Hub (Κόμβος Διασυνδεσης)	Αμοιβαιότητα
St16	St18	St10	St16	St09	St16	St02	St06
St09	St11	St16	St10	St16	St09	St07	St09
St04	St17	St04	St02	St10	St10	St14	St02
St02	St01	St11	St07	St02	St07	St08	St04
St06	St12	St03	St08	St06	St02	St09	St10
St10	St21	St20	St14	St08	St04	St21	St16
St03	St10	St15	St04	St14	St14	St16	St08
St14	St16	St06	St03	St21	St08	St15	St20
St20	St04	St21	St21	St04	St03	St18	St07
St08	St14	St12	St15	St20	St15	St04	St14
St15	St15	St14	St06	St03	St21	St10	St05
St07	St07	St09	St12	St19	St06	St17	St12
St19	St09	St07	St20	St07	St12	St12	St03
St12	St02	St19	St19	St15	St11	St19	St13
St11	St13	St02	St11	St11	St19	St01	St19
St21	St03	St18	St18	St12	St20	St11	St11
St13	St08	St08	St13	St05	St18	St13	St15
St22	St19	St17	St05	St18	St13	St03	St17
St18	St06	St01	St17	St13	St22	St06	St18
St17	St20	St13	St22	St17	St17	St20	St21
St05	St05	St05	St09	St22	St05	St05	St01
St01	St22	St22	St01	St01	St01	St22	St22

Η Εικόνα 6 παρουσιάζει την κατάταξη των μαθητών σε πολλαπλές μετρικές κεντρικότητας. Διαπιστώνεται μερική σύγκλιση στις ανώτερες θέσεις. Περιορισμένος αριθμός μαθητών εμφανίζεται σταθερά ψηλά στις πιο εξεζητημένες μετρικές (ιδιοδιανυσματική κεντρικότητα, PageRank, authority), υποδηλώνοντας ύπαρξη πυρήνα επιρροής. Αντίθετα, μαθητές με υψηλές τιμές hub ή εξερχόμενο βαθμό αλλά μέτριο authority φαίνεται να λειτουργούν ως εκκινητές δεσμών χωρίς αντίστοιχη αναγνώριση, ενώ αυξημένη ενδιάμεση κεντρικότητα με μέτριο βαθμό υποδεικνύει διαμεσολαβητικό ρόλο μεταξύ υποομάδων. Δεδομένης της υψηλής πυκνότητας του δικτύου (0,92) και του μικρού μέσου μήκους διαδρομής (2,3), οι τιμές της κεντρικότητας εγγύτητας εμφανίζονται συμπιεσμένες και συνεπώς εμφανίζουν μειωμένη διακριτική ικανότητα σε σχέση με τις προαναφερθείσες κεντρικότητες. Επιπλέον, η απουσία συστηματικής υπερεκπροσώπησης συγκεκριμένου τμήματος στις κορυφές των κατατάξεων συνάδει με χαμηλή ομοφιλία ως προς το χαρακτηριστικό «τμήμα».

ΣΥΖΗΤΗΣΗ-ΣΥΜΠΕΡΑΣΜΑΤΑ

Τα αποτελέσματα καταδεικνύουν ότι η αμοιβαιότητα στις φιλικές σχέσεις δεν είναι δεδομένη: 12 από τους 22 μαθητές έχουν περισσότερες μονόπλευρες φιλίες. Οι διαφορετικές μετρικές της ανάλυσης δικτύου μπορούν να αποτυπώσουν διαφορετικά χαρακτηριστικά της δομής των σχέσεων μεταξύ των μαθητών. Η ύπαρξη μαθητών με υψηλή ενδιάμεση κεντρικότητα υποδηλώνει ότι ακόμα και μαθητές χωρίς ιδιαίτερη δημοφιλία παίζουν κρίσιμο ρόλο στη διατήρηση της κοινωνικής συνοχής. Η αναγνώριση αυτών των μαθητών είναι απαραίτητη για την πρόληψη κοινωνικής απομόνωσης και τη στήριξη της ψυχοκοινωνικής τους ανάπτυξης. Στο συγκεκριμένο σχολείο το δίκτυο φιλίας είναι συνεκτικό, με μικρό μέσο μήκος διαδρομής όπως είναι αναμενόμενο για ένα μικρό σχολείο. Υπάρχουν μαθητές με ηγετικές τάσεις αλλά και μαθητές που δρουν ενωτικά, συνδέοντας μαθητές που θα κινδύνευαν με απομόνωση. Ορισμένοι μαθητές που δεν συγκαταλέγονται στους «δημοφιλείς» έχουν μεγάλη ενδιάμεση κεντρικότητα και είναι αυτοί που κρατάνε ενωμένη τη μαθητική κοινότητα.

Η ανάδειξη των ρόλων των μαθητών μπορεί να βοηθήσει τους εκπαιδευτικούς και το ειδικό προσωπικό να λάβουν δράση ώστε να ενισχύσουν τις κοινωνικές και τις φιλικές σχέσεις και να βελτιώσουν το κλίμα στο σχολείο. Η δημιουργία ενός κοινωνικού προφίλ για κάθε μαθητή μέσα στο σχολικό πλαίσιο αποτελεί ένα χρήσιμο εργαλείο για την σύνταξη κι εφαρμογή του εξατομικευμένου προγράμματος εκπαίδευσης, ειδικά όσον αφορά την ανάπτυξη δεξιοτήτων κοινωνικής συμπεριφοράς, κοινωνικής οργάνωσης κοκ. Η μελέτη αναδεικνύει επίσης το εκπαιδευτικό όφελος που μπορεί να αποφέρει η ανάλυσης κοινωνικών δικτύων. Οι εκπαιδευτικοί μπορούν να χρησιμοποιήσουν τις πληροφορίες που προσφέρουν τα δεδομένα για να παρέμβουν, ενισχύοντας την κοινωνική δικτύωση των πιο ευάλωτων μαθητών. Παράλληλα, οι μαθητές με ηγετικούς ρόλους μπορούν να κινητοποιηθούν για να ενισχύσουν την ομαδικότητα και την αποδοχή. Στη διεθνή βιβλιογραφία, παρόμοια ευρήματα έχουν καταγραφεί για τη σημασία των «κρυφών ηγετών» σε σχολικές τάξεις (Farmer et al., 2019).

Η καινοτομία της παρούσας μελέτης έγκειται στη χρήση τεχνικών Τεχνητής Νοημοσύνης για την ενίσχυση της ανάλυσης, καθιστώντας την πιο αποτελεσματική και αξιοποιήσιμη στην καθημερινή πράξη. Η ανάλυση κοινωνικών δικτύων σε συνδυασμό με αλγορίθμους τεχνητής νοημοσύνης αποτελεί ισχυρό εργαλείο για την κατανόηση των κοινωνικών σχέσεων στην εκπαίδευση. Η μελέτη σε ειδικό σχολείο ανέδειξε: α) την πολυπλοκότητα της φιλίας, β) την ύπαρξη μαθητών-γεφυρών, γ) τη σημασία της χρήσης ανάλυσης κοινωνικών δικτύων για την ενίσχυση της κοινωνικής συνοχής. Οι εκπαιδευτικοί μπορούν να αξιοποιήσουν τα αποτελέσματα για την ανάπτυξη εξατομικευμένων παρεμβάσεων, με στόχο την προώθηση της κοινωνικής ένταξης και την αποτροπή της απομόνωσης. Η μεθοδολογία αυτή μπορεί να επεκταθεί σε μεγαλύτερα δείγματα και διαφορετικά εκπαιδευτικά περιβάλλοντα, συνδυάζοντας ποσοτικά και ποιοτικά δεδομένα.

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ΔΙΕΡΕΥΝΗΣΗ ΓΝΩΣΕΩΝ ΜΑΘΗΤΩΝ ΔΗΜΟΤΙΚΩΝ ΣΧΟΛΕΙΩΝ ΓΙΑ ΤΗΝ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Φλάμπουρας Νιέτος Ηλίας
Διευθυντής 1ου Δημοτικού Ζακύνθου, Διδάκτορας
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
hflabouras@yahoo.gr

Καμπάση Αικατερίνη
Καθηγήτρια
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
kkabassi@ionio.gr

Ζούγρας Διονύσιος
Εκπαιδευτικός, Μεταπτυχιακός Φοιτητής
Ιόνιο Πανεπιστήμιο
Ζάκυνθος, Ελλάδα
zougras77@yahoo.gr

Φλάμπουρα Νιέτου Ήλια
Μεταπτυχιακή Φοιτήτρια
Πάντειο Πανεπιστήμιο
Αθήνα, Ελλάδα
ilianietou@gmail.com

ΠΕΡΙΛΗΨΗ

Σκοπός της εργασίας είναι να διερευνήσει τις γνώσεις των μαθητών Δημοτικού για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση. Για το σκοπό αυτό πραγματοποιήθηκε μια ποσοτική έρευνα σε δείγμα 321 μαθητών Δημοτικού που πηγαίνουν στις τάξεις Δ, Ε και ΣΤ στο Νομό Ζακύνθου. Η συλλογή των δεδομένων έγινε με διανομή έντυπου ερωτηματολογίου στους μαθητές. Τα αποτελέσματα της έρευνας έδειξαν πως η πλειοψηφία των μαθητών γνώριζαν την έννοια της τεχνητής νοημοσύνης (78.5%) και είχαν χρησιμοποιήσει οι ίδιοι ή οι γονείς τους τεχνητή νοημοσύνη (59.7%). Από την ανάλυση των δεδομένων προέκυψε πως οι μαθητές τείνουν να συμφωνήσουν με το ότι η Τεχνητή Νοημοσύνη μπορεί να δημιουργήσει εκπαιδευτικά παιχνίδια που κάνουν τη μάθηση πιο διασκεδαστική, μπορεί να χρησιμοποιηθεί για να δημιουργήσει εκπαιδευτικά παιχνίδια, μπορεί να βοηθήσει τους μαθητές να μάθουν νέες γλώσσες με πιο εύκολο τρόπο και μπορεί να βοηθήσει στην επίλυση μαθηματικών προβλημάτων με εξηγήσεις βήμα-βήμα. Γενικά, οι μαθητές έχουν ένα μέτριο προς υψηλό επίπεδο γνώσεων σε ζητήματα τεχνητής νοημοσύνης, μια ουδέτερη στάση απέναντι στην τεχνητή νοημοσύνη και σε μέτριο βαθμό αναγνωρίζουν τα οφέλη της τεχνητής νοημοσύνης σε διάφορους τομείς της καθημερινότητας. Τέλος, τα ευρήματα έδειξαν πως η αύξηση των γνώσεων των μαθητών και η διαμόρφωση μιας θετικότερης αντίληψης για την τεχνητή νοημοσύνη επηρεάζει θετικά τη στάση των μαθητών για τη χρήση τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: Τεχνητή νοημοσύνη, εκπαίδευση, γνώσεις μαθητών, πρωτοβάθμια εκπαίδευση

ΕΙΣΑΓΩΓΗ

Η τεχνολογία έχει αλλάξει εντελώς το εκπαιδευτικό τοπίο, παρέχοντες δυνατότητες για νέες εκπαιδευτικές προσεγγίσεις (Zhang & Aslan, 2021). Ωστόσο, η απλή χρήσης της τεχνολογίας δεν εγγυάται βελτιωμένη εκπαιδευτική ποιότητα ή καλύτερα ακαδημαϊκά αποτελέσματα. Είναι σημαντικό να καθοριστεί πώς τα ψηφιακά εργαλεία μπορούν να υποστηρίξουν αποτελεσματικά τους μαθητές κατά την εκπαιδευτική διαδικασία (Haldorai et al., 2020). Ως εκ τούτου, κάθε τύπος τεχνολογίας που χρησιμοποιείται στον τομέα της εκπαίδευσης πρέπει να εξετάζεται με βάση τα ιδιαίτερα χαρακτηριστικά του (An & Oliver, 2020).

Μια αναδυόμενη τεχνολογία που αναδιαμορφώνει το εκπαιδευτικό τοπίο είναι η Τεχνητή Νοημοσύνη (AI) (Ouyang & Jiao, 2021). Η τεχνητή νοημοσύνη έχει τη δυνατότητα να κάνει προβλέψεις, να παίρνει αποφάσεις και να εκτελεί εργασίες προσομοιώνοντας την ανθρώπινη συμπεριφορά με χρήση δεδομένων (Popenici & Kerr, 2017; Williamson & Eynon, 2020). Οι τεχνολογίες τεχνητής νοημοσύνης, όπως η μηχανική μάθηση, η επεξεργασία φυσικής γλώσσας και τα νευρωνικά δίκτυα, έχουν βοηθήσει στη δημιουργία τεχνολογικών συστημάτων ικανών να εκτελούν εργασίες που απαιτούν συνήθως ανθρώπινη νοημοσύνη. Οι εξελίξεις και η προσβασιμότητα του έχουν οδηγήσει σε εκθετική ανάπτυξη, επηρεάζοντας θεμελιωδώς κοινωνικούς τομείς όπως, για παράδειγμα, η βιομηχανία της υγείας, η μεταποίηση, οι μεταφραστικές υπηρεσίες και η εξυπηρέτηση πελατών. Αυτό που φαίνεται να ενδιαφέρει τους ερευνητές τα τελευταία έτη είναι ο αντίκτυπος της τεχνητής νοημοσύνης στην εκπαίδευση (Kamalov et al., 2023; Seo et al., 2021). Στον τομέα της εκπαίδευσης, οι ερευνητές υποστηρίζουν ότι όταν η τεχνητή νοημοσύνη αξιοποιείται στο μέγιστο των δυνατοτήτων της, μπορεί να βελτιώσει την εκπαιδευτική διαδικασία και να παρέχει σημαντικά οφέλη σε εκπαιδευτικούς και μαθητές (Holmes & Tuomi, 2022; Yang, 2022).

Έχουν δημιουργηθεί διαφορετικές μορφές Τεχνητής Νοημοσύνης για την εκπαίδευση συμπεριλαμβανομένων συστημάτων υποστήριξης συνεργατικής μάθησης και εξατομικευμένων εκπαιδευτικών προσεγγίσεων (Ouyang & Jiao, 2021). Καθώς η συγκεκριμένη τεχνολογία συνεχίζει να αναδιαμορφώνει το εκπαιδευτικό τοπίο, υπάρχει μια αυξανόμενη ανάγκη να κατανοήσουμε τον αντίκτυπο της τεχνητής νοημοσύνης στους μαθητές. Από την ανασκόπηση της βιβλιογραφίας έχουν καταγραφεί αρκετές έρευνες που έχουν εξετάσει είτε τις απόψεις των εκπαιδευτικών για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση (Cabero-Almenara et al., 2024; Kuleto et al., 2022; Velli & Zafiropoulos, 2024) είτε τις απόψεις μαθητών δευτεροβάθμιας εκπαίδευσης για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση (Bochniarz et al., 2021; Chai et al., 2020; Suh & Ahn, 2022). Έως τώρα δεν έχει καταγραφεί έρευνα που να έχει αξιολογήσει τις γνώσεις των μαθητών Δημοτικού για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση. Με βάση την παραπάνω διαπίστωση γίνεται φανερό πως είναι σημαντικό να μελετηθεί το συγκεκριμένο θέμα καθώς μια τέτοια μελέτη θα μπορέσει να παράσχει σημαντικά ευρήματα για το πως οι μαθητές Δημοτικού βλέπουν την ενσωμάτωση της τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία καθώς και για το ποιοι παράγοντες σχετίζονται με τη στάση των μαθητών απέναντι στην τεχνητή νοημοσύνη. Επιπλέον, το συγκεκριμένο θέμα είναι σημαντικό καθώς στην Ελλάδα έως τώρα δεν έχει πραγματοποιηθεί έρευνα σε δείγμα μαθητών ούτε στη δευτεροβάθμια εκπαίδευση. Οπότε η παρούσα μελέτη αποτελεί μια από τις πρώτες ερευνητικές προσπάθειες αξιολόγησης των γνώσεων των μαθητών/τριών για την τεχνητή νοημοσύνη στο Ελληνικό εκπαιδευτικό πλαίσιο.

Τα αποτελέσματα της διπλωματικής εργασίας αναμένεται να δώσουν χρήσιμα στοιχεία αναφορικά με το πως βλέπουν οι μαθητές Δημοτικού την ένταξη και τη χρήση συστημάτων τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία. Από την έρευνα αναμένεται να αναδειχθούν τα οφέλη που αναγνωρίζουν οι μαθητές από τη χρήση τεχνητής νοημοσύνης, το αν οι μαθητές έχουν γνώσεις σε ζητήματα τεχνητής νοημοσύνης καθώς και αν είναι θετικοί απέναντι στην τεχνητή νοημοσύνη γενικά. Τα αποτελέσματα θα μπορούσαν να χρησιμοποιηθούν από αρμόδιους φορείς με στόχο την στοχευμένη ενημέρωση των μαθητών σε ζητήματα που αφορούν την τεχνητή νοημοσύνη καθώς και στην δημιουργία στρατηγικών για την ένταξη της τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία.

ΑΝΑΣΚΟΠΗΣΗ ΒΙΒΛΙΟΓΡΑΦΙΑΣ

Από τη δεκαετία του 1950, η τεχνητή νοημοσύνη (AI) είναι ένας αναπτυσσόμενος τομέας τεχνολογίας που ενσωματώνει συνεχώς νέες στρατηγικές και τακτικές (Popenici & Kerr, 2017). Τα συστήματα που χρησιμοποιούν τεχνητή νοημοσύνη μπορούν να μαθαίνουν μόνα τους και να βελτιώνονται με την πάροδο του χρόνου χρησιμοποιώντας δεδομένα (Williamson & Eynon, 2020). Αυτή η τεχνολογία μπορεί να προσομοιώσει την ανθρώπινη συμπεριφορά εκτελώντας εργασίες, λαμβάνοντας αποφάσεις και κάνοντας προβλέψεις. Σήμερα, η τεχνητή νοημοσύνη είναι ένα κρίσιμο συστατικό πολλών ψηφιακών τεχνολογιών που χρησιμοποιούνται συνήθως, όπως τα smartphone, οι έξυπνοι βοηθοί στο σπίτι και τα αυτοκίνητα (Abduljabbar et al., 2019; Mori et al., 2024).

Συνοπτικά, η τεχνητή νοημοσύνη περιλαμβάνει ένα φάσμα τεχνολογιών που έχουν σχεδιαστεί για να αναπαράγουν ή να προσομοιώνουν τις ανθρώπινες γνωστικές λειτουργίες. Το πεδίο γενικά κατηγοριοποιείται με βάση

την ικανότητα (δυνατότητες) σε Narrow AI, General AI και το θεωρητικό Super Intelligent AI, και με βάση τη λειτουργικότητα σε συστήματα που κυμαίνονται από απλές αντιδραστικές μηχανές έως εκείνες που μπορεί τελικά να έχουν αυτογνωσία. Καθώς η έρευνα συνεχίζεται, αυτοί οι ορισμοί και οι ταξινομήσεις πιθανότατα θα εξελιχθούν, διαμορφώνοντας τόσο την τεχνική ανάπτυξη της τεχνητής νοημοσύνης όσο και τα ηθικά πλαίσια που απαιτούνται για την καθοδήγηση της ενσωμάτωσής της τεχνητής νοημοσύνης στην κοινωνία (Davenport, 2019).

Πολλές δυνατότητες βελτίωσης των εκπαιδευτικών εμπειριών έχουν καταστεί εφικτές από τις τεχνολογικές εξελίξεις. Η εκπαιδευτική τεχνολογία (Edtech), είναι ένας ταχέως αναπτυσσόμενος τομέας που περιλαμβάνει μια σειρά από θεωρίες μάθησης εκτός από χρήσιμα ψηφιακά εργαλεία (Haleem et al., 2022). Η μάθηση τη σημερινή εποχή είναι πλέον διαθέσιμη τόσο στις «παραδοσιακές» τάξεις με την δια ζώσης επικοινωνία μεταξύ εκπαιδευτικού και μαθητή όσο εξ αποστάσεως με χρήση εργαλείων τεχνολογίας που επιτρέπουν την επικοινωνία και αλληλοεπίδραση εκπαιδευτικού και μαθητή από απόσταση (Sharma, 2022).

Η τεχνητή νοημοσύνη αναδιαμορφώνει όλο και περισσότερο το εκπαιδευτικό τοπίο με την εισαγωγή καινοτόμων μεθόδων που ενισχύουν τόσο τη διδασκαλία όσο και τη μάθηση. Μία από τις πιο σημαντικές επιπτώσεις της τεχνητής νοημοσύνης στην εκπαίδευση είναι η ικανότητά της να παρέχει εξατομικευμένες μαθησιακές εμπειρίες (Kaswan et al., 2024). Αναλύοντας μεμονωμένα δεδομένα, τα συστήματα τεχνητής νοημοσύνης μπορούν να προσαρμόσουν το εκπαιδευτικό περιεχόμενο, να προσαρμόσουν τις ταχύτητες εκμάθησης και να εντοπίσουν τομείς όπου ένας μαθητής μπορεί να χρειαστεί πρόσθετη υποστήριξη. Αυτή η προσαρμογή όχι μόνο βοηθά τους μαθητές να κατανοήσουν πιο αποτελεσματικά τις δύσκολές γι' αυτούς έννοιες, αλλά ενθαρρύνει επίσης μια πιο ελκυστική και διαδραστική διαδικασία μάθησης (Owoc et al., 2021).

Ένα άλλο πλεονέκτημα της ενσωμάτωσης της τεχνητής νοημοσύνης στην εκπαίδευση είναι η ελάφρυνση του διοικητικού φόρτου εργασίας που συχνά μειώνει τον χρόνο των εκπαιδευτικών (Alam, 2021). Τα συστήματα που τροφοδοτούνται από την τεχνητή νοημοσύνη μπορούν να αυτοματοποιήσουν εργασίες ρουτίνας όπως η βαθμολόγηση, η παρακολούθηση της παρουσίας των μαθητών και ο προγραμματισμός, επιτρέποντας στους εκπαιδευτικούς να αφιερώνουν περισσότερο χρόνο σε διαδραστικές και δημιουργικές πτυχές της διδασκαλίας. Αυτό όχι μόνο βελτιώνει την αποτελεσματικότητα των εκπαιδευτικών μονάδων αλλά ενισχύει επίσης την ποιότητα της εκπαίδευσης ελευθερώνοντας πολύτιμο χρόνο από τους εκπαιδευτικούς (Mishra & Varshney, 2024).

Η τεχνητή νοημοσύνη διαδραματίζει επίσης σημαντικό ρόλο στο να κάνει την εκπαίδευση πιο προσιτή ενώ η χρήση της μπορεί να προωθήσει μια εκπαίδευση χωρίς αποκλεισμούς. Οι προηγμένες τεχνολογικές πλατφόρμες που χρησιμοποιούν τεχνητή νοημοσύνη μπορούν να προσφέρουν μετάφραση γλώσσας σε πραγματικό χρόνο, προσαρμοστικά εργαλεία εκμάθησης και προσβάσιμο περιεχόμενο που απευθύνεται σε μαθητές με διαφορετικές ανάγκες, συμπεριλαμβανομένων εκείνων με αναπηρίες (Almufareh et al., 2024). Καταρρίπτοντας τα παραδοσιακά εμπόδια στη μάθηση, οι λύσεις που βασίζονται σε συστήματα τεχνητής νοημοσύνης διασφαλίζουν ότι όλοι οι μαθητές έχουν την ευκαιρία να επιτύχουν ανεξάρτητα από το υπόβαθρό τους ή τις ατομικές τους προκλήσεις (Schicchi & Taibi, 2024).

Επιπλέον, η εισαγωγή της τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία ενισχύει ένα περιβάλλον καινοτομίας και δημιουργικότητας. Διαδραστικά εργαλεία και ψηφιακές προσομοιώσεις που βασίζονται στην τεχνητή νοημοσύνη μετατρέπουν αφηρημένες ιδέες σε απτές μαθησιακές εμπειρίες, διεγείροντας έτσι την κριτική σκέψη και τις δεξιότητες επίλυσης προβλημάτων (Chang & Tsai, 2021). Τέτοιες ελκυστικές μέθοδοι όχι μόνο προσελκύουν την προσοχή των μαθητών αλλά και τους προετοιμάζουν για ένα μέλλον όπου η τεχνολογική ευχέρεια και γνώση θα είναι απαραίτητη (Creely & Henriksen, 2019).

Συνοπτικά, η τεχνητή νοημοσύνη φέρνει μια σειρά από οφέλη στην εκπαιδευτική διαδικασία, που κυμαίνονται από εξατομικευμένη μάθηση και διοικητική αποτελεσματικότητα έως ενισχυμένη προσβασιμότητα και καινοτόμες μεθόδους διδασκαλίας. Καθώς αυτές οι τεχνολογίες συνεχίζουν να εξελίσσονται, υπόσχονται τη δημιουργία πιο αποτελεσματικών, ελκυστικών και περιεκτικών εκπαιδευτικών εμπειριών για τους μαθητές σε όλο τον κόσμο.

Η εισαγωγή της τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία έχει πυροδοτήσει ποικίλες αντιδράσεις τόσο από εκπαιδευτικούς όσο και από μαθητές, αντανακλώντας ένα περίπλοκο μείγμα ενθουσιασμού, σκεπτικισμού και επιφυλακτικής αισιοδοξίας (Chai et al., 2020; Choi et al., 2024; Kuleto et al., 2022). Οι εκπαιδευτικοί, που βρίσκονται στην πρώτη γραμμή της διαμόρφωσης της εκπαιδευτικής διαδικασίας, επιδεικνύουν μια σειρά στάσεων απέναντι στην τεχνητή νοημοσύνη. Πολλοί εκπαιδευτικοί εκτιμούν τη δυνατότητα της τεχνητής νοημοσύνης να τους βοηθήσει σε εργασίες ρουτίνας, επιτρέποντάς τους έτσι να εστιάσουν περισσότερο στην εξατομικευμένη διδασκαλία και στις ουσιαστικές αλληλεπιδράσεις με τους μαθητές τους (Yue et al., 2024). Αυτοί οι εκπαιδευτικοί βλέπουν την τεχνητή νοημοσύνη ως ένα εργαλείο που μπορεί να βελτιώσει τη μαθησιακή εμπειρία προσφέροντας ανατροφοδότηση σε πραγματικό χρόνο, διευκολύνοντας τη διαφοροποιημένη διδασκαλία και υποστηρίζοντας την ανάπτυξη στρατηγικών

διδασκαλίας που βασίζονται σε πραγματικά δεδομένα (Ayanwale et al., 2022). Ωστόσο, υπάρχει επίσης μια ομάδα εκπαιδευτικών που εκφράζουν ανησυχίες για την ταχεία ενσωμάτωση της τεχνητής νοημοσύνης στην εκπαίδευση. Αυτοί οι εκπαιδευτικοί ανησυχούν ότι η υπερβολική εξάρτηση από την τεχνολογία θα μπορούσε να υπονομεύσει το ανθρώπινο στοιχείο της διδασκαλίας, δυνητικά μειώνοντας τον ρόλο της ενσυναίσθησης, της δημιουργικότητας και της κριτικής σκέψης που προωθείται από την παραδοσιακή παιδαγωγική (Chai et al., 2023).

Οι μαθητές, από την άλλη πλευρά, γενικά επιδεικνύουν υψηλό επίπεδο περιέργειας και είναι ανοιχτοί απέναντι στις νέες τεχνολογίες, συμπεριλαμβανομένης της τεχνητής νοημοσύνης. Πολλοί νέοι μαθητές εκτιμούν τα διαδραστικά και προσαρμοστικά περιβάλλοντα μάθησης που μπορεί να δημιουργήσει η τεχνητή νοημοσύνη, διαπιστώνοντας ότι η εξατομικευμένη ανατροφοδότηση και το προσαρμοσμένο περιεχόμενο μπορούν να κάνουν τις εκπαιδευτικές τους εμπειρίες πιο ελκυστικές και σύγχρονες (Marx et al., 2023). Η χρήση εκπαιδευτικών πλατφορμών που βασίζονται στην τεχνητή νοημοσύνη συχνά οδηγεί σε μια πιο δυναμική διαδικασία μάθησης, όπου οι μαθητές αισθάνονται ενδυναμωμένοι από την ικανότητα να μαθαίνουν με τον δικό τους ρυθμό και λαμβάνουν άμεση υποστήριξη όταν χρειάζεται (Kim & Youngjun, 2020). Παρά αυτές τις θετικές στάσεις, ορισμένοι μαθητές εκφράζουν ανησυχία για τα πιθανά μειονεκτήματα ενός εκπαιδευτικού συστήματος με επίκεντρο την τεχνητή νοημοσύνη. Οι ανησυχίες σχετικά με την πιθανή απώλεια της άμεσης ανθρώπινης αλληλεπίδρασης, η πρόκληση της χρήσης πολύπλοκων τεχνολογικών εργαλείων χωρίς επαρκή υποστήριξη και ο φόβος να χαθεί η επαφή με τους εκπαιδευτικούς ή τους συμμαθητές τους είναι αυτές που αναφέρονται σε μεγαλύτερο βαθμό (Marx et al., 2023).

Ουσιαστικά, οι στάσεις τόσο των εκπαιδευτικών όσο και των μαθητών απέναντι στην τεχνητή νοημοσύνη στην εκπαίδευση διαμορφώνονται από την ισορροπία μεταξύ των πολλά υποσχόμενων δυνατοτήτων της και των προκλήσεων που παρουσιάζει (Pokrivcakova, 2023). Ενώ οι εκπαιδευτικοί επιδιώκουν να αξιοποιήσουν την τεχνητή νοημοσύνη για να βελτιώσουν τις διδακτικές πρακτικές και να βελτιώσουν την αποτελεσματικότητα τους, είναι επιφυλακτικοί για τη διατήρηση των βασικών αξιών της ανθρωποκεντρικής εκπαίδευσης (Chai et al., 2023). Ομοίως, οι μαθητές ενθουσιάζονται από τις εξατομικευμένες και διαδραστικές ευκαιρίες που προσφέρει η τεχνητή νοημοσύνη, αλλά αναγνωρίζουν επίσης τη σημασία της διατήρησης ουσιαστικών ανθρώπινων συνδέσεων στο μαθησιακό περιβάλλον. Αυτή η εξελισσόμενη σχέση μεταξύ τεχνολογίας και παιδαγωγικής υποδηλώνει ότι η επιτυχής ενσωμάτωση της τεχνητής νοημοσύνης στην εκπαίδευση θα εξαρτηθεί από την εξεύρεση μιας αρμονικής ισορροπίας που μεγιστοποιεί τα οφέλη της ενώ θα αντιμετωπίζει τις θεμιτές ανησυχίες όλων των εμπλεκόμενων (Kim & Youngjun, 2020; Marx et al., 2023).

ΜΕΘΟΔΟΛΟΓΙΑ

Η έρευνα πραγματοποιήθηκε σε δείγμα μαθητών πρωτοβάθμιας εκπαίδευσης. Η επιλογή του δείγματος βασίστηκε στη μεθοδολογία δειγματοληψίας που είναι γνωστή ως δειγματοληψία σκοπιμότητας. Στο συγκεκριμένο τύπο δειγματοληψίας ένας ερευνητής επιλέγει συμμετέχοντες με βάση την ευκολία πρόσβασης και τη διαθεσιμότητά τους. Αυτή η μέθοδος χρησιμοποιείται συχνά όταν ο χρόνος ή οι πόροι είναι περιορισμένοι και καθιστούν ανέφικτη τη χρήση πιο αυστηρών μεθόδων δειγματοληψίας όπως η απλή τυχαία δειγματοληψία ή η δειγματοληψία κατά συστάδες (Creswell & Creswell, 2022). Για τη διεξαγωγή της έρευνας μοιράστηκαν συνολικά 350 έντυπα ερωτηματολόγια σε μαθητές της Δ, Ε και ΣΤ Δημοτικού στο Ν. Ζακύνθου. Η επιλογή των συγκεκριμένων μαθητών έγινε από το ευρύτερο κοινωνικό και εργασιακό περιβάλλον των ερευνητών. Συνολικά, από τα 350 ερωτηματολόγια επιστράφηκαν συμπληρωμένα τα 321 (ποσοστό ανταπόκρισής 91.7%). Το δείγμα της έρευνας αποτελούνταν κατά 53.6% (ν = 172) από αγόρια και κατά 46.4% (ν = 149) από κορίτσια. Τα στοιχεία δείχνουν πως το 35.5% (ν = 114) των μαθητών πηγαίνουν στη Δ Δημοτικού, το 37.4% (ν = 120)των μαθητών πηγαίνουν στην Ε Δημοτικού και το 27.1% (ν = 87) των μαθητών πηγαίνουν στη ΣΤ Δημοτικού. Τέλος, από το σύνολο του δείγματος το 52.3% (ν = 168) των μαθητών διαμένει σε αστική περιοχή και το 47.7% (ν = 153) των μαθητών διαμένει σε αγροτική περιοχή.

Η συλλογή των πρωτογενών δεδομένων πραγματοποιήθηκε με διανομή έντυπου ερωτηματολογίου. Το ερωτηματολόγιο φτιάχτηκε από τους ίδιους τους ερευνητές στηριζόμενοι σε προηγούμενα ερωτηματολόγια τα οποία μετρούσαν στάσεις μαθητών/ μαθητριών σε άλλα αντικείμενα. Αρχικά, το ερωτηματολόγιο της έρευνας δόθηκε σε πανεπιστημιακούς καθηγητές όπου έκαναν τις απαραίτητες παρατηρήσεις και διορθώσεις και σε φιλόλογο που το κοίταξε συντακτικά για τυχόν παραλείψεις ή ασάφειες. Στην επόμενη φάση δόθηκε σε δύο μαθητές της τέταρτης δύο μαθητές της πέμπτης και σε δύο μαθητές της έκτης τάξης για να εξεταστεί αν το κατά πόσο ήταν κατανοητό από μαθητές αυτής της ηλικίας. Αφού έγιναν οι απαραίτητες παρατηρήσεις και διορθώσεις αφαιρέθηκαν κάποιες ερωτήσεις και οι ερευνητές κατέληξαν στην τελική του μορφή όπου περιείχε 16 ερωτήματα για τις γνώσεις των μαθητών. Μετά τις στατιστικές αναλύσεις στην πιλοτική φάση διαπιστώθηκε ότι όλα τα ερωτήματα φόρτιζαν θετικά και δεν είχαν χαμηλή φόρτιση. Για το λόγο αυτό αποφασίστηκε να χρησιμοποιηθεί όπως έχει. Όλες οι ερωτήσεις είναι διατυπωμένες σε κλίμακα Likert είτε με διαβάθμιση από 1 = διαφωνώ απόλυτα έως 5 = συμφωνώ απόλυτα .Από τις απαντήσεις στις 16 ερωτήσεις που αξιολογούν τις γνώσεις των μαθητών για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση υπολογίστηκε η

μεταβλητή «Γνώσεις» που λαμβάνει τιμές στο διάστημα [1, 5]. Η μεταβλητή υπολογίστηκε ως ο μέσος όρος των απαντήσεων των μαθητών στις 16 ερωτήσεις.

Η συλλογή του ερευνητικού υλικού πραγματοποιήθηκε σε δημόσια σχολεία πρωτοβάθμιας εκπαίδευσης του Ν. Ζακύνθου. Η έρευνα πραγματοποιήθηκε 8-10 Ιανουαρίου 2025 ενώ η πιλοτική έρευνα 16-18 Δεκεμβρίου 2024 μέσω έντυπων ερωτηματολογίων. Τα έντυπα ερωτηματολόγια διανεμήθηκαν από τον ίδιους τους ερευνητες στους μαθητές/τριες του Νομού Ζακύνθου, αφού προηγουμένως είχε ζητηθεί η άδεια εισόδου στα σχολεία από τους διευθυντές των σχολείων. Η συμμετοχή στην έρευνα ήταν εθελοντική. Πριν τη συμπλήρωση πραγματοποιήθηκε ενημέρωση για το περιεχόμενο και τους στόχους της έρευνας, ενώ έγινε σαφές ότι τα δεδομένα θα χρησιμοποιηθούν καθαρά για ερευνητικούς/ ακαδημαϊκούς σκοπούς και ότι θα τηρηθεί η ανωνυμία. Στους ερωτηθέντες τονίσθηκε ιδιαίτερα ότι τα ερωτηματολόγια συμπληρώνονται ανώνυμα, ότι δεν υπάρχουν σωστές ή λάθος απαντήσεις και ότι τα αποτελέσματα θα χρησιμοποιηθούν για καθαρά επιστημονικούς σκοπούς, ενώ τους ζητήθηκε να απαντήσουν με απόλυτη ειλικρίνεια και στο κατάλληλο περιβάλλον. Με τους συμμετέχοντες δεν έγινε καμία συζήτηση σχετικά με τη θεματολογία της έρευνας πριν τη συμπλήρωση των ερωτηματολογίων, πέρα από τις οδηγίες, όπου χρειάστηκε, για την πλήρη κατανόηση των ερωτήσεων και την αποφυγή λαθών. Ο συνολικός χρόνος που απαιτήθηκε για τη συμπλήρωσή τους, σύμφωνα με τον αρχικό σχεδιασμό, την πιλοτική έρευνα αλλά και τα λεγόμενα των ίδιων των μαθητών/μαθητριών που συμμετείχαν στην κυρίως έρευνα, υπολογίστηκε περίπου στα 10-15 λεπτά.

Η ανάλυση των δεδομένων πραγματοποιήθηκε με χρήση του λογισμικού επεξεργασίας και ανάλυσης ποσοτικών δεδομένων SPSS version 27. Σε πρώτο στάδιο στα δεδομένα της έρευνας πραγματοποιήθηκε ανάλυση αξιοπιστίας υπολογίζοντας το συντελεστή αξιοπιστίας α του Cronbach. Σύμφωνα με τη βιβλιογραφία τιμές του συντελεστή αξιοπιστίας α του Cronbach άνω του 0.7 είναι ένδειξη ενός καλού επιπέδου αξιοπιστίας (Creswell & Creswell, 2022). Στη συνέχεια πραγματοποιήθηκε περιγραφική ανάλυση για την αποτύπωση των γνώσεων μαθητών/τριών δημοτικού για την τεχνητή νοημοσύνη στην εκπαίδευση. Για την περιγραφική ανάλυση έγινε υπολογισμός του μέσου όρου (ΜΟ) και της τυπικής απόκλισης (ΤΑ) καθώς όλες οι μεταβλητές της έρευνας είναι διατακτικές σε κλίμακα 1 έως 5. Τέλος, πραγματοποιήθηκε ανάλυση με εφαρμογή στατιστικών ελέγχων με στόχο να διερευνηθούν διαφορές στις γνώσεις των μαθητών ως προς το φύλο, την τάξη και τον τόπο διαμονής Για το σκοπό αυτό χρησιμοποιήθηκε ο έλεγχος ανεξαρτησίας χ^2, ο έλεγχος t-test, ο έλεγχος one-wayANOVA και ο έλεγχος two-wayANOVA.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Στην πρώτη ενότητα της ανάλυσης παρουσιάζονται τα αποτελέσματα της ανάλυσης σχετικά με την αξιοπιστία του ερωτηματολογίου της έρευνας. Από τον Πίνακα 1 προκύπτει πως η ενότητα του ερωτηματολογίου που διερευνά τις γνώσεις των μαθητών σε ζητήματα τεχνητής νοημοσύνης εμφανίζει αξιοπιστία α = 0.781 (ικανοποιητικό επίπεδο αξιοπιστίας). Από τον ανάλυση για τις μεμονωμένες ερωτήσεις και το κατά πόσο αυτές πρέπει να συμπεριληφθούν στην κλίμακα ή όχι (στήλη Cronbach's Alpha if Item Deleted) προκύπτει πως η αφαίρεση οποιασδήποτε ερώτησης από τις 16 θα είχε ως αποτέλεσμα τη μείωση του συντελεστή αξιοπιστίας.

Πίνακας 1
Έλεγχος αξιοπιστίας για τη διάσταση «Γνώσεις»

Cronbach's Alpha	N of Items
.781	16

Η επόμενη ανάλυση αφορά την καταγραφή του ποσοστού των μαθητών που γνωρίζει τι είναι η τεχνητή νοημοσύνη και του ποσοστού των μαθητών που έχουν χρησιμοποιήσει οι ίδιοι ή οι γονείς τους τεχνητή νοημοσύνη. Από τα αποτελέσματα προκύπτει πως το 78.5% των μαθητών ανέφεραν πως γνωρίζουν την έννοια της τεχνητής νοημοσύνη και πως το 57.9% των μαθητών ανέφεραν πως έχουν χρησιμοποιήσει οι ίδιοι ή οι γονείς τους τεχνητή νοημοσύνη.

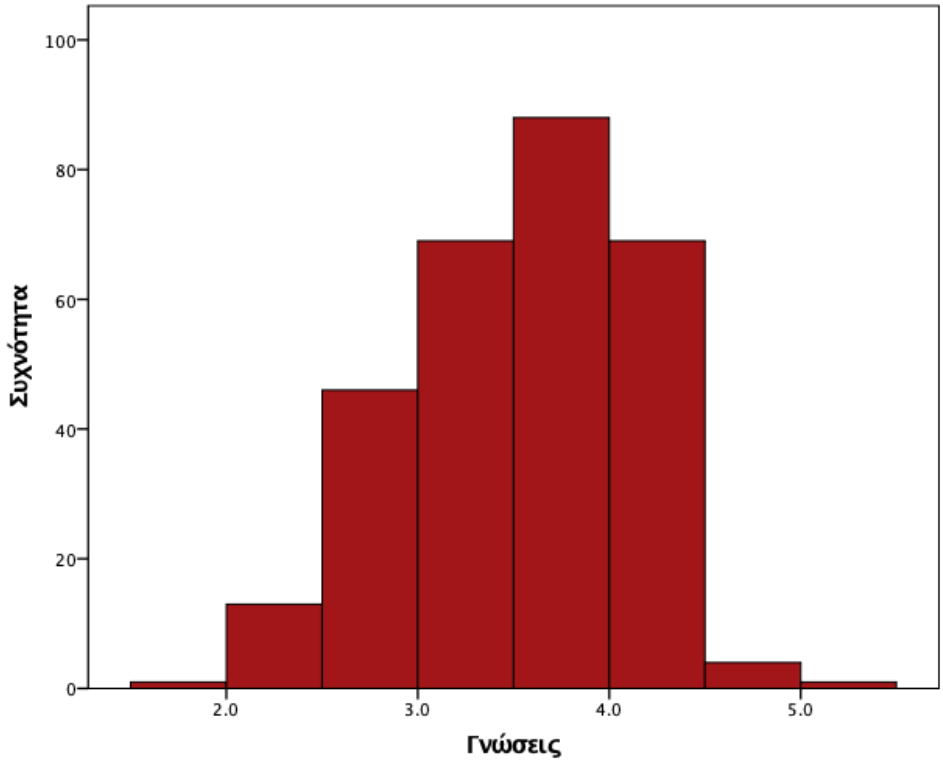
Από τις μεμονωμένες ερωτήσεις που αξιολογούν τις γνώσεις των μαθητών για την τεχνητή νοημοσύνη προκύπτει πως οι μαθητές τείνουν να συμφωνήσουν με το ότι η Τεχνητή Νοημοσύνη μπορεί να δημιουργήσει εκπαιδευτικά παιχνίδια που κάνουν τη μάθηση πιο διασκεδαστική (ΜΟ = 3.8, ΤΑ = 1.3), μπορεί να χρησιμοποιηθεί για να δημιουργήσει εκπαιδευτικά παιχνίδια (ΜΟ = 3.8, ΤΑ = 1.1), μπορεί να βοηθήσει τους μαθητές να μάθουν νέες γλώσσες με πιο εύκολο τρόπο (ΜΟ = 3.7, ΤΑ = 1.2) και μπορεί να βοηθήσει στην επίλυση μαθηματικών προβλημάτων με εξηγήσεις βήμα-βήμα (ΜΟ = 3.7, ΤΑ = 1.2).

Παρόμοια, οι μαθητές τείνουν να συμφωνήσουν με το ότι υπάρχουν εκπαιδευτικές εφαρμογές που χρησιμοποιούν Τεχνητή Νοημοσύνη για να απαντούν σε ερωτήσεις μαθητών (ΜΟ = 3.7, ΤΑ = 1.3) και με το ότι η Τεχνητή Νοημοσύνη μπορεί να προτείνει εκπαιδευτικά βίντεο ή υλικό ανάλογα με αυτά που ενδιαφέρουν τους μαθητές/μαθήτριες (ΜΟ = 3.6, ΤΑ = 1.1), μπορεί να βοηθήσει τους μαθητές να μάθουν να σχεδιάζουν ή να ζωγραφίζουν (ΜΟ = 3.6, ΤΑ =

1.2) και μπορεί να χρησιμοποιηθεί για να δημιουργήσει εικονικές τάξεις όπου οι μαθητές μπορούν να συμμετέχουν (ΜΟ = 3.6, ΤΑ = 1.3). Αντίστοιχα, οι μαθητές έχουν μια ουδέτερη άποψη για το αν η Τεχνητή Νοημοσύνη μπορεί να χρησιμοποιηθεί για να δημιουργήσει εξατομικευμένα μαθήματα για κάθε μαθητή (ΜΟ = 3.1, ΤΑ = 1.3), για το αν η Τεχνητή Νοημοσύνη μπορεί να βοηθήσει τους δασκάλους να αξιολογούν τις εργασίες πιο γρήγορα (ΜΟ = 3.2, ΤΑ = 1.2) και για το αν η Τεχνητή Νοημοσύνη μπορεί να προβλέψει ποιοι μαθητές χρειάζονται περισσότερη βοήθεια στα μαθήματά τους (ΜΟ = 3.2, ΤΑ = 1.4).

Συνολικά, το μέσο επίπεδο γνώσεων των μαθητών για την τεχνητή νοημοσύνη είναι ίσο με 3.5 (ΤΑ = 0.6) σε μια κλίμακα μεταξύ 1 και 5 (Διάγραμμα 1). Το εύρημα δείχνει πως οι μαθητές έχουν ένα μέτριο προς υψηλό επίπεδο γνώσεων σε ζητήματα τεχνητής νοημοσύνης.

Διάγραμμα 1.
Κατανομή της μεταβλητής «Γνώσεις»



Η επόμενη ανάλυση είχε στόχο να διερευνήσει το κατά πόσο καταγράφονται σημαντικές διαφορές στις γνώσεις των μαθητών ως προς το φύλο, την τάξη και την περιοχή διαμονής. Από τον έλεγχο t-test προκύπτει πως δεν υπάρχει στατιστικά σημαντική διαφορά στο συνολικό επίπεδο γνώσεων μεταξύ αγοριών και κοριτσιών ($t = 0.526$, $p = 0.599$). Παρόμοια, δεν καταγράφηκαν στατιστικά σημαντικές διαφορές ως προς το φύλο των μαθητών σε καμία από τις επιμέρους ερωτήσεις που αξιολογούν τις γνώσεις τους ($p > 0.05$).

Ο έλεγχος one-wayANOVA έδειξε πως δεν καταγράφεται στατιστικά σημαντική διαφορά στο επίπεδο γνώσεων των μαθητών σε σύγκριση με την τάξη τους ($F = 0.234$, $p = 0.792$). Αντίθετα, καταγράφηκαν δύο στατιστικά σημαντικές διαφορές στο κατά πόσο οι μαθητές πιστεύουν πως η Τεχνητή Νοημοσύνη μπορεί να βοηθήσει στην επίλυση μαθηματικών προβλημάτων με εξηγήσεις βήμα-βήμα ($F = 3.396$, $p = 0.035$) κατά πόσο οι μαθητές πιστεύουν πως η Τεχνητή Νοημοσύνη μπορεί να χρησιμοποιηθεί για να δημιουργήσει εικονικές τάξεις όπου οι μαθητές μπορούν να συμμετέχουν ($F = 3.848$, $p = 0.022$). Η ανάλυση έδειξε πως οι μαθητές της Δ Δημοτικού (ΜΟ = 3.9, ΤΑ = 1.2) συμφωνούν σε μεγαλύτερο βαθμό από τους μαθητές Ε Δημοτικού (ΜΟ = 3.7, ΤΑ = 1.2) και ΣΤ Δημοτικού (ΜΟ = 3.5, ΤΑ = 1.2) με το ότι η Τεχνητή Νοημοσύνη μπορεί να βοηθήσει στην επίλυση μαθηματικών προβλημάτων με εξηγήσεις βήμα-βήμα. Παρόμοια, οι μαθητές της Δ Δημοτικού (ΜΟ = 3.7, ΤΑ = 1.4) και Ε Δημοτικού (ΜΟ = 3.6, ΤΑ = 1.2) συμφωνούν σε μεγαλύτερο βαθμό από τους μαθητές ΣΤ Δημοτικού (ΜΟ = 3.2, ΤΑ = 1.3) με το ότι η Τεχνητή Νοημοσύνη μπορεί να χρησιμοποιηθεί για να δημιουργήσει εικονικές τάξεις όπου οι μαθητές μπορούν να συμμετέχουν.

Από την ανάλυση του ελέγχου t-test δεν καταγράφεται στατιστικά σημαντική διαφορά στο επίπεδο γνώσεων των μαθητών σε σύγκριση με την περιοχή διαμονής ($t = -1.041$, $p = 0.299$). Αντίθετα, καταγράφηκε στατιστικά σημαντική διαφορά στο κατά πόσο οι μαθητές πιστεύουν πως τα ρομπότ που διδάσκουν μαθητές λειτουργούν με Τεχνητή Νοημοσύνη($t = 2.070$, $p = 0.039$). Τα αποτελέσματα έδειξαν πως οι μαθητές από αστική περιοχή (ΜΟ = 3.5, ΤΑ = 1.2) συμφωνούν σε μεγαλύτερο βαθμό με το ότι τα ρομπότ που διδάσκουν μαθητές λειτουργούν με Τεχνητή Νοημοσύνη σε σύγκριση με τους μαθητές από αγροτική περιοχή (ΜΟ = 3.3, ΤΑ = 1.2).

Τέλος, πραγματοποιήθηκε ανάλυση για να εξεταστεί αν υπάρχει σημαντική αλληλοεπίδραση μεταξύ φύλου και τάξης στο επίπεδο γνώσεων των μαθητών. Από τα αποτελέσματα προκύπτει πως δεν καταγράφεται στατιστικά σημαντική αλληλοεπίδραση μεταξύ φύλου και τάξης στο επίπεδο γνώσεων των μαθητών ($F = 1.748$, $p = 0.176$).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η παρούσα εργασία είχε σκοπό να εξετάσει τις γνώσεις των μαθητών Δημοτικού για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση. Τα αποτελέσματα έδειξαν πως γενικά οι μαθητές Δημοτικού έχουν ένα μέτριο επίπεδο γνώσεων αναφορικά με τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση ενώ έχουν μια ουδέτερη στάση για τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση. Παρόμοια, οι μαθητές σε μέτριο βαθμό αναγνωρίζουν τα οφέλη της τεχνητής νοημοσύνης σε διάφορους τομείς της καθημερινότητας καθώς και τα πιθανά οφέλη της στην εκπαιδευτική διαδικασία εκφράζοντας μια ουδέτερη αντίληψη στις ερωτήσεις που τους τέθηκαν για τη χρησιμότητά της. Τα αποτελέσματα αυτά δείχνουν πως οι μαθητές Δημοτικού τη σημερινή εποχή δεν είναι ακόμη εξοικειωμένοι με την τεχνητή νοημοσύνη και έχουν γενικά μια ουδέτερη άποψη για τη χρήση της στην εκπαιδευτική διαδικασία. Για το λόγο αυτό πρέπει να πραγματοποιηθούν δράσεις ενημέρωσης των μαθητών για την τεχνητή νοημοσύνη και την χρήση της στην εκπαιδευτική διαδικασία πριν πραγματοποιηθεί εφαρμογή της στην πράξη. Η ενημέρωση των μαθητών αναμένεται να διαμορφώσει υψηλότερο επίπεδο γνώσεων και θετικότερες αντιλήψεις για την τεχνητή νοημοσύνη και αυτό με τη σειρά του αναμένεται να διαμορφώσει μια θετικότερη στάση των μαθητών για τη χρήση της τεχνητής νοημοσύνης στην εκπαιδευτική διαδικασία.

ΠΕΡΙΟΡΙΣΜΟΙ ΤΗΣ ΕΡΕΥΝΑΣ

Η εργασία που πραγματοποιήθηκε έχει και ορισμένους περιορισμούς που περιορίζουν την γενικευσιμότητα των αποτελεσμάτων στο σύνολο των μαθητών Δημοτικού. Βασικός περιορισμός της έρευνας είναι ότι το δείγμα των μαθητών επιλέχθηκε από μια συγκεκριμένη γεωγραφική περιοχή (Ν. Ζακύνθου) ενώ ο τρόπος επιλογής του δείγματος έγινε με βάση μια μορφή δειγματοληψίας σκοπιμότητας. Αυτά τα δύο στοιχεία μειώνουν την εξωτερική εγκυρότητα της μελέτης με αποτέλεσμα τα αποτελέσματα να μη αντιπροσωπεύουν το σύνολο των μαθητών Δημοτικού στην Ελλάδα.

ΠΡΟΤΑΣΕΙΣ

Τα αποτελέσματα που προέκυψαν παρέχουν μια εικόνα για τις γνώσεις των μαθητών αλλά για να έχουμε μια πιο αντιπροσωπευτική εικόνα θα πρέπει μελλοντικά να πραγματοποιηθεί μεγαλύτερη σε έκταση έρευνα με μαθητές από όλη την Ελλάδα που θα επιλεχθούν με χρήση κάποιας μορφής δειγματοληψίας όπως η στρωματοποιημένη δειγματοληψία. Επιπλέον, μελλοντικά θα πρέπει να διερευνηθούν οι γνώσεις των εκπαιδευτικών αλλά και των γονέων των μαθητών αναφορικά με τη χρήση της τεχνητής νοημοσύνης στην εκπαίδευση. Τέλος, σε μελλοντική έρευνα θα ήταν χρήσιμο να διεξαχθεί συνδυασμός ποσοτικής και ποιοτικής έρευνας σε μαθητές και εκπαιδευτικούς ώστε να μπορεί να αναδειχθεί ένα ασφαλέστερο συμπέρασμα αναφορικά με τις προκλήσεις και τα οφέλη της χρήσης τεχνητής νοημοσύνης στην εκπαίδευση.

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ΘΠ2: Η παιδαγωγική ενσωμάτωση των Ψηφιακών Μέσων στη διδακτική πράξη (Θεωρίες Μάθησης, Προγράμματα Σπουδών και Ψηφιακά Μέσα)

ΔΙΔΑΣΚΑΛΙΑ ΟΛΟΚΛΗΡΟΥ ΤΟΥ ΛΟΓΟΤΕΧΝΙΚΟΥ ΕΡΓΟΥ ΤΟΥ Κ. ΘΕΟΤΟΚΗ «Η ΤΙΜΗ ΚΑΙ ΤΟ ΧΡΗΜΑ» ΜΕ ΤΗ ΧΡΗΣΗ Τ.Π.Ε.

Βοντίτσου Άννα
Εκπαιδευτικός, Π.Ε.02
Δ.Δ.Ε. Πρέβεζας
Πρέβεζα, Ελλάδα
avontitsou@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η εισήγηση αυτή αναδεικνύει την αξιοποίηση των Τ.Π.Ε. στη διδασκαλία της λογοτεχνίας στη Β΄ Λυκείου, συγκεκριμένα στο έργο «Η τιμή και το χρήμα» του Κ. Θεοτόκη. Η χρήση ψηφιακών μέσων -το διαδίκτυο, ο διαδραστικός πίνακας, η e-τάξη, το οπτικοακουστικό υλικό (ebook, ταινία) και η τεχνητή νοημοσύνη (γλωσσικά μοντέλα)- συνεισφέρει στην επίτευξη των διδακτικών στόχων μέσω καινοτόμων μεθόδων.

Εισαγωγικά, παρουσιάζονται τα προγράμματα σπουδών των ετών 2011, 2021, 2023-2024 που στοχεύουν στον κριτικό και ψηφιακό γραμματισμό. Στη συνέχεια, καταγράφονται ο θετικός ρόλος των Τ.Π.Ε. στην εκπαίδευση και ειδικότερα στη διδασκαλία της λογοτεχνίας αλλά και οι προκλήσεις.

Στο κύριο μέρος της εισήγησης αναλύεται η διδακτική πρόταση ολόκληρης της νουβέλας του Κ. Θεοτόκη μέσω της πλατφόρμας e-τάξη. Περιγράφονται το μοντέλο διδασκαλίας, οι μέθοδοι, η πορεία διδασκαλίας, τα βοηθητικά μέσα και δειγματικά παρουσιάζονται σε φύλλα εργασίας ερωτήσεις κατανόησης, σχολιασμού απόψεων, αφηγηματολογίας, διακειμενικότητας, οπτικοποίησης παραγράφων, αλλαγής αφηγηματικών τρόπων ή οπτικής γωνίας αλλά και παραγωγής λόγου με τη βοήθεια της Τ.Ν.

Στο τέλος της εισήγησης, συνάγονται τα συμπεράσματα από την αλληλεπιδραστική σχέση των Τ.Π.Ε. με τη διδακτική της λογοτεχνίας.

Λέξεις – κλειδιά: λογοτεχνία, μεικτό μοντέλο διδασκαλίας, χρήση Τ.Π.Ε., τεχνητή νοημοσύνη (Τ.Ν.), ψηφιακός γραμματισμός, νέα προγράμματα σπουδών.

ΕΙΣΑΓΩΓΗ

Με τα προγράμματα σπουδών του 2011 (Π.Σ. 2011) αλλά και των 2021 (Π.Σ. 2021), 2023-2024 (Ν.Π.Σ. 2023-2024) αναφορικά με τη διδασκαλία της Γλώσσας/Λογοτεχνίας επιδιώκεται ο κριτικός και ο πολυτροπικός γραμματισμός, που ανανεώνουν όλη τη μαθησιακή διαδικασία (Anastasiadou-Symeonidou et al., 2015). Τα νέα Π.Σ. του 2023-2024 προωθούν την ενεργό συμμετοχή και συνεργασία όλων των μαθητών/-τριών, μέσω της δημιουργίας περιβαλλόντων συμπερίληψης, καθοδηγούμενης μάθησης, αυτενέργειας, συνεργατικής δράσης, διερευνητικής μάθησης, βιωματικής προσέγγισης, συνεργατικής επίλυσης προβλημάτων, επικοινωνιακής προσέγγισης, και μετασχηματιστικής λογικής (Ι.Ε.Ρ./Ν.C.). Επίσης, προωθούν τη χρησιμοποίηση νέων τεχνολογιών στη διδακτική πρακτική, αξιοποιώντας τα πλεονεκτήματα της ηλεκτρονικής μάθησης και τα διαθέσιμα ψηφιακά εργαλεία, ώστε με την απόκτηση ψηφιακής εγγραμματοσύνης να αυξηθεί η συμμετοχικότητα, η συνεργατικότητα και να δοθούν κίνητρα για μάθηση (Ι.Ε.Ρ./Ν.C.). Μέσα σ' αυτό το πλαίσιο προτείνεται η διδασκαλία της νουβέλας του Κ. Θεοτόκη με τη χρήση των Τ.Π.Ε. που βοηθούν, για να φτάσει το διδακτικό υλικό στους μαθητές, να προβληθεί (αρχεία, διαδίκτυο, ηλεκτρονική τάξη, διαδραστικός πίνακας, ebook) αλλά και να χρησιμοποιηθεί στη δημιουργική γραφή, την οπτικοποίηση αφηγηματικού λόγου ή την διεκπεραίωση ομαδοσυνεργατικών εργασιών.

Ο ΡΟΛΟΣ ΤΩΝ Τ.Π.Ε. ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΘΕΤΙΚΑ ΚΑΙ ΠΡΟΚΛΗΣΕΙΣ

Οι Τ.Π.Ε. έχουν εισβάλει στην καθημερινή ζωή όλων, εκπαιδευτικών και μαθητών/-τριών. Είναι προφανές συνεπώς, γιατί τα σύγχρονα εκπαιδευτικά προγράμματα σπουδών εντάσσουν τα εργαλεία των τεχνολογιών αυτών στη μαθησιακή διαδικασία, αξιοποιώντας τα για τις απαιτήσεις των εκπαιδευτικών δραστηριοτήτων από μικρή ηλικία και με φυσικό τρόπο (Dimitrakopoulou, 2002). Ενδεικτικά, τονίζεται πως μέσα από τη χρήση του διαδραστικού πίνακα αυξάνεται ο ρυθμός και η περιεκτικότητα του μαθήματος αλλά και η συνεργατικότητα και η συμμετοχικότητα, διευκολύνεται η διαλογική διδασκαλία, αυξάνεται το ενδιαφέρον των μαθητών/-τριών από την παρουσίαση διδακτικού υλικού πολυτροπικά βάσει πολυαισθητηριακής προσέγγισης της γνώσης, μπορεί να αξιοποιηθεί και στην ειδική αγωγή (οπτικο-ακουστικό υλικό: ebook-ταινία) και την παραστατική διδασκαλία, προσφέρονται κίνητρα για μάθηση (Anastasiades et al., 2010; Koenraad, 2008; Niarrou & Grousouzakou, 2007). Οι έρευνες έδειξαν ακόμα ότι ο σχεδιασμός του μαθήματος σε διαδραστικό πίνακα μπορεί να βοηθήσει τους εκπαιδευτικούς να γίνουν πιο αποτελεσματικοί και με αυτό τον τρόπο να αυξήσουν την παραγωγικότητα τους. Η συγκεκριμένη τεχνολογία δίνει έμφαση στις στρατηγικές μάθησης που αφορούν στο «Μάθημα για Όλη την Τάξη» (Niarrou & Grousouzakou, 2007). Ταυτόχρονα, η χρήση της πλατφόρμας ηλεκτρονικής μάθησης (η-τάξη) παρέχει σε όλους, μαθητές/-τριες και εκπαιδευτικούς, ασφαλή και δωρεάν πρόσβαση ως πιστοποιημένοι χρήστες μέσω του λογαριασμού τους στο Πανελλήνιο Σχολικό Δίκτυο, οποιαδήποτε χρονική στιγμή, οπουδήποτε και αν βρίσκονται και από οποιαδήποτε σταθερή ή φορητή συσκευή (σταθερό υπολογιστή, φορητό, ταμπλέτα, κινητό τηλέφωνο). Βέβαια και η χρήση της τεχνητής νοημοσύνης, ως βοηθού του εκπαιδευτικού (**Kofteros,** 2024) μπορεί να εισαχθεί σε διάφορες φάσεις της διδασκαλίας των φιλολογικών μαθημάτων και συγκεκριμένα της λογοτεχνίας, όπως θα αναδειχθεί μέσα από τη διδακτική πρόταση. Παράλληλα, μέσω Τ.Ν. δημιουργούνται ιστορίες με εναλλακτικό τέλος, οπτικοποιούνται αποσπάσματα του έργου, αντικαθίστανται αφηγηματικοί τρόποι και τεχνικές, δημιουργούνται ιστορίες με κοινό θέμα, και αποδίδεται συνοπτικά το περιεχόμενο των κεφαλαίων ταχύτατα. Η χρήση συγκεκριμένα των ψηφιακών βοηθών μάθησης (chatbots) έχει τη δυνατότητα να βελτιώνει συνεχώς το μαθησιακό περιβάλλον, καθώς και να διεγείρει τον ενθουσιασμό, την πρωτοβουλία και τη δημιουργικότητα και την αλληλεπίδραση των μαθητών/τριών (Adiguzel, et al., *2023; Laos, 2025;* Lytsiousi*, 2025; Mavridis, 2024)*. Επιπρόσθετα, οι Τ.Π.Ε. μπορούν να συμβάλλουν στην ανάδειξη του παιγνιώδους χαρακτήρα της έντυπης λογοτεχνίας μέσω ποικίλων εφαρμογών για κατασκευή εννοιολογικών χαρτών, σταυρολέξων, κουίζ κ.ά. Αλλά και ο επεξεργαστής κειμένου ευνοεί τον πειραματισμό με τις λέξεις, ευνοεί τις διορθώσεις και τις επάλληλες γραφές κατά τη δημιουργική γραφή. Η μεταγραφή, εξάλλου, ενός λογοτεχνικού κειμένου με τη βοήθεια των πολυμέσων αναδεικνύει τη συνομιλία τεχνών στο εσωτερικό του και τη συνεργασία των αισθήσεων για την πρόσληψή του.

Η ΔΙΔΑΚΤΙΚΗ ΠΡΟΤΑΣΗ ΓΙΑ ΤΟ ΕΡΓΟ ΤΟΥ Κ. ΘΕΟΤΟΚΗ «Η ΤΙΜΗ ΚΑΙ ΤΟ ΧΡΗΜΑ»

Η ΕΠΙΛΟΓΗ ΤΟΥ ΕΡΓΟΥ

Ο Κ. Θεοτόκης είναι εκπρόσωπος του κοινωνικού ρεαλισμού κι ο εισηγητής του κοινωνιστικού μυθιστορήματος, αυτός που διεύρυνε ουσιαστικότερα από κάθε άλλον σύγχρονό του τα όρια της ηθογραφίας και της έδωσε καινούργια αίγλη (Ziras, 1979; Karvelis, 1978; Mastrodimitris, 1978; Stergiopoulos, 1986; Charis, 1963, 1976; Chourmouzios, 1946). Στη νουβέλα του «Η τιμή και το χρήμα» - έτος συγγραφής: 1911-1912, έτος έκδοσης: 1914- δεν εμμένει στη φωτογραφική απεικόνιση της πραγματικότητας αλλά στρέφεται στην κριτική και αντικειμενική επισκόπηση αυτής. Ρεαλιστική η γραφή του (Beaton, 1996; Politis, 1999: 257; Vitti, 1987) με σαφή επίδραση από τον (Γαλλικό) νατουραλισμό (Galaios, 2011; Dallas, 2005: 224-225, 231-234; Karvelis, 2017; Filippidis, 1997). Το δίδαγμα του Κ. Θεοτόκη είναι αυτό του κοινωνικού ρεαλιστή (Stergiopoulos, 1986) να δείξει, δηλαδή, πώς ο χαρακτήρας είναι δημιούργημα των κοινωνικών συνθηκών, όπου ζει ο άνθρωπος. Έντονη εξάλλου είναι η επιθυμία του για κοινωνική δικαιοσύνη και η αναμόρφωση της κοινωνίας,

επηρεασμένος από τον σοσιαλισμό, καθώς μέσα από τις νουβέλες του θέλησε να δείξει το δρόμο που θα οδηγούσε τη γυναίκα στην κοινωνική της απελευθέρωση (Karvelis, 2017). Με τον τρόπο αυτό εξυπηρετούνται και οι στρατηγικές του/της εκπαιδευτικού και ικανοποιούνται οι γνωστικοί και μεταγνωστικοί στόχοι του μαθήματος σύμφωνα με τον κριτικό γραμματισμό των Ν.Π.Σ. Ολοκληρώνοντας, η διδακτική αξιοποίηση μέσω Τ.Π.Ε. της νουβέλας του Κ. Θεοτόκη, που στηρίζεται σε διδασκαλία κειμενικού είδους που παράγεται σε συγκεκριμένο κοινωνικοπολιτιστικό πλαίσιο και γίνεται φορέας ιδεολογίας, εντάσσεται στο παραπάνω πλαίσιο.

ΣΚΟΠΟΙ ΤΗΣ ΔΙΔΑΣΚΑΛΙΑΣ

Οι στόχοι της διδασκαλίας ενός λογοτεχνικού έργου με τη χρήση Τ.Π.Ε. εντάσσονται στους γενικούς σκοπούς του μαθήματος που κι αυτοί εντάσσονται στους σκοπούς της εκπαίδευσης που αποτελεί μέρος της όλης παιδείας (Balaskas, 1990: 136). Συγκεκριμένα, οι στόχοι διδασκαλίας του έργου του Κ. Θεοτόκη είναι οι εξής:

- Να γνωρίσουν οι μαθητές/-τριες το είδος του μυθιστορήματος, το λογοτεχνικό ρεύμα στο οποίο εντάσσεται το έργο, το συγγραφέα και να εξοικειωθούν με τις αρχές της αφηγηματολογίας.
- Να πληροφορηθούν τη θέση της γυναίκας στις αρχές του 20ου αι, το θεσμό της προίκας και να τα συγκρίνουν με τη σύγχρονη εποχή (φεμινιστικό κίνημα, χειραφέτηση της γυναίκας).
- Να γνωρίσουν την κοινωνία της Κέρκυρας των αρχών του 20ου αι (άνοδος αστικής τάξης και παρακμή της αριστοκρατίας), ώστε να επιτευχθεί μια μετάγγιση βιωμένης εμπειρίας από τον πομπό στο δέκτη (Balaskas, 1985, 1990).
- Να προβληματιστούν σχετικά με τη σχέση Τιμής - Χρήματος αλλά και με τις παθογένειες της ελληνικής κοινωνίας της εποχής εκείνης.
- Να εξοικειωθούν με την τεχνολογία που αποτελεί την καθημερινότητά τους και να βιώσουν τη σχέση της τεχνολογίας/Τ.Ν. με τη γλώσσα/λογοτεχνία.
- Να απολαύσουν το έργο όσον αφορά το περιεχόμενο αλλά και την αισθητική του.
- Να καλλιεργηθεί η φιλαναγνωσία των μαθητών / -τριών.
- Να γνωρίσουν τη γλώσσα του κειμένου.
- Να βιώσουν τις ανησυχίες, τους φόβους, τις αγωνίες και τα έντονα συναισθήματα που χαρακτηρίζουν την καθημερινή ζωή των ανθρώπων, που πολλές φορές δεν καθορίζουν τη μοίρα τους.
- Να κατανοήσουν τα κίνητρα των συμπεριφορών και των στάσεων των ηρώων. Να γνωρίσουν το ήθος και τους χαρακτήρες τους και να παρακολουθήσουν την εξέλιξη της ψυχολογικής τους πορείας.

ΜΟΝΤΕΛΟ ΚΑΙ ΜΕΘΟΔΟΙ ΔΙΔΑΣΚΑΛΙΑΣ

Το μοντέλο διδασκαλίας είναι μεικτό, μαθητοκεντρικό και δασκαλοκεντρικό. Εστιάζει στο λογοτεχνικό κείμενο (κειμενοκεντρική μέθοδος) το οποίο εντάσσει στο ιστορικο-φιλολογικό περικείμενό του. Πρόκειται για ένα μοντέλο μαθητοκεντρικό, καθώς στηρίζεται στο **διερευνητικό τρόπο μάθησης, αλλά και δασκαλοκεντρικό, καθώς η διδασκαλία πραγματώνεται μέσα από μια διαλογική διδασκαλία (διδακτικός διάλογος με ερωταποκρίσεις)**. Τελείται δηλαδή μια καθοδηγούμενη διερεύνηση για την κατανόηση των αφηγηματικών τρόπων ή τεχνικών, των εκφραστικών μέσων αλλά και του επτανησιακού ιδιώματος, της κοινωνίας των αρχών του 20ου αι αλλά και της ψυχολογικής πορείας των ηρώων. Ταυτόχρονα, το μαθητοκεντρικό μοντέλο διδασκαλίας στηρίζεται και στην ομαδοκεντρική μέθοδο, μια μάθηση που αναδεικνύει την κοινωνική διάσταση της μάθησης, καθώς ενισχύει τη συνεργατική εργασία. Μέθοδος διδασκαλίας είναι και μια **διακειμενική προσέγγιση της λογοτεχνίας** (συνανάγνωση κειμένων), η «συνομιλία», δηλαδή, του κειμένου με άλλα έργα του ιδίου ή άλλων συγγραφέων, ομόθεμα (με κοινούς θεματικούς άξονες) ή ομότροπα (με κοινούς εκφραστικούς τρόπους). Τέλος, γίνεται χρήση Τ.Π.Ε. που αποτελούν συστατικό στοιχείο οργάνωσης και λειτουργίας του μαθήματος και προσανατολίζουν την εκπαίδευση σε μη γλωσσικά ερεθίσματα αλλά σε οπτικοακουστικά, ώστε να επιτυγχάνεται μια πολυτροπική παρουσίαση του λογοτεχνικού κειμένου.

ΠΡΟΑΠΑΙΤΟΥΜΕΝΑ

Διαδραστικός πίνακας, σύνδεση με το διαδίκτυο, γνώση κειμενογράφου, χρήσης ηλεκτρονικής τάξης, χρήσης των γλωσσικών μοντέλων (chatbots) της τεχνητής νοημοσύνης αλλά και γνώση του αφηγηματικού είδους και βασικών όρων αφηγηματολογίας (π.χ. αφηγητής, αφηγηματικοί τρόποι και τεχνικές).

Η ΔΙΔΑΚΤΙΚΗ ΠΟΡΕΙΑ
ΣΥΝΔΕΣΗ ΜΕ ΤΑ ΠΡΟΗΓΟΥΜΕΝΑ (1 ΩΡΑ)

Έχει προηγηθεί α) εισαγωγική διδασκαλία για τη Νέα Αθηναϊκή σχολή και την πεζογραφία των τελευταίων δεκαετιών του 19ου αι και των αρχών του 20ου αι για την ηθογραφία, για το μυθιστόρημα (και τις διαφορές του από το

διήγημα και τη νουβέλα) για τις τεχνοτροπίες που παρατηρούνται την ίδια περίοδο στο μυθιστόρημα (ρεαλισμός-νατουραλισμός). β) εισαγωγική διδασκαλία για τον ηθογράφο Κερκυραίο πεζογράφο Κ. Θεοτόκη (βίος, τόπος, χρόνος, οικονομική και πολιτική κατάσταση της εποχής του, λογοτεχνικές και πολιτικές επιρροές του).

ΠΑΡΟΥΣΙΑΣΗ -ΚΑΤΑΝΟΗΣΗ ΤΟΥ ΕΡΓΟΥ

Όλο το έργο χωρίζεται σε 13 κεφάλαια[1] που φέρουν τίτλο. Στην πλατφόρμα της ηλεκτρονικής τάξης αναρτάται σύνδεσμος με το ηχητικό βιβλίο (eVivlio – Audiobooks) (I.E.P.) και ένα αρχείο με το έργο του Κ. Θεοτόκη, έκδοσης Γιάννη Φαρσάρη, Ανοιχτή βιβλιοθήκη (www.openbook.gr). Οι μαθητές/-τριες οφείλουν να έχουν διαβάσει ή ακούσει το κεφάλαιο που πρόκειται να διδαχθεί. Μπορούν να χρησιμοποιήσουν ένα γλωσσάρι του επτανησιακού ιδιώματος που έχει αναρτηθεί στην ηλεκτρονική τάξη, για να κατανοήσουν τις ιδιωματικές λέξεις του έργου. Η διδασκαλία κάθε κεφαλαίου είναι ωριαία και ακολουθείται πορεία απαγωγική (ανεστραμμένη πυραμίδα): αναρτώνται στην e -τάξη ανά κεφάλαιο ερωτήσεις κατανόησης και επεξεργασίας του αφηγηματικού λόγου βάσει της ερευνητικής και διαλεκτικής μεθόδου διδασκαλίας από κάτι γενικό σε κάτι πιο ειδικό. Αρχικά, παρουσιάζεται το κείμενο συνοπτικά, δίνοντας έμφαση στην πλοκή, το κύριο θέμα, τους βασικούς χαρακτήρες, τον τόπο και το χρόνο. Αναρτώνται ερωτήσεις όπως: Ποιο είναι το βασικό θέμα του κεφαλαίου; Ποιος είναι ο κεντρικός ήρωας και τα άλλα πρόσωπα; Ποιος είναι ο τόπος και ο χρόνος; Πώς εξελίσσεται ο μύθος; Ποιο είναι το κύριο μήνυμα του συγγραφέα; (Κορυφή της πυραμίδας -Βασικές πληροφορίες-Γενική εικόνα). Αμέσως μετά εξετάζεται το «πώς αφηγείται ο συγγραφέας», το ύφος του, τα εκφραστικά μέσα (εικόνες, παρομοιώσεις, μεταφορές, κοσμητικά επίθετα κ.ά), οι αφηγηματικοί τρόποι (αφήγηση, διάλογος, περιγραφή, εσωτερικός μονόλογος, σχόλιο) και τεχνικές (όπως ευθύγραμμη αφήγηση, επιτάχυνση κ. ά). Ταυτόχρονα, θέτονται προβληματισμοί για τη σχέση γλώσσας και τεχνικής με την κατανόηση του κειμένου. Θέτονται ερωτήσεις όπως: Με ποιους αφηγηματικούς τρόπους παρουσιάζονται οι ήρωες; Ποια γλωσσικά μέσα χρησιμοποιούνται, για να περιγραφούν οι ήρωες; Με ποιες εικόνες (οπτικές, κινητικές, ακουστικές, οσφρητικές) παρουσιάζονται ο τόπος ή οι ήρωες; Ποιο το ύφος του κειμένου και με ποιες γλωσσικές επιλογές το επιτυγχάνει ο συγγραφέας; Ποια η γλώσσα του κειμένου; Μπορείτε να βρείτε τύπους του επτανησιακού ιδιώματος; (Μέση της πυραμίδας – γλώσσα, ύφος, αφηγηματικοί τρόποι και τεχνικές). Ολοκληρώνοντας, η διδασκαλία προχωρά στη διερεύνηση του «γιατί», σε βαθύτερη ανάλυση των χαρακτήρων, των ψυχολογικών τους διακυμάνσεων τεκμηριωμένη στον αφηγηματικὸ λόγο, αφού το έργο συνδέεται με το ιστορικό και κοινωνικό πλαίσιο στο οποίο γράφτηκε. Ενθαρρύνονται οι μαθητές να εκφράσουν προσωπικές απόψεις και να αναπτύξουν επιχειρήματα. Διατυπώνονται για παράδειγμα οι ερωτήσεις: Ποια η συναισθηματική κατάσταση του ήρωα; Πώς κρίνετε τη συμπεριφορά του ήρωα; Για ποιους λόγους νομίζετε πως η ήρωας ενεργεί με αυτόν τον τρόπο; Ποια η σχέση του τίτλου με τη φράση «Ανάθεμα τα τάλαρα!», Πώς θα δρούσατε εσείς σε ανάλογη περίπτωση; Ποιον ήρωα θαυμάζετε και ποιον όχι και γιατί; (Βάση της πυραμίδας -Λεπτομερής ανάλυση και κριτική σκέψη). Ολοκληρώνοντας, γίνεται ωριαία αποτίμηση όλου του έργου με γενικές ερωτήσεις αναφορικά με τον τίτλο, τα χαρακτηριστικά της ηθογραφίας, τα κοινωνικά προβλήματα της εποχής, τη γλώσσα του κειμένου, τους χαρακτήρες, τις αξίες: Να εξηγήσετε γιατί, κατά τη γνώμη σας, ο συγγραφέας επέλεξε το συγκεκριμένο τίτλο για το έργο. Ποιος άλλος τίτλος νομίζετε θα ταίριαζε στη νουβέλα αυτή; Ποια χαρακτηριστικά της ηθογραφίας εντοπίζετε στο έργο του Κ. Θεοτόκη (αναφέρετε 5 χαρακτηριστικά με αναφορές από το έργο). Ο Κ. Θεοτόκης κατακρίνει τα κακώς κείμενα της εποχής του. Ποια είναι τα σημαντικότερα προβλήματα τα οποία αναφέρονται στο πεζογράφημα; Να καταγράψετε γλωσσικές ιδιωματικές λέξεις ή φράσεις που χρησιμοποιούσαν οι Έλληνες της Κέρκυρας της εποχής στην οποία αναφέρεται το έργο. Να ετοιμάσετε ένα μικρό γλωσσάρι μ' αυτά ή να καταγράψετε κάποια χαρακτηριστικά του ιδιώματος. Ποιες προσωπικότητες της νουβέλας θαυμάσατε πιο πολύ και γιατί; Ποιες αξίες προβάλλονται στο έργο του Θεοτόκη; Όταν η διδασκαλία ολόκληρου του έργου ολοκληρωθεί, γίνεται προβολή της ταινίας της Τώνιας Μαρκετάκη (1984), «Η τιμή της αγάπης» βασισμένη στη νουβέλα του Κ. Θεοτόκη (επιλεγμένα αποσπάσματα). Γίνεται σύγκριση της ταινίας με τη νουβέλα, εντοπίζονται τυχόν διαφορές και οι λόγοι της διαφοροποίησης.

ΑΞΙΟΛΟΓΗΣΗ ΤΟΥ ΜΑΘΗΜΑΤΟΣ

Η αξιολόγηση του μαθήματος γίνεται με ατομικές και ομαδικές εργασίες ανά κεφάλαιο που αποστέλλονται μέσω e-τάξης. Έχουν καθοριστεί οι ομάδες (μέλη και υπεύθυνοι που ανεβάζουν στην πλατφόρμα την ομαδική εργασία). Η βαθμολογία και η διόρθωση των εργασιών αποστέλλονται ηλεκτρονικά.

[1] Α΄ Το λαθρεμπόριο. Β΄Ο διάλογος της σιόρας Επιστήμης με τον Αντρέα και η πρώτη συνάντηση του Αντρέα με τη Ρήνη. Γ΄ Στην ταβέρνα του Τραγούδη. Δ΄ Στην πλατεία του Μαντουκιού και στο σπίτι της σιόρας Επιστήμης. Ε΄Ο Αντρέας ταξιδεύει με το καΐκι του, για να κάνει λαθρεμπόριο. ΣΤ΄ Ο Αντρέας κλέβει τη Ρήνη με τη θέλησή της. Ζ΄Η σιόρα Επιστήμη μαθαίνει την αρπαγή της Ρήνης και τρέχει να τη σώσει. Η΄Ο αγώνας λόγων του Σπύρου και της σιόρας Επιστήμης. Θ΄Η αντιφατική συμπεριφορά του Αντρέα. Ι' Η τραγική κατάσταση της Ρήνης. ΙΑ΄Η αγάπη ανάμεσα στη σιόρα Επιστήμη και την κόρη της νικά! ΙΒ΄Η σιόρα Επιστήμη πηγαίνει στην αγορά, για να βρει τον Αντρέα. ΙΓ΄Η Ρήνη αρνείται την πρόταση του Αντρέα να την παντρευτεί.

(Α) Οι ατομικές εργασίες περιλαμβάνουν ερωτήσεις (1) περιεχομένου και σχετικές με το συγκείμενο (χωροχρόνος, ιστορικές, κοινωνικές και οικονομικές συνθήκες του χρόνου συγγραφής, ο πολιτισμός, οι αντιλήψεις, οι παραδόσεις και τα ήθη), (2) κειμενικών δεικτών (λογοτεχνικό είδος, αφηγηματικοί τρόποι, τεχνικές, σχήματα λόγου, γλωσσικές επιλογές, στοιχεία εξέλιξης και πλοκής, οι χαρακτήρες και η δράση τους, το ύφος. ο τίτλος), (3) σχολιασμού απόψεων διακειμενικότητας (συνανάγνωσης του έργου με άλλα έργα του ιδίου ή άλλων συγγραφέων, με κοινούς θεματικούς άξονες ή με κοινούς εκφραστικούς τρόπους), (4) χρήσης Τ.Ν. (chatbots): (α) οπτικοποίησης (εικονογράφησης) κάποιων αφηγηματικών αποσπασμάτων και αξιολόγηση του αποτελέσματος από τους ίδιους τους/τις μαθητές/τριες (β) αλλαγής αφηγητή, οπτικής γωνίας, αφηγηματικών τρόπων (π.χ. αντικατάσταση του εσωτερικού μονολόγου ή του διαλόγου με τριτοπρόσωπη αφήγηση) κάποιων αποσπασμάτων και αξιολόγηση του αποτελέσματος, (γ) ανάπτυξης διαλόγου των μαθητών/-τριών με τον Κ. Θεοτόκη/Τ.Ν. (chatbot) π.χ. για την επιλογή του τίτλου ή των αφηγηματικών τρόπων με στόχο την ανάπτυξη επιχειρηματολογίας αλλά και κριτικής αντιμετώπισης της Τ.Ν.

(Β) Οι ομαδικές εργασίες: Οι μαθητές/-τριες χωρισμένοι σε ομάδες των 4 ατόμων βάσει της ομαδοσυνεργατικής μεθόδου (Matsagouras, 2000) αναλαμβάνουν εργασίες (1) παραγωγής κριτικού λόγου: η ανάπτυξη τεκμηριωμένης προσωπικής γνώμης, η συμφωνία ή η διαφωνία τους με προβλήματα, θέσεις, στάσεις, στερεότυπα, προκαταλήψεις κ.ά. που θέτει το κείμενο (2) δημιουργικής γραφής, που συνοδεύεται με ετεροαξιολόγηση (**Kofteros**, 2024: 93) όπως: (α) Δημιουργίας εναλλακτικού τέλους: «Αν αλλάζατε το τέλος της νουβέλας, πώς θα τελειώνατε το πεζογράφημα; Φανταστείτε ένα διαφορετικό τέλος και προχωρήστε σε παραγωγή λόγου. Έπειτα ζητήστε από την Τ.Ν. (chatbots) να κάνει το ίδιο και αξιολογήστε το αποτέλεσμα. Ποια πρόταση θεωρείτε πιο πετυχημένη και γιατί;» (β) Προσθήκης κάποιου ήρωα με αποτέλεσμα την αλλαγή της πλοκής ή της σκηνής. Για παράδειγμα: «Ο μπάρμπα Σπύρος στο κεφ. ΙΑ΄ βρίσκεται έξω από το παράθυρο του σπιτιού του Αντρέα και ακούει τις ηρωίδες να μιλούν και αυτός σχολιάζει το διάλογο των γυναικών με εσωτερικό μονόλογο. Φανταστείτε τη σκηνή και ζητήστε και από την Τ.Ν. (chatbots) να κάνει το ίδιο. Στη συνέχεια, αξιολογείστε το αποτέλεσμα.» (γ) Καταγραφής συναισθημάτων και σκέψεων κάποιου ήρωα του έργου από τους μαθητές στο ημερολόγιό τους. (δ) Περιληπτικής απόδοσης του περιεχομένου ενός κεφαλαίου: «Ετοιμάστε την περίληψη του κεφαλαίου και ζητήστε το ίδιο από την Τ.Ν. (chatbots). Στη συνέχεια αξιολογήστε τις περιλήψεις.»

ΦΥΛΛΑ ΕΡΓΑΣΙΑΣ

ΦΥΛΛΟ 1^{Ο}: ΚΕΦΑΛΑΙΟ Γ΄: Α΄ ΜΕΡΟΣ - ΑΤΟΜΙΚΕΣ ΕΡΓΑΣΙΕΣ

1. α) Ποιος ο τόπος, ο χρόνος και τα πρόσωπα του 3^{ου} κεφαλαίου; β) Πώς περιγράφεται η ταβέρνα του Τραγούδη (βρείτε επίθετα και εικόνες: οπτικές, ακουστικές, κινητικές και οσφρητικές);

2. α) Να αναφέρετε κάποια επαγγέλματα που υπήρχαν στην Κέρκυρα στις αρχές του 20ου αι. και να σχολιάσετε την εξέλιξή τους στον 21^{ο} αι. β) Να καταγράψετε από το κεφάλαιο γ΄ γλωσσικές ιδιωματικές λέξεις ή φράσεις που χρησιμοποιούσαν οι Έλληνες της Κέρκυρας της εποχής στην οποία αναφέρεται το έργο.

3.α) Γιατί οι άνδρες δεν ήθελαν να αποκτούν κορίτσια στις αρχές του 20^{ου} αι; Να απαντήσετε με αναφορές στο τρίτο κεφάλαιο. β) Διαβάζοντας το τρίτο κεφάλαιο βρίσκετε αναλογίες αναφορικά με τη θέση του άντρα στη σημερινή εποχή;

4.α) «Σας το δίνω γραφτό, η Κυβέρνηση είναι πεσμένη.» «Το ξέρουμε» του αποκρίθηκε ο Αντρέας «που δεν ανήκεις στο κόμμα, γιατί δεν έφαες όσα ήθελες από την εργολαβία του θεάτρου·μα το χατήρι δε θα σου γένει.» Ποια πολιτική κατάσταση της εποχής στην Κέρκυρα καυτηριάζει ο συγγραφέας; β) Να συγκρίνετε το παρακάτω απόσπασμα από το έργο του Κ. Χατζόπουλου, «Αγάπη στο χωριό» με το συγκεκριμένο κεφάλαιο από το έργο του Κ. Θεοτόκη «Η τιμή και το χρήμα».

«Καλώς τουν κυρ Γιώργ'» άκουσε άξαφνα μια φωνή από το βάθος και προχώρησε εκεί. Θολό φως, πέφτοντας από ένα στενό παράθυρο θαμπόφεγγε τρεις ανθρώπους καθισμένους γύρω σ΄ ένα μικρό τραπέζι. «Μουρέ ισείς είσαστι; Τόστρουσάτι κιόλας; Απ' ν' ικλισά ίσα στουν πουτιστή!» είπε σαν τους γνώρισε πως ήταν τρεις αργατικοί, και στάθηκι μπροστά τους. «Ήρθαμι να κάνουμι σιφτέ τ' Φώτ' στου νέου απόγειου. Κάτσι να σι κεράσουμι» είπε ο ένας απ' αυτούς. «Οχ, καημένι Τάσου, δεν είμι να κάτσου. Ήρθα κάτ' να που τ' Φώτ΄ιδώ», απάντησε ο Γιώργης γυρίζοντας κατά το Φώτη που σίμωσε από το βάθος με το γιλέκι μονάχα και με μακριά ποδιά ίσα με κάτω. «Ξ'στός ανέστ'», είπε τούτος, δίνοντάς του το χέρι και πρόβαλε το στόμα. «Αληθώς ανέστ'». Ο Γιώργης έκαμε το ίδιο κίνημα. Εκείνοι που κάθονταν στο τραπέζι,

σαν τους είδαν που φιλήθηκαν, σηκώθηκαν και φιλήθηκαν κι αυτοί με το Γιώργη. «Έχ'ς αδειά να σ' που ένα λόγου;» ρώτησε τούτος το Φώτη ύστερα από μικρή σιωπή. «Μιταχαράς» αποκρίθηκε εκείνος και τράβηξε προς τα μέσα. Ο Γιώργης τον ακολούθησε. «Να πιάσου δυο κρασάκια;» ρώτησε ο πρώτος, άμα έφτασαν σ' ένα τραπέζι μπροστά στον πάγκο, κ' έδωκε ένα σκαμνί του Γιώργη. «Δεν τ' αφήν'ς καλύτιρα!» «Να στείλου να μας φέρ'νι δυο καφέδις;» «Ότ' έπια. Κάτσι να σ' που τώρα πόχ'ς αδειά, μπριν έρθ' ου κόσμους» ξαναπάντησε ο Γιώργης και κάθισε.» Κ. Χατζόπουλος, «Αγάπη στο χωριό».

Β΄ ΜΕΡΟΣ - ΕΡΓΑΣΙΕΣ ΟΜΑΔΟΣΥΝΕΡΓΑΤΙΚΕΣ

Α΄ Ομάδα: Σχετικά με τη θέση των αντρών επισημαίνεται από την Ευγενία Ζαβρίδου (Zavridou, 2010: 55): «Οι άντρες αφιερώνουν αρκετό χρόνο καθημερινά στη διασκέδασή τους με τις συναναστροφές και τις συζητήσεις τους στις ταβέρνες.» Να βρείτε αν επιβεβαιώνεται αυτή η επισήμανση στο 3ο κεφάλαιο.

Β΄ Ομάδα: «Η βασική ιδέα του έργου, που επαναλαμβάνεται σταθερά από τη Ρήνη και τον Αντρέα όπως και από άλλα πρόσωπα, είναι η ιδέα που συνοψίζεται στη φράση «Ανάθεμά τα τά τάλαρα!». Στηρίζεται στη βασική αντίθεση χρήμα (υλικό) - τιμή (πνευματικό). Η αντίθεση αυτή συνδηλώνει πως η υπερτίμηση του χρήματος και η υποτίμηση της τιμής δημιουργούν μια αντιφατική κατάσταση που προκαλεί πόνο.» Πώς επιβεβαιώνεται η άποψη αυτή της Ευγενίας Ζαβρίδου (Zavridou, 2010: 52) στο τρίτο κεφάλαιο;

Γ΄ Ομάδα: «Η γυναίκα της εποχής πρέπει να υπακούει σε έναν κώδικα συμπεριφοράς και να ακολουθεί ένα συγκεκριμένο πρότυπο αρετών, δηλαδή να είναι ηθική, τίμια και εργατική. Αυτές οι τρεις ιδιότητες πρέπει να συνδυάζονται με την ομορφιά και την προίκα, για να έχει μια κοπέλα ελπίδες να παντρευτεί.» Πώς επιβεβαιώνε-ται η παραπάνω άποψη της Ευγενίας Ζαβρίδου (Zavridou,2010: 54-55) στο τρίτο κεφάλαιο;

Δ΄ Ομάδα: «Απέναντι στον πόλεμο ο συγγραφέας παίρνει αρνητική στάση δηλώνοντας ότι οι πόλεμοι είναι πηγή της αδικίας και της ανισότητας: Εκφράζει πόνο για το δράμα της ελληνικής κοινωνίας που αντιμετωπίζει την αθλιότητα και την εκμετάλλευση, παρουσιάζοντάς το με γλαφυρότητα μέσα από τον καθημερινό αγώνα, την αγωνία για το καθημερινό ψωμί, το μόχθο και τον κάματο που παραμένουν αδικαίωτα, την πίκρα που λυγίζει την ηθική και την αγνότητα των ανθρώπων.» Να βρείτε αν επιβεβαιώνεται αυτή η άποψη της Ευγενίας Ζαβρίδου (Zavridou, 2010: 51) στο τρίτο κεφάλαιο.

Ε΄ Ομάδα: «Η ταβέρνα σεσημασμένος νατουραλιστικός χώρος περιγράφεται όχι μόνο εξωτερικά και εσωτερικά (κυρίως), αλλά και ως φορέας ποικίλλων διαταξικών λειτουργιών (ψυχαγωγίας, πολιτικής συζήτησης και προπαγάνδας).» Να επιβεβαιώσετε την άποψη του Ιωάννη Γαλαίου (Galaios, 2011: 330) στο συγκεκριμένο κεφάλαιο.

ΦΥΛΛΟ 2Ο: Ζ΄ ΚΕΦΑΛΑΙΟ: Α΄ ΜΕΡΟΣ – ΑΤΟΜΙΚΕΣ ΕΡΓΑΣΙΕΣ

1.α) Ποιος ο τόπος, ο χρόνος και τα πρόσωπα της αφήγησης στο κεφάλαιο Ζ΄; β) Πώς αντέδρασε η σιόρα Επιστήμη, όταν η γειτόνισσά της η Κωνσταντίνα έτρεξε να την πληροφορήσει πως ο Αντρέας έκλεψε την κόρη της; Με ποια εκφραστικά μέσα παρουσιάζεται από τον Κ. Θεοτόκη η αντίδρασή της;

2. Ποιους από τους παρακάτω αφηγηματικούς τρόπους χρησιμοποιεί ο Κ. Θεοτόκης σ΄ αυτό το κεφάλαιο: αφήγηση, περιγραφή, διάλογος, εσωτερικός μονόλογος, ελεύθερος πλάγιος λόγος, σχόλιο; Ποιος ο ρόλος τους;

3.α) Ποια τα συναισθήματα της σιόρας Επιστήμης, όταν πληροφορήθηκε την αρπαγή της κόρης της από τον Αντρέα; β) Ποια τα συναισθήματα του κόσμου για τη σιόρα Επιστήμη σ' αυτό το κεφάλαιο; Με ποια γλωσσικά μέσα εκφράζονται;

4. Να οπτικοποιήσετε μέσω T.N. (chatbots) κάποιο απόσπασμα του κεφαλαίου και έπειτα να αξιολογήσετε το αποτέλεσμα.

5. Να συγκρίνετε (α)τη συμπεριφορά των γονιών της νεαρής ηρωίδας του Κ. Θεοτόκη, όταν πληροφορήθηκαν την «ατίμωσή» της στο απόσπασμα του έργου «Υπόληψη» του Κ. Θεοτόκη που σας δίνεται παρακάτω, με τη συμπεριφορά της σιόρας Επιστήμης στο συγκεκριμένο κεφάλαιο του Κ. Θεοτόκη. (β) τους άγραφους νόμους της αγροτικής κοινωνίας των αρχών του 20ου αι αναφορικά με την «τιμή» της κοπέλας.

«Το σόι μας είναι φτωχό, ναι, μα είναι αντρόπιαστο. Εγώ είμαι γέροντας, μα έχω εδικούς παληκάρια. Λέγε Μαρία, τι σου'καμε ο παλιάνθρωπος;» Κ' εσηκώθηκε. «Σου μίλησε άσκημους λόγους;» ερώτησε. «Ναι» είπε δειλά η

Μαρία. «Κ' επαραδέχτηκες;» εφώναξε η μητέρα χολεμένη, σηκώνοντας μία σκίζα από τη στιά για να δείρει τη θυγατέρα της. «Αυτά τα διδάγματα σου'χα δώκει; Έτσι μας τιμάς;» Επρόστεσε φοβερίζοντας. «Δε φταίω» είπε η Μαρία κρούβοντας ντροπιασμένη το πρόσωπο. «Έπρεπε να του βγάλεις τα μάτια» της αποκρίθηκε η μάνα της. «Μόπιασε το χέρι!». «Το χέρι; Κι από τα χτες δεν ήξερες να μιλήσεις;» «Σκύλα» την έβρισε ο Ζόψης αχνίζοντας. «Ξαφνικό μας» είπε η μάνα χτυπώντας το κεφάλι της. «Τέτοια θέρισσα είσουνε και σ' εθρέφαμε σπίτι μας; Θα σε διώξουμε όμως, ή θα σε κάμουμε να δώκεις τέλος χωρίς φαί και χωρίς πιοτό.» «Και σου' καμε κι άλλο;» ερώτησε βραχνά ο πατέρας «σ΄εφίλησε κιόλας α χρειάζεται;» Μια στιγμή ετσώπασαν όλοι. Οι γονέοι ετήραξαν ανήσυχοι τη θυγατέρα τους προσμένοντας την απάντηση. Εκείνη τους εκοίταξε φοβισμένη κ' εκούνησε άφωνα το κεφάλι. «Τι λες μωρή» είπε ο γέρος οργισμένος και της έπιασε το χέρι και την ετίναξε όσο εδυνότουν. «Τέτοια ντροπή μού' καμες;» Όμως την ερώτησε: «Ήταν κι άλλος αυτού;» «Ναι» αποκρίθηκε τρομασμένη «μας είδε η Κατερίνα και η μάνα της». «Αχ, αχ» έκαμε η μητέρα και την έφτυσε στο πρόσωπο και την εχτύπησε με τη σκίζα. Το χωριό λοιπόν όλο το ξέρει. Και γω να σε βαστάξω σπίτι μου. Φεύγα γλήγορα, φεύγα. Ή να σε πάρει ή να χαθείς.» Και λέγοντας έτσι ο πατέρας την ετίναζε και την άμπωνε θυμωμένος προς την πόρτα και με μια κλωτσιά την έβγαλε όξω.» Κ. Θεοτόκης, Η Υπόληψη (1904).

Β΄ ΜΕΡΟΣ - ΕΡΓΑΣΙΕΣ ΟΜΑΔΟΣΥΝΕΡΓΑΤΙΚΕΣ

Α΄ Ομάδα: «Η σιόρα Επιστήμη οδηγημένη από την ανάγκη, ανέπτυξε έναν υπολογιστικό χαρακτήρα με κέντρο της συνείδησής της το χρήμα.» Επιβεβαιώνεται η άποψη του Γ.Δ. Παγανού (Paganos 2017: 39) για τη σιόρα Επιστήμη σ΄ αυτό το κεφάλαιο;

Β΄ Ομάδα: Το κεφάλαιο θα μπορούσε να ονομαστεί «ο ύμνος της αγάπης». Επιβεβαιώνεται αυτός ο χαρακτηρισμός;

Γ΄ Ομάδα: Ο διάλογος αποτελεί τον κυρίαρχο αφηγηματικό τρόπο στα περισσότερα μέρη του διηγήματος, με αποτέλεσμα να αποδίδονται με παραστατικότητα, ζωντάνια και αμεσότητα οι συναισθηματικές εξάρσεις και οι δραματικές εντάσεις. Επιβεβαιώνεται η άποψη στο συγκεκριμένο κεφάλαιο;

Δ΄ Ομάδα: «Υπάρχει μια ομαλή εξέλιξη του αφηγηματικού χρόνου χωρίς περίτεχνες αναδρομές και επανασυνδέσεις.» Επιβεβαιώνεται η άποψη του Γ. Δ. Παγανού (Paganos 2017: 41) στο συγκεκριμένο κεφάλαιο;

Ε΄ Ομάδα: «Κεντρικός στόχος των ιστοριών του Θεοτόκη είναι οι δυνάμεις που κινούν τα νήματα, διαμορφώνουν τους χαρακτήρες και βρίσκονται πίσω από τις αποφάσεις τους και τις πράξεις τους. Στις δυνάμεις αυτές ανήκουν οι άγραφοι νόμοι της αγροτικής κοινωνίας (π.χ. η τιμή της κόρης ή της οικογένειας) και τα ανθρώπινα πάθη (π.χ. το ερωτικό πάθος, η ζήλια). Έτσι άλλοι ήρωες εμφανίζονται ως υπερασπιστές της τιμής της γυναίκας και της υπόληψης της οικογένειας και άλλοι είναι δέσμιοι των παθών τους.» Επιβεβαιώνεται η παραπάνω άποψη του Τάκη Καρβέλη (Karvelis, 2017: 34) στο συγκεκριμένο κεφάλαιο, μελετώντας τη συμπεριφορά των βασικών ηρώων;

ΦΥΛΛΟ 3^{Ο}: ΚΕΦΑΛΑΙΟ ΙΑ΄: Α΄ ΜΕΡΟΣ – ΑΤΟΜΙΚΕΣ ΕΡΓΑΣΙΕΣ

1.α) Πώς αντέδρασε η τοπική κοινωνία, όταν η Ρήνη άρχισε να δουλεύει στο εργοστάσιο; β) Ποιες κοινωνικές αλλαγές βλέπετε να συντελούνται στη μικρή συντηρητική κοινωνία αυτού του προαστίου της Κέρκυρας;

2.α) Ποιες αξίες προβάλλονται σ' αυτήν την ενότητα; β)Ποια η συναισθηματική κατάσταση των ηρωίδων (μάνας & κόρης);

3.Υποθέστε πως αλλάζει ο αφηγητής (παντογνώστης αφηγητής-συγγραφέας) και αφηγήτρια του κεφαλαίου γίνεται η Ρήνη. Τι αλλαγές θα συμβούν στο πρόσωπο του αφηγητή και στην οπτική γωνία; Στη συνέχεια ζητήστε από τα γλωσσικά μοντέλα της Τ.Ν. (chatbots) να προχωρήσουν σ' αυτήν την αλλαγή στο συγκεκριμένο κεφάλαιο. Πώς κρίνετε αυτήν την αλλαγή του αφηγητή διαβάζοντας το νέο κεφάλαιο που σας έχει δώσει η Τ.Ν.;

4. Ποια τα συναισθήματά σας για τις δύο ηρωίδες-πρωταγωνίστριες του Κ. Θεοτόκη, όπως σας γεννιούνται από τα λόγια και τα έργα τους στη συγκεκριμένη σκηνική ενότητα;

5. «Στον πυρήνα και των δύο έργων υπάρχει το ίδιο πρόβλημα: η υποβαθμισμένη θέση της γυναίκας μέσα στην ελληνική κοινωνία των αρχών του 20^{ου} αι. Ο Α. Παπαδιαμάντης επιλέγοντας μια προωθημένη φανταστική λύση έδωσε μια «δαιμονική» και τραγικότερη διάσταση στον τύπο της ηρωίδας του. Αντίθετα, ο Θεοτόκης μένοντας πιστός στις σοσιαλιστικές ιδέες που τον ενέπνευσαν, όταν έγραφε την κοινωνική του νουβέλα -πριν από τους Βαλκανικούς πολέμους-

θέλησε να δείξει με μέθοδο αυστηρά ρεαλιστική το δρόμο που θα οδηγούσε τη γυναίκα στην κοινωνική της απελευθέρωση» (Paganos, 2017: 38). Αφού διαβάσετε το παρακάτω απόσπασμα από τη Φόνισσα (1903) του Α. Παπαδιαμάντη και αφού το συγκρίνετε με τη συγκεκριμένη σκηνική ενότητα της νουβέλας «Η Τιμή και το χρήμα» (1912) του Κ. Θεοτόκη, να επιβεβαιώσετε την παραπάνω άποψη του Γ.Δ. Παγανού.

«Τι δούλεψη να κάμη κανείς στη φτώχεια!... Η μεγαλύτερη καλωσύνη που μπορούσε να τους εκάμη (ενν. στα κορίτσια) θα ήτον να είχε κανείς στερφοβότανο να τους δώση. (Θε μ', σχώρεσέ με!) Ας ήτον και παλικαροβότανο!επέφερε Γιατί κάνει όλο κοριτσάκια, κι αυτή η φτωχιά!... Θαρρώ πως έχει πέντ' έξι ως τώρα. Δεν ξέρω αν της έχη πεθάνει κανένα... απ' αυτά τα εφτάψυχα!» Είχεν ερευνήσει, τω όντι, επί χρόνους πολλούς, εις τα βουνά και τας φάραγγας, όπως εύρη «παλικαροβότανο» διά την κόρην της, αλλ' εκείνο το οποίον της είχε δώσει δεν επέτυχεν εξ εναντίας, ενήργησε μάλλον ως «κοριτσοβότανο». Και όμως εις αυτήν άλλοτε, όταν της το έδωκεν η ανδραδέλφη της, είχε τελεσφορήσει, διότι έκαμε τέσσαρας υιούς, και μόνον τρεις θυγατέρας. Όσον αφορά το «στερφοβότανο», ο πνευματικός τής είχεν ειπεί προ χρόνων ότι είναι μεγάλη αμαρτία.[…]Η Φραγκογιαννού εσκέφθη: «Θα φωνάξουν, τάχα;... Θ' ακουστή; Πού ν' ακουστή!... Πρέπει να κάμω γλήγορα, προσέθηκε μέσα της. Αυτός, όπου είναι, τώρα σε λίγο, θά 'ρθη δω, γιατί θα σουρουπώση, και δε θα βλέπη να κάνη δουλειά εκεί κάτω... Και πρέπει να φεύγω το γληγορότερο, χωρίς να με ιδή, όπως δεν με είδε ως τώρα».Εδίστασε προς στιγμήν. Ησθάνθη μέσα της φοβεράν πάλην. Είτα είπε, σχεδόν μεγαλοφώνως: «Καρδιά!... αυτό είναι μια απόφαση».Και δράξασα με τας δύο χείρας τα δύο κοράσια, τα ώθησε με μεγάλην βίαν.Ηκούσθη μέγας πλαταγισμός.Τα δύο πλάσματα έπλεαν εις το νερόν της στέρνας. Η μεγαλυτέρα κορασίς έρρηξεν οξείαν κραυγήν, ήτις αντήχησεν εις την μοναξιάν της εσπέρας.— Μα...!Εξ εμφύτου ορμής, η Φραγκογιαννού έστρεψε το πρόσωπον προς την λευκήν καλύβην, όπου μέχρι τούδε είχεν εστραμμένα τα νώτα.Και συγχρόνως ητοιμάζετο να φύγη, και συνάμα έστρεφε τον κανθόν του όμματος προς την στέρναν, διά να ιδή αν διήρκει η αγωνία. Ανέλαβε το καλάθι της, το οποίον είχεν αποθέσει κατ' γης, και απεμακρύνθη δύο βήματα. «Φόνισσα, Α. Παπαδιαμάντης».

Β΄ ΜΕΡΟΣ - ΟΜΑΔΟΣΥΝΕΡΓΑΤΙΚΕΣ ΕΡΓΑΣΙΕΣ

Α΄ Ομάδα: «Η νέα αναζητεί τη μητρική στοργή, γιατί η καρδιά της έχει πληγωθεί, αναζητεί τη ζεστασιά, γιατί νιώθει κατάμονη να αντιμετωπίσει την σκληρότητα του κόσμου και η σιόρα Επιστήμη θα αλαφρύνει την ψυχή της κόρης της, όπως μόνο οι μάνες ξέρουν.» Να επιβεβαιώσετε την άποψη της Ευγενίας Ζαβρίδου (Zavridou, 2010: 42) στο Ι Α΄ κεφάλαιο.

Β΄ Ομάδα: «Οι μητέρες θυγατέρων, καθώς ζουν κάτω από το άγχος της αποκατάστασής τους - μια και η προίκα συνήθως είναι ανύπαρκτη και επομένως οι πιθανότητες πιο περιορισμένες - όλες μεθοδεύονται χίλιους τρόπους, για να συνδυάσουν την αυστηρότητα με την ανοχή, την ελευθερία κινήσεων των θυγατέρων τους με τον περιορισμό. Η μάνα σ' αυτή τη σκηνική ενότητα φαίνεται να υποχωρεί και αλλάζει στάση, προκειμένου να δει την κόρη της παντρεμένη». Να επιβεβαιώσετε την άποψη της Ανθούλας Σεφεριάδου (Seferiadou, 1982: 326) και να εξηγήσετε τους λόγους της υποχώρησής της.

Γ΄ Ομάδα: «Και όταν σε λίγο ο Ανδρέας, χαρούμενος για την υποχώρηση της σιόρα Επιστήμης στο ζήτημα της προίκας θα της ζητήσει να τον ακολουθήσει, η Ρήνη θα του δώσει ένα ηθικό μάθημα με την άρνησή της.» Να σχολιάσετε την άποψη του Γ.Δ. Παγανού (Paganos 2017: 39) στο Ι Α΄ κεφάλαιο.

Δ΄ Ομάδα: «Τα βασικά πρόσωπα του έργου είναι αποκλειστικά οι δυο γυναίκες. Αντίθετα οι άντρες (ο Αντρέας, ο θείος του, ο Σπύρος και ο γέρο-Τρίνκουλος) απεικονίζονται παραδομένοι είτε στις ανθρώπινες αδυναμίες είτε στις κοινωνικές προκαταλήψεις και ανίκανοι να σπάσουν τα δεσμά τους». Να επιβεβαιώσετε την άποψή του Γ.Δ. Παγανού (Paganos 2017: 40) βασισμένοι στο Ι Α΄ κεφάλαιο.

Ε΄ Ομάδα: Η Ρήνη χαρακτηρίζεται ως περίπτωση γυναίκας που απελευθερώνεται από τις προκαταλήψεις, που επικρατούσαν στην εποχή της. Να εκφράσετε τις απόψεις σας πάνω σ' αυτή τη θέση με βάση το Ι Α΄ κεφάλαιο.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Μέσα από τη διδακτική πρόταση, λοιπόν, αναδεικνύεται η αλληλεπιδραστική σχέση ψηφιακών μέσων με τη διδακτική της λογοτεχνίας και η αποτελεσματικότητα του περιβάλλοντος μάθησης από τη χρήση των τεχνολογικών εφαρμογών. Η χρήση των Τ.Π.Ε. είναι πολλαπλώς ωφέλιμη, αν αξιοποιηθούν σε ένα περιβάλλον εργασίας, που βασίζεται σε μια νέα λογική διδακτικής και παιδαγωγικής προσέγγισης του μαθήματος που διευκολύνει την ανάπτυξη δεξιοτήτων για την αναζήτηση πληροφοριών, την κριτική επεξεργασία και συνθετική παρουσίαση των δεδομένων που συλλέγονται με τη χρήση πολυτροπικών κειμένων και ποικίλων σημειωτικών πόρων, την πραγμάτευση ενός θέματος από διαφορετικές οπτικές γωνίες, τον πειραματισμό κατά το γράψιμο και την παραστατικότητα στην παρουσίαση· τη συνεργατική μάθηση

και την ανάπτυξη πρωτοβουλιών στο πλαίσιο της ομάδας. Αναφαίνονται και οι προκλήσεις από αυτή τη σύζευξη γνωστικού αντικειμένου και Τ.Π.Ε. σύμφωνα με τους παιδαγωγικούς σκοπούς της διδακτικής πρότασης στο πλαίσιο των κριτικών και πολυτροπικών προγραμμάτων διδασκαλίας της λογοτεχνίας των τελευταίων χρόνων, καθώς απαιτείται ψηφιακή κατάρτιση, δημιουργικότητα και ηθική χρήση. Όμως παρά τις προκλήσεις, η χρήση των Τ.Π.Ε. στη διδασκαλία της λογοτεχνίας δημιουργεί προσδοκίες για μια καινοτόμα, πιο συμμετοχική, διδασκαλία των λογοτεχνικών κειμένων στη σχολική τάξη.

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Ο ΡΟΛΟΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΣΤΗΝ ΑΠΟΤΕΛΕΣΜΑΤΙΚΗ ΕΦΑΡΜΟΓΗ ΤΗΣ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΜΕ ΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ

Κεραμίδα Αρετή
Σύμβουλος Εκπαίδευσης της Αγγλικής Γλώσσας
e-mail: aretikeramida@gmail.com

ΠΕΡΙΛΗΨΗ

Οι σύγχρονες θεωρίες μάθησης αναγνωρίζουν την ανάγκη για μια συμπεριληπτική εκπαιδευτική διαδικασία η οποία θα σέβεται και θα λαμβάνει υπόψη της τη διαφορετικότητα των μαθητών, σε ένα πλαίσιο διαφοροποιημένης διδασκαλίας, η οποία είναι η μεθοδολογία που βασίζεται στην υπόθεση ότι η διδακτική πράξη χρειάζεται να διαφοροποιείται και να προσαρμόζεται ανάλογα με τις εμπειρίες, τις ανάγκες, τη διαφορετικότητα του μαθητικού πληθυσμού και τα ιδιαίτερα χαρακτηριστικά της κάθε τάξης. Οι παράμετροι που διαφοροποιούνται αφορούν το περιβάλλον της μάθησης, το περιεχόμενο και τη διαδικασία της μάθησης, και το αποτέλεσμα της μάθησης.

Μια τέτοια μαθησιακή διαδικασία, η οποία αξιοποιεί με παιδαγωγικά ορθούς τρόπους τις θεωρητικές παραδοχές του οικοδομισμού και τις νέες τεχνολογίες, απαιτεί από τους εκπαιδευτικούς να αποστασιοποιηθούν από το παραδοσιακό και συντηρητικό δασκαλοκεντρικό μοντέλο διδασκαλίας, που συχνά χαρακτηρίζεται και από μια επιφυλακτική στάση έναντι στην καινοτομία στη διδασκαλία και την εκπαίδευση γενικότερα. Στο πλαίσιο του παραπάνω προβληματισμού, στην εργασία αυτή εξετάζουμε τον ρόλο του εκπαιδευτικού στη διαφοροποιημένη διδασκαλία, δηλαδή, τον τρόπο με τον οποίο θα πρέπει να σκέφτεται και να ενεργεί πριν, κατά τη διάρκεια, αλλά και μετά από την πραγματοποίηση της διδασκαλίας, όταν αναστοχάζεται και «αφουγκράζεται» την τάξη έτσι ώστε να συμβάλλει στην επιτυχή της εφαρμογή. Περιγράφουμε τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιθυμούν να εγκαταλείψουν την παραδοσιακή δασκαλοκεντρική προσέγγιση στη διδασκαλία της αγγλικής γλώσσας και να υιοθετήσουν μια προσέγγιση που θέτει στο επίκεντρο τους μαθητές τους, τα ενδιαφέροντα, τα μαθησιακά τους στυλ και τις ανάγκες τους και αξιοποιεί τις νέες τεχνολογίες.

Στη συζήτηση αυτή αποφεύγουμε «μηχανιστικές» προσεγγίσεις από την ελληνική και την ξενόγλωσση βιβλιογραφία που εστιάζονται σε «ρόλους» του εκπαιδευτικού, επειδή μια τέτοια «ανελαστική» θεώρηση δεν συνάδει με τον χαρακτήρα της διαφοροποιημένης διδασκαλίας, η οποία είναι μεν μια οργανωμένη και συστηματική διαδικασία, αλλά δεν μπορεί να βάλει τον εκπαιδευτικό σε συγκεκριμένα «καλούπια». Κατά συνέπεια, στη συγκεκριμένη εργασία, η έννοια της φράσης «ρόλος» του εκπαιδευτικού αναφέρεται στα χαρακτηριστικά που είναι χρήσιμο να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν στην πράξη τα πορίσματα ερευνών σχετικά με τη διαφοροποιημένη διδασκαλία και την αξιοποίηση των νέων τεχνολογιών.

Επειδή η εφαρμογή της διαφοροποιημένης διδασκαλία προϋποθέτει την αποδοχή μιας γενικότερης φιλοσοφίας προσέγγισης της μαθησιακής διαδικασίας, οι εκπαιδευτικοί χρειάζεται να αποδέχονται αυτή τη φιλοσοφία και τον τρόπο σκέψης για τη διδακτική πράξη, να είναι πρόθυμοι να κινηθούν έξω από τη «ζώνη άνεσής» τους και να δοκιμάσουν νέες ιδέες και πρακτικές. Είναι σημαντικό να απομακρυνθούν από την αντίληψη που έχουν για τους εαυτούς τους ως αυτοί που διαθέτουν και μοιράζουν τη γνώση και να κινηθούν προς μια θεώρηση του ρόλου τους που βρίσκεται εγγύτερα σε αυτό του «ενορχηστρωτή μαθησιακών ευκαιριών», αναλαμβάνοντας τον ρόλο του μέντορα. Επίσης, είναι απαραίτητο να παρακολουθούν και να παρατηρούν συστηματικά τους μαθητές τους κατά τη διάρκεια της ατομικής ή της ομαδικής τους εργασίας, να διαπιστώνουν τις δυσκολίες των μαθητών από πρώτο χέρι τη στιγμή που παρουσιάζονται και να παρέχουν υποστήριξη. Τέλος, με στόχο την επαγγελματική τους ανάπτυξη, είναι απαραίτητη η γνώση των θεωρητικών αρχών της διαφοροποιημένης διδασκαλίας, καθώς η γνώση αυτή θα τους βοηθήσει να εντοπίσουν τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν τη διαφοροποίηση στη διδασκαλία μέσω των νέων τεχνολογιών σε πρακτικό επίπεδο. Παράλληλα, η αναστοχαστική και κριτική μελέτη της βασικής βιβλιογραφίας θα τους ενισχύσει στην προσπάθειά τους να εφαρμόσουν στο ελληνικό σχολείο τα πορίσματα ερευνών που έχουν πραγματοποιηθεί σε διαφορετικά εκπαιδευτικά συστήματα με τα δικά τους χαρακτηριστικά και ιδιαιτερότητες.

Λέξεις – κλειδιά: διαφοροποιημένη διδασκαλία, νέες τεχνολογίες, ρόλος εκπαιδευτικών

ΕΙΣΑΓΩΓΗ

Η εργασία αυτή εστιάζει στον ρόλο και στα χαρακτηριστικά που είναι χρήσιμο να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν στην πράξη τη διαφοροποιημένη διδασκαλία στη διδασκαλία της αγγλικής γλώσσας, αξιοποιώντας παράλληλα με παιδαγωγικά κατάλληλο τρόπο τις νέες τεχνολογίες. Βασίζεται στην παραδοχή ότι οι εκπαιδευτικοί αποτελούν κεντρικό και καθοριστικό παράγοντα στην επιτυχή εφαρμογή της διαφοροποιημένης διδασκαλίας και ότι ο ρόλος του έχει καίρια σημασία (Sakellariou & Mitsi, 2018). Η εργασία ακολουθεί την παρακάτω διάρθρωση. Στην αρχή περιγράφονται οι λόγοι για τους οποίους η διαφοροποιημένη διδασκαλία αποτελεί έναν αποτελεσματικό και καινοτόμο τρόπο οργάνωσης της εκπαιδευτικής πράξης. Ακολουθεί η συνοπτική περιγραφή και ανάλυση των χαρακτηριστικών της. Με βάση την συζήτηση αυτή, η εργασία επικεντρώνεται στον ρόλο των εκπαιδευτικών, εξετάζοντας τις ενέργειες τις οποίες χρειάζεται να κάνουν, αλλά και τη γενικότερη συμπεριφορά τους έτσι ώστε η διαφοροποίηση της διδασκαλίας να συμβάλλει με θετικό τρόπο στην προσπάθεια αναβάθμισης της διδασκαλίας.

Η ΑΝΑΓΚΗ ΓΙΑ ΤΗ ΔΙΑΦΟΡΟΠΟΙΗΣΗ ΤΗΣ ΔΙΔΑΣΚΑΛΙΑΣ

Το σύγχρονο σχολείο βρίσκεται αντιμέτωπο με μια σειρά από προκλήσεις. Συχνά επισημαίνεται, τόσο από εκπαιδευτικούς όσο κι από μελετητές της εκπαίδευσης, ότι το σχολείο με τον τρόπο που λειτουργεί σήμερα δεν παράγει υψηλά ακαδημαϊκά αποτελέσματα για όλους τους μαθητές. Δυσκολεύεται να ανταποκριθεί στις ανάγκες και τις απαιτήσεις της σύγχρονης ψηφιακής κοινωνίας και να ενσωματώσει συστηματικά τις νέες τεχνολογίες στη διδασκαλία, ενώ παράλληλα συχνά δεν καταφέρνει να εμπλέξει με ενεργητικό τρόπο τους μαθητές στη μαθησιακή διαδικασία.

Αυτό αποδίδεται σε μεγάλο βαθμό στο γεγονός ότι δεν είναι ελκυστικό σε μια μεγάλη κατηγορία μαθητών. Το σχολείο συχνά φαίνεται ότι συνεχίζει να εδράζεται σε παρωχημένες παραδοσιακές μεθόδους μετωπικής διδασκαλίας, αδυνατώντας να ενσωματώσει δημιουργικά και να αξιοποιήσει πλήρως καινοτόμες και μαθητοκεντρικές εκπαιδευτικές μεθόδους. Ωστόσο, ερευνητικά δεδομένα δείχνουν ότι η παραδοσιακή μετωπική προσέγγιση της διδασκαλίας που προορίζεται για τον «μέσο μαθητή» δεν είναι αποτελεσματική, καθώς ευνοεί την παθητικότητα, δεν καλύπτει τις ανάγκες ενός σημαντικού αριθμού μαθητών και δεν παρέχει ευκαιρίες για μάθηση (Valiandes and Neophytou, 2017b). Ως εκ τούτου, η μαθησιακή διαδικασία χρειάζεται να εμπλουτιστεί με μεθόδους διδασκαλίας οι οποίες προτάσσουν τη συμπερίληψη, αξιοποιώντας βιωματικές πρακτικές, τη συνεργατική και τη διερευνητική μάθηση, λαμβάνοντας υπόψη τα ενδιαφέροντα και τα ιδιαίτερα χαρακτηριστικά των μαθητών με απώτερο στόχο τη σχολική επιτυχία για όλους τους μαθητές.

Η διαφοροποιημένη διδασκαλία μπορεί, εφόσον χρησιμοποιηθεί συστηματικά και μεθοδικά, να αποτελέσει μια τεκμηριωμένη και αποτελεσματική απάντηση στο ανωτέρω ζήτημα. Η διαφοροποιημένη διδασκαλία βασίζεται στις αρχές του οικοδομισμού (Valiandes and Neophytou, 2017a) και στην υπόθεση ότι η διδακτική πράξη χρειάζεται να διαφοροποιείται και να προσαρμόζεται ανάλογα με τις εμπειρίες, τις ανάγκες, τη διαφορετικότητα του μαθητικού πληθυσμού και τα ιδιαίτερα χαρακτηριστικά της κάθε τάξης. Κατά συνέπεια, στο πλαίσιο της διαφοροποίησης, οι εκπαιδευτικοί, σχεδιάζουν μεθοδικά και διεξάγουν τη διδασκαλία των μαθημάτων τους με γνώμονα το γεγονός ότι οι μαθητές δεν αποτελούν ένα ομοιογενές σύνολο, αλλά διαφορετικές προσωπικότητες που έχουν διαφορετικές δεξιότητες, ικανότητες, ενδιαφέροντα, μαθησιακά στυλ, κίνητρα, ανάγκες και ταχύτητα μάθησης (Dodge, 2005). Λαμβάνοντας υπόψη τα προαναφερθέντα, οι εκπαιδευτικοί με προγραμματισμένες και σκόπιμες ενέργειες προσαρμόζουν παραμέτρους της μαθησιακής διαδικασίας, όπως τις διδακτικές μεθόδους, τους διαθέσιμους πόρους, τις πηγές πληροφόρησης, το περιεχόμενο, τις δραστηριότητες και τις απαιτήσεις των εργασιών που υποβάλλουν οι μαθητές, προκειμένου να αποδείξουν την κατανόηση και τις δεξιότητες που έχουν αναπτύξει. Οι παράμετροι που διαφοροποιούνται στο πλαίσιο της διαφοροποιημένης διδασκαλίας είναι: (α) το περιβάλλον της μάθησης, (β) το περιεχόμενο και τη διαδικασία της μάθησης, (γ) και το αποτέλεσμα της μάθησης (Tomlinson, 2001).

Στο σημείο αυτό χρειάζεται να επισημανθούν δύο χαρακτηριστικά της διαφοροποιημένης διδασκαλίας, επειδή συχνά αποτελούν πεδίο παρανοήσεων. Πρώτον, χρειάζεται να υπογραμμιστεί ότι ο στόχος της διαφοροποιημένης διδασκαλίας δεν είναι αποκλειστικά να υποστηρίξει τους μαθητές με λιγότερες γνώσεις και χαμηλότερες επιδόσεις, αλλά να ωφελήσει όλους τους μαθητές. Οι σύγχρονες θεωρίες μάθησης αναγνωρίζουν την ανάγκη για μια συμπεριληπτική εκπαιδευτική διαδικασία η οποία θα σέβεται και θα λαμβάνει υπόψη της τη διαφορετικότητα των μαθητών, σε ένα πλαίσιο διαφοροποιημένης διδασκαλίας που χρησιμοποιεί συστηματικά σχεδιασμένες πρακτικές, οι οποίες δίνουν στους εκπαιδευτικούς τη δυνατότητα να ανταποκριθούν στις ανάγκες όλων των μαθητών σε ετερογενείς τάξεις, επιτρέποντάς τους με τον τρόπο αυτό να έχουν τα μέγιστα μαθησιακά αποτελέσματα (Pozas et al., 2021).

Δεύτερον, η διαφοροποιημένη διδασκαλία δεν είναι απλά μια μέθοδος με προκαθορισμένες «λύσεις» που μπορούν να ακολουθήσουν οι εκπαιδευτικοί και οι οποίες είναι «υποχρεωτικά» επιτυχημένες. Η διαφοροποιημένη διδασκαλία συνιστά μια ολοκληρωμένη θεωρία και φιλοσοφία που διαπερνά όλα τα στάδια της μαθησιακής διαδικασίας· από τον προσδιορισμό του προβλήματος (π.χ. η διδασκαλία δεν είναι αποτελεσματική και χρειάζεται επαναξιολόγηση ή/και προσαρμογές/αλλαγές), ως τον σχεδιασμό, την υλοποίηση και την αξιολόγηση της διδακτικής πράξης και της ανατροφοδότησής της με τα αποτελέσματα της διαδικασίας που προηγήθηκε. Αποτελεί μια πειστική και ουσιαστική θεωρία που έχει συγκεκριμένη εφαρμογή στη σχολική τάξη, επειδή η διαφοροποίηση στη διδασκαλία στηρίζεται σε ένα γερό θεωρητικό υπόβαθρο και όγκο ερευνών, που διερευνούν τη διαφορετικότητα των μαθητών και τις μοναδικές ανάγκες τους. Μετουσιώνοντας την εκπαιδευτική θεωρία σε εκπαιδευτική πράξη, η διαφοροποιημένη διδασκαλία συνεπάγεται την εφαρμογή διδακτικών πρακτικών εντός της τάξης, οι οποίες δεν είναι τυχαίες ή αυθόρμητες, αλλά συστηματικές και προγραμματισμένες. Αυτές οι πρακτικές περιλαμβάνουν, όπως έχει αναφερθεί παραπάνω, την προσαρμογή κρίσιμων παραμέτρων, όπως το περιβάλλον της μάθησης, του περιεχομένου, της διαδικασίας μάθησης και του αποτελέσματος της διδασκαλίας (Tomlinson & Imbeau, 2010) προκειμένου να εξασφαλιστεί ότι όλοι οι μαθητές έχουν τη δυνατότητα για ενεργή, κι όχι παθητική, συμμετοχή και εμπλοκή στις μαθησιακές δραστηριότητες, και συνεπώς, μπορούν να ωφεληθούν από τη μαθησιακή διαδικασία.

Στην εργασία μας αυτή, με βάση την ανασκόπηση της βιβλιογραφίας, αλλά και την εμπειρία μας, υποστηρίζουμε ότι η διαφοροποιημένη διδασκαλία εντάσσεται στο ευρύτερο πλαίσιο καινοτόμων διδακτικών πρακτικών. Οι καινοτόμες διδακτικές πρακτικές αποτελούν προσεγγίσεις που αποσκοπούν στην ενίσχυση της ενεργής και ουσιαστικής μαθητικής συμμετοχής, προωθούν συστηματικά την κριτική και τη δημιουργική σκέψη, έχουν τη δυνατότητα να προσαρμοστούν στις ανάγκες και εμπειρίες των μαθητών και, εν τέλει, δημιουργούν ευνοϊκές συνθήκες για μάθηση και πρόοδο για όλους τους μαθητές. Οι μέθοδοι αυτές συχνά αξιοποιούν δημιουργικά τις Τεχνολογίες της Πληροφορίας και της Επικοινωνίας (Τ.Π.Ε.)., την ομαδοσυνεργατικότητα και μαθητοκεντρικές μεθόδους διδασκαλίας, όπως η ανακαλυπτική και η διερευνητική μάθηση και η διδασκαλία με την αξιοποίηση ερευνητικών εργασιών (projects). Διακρίνονται από τις παραδοσιακές και συντηρητικές μεθόδους διδασκαλίας, οι οποίες συχνά είναι δασκαλοκεντρικές και χρησιμοποιούν ομοιόμορφες μορφές μάθησης, παραγνωρίζοντας την ατομικότητα των μαθητών. Συνεπώς, δεν ενεργοποιούν τα μαθησιακά κίνητρα, αλλά ενισχύουν την αποστασιοποίηση από τη διδασκαλία και την παθητικότητα.

Στο πλαίσιο του παραπάνω προβληματισμού, στην εργασία αυτή εξετάζουμε τον ρόλο των εκπαιδευτικών στη διαφοροποιημένη διδασκαλία, δηλαδή, τον τρόπο με τον οποίο θα πρέπει να σκέφτονται και να ενεργούν πριν, κατά τη διάρκεια, αλλά και μετά από την πραγματοποίηση της διδασκαλίας, όταν αναστοχάζονται και «αφουγκράζονται» την τάξη και τη διδασκαλία έτσι ώστε να συμβάλλουν στην επιτυχή της εφαρμογή. Περιγράφουμε τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιθυμούν να εγκαταλείψουν την παραδοσιακή δασκαλοκεντρική προσέγγιση στη διδασκαλία της αγγλικής γλώσσας και να υιοθετήσουν μια προσέγγιση που θέτει στο επίκεντρο τους μαθητές τους, τα ενδιαφέροντα, τα μαθησιακά τους στυλ και τις ανάγκες τους και αξιοποιεί τις νέες τεχνολογίες.

Στη συζήτηση αυτή, όπως έχουμε ήδη αναφέρει, αποφεύγουμε τυποποιημένες προσεγγίσεις από την ελληνική και την ξενόγλωσση βιβλιογραφία που εστιάζονται σε «ρόλους» του εκπαιδευτικού, επειδή μια τέτοια «ανελαστική» θεώρηση δεν συνάδει με τον χαρακτήρα της διαφοροποιημένης διδασκαλίας, η οποία είναι μεν μια οργανωμένη και συστηματική διαδικασία, αλλά δεν μπορεί να περιορίσει τους εκπαιδευτικούς σε προκαθορισμένα και άκαμπτα (και, συνεπώς, μη δημιουργικά) πλαίσια. Επομένως, στη συγκεκριμένη εργασία, η έννοια της φράσης «ρόλος» του εκπαιδευτικού αναφέρεται στα χαρακτηριστικά που είναι χρήσιμο να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν στην πράξη τα πορίσματα ερευνών σχετικά με τη διαφοροποιημένη διδασκαλία και την αξιοποίηση των νέων τεχνολογιών.

Ο ΡΟΛΟΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΣΤΗ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗ ΔΙΔΑΣΚΑΛΙΑ

Η μαθησιακή διαδικασία που ενσωματώνει τη διαφοροποίηση στη διδασκαλία, και η οποία επιδιώκει να αξιοποιήσει με παιδαγωγικά ορθούς τρόπους τις θεωρητικές παραδοχές του οικοδομισμού, που υποστηρίζει ότι η μάθηση αποτελεί μια ενεργή διαδικασία οικοδόμησης της γνώσης (von Glasersfeld, 1996), και τις νέες τεχνολογίες, απαιτεί από τους εκπαιδευτικούς να αποστασιοποιηθούν από το παραδοσιακό και συντηρητικό δασκαλοκεντρικό μοντέλο διδασκαλίας, το οποίο συχνά χαρακτηρίζεται και από μια επιφυλακτική στάση έναντι στην καινοτομία στη διδασκαλία και την εκπαίδευση γενικότερα.

Στο τμήμα αυτό της εργασίας περιγράφουμε τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιθυμούν να εγκαταλείψουν την παραδοσιακή δασκαλοκεντρική προσέγγιση και επιδιώκουν να οργανώσουν τη διδακτική πράξη με επίκεντρο τους μαθητές τους, τα ενδιαφέροντα, τα μαθησιακά τους στυλ και τις ανάγκες τους, αξιοποιώντας ταυτόχρονα και τις νέες τεχνολογίες. Φυσικά, δεν επιχειρείται ο προσδιορισμός και η περιγραφή όλων των

επιθυμητών χαρακτηριστικών των εκπαιδευτικών. Παρουσιάζονται, ωστόσο, οι θεμελιώδεις αρχές και τα βασικά χαρακτηριστικά των εκπαιδευτικών στη διαφοροποιημένη διδασκαλία. Από τη συζήτηση αυτή, οι αναγνώστες μπορούν να συνάγουν τα γνωρίσματα τα οποία διακρίνουν τους εκπαιδευτικούς που εφαρμόζουν αποτελεσματικά τη διαφοροποίηση στη διδασκαλία, αλλά κι εκείνα τα οποία αποτελούν τροχοπέδη στην ολοκληρωμένη και αποτελεσματική της εφαρμογή.

ΑΞΙΟΠΟΙΗΣΗ ΔΙΑΦΟΡΕΤΙΚΩΝ ΚΑΙ ΕΥΕΛΙΚΤΩΝ ΟΜΑΔΟΠΟΙΗΣΕΩΝ

Η διαφοροποιημένη διδασκαλία αποτελεί μια ευέλικτη φιλοσοφία διδασκαλίας, που αξιοποιεί διαφορετικές μεθόδους, τεχνικές και ομαδοποιήσεις μαθητών (Gheyssens et al., 2022; Tomlinson, 2017). Για παράδειγμα, οι εκπαιδευτικοί αξιοποιούν, ανάλογα με την ιδιαιτερότητα κάθε τάξης, την ατομική εργασία, την εργασία σε ζευγάρια και την εργασία σε επίπεδο τάξης (ολομέλεια). Επειδή η εργασία σε επίπεδο τάξης έχει ταυτιστεί με την παραδοσιακή «μετωπική», δασκαλοκεντρική διδασκαλία, αυτό δεν σημαίνει ότι η διδασκαλία που σχεδιάζεται και υλοποιείται με βάση τη διαφοροποιημένη διδασκαλία απορρίπτει a priori την εργασία σε επίπεδο τάξης.

Για παράδειγμα, στη διδασκαλία της αγγλικής γλώσσας, σε ένα μάθημα που έχει ως στόχο την ανάπτυξη της δεξιότητας παραγωγής προφορικού λόγου, της κριτικής σκέψης, της συνεργασίας και της αποδοχής διαφορετικών απόψεων, οι μαθητές συμμετέχουν σε μια συζήτηση με θέμα: "Πρέπει οι έφηβοι να χρησιμοποιούν τα κοινωνικά δίκτυα;" Οι εκπαιδευτικοί που επιθυμούν να χρησιμοποιήσουν διαφορετικές και ευέλικτες ομαδοποιήσεις, που «ρέουν» με φυσικό τρόπο από τον σχεδιασμό της ανωτέρω μαθησιακής δραστηριότητας, έχουν τη δυνατότητα να χωρίζουν την τάξη σε δύο ομάδες: μία υπέρ της χρήσης κοινωνικών δικτύων από τους εφήβους και μία κατά. Σε επίπεδο ατομικής εργασίας, οι μαθητές λαμβάνουν κάρτες με σημειώσεις (note cards) και γράφουν 2-3 βασικά επιχειρήματα που υποστηρίζουν τη θέση τους. Η διαφοροποίηση στο στάδιο αυτό μπορεί να αφορά την χρήση λεξικών για κάποιους μαθητές και την παροχή λεξιλογίου ή εκφράσεων για να τους βοηθήσει να γράψουν τις απόψεις τους. Οι πιο προχωρημένοι μαθητές μπορούν να γράψουν μια μικρή παράγραφο με παραδείγματα και αιτιολόγηση των απόψεών τους. Στη συνέχεια, οι μαθητές εργάζονται σε ζευγάρια. Συζητούν τα επιχειρήματά τους και παρουσιάζουν (π.χ. σε δύο λεπτά) τις ιδέες τους στον συμμαθητή τους, ενώ στη συνέχεια αλλάξουν ρόλους. Η ομαδική εργασία πραγματοποιείται ενώνοντας τα ζευγάρια για να σχηματιστούν μικρές ομάδες των τεσσάρων μαθητών. Στις ομάδες αυτές, οι μαθητές επεξεργάζονται τα επιχειρήματά τους, επιλέγοντας τα ισχυρότερα και πιο πειστικά. Σε επίπεδο τάξης, διεξάγεται η συζήτηση, ανάμεσα στις δύο μεγαλύτερες ομάδες (υπέρ και κατά της χρήσης των κοινωνικών δικτύων από τους εφήβους).

Δραστηριότητες σαν και αυτή που περιγράφεται παραπάνω, στην οποία οι μαθητές εκφράζουν ελεύθερα τις απόψεις τους, προϋποθέτουν ένα υποστηρικτικό, φιλικό και μη ανταγωνιστικό περιβάλλον μάθησης, τα βασικά χαρακτηριστικά του οποίου περιγράφονται στην επόμενη ενότητα.

ΔΙΑΦΟΡΟΠΟΙΗΣΗ ΤΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΜΑΘΗΣΗΣ

Η διαφοροποίηση του περιβάλλοντος της μάθησης έχει ως συνιστώσες το φυσικό περιβάλλον της τάξης, αλλά και τις σχέσεις ανάμεσα στους μαθητές και ανάμεσα στους μαθητές και τους εκπαιδευτικούς. Αναφέρεται, δηλαδή, τόσο στον χώρο όσο και στις σχέσεις που διαμορφώνονται μέσα στη σχολική τάξη και αφορά τη διαφοροποίηση ως προς το κλίμα και την οργάνωση της τάξης.

Οι εκπαιδευτικοί χρειάζεται να δημιουργούν ένα υποστηρικτικό περιβάλλον μάθησης, το οποίο ευνοεί την παροχή υψηλού επιπέδου εκπαίδευσης (Mills et al., 2014). Η διαφοροποιημένη διδασκαλία αποσκοπεί στη δημιουργία μιας σχολικής τάξης στην οποία οι μαθητές αισθάνονται άνετα και στην οποία οι διαφορές δεν αντιμετωπίζονται ως «αναγκαία κακά», αλλά ως ευκαιρίες για εμπλουτισμό της διδακτικής πράξης. Η βέλτιστη αξιοποίηση της διαφοροποιημένης διδασκαλίας επιτυγχάνεται μέσω ενός υποστηρικτικού περιβάλλοντος μάθησης στο οποίο οι μαθητές έχουν την αίσθηση της ασφάλειας και του σεβασμού.

Στο πλαίσιο αυτό, ο στόχος του εκπαιδευτικού σε ένα εκπαιδευτικό σύστημα που επιδιώκει να εφαρμόσει τη διαφοροποιημένη διδασκαλία είναι η δημιουργία ενός φιλικού σχολικού κλίματος μέσα στην τάξη, που μειώνει το σχολικό άγχος των μαθητών. Το σχολικό άγχος αποτελεί έναν παράγοντα ο οποίος στη σχετική βιβλιογραφία έχει συνδεθεί με χαμηλές επιδόσεις, ιδιαίτερα αναφορικά με την επίδοση στην ξένη γλώσσα (Horwitz, 2001). Οι μαθητές που βιώνουν μαθησιακό άγχος δεν συμμετέχουν ενεργητικά στη μαθησιακή διαδικασία και στις εκπαιδευτικές δραστηριότητες, κυρίως επειδή φοβούνται ότι τα λάθη που θα κάνουν στη χρήση της ξένης γλώσσας θα αποτελέσουν αντικείμενο αρνητικής αξιολόγησης από τους εκπαιδευτικούς και τους συμμαθητές τους. Κατά συνέπεια, επιλέγουν την παθητική συμμετοχή και δεν εμπλέκονται με ενεργό και δημιουργικό τρόπο στη μαθησιακή διαδικασία.

Από τα παραπάνω συνάγεται ότι είναι σημαντικό οι εκπαιδευτικοί να δημιουργούν στην τάξη, και ιδιαίτερα στην ξενόγλωσση τάξη όπου είναι φυσικό οι μαθητές να κάνουν αρκετά λάθη, μια ατμόσφαιρα στην οποία, όπως έχει προαναφερθεί, τα λάθη στη χρήση της ξένης γλώσσας δεν αποτελούν αντικείμενο κριτικής, αλλά μια φυσιολογική διαδικασία κατά την εκμάθηση της ξένης γλώσσας και μια ευκαιρία για μάθηση (Dörnyei, 2001). Επιπλέον, να μην διορθώνουν άμεσα όλα τα λάθη των μαθητών στη χρήση της ξένης γλώσσας, καθώς αυτό υπονομεύει την αυτοπεποίθησή τους και τους αποτρέπει από το να συμμετέχουν στις μαθησιακές δραστηριότητες. Οι εκπαιδευτικοί χρειάζεται, επίσης, να παρέχουν σχόλια προς τους μαθητές σχετικά με την επίδοσή τους εστιάζοντας στα θετικά σημεία και την προσπάθεια που καταβάλλουν, αποφεύγοντας τις συγκρίσεις και αρνητικές αξιολογήσεις.

Η στάση των εκπαιδευτικών έναντι στην αξιολόγηση στη διαφοροποιημένη διδασκαλία εξετάζεται συνοπτικά στην ενότητα που ακολουθεί.

ΑΞΙΟΠΟΙΗΣΗ ΤΗΣ ΕΝΑΛΛΑΚΤΙΚΗΣ ΑΞΙΟΛΟΓΗΣΗΣ

Ένα κρίσιμο χαρακτηριστικό της διαφοροποιημένης διδασκαλίας αποτελεί το γεγονός ότι οι εκπαιδευτικοί οφείλουν να χρησιμοποιούν συνδυαστικά τόσο τις παραδοσιακές μορφές αξιολόγησης (αρχική/διαγνωστική, διαμορφωτική, τελική ή αθροιστική) όσο και εναλλακτικές μορφές αξιολόγησης. Οι διάφορες αυτές μορφές αξιολόγησης που χρησιμοποιούνται στη διαφοροποιημένη διδασκαλία είναι αναγκαίο να έχουν τα ακόλουθα χαρακτηριστικά: (α) να αποτελούν μια διαρκή διαδικασία και είναι στενά συνδεδεμένες η μια με την άλλη, (β) να υιοθετούν μια μαθητοκεντρική, κι όχι μια ανταγωνιστική προσέγγιση, η οποία να θέτει ως απώτερο στόχο την αξιολόγηση της πορείας της διδασκαλίας και τον έλεγχο επίτευξης των μαθησιακών στόχων που έχουν τεθεί για κάθε έναν μαθητή ξεχωριστά. Συνεπώς, η αξιολόγηση στη διαφοροποιημένη διδασκαλία δεν αποτελεί έναν μηχανισμό που τιμωρεί τους μαθητές για τυχόν αποτυχία επίτευξης συγκεκριμένων μαθησιακών στόχων, αλλά ένα μέσο ανατροφοδότησης που επισημαίνει στους μαθητές τα θετικά σημεία της προσπάθειάς τους, αλλά και τα βήματα που χρειάζεται να ακολουθήσουν για να αναπτύξουν τις δεξιότητές τους και να επιτύχουν τους μαθησιακούς στόχους. Επίσης, η αξιολόγηση είναι πιο αποτελεσματική όταν αποτελεί ένα εργαλείο που δείχνει τον βαθμό επίτευξης των μαθησιακών στόχων και παρέχει πληροφορίες αναφορικά με τους παράγοντες που χρειάζεται να τροποποιηθούν στη διδασκαλία, προκειμένου οι εκπαιδευτικοί να παρέχουν στους μαθητές την ευκαιρία να κατακτήσουν τη γνώση και τους μαθησιακούς στόχους.

Μορφές εναλλακτικής αξιολόγησης που χρησιμοποιούνται συχνά στην ξενόγλωσση εκπαίδευση είναι οι ακόλουθες (Valiandes and Neophytou, 2017a): αξιολόγηση με βάση ατομική ή ομαδική ερευνητική εργασία (project), αξιολόγηση με βάση τον φάκελο του μαθητή/φάκελος επιτευγμάτων του μαθητή (portfolio), ημερολόγιο μάθησης (learning log), και με βάση την αυτοαξιολόγηση ή/και ετεροαξιολόγηση.

Οι παραπάνω μορφές εναλλακτικής αξιολόγησης δεν εστιάζουν αποκλειστικά σε ποσοτικά χαρακτηριστικά (π.χ. βαθμός), αλλά και σε ποιοτικά χαρακτηριστικά της επίδοσης των μαθητών. Δηλαδή, οι εναλλακτικές μορφές αξιολόγησης δεν έχουν ως επίκεντρο τη βαθμολογία, αλλά την περιγραφή της πορείας του μαθητή προς τους μαθησιακούς στόχους που έχουν τεθεί, λαμβάνοντας υπόψη τα ιδιαίτερα χαρακτηριστικά του κάθε μαθητή και την πρόοδο που έχει δείξει. Είναι, επίσης, περιγραφικές, επειδή ενδιαφέρονται: (α) να περιγράψουν τη διαφορά ανάμεσα στο τρέχον επίπεδο γνώσεων των μαθητών και το επιθυμητό (τους μαθησιακούς στόχους), (β) να περιγράψουν και άλλους τομείς, εκτός από τη βαθμολογία (π.χ. τις συνεργατικές, επικοινωνιακές δεξιότητες των μαθητών, τα μαθησιακά κίνητρα, κλπ.), γεγονός που σημαίνει ότι καλύπτει πτυχές της δραστηριότητας των μαθητών μέσα στη σχολική τάξη αλλά και την ευρύτερη σχολική κοινότητα οι οποίες δεν λαμβάνονται υπόψη στην παραδοσιακή/συμβατική αξιολόγηση, και (γ) να συλλέξουν πληροφορίες από τρεις αλληλοσυνδεόμενους «παράγοντες» της μαθησιακής διαδικασίας: τους μαθητές, τους γονείς και τους ίδιους τους εκπαιδευτικούς.

ΑΠΟΔΟΧΗ ΤΗΣ ΦΙΛΟΣΟΦΙΑΣ ΤΗΣ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗΣ ΔΙΔΑΣΚΑΛΙΑΣ

Η αποτελεσματική και μεθοδική εφαρμογή της διαφοροποιημένης διδασκαλίας έχει ως προϋπόθεση την αποδοχή μιας γενικότερης φιλοσοφίας για τη διδασκαλία και έναν τρόπο σκέψης για τη διδακτική πράξη με βάση τον σεβασμό για τους μαθητές, την αναγνώριση των διαφορών τους και τη θέληση για υποστήριξη έτσι ώστε να ωφεληθούν όλοι οι μαθητές (Smale-Jacobse, et al., 2019). Κατά συνέπεια, οι εκπαιδευτικοί που επιθυμούν να την εφαρμόσουν χρειάζεται να επιδεικνύουν διάθεση να κινηθούν έξω από τη «ζώνη άνεσής» τους, ενσωματώνοντας στη διδασκαλία νέες ιδέες και πρακτικές. Είναι σημαντικό, στο πλαίσιο του οικοδομισμού, να απομακρυνθούν από την αντίληψη που έχουν για τους εαυτούς τους ως αυτοί που διαθέτουν και μοιράζουν τη γνώση (Schcolnik et al. 2006) και να κινηθούν προς μια θεώρηση του ρόλου τους που βρίσκεται εγγύτερα σε αυτό του «ενορχηστρωτή μαθησιακών ευκαιριών» και του μέντορα. Επίσης, είναι χρήσιμο να παρακολουθούν και να παρατηρούν συστηματικά τους μαθητές τους κατά τη διάρκεια της

ατομικής ή της ομαδικής τους εργασίας, να διαπιστώνουν τις δυσκολίες που αντιμετωπίζουν, τη στιγμή που αυτές παρουσιάζονται, έτσι ώστε να παρέχουν υποστήριξη και την κατάλληλη ανατροφοδότηση.

Τέλος, με στόχο την επαγγελματική τους ανάπτυξη, είναι απαραίτητη η γνώση των θεωρητικών αρχών της διαφοροποιημένης διδασκαλίας, καθώς η γνώση αυτή θα τους βοηθήσει να εντοπίσουν τα χαρακτηριστικά που χρειάζεται να έχουν οι εκπαιδευτικοί που επιχειρούν να εφαρμόσουν την διαφοροποίηση στη διδασκαλία σε πρακτικό επίπεδο. Παράλληλα, η αναστοχαστική και κριτική μελέτη της βασικής βιβλιογραφίας θα τους ενισχύσει στην προσπάθειά τους να εφαρμόσουν στο ελληνικό σχολείο τα πορίσματα ερευνών που έχουν πραγματοποιηθεί σε διαφορετικά εκπαιδευτικά συστήματα που έχουν τα δικά τους χαρακτηριστικά και ιδιαιτερότητες.

ΤΕΧΝΟΛΟΓΙΕΣ ΤΗΣ ΠΛΗΡΟΦΟΡΙΑΣ ΚΑΙ ΤΗΣ ΕΠΙΚΟΙΝΩΝΙΑΣ

Η συμβολή των Τεχνολογιών της Πληροφορίας και της Επικοινωνίας (Τ.Π.Ε.) στην εφαρμογή της διαφοροποιημένης διδασκαλίας είναι καίριας σημασίας, καθώς οι νέες τεχνολογίες έχουν τη δυνατότητα να υποστηρίξουν τη σύζευξη των θεωρητικών αρχών της διαφοροποιημένης διδασκαλίας με την πρακτική της εφαρμογή στη σχολική τάξη. Η διαφοροποιημένη διδασκαλία αξιοποιεί παιδαγωγικά τις Τ.Π.Ε. για να μεγιστοποιήσει τα μαθησιακά αποτελέσματα. Αυτό απορρέει από το γεγονός ότι οι νέες τεχνολογίες επιτρέπουν εναλλακτικούς τρόπους παρουσίασης του εκπαιδευτικού υλικού, πολλαπλούς τρόπους αξιοποίησής του και εμπλοκής των μαθητών με αυτό, καθώς επίσης και ποικίλες προσεγγίσεις αναφορικά με τους τρόπους παρουσίασης του αποτελέσματος της μάθησης (Panteliadou, 2013).

Ειδικότερα, και χωρίς το θέμα να εξαντλείται στην παρούσα εργασία, σε σχέση με τη διαφοροποίηση της παρουσίασης του αποτελέσματος της μάθησης, εργαλεία του συμμετοχικού ιστού (Web 2.0), που διευκολύνουν την αλληλεπίδραση, τη συνεργασία και τον διαμοιρασμό περιεχομένου (Diamantis & Bikos, 2022), μπορούν να αξιοποιηθούν για τη συνεργασία των μαθητών στο πλαίσιο της δημιουργίας του τελικού προϊόντος. Επιπλέον, εργαλεία Web 2.0, όπως ιστολόγια (blogs), wikis, podcasts (π.χ. ηχητικές συζητήσεις), εικονικά περιβάλλοντα μάθησης (virtual learning environments), εργαλεία για ψηφιακές παρουσιάσεις και αφηγήσεις (digital storytelling tools), ιστότοποι κοινωνικής δικτύωσης, ψηφιακές αφίσες (digital posters) και διαδικτυακές παρουσιάσεις είναι δυνατό να χρησιμοποιηθούν για να παρουσιάσουν οι μαθητές με δημιουργικό τρόπο τα αποτελέσματα της μαθησιακής διαδικασίας. Αναφορικά με τη διαφοροποίηση του περιεχομένου, το διαδίκτυο παρέχει μια ευρεία γκάμα υλικού, όπως για παράδειγμα, βίντεο, εικόνες, ηχητικά αρχεία, πολυτροπικά κείμενα (multimodal texts), που δε βασίζονται αποκλειστικά στον γραπτό λόγο για τη μετάδοση του μηνύματος, κείμενα με υπερσυνδέσμους (hyperlinks), κλπ., τα οποία μπορεί να αξιοποιήσει ο εκπαιδευτικός, ανάλογα με το μαθησιακό στυλ των μαθητών (Karatza, 2019).

Ωστόσο, αυτό που χρειάζεται να επισημανθεί είναι ότι οι εκπαιδευτικοί χρειάζεται να υιοθετούν μια «εκλεκτική» και «αναστοχαστική» προσέγγιση σε σχέση με τη βέλτιστη χρησιμοποίηση των νέων τεχνολογιών. Αυτό έχει ως βασική προϋπόθεση την εξοικείωση των εκπαιδευτικών τόσο με τις δυνατότητες όσο και με τους περιορισμούς των ψηφιακών εργαλείων που είναι διαθέσιμα, έτσι ώστε να είναι σε θέση να επιλέγουν τα κατάλληλα και τα πιο αποδοτικά. Τα κατάλληλα ψηφιακά εργαλεία (π.χ. πλατφόρμες κοινωνικών μέσων, συνεργατικά εργαλεία, το διαδίκτυο) θα τους επιτρέψουν να επιτύχουν τους μαθησιακούς στόχους που έχουν θέσει, χωρίς να αποπροσανατολίζουν ή να μπερδεύουν τους μαθητές.

Για παράδειγμα, στο πλαίσιο της διδασκαλίας της αγγλικής γλώσσας, μια εφαρμογή Web 2.0 με την οποία έχουν τη δυνατότητα να δημιουργήσουν διαδικτυακές παιγνιώδεις δραστηριότητες και κουίζ (π.χ. Kahoot!) μπορεί να είναι χρήσιμη για ατομική ή για εργασία σε ζευγάρια για την εξάσκηση σε λεξιλόγιο ή γραμματική, αλλά όχι ιδιαίτερα κατάλληλη για την εξάσκηση δεξιοτήτων κριτικής και δημιουργικής σκέψης. Επιπλέον, είναι δυνατό να δίνει έμφαση στις γρήγορες απαντήσεις και στον ανταγωνισμό, κάτι το οποίο μπορεί να δημιουργήσει ένα περιβάλλον μάθησης το οποίο είναι ανταγωνιστικό και κατάλληλο για μαθητές με «οπτικό» στυλ μάθησης, αλλά όχι ιδιαίτερα ελκυστικό σε κάποιους μαθητές (π.χ. αυτούς που είναι ακουστικοί ή κιναισθητικοί τύποι). Ένα τέτοιο περιβάλλον μάθησης είναι πιθανό να μην προάγει την διαφοροποίηση στη διδασκαλία και την αποτελεσματική ενσωμάτωση των νέων τεχνολογιών, αλλά αντίθετα μπορεί να προκαλέσει σχολικό άγχος και χαμηλά μαθησιακά κίνητρα. Με βάση το παράδειγμα αυτό, είναι εμφανές ότι οι εκπαιδευτικοί χρειάζεται να λαμβάνουν αποφάσεις σχετικά με την έκταση, το εύρος και τον τρόπο αξιοποίησης των νέων τεχνολογιών, λαμβάνοντας υπόψη τους μαθησιακούς στόχους που έχουν θέσει, τα χαρακτηριστικά των μαθητών τους, και το ευρύτερο πλαίσιο της διδασκαλίας.

ΑΤΟΜΙΚΑ ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ

Εκτός από τα παραπάνω, οι εκπαιδευτικοί που θα επιχειρήσουν να εφαρμόσουν στην πράξη τα πορίσματα ερευνών σχετικά με την αξιοποίηση της διαφοροποιημένης διδασκαλίας θα πρέπει να διαθέτουν και συγκεκριμένα

χαρακτηριστικά. Τα χαρακτηριστικά αυτά (νοοτροπία και τρόπος με τον οποίο αντιμετωπίζουν τη διδασκαλία) είναι απαραίτητα στους εκπαιδευτικούς που επιθυμούν να βγουν από τη ζώνη άνεσής τους, δηλαδή, να εγκαταλείψουν διδακτικές πρακτικές που εφαρμόζουν για χρόνια όταν αυτές δεν είναι αποτελεσματικές, και να υιοθετήσουν καινοτόμες διδακτικές πρακτικές.

Πρώτον, οι εκπαιδευτικοί χρειάζεται να έχουν ευελιξία και ετοιμότητα προκειμένου να επιλέξουν τον κατάλληλο τρόπο για την παρουσίαση του νέου περιεχομένου και να αξιολογήσουν την κατανόηση του νέου υλικού από τους μαθητές για να ανταποκριθούν στα διαφορετικά μαθησιακά στυλ των μαθητών. Η έννοια του μαθησιακού στυλ βασίζεται στην υπόθεση ότι κάθε άνθρωπος έχει ένα διαφορετικό μονοπάτι με το οποίο η νέα πληροφορία γίνεται ευκολότερα αντιληπτή, έναν διαφορετικό δρόμο για να μαθαίνει, δηλαδή «να συλλέγει, να επεξεργάζεται και να οργανώνει τις πληροφορίες» (Platsidou & Zagora, 2006:160). Κάποιοι μαθητές μαθαίνουν κάτι μόνο όταν οι πληροφορίες και το μαθησιακό υλικό παρουσιάζονται οπτικά (οπτικοί τύποι/visual learners), κάποιοι άλλοι μαθητές μαθαίνουν καλύτερα μέσω της ακρόασης (ακουστικοί τύποι/auditory learners), ενώ οι κιναισθητικοί τύποι (kinaesthetic learners) προτιμούν την κίνηση, την αφή, τη μίμηση, το παιχνίδι ρόλων και τη βιωματική εμπειρία. Επιπλέον, κάποιοι μαθητές προτιμούν να προσεγγίζουν το μαθησιακό υλικό σταδιακά, βήμα-βήμα, ενώ κάποιοι υιοθετούν μια συνολικότερη προσέγγιση.

Η συζήτηση αυτή δείχνει ότι οι εκπαιδευτικοί χρειάζεται να εμπλακούν σε μια προσπάθεια κατανόησης των μαθητών τους και να αντιλαμβάνονται ότι η πληροφορία χρειάζεται να παρουσιάζεται με πολλαπλούς τρόπους, έτσι ώστε να απευθυνθούν σε όλους τους μαθητές, οι οποίοι έχουν διαφορετικά μαθησιακά στυλ (Platsidou & Zagora, 2006). Αντίστοιχα, οι εργασίες και οι δραστηριότητες στις οποίες συμμετέχουν οι μαθητές είναι χρήσιμο να λαμβάνουν υπόψη τα διαφορετικά μαθησιακά στυλ των μαθητών. Οι εκπαιδευτικοί θα το επιτύχουν αυτό αξιοποιώντας την επικοινωνία, την παρατήρηση και τη συζήτηση με τους μαθητές προκειμένου να τους γνωρίσουν καλύτερα, να γνωρίσουν τα ενδιαφέροντά τους, τον τρόπο με τον οποίο επιθυμούν να εργάζονται, τις προσδοκίες που έχουν για το μάθημα, το εκπαιδευτικό υλικό, τις δραστηριότητες που τους παρωθούν, κλπ.

Δεύτερον, χρειάζεται υπομονή και επιμονή, επειδή η διαφοροποιημένη διδασκαλία δεν αποφέρει άμεσα θετικά αποτελέσματα. Η επιμονή είναι απαραίτητη, καθώς ερευνητικά ευρήματα δείχνουν ότι παράγοντες όπως το μεγάλο μέγεθος των τάξεων, η έλλειψη κατάλληλου εξοπλισμού και οι χρονικοί περιορισμοί αποτελούν δυσκολίες στην εφαρμογή της διαφοροποιημένης διδασκαλίας (Palaiopanou, 2020).

Τρίτον, χρειάζεται η διάθεση για συνεργασία με τους άλλους εκπαιδευτικούς του σχολείου, με τη διοίκηση και με τους γονείς. Αυτό είναι σημαντικό, επειδή η διαφοροποίηση στη διδασκαλία εφαρμόζεται ευκολότερα και παράγει καλύτερα αποτελέσματα σε ένα σχολείο στο οποίο δεν εφαρμόζεται αποσπασματικά από 1-2 εκπαιδευτικούς, αλλά αποτελεί τη συνήθη εκπαιδευτική μεθοδολογία που έχει ενσωματωθεί και «εγγραφεί» στην κουλτούρα του σχολείου. Η συνεργασία με τους γονείς επιτρέπει στους εκπαιδευτικούς να εξηγήσουν τον τρόπο διδασκαλίας και να αποκτήσουν την υποστήριξη των γονέων, οι οποίοι συχνά έχουν συνηθίσει στη συντηρητική και δασκαλοκεντρική διαδικασία και ενδεχομένως να μην κατανοούν τις προσπάθειες των εκπαιδευτικών να εμπλέξουν ενεργά όλους τους μαθητές σε μια προσέγγιση με την οποία αυτοί δεν είναι εξοικειωμένοι.

ΣΥΜΠΕΡΑΣΜΑ

Η ενσωμάτωση καινοτόμων εκπαιδευτικών πρακτικών στη διδασκαλία παρέχει τη δυνατότητα για αναβάθμιση της ποιότητας της διδασκαλίας και την ενίσχυση όλων των μαθητών στην προσπάθειά τους για την αξιοποίηση των δυνατοτήτων τους και την επίτευξη των μαθησιακών στόχων.

Σε επίπεδο πράξης, για να αποδειχτούν πράγματι ωφέλιμες καινοτόμες εκπαιδευτικές πρακτικές, όπως η διαφοροποιημένη διδασκαλία, χρειάζεται γνώση του θεωρητικού πλαισίου, έτσι ώστε οι εκπαιδευτικοί να μπορούν να μετατρέψουν την εκπαιδευτική θεωρία σε ρεαλιστικές πρακτικές που μπορούν να εφαρμόσουν στη σχολική τάξη. Είναι απαραίτητη, επίσης, μια αλλαγή στον τρόπο με τον οποίο οι εκπαιδευτικοί αντιλαμβάνονται τον ρόλο τους, και ειλικρινή διάθεση για καινοτομία, επειδή τα αποτελέσματα της διαφοροποιημένης διδασκαλίας δεν είναι άμεσα ορατά, αλλά χρειάζονται χρόνο για να γίνουν αντιληπτά.

Με βάση την παραπάνω συζήτηση, στην εργασία αυτή επισημάναμε τις γενικές κατευθύνσεις, τη «φιλοσοφία» η οποία χρειάζεται να διέπει τους εκπαιδευτικούς που επιχειρούν να εφαρμόσουν τη διαφοροποίηση στη διδασκαλία της αγγλικής γλώσσας. Ειδικότερα, οι παραπάνω προτάσεις αναφορικά με τον ρόλο των εκπαιδευτικών στη διαφοροποιημένη διδασκαλία αποτελούν χαρακτηριστικά, αλλά και γνωστικά και πνευματικά εφόδια που χρειάζεται να διαθέτουν οι εκπαιδευτικοί που επιθυμούν να εγκαταλείψουν την παραδοσιακή δασκαλοκεντρική προσέγγιση στη διδασκαλία της

αγγλικής γλώσσας και να υιοθετήσουν μια προσέγγιση που θέτει στο επίκεντρο τους μαθητές τους, τα ενδιαφέροντα, τα μαθησιακά τους στυλ και τις ανάγκες τους.

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ΕΠΙΔΡΑΣΤΙΚΕΣ ΤΕΧΝΟΛΟΓΙΕΣ ΣΤΗ ΛΟΓΙΣΤΙΚΗ ΚΑΙ ΕΛΕΓΚΤΙΚΗ: ΕΝΑ ΜΕΤΑΚΥΛΙΟΜΕΝΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΒΑΡΟΣ

Μαγουλά Αγγελική Ελένη
Υποψήφια Διδάκτορας
Τμήμα Λογιστικής & Χρηματοοικονομικής, Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: aemagoula@uniwa.gr

Χαραμής Δημήτριος
Επίκουρος Καθηγητής
Τμήμα Λογιστικής & Χρηματοοικονομικής, Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: dcharamis@uniwa.gr

Συκιανάκης Νικόλαος
Καθηγητής
Τμήμα Λογιστικής & Χρηματοοικονομικής, Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: niksyk@uniwa.gr

ΠΕΡΙΛΗΨΗ

Η ανατρεπτική δυναμική των νέων τεχνολογιών αποτελεί πλέον καθημερινό γεγονός που επιδρά τόσο στις επαγγελματικές όσο και στις ακαδημαϊκές επιδιώξεις του ατόμου, από το επίπεδο της πρωτοβάθμιας εκπαίδευσης μέχρι και το ανώτερο επίπεδο γνώσης. Το παρόν πόνημα διερευνά αυτές τις νέες τεχνολογίες που διαφαίνεται να διαταράσσουν σε μεγάλο βαθμό τις ισορροπίες κατάκτησης της επιστημονικής γνώσης, όπως big data analytics (BDA), robotic process automation (RPA), artificial intelligence (AI), Internal of Things (IoT) and distributed ledger technologies (DLT). Αυτή η ανατρεπτική δυναμική διερευνάται από τα στοιχεία ακαδημαϊκών φορέων του τομέα λογιστικής και ελεγκτικής, καθώς οι εν δυνάμει απόφοιτοι εκτίθενται από την έναρξη της επαγγελματικής τους δραστηριοποίησης σε σωρεία τεχνολογικών μεταβολών, μειονεκτούν στην αγορά εργασίας άνευ της κατάλληλης ακαδημαϊκής προετοιμασίας και δυσχεραίνονται στην υιοθέτηση τεχνολογικών εργαλείων κατά τις συνήθεις εργασιακές τους πρακτικές.

Μέσω της παρούσας βιβλιογραφικής ανασκόπησης επιχειρείται η ευαισθητοποίηση των φορέων γνώσης στην υιοθέτηση στο μέγιστο βαθμό όλων των νέων τεχνολογιών κατά την μετάδοση της γνώσης ανεξαρτήτως πεδίου. Τα αποτελέσματα καταδεικνύουν ότι καθώς οι νέες τεχνολογίες αυξάνουν τις εργασιακές απαιτήσεις χρήσης τους από τον επαγγελματία του τομέα λογιστικής και χρηματοοικονομικής ελεγκτικής, μετακυλίεται στην τριτοβάθμια εκπαίδευση η ευθύνη της αρτιότερης προετοιμασίας των εν δυνάμει φοιτητών. Συναφώς, καταδεικνύεται το γεγονός ότι τα ακαδημαϊκά ιδρύματα αρχίζουν σταδιακά να αναγνωρίζουν την απαίτηση για ενσωμάτωση και εφαρμοστική χρήση των υπόψη τεχνολογιών με διαφορετικές μεθόδους προσέγγισης και βαθμό υιοθέτησης. Επίσης, αναδεικνύονται οι τομείς βελτίωσης και οι τάσεις απόκλισης από την τεχνολογική εξέλιξη, συνεκτιμώντας την προδιάθεση για διατήρηση της ακαδημαϊκής ισορροπίας, ενώ επισημαίνεται ο αντίκτυπος της μονοδιάστα της χρήσης των παλαιότερων, κατά τη διδασκαλία των νεότερων τεχνολογιών. Συνακολούθως, η πίεση για επικαιροποίηση της κατάρτισης επί των αναδυόμενων τεχνολογιών μετακυλίεται στην πρότερη βαθμίδα εκπαίδευσης, ως εφαλτήριο του δομημένου εγκλιματισμού σε μία διαρκή εξέλιξη. Τέλος, τα αποτελέσματα της παρούσας αναδεικνύουν την ανάγκη για επικαιροποίηση των οριζόντιων (ήπιων) δεξιοτήτων ως εργαλείο διαχείρισης των αναδυόμενων τεχνολογιών και μίας ολιστικής βελτίωσης της ακαδημαϊκής και επαγγελματικής απόδοσης των αποφοίτων.

Ολοκληρώνοντας, η παρούσα αναδεικνύει θέματα μελλοντικής έρευνας αναφορικά με τα αντικείμενα και τους τομείς ενσωμάτωσης στην Τριτοβάθμια Εκπαίδευση, καθώς και τις σχετικές εκπαιδευτικές πρακτικές.

Λέξεις – κλειδιά: Λογιστική, Ελεγκτική, Εκπαίδευση, Αναδυόμενες Τεχνολογίες.

ΕΙΣΑΓΩΓΗ

Αναγνωρίζοντας ότι η τεχνολογία πάντα αποτελεί ανατρεπτικό παράγοντα του συνολικού κοινωνικού γίγνεσθαι, το παρόν πόνημα έχει ως αντικείμενο τη λογιστική και ελεγκτική δραστηριότητα. Επικεντρώνεται στην ταχεία επίδραση των νέων τεχνολογιών στους συγκεκριμένους τομείς, καθώς είναι προφανές ότι απαιτεί την ενσωμάτωση των υπόψη τεχνολογικών δεξιοτήτων στην ουσιαστική επαγγελματική δραστηριοποίηση του ατόμου-επαγγελματία (ACCA, 2020b) στη λογιστική και ελεγκτική κατεύθυνση (Dai and Vasarhelyi, 2017).

Οι επαγγελματικοί φορείς πιστοποίησης (ACCA, 2021; Chartered Accountants Ireland, 2019; CIMA, 2021) επικαιροποίησαν ήδη τα εξεταζόμενα αντικείμενα, ενώ οι μεγάλες λογιστικές και ελεγκτικές εταιρείες έχουν επενδύσει στα απαιτούμενα νέα τεχνολογικά εργαλεία, προκειμένου να ανταπεξέλθουν στις τρέχουσες επαγγελματικές απαιτήσεις (Cooper et al., 2019). Τουναντίον, η τριτοβάθμια εκπαίδευση υπόκειται κριτική για τη διαφαινόμενη καθυστέρηση ή αναβλητικότητα στην ενσωμάτωση των νέων τεχνολογιών (Dzuranin et al., 2018; Griffin and Wright, 2015; Hasan, 2022). Η υστέρηση αυτή φαίνεται να επιβεβαιώνεται από το γεγονός ότι, σε παγκόσμια κλίμακα, προτιμούνται οι απόφοιτοι των τεχνολογικών σχολών (IT, computer science κλπ.) από τις μεγάλες ελεγκτικές εταιρείες έναντι των αποφοίτων των λογιστικών σχολών/τμημάτων (Qasim et al., 2022). Έρευνες καταδεικνύουν ότι το 31% των νεοπροσληφθέντων από τις λογιστικές εταιρείες δεν είναι απόφοιτοι λογιστικών τμημάτων, σημειώνοντας σταθερή αυξητική τάση 11% ετησίως (Tysiac and Drew, 2018). Η τμηματική ενασχόληση επί των επιπτώσεων αυτής της εξέλιξης στην ακαδημαϊκή κοινότητα της λογιστικής και της ελεγκτικής (Apostolou et al., 2022) καθώς και η μελέτη της επίδρασης ανά μεμονωμένη τεχνολογία (Hasan, 2022; Liu et al., 2021) έχουν σαν αποτέλεσμα οι απόφοιτοι λογιστικής να μειονεκτούν ολιστικά και να επιδεικνύουν άρνηση στην υιοθέτησή των κατά την μετέπειτα επαγγελματική τους σταδιοδρομία (Qasim and Kharbat, 2020). Πάνω από δεκαετία, η επιστημονική κοινότητα κρούει τον κώδωνα στην πανεπιστημιακή κοινότητα για την επικαιροποίηση των προγραμμάτων εκπαίδευσης προκειμένου να αναπτύξουν εργαλειοθήκη για την μετάδοση των τεχνολογικών δεξιοτήτων σε επίπεδο ανταγωνιστικό της επαγγελματικής απασχόλησης (Lawson et al., 2014; McKinney et al., 2017).

Η παρούσα επιχειρεί να απαντήσει γιατί πρέπει η ακαδημαϊκή κοινότητα να ενσωματώσει τις νέες τεχνολογίες εκείνες που φέρονται να έχουν την μεγαλύτερη επίπτωση στον επαγγελματικό χώρο της λογιστικής και της ελεγκτικής. Οι υπό εξέταση νέες τεχνολογίες ανασκοπούνται ταυτόχρονα, παρόλο που η εξέλιξή τους βρίσκεται σε διαφορετικό στάδιο ανάπτυξης και επίδρασης, προκειμένου να εντοπιστούν οι σύγχρονες επικαιροποιημένες τάσεις. Η ερευνητική μεθοδολογία και οι τεχνικές που χρησιμοποιήθηκαν παρουσιάζονται στο δεύτερο μέρος της παρούσας, στο τρίτο μέρος επιχειρείται μία συνοπτική παρουσίαση των νέων τεχνολογιών, ενώ στο τέταρτο μέρος διερευνάται η ενσωμάτωση από την ακαδημαϊκή κοινότητα και ακολουθεί η παρουσίαση των αποτελεσμάτων στο πέμπτο μέρος. Τέλος, στο έκτος μέρος ακολουθεί η συζήτηση και προτείνονται ερωτήματα για μελλοντική έρευνα. Η συμβολή της παρούσας επαφίεται στο γεγονός ότι συνεκτιμά ταυτόχρονα τα είδη των νέων τεχνολογιών που επιδρούν στους τομείς της λογιστικής και της ελεγκτικής, προκειμένου να συνδράμει την ακαδημαϊκή και την ευρύτερη εκπαιδευτική κοινότητα στην συμμετοχή και ενασχόληση με αυτές (Kotb et al., 2019; McConville, 2023).

ΜΕΘΟΔΟΛΟΓΙΑ ΚΑΙ ΤΕΧΝΙΚΕΣ

Η βιβλιογραφική ανασκόπηση επιχειρεί να αναγνωρίσει τις σύγχρονες τάσεις και να επισημάνει καίρια σημεία που διατάσσουν και επιδρούν στην τριτοβάθμια εκπαίδευση στον τομέα της λογιστικής και της ελεγκτικής, αλλά επιβαρύνουν και διογκώνουν τις απαιτήσεις εναρμόνισης της ευρύτερου εκπαιδευτικού σχήματος, αναφορικά με τις νέες τεχνολογίες. Η ημι-συστηματική μεθοδολογία επιλέχθηκε, καθώς επιτρέπει την προσέγγιση ενός θέματος από διαφορετικά επιστημονικά πεδία, προκειμένου να αντληθούν χρήσιμες πληροφορίες και τάση για εφαρμογή (Snyder, 2019). Η παρούσα ημι-συστηματική βιβλιογραφική ανασκόπηση διενεργήθηκε χρησιμοποιώντας πηγές διεπιστημονικών πεδίων που έχουν δημοσιευθεί σε περιοδικά καταχωρημένα στους ιστότοπους Google Scholar, Web of Science και Scopus ως ενδείκτες ποιοτικών ερευνών, προκειμένου να αξιοποιηθούν οι μελέτες από διαφορετικά επιστημονικά πεδία, πλέον της λογιστικής, ώστε να εκμαιευθούν κατεκτημένες τεχνογνωσίες και εμπειρίες από αυτά τα πεδία που χρησιμοποιούν ήδη τις συγκεκριμένες τεχνολογίες.

Η παραμετροποίηση του ερωτήματος καταλόγου περιλάμβανε τους όρους “BDA”, “ML”, ”AI”, ”data security”, “data analytics”, “IoT’, “cloud computing”, “RPA”,“DLT”, “XBRL” και “accounting” και “audit” και “education”. Ειδικά στην παράμετρο “audit” εξαιρέθηκαν μελέτες που αναφέρονταν σε τεχνικό έλεγχο ή έλεγχο ασφαλείας ή έλεγχο κυβερνοάμυνας, καθώς αναφέρονται κυρίως σε θέματα του επιστημονικού πεδίου της πληροφορικής και δικτύων αναμετάδοσης της πληροφορίας, ήτοι διαφοροποιείται από το πεδίο ενδιαφέροντος που είναι ο χρηματοοικονομικός έλεγχος. Επίσης, ενσωματώθηκε το ‘cloud computing” καθώς πρωτίστως είναι αποθηκευτικός χώρος, αλλά επιδρά στην αξιοπιστία των λογιστικών δεδομένων και αρχείων που τηρούνται (χρόνος και πλήθος πληροφοριών και ιδιοκτησιακό

καθεστώς) υπό την σκέπη του internet based computing. Τέλος, σημειώνεται ότι στον όρο DLT εμπεριέχεται η έννοια του blockchain, καθώς αποτελεί υποείδος της υπόψη τεχνολογίας, ως τεχνολογικό μέσο διάχυσης, τήρησης και επιβεβαίωσης της πληροφορίας.

Αναφορικά με το χρονικό διάστημα αναφοράς επιλέχθηκε εύρος δημοσιεύσεων 2020-2024, ως πιο αντιπροσωπευτικό καθώς από το 2020 εντοπίζονται αισθητά διαφοροποιημένες έρευνες για σχηματοποιημένες συστημικά έννοιες, όπως για παράδειγμα το DeFi πλέον έχει διαφοροποιηθεί από τον αμιγή τομέα της λογιστικής. Επίσης, η ανασκόπηση περιλαμβάνει μόνο δημοσιεύσεις στην αγγλική γλώσσα με διεξαγωγή του πρώτου επιπέδου ελέγχου των αποτελεσμάτων από τις περιλήψεις, προκειμένου να αποβληθούν έρευνες εκτός του αντικειμένου εκπαίδευσης ή με μία ελάχιστη αναφορά χωρίς εκπαιδευτικό αποτέλεσμα.

ΕΠΙΔΡΑΣΤΙΚΕΣ ΤΕΧΝΟΛΟΓΙΕΣ ΣΤΗ ΛΟΓΙΣΤΙΚΗ ΚΑΙ ΤΗΝ ΕΛΕΓΚΤΙΚΗ

Η παρούσα ανασκόπηση αναφέρεται στο σύνολο των μέχρι τώρα διαφοροποιημένων τεχνολογιών που επιδρούν στους τομείς της λογιστικής και ελεγκτικής, και συγκεκριμένα στις Big Data Analytics (συμπεριλαμβανόμενων των data analytics), Machine Learning, Artificial Intelligence, Internet of Things, Data Security, Cloud computing, Robotic Process Automation και Distributed Ledger Technologies (συμπεριλαμβανόμενου του Blockchain). Εν συντομία θα οριστούν οι υπόψη τεχνολογίες (σύμφωνα με την εφαρμοστική τους χρήση) διακριτά και θα παρουσιαστούν οι εργαλειοθήκες - μνημονεύοντας παράλληλα εμπεριεχόμενους κινδύνους / δυσχέρειες - που παράγονται υπό το πρίσμα της λογιστικής και της ελεγκτικής, καθώς και οι νέες απαιτήσεις που αναδεικνύονται ως πρόκριμα αναβάθμισης των τεχνικών και επαγγελματικών δεξιοτήτων των υπόψη τομέων.

Πρωτίστως, το τεράστιο πλήθος δεδομένων έχει προκαλέσει έκρηξη στοιχείων και αρχείων σε όλους τους τομείς δραστηριότητας, ειδικά όμως όσον αφορά την λογιστική, ελεγκτική και εκπαίδευση, τα δεδομένα καθίστανται μη διαχειρίσιμα με τις συμβατικές μεθόδους διαχείρισης, ταξινόμησης και διατήρησής τους. Για τις ανάγκες της παρούσας δεν προκρίνεται η διάκριση των δεδομένων σε μεγάλα ή μικρά (big data ή απλά data) καθώς πλέον όλα τα δεδομένα καλύπτονται και εμφανίζουν τα χαρακτηριστικά των 4 "v" (volume, velocity, variety, veracity - όγκος, ταχύτητα, ποικιλία, εγκυρότητα) διαφοροποιώντας τα από την παραδοσιακή θεώρηση των στοιχείων/αρχείων που τηρούνταν σε έντυπα βιβλία, συμπαρασύροντας αντίστοιχα και την πληροφορία που αυτά ενσωματώνουν (Laney, 2001). Συνεπακόλουθο των χαρακτηριστικών αυτών είναι η ανάπτυξη BDA (Big Data Analytics) προκειμένου να καταστεί δυνατή μία διαδικασία χρήσης δεδομένων (δομημένων και μη) μέσω της εφαρμογής αναλυτικών τεχνικών και μοντέλων (στατιστικών, ποσοτικών, διαγνωστικών και περιγραφικών) ως εργαλεία ανάλυσης και διύλισης των συσσωρευμένων πληροφοριών (Schneider et al., 2015; Appelbaum et al., 2017). Αντιστοίχως το βάρος της λογιστικής μεταφέρεται στη διοικητική λογιστική / διαχειριστική λογιστική (management accounting) και στους χρηματοοικονομικούς ελέγχους (audit) (Moeller et al., 2020; Nielsen, 2015; Schmidt et al., 2020; Dai and Vasarhelyi, 2017; Warren et al., 2015). Παράλληλα, οι επαγγελματικοί φορείς πιστοποίησης (ACCA, 2020b) επισημαίνουν την ανάγκη ενίσχυσης των ήπιων δεξιοτήτων όπως κριτική σκέψη, αντίληψη αφηρημένων σχέσεων, επίλυση προβλημάτων παράλληλα με τις απαραίτητες τεχνικές (data literacy, data interpretation, data analysis, data finance, data visualisation, data mining) δεξιότητες (Blix, 2021).

Η επόμενη τεχνολογία ανήκει στην κατηγορία τεχνολογικής παρέμβασης που γίνεται λιγότερο αισθητή, λόγω του τρόπου αλληλεπίδρασής της με τον εργασιακό βίο. Ως τεχνολογία το RPA (Robotic Process Automation - RPA / Ρομποτική Αυτοματοποίηση Διαδικασιών-Διεργασιών / Ψηφιακά Ρομπότ) ορίζεται μία ομπρέλα εργαλείων χρήσης εικονικών ρομπότ λογισμού - τα γνωστά ως bots - για την εκτέλεση χειρωνακτικών, χρονοβόρων, επαναλαμβανόμενων, δομημένων και κοστοβόρων εργασιών (Van der Aalst et al., 2018; Cooper et al., 2019). Η εν λόγω τεχνολογία αξιοποιείται στη λογιστική και ελεγκτική για διεργασίες όπως συμφωνίες υπολοίπου (τραπεζικό / ταμειακά διαθέσιμα - reconciliations), επιβεβαίωση παραγγελιοληψίας / παραγγελιοδοσίας (order validation), παρακολούθηση αποθεμάτων (inventory tracking), φορολογικές αναφορές (tax reporting), τέλους χρήσης αναφορές και ενοποιήσεις (financial reporting closing - consolidation) καθώς και διεξαγωγή βασικών ελεγκτικών διεργασιών (Moffitt et al., 2018). Συνακολούθως, λογιστές και ελεγκτές πρέπει να ελέγχουν κάθε τομέα ανάθεσης και εκτέλεσης που εξυπηρετείται από bot, ώστε να διασφαλίσουν την αξιοπιστία και ακρίβεια του πυρήνα της δικής τους εξατομικευμένης εργασίας (McCann, 2018; Kokina et al. (2021).

Ίσως η πιο διαφημισμένη από όλες τεχνολογία, αυτή της τεχνητής νοημοσύνης (Artificial Intelligence - AI) συμπεριλαμβάνει μία πλειάδα τεχνολογιών όπου υπολογιστικός αλγόριθμος εκτελεί εργασίες χωρίς την ανθρώπινη παρέμβαση όπως οπτικοποίηση, σημασιολογική ανάλυση, λήψη αποφάσεων, μηχανική μάθηση (Gotthardt et al., 2020; Petkov, 2020; Cho et al., 2020). Η επίδραση στους τομείς της λογιστικής και ελεγκτικής είναι εντυπωσιακή διεκπεραιώνοντας τις διεργασίες ανάλυσης (δομημένων και μη) δεδομένων, εκτίμησης, αναγνώρισης δοσοληψιών, εκτέλεσης, ελέγχου καταχωρήσεων (πολυκριτηριακή και συγκριτική), διερεύνησης τάσεων, κινδύνων, πρόβλεψης και

κενών προς αποφυγή ή συμμόρφωση ή διαχείριση (ICAEW, 2018a; ACCA,2020a). Προς επίρρωση της επίδρασης, το 96% των μεγάλων λογιστικών εταιρειών έχουν υιοθετήσει ή προγραμματίζουν ή εκπαιδεύουν να υιοθετήσουν AI τεχνολογίες για την εκτέλεση λογιστικών διεργασιών (Thomson Reuters, 2024), σε μετεξέλιξη του 11% υιοθέτησης κατά το 2019 (Oracle, 2019). Ήτοι, απαιτείται γνώση μοντελοποίησης (modeling), αξιολόγησης (valuation), εγκληματολογική λογιστική (forensic accounting) και εκτίμησης / πρόβλεψης ποσοτικών και ποιοτικών τεχνικών αναλύσεων (Technical Analysis), ενώ σε επίπεδο προσωπικών δεξιοτήτων (soft skills) η έμφαση δίνεται στην προσαρμοστικότητα, δημιουργικότητα και κριτική σκέψη επί της πληροφορίας (Bakarich and O'Brien, 2021, Ding et al., 2020).

Στο επίπεδο της τεχνολογίας κατανεμημένου καθολικού (Distributed Ledger Technology - DLT) περιλαμβάνονται σωρεία τεχνολογιών με προεξέχουσες τις blockchain, hashgraph, directed acyclic graph (DAG), holochain, tempo/radix οι οποίες ήδη έχουν εισαχθεί και αξιοποιούνται από τα υπολογιστικά συστήματα και αγορές. Ένας γενικευμένος ορισμός αποδίδει την DLT ως έναν ψηφιακό κατάλογο επιβεβαιωμένων καταχωρήσεων (digital ledger - ψηφιακό καθολικό) εξασφαλίζοντας διαφάνεια και χρονική συνέπεια των στοιχείων (Dai and Vasarhelyi, 2017). Η εν λόγω τεχνολογία κυριαρχεί προκρίνοντας την τριπλογραφία (Triple Entry Accounting - TEA) έναντι της παραδοσιακής διπλογραφίας, καθώς εισέρχεται η έννοια της διάστασης της επιβεβαίωσης γεγονότος (Fullana and Ruiz, 2021; Kitsantas, 2022). Ήδη μελέτες καταδεικνύουν ότι η DTL θα παράξει ολοκληρωμένες επιχειρηματικές λύσεις αναφορικά με τις λογιστικές επιβεβαιωμένες καταχωρήσεις των στοιχείων και αρχείων των οικονομικών καταστάσεων και αναφορών (Inghirami, 2019; Dai and Vasarhelyi, 2017), ενώ ερευνητές επεξεργάζονται τη συνολική τροποποίηση των λογιστικών καταχωρήσεων, τεχνικών ελέγχου και εκτέλεσης του χρηματοοικονομικού ελέγχου (Coyne and McMickle, 2017; Schmitz and Leoni, 2019; ICAEW, 2018b), ενώ απαιτείται να επιδείξουν επιμέλεια στην αξιολόγηση, καταχώρηση, επιβεβαίωση και έλεγχο των σχετιζόμενων DLT περιουσιακών στοιχείων και υποχρεώσεων τηρώντας την κείμενη νομοθεσία (Nicolau, 2021).

Λιγότερο προφανής είναι η εμπλοκή της τεχνολογίας διαδικτύου των πραγμάτων (Internet of Things - IoT) καθώς αρχικά εντοπίζεται στην ανάπτυξη της τεχνολογικής υποδομής και των τεχνολογικών μέσων της υποδομής, όμως η τεχνολογική υποδομή (π.χ. 5G δίκτυο) προετοίμασε και προετοιμάζει το έδαφος για επαγγελματική αξιοποίηση και εφαρμογή. Ως πρώτο σημείο εμπλοκής αποτελεί το στοιχείο "χρόνου" καθώς δίνει τη δυνατότητα διενέργειας ελέγχου χρηματοοικονομικών στοιχείων και αρχείων (big data) σε πραγματικό χρόνο ακόμα και εξ αποστάσεως. Συνακολούθως, ο έλεγχος καθίσταται διαρκής συμπιέζοντας την ακατάπαυστη λογιστική εργασία, όπως ενδεικτικά το CloudAccounting απαιτείται για CloudAuditing, με διαρκής εποπτεία των λογαριασμών / καταχωρήσεων βελτιστοποιώντας τη διαχείριση κινδύνου σε όλα τα επίπεδα και τήρηση των κανονιστικών διατάξεων (INAA, 2023). Βασικά στοιχεία της τεχνολογίας είναι ο διαμοιρασμός των λογιστικών εργασιών, ελαχιστοποίηση της ελεγκτικής προσπάθειας, αναβάθμιση των χρηματοοικονομικών αναφορών και συρρίκνωση του χρόνου ολοκλήρωσης της ελεγκτικής αναφοράς. Επιπλέον, η XBRL (eXtensive Business Reporting Language) είναι η ενδεικνυόμενη γλώσσα για την ψηφιακή χρηματοοικονομική αναφορά και πληροφορίας, η οποία ήδη αξιοποιείται ως διεθνές πρότυπο (πλαίσιο) κωδικοποίησης και αναφορών του συνόλου των χρηματοοικονομικών και μη χρηματοοικονομικών πληροφοριών (XBRL, 2025).

Σημειώνεται ότι ήδη πολλά συστήματα επιχειρησιακού σχεδιασμού (ERP) έχουν συμπεριλάβει DBA, AI, ML λειτουργίες στα λογισμικά τους προς διευκόλυνση των λογιστικών και ελεγκτικών διεργασιών (SAP S / 4 HANA / ORACLE), ενώ ήδη έχουν εμπορικά αναπτυχθεί DLT τεχνολογίες από παρόχους εφαρμογών όπως ενδεικτικά το Azure (Microsoft), η Leonardo (SAP) αλλά και το Rubix Core (Deloitte - Dapp Creator). Τέλος, επισημαίνεται ότι η ανωτέρω παρουσίαση είναι ενδεικτική και όχι εξαντλητική, προς εξυπηρέτηση της οριοθέτησης των όρων που διερευνούνται στην παρούσα βιβλιογραφική ανασκόπηση.

ΑΚΑΔΗΜΑΪΚΗ ΕΝΣΩΜΑΤΩΣΗ ΣΤΗ ΛΟΓΙΣΤΙΚΗ ΚΑΙ ΕΛΕΓΚΤΙΚΗ

Στο παρόν μέρος θα γίνει ανασκόπηση ανά τεχνολογία ή με μερική ομαδοποίηση των τεχνολογιών, όπως προκύπτει από τις μελέτες και θα επιχειρηθεί μία συγκεντρωτική παρουσίαση των αποτελεσμάτων στο τέλος του, προκειμένου να εξαχθούν τα θέματα προς συζήτηση. Επίσης, πρέπει να σημειωθεί ότι κάποιες τεχνολογίες έχουν μελετηθεί περισσότερο από άλλες, είτε επειδή είναι λιγότερο τεχνικές είτε επειδή έχουν ήδη εξελιχθεί. Για τον λόγο αυτό τα συνολικά αποτελέσματα θα παρουσιαστούν συγκεντρωτικά αναφορικά με την τάση που υποδεικνύεται από τους μελετητές.

Αρχικά, η BDA που δύναται να καλυφθεί εργαστηριακά, δεν απαιτεί υποστήριξη με νέα συγγράμματα ή επένδυση σε νέο εξοπλισμό και προσεγγίζει ολιστικά κάποια από τα άλλα ακαδημαϊκά μαθήματα (π.χ. στατιστική) έχει ενσωματωθεί σε μεγάλο βαθμό από τα ιδρύματα στο υφιστάμενό τους πρόγραμμα (Andiola et al., 2020; ACCA, 2020b; Liu et al., 2021), και σε μεγάλο δε βαθμό διδάσκεται διακριτά από άλλα μαθήματα (Moore and Felo, 2021) ή στα πλαίσια των μαθημάτων πληροφοριακών συστημάτων λογιστικής (Losi et al., 2022; Qasim et al., 2022; Qasim and Kharbat, 2020). Προκύπτουν προβληματισμοί όμως αφενός με τις ικανότητες και γνώσεις επί των BDA που έχουν οι ίδιοι οι

εκπαιδευτές και αφετέρου η έλλειψη επαρκούς χώρου διοργάνωσης των υπόψη μαθημάτων, καθώς σημειώνεται μεγαλύτερο ενδιαφέρον προσέλευσης (Andiola et al., 2020; Dzuranin et al., 2018; Losi et al., 2022). Επίσης, μελετητές διαπίστωσαν ότι τα εκπαιδευτικά προγράμματα είναι γενικόλογα ή με εντυπωσιακότερους τίτλους από την πραγματική ύλη που καλύπτεται, με αποτέλεσμα τόσο οι εκπαιδευτές όσο και οι εκπαιδευόμενοι να υποαποδίδουν ή να αδιαφορούν (Andiola et al., 2020). Τέλος, αριθμός μελετών προβληματίζεται επί της περιορισμένης έκθεσης σε συναφείς εφαρμογές, καθώς κατά κύριο λόγο τα BDA προσεγγίζονται ακαδημαϊκά από συμβατικά εργαλεία (EXCEL) με ελάχιστη έκθεση σε άλλα προγράμματα όπως το TABLEAU (Andiola et al., 2020; Schoenfeldt and Birt, 2020; Laplante and Vernon, 2021; Raschke and Charron, 2021). Συμπερασματικά, παρατηρείται μία θεμελιωμένη αντίληψη της ακαδημαϊκής κοινότητας υπέρ της απόκτησης της υπόψη τεχνικής (επαγγελματικής / κάθετης) δεξιότητας, αποφεύγοντας τα σύνθετα τεχνολογικά εργαλεία και τις προσωπικές (κοινωνικές / οριζόντιες) δεξιότητες που απαιτούνται, για την αποδοτικότερη κατάκτηση της ακαδημαϊκής γνώσης (Shawver and Shawver, 2020; Losi et al., 2022).

Αναφορικά με την RPA, παρόλο που πρότερες μελέτες έχουν ήδη αναδείξει την ανάγκη για ακαδημαϊκή προετοιμασία των αποφοίτων λογιστικής στην εν λόγω τεχνολογία (Cooper et al., 2019), οι μελετητές αναδεικνύουν την έλλειψη τεχνογνωσίας, εξοπλισμού και προσωπικού στα ακαδημαϊκά ιδρύματα (Vincent et al., 2020), πλέον της ενδεχόμενης απλής θεωρητικής παρουσίασής της στο μάθημα των πληροφοριακών συστημάτων λογιστικής (Harrast and Wood, 2023) ενώ υπάρχει πλέον διαθεσιμότητα σε εκτενείς ασκήσεις (Vincent et al., 2020), οργανωμένη διάταξη μαθημάτων (EY, 2022), και εργαλειοθήκες (Keys and Zhang, 2020). Όσον αφορά την AI εντοπίζεται ελάχιστη βιβλιογραφία σε σχέση τη λογιστική ή ελεγκτική (Zhang et al., 2020). Όμως, οι υφιστάμενες μελέτες καταδεικνύουν την ανάγκη επικαιροποιήσης των προγραμμάτων σπουδών, ώστε να καλυφθούν οι εκτεταμένες ανάγκες των αγορών και της βιομηχανίας αναφορικά με την υπόψη τεχνολογία τόσο στη λογιστική όσο και την ελεγκτική (Hasan, 2022; Polimeni and Burke, 2021). Στην ίδια κατεύθυνση κινείται και η βιβλιογραφία αναφορικά με την DLT (Zhang et al., 2020; ICAEW, 2018b). Σημαντική επισήμανση αναδύεται όμως από μελέτες που υιοθετούν την έκθεση των φοιτητών λογιστικής στην DLT προκειμένου να αξιολογούν την επίδραση της DLT (Stratopoulos, 2020; Lee et al. 2022). Μελέτη επί της εκπαίδευσης σε μεταπτυχιακούς φοιτητές απεδείχθη πιο αποτελεσματική από το αντίστοιχο εκπαιδευτικό πρόγραμμα σε προπτυχιακούς φοιτητές (Stern and Reinstein, 2021). Τέλος, αναδεικνύεται μία τάση για εμπειρική και εφαρμοσμένη πανεπιστημιακή γνώση αντί της θεωρητικής ενασχόλησης με την υπόψη τεχνολογία (Kaden et al., 2021).

Όσον αφορά στην τεχνολογία AI, η έμφαση δίνεται στην ευρύτερη αντίληψη της τεχνολογίας, επί του παρόντος, καθώς λόγω των ιδιοτήτων της μπορεί να απορροφήσει αντικείμενα για τα οποία δεν απαιτείται ο ανθρώπινος παράγοντας αξιοποιώντας το ανθρώπινο δυναμικό σε δραστηριότητες πιο απαιτητικές. Έτσι προτείνεται η ακαδημαϊκή χρήση AI (σε συνδυασμό με άλλες τεχνολογίες) για εκτέλεση βασικών (όχι τεχνικών) λογιστικών λειτουργιών προκειμένου να εκπαιδευτούν στην διαχείριση / αξιολόγηση / ανάδειξη των "κακώς" παραχθέντων αποτελεσμάτων ή ενεργειών (Ballantine, et al., 2024). Αξίζει να σημειωθεί ότι η AI, φέρει θετικές και αρνητικές κριτικές, καθώς την συγκεκριμένη τεχνολογία την ακολουθεί μία σκοτεινή ως προς την χρήση της πορεία που πλήττει την αξιοπιστία των αποτελεσμάτων της, όμως μελέτες αναδεικνύουν τη σημαντικότητά της στη λογιστική και την αποδοχή της ως εκπαιδευτικό εργαλείο συνολικά από την πλευρά των ίδιων των φοιτητών (Sundkvist and Kulset, 2024). Τέλος, ενδιαφέρον προκαλεί το γεγονός της έλλειψης μελετών αναφορικά με την IoT και τη λογιστική, παρόλο που ήδη υφίστανται μελέτες που καταδεικνύουν τη σημαντικότητα υιοθέτησης της IoT από την πανεπιστημιακή κοινότητα με στόχο την καινοτομία και την ακαδημαϊκή πρωτοπορία σε διεπιστημονικό επίπεδο παρέχοντας υψηλού επιπέδου εκπαίδευση (Aldowah et al., 2017; INAA, 2023). Επί των συνδυαστικών τεχνολογιών, μελέτες δείχνουν να συμφωνούν στην επιτακτική ανάγκη ενσωμάτωσης των τεχνολογιών στα υφιστάμενα πεδία / μαθήματα σε πανεπιστημιακό επίπεδο (Qasim and Kharbat, 2020), προκειμένου να αναπτυχθούν ανταγωνιστικές τεχνολογικές δεξιότητες (Qasim et al., 2022). Ενώ στην επισήμανση ότι ο βαθμός ενσωμάτωσης συναρτάται από την άρνηση ή την αποδοχή τόσο της ακαδημαϊκής όσο και της φοιτητικής κοινότητας, προκρίνεται η προληπτική αντιμετώπιση με ευρεία τεχνολογική εναρμόνιση των ακαδημαϊκών προγραμμάτων σύμφωνα με τις επικαιροποιημένες απαιτήσεις της αγοράς εργασίας (Polimeni and Burke, 2021). Πιο εφαρμοστικά συμπεράσματα προκύπτουν από τις μελέτες που διερευνούν την ανταπόκριση και τις δυσχέρειες των ίδιων των φοιτητών σε επικαιροποιημένα ακαδημαϊκά προγράμματα (Wang, 2022), όπου οι φοιτητές ανταποκρίθηκαν εξαιρετικά ως προς το τεχνικό μέρος της κατάρτισης, όμως υποαπέδωσαν στις ανοιχτού τύπου ασκήσεις και ορθή εκτέλεση ερωτημάτων, με αποτέλεσμα να εξαγχθούν μη αξιολογήσιμα αποτελέσματα (Yassin and Toumeh, 2024).

Επιπρόσθετα, διερευνώντας το λανθάνον ή ανεπίσημο αναλυτικό πρόγραμμα (εντοπίζεται και ως παραπρόγραμμα - hidden curriculum), μελέτες καταδεικνύουν τάση του ακαδημαϊκού προσωπικού στην εκπαίδευση επί της χρήσης έναντι της έκθεσης των φοιτητών στην τεχνική χρήσης των νέων τεχνολογιών (Handoyo, 2024; Sebele-Mpofu, 2024). Τέλος, προεξέχουσα θέση εντοπίζεται στο κενό που σχηματίζεται από τα χαρακτηριστικά της ίδιας της πιστοποίησης, που επιβεβαιώνει πλήρωση συγκεκριμένης απαίτησης και όχι γνώσης (AACSB, 2022) ή καλύπτει συγκεκριμένα αντικείμενα (Ballantine et al, 2024).

Συγκεντρωτικά, οι επικαιροποιημένες τάσεις που αφορούν στην τριτοβάθμια εκπαίδευση είναι η ανάγκη εξοικείωσης των προπτυχιακών φοιτητών με τις νέες τεχνολογίες είτε ως αυτόνομα μαθήματα είτε ενσωματωμένα στα υφιστάμενα μαθήματα των ακαδημαϊκών προγραμμάτων. Έτσι, τα ακαδημαϊκά ιδρύματα καλούνται να υπερβούν το επίπεδο της απλής διδαχής αναφορικά με την χρήση της τεχνολογίας καθιστώντας επιτακτική την εφαρμοστική χρήση τους σε σχέση με τα αντικείμενα της λογιστικής και της ελεγκτικής (Schoenfeldt and Birt, 2020). Συνοψίζοντας προκύπτει ότι, δεν υφίσταται μία ιδανική μέθοδος εκπαίδευσης (π.χ μελέτη περίπτωσης, προσομοίωση, εκπόνηση εργασιών, αυτοτελές ή ενσωματωμένο μάθημα), ενώ παράλληλα με την εφαρμοστική χρήση των νέων τεχνολογιών θα πρέπει να αναπτύσσονται οι οριζόντιες δεξιότητες (Tysiac, 2020) με κυρίαρχες την κριτική σκέψη, την αναλυτική σκέψη, τη δόμηση προβληματικών, την αντίληψη μη σχηματοποιημένων ή μη δομημένων προβλημάτων, την επικοινωνία (προφορική και ψηφιακή), τη δημιουργικότητα, την προσαρμοστικότητα, τη διαχείριση χρόνου, τη κατάτμηση πληροφορίας και την κατανόηση κατάστασης (προβλήματος).

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η παρούσα ανασκόπηση διερευνώντας την επενέργεια των επιδραστικών τεχνολογιών στα ακαδημαϊκά προγράμματα των κατευθύνσεων της λογιστικής και της ελεγκτικής, καταλήγει στην επιβεβαίωση της τάσης για ενσωμάτωσή (αυτοτελώς) ή και εμπλουτισμό (συσχετισμένα) των υφισταμένων προγραμμάτων σπουδών τριτοβάθμιας εκπαίδευσης στις υπόψη κατευθύνσεις (Moore and Felo, 2021). Λόγω της διαφοροποίησης της εξέλιξης των ίδιων των τεχνολογιών και της πολυεπίπεδης επιρροής στις υπόψη κατευθύνσεις, της αφομοίωσης από αυτές και της αυτονόμησης σε υποκλάδο της τεχνολογίας σε διαφορετικό χρόνο και πεδίο, οι τάσεις παρουσιάζονται αθροιστικά καθώς εμφανίζουν σε έναν άξονα. Ο κοινός αυτός άξονας είναι η βελτιστοποίηση και επικαιροποίηση της παρεχόμενης γνώσης προς επίτευξη της ενδεδειγμένης προετοιμασίας των αποφοίτων των ακαδημαϊκών ιδρυμάτων.

Η κεντρική τάση της εκπαιδευτικής κοινότητας είναι η εφαρμοστική τους χρήση επιτρέποντας ευελιξία και συνεργασία σε ακαδημαϊκό επίπεδο με παραλλαγές των μεθόδων εκπαίδευσης επί των νέων τεχνολογιών ανά τεχνολογία ή και ανά επιστημονικό αντικείμενο και επίπεδο. Παρόλες τις υφιστάμενες δυσχέρειες (Zhang et al., 2020) σε επίπεδο τεχνογνωσίας, τεχνολογίας, τεχνολογικής κατάρτισης, χρηματοδότησης και ακαδημαϊκού χρόνου, επιχειρείται δυναμικά πλέον υιοθετώντας πολύπλευρες και πλουραλιστικές παιδαγωγικές μεθόδους (Andiola et al., 2020) η πληρέστερη ακαδημαϊκή προετοιμασία των φοιτητών των οικείων τμημάτων (Harrast and Wood, 2023). Εκτός από την ίδια την αγορά εργασίας και τους φορείς επαγγελματικής πιστοποίησης που απαιτούν από τους επαγγελματίες μία πιο τεχνική κατάρτιση των αποφοίτων (Andiola et al., 2020), τα ακαδημαϊκά ιδρύματα σταδιακά προσεγγίζουν άμεσα ή έμμεσα τα παραδοσιακά εκπαιδευτικά αντικείμενα με τις υπόψη τεχνολογίες (Moore and Felo, 2021). Βασική δυσκολία που συναντάται ακαδημαϊκά είναι η πρωταρχική κλίση (προτίμηση) υπέρ της χρήσης των υφιστάμενων εργαλείων (τεχνολογιών) προκειμένου να διδαχθεί μία νέα τεχνολογία (Andiola et al., 2020). Συνακολούθως, υποβαθμίζεται η αξιοποίηση των νέων εργαλειοθηκών και αποξενώνονται οι φοιτητές από την υιοθέτηση της νέας τεχνολογίας (Stratopoulos, 2020). Επιπρόσθετα, το κόστος απόκτησης, αδειοδότησης, τεχνογνωσίας και διατήρησης όλων των προαναφερθέντων τεχνολογιών και του προσωπικού που απαιτείται από κάθε εκπαιδευτικό ίδρυμα αποτελεί αποτρεπτικό παράγοντα. Αναντίρρητα, η συνδυαστική αξιοποίηση όλων των τεχνολογιών (Polimeni and Burke, 2021) ενδείκνυται καθώς έμπρακτα ενισχύει τη δημιουργικότητα, προσαρμοστικότητα, κριτική σκέψη και δεξιότητα επίλυσης προβλημάτων (Keys and Zhang, 2020; Harrast and Wood, 2023) από τα ίδια τα εκπαιδευτικά ιδρύματα.

Συμπληρωματικά, ως προς τον τρόπο ενσωμάτωσης (αυτόνομα ή ενσωματωμένα) σε υφιστάμενα εκπαιδευτικά αντικείμενα, καθώς και ως προς την εκπαιδευτική μέθοδο, η παρούσα ανασκόπηση καταδεικνύει ότι είναι δευτερεύουσας σημασίας σε σχέση με τον εκπαιδευτικό στόχο. Κάθε εκπαιδευτικός τομέας (μάθημα) παρέχει ποικιλία δεξιοτήτων, ενώ κάθε τεχνολογία έχει διαφορετικό βαθμό αντιστοίχισης. Κάποιες μπορούν να διδαχθούν αυτόνομα (DLT) και άλλα ενσωματωμένα (BDA με στατιστική, διοικητική λογιστική, χρηματοοικονομική ανάλυση, επιχειρησιακή πληροφορική). Δύναται λοιπόν το κάθε ίδρυμα ανάλογα με τον προσανατολισμό που το διακατέχει να εμπλουτίσει το εκπαιδευτικό του πρόγραμμα με την εργαλειοθήκη του (σε αντικείμενα, βαθμό και έκταση) κατ' επιλογή (Polimeni and Burke, 2021), σε πιο πρακτικά ή σε πιο τεχνικά πεδία (Kaden et al., 2021). Μελέτες επισημαίνουν ότι στόχος είναι η έκθεση στις τεχνολογίες εφαρμοστικά προκειμένου να αναπτυχθούν παράλληλα οι πολύ σημαντικές οριζόντιες δεξιότητες και όχι η απλή στατική χρήση των τεχνολογιών. Ο παράγοντας ανάπτυξης των οριζόντιων δεξιοτήτων διαφαίνεται κρίσιμος καθώς οι φοιτητές είναι ήδη εξοικειωμένοι με τις τεχνολογίες, οπότε το χρηστικό μέρος της εκπαίδευσης δεν καθίσταται χρονοβόρο. Ο παράγοντας βιωματικής εκπαίδευσης (hands-on) δεν αποτελεί αντικείμενο μελέτης της παρούσας, όμως από την ανασκόπηση προκύπτει ότι η βιωματική εκπαίδευση με τις εργαλειοθήκες των τεχνολογιών επιταχύνουν την ανάπτυξη των δεξιοτήτων, (Zhang et al., 2020; Apostolou et al., 2022), καθώς δεν περιορίζεται στη γνώση εξαγωγής δεδομένων αλλά ερμηνεία αυτών (αυτοσκοπός).

Η ανάπτυξη των οριζόντιων δεξιοτήτων επισημαίνεται από όλες τις μελέτες που προαναφέρθηκαν, καθώς οι τεχνολογίες έχουν κύριο γνώρισμα την πρακτικότητά τους. Συνεπώς, αξιοποιούνται από όλες τις βαθμίδες εκπαίδευσης, αφορούν όλα τα επαγγέλματα, εμφανίζονται σταδιακά από όλες τις εκφάνσεις της καθημερινότητας. Άρα η αρχική ανάπτυξη των οριζόντιων δεξιοτήτων θα πρέπει να έχει έναρξη την πρωτοβάθμια, να εξελίσσεται στη δευτεροβάθμια και να ενισχύεται στο επίπεδο της τριτοβάθμιας εκπαίδευσης (Kokina et al., 2021; Shawver and Shawver, 2020; Dzuranin et al., 2018; Zhang et al., 2015; Riley et al., 2021), προκειμένου να επέλθει σταδιακή ωρίμανση ανά επίπεδο εκπαίδευσης.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η ακαδημαϊκή κοινότητα στους τομείς της λογιστικής και της ελεγκτικής αποδεικνύει ότι καταβάλλει προσπάθεια ενσωμάτωσης των νέων τεχνολογιών στα προγράμματα σπουδών της. Βέβαια, καθώς οι τεχνολογίες υπεισέρχονται σε επιστημονικά και επαγγελματικά πεδία, κατ' αντιστοιχία σταθεροποιούνται και οι γνωστικές απαιτήσεις που απαιτούνται. Επομένως, αναμένεται στα επόμενα χρόνια να διαπιστώσουμε ευρύτερη εφαρμογή και διείσδυση των υπόψη τεχνολογιών στα ακαδημαϊκά προγράμματα. Επίσης, καθώς νέες τεχνολογίες οριοθετούνται στην αγορά εργασίας, απατείται να διατηρηθεί η ευελιξία των τομέων διάδρασης με τα επίσημα προγράμματα σπουδών και επαγρύπνηση για παρέμβαση ή εμπλουτισμό των δομικών στοιχείων των νέων τεχνολογιών στην αντίστοιχη επιστημονική κατεύθυνση.

Βασικά συμπεράσματα του παρόντος πονήματος είναι η υιοθέτηση των νέων τεχνολογιών και των εργαλειοθηκών αυτών, η χρήση της κατάλληλης (ακόμα και συνδυασμένης) τεχνολογίας σε σχέση με το εκπαιδευτικό αντικείμενο, η αποφυγή της σωρευτικής θεωρητικής αντιμετώπισης καθώς οι νέες τεχνολογίες είναι εξατομικευμένης πρακτικής εφαρμογής, η κατανόηση από την ίδια την ακαδημαϊκή κοινότητα των εργαλειοθηκών και των γνωστικών στοιχείων που απαιτείται να υιοθετηθούν, ώστε να αξιοποιούνται σε συνάρτηση με τις δεξιότητες (οριζόντιες και κάθετες) που επιβάλλεται να αποκτηθούν ακόμα και σταδιακά.

Για τον λόγο αυτό προτείνεται να διερευνηθεί περαιτέρω, η σκοπιμότητα της παροχής πιστοποίησης της τεχνογνωσίας από το ίδια τα ακαδημαϊκά ιδρύματα επί των τεχνολογιών που έχουν εξαντληθεί μέσα από τα οικεία ακαδημαϊκά προγράμματα, με στόχο να αποφευχθεί η σε δεύτερο χρόνο της απαίτηση πιστοποίηση κατάρτισης, ως πλεονασματική. Επιπλέον, σκόπιμο είναι να διερευνηθεί περαιτέρω ο βαθμός στον οποίο τα ακαδημαϊκά ιδρύματα εγκαταλείπουν την εκτεταμένη χρήση προυπαρχουσών τεχνολογιών για να εξηγήσουν ή να εξοικειώσουν τους φοιτητές με τις νέες τεχνολογίες, έχοντας ως γνώμονα τις επικαιροποιημένες εργασιακές απαιτήσεις.

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ΘΠ3: Αξιοποίηση και Αξιολόγηση των Ψηφιακών και Τεχνολογικών Μέσων

ΤΑ ΟΦΕΛΗ ΤΗΣ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΚΠΑΙΔΕΥΣΗΣ ΜΕΣΑ ΑΠΟ ΤΟ ΠΡΙΣΜΑ ΜΑΘΗΤΩΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΩΝ ΝΟΜΩΝ ΑΤΤΙΚΗΣ ΚΑΙ ΚΥΚΛΑΔΩΝ

Βλασσόπουλος Γεράσιμος
Postdoctoral Researcher, PhD, MSc, Εκπαιδευτικός ΠΕ82,
Πανεπιστήμιο Δυτικής Αττικής, Τμήμα Βιοϊατρικών Επιστημών – ΣΕΥΠ,
Ελλάδα, Αθήνα
e-mail: makisvlass@gmail.com

ΠΕΡΙΛΗΨΗ

Ο COVID-19 πρωτοεμφανίστηκε στην Κίνα το Δεκέμβριο του 2019. Μετά την ανακήρυξή του ως παγκόσμια πανδημία τον Μάρτιο του 2020, πολλές χώρες της Ε.Ε. έκλεισαν τα εκπαιδευτικά ιδρύματα. Στην Ελλάδα η SARS-CoV-2 παρουσιάστηκε το Φεβρουάριο του 2020. Μετά το ένατο κρούσμα, ανακοινώθηκε το κλείσιμο εκπαιδευτικών ιδρυμάτων, συγκεκριμένων νομών για 48 ώρες στις 5-6 Μαρτίου. Παρά τα αναρίθμητα αρνητικά της πανδημίας, πάρθηκαν αποφάσεις και οργανώθηκε η ψηφιακή εξέλιξη της χώρας. Το κλείσιμο των σχολείων πυροδότησε την προσπάθεια για εφαρμογή της ΕξΑΕ.

Μέσω της έρευνας διερευνήθηκαν τα οφέλη της ΕξΑΕ, μέσα από το πρίσμα των μαθητών δευτεροβάθμιας εκπαίδευσης. Εφαρμόστηκε μικτή δειγματοληψία (Στρωματοποιημένη και κατά Συστάδες). Συμμετείχαν 462 μαθητές Γυμνασίων και Λυκείων των νομών Αττικής και Κυκλάδων. Η έρευνα διεξήχθη τον 05/2020. Τα δεδομένα συλλέχθηκαν στο LimeSyrvey, αναλύθηκαν με SPSS (25). Πραγματοποιήθηκε έλεγχος αξιοπιστίας του ερωτηματολογίου με το δείκτη Cronbach’s Alpha, περιγραφική στατιστική, παραγοντική ανάλυση και η δοκιμασία Chi-square.

Το 78,1% των μαθητών ωφελήθηκαν λίγο από την ΕξΑΕ, έναντι του 6,9% των μαθητών που ωφελήθηκαν πολύ από την εφαρμογή της.

Η ΕξΑΕ στήριξε μέσω της πανδημίας το Ελληνικό εκπαιδευτικό σύστημα, σε κάθε βαθμίδα εκπαίδευσης, ωστόσο οι μαθητές Γυμνασίων και Λυκείων, κατά πλειοψηφία, δήλωσαν πως δεν ωφελήθηκαν από αυτή τη μορφή εκπαίδευσης, καθώς δεν ικανοποιήθηκαν οι αρχικές τους προσδοκίες και δεν απέκτησαν τις θεωρητικές γνώσεις που ήλπιζαν ότι θα αποκτήσουν.

Η σύγκριση των ευρημάτων με αντίστοιχα από τη διεθνή βιβλιογραφία αποκαλύπτει κοινά προβλήματα, προκλήσεις αλλά και διαφορές που σχετίζονται με τις ιδιαιτερότητες του εκάστοτε εκπαιδευτικού συστήματος, το επίπεδο τεχνολογικής υποδομής της κάθε χώρας, με τους ιδιαίτερους πολιτισμικούς και οικονομικούς παράγοντες της.

Λέξεις - κλειδιά: Εξ Αποστάσεως Εκπαίδευση, Τηλεκπαίδευση, Τεχνολογίες Πληροφοριών και Επικοινωνιών, Σύγχρονη, Ασύγχρονη. Συντομογραφίες: Απλή Τυχαία Δειγματοληψία (ΑΤΔ), Εξ Αποστάσεως Εκπαίδευση (ΕξΑΕ), Τεχνολογίες Πληροφοριών και Επικοινωνιών (ΤΠΕ)

ΕΙΣΑΓΩΓΗ

Την περίοδο της πανδημίας η εφαρμογή ΤΠΕ με τη χρήση σύγχρονης και ασύγχρονης ΕξΑΕ στήριξε σε παγκόσμιο επίπεδο την εκπαιδευτική κοινότητα σε κάθε εκπαιδευτική βαθμίδα.

Είναι γεγονός ότι τα σχολεία σε χρόνο ρεκόρ εκλαισαν το ένα μετά το άλλο σε παγκόσμιο επίπεδο. Στην Ελλάδα το άνοιγμα των σχολείων, μετά τις καλοκαιρινές διακοπές, σηματοδότησε μια περίοδο αύξησης των κρουσμάτων κορωνοϊού, γεγονός που προκάλεσε ανησυχία για πιθανότητα ενός νέου ξεσπάσματος, με δεδομένο ότι το χειμώνα υπάρχει έξαρση της γρίπης. Οι χώρες της Ε.Ε έλαβαν διαφορετικά μέτρα για το άνοιγμα των σχολείων. Η Ελλάδα ακολούθησε την κοινή πρακτική με τις άλλες χώρες της Ε.Ε. κατά τη διάρκεια της πανδημίας, σύμφωνα με τις συστάσεις του W.H.O. (**Πίνακας 1**).

Πίνακας 1
Ημερομηνίες επανεκκίνησης των σχολείων της Ε.Ε. και μέτρα προστασίας των μαθητών στα σχολεία κατά τη διάρκεια της πανδημίας

Χώρες	Ημερομηνία ανοίγματος σχολείων	Μέτρα προστασίας μετά το άνοιγμα των σχολείων πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης
Ελλάδα (Kathimerini, 2020)	14/09/2020	Χρήση μάσκας σε όλους τους χώρους του σχολείου. Χρήση αντισηπτικών. Διαφορετικά διαλείμματα.
Ισπανία (Wires,2020)	Ορισμένα σχολεία λειτούργησαν από 07/09/2020	Διατήρηση απόστασης (τουλάχιστον 1,5m), οι σχολικές εγκαταστάσεις απολυμαίνονταν τουλάχιστον μία φορά ημερησίως, ενώ οι τουαλέτες καθαρίζονταν τρεις φορές κάθε μέρα.
Γαλλία (McAuley, 2020)	01/09/2020	Οι καθηγητές και οι μαθητές άνω των 11 ετών φορούσαν μάσκες σε όλους τους χώρους, εάν δεν ήταν εγγυημένη η ελάχιστη απόσταση του 1m.
Βέλγιο (Naftemporiki, 2020)	01/09/2020	Χρήση μάσκας άνω των 12 ετών.
Δανία (Naftemporiki, 2020)	10/10/2020	Στις σχολικές αίθουσες υπήρχαν 10 – 12 μαθητές οι οποίοι βρίσκονταν σε απόσταση 2m και έπλεναν τα χέρια τους κάθε μιάμιση ώρα, ενώ δεν ήταν υποχρεωτική η χρήση μάσκας.
Μ.Βρετανία (Barr, 2020)	Από αρχές Σεπτέμβρη	Χρήση μάσκας όλων των μαθητών.
Ιταλία (Orlandi, 2020)	14/10/2020	Η μάσκα ήταν υποχρεωτική κατά την άφιξη και αναχώρηση του μαθητή από το σχολείο, αλλά όχι μέσα στην τάξη, αν υπήρχε η απαραίτητη απόσταση. Προσλήφθηκαν 40.000 επιπλέον εκπαιδευτικοί και τα σχολεία προμηθεύτηκαν μονά θρανία για να διασφαλιστούν οι αποστάσεις.
Ολλανδία (Naftemporiki, 2020)	08/2020	Δεν ήταν αναγκαία η απόσταση μεταξύ των μαθητών. Ορισμένα σχολεία απαιτούσαν από τους μεγαλύτερους μαθητές να φορούν μάσκες στους διαδρόμους λόγω έλλειψης χώρου. Οι μεγαλύτεροι μαθητές διατηρούσαν απόσταση από τους δασκάλους.
Γερμανία (Godin, 2020)	10/08/2020	Χρήση μάσκας για τους μαθητές άνω των 15 ετών. Η Βόρεια Ρηνανία-Βεστφαλία ήταν αρχικώς το μόνο κρατίδιο που κατέστησε υποχρεωτική τη μάσκα στα σχολεία, ενώ οι μαθητές σε κρατίδια όπως το Βερολίνο τη φορούσαν μόνο έξω από τις τάξεις.
Πολωνία **(**Bretan, 2020**)**	01/09/2020	Οι αρχές δεν επέβαλαν τη χρήση μάσκας ή τη μείωση του αριθμού των μαθητών στις αίθουσες, τα παιδιά καλούνταν να πλένουν τα χέρια τους συχνά και να αποφεύγουν τις συγκεντρώσεις σε μεγάλες ομάδες.
Σουηδία (Naftemporiki, 2020)	20/08/2020	Οι μάσκες δεν ήταν υποχρεωτικές και το κάθε σχολείο ήταν υπεύθυνο για την επιβολή κανόνων.

Η πανδημία ήταν στην πραγματικότητα η μεγαλύτερη πρόκληση που αντιμετώπισαν ποτέ τα εκπαιδευτικά συστήματα παγκοσμίως και σχετίστηκε άμεσα με την ΕξΑΕ. Αυτό επιβεβαιώνεται από τη διεθνή βιβλιογραφία. Μεταξύ των σχετικών δημοσιευμένων άρθρων περιλαμβάνονται έρευνες και κείμενα για:

- Το άγχος και τον ψυχολογικό αντίκτυπο της επιδημίας COVID-19 σε φοιτητές κολεγίων (Cao et al., 2020).
- Ρεαλιστικές οδηγίες ειδικά γραμμένες για δασκάλους, μαθητές, γονείς και ιδρύματα σχετικά με τον τρόπο διαχείρισης της ΕξΑΕ κατά τη διάρκεια του COVID-19 (Daniel, 2020).
- Την ΕξΑΕ ως (μία και μοναδική λύση) πανάκεια κατά τη διάρκεια της κρίσης του COVID-19 (Dhawan, 2020).
- Πειράματα διαδικτυακής μάθησης σε σχολεία δευτεροβάθμιας εκπαίδευσης κατά τη διάρκεια του κορωνοϊού (Anouti & Naim El Rouadi, 2020).

Η παγκόσμια ανησυχία, μας οδήγησε σε ανάγκη περαιτέρω διερεύνησης αυτής της νέας εκπαιδευτικής κατάστασης.

ΜΕΘΟΔΟΣ ΤΗΣ ΕΡΕΥΝΑΣ

ΤΟ ΔΕΙΓΜΑ ΤΗΣ ΜΕΛΕΤΗΣ

Η έρευνα διεξήχθη το Μάιο του 2020. Επιλέχτηκαν σχολεία με μικτό πληθυσμό αγοριών – κοριτσιών. Το τελικό δείγμα αποτελούνταν από αντιπροσωπευτικό και ομοιογενή αριθμό μαθητών, με σκοπό την αξιοπιστία και την εγκυρότητα της έρευνας (Farmakis, 2015). Τον πληθυσμό της έρευνας αποτέλεσαν μαθητές Γυμνάσιων και Λυκείων. Οι περιοχές που διεξήχθη η έρευνα ήταν σχολεία της Αθήνας και της Πάρου. Στην έρευνα συμμετείχαν 3 Γυμνάσια, 3 Λύκεια από την Αττική και 3 Γυμνάσια, 3 Λύκεια από τις Κυκλάδες. Αναλυτικότερα, το δείγμα αποτελούνταν από 12 σχολεία που το κάθε ένα είχε τρεις διαφορετικές τάξεις (Α', Β', Γ').

Κατά το δειγματοληπτικό σχεδιασμό αποφασίστηκε η συμμετοχή 500 μαθητών, οι 300 φοιτούσαν σε Γυμνάσια, (50 ανά σχολείο), ενώ οι 200 σε Λύκεια, (34 ανά σχολείο). Ο τελικός αριθμός των συμμετεχόντων της έρευνας ήταν 462 μαθητές, Πίνακας 3, αριθμός ικανοποιητικός για την αμερόληπτη και χωρίς προκαταλήψεις κατάθεση των απόψεων τους (Cohen et al., 2017).

Η ΜΕΘΟΔΟΣ ΤΗΣ ΔΕΙΓΜΑΤΟΛΗΨΙΑΣ

Κατά το δειγματοληπτικό σχεδιασμό αποφασίστηκε η εφαρμογή μικτής δειγματοληψίας, ως η καταλληλότερη μέθοδος, για αντιπροσωπευτικότερο δείγμα του πληθυσμού (Collins et al, 2007 · Sharp et al., 2011).

Επιλέχθηκαν για την έρευνα οι νομοί Αττικής και Κυκλάδων (στρωματοποιημένη δειγματοληψία). Κάθε ένας εξ αυτών αποτέλεσε διαφορετικό στρώμα της έρευνας. Η ιδιαιτερότητα της συγκεκριμένης μελέτης ήταν η συμμετοχή πληθυσμών από αστικές και ημιαστικές (νησιωτικές) περιοχές.

Στη συνέχεια εφαρμόστηκε η κατά συστάδες απλή τυχαία δειγματοληψία πολλών σταδίων ίσου μεγέθους (Kamalu et al., 2024). Η δειγματοληψία ήταν τυχαία διότι στα διάφορα στάδια της, οι σύνθετες μονάδες επιλέχθηκαν με απλή τυχαία δειγματοληψία (Chalikias et al., 2015). Τα μέλη του πληθυσμού προσεγγίστηκαν με έμμεσο τρόπο, μέσω μεγαλύτερων ομάδων στις οποίες ανήκει το κάθε μέλος. Επιλέχθηκαν ισομεγέθη δείγματα των πληθυσμών της έρευνας.

Αναλογικός καταμερισμός μεταξύ δειγμάτων και πληθυσμών δεν εφαρμόστηκε διότι, προέκυπταν δείγματα μαθητών των Κυκλάδων πολύ μικρά για να διεξαχθούν συμπεράσματα (Zafiropoulos, 2010). Η κατά συστάδες δειγματοληψία πραγματοποιείται σε διάφορα στάδια, ώστε να εξυπηρετηθούν οι ανάγκες της έρευνας (Farmakis, 2015). Κατά το δειγματοληπτικό σχεδιασμό η δειγματοληψία εφαρμόστηκε σε 4 στάδια:

- 1ο στάδιο, με ΑΠΔ, πραγματοποιήθηκε η επιλογή της πρωτογενούς δειγματοληπτικής μονάδας. Από τις περιφέρειες του νομού Αττικής επιλέχθηκε με κλήρωση η Δ' Αθήνας. Από τις περιφέρειες του νομού Κυκλάδων επιλέχθηκε η Δ' Κυκλάδων.
- 2ο στάδιο, με ΑΠΔ, επιλέχθηκε η δευτερογενής δειγματοληπτική μονάδα που αφορούσε τα σχολεία της έρευνας.
- 3ο στάδιο, από τα σχολεία της έρευνας επιλέχθηκαν τα προς μελέτη τμήματα.
- 4ο στάδιο, από τα τμήματα των σχολείων επιλέχθηκαν οι μαθητές. Η επιλογή του δείγματος πραγματοποιήθηκε σε επίπεδο μεμονωμένων μελών του πληθυσμού (Papageorgiou, 2015).

Η ΔΟΜΗ ΤΟΥ ΕΡΩΤΗΜΑΤΟΛΟΓΙΟΥ

Πραγματοποιήσαμε ποσοτική έρευνα με χρήση κατάλληλα δομημένων ερωτηματολογίων (Iseris, 2016). Μοιράστηκαν ερωτηματολόγια και στις τρεις τάξεις (Α', Β', Γ') κάθε σχολείου. Στη σύνταξη του ερωτηματολογίου, χρησιμοποιήθηκαν σαφείς ερωτήσεις κλειστού τύπου, με χρήση απλής γλώσσας και ύπαρξης κατάλληλων επεξηγήσεων. Το ερωτηματολόγιο αποτελούνταν από δύο μέρη. Οι ερωτήσεις ήταν διαβαθμισμένης κλίμακας τύπου Likert με τρεις

διαβαθμισμένες απαντήσεις «λίγο», «αρκετά», «πολύ». Ο χρόνος συμπλήρωσης των ερωτηματολογίων διαρκούσε 10 λεπτά. Η δομή του ερωτηματολογίου παρουσιάζεται στον **Πίνακα 2**

Πίνακας 2.
Δομή ερωτηματολογίου

Τμήματα	Είδος ερωτήσεων	Πλήθος ερωτήσεων
Πρώτο	Δημογραφικά στοιχεία	3
Δεύτερο	Οφέλη από την ΕξΑΕ	18

Η ΣΤΑΤΙΣΤΙΚΗ ΑΝΑΛΥΣΗ ΤΩΝ ΔΕΔΟΜΕΝΩΝ

Κατά τη στατιστική ανάλυση πραγματοποιήθηκε:

- Περιγραφική στατιστική ανάλυση
- Έλεγχος αξιοπιστίας του ερωτηματολογίου με το δείκτη Cronbach's Alpha.
- Παραγοντική ανάλυση
- Chi-square test για να διερευνηθούν οι σημαντικότερες συσχετίσεις μεταξύ των μεταβλητών που απαρτίζουν το ερευνητικό ερώτημα, «βαθμός ικανοποίησης από τα οφέλη της ΕξΑΕ».

ΟΙ ΠΕΡΙΟΡΙΣΜΟΙ ΤΗΣ ΜΕΛΕΤΗΣ

Παρουσιάστηκαν μεθοδολογικοί περιορισμοί που αφορούσαν το μέγεθος του δείγματος, την έλλειψη προηγούμενης έρευνας, καθώς επίσης χρονικοί περιορισμοί και περιορισμοί μεροληψίας και φόβου λόγω πανδημίας (Alex, 2023).

ΑΠΟΤΕΛΕΣΜΑΤΑ ΤΗΣ ΕΡΕΥΝΑΣ

ΠΕΡΙΓΡΑΦΙΚΗ ΣΤΑΤΙΣΤΙΚΗ

Στον **Πίνακα 3** φαίνονται οι συμμετέχοντες στην έρευνα. Οι μαθήτριες (52,06%) που έλαβαν μέρος στην έρευνα ήταν ελαφρώς περισσότερες από τους μαθητές (47,94%), ενώ οι μαθητές των Γυμνασίων (62,47%) ήταν περισσότεροι από των Λυκείων (37,53%).

Πίνακας 3.
Συμμετέχοντες στην έρευνα.

Φύλο	Πλήθος συμμετοχών	Ποσοστό
Κορίτσια	240	52,06%
Αγόρια	222	47,94%
Σχολεία	Πλήθος συμμετοχών	Ποσοστό
Γυμνάσια(6)	288	62,47%
Λύκεια (6)	174	37,53%
Συμμετέχοντες στην έρευνα	468	100%
Σύνολο ερωτηματολογίων	462	97,72%

ΕΛΕΓΧΟΣ ΑΞΙΟΠΙΣΤΙΑΣ

Προσδιορίστηκε ο συντελεστής αξιοπιστίας Cronbach's Alpha για να ελεγχθεί εάν οι ερωτήσεις παρουσιάζουν υψηλή μεταξύ τους συνοχή (Markos, 2012). Ο συντελεστής είχε τιμή: a = 0,753.

ΠΑΡΑΓΟΝΤΙΚΗ ΑΝΑΛΥΣΗ

Πριν από κάθε ερευνητικό ερώτημα, αναλύθηκαν οι μεταβλητές με τη μεθοδολογία της ανάλυσης παραγόντων. Σκοπός ήταν να δούμε την αλληλεπίδραση των μεταβλητών ως προς την μεταξύ τους συνδιακύμανση, ώστε να επικεντρωθούμε σε λίγες μόνο μεταβλητές (ερωτήσεις) όπου οι απαντήσεις τους παίζουν καθοριστικό ρόλο στην ερμηνεία του ερευνητικού ερωτήματος. Η ανάλυση παραγόντων έδειξε ότι από τις 18 ερωτήσεις που συνδέονταν με το ερευνητικό ερώτημα, οι 9 είχαν τη μεγαλύτερη σχέση μεταξύ τους με τιμή Extraction του Factor Analysis μεγαλύτερη από 0,6 και τιμή του στατιστικού κριτηρίου Kaiser Meyer Olkin αρκετά υψηλή 0,813.

ΕΦΑΡΜΟΓΗ ΤΗΣ ΔΟΚΙΜΑΣΙΑΣ CHI-SQUARE

Για κάθε σημαντική μεταβλητή του ερευνητικού ερωτήματος μελετήθηκε η σχέση της με τη μεταβλητή «βαθμός ικανοποίησης από τα οφέλη της ΕξΑΕ». Για το σκοπό αυτό φτιάχτηκαν ξεχωριστοί πίνακες για κάθε ζεύγος μεταβλητών, ένας εκ των οποίων είναι ο **Πίνακας 4**.

Πίνακας 4.
Chi-square για το βαθμό ενδιαφέροντος της σύγχρονης ΕξΑΕ και το βαθμό ικανοποίησης από τα οφέλη που προσφέρει. Η διαφορά είναι στατιστικά σημαντική, (p <0,001).

		Βαθμός ενδιαφέροντος για τη σύγχρονη ΕξΑΕ (Webex).			
		Λίγο	**Αρκετά**	**Πολύ**	**Σύνολο**
Βαθμός ικανοποίησης από τα οφέλη της ψηφιακής εκπαίδευσης (Βελτίωση θεωρητικών γνώσεων)	**Λίγο**	27,3% (126)	27,3% (126)	23,6% (109)	78,1% (361)
	Αρκετά	2,6% (12)	4,8% (22)	7,6% (35)	14,9% (69)
	Πολύ	0,6% (3)	1,9% (9)	4,3% (20)	6,9% (32)
	Σύνολο	30,5% (141)	34% (157)	35,5% (164)	100% (462)

Στον **Πίνακα 4** φαίνεται πως οι μαθητές δεν έδειξαν ενδιαφέρον για την ΕξΑΕ και δεν ωφελήθηκαν από αυτή. Με την εφαρμογή παρόμοιων πινάκων δημιουργήθηκε ο **Πίνακας 5**.

Πίνακας 5.
Απαντήσεις των μαθητών επί των σημαντικότερων ερωτημάτων που αφορούν το βαθμό ικανοποίησης από τα οφέλη της ΕξΑΕ.

Α/Α	**Προφίλ μαθητών**		**Οφέλη από την ψηφιακή εκπαίδευση (Βελτίωση θεωρητικών γνώσεων)**				
		Συνολικά Ποσοστά ικανοποίησης μαθητών	**Λίγο**	**Αρκετά**	**Πολύ**	**Σύνολο**	**Τιμή p Chi-square**
	Μεταβλητές		78,1% (361)	14,9% (69)	6,9% (32)	100% (462)	
1	**Το εκπαιδευτικό υλικό της ασύγχρονης ΕξΑΕ (e-class) ήταν πολύ ενδιαφέρον.***	Λίγο 50,4% Πολύ 20,6%	13,4% (62)	3,9% (18)	3,2% (15)		
2	**Η χρήση του εκπαιδευτικού υλικού της ασύγχρονης ΕξΑΕ (e-class) ενίσχυσε σημαντικά την εκπαιδευτική διαδικασία.***	Λίγο 68,4% Πολύ 10,2%	5,8% (27)	2,6% (12)	1,7% (8)		
3	**Το εκπαιδευτικό υλικό της ασύγχρονης ΕξΑΕ (e-class) ενημερωνόταν συχνά, ως προς τη δομή και το περιεχόμενο.***	Λίγο 46,1% Πολύ 21,6%	13,9% (64)	4,5% (21)	3,2% (15)		<0,001
4	**Η συμβατική διδασκαλία ενισχύεται σημαντικά από την ΕξΑΕ.***	Λίγο 70,3% Πολύ 11,9%	5,4% (25)	3,7% (17)	2,8% (13)		

Α/Α	Προφίλ μαθητών		Οφέλη από την ψηφιακή εκπαίδευση (Βελτίωση θεωρητικών γνώσεων)				
		Συνολικά Ποσοστά ικανοποίησης μαθητών	Λίγο	Αρκετά	Πολύ	Σύνολο	Τιμή p Chi-square
	Μεταβλητές		78,1% (361)	14,9% (69)	6,9% (32)	100% (462)	
5	**Οι μαθητές ήταν πολύ ευχαριστημένοι από τον τρόπο που πραγματοποιήθηκαν τα εξ αποστάσεως σύγχρονα μαθήματα.***	Λίγο 40,7% Πολύ 21,9%	12,6% (58)	5,6% (26)	3,7% (17)		
6	**Υπήρξε μεγάλο ενδιαφέρον για τη σύγχρονη ΕξΑΕ (Webex).**	Λίγο 30,5% Πολύ 35,5%	23,6% (109)	7,6% (35)	4,3% (20)		<0,001
7	**Οι μαθητές ήταν πολύ ευχαριστημένοι από τις δεξιότητες πληροφορικής που απέκτησαν.**	Λίγο 66,7% Πολύ 11,9%	6,7% (31)	2,8% (13)	2,4% (11)		
8	**Οι μαθητές ήταν πολύ ευχαριστημένοι από δεξιότητες που απέκτησαν στα εργαστηριακά μαθήματα.**	Λίγο 85,5% Πολύ 0,2%	0,0% (0)	0,0% (0)	0,2% (1)		0,05
9	**Οι μαθητές θεωρούν σημαντική την απουσία πίνακα.**	Λίγο 21,6% Πολύ 65,7%	43,7% (202)	9,5% (44)	3,5% (16)		0,663

Οι μεταβλητές που συμπεριλήφθησαν στον παράγοντα του SPSS και θεωρούνται οι πιο σημαντικές ως προς την ερμηνεία του ερευνητικού ερωτήματος είναι όσες παρουσιάζονται με (*).

Η ανάλυση (Chi-square) έδειξε ότι το 78,1% των μαθητών δεν έμεινε ικανοποιημένο από τις θεωρητικές γνώσεις που απέκτησε (ωφελήθηκε λίγο από την ΕξΑΕ), ενώ το 6,9% θεωρούσε ότι οι γνώσεις του βελτιώθηκαν σημαντικά, (**Πίνακας 3, Πίνακας 4**).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Από όλους όσοι ωφελήθηκαν λίγο από την ΕξΑΕ (78,1%):

1. το 13,4% υποστήριξε πως το υλικό της ασύγχρονης ΕξΑΕ είναι ενδιαφέρον, (p<0,001).
2. το 5,8% δήλωσε πως η χρήση της ασύγχρονης ΕξΑΕ ενίσχυσε σημαντικά την εκπαιδευτική διαδικασία, (p<0,001).
3. το 13,9% δήλωσε πως το εκπαιδευτικό υλικό της ασύγχρονης ΕξΑΕ ήταν αρκετά ενημερωμένο ως προς τη δομή και το περιεχόμενο, (p<0,001).
4. το 5,4% ανέφερε πως ενισχύεται σημαντικά η συμβατική διδασκαλία από την ΕξΑΕ, (p<0,001).
5. το 12,6% δήλωσε ευχαριστημένο από τον τρόπο διεξαγωγής των μαθημάτων σύγχρονης ΕΑΕ, (p<0,001).
6. το 23,6% ανέφερε πως τα σύγχρονα μαθήματα ΕξΑΕ ήταν πολύ ενδιαφέροντα, (p<0,001).
7. το 6,7% δήλωσε πως βελτιώθηκαν σημαντικά οι δεξιότητες τους στην πληροφορική, (p<0,001).
8. το 0,2% δήλωσε πως βελτιώθηκαν οι δεξιότητες στους στα εργαστηριακά μαθήματα, (p=0,05).
9. το 43,7% θεωρούσε σημαντική την απουσία πίνακα, (p>0,05).

Από όλους όσοι ωφελήθηκαν πολύ από την ΕξΑΕ (6,9%):

1. το 3,2% δήλωσε ότι αυτό συνέβη χάρη στο ενδιαφέρον υλικό της ασύγχρονης εκπαίδευσης, (p<0,001).
2. το 1,7% δήλωσε ότι η χρήση της ασύγχρονης ΕξΑΕ ενίσχυσε σημαντικά την εκπαιδευτική διαδικασία, (p<0,001).
3. το 3,2% ανέφερε πως το e-class ήταν πολύ ενημερωμένο, (p<0,001).

4. το 2,8% ανέφερε πως ενισχύεται σημαντικά η συμβατική διδασκαλία από την ΕξΑΕ, (p<0,001).
5. το 3,7% ανέφερε πως ήταν ικανοποιημένο από τον τρόπο διεξαγωγής των μαθημάτων σύγχρονης ΕξΑΕ, (p<0,001).
6. το 4,3% ανέφερε πως τα σύγχρονα μαθήματα ΕξΑΕ ήταν πολύ ενδιαφέροντα, (p<0,001).
7. το 2,4% ανέφερε πως βελτιώθηκαν σημαντικά οι δεξιότητες τους στην πληροφορική, (p<0,001),
8. το 0,2% δήλωσε πως βελτιώθηκαν οι δεξιότητες στους στα εργαστηριακά μαθήματα, (p=0,05).
9. το 3,5% θεωρούσε σημαντική την απουσία πίνακα, (p=0,663).

Εν κατακλείδι, η ΕξΑΕ μπορεί να στήριξε το Ελληνικό εκπαιδευτικό σύστημα, ωστόσο δεν ωφέλησε στο βαθμό που όφειλε, διότι δεν οργανώθηκε με μεθοδικότητα, βάσει παιδαγωγικών μεθόδων και τεχνικών. Επιπλέον, δεν ακολουθήθηκαν οι αρχές που διέπουν την ΕξΑΕ με αποτέλεσμα να μη γίνει αποδεκτή από τους μαθητές.

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ΑΞΙΟΛΟΓΗΣΗ ΜΙΑΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΕΦΑΡΜΟΓΗΣ ΓΙΑ ΚΙΝΗΤΕΣ ΣΥΣΚΕΥΕΣ ANDROID, ΓΙΑ ΤΗΝ ΚΑΤΑΝΟΗΣΗ ΕΝΝΟΙΩΝ ΤΗΣ ΦΥΣΙΚΗΣ Ε' ΔΗΜΟΤΙΚΟΥ ΜΕ ΑΞΙΟΠΟΙΗΣΗ VOICE ASSISTANT

Δομουχτσής Στέργιος,
Μεταπτυχιακός φοιτητής ΠΜΣ «Επιστήμες της Αγωγής: Εφαρμογές Τεχνολογιών Πληροφορίας και Επικοινωνιών στην Εκπαίδευση και τη Διά Βίου Μάθηση»
Τμήμα Εκπαιδευτικής και Κοινωνικής Πολιτικής - Πανεπιστημιο Μακεδονιας
Θεσσαλονίκη, Ελλάδα
e-mail: stdomus@sch.gr

Λέυκος Ιωάννης
Ε.ΔΙ.Π.
Εργ. Πληροφορικής & Ρομποτικής για την Εκπ/ση & την Κοινωνία (LIRES)Τμήμα Εκπαιδευτικής & Κοινωνικής Πολιτικής - Πανεπιστημιο Μακεδονιας
Θεσσαλονίκη, Ελλάδα
e-mail: lefkos@uom.edu.gr

Δομουχτσής Νικόλαος
Εκπαιδευτικός ΠΕ83, ΕΝΕΓΥΛ Μεσολογγίου
Μεσολόγγι , Ελλάδα
e-mail: nikos_domis@hotmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη χρήση της μάθησης μέσω κινητών συσκευών στη διδασκαλία της Φυσικής στο δημοτικό σχολείο, με ιδιαίτερη έμφαση στην έννοια της Θερμότητας. Το θεωρητικό πλαίσιο βασίζεται σε πολλές θεωρίες μάθησης, όπως η θεωρία της συμπεριφορικής μάθησης, η θεωρία της ανακαλυπτικής μάθησης, ο κονστρουκτιβισμός και ο κοινωνικός κονστρουκτιβισμός, για να παράσχει μια ολιστική εξήγηση της επιστημονικής μάθησης των μαθητών. Η έρευνα διερευνά επίσης την παρούσα κατάσταση της επιστημονικής εκπαίδευσης στην Ελλάδα, δίνοντας έμφαση στις προοπτικές και τις προκλήσεις των μαθητών στην κατανόηση της έννοιας της θερμότητας. Εξετάζει τα κίνητρα, τα οφέλη και τα μειονεκτήματα της μάθησης μέσω κινητών συσκευών, αναλύοντας τις έννοιες του σχεδιασμού της κινητής μάθησης και τη διαδικασία παραγωγής εκπαιδευτικών εφαρμογών.

Η μελέτη χρησιμοποιεί έναν συνδυασμό ερευνητικών προσεγγίσεων ευχρηστίας και αποτελεσματικότητας, χρησιμοποιώντας μια μεικτή μεθοδολογική προσέγγιση. Η μελέτη ευχρηστίας εξετάζει το μέγεθος της ευκολίας και της εμπλοκής της εκπαιδευτικής εφαρμογής, ενώ η έρευνα αποτελεσματικότητας μετρά την επίδραση της εφαρμογής στην κατανόηση της Θερμότητας από τους μαθητές. Η προσέγγιση της μελέτης περίπτωσης χρησιμοποιείται για την παροχή πολύτιμων πληροφοριών σχετικά με τις μαθησιακές εμπειρίες και τα αποτελέσματα των μαθητών. Το δείγμα αποτελείται από μαθητές δημοτικού σχολείου, ενώ τα δεδομένα συλλέγονται με τεστ πριν και μετά την εφαρμογή, ερωτηματολόγια και παρατηρήσεις.

Τα ευρήματα δείχνουν ότι η χρήση εφαρμογών κινητής μάθησης μπορεί να βελτιώσει σημαντικά τη συμμετοχή των μαθητών και την κατανόηση των ιδεών της φυσικής. Η αξιολόγηση της ευχρηστίας αποκαλύπτει σημαντικά επίπεδα ευχαρίστησης και απλότητας της χρήσης, ενώ η αξιολόγηση της αποτελεσματικότητας καταδεικνύει σημαντικές βελτιώσεις στη συγκράτηση πληροφοριών και στις ικανότητες εφαρμογής των μαθητών. Η έρευνα συνεχίζεται με τη συζήτηση των αναμενόμενων πλεονεκτημάτων της μάθησης μέσω κινητών συσκευών, προσφέροντας τεκμηριωμένες προτάσεις προς τους εκπαιδευτικούς και τους υπεύθυνους χάραξης πολιτικής για τη διευκόλυνση της χρήσης της τεχνολογίας στην επιστημονική εκπαίδευση.

Λέξεις – κλειδιά: voice assistant, Android, ευχρηστία, αποτελεσματικότητα, εφαρμογή,Η Μάθηση μέσω Κινητών Συσκευών (M-Learning) στη Διδασκαλία της Φυσικής στο Δημοτικό Σχολείο

Η ραγδαία εξέλιξη της τεχνολογίας έχει φέρει επανάσταση σε πολλούς τομείς της ανθρώπινης δραστηριότητας, και η εκπαίδευση δεν αποτελεί εξαίρεση. Οι κινητές συσκευές, όπως τα smartphones και τα tablets, έχουν γίνει αναπόσπαστο κομμάτι της καθημερινότητάς μας, και η ενσωμάτωσή τους στην εκπαιδευτική διαδικασία, γνωστή ως m-learning (mobile learning), παρουσιάζει σημαντικές προοπτικές. Ειδικότερα, στη διδασκαλία των Φυσικών Επιστημών στο δημοτικό σχολείο, όπου η πειραματική προσέγγιση και η βιωματική μάθηση διαδραματίζουν κεντρικό ρόλο, η χρήση κινητών συσκευών μπορεί να προσδώσει νέα δυναμική και να βελτιώσει την αποτελεσματικότητα της διδασκαλίας.

ΤΟ ΠΑΙΔΑΓΩΓΙΚΟ ΠΛΑΙΣΙΟ ΚΑΙ ΤΑ ΟΦΕΛΗ ΤΟΥ M-LEARNING

Η διδασκαλία της Φυσικής στο δημοτικό σχολείο έχει ως βασικό στόχο να προκαλέσει το ενδιαφέρον των μαθητών για τον φυσικό κόσμο, να αναπτύξει την παρατηρητικότητα και την κριτική τους σκέψη, και να τους εξοικειώσει με βασικές επιστημονικές έννοιες. Το παραδοσιακό μοντέλο διδασκαλίας, βασισμένο κυρίως στη θεωρία και την απομνημόνευση, συχνά αδυνατεί να εμπλέξει ενεργά τους μικρούς μαθητές (Ally, 2009). Αντίθετα, το m-learning, μέσω της διαδραστικής και εξατομικευμένης μάθησης που προσφέρει, μπορεί να γεφυρώσει αυτό το χάσμα (Sung, Chang & Liu, 2016).

Ένα από τα σημαντικότερα οφέλη του m-learning είναι η φορητότητα των συσκευών. Αυτή η δυνατότητα επιτρέπει η μάθηση να μην περιορίζεται μόνο εντός της σχολικής τάξης, αλλά να επεκτείνεται σε οποιοδήποτε περιβάλλον, όπως το σπίτι, το πάρκο ή ένα μουσείο. Για τη Φυσική, αυτό είναι ιδιαίτερα σημαντικό, καθώς οι μαθητές μπορούν να παρατηρήσουν φυσικά φαινόμενα στην πραγματική τους διάσταση και να συνδέσουν τη θεωρία με την πράξη (Kukulska-Hulme, 2012). Για παράδειγμα, μπορούν να χρησιμοποιήσουν εφαρμογές για να μετρήσουν την ταχύτητα ενός κινούμενου αντικειμένου στην αυλή του σχολείου ή να καταγράψουν ήχους και να τους αναλύσουν.

Επιπλέον, οι κινητές συσκευές προσφέρουν πρόσβαση σε πλούσιο εκπαιδευτικό υλικό. Υπάρχουν αναρίθμητες εφαρμογές, προσομοιώσεις, εκπαιδευτικά βίντεο και διαδραστικά παιχνίδια που μπορούν να καταστήσουν τις αφηρημένες έννοιες της Φυσικής πιο κατανοητές και ελκυστικές. Οι μαθητές μπορούν να εξερευνήσουν εικονικά εργαστήρια, να πραγματοποιήσουν πειράματα με ασφάλεια και να οπτικοποιήσουν δύσκολα φαινόμενα, όπως η κυκλοφορία του ηλεκτρικού ρεύματος ή η διάθλαση του φωτός. Αυτό ενισχύει τη βιωματική μάθηση και την ενεργό συμμετοχή, καθιστώντας τους μαθητές συνδημιουργούς της γνώσης (Vavoula & Sharples, 2009).

Η ενσωμάτωση των κινητών συσκευών στη διδασκαλία της Φυσικής στο δημοτικό σχολείο μπορεί να λάβει διάφορες μορφές. Οι εκπαιδευτικοί μπορούν να χρησιμοποιήσουν εφαρμογές για:

Διαδραστικές ασκήσεις και κουίζ, για την εμπέδωση των εννοιών και την άμεση ανατροφοδότηση.

Προσομοιώσεις και εικονικά πειράματα, για την κατανόηση σύνθετων φαινομένων.

Εκπαιδευτικά παιχνίδια (gamification), για την αύξηση του κινήτρου και την ψυχαγωγική μάθηση (Johnson et al., 2016).

Εργαλεία συλλογής και ανάλυσης δεδομένων: Οι αισθητήρες των συσκευών μετατρέπουν τα κινητά σε φορητά εργαστήρια.

Δημιουργία περιεχομένου: Οι μαθητές παράγουν βίντεο, παρουσιάσεις ή ημερολόγια παρατήρησης, ενισχύοντας τη δημιουργικότητα.

Παρά τα πολλαπλά οφέλη, η επιτυχής ενσωμάτωση του m-learning στη διδασκαλία της Φυσικής αντιμετωπίζει και ορισμένες προκλήσεις. Μία από τις σημαντικότερες είναι η έλλειψη επαρκούς υποδομής και κατάλληλης επιμόρφωσης των εκπαιδευτικών (Traxler, 2010). Πολλοί μπορεί να μην είναι εξοικειωμένοι με τις τεχνολογίες ή να διστάζουν να τις ενσωματώσουν στη διδακτική πράξη. Επίσης, η ασφάλεια στο διαδίκτυο, η προστασία των προσωπικών δεδομένων και η διαχείριση της τάξης αποτελούν σημαντικά ζητήματα (UNESCO, 2018).

Συνοψίζοντας, η μάθηση μέσω κινητών συσκευών προσφέρει μια συναρπαστική ευκαιρία να μετασχηματιστεί η διδασκαλία της Φυσικής στο δημοτικό σχολείο. Με σωστό σχεδιασμό, τεχνολογική υποστήριξη και επιστημονικά τεκμηριωμένη επιμόρφωση, το m-learning μπορεί να βελτιώσει την κατανόηση των εννοιών και να καλλιεργήσει θετική στάση προς τις Φυσικές Επιστήμες (Sung, Chang, & Liu, 2016; Traxler, 2010).

ΕΡΕΥΝΗΤΙΚΗ ΔΟΜΗ ΚΑΙ ΣΚΟΠΟΙ

Η ερευνητική διαδικασία οργανώθηκε σε τρεις άξονες:

Ευχρηστία: Διερευνήθηκε η φιλικότητα της εφαρμογής προς τον χρήστη, η πολυπλοκότητα της πλοήγησης, η ανάγκη για εξωτερική βοήθεια, και η γενική εμπειρία χρήσης.

Αποτελεσματικότητα: Εξετάστηκε η γνωστική επίδραση της χρήσης της εφαρμογής, μέσω συγκριτικής ανάλυσης pre-test και post-test ερωτηματολογίων.

Ικανοποίηση και αποδοχή: Μετρήθηκε η ικανοποίηση από τη χρήση της εφαρμογής από μαθητές και εκπαιδευτικούς, μέσω ημιδομημένων συνεντεύξεων και του SUS.

Η επιλογή της ημιπειραματικής μεθοδολογίας ενισχύθηκε από τη φύση της παρέμβασης που πραγματοποιήθηκε, καθώς εξετάστηκε η διαφορά επιδόσεων πριν και μετά τη χρήση της εφαρμογής (Cohen et al., 2018).

ΕΡΕΥΝΗΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ ΕΥΧΡΗΣΤΙΑΣ ΕΦΑΡΜΟΓΗΣ ΓΙΑ ΚΙΝΗΤΕΣ ΣΥΣΚΕΥΕΣ ΜΕ USABILITY TEST

Η επιτυχία μιας εφαρμογής για κινητές συσκευές εξαρτάται σε μεγάλο βαθμό από την ευχρηστία της, δηλαδή το πόσο εύκολη και ευχάριστη είναι η χρήση της για τους χρήστες. Μια εφαρμογή μπορεί να προσφέρει εντυπωσιακές λειτουργίες, αλλά αν είναι δύσχρηστη, οι χρήστες θα την εγκαταλείψουν γρήγορα. Η ερευνητική προσέγγιση ευχρηστίας (usability research) είναι μια συστηματική διαδικασία που στοχεύει στον εντοπισμό προβλημάτων ευχρηστίας και στη βελτίωση της εμπειρίας του χρήστη (User Experience - UX). Ένα από τα πιο αποτελεσματικά εργαλεία αυτής της προσέγγισης είναι το usability test (δοκιμή ευχρηστίας).

Η διεξαγωγή αυτής της έρευνας είναι ωφέλιμη και επίκαιρη, καθώς εξετάζεται αν η εφαρμογή και ο τρόπος λειτουργίας της είναι κατανοητός από τον μαθητή, αν είναι εύκολη στη χρήση της και στη μάθησή της και αν είναι κατάλληλη για το επίπεδο των μαθητών.

Τα αποτελέσματα της έρευνας μπορούν να αξιοποιηθούν από την εκπαιδευτική κοινότητα, ώστε οι εκπαιδευτικοί να ανακαλύψουν το πόσο αποτελεσματικό παιδαγωγικό εργαλείο μπορεί να αποδειχθεί η χρήση μια Ηλεκτρονικής εφαρμογής σε κάποιο στάδιο της διδακτικής διαδικασίας ώστε να επιτευχθεί η ενεργή εμπλοκή των μαθητών στη διαδικασία της μάθησης.

Επίσης, αν η εφαρμογή αποδειχθεί χρήσιμη και εύχρηστη, θα μπορούσε να εμπλουτιστεί με περισσότερα θέματα.

ΑΠΟΤΕΛΕΣΜΑΤΑ ΕΡΕΥΝΑΣ ΕΥΧΡΗΣΤΙΑΣ ΕΦΑΡΜΟΓΗΣ (USABILITY TEST)

Το usability test είναι μια ποιοτική μέθοδος έρευνας κατά την οποία πραγματικοί χρήστες αλληλεπιδρούν με την εφαρμογή (ή ένα πρωτότυπο αυτής) σε ένα ελεγχόμενο περιβάλλον, ενώ ένας ερευνητής παρακολουθεί και καταγράφει τη συμπεριφορά τους. Ο στόχος δεν είναι να ελεγχθεί η λειτουργικότητα της εφαρμογής (αν δουλεύει δηλαδή), αλλά το πώς οι χρήστες την χρησιμοποιούν, ποιες δυσκολίες αντιμετωπίζουν, και πώς νιώθουν κατά τη διάρκεια της αλληλεπίδρασης

Στην περίπτωση της Εφαρμογής Φυσικογνωμικά, ο έλεγχος ευχρηστίας πραγματοποιήθηκε για να προσδιοριστεί ο βαθμός στον οποίο κατανοούν οι χρήστες το προϊόν, πόσο εύκολο είναι στην εκμάθησή του, πόσο εύκολο στη χρήση του και πόσο ελκυστικό είναι για τους χρήστες υπό συγκεκριμένες συνθήκες και απαιτήσεις.

Το δείγμα των ερωτώμενων αποτέλεσαν 14 εκπαιδευτικοί Πρωτοβάθμιας εκπαίδευσης οι οποίοι αφού έκαναν χρήση της Ε.Φ., απάντησαν στο ερωτηματολόγιο Ευχρηστίας

ΑΠΟΤΕΛΕΣΜΑΤΑ ΕΡΕΥΝΗΤΙΚΗΣ ΠΡΟΣΕΓΓΙΣΗΣ ΑΠΟΤΕΛΕΣΜΑΤΙΚΟΤΗΤΑΣ ΕΦΑΡΜΟΓΗΣ

Η ερευνητική προσέγγιση της αποτελεσματικότητας μιας εφαρμογής για κινητές συσκευές στη διδασκαλία της Φυσικής στο δημοτικό σχολείο είναι πολύπλευρη. Δεν αρκεί απλώς η ύπαρξη της τεχνολογίας, αλλά απαιτείται συστηματική διερεύνηση για να διασφαλιστεί ότι αυτή προσφέρει ουσιαστική παιδαγωγική προστιθέμενη αξία,

βελτιωμένα μαθησιακά αποτελέσματα και συμβάλλει στην επίτευξη των μαθησιακών στόχων με τον καλύτερο δυνατό τρόπο.

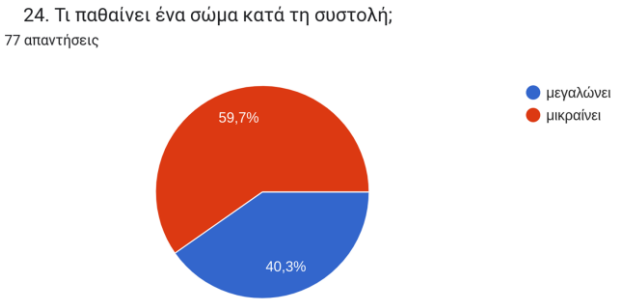
Βασικό πεδίο της έρευνας Αποτελεσματικότητας της εφαρμογής αφορά την κατανόηση των σχετικών εννοιών από μαθητές. Ως εργαλείο μέτρησης χρησιμοποιήθηκε ένα ερωτηματολόγιο γνωστικού περιεχομένου, το οποίο διαμοιράστηκε σε 2 φάσεις, δηλαδή πριν και μετά την χρήση της εφαρμογής.

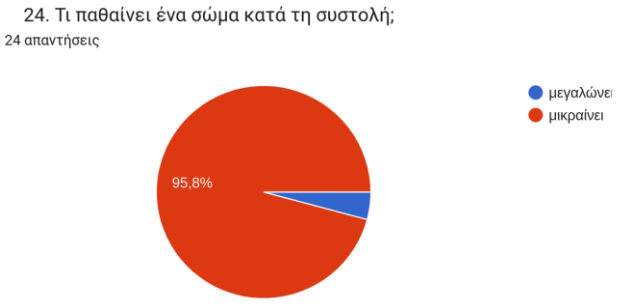
Σκοπός της 1ης φάσης ήταν να διαπιστωθεί το επίπεδο των γνώσεων που είχαν οι μαθητές πάνω σε θέματα του κεφαλαίου της Θερμότητας. Επισημαίνεται ότι είναι μια ενότητα που είχαν ήδη διδαχθεί στο σχολείο όλοι οι μαθητές. Τα αποτελέσματα αυτής της φάσης έδειξαν ότι μεγάλο ποσοστό των μαθητών δεν είχε κατακτήσει το γνωστικό αντικείμενο μέσα από την τυπική εκπαιδευτική διαδικασία. Έτσι, ερωτήσεις που αφορούσαν βασικές έννοιες της Φυσικής και έχουν εφαρμογή στην καθημερινότητα του ανθρώπου, δεν είχαν σταθερές απαντήσεις από την πλειοψηφία του δείγματος κι αυτό φάνηκε από τη μεγάλη διασπορά των απαντήσεων στις ερωτήσεις, όπως είναι ορατό και στα διαγράμματα που ακολουθούν.

Κατά τη 2η φάση της έρευνας δόθηκαν τα ερωτηματολόγια στους ίδιους μαθητές αφού έκαναν χρήση της Ε.Φ..

Ερώτηση με α/α 24. Τι παθαίνει ένα σώμα κατά τη συστολή;

Διαγράμματα 1α-1β
Αποτελεσματικότητα στην κατανόηση εννοιών – Συστολή (Πειραματική ομάδα)



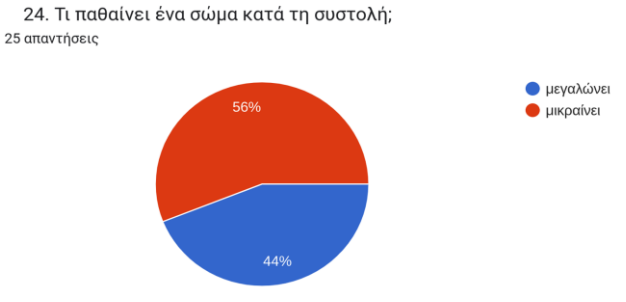


Αλλαγή φυσικής κατάστασης σώματος κατά τη Συστολή. Από τη θεωρητική προσέγγιση του Βιβλίου των Φυσικών της Ε τάξης Δημοτικού και τα συμπεράσματα που εξάγονται από τις πειραματικές εργασίες, είναι γνωστό ότι ”Όταν ένα σώμα αποβάλλει θερμότητα, ψύχεται. Τότε μικραίνει σε όλες του τις διαστάσεις. Το φαινόμενο αυτό ονομάζεται συστολή” (Φυσικά Ε Δημοτικού Βιβλίο μαθητή).

Οι απαντήσεις έδειξαν ότι σχεδόν οι μισοί μαθητές πίστευαν (40%) ότι ένα σώμα μεγαλώνει κατά τη Συστολή. Είναι φανερό ότι οι έννοιες της Διαστολής και Συστολής είναι συγκεχυμένες στο μυαλό των παιδιών.

Μετά τη χρήση της εφαρμογής οι σωστές απαντήσεις πλησίασαν το 90%. Φαίνεται ότι με τη χρήση της Ε.Φ, κατακτήθηκε σωστά η γνώση κι απομακρύνθηκαν οι αμφιβολίες που υπήρχαν.

Διαγράμματα 2α-2β
Αποτελεσματικότητα στην κατανόηση εννοιών – Συστολή (Ομάδα ελέγχου)

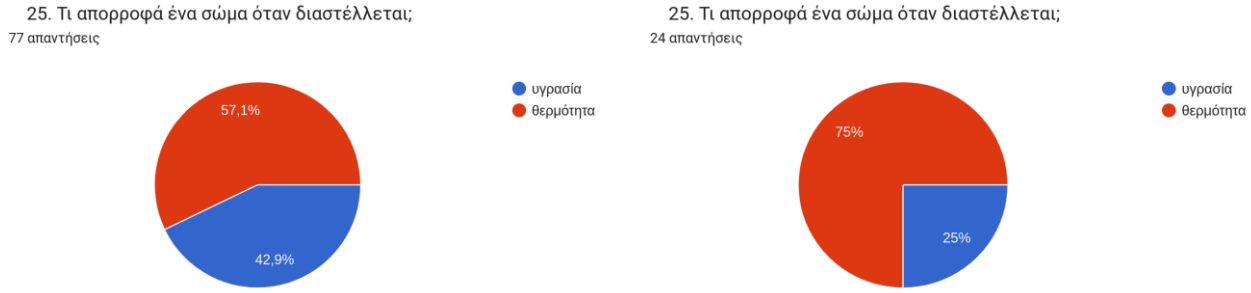




Παράλληλα ελέγχοντας και τα αποτελέσματα της Ομάδας ελέγχου, διαπιστώνεται ότι οι απαντήσεις μεταβλήθηκαν ελαφρώς προς τη σωστή κατεύθυνση μεταξύ των δύο τεστ αξιολόγησης.

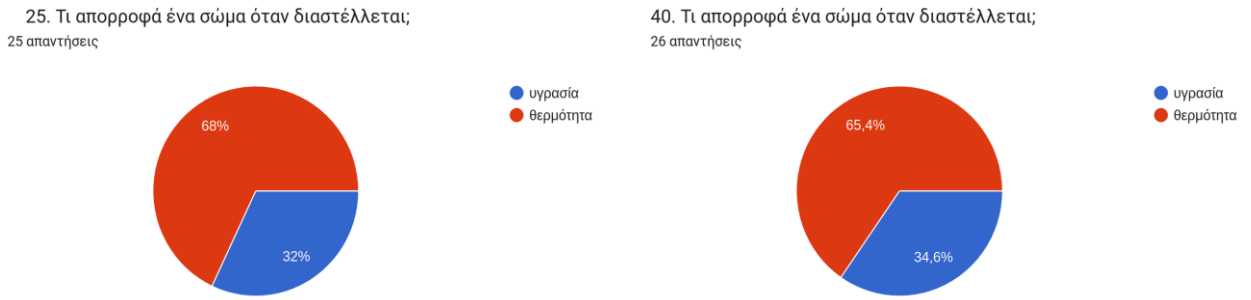
Ερώτηση με α/α 25. Τι απορροφά ένα σώμα όταν διαστέλλεται;

Διαγράμματα 3α-3β
Αποτελεσματικότητα στην κατανόηση εννοιών – Τι απορροφά ένα σώμα όταν διαστέλλεται; (Πειραματική ομάδα)



Στο Τετράδιο εργασιών των Φυσικών της Ε Δημοτικού ο μαθητής/ μαθήτρια ανακαλύπτει κάθε φυσικό φαινόμενο μέσα από πειραματικές διαδικασίες που εκτελούν με τη βοήθεια του εκπαιδευτικού της τάξης. Στο τέλος καλείται να εκφράσει τα συμπεράσματά του ερμηνεύοντας τα αποτελέσματα των πειραμάτων. Στα κεφάλαια της διαστολής των στερεών, των υγρών και των αερίων, αποτελεί κοινή παραδοχή ότι τα σώματα όταν απορροφούν θερμότητα διαστέλλοντα. Από τις απαντήσεις στη συγκεκριμένη ερώτηση φαίνεται ότι οι μαθητές/ μαθήτριες δεν κατέκτησαν τη σωστή ορολογία. Οι μισοί περίπου 42,9% δεν απάντησαν σωστά. Το ποσοστό των λανθασμένων απαντήσεων μειώθηκε στο 25% μετά τη χρήση της Ε.Φ.

Διαγράμματα 4α-4β
Αποτελεσματικότητα στην κατανόηση εννοιών – Τι απορροφά ένα σώμα όταν διαστέλλεται; (Ομάδα ελέγχου)



Παρατηρώντας τα αποτελέσματα των απαντήσεων της Ομάδας Ελέγχου, διαπιστώνουμε πως το ποσοστό των λανθασμένων επιλογών των χρηστών δε μεταβλήθηκε σημαντικά στη δεύτερη φορά.

Ερώτηση με α/α 42. Ποια είναι η φυσική κατάσταση ενός σώματος μετά την τήξη;

Σύμφωνα με το εξαγόμενο συμπέρασμα στο Τετράδιο εργασιών των Φυσικών Ε Δημοτικού: Όταν ένα στερεό παίρνει θερμότητα, κάποια στιγμή αρχίζει να αλλάζει φυσική κατάσταση. Ένα μέρος του γίνεται υγρό. Τα αποτελέσματα των αρχικών απαντήσεων της Πειραματικής ομάδας υποδεικνύουν μια ασαφή θέση για τους μισούς σχεδόν ερωτόμενους μαθητές. Μετά τη χρήση της εφαρμογής το ποσοστό σψστών απαντήσεων αυξήθηκε στο 88%.

Διαγράμματα 5α-5β
Αποτελεσματικότητα στην κατανόηση εννοιών – Ποια είναι η φυσική κατάσταση ενός σώματος μετά την τήξη; (Πειραματική ομάδα)





Διαγράμματα 6α-6β
Αποτελεσματικότητα στην κατανόηση εννοιών – Ποια είναι η φυσική κατάσταση ενός σώματος μετά την τήξη; (Ομάδα ελέγχου)





Παρατηρώντας τα αντίστοιχα αποτελέσματα της Ερευνητικής ομάδας συμπεραίνουμε πως οι σωστές απαντήσεις παρέμειναν σταθερές και στις δύο αξιολογήσεις.

Αποτελέσματα Ποσοτικής Ανάλυσης
Πειραματική Ομάδα:
Μέσο ποσοστό σωστών pre-test: 61,35%
Μέσο ποσοστό σωστών post-test: 75,00%
Μέση μεταβολή: +13,65 μονάδες
$t(76) = 6,02$, $p < 0,001$ (στατιστικά σημαντική βελτίωση)
Ομάδα Ελέγχου:
Μέσο ποσοστό σωστών pre-test: 53,6%
Μέσο ποσοστό σωστών post-test: 58,2%
Μέση μεταβολή: +4,6 μονάδες
$t(45) = -2,53$, $p = 0,014$ (οριακή στατιστική βελτίωση)

Πίνακας 1.
Σύγκριση Πειραματικής και Ομάδας Ελέγχου

Δείκτης	Πειραματική Ομάδα	Ομάδα Ελέγχου
Pre-test (%)	61,35%	53,6%
Post-test (%)	75,00%	58,2%
Μέση Μεταβολή	+13,65	+4,6
Στατιστική Σημαντικότητα	$p < 0,001$	$p = 0,014$

Η στατιστική ανάλυση υποδεικνύει σαφή ανωτερότητα της επίδρασης της εφαρμογής στη γνωστική ενίσχυση της έννοιας της Θερμότητας.

ΠΟΙΟΤΙΚΗ ΑΝΑΛΥΣΗ

Οι συνεντεύξεις ανέδειξαν υψηλά επίπεδα ικανοποίησης. Οι μαθητές χαρακτήρισαν την εφαρμογή ως «εύχρηστη», «διασκεδαστική» και «κατανοητή». Ιδιαίτερη αναφορά έγινε στον ρόλο των πειραμάτων και του φωνητικού βοηθού. Οι απαντήσεις έδειξαν συναισθηματική εμπλοκή και θετική διάθεση, ενώ προτάθηκαν μικρές αισθητικές βελτιώσεις.

Απόσπασμα (Ιωάννα): «Θα θυμάμαι τις πληροφορίες έτσι όπως τις έμαθα, γιατί τις εφάρμοσα κιόλας... δεν θα τα θυμάμαι απλά όπως τα διάβασα, θα τα θυμάμαι γιατί τα έκανα και εφαρμογή».

ΣΥΖΗΤΗΣΗ

Η εφαρμογή απέδειξε την παιδαγωγική της αξία, εφόσον συνδύασε στοιχεία παιχνιδιού, οπτικοποίησης και προσωπικής αλληλεπίδρασης. Το m-learning, όπως αναφέρεται από τον Kearney et al. (2012), καθιστά τη μάθηση πιο ελκυστική και συμβατή με τα μαθησιακά προφίλ των ψηφιακών μαθητών. Η σύγκριση με την ομάδα ελέγχου επιβεβαιώνει ότι οι τεχνολογικά ενισχυμένες στρατηγικές προσφέρουν ανώτερη γνωστική υποστήριξη. Επιπλέον, οι θετικές μαρτυρίες από τις συνεντεύξεις ενισχύουν την αξιοπιστία των ποσοτικών ευρημάτων.

ΠΕΡΙΟΡΙΣΜΟΙ

Περιορισμένος αριθμός ταυτοποιημένων συμμετεχόντων στην τελική φάση
Απουσία μακροχρόνιας παρακολούθησης της διατήρησης γνώσεων
Πιθανή προκατάληψη λόγω αυτοαναφορικών μεθόδων
Περιορισμένη γενικευσιμότητα λόγω μικρού γεωγραφικού εύρους

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΤΑΣΕΙΣ

Η χρήση εκπαιδευτικών εφαρμογών με φωνητικό βοηθό, σε συνδυασμό με διαδραστικό περιεχόμενο και εικονικά εργαστήρια, αποδεικνύεται αποτελεσματική στην ενίσχυση της γνώσης. Η παρούσα μελέτη αναδεικνύει την ανάγκη ενσωμάτωσης των εργαλείων m-learning στην πρωτοβάθμια εκπαίδευση. Προτείνεται η περαιτέρω έρευνα με ευρύτερο δείγμα, όπως και η δημιουργία πολυθεματικών εφαρμογών που να καλύπτουν περισσότερα πεδία των Φυσικών Επιστημών.

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ΣΥΜΠΕΡΑΣΜΑΤΑ ΕΡΕΥΝΑΣ ΓΙΑ ΤΗ ΧΡΗΣΗ ΤΩΝ ΜΕΣΩΝ ΚΟΙΝΩΝΙΚΗΣ ΔΙΚΤΥΩΣΗΣ ΑΠΟ ΕΦΗΒΟΥΣ

Κατσαρός Κωνσταντίνος
Σύμβουλος Εκπαίδευσης Πληροφορικής ΠΕ86
Διεύθυνσης Δευτεροβάθμιας Εκπαίδευσης Αιτωλοακαρνανίας
e-mail: katsaros74@sch.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη χρήση των μέσων κοινωνικής δικτύωσης από μαθητές Δευτεροβάθμιας Εκπαίδευσης, εστιάζοντας στις συνήθειες, στους κινδύνους που μπορεί να προκύψουν από τη χρήση των μέσων αλλά και στους πιθανούς τρόπους αντιμετώπισής τους.

Για τη συλλογή των δεδομένων χρησιμοποιήθηκε ερωτηματολόγιο που διανεμήθηκε και συμπληρώθηκε από 80 μαθητές Β Λυκείου (32 αγόρια και 48 κορίτσια), ηλικίας 16-17 ετών, προερχόμενους από ένα αστικό σχολείο της Λευκάδας. Το ερωτηματολόγιο δημιουργήθηκε με στόχο να αποτυπωθούν οι συνήθειες, η συχνότητα αλλά και ο τρόπος χρήσης των κοινωνικών δικτύων, να εντοπιστούν πιθανοί κίνδυνοι (όπως διαδικτυακός εκφοβισμός, παραβίαση προσωπικών δεδομένων, εθισμός) και να εξεταστεί αν υπάρχουν διαφορές στην επίδραση αυτών των κινδύνων ανάλογα με το φύλο των μαθητών.

Τα ευρήματα επιβεβαιώνουν την εφαρμογή της θεωρίας του ψηφιακού εθισμού (Young, 1998) όσον αφορά την υπερβολική χρήση, της κοινωνικής μάθησης (Bandura, 1977) στις επιλογές πλατφορμών και συμπεριφορών, και της αντίληψης του κινδύνου (Slovic, 1987) στις διαφορές φύλου.

Σύμφωνα με τα αποτελέσματα, η πλειονότητα των μαθητών χρησιμοποιεί τα μέσα κοινωνικής δικτύωσης σε καθημερινή βάση, κυρίως στην επικοινωνία με φίλους - συγγενείς και στην ψυχαγωγία και λιγότερο στην ενημέρωση. Δημοφιλέστερες πλατφόρμες αναδεικνύονται το Instagram, το TikTok και το Snapchat ενώ λιγότερο δημοφιλής είναι η πλατφόρμα του Facebook και του Χ.

Είναι σημαντικό όμως να τονιστεί ότι ένα σημαντικό ποσοστό μαθητών ανέφερε ότι έχει έρθει αντιμέτωπο με κινδύνους ή έχει γνώση ότι άτομα του άμεσου περιβάλλοντός του έχουν αντιμετωπίσει καταστάσεις που τους έκαναν να αισθανθούν άβολα. Η επεξεργασία των ερωτηματολογίων ανέδειξε ότι οι μαθήτριες βιώνουν πιο συχνά περιστατικά που τις κάνουν να νοιώθουν άβολα αλλά από την άλλη αυτό τις ωθεί να ανησυχούν περισσότερο για την ασφάλεια των προσωπικών τους δεδομένων και τις κάνει επιφυλακτικότερες έναντι των μαθητών στην αντιμετώπιση και διαχείριση διαδικτυακών κινδύνων. Αντίθετα, τα αγόρια εμφανίζονται πιο επιρρεπή σε θέματα πρόληψης κινδύνων.

Η έρευνα αναδεικνύει επίσης ότι οι περισσότεροι μαθητές έχουν διδαχθεί και γνωρίζουν βασικούς τρόπους προστασίας (όπως διαχείριση κωδικών, ρυθμίσεις απορρήτου, αποκλεισμός ανεπιθύμητων χρηστών, αναζήτηση σε σχετικές ιστοσελίδες), όμως είτε από αμέλεια είτε από άλλους λόγους δεν εφαρμόζουν πάντα τους απαιτούμενους κανόνες για την ατομική τους ασφάλεια.

Η εκπαίδευση σε θέματα ψηφιακής ασφάλειας και η προώθηση ενός υγιούς διαδικτυακού περιβάλλοντος κρίνονται απαραίτητες, τόσο από τους εκπαιδευτικούς όσο και από τους γονείς. Έμφαση πρέπει να δοθεί επίσης στη διερεύνηση των αιτιών της διαφοράς που παρατηρήθηκε να υπάρχει ανάλογα με το φύλο των μαθητών.

Λέξεις – κλειδιά: διαδίκτυο, μέσα κοινωνικής δικτύωσης, εκφοβισμός, ασφάλεια

ΕΙΣΑΓΩΓΗ

Τα μέσα κοινωνικής δικτύωσης έχουν καταστεί αναπόσπαστο μέρος της καθημερινότητας των εφήβων, προσφέροντας νέους εναλλακτικούς τρόπους επικοινωνίας, ψυχαγωγίας και έκφρασης σε σχέση με το παρελθόν. Ωστόσο, η ευρεία χρήση τους έχει εγείρει ανησυχίες για τους πιθανούς κινδύνους που ελλοχεύουν, ιδιαίτερα σε ηλικιακές ομάδες με περιορισμένη εμπειρία και κρίση (Livingstone & Helsper, 2007).

Σκοπός της παρούσας μελέτης είναι να αποτυπώσει τον τρόπο με τον οποίο μαθητές Δευτεροβάθμιας Εκπαίδευσης, που συμμετείχαν σε έρευνα με χρήση ερωτηματολογίου, χρησιμοποιούν τα κοινωνικά δίκτυα, να εντοπίσει τους κινδύνους που αντιμετωπίζουν και να αναδείξει τις στάσεις και αντιδράσεις τους. Στην μελέτη εξετάστηκε επίσης αν το φύλο των μαθητών / μαθητριών επιδρά στα υπό εξέταση ζητήματα.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η παρούσα μελέτη βασίστηκε σε τρεις βασικές θεωρητικές προσεγγίσεις που χρησιμοποιήθηκαν για να ερμηνευθεί η συμπεριφορά των εφήβων στον ψηφιακό χώρο: τη Θεωρία του Ψηφιακού Εθισμού (Young, 1998), τη Θεωρία της Κοινωνικής Μάθησης (Bandura, 1977) και τη Θεωρία της Αντίληψης του Κινδύνου (Slovic, 1987). Οι θεωρίες αυτές προσφέρουν το πρίσμα υπό το οποίο επιχειρείται να κατανοηθεί η σχέση των νέων με τα μέσα κοινωνικής δικτύωσης, λαμβάνοντας υπόψη τόσο ψυχολογικές όσο και κοινωνικές διαστάσεις.

Συγκεκριμένα, η Θεωρία Ψηφιακού Εθισμού υποστηρίζει ότι η υπερβολική χρήση του διαδικτύου μπορεί να οδηγήσει σε συμπεριφορές εξάρτησης, επηρεάζοντας τη σχολική επίδοση, την ψυχολογία και τις κοινωνικές σχέσεις των εφήβων. Η Kimberly Young υπήρξε πρωτοπόρος στη μελέτη της εθιστικής χρήσης του Διαδικτύου, προτείνοντας ότι η υπερβολική και ανεξέλεγκτη χρήση του μπορεί να αποκτήσει τα χαρακτηριστικά κλινικής εξάρτησης. Σύμφωνα με τη θεωρία της, ο ψηφιακός εθισμός χαρακτηρίζεται από εμμονική ανάγκη για σύνδεση, απώλεια ελέγχου του χρόνου χρήσης, παραμέληση καθημερινών δραστηριοτήτων και υποχρεώσεων και συναισθηματική εξάρτηση από τη διαδικτυακή παρουσία. Τα μέσα κοινωνικής δικτύωσης, και ιδιαίτερα εφαρμογές όπως το TikTok και το Instagram, ενισχύουν αυτή την εξάρτηση μέσω μηχανισμών άμεσης ανταμοιβής και συνεχούς αλληλεπίδρασης. Στους εφήβους, οι οποίοι διανύουν ένα κρίσιμο στάδιο ταυτότητας και αναζήτησης κοινωνικής αποδοχής, η ανάγκη για «ψηφιακή αναγνώριση» (likes, followers, shares) μπορεί να αποτελέσει ισχυρό ερέθισμα, αυξάνοντας τον κίνδυνο εξάρτησης.

Από την άλλη, η Θεωρία Κοινωνικής Μάθησης, περιγράφει πώς οι έφηβοι υιοθετούν συμπεριφορές παρατηρώντας πρότυπα στο περιβάλλον τους. Τα social media αποτελούν ισχυρά μέσα μίμησης και διάδοσης. Ο Albert Bandura, υποστηρίζει ότι η ανθρώπινη συμπεριφορά μαθαίνεται παρατηρώντας και μιμούμενη πρότυπα από το περιβάλλον. Η θεωρία αυτή βασίζεται στη διαδικασία της παρατήρησης – μίμησης – ενίσχυσης, όπου οι άνθρωποι υιοθετούν συμπεριφορές εάν διαπιστώνουν ότι αυτές επιβραβεύονται. Στο περιβάλλον των social media, οι έφηβοι εκτίθενται διαρκώς σε πρότυπα συμπεριφοράς — είτε πρόκειται για διάσημους influencers είτε για συνομηλίκους — τα οποία παρουσιάζονται συχνά με εξιδανικευμένο τρόπο, ενισχύοντας την πίεση για συμμόρφωση και αποδοχή. Μέσω της μίμησης αυτών των προτύπων ενισχύονται καταναλωτικές και αισθητικές συμπεριφορές (μόδα, trends), διαμορφώνονται στάσεις ζωής και αξίες και κανονικοποιούνται ακόμη και τοξικές ή επικίνδυνες συμπεριφορές, όπως το διαδικτυακό bullying ή η υπερπροβολή της προσωπικής ζωής. Η συγκεκριμένη θεωρία αποκτά ιδιαίτερη σημασία όταν εξετάζουμε την επίδραση των μέσων σε νέους που δεν έχουν αναπτύξει ακόμη πλήρως τις δεξιότητες κριτικής σκέψης και αυτορρύθμισης.

Τέλος, η Θεωρία Αντίληψης του Κινδύνου, εξηγεί πώς άτομα και κοινωνικές ομάδες αντιλαμβάνονται και αντιδρούν σε κινδύνους, επηρεαζόμενα από παράγοντες όπως το φύλο, η εμπειρία και η κοινωνική θέση. Ο Paul Slovic ανέπτυξε τη θεωρία της υποκειμενικής αντίληψης του κινδύνου, σύμφωνα με την οποία οι άνθρωποι δεν αντιδρούν σε απειλές με βάση την αντικειμενική επικινδυνότητά τους, αλλά με βάση το πώς τις αντιλαμβάνονται συναισθηματικά και πολιτισμικά. Η θεωρία του Slovic αναδεικνύει ότι το φύλο, η ηλικία και το κοινωνικό πλαίσιο επηρεάζουν την αντίληψη των κινδύνων. Οι γυναίκες (σε όλες τις ηλικίες) αντιλαμβάνονται τους κινδύνους ως μεγαλύτερους και είναι πιο επιφυλακτικές, ιδίως σε θέματα προσωπικής ασφάλειας και προστασίας της ιδιωτικότητας ενώ οι άνδρες συχνά υποεκτιμούν τους κινδύνους και εμφανίζονται πιο πρόθυμοι να ρισκάρουν ή να αγνοούν απειλές. Η θεωρία αυτή είναι ιδιαίτερα σημαντική για την παρούσα μελέτη, καθώς εξετάζει τις διαφορές φύλου στην αντίληψη των διαδικτυακών κινδύνων, όπως έχουν καταδείξει και μεταγενέστερες έρευνες (Harris et al., 2017). Η πολιτισμική διάσταση του φύλου (gender socialization) φαίνεται να παίζει ρόλο στην καλλιέργεια αυτών των στάσεων, όπως καταδεικνύουν και μεταγενέστερες έρευνες (Harris et al., 2017).

Η σύνθεση των παραπάνω θεωριών μάς επιτρέπει να κατανοήσουμε γιατί οι μαθητές στρέφονται σε συγκεκριμένα μέσα (μέσω της θεωρίας της κοινωνικής μάθησης), πώς ενδέχεται να αποκτήσουν συμπεριφορές εξάρτησης (μέσω της θεωρίας του ψηφιακού εθισμού) και γιατί διαφοροποιούνται ανάλογα με το φύλο ως προς την εμπειρία και την αντιμετώπιση των διαδικτυακών κινδύνων (μέσω της θεωρίας της αντίληψης του κινδύνου). Η ενοποίηση αυτών των προσεγγίσεων αποτελεί βασικό θεωρητικό υπόβαθρο για την ερμηνεία των ευρημάτων της έρευνας και τη διαμόρφωση πρακτικών παρεμβάσεων στο πεδίο της σχολικής και οικογενειακής αγωγής.

ΜΕΘΟΔΟΛΟΓΙΑ

Η έρευνα πραγματοποιήθηκε σε Λύκειο της Λευκάδας και συμμετείχαν 80 μαθητές Β' Λυκείου (32 αγόρια και 48 κορίτσια), ηλικίας 16-17 ετών. Χρησιμοποιήθηκε ερωτηματολόγιο κλειστού τύπου, το οποίο κάλυπτε τη συχνότητα και τους σκοπούς χρήσης των μέσων κοινωνικής δικτύωσης, τις εμπειρίες με διαδικτυακούς κινδύνους (εκφοβισμός, παραβίαση δεδομένων, εθισμός), τις στρατηγικές προστασίας και τις αντιλήψεις ανά φύλο. Το ερωτηματολόγιο απαντήθηκε στο εργαστήριο Πληροφορικής από τους μαθητές στο πλαίσιο γενικότερης παρέμβασης για θέματα ασφάλειας στο διαδίκτυο και συμπληρώθηκε παρουσία εκπαιδευτικού.

Η ανάλυση έγινε με τη χρήση περιγραφικής στατιστικής και οπτικοποίηση των αποτελεσμάτων σε ποσοστιαίες κατανομές.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η πλειοψηφία των ερωτηθέντων ήταν κορίτσια, γεγονός που μπορεί να επηρεάσει τα συνολικά ευρήματα, αλλά τελικά μας δίνει τη δυνατότητα να εντοπίσουμε τις διαφορές στην αντίληψη των θεμάτων που εξετάστηκαν αλλά και πιθανές διαφορετικές προσεγγίσεις σε αυτά.

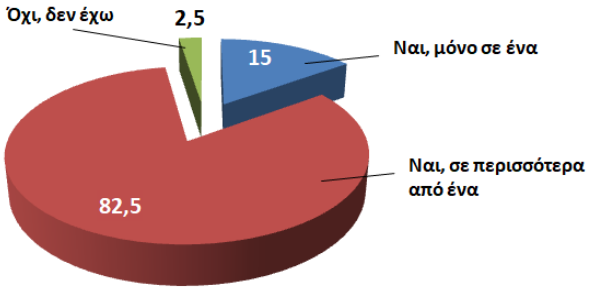
Κυρίαρχη συσκευή για πρόσβαση στο διαδίκτυο αποτελεί το κινητό τηλέφωνο με ποσοστό πάνω από 95% στο σύνολο των ερωτηθέντων.

Κύριες δραστηριότητες

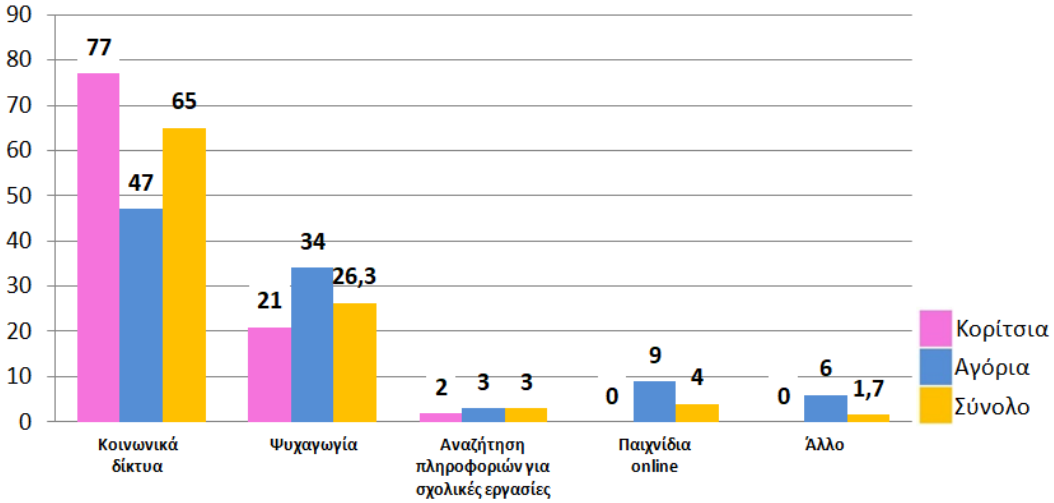
Η κύρια δραστηριότητα για τους ερωτώμενους είναι η σύνδεση και χρήση κοινωνικών δικτύων και μάλιστα σε πολύ μεγάλα ποσοστά, με τα δύο τρίτα των εφήβων να τα χρησιμοποιούν ενεργά. Σχεδόν όλοι οι έφηβοι (97.5%) έχουν λογαριασμό σε κοινωνικά δίκτυα, με τη συντριπτική πλειοψηφία (82.5%) να είναι ενεργή σε περισσότερες από μία πλατφόρμες (Εικόνα 1) Κοινωνικής Δικτύωσης.

Η ψυχαγωγία ακολουθεί σε μεγάλη απόσταση. Η χρήση για σχολικές εργασίες ή παιχνίδια είναι πολύ μικρότερη (Εικόνα 2).

Εικόνα 1.
Έχεις λογαριασμό σε μέσο κοινωνικής δικτύωσης;

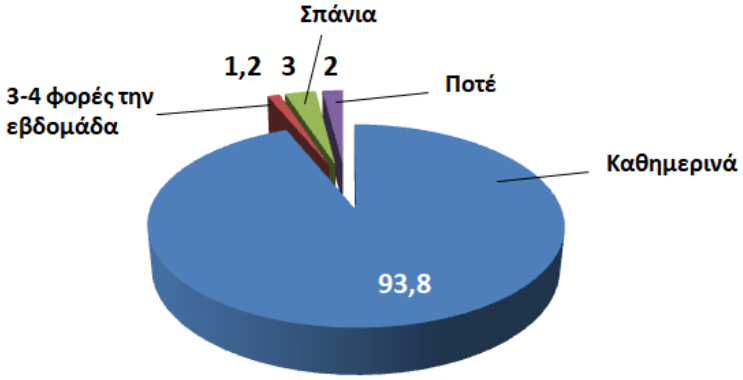


Εικόνα 2.
Ποια είναι η κύρια σου δραστηριότητα στο διαδίκτυο;



Η χρήση των κοινωνικών δικτύων είναι καθημερινή, σχεδόν καθολικά (93.8%) (Εικόνα 3). Υπάρχει σαφής διαφορά στις κύριες δραστηριότητες αν εστιάσουμε στις απαντήσεις ανά φύλο. Τα κορίτσια κυριαρχούν στη χρήση κοινωνικών δικτύων (77% έναντι 47% των αγοριών). Αντίθετα, τα αγόρια ασχολούνται πολύ περισσότερο με την ψυχαγωγία (34% έναντι 21% των κοριτσιών) και, κυρίως, με τα online παιχνίδια (9% έναντι 0% των κοριτσιών).

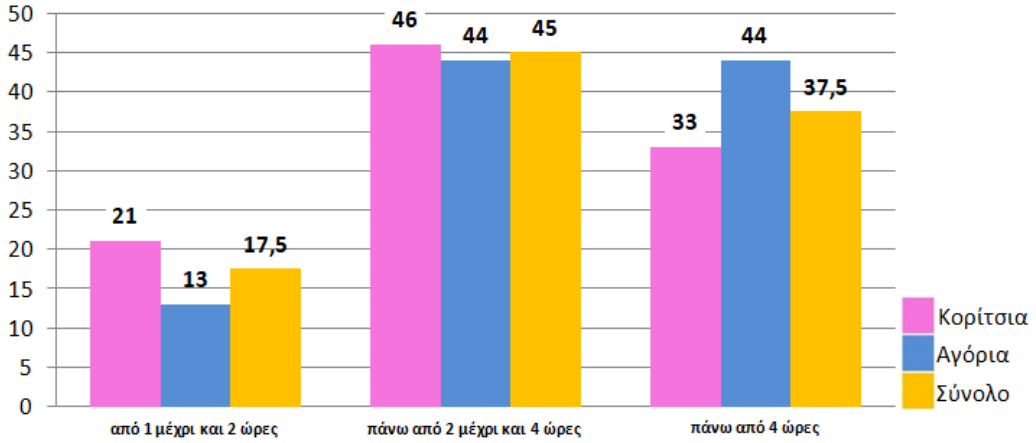
Εικόνα 3.
Πόσο συχνά χρησιμοποιείς τα κοινωνικά δίκτυα;



Χρόνος χρήσης

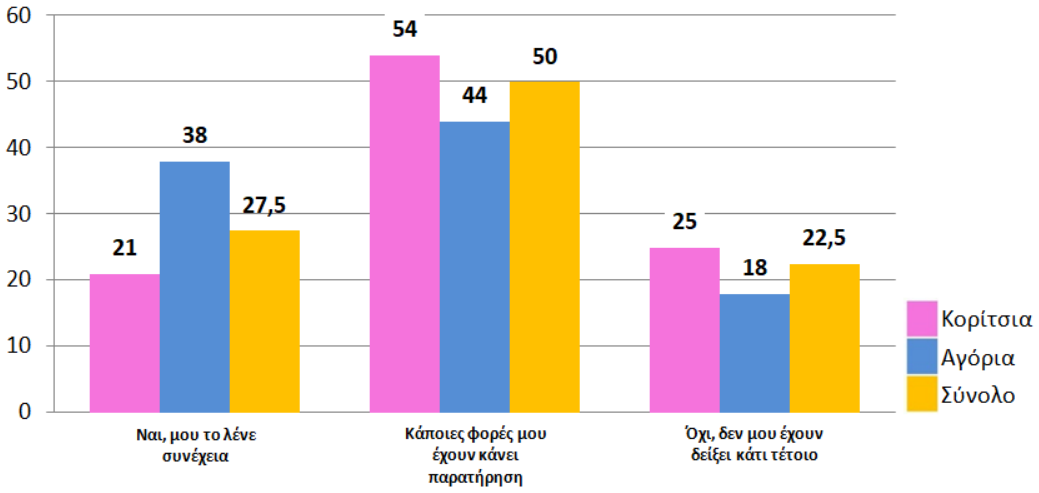
Σχεδόν οι μισοί (45%) των ερωτηθέντων χρησιμοποιούν το διαδίκτυο για 2-4 ώρες την ημέρα, ενώ ένα σημαντικό ποσοστό (37.5%) το χρησιμοποιεί πάνω από 4 ώρες. Τα αγόρια περνούν αναλογικά περισσότερο χρόνο στο διαδίκτυο (> 4 ώρες: 44% αγόρια έναντι 33% κορίτσια), ενώ τα κορίτσια έχουν ελαφρώς μεγαλύτερο ποσοστό στην κατηγορία 1-2 ώρες (Εικόνα 4).

Εικόνα 4.
Πόσες ώρες την ημέρα χρησιμοποιείς το διαδίκτυο;



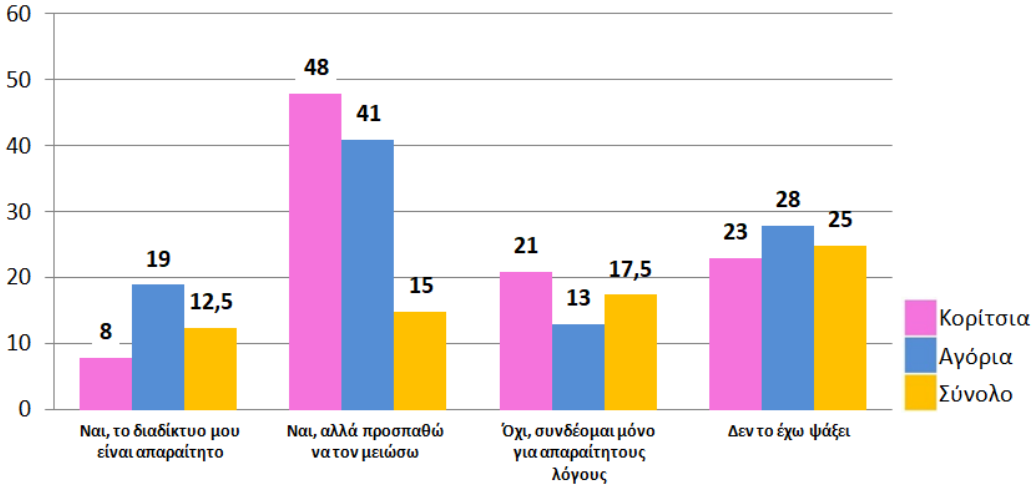
Οι περισσότεροι γονείς (77.5% συνολικά) εκφράζουν ανησυχία για τον χρόνο που περνούν τα παιδιά τους στο διαδίκτυο, είτε συχνά (27.5%) είτε περιστασιακά (50%). Οι γονείς των αγοριών εκφράζουν την ανησυχία τους σε ποσοστό 38% στα αγόρια και 21% στα κορίτσια ("Ναι, μου το λένε συνέχεια": 38% αγόρια έναντι 21% κορίτσια). Στις παρατηρήσεις που κάνουν τα ποσοστά είναι 44% στα αγόρια και 54% στα κορίτσια (Εικόνα 5).

Εικόνα 5.
Οι γονείς σας θεωρούν ότι καταναλώνετε υπερβολικό χρόνο στο διαδίκτυο;



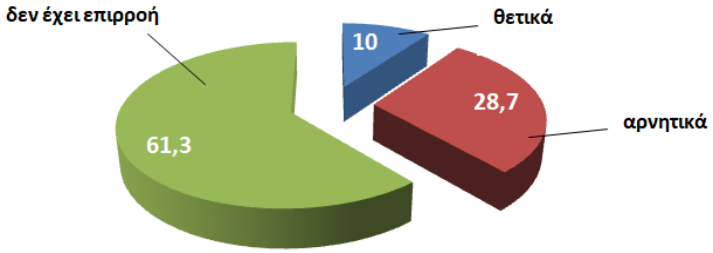
Μεταξύ των ερωτώμενων, ένα 27.5% αναγνωρίζει ως υπερβολική τη χρήση που κάνει (12.5% το θεωρεί απαραίτητο και 15% προσπαθεί να τη μειώσει) ενώ το 25% δηλώνει ότι "δεν το έχει ψάξει" (Εικόνα 6). Τα αγόρια σε μεγαλύτερο ποσοστό θεωρούν το διαδίκτυο "απαραίτητο" (19% έναντι 8% των κοριτσιών), ενώ τα κορίτσια αναγνωρίζουν περισσότερο την ανάγκη να μειώσουν το χρόνο χρήσης ("Ναι, αλλά προσπαθώ να τον μειώσω": 48% κορίτσια έναντι 31% αγόρια). Τα κορίτσια επίσης δηλώνουν πιο συχνά ότι συνδέονται μόνο για απαραίτητους λόγους (21% έναντι 13%).

Εικόνα 6.
Εσύ θεωρείς ότι καταναλώνεις υπερβολικό χρόνο στο διαδίκτυο;



Η πλειοψηφία των ερωτώμενων (61.3%) πιστεύει ότι η χρήση του διαδικτύου δεν επηρεάζει τη σχολική τους απόδοση. Ωστόσο, ένα σχεδόν 30% αναφέρει αρνητική επίδραση (Εικόνα 7).

Εικόνα 7.
Πιστεύεις ότι η χρήση του διαδικτύου έχει επηρεάσει την απόδοσή σου στο σχολείο....



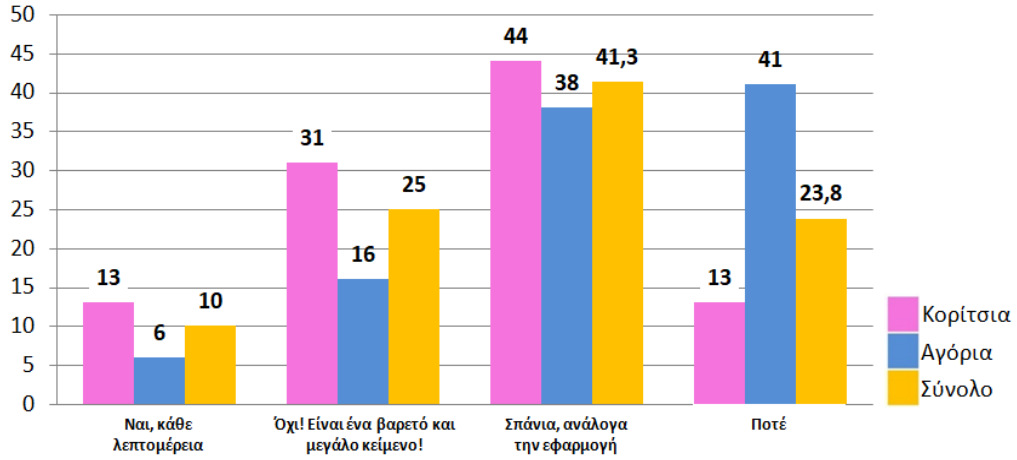
Ασφάλεια και διαμοιρασμός υλικού

Ένα ποσοστό (10%) διαβάζει λεπτομερώς τις συμφωνίες χρήσης των μέσων κοινωνικής δικτύωσης στα οποία έχουν πρόσβαση. Η πλειοψηφία είτε τις βρίσκει βαρετές/μεγάλες (25%) είτε τις διαβάζει σπάνια (41.3%) ή ποτέ (23.8%). Τα κορίτσια είναι πιο πιθανό να διαβάσουν "κάθε λεπτομέρεια" (13% έναντι 6% των αγοριών) και "σπάνια" να το κάνουν (44% έναντι 38%). Αντίθετα, τα αγόρια απορρίπτουν πιο συχνά την ανάγνωση ως "βαρετό και μεγάλο κείμενο" (31% έναντι 11% των κοριτσιών) (Εικόνα 8).

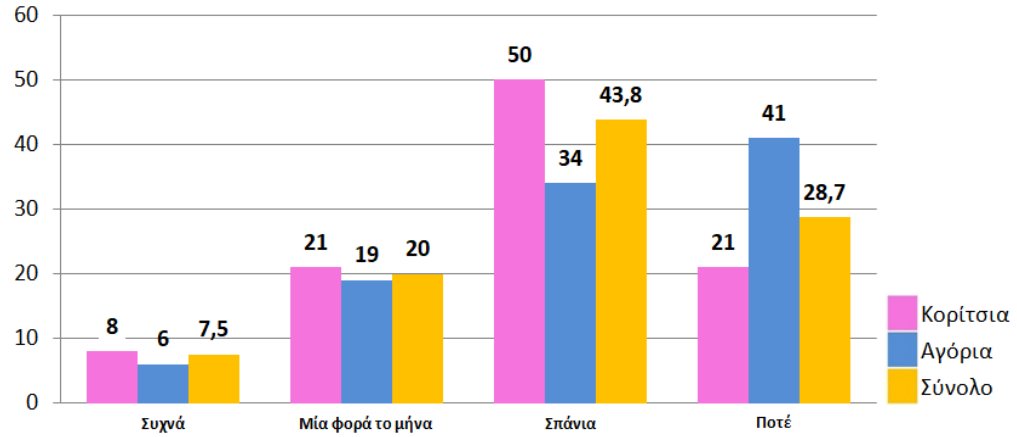
Η πλειοψηφία των εφήβων (72.5%) δεν ελέγχει συχνά (43.8% σπάνια, 28.7% ποτέ) τις ρυθμίσεις απορρήτου. Τα αγόρια ενώ από τη μια δηλώνουν ότι ελέγχουν "συχνά" τις ρυθμίσεις απορρήτου σε διπλάσιο ποσοστό από τα κορίτσια (10% έναντι 5%) από την άλλη δηλώνουν επίσης "ποτέ" σε μεγαλύτερο ποσοστό (37% έναντι 21% των κοριτσιών). Τα κορίτσια ελέγχουν "σπάνια" σε πολύ μεγαλύτερο ποσοστό (50% έναντι 34%) (Εικόνα 9).

Η συντριπτική πλειοψηφία (83.7%) αλλάζει τους κωδικούς πρόσβασης πολύ σπάνια ή ποτέ. Πάνω από τους μισούς (56.3%) χρησιμοποιούν τον ίδιο ή παρόμοιους κωδικούς πρόσβασης για πολλούς λογαριασμούς.

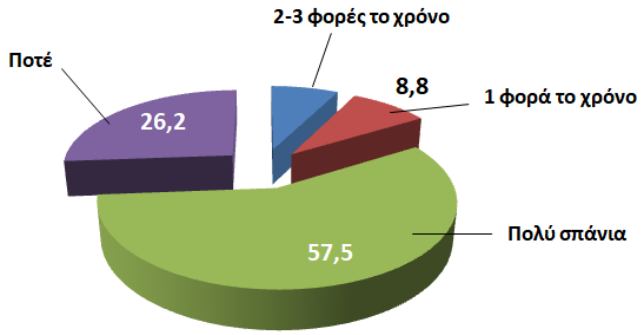
Εικόνα 8.
Διαβάζεις τη συμφωνία πριν δημιουργήσεις λογαριασμό σε μέσα κοινωνικής δικτύωσης ή εφαρμογές που συνδέεσαι;



Εικόνα 9.
Ελέγχεις τις ρυθμίσεις απορρήτου στα κοινωνικά σου δίκτυα;



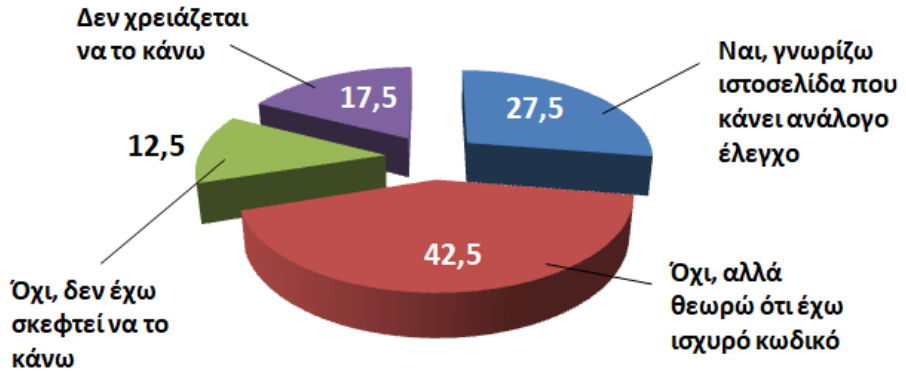
Εικόνα 10.
Πόσο συχνά αλλάζεις τους κωδικούς πρόσβασης στα μέσα κοινωνικής δικτύωσης ή σε εφαρμογές που χρησιμοποιείς;



Ωστόσο, η συνολική τάση για χρήση ίδιων κωδικών είναι υψηλή και στα δύο φύλα (Κορίτσια: 55%, Αγόρια: 57%) (Εικόνα 10). Ένα μεγάλο ποσοστό (42.5%) "θεωρεί" ότι έχει ισχυρό κωδικό χωρίς να το έχει ελέγξει, ενώ ένα άλλο

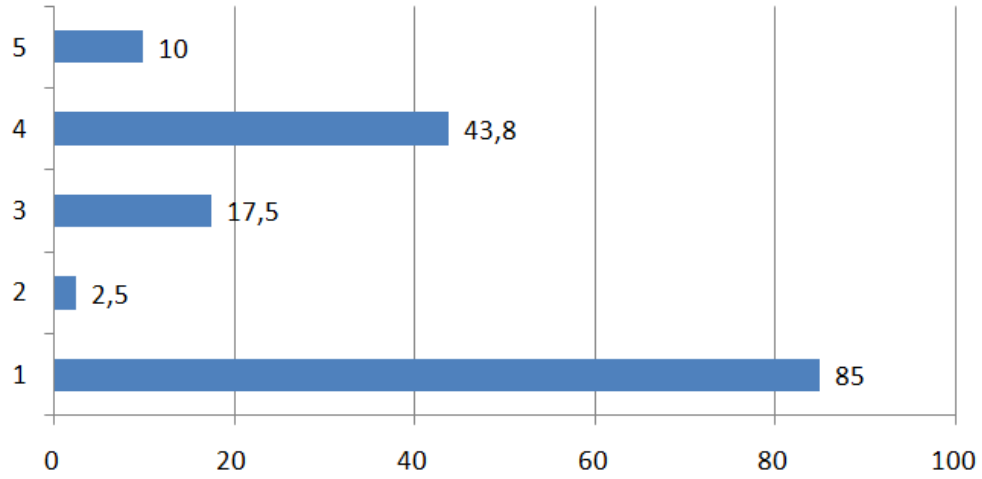
30% είτε δεν έχει σκεφτεί να το κάνει είτε πιστεύει ότι δεν χρειάζεται (Εικόνα 11). Τα αγόρια δηλώνουν σε ελαφρώς μεγαλύτερο ποσοστό ότι χρησιμοποιούν τον ίδιο κωδικό "σχεδόν πάντα" (20% έναντι 13% των κοριτσιών).

Εικόνα 11.
Έχεις ελέγξει ποτέ πόσο "ισχυρός" είναι ο κωδικός πρόσβασης που έχεις επιλέξει;



Οι ερωτηθέντες, θα μοιραζόταν προσωπικά στοιχεία όπως όνομα, επώνυμο και κινητό τηλέφωνο σε υψηλό ποσοστό (85%). Επίσης, ένα σημαντικό ποσοστό (43.8%) θα μοιραζόταν φωτογραφίες/βίντεο (Εικόνα 12). Όσον αφορά στο θέμα της μόνιμης διαγραφής περιεχομένου online, σχεδόν 60% (36.2% + 23.8%) δεν είναι σίγουροι ή πιστεύουν ότι η διαγραφή δεν είναι μόνιμη, κάτι που είναι πιο κοντά στην πραγματικότητα πολλών διαδικτυακών πλατφορμών.

Εικόνα 12.
Ποια από τα παρακάτω θεωρείς ότι θα μπορούσες να μοιραστείς με άλλους στο διαδίκτυο; (πολλαπλή επιλογή)

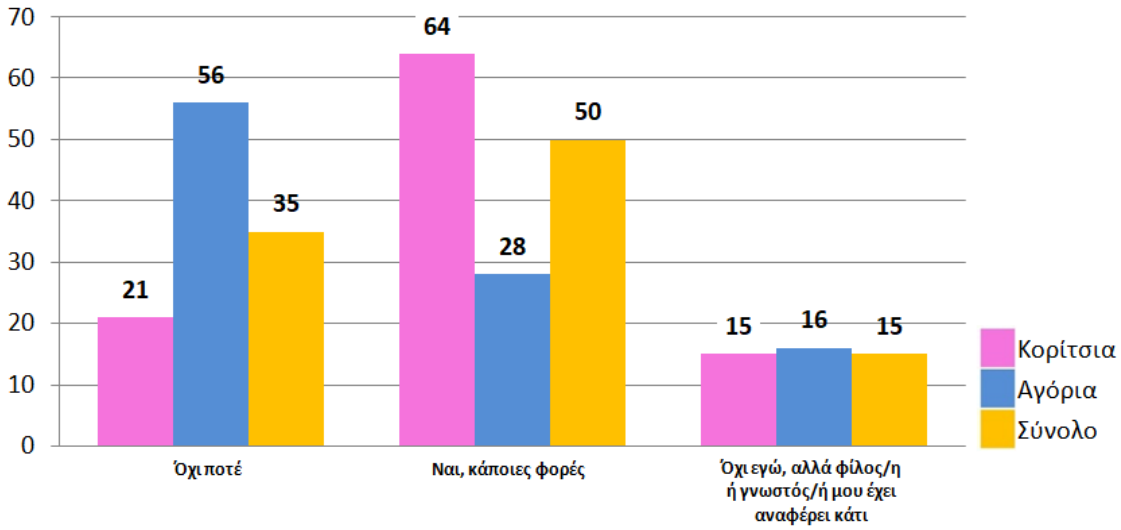


1. Προσωπικά στοιχεία (Όνομα – Επώνυμο, Κινητό τηλέφωνο, κλπ)
2. Διεύθυνση κατοικίας
3. Ωράριο δραστηριοτήτων
4. Φωτογραφίες - βίντεο
5. Μέρη που συχνάζω

Συμπεριφορές και ενημέρωση

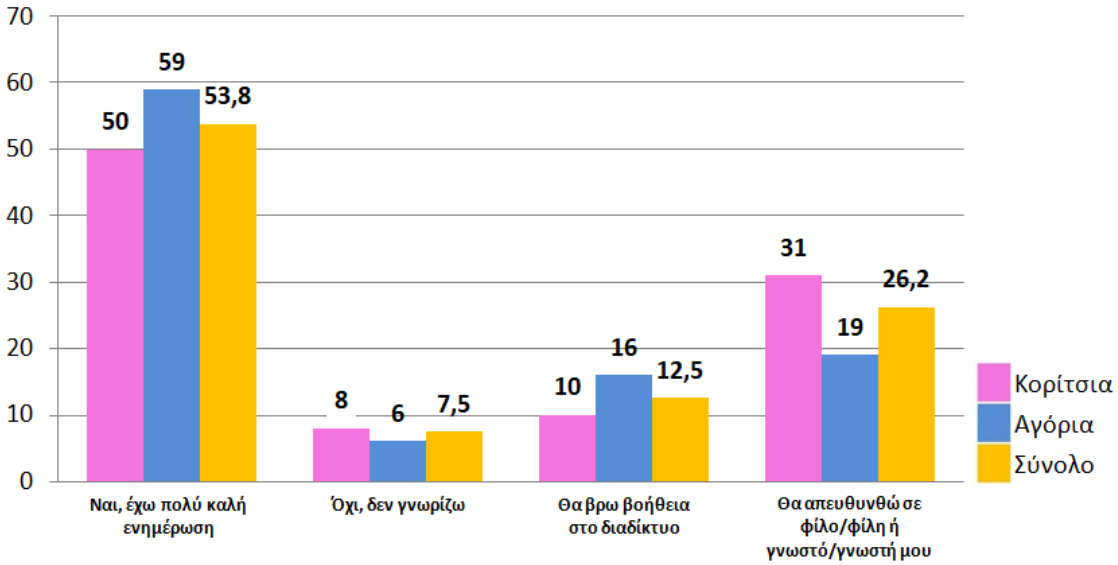
Ένα μεγάλο ποσοστό των ερωτηθέντων (50%) έχει νιώσει άβολα με τη συμπεριφορά άλλων στο διαδίκτυο, ενώ ένα επιπλέον 15% γνωρίζει κάποιον που έχει βιώσει κάτι τέτοιο. Τα κορίτσια έχουν νιώσει άβολα "κάποιες φορές" σε πολύ μεγαλύτερο ποσοστό από τα αγόρια (64% έναντι 28%) που δηλώνουν "όχι ποτέ" σε πολύ μεγαλύτερο ποσοστό (56% έναντι 21% των κοριτσιών) (Εικόνα 13).

Εικόνα 13.
Έχεις νοιώσει ποτέ άβολα με τη συμπεριφορά άλλου στο διαδίκτυο;



Πάνω από τους μισούς εφήβους (53.8%) δηλώνουν καλά ενημερωμένοι για θέματα ασφαλούς χρήσης του διαδικτύου. Ωστόσο, ένα σημαντικό ποσοστό (26.2%) θα απευθυνόταν σε φίλους/γνωστούς αν συναντούσε δυσκολίες ή διαδικτυακές επιθέσεις. Ένα ποσοστό 7.5% δηλώνει ότι δεν γνωρίζει πού να απευθυνθεί σε περίπτωση που δεχτεί παρενόχληση (Εικόνα 14). Τα αγόρια δηλώνουν ελαφρώς πιο ενημερωμένα (59% έναντι 50% των κοριτσιών) και πιο πιθανό να αναζητήσουν βοήθεια στο διαδίκτυο (16% έναντι 10% των κοριτσιών). Αντίθετα, τα κορίτσια είναι πιο πιθανό να απευθυνθούν σε φίλους/γνωστούς (31% έναντι 19% των αγοριών).

Εικόνα 14.
Γνωρίζεις που θα απευθυνθείς σε περίπτωση που δεχτείς μια διαδικτυακή απειλή;



ΣΥΖΗΤΗΣΗ

Τα ευρήματα επιβεβαιώνουν καταρχάς την υψηλή έκθεση των εφήβων στο διαδίκτυο σε καθημερινή βάση και τις γνώσεις που υπάρχουν σχετικά με τις προτιμήσεις των νέων για τη χρήση συγκεκριμένων μέσων κοινωνικής δικτύωσης, ενώ ενισχύουν και επιβεβαιώνουν πλήρως τις θεωρητικές προσεγγίσεις που παρουσιάστηκαν και αναδεικνύουν τις σύνθετες σχέσεις που αναπτύσσουν οι έφηβοι με τα μέσα κοινωνικής δικτύωσης αλλά και τους κινδύνους που ενέχουν αυτά.

Η διαπίστωση ότι η συντριπτική πλειονότητα των μαθητών χρησιμοποιεί καθημερινά τα μέσα κοινωνικής δικτύωσης, επιβεβαιώνει την αυξανόμενη «ψηφιοποίηση» της εφηβικής ζωής. Τα ευρήματα ευθυγραμμίζονται με έρευνες όπως αυτή των Twenge et al. (2018), που καταγράφουν ραγδαία αύξηση της καθημερινής χρήσης μεταξύ εφήβων σε παγκόσμιο επίπεδο. Οι έφηβοι αφιερώνουν σημαντικό χρόνο στο διαδίκτυο, κυρίως μέσω κινητών τηλεφώνων, με τα κοινωνικά δίκτυα να κυριαρχούν στην καθημερινή τους δραστηριότητα, γεγονός που σύμφωνα με τα αποτελέσματα απασχολεί τόσο τους γονείς όσο και τους ίδιους. Σύμφωνα μάλιστα με αυτά, φαίνεται να υπάρχει μεγαλύτερη αυτορρύθμιση και επίγνωση της χρήσης από την πλευρά των κοριτσιών, ενώ τα αγόρια δείχνουν μεγαλύτερη εξάρτηση ή λιγότερη προσπάθεια για μείωση. Για ένα σημαντικό κομμάτι των εφήβων, η αυξημένη χρήση του διαδικτύου μπορεί να αποτελεί παράγοντα απόσπασης ή μείωσης της ακαδημαϊκής επίδοσης ενώ σίγουρα αποτελεί αιτία προστριβής με τους γονείς που προβαίνουν συχνά σε παρατηρήσεις.

Η θεωρία του Bandura (1977) επιβεβαιώνεται καθώς τόσο η χρήση όσο και οι στάσεις φαίνεται να επηρεάζονται από πρότυπα που προβάλλονται στο διαδίκτυο. Επιπλέον, η ψηφιακή εξάρτηση, όπως περιγράφεται από τη Young (1998), φαίνεται να εμφανίζεται κυρίως σε πλατφόρμες που ενισχύουν τη συνεχή αλληλεπίδραση και την ανατροφοδότηση μέσω "likes" και σχολίων, όπως το TikTok και το Instagram.

Η υπεροχή του Instagram, TikTok και Snapchat σε σχέση με πλατφόρμες όπως το Facebook ή το X (πρώην Twitter), επιβεβαιώνει πως οι μαθητές επιλέγουν μέσα κοινωνικής δικτύωσης που ενσωματώνουν περισσότερη άμεση αλληλεπίδραση εγκαταλείποντας μέσα που θεωρούνται ξεπερασμένα για τις ηλικίες αυτές ή που φαίνεται να επιλέγονται από γονείς ή ενήλικες (Anderson & Jiang, 2018).

Σαφώς αποτυπώνεται ότι οι μαθητές και οι μαθήτριες χρησιμοποιούν τα μέσα για επικοινωνία και ψυχαγωγία και όχι για ενημέρωση, επιβεβαιώνοντας τη λειτουργία των μέσων αυτών σύμφωνα με την περιγραφή που κάνει η θεωρία της Κοινωνικής Μάθησης του Bandura (1977). Τα κορίτσια κυριαρχούν στα κοινωνικά δίκτυα, ενώ τα αγόρια στην ψυχαγωγία και τα online παιχνίδια. Αυτή η διάκριση ήταν η πιο σαφής και αναμενόμενη. Οι νέοι, μέσω της παρατήρησης και της μίμησης, αναζητούν αποδοχή αλλά και ταύτιση με πρότυπα.

Παράλληλα, αναδεικνύονται οι σημαντικές διαφοροποιήσεις στην αντίληψη του κινδύνου ανάλογα με το φύλο των μαθητών, γεγονός που συμφωνεί με τη θεωρία του Slovic (1987). Οι μαθήτριες εμφανίζονται πιο ευαισθητοποιημένες σε θέματα προσωπικής ασφάλειας, ενώ τα αγόρια δείχνουν μεγαλύτερη αδιαφορία και ενίοτε έλλειψη προληπτικής συμπεριφοράς. Αυτό ίσως σχετίζεται με κοινωνικά στερεότυπα που ενισχύουν την ανθεκτικότητα ή την αίσθηση κυριαρχίας των αγοριών στον ψηφιακό χώρο (Livingstone & Brake, 2010).

Ιδιαίτερο ενδιαφέρον παρουσιάζει το εύρημα ότι πολλοί μαθητές έχουν βιώσει ή γνωρίζουν περιστατικά κινδύνων, όπως παρενόχληση, διαδικτυακός εκφοβισμός ή παραβίαση της ιδιωτικότητας. Το γεγονός αυτό συνδέεται άμεσα με τη θεωρία του Ψηφιακού Εθισμού (Young, 1998), καθώς η παρατεταμένη και ανεξέλεγκτη έκθεση στα μέσα αυξάνει τις πιθανότητες να βρεθεί κάποιος σε τέτοια περιστατικά.

Αξιοσημείωτη είναι επίσης και η διαφορά στις εμπειρίες μεταξύ φύλων. Τα κορίτσια δηλώνουν ότι συχνότερα αντιμετωπίζουν περιστατικά που τις κάνουν να αισθάνονται άβολα και, ως αποτέλεσμα, επιδεικνύουν μεγαλύτερη προσοχή και ευαισθησία σε θέματα προστασίας δεδομένων. Αντίθετα, τα αγόρια εμφανίζονται λιγότερο επιφυλακτικά και πιο επιρρεπή σε απερίσκεπτη χρήση, επιβεβαιώνοντας τη θεωρία του Slovic (1987) περί διαφοροποιημένης αντίληψης του κινδύνου με βάση το φύλο, αφού οι μαθήτριες είναι πιο ευαισθητοποιημένες σε θέματα διαδικτυακής παρενόχλησης και παραβίασης προσωπικών δεδομένων, σε αντίθεση με τους μαθητές, οι οποίοι τείνουν να έχουν πιο χαλαρή στάση. Η συγκεκριμένη διαφοροποίηση ενδέχεται να ερμηνευτεί και υπό το πρίσμα των πολιτισμικών προτύπων: κορίτσια κοινωνικοποιούνται συχνά σε ένα περιβάλλον που τις προτρέπει να είναι προστατευτικές και επιφυλακτικές, ενώ τα αγόρια ενθαρρύνονται προς πιο ριψοκίνδυνες ή αυθόρμητες συμπεριφορές (Harris et al., 2017).

Ένα σημείο που επίσης αναδεικνύεται είναι το γεγονός ότι, αν και οι περισσότεροι μαθητές δηλώνουν ότι έχουν διδαχθεί βασικές πρακτικές ψηφιακής ασφάλειας (π.χ. διαχείριση κωδικών, ρυθμίσεις απορρήτου), δεν τις εφαρμόζουν από αμέλεια ή, ακόμη χειρότερα, θεωρούν ότι δεν χρειάζεται να τις εφαρμόσουν. Αυτή η ασυνέπεια μεταξύ γνώσης και πράξης επισημαίνει την ανάγκη για ουσιαστικότερη ψηφιακή παιδεία, που δεν περιορίζεται στη μετάδοση πληροφοριών αλλά δίνει έμφαση στην κριτική σκέψη, την ενσυναίσθηση και την αυτορρύθμιση. Φαίνεται συνεπώς πως οι μαθητές ενώ γνωρίζουν την ορθή συμπεριφορά την παραβλέπουν είτε γιατί δεν εκτιμούν τον κίνδυνο ως σημαντικό, είτε γιατί οι κοινωνικές πιέσεις και η επιθυμία για συμμετοχή σε συγκεκριμένες πρακτικές (π.χ. δημόσια προφίλ, tagging σε φωτογραφίες, reposts) υπερνικούν τη λογική της προστασίας. Μάλιστα, η προθυμία να μοιραστούν τόσο ευαίσθητες πληροφορίες εγείρει σοβαρά ζητήματα ιδιωτικότητας και κινδύνων όπως το cyberbullying ή η εκμετάλλευση.

Τα δεδομένα της παρούσας μελέτης τονίζουν την ανάγκη για συστηματική και ουσιαστική εκπαίδευση στον ψηφιακό γραμματισμό. Δεν αρκεί η απλή διδασκαλία τεχνικών δεξιοτήτων, χρειάζεται ένα ολιστικό παιδαγωγικό πλαίσιο, το οποίο θα ενσωματώνει την κριτική προσέγγιση των μέσων (πώς κατασκευάζεται το περιεχόμενο, ποιοι το παράγουν, ποιες είναι οι συνέπειες), την κοινωνική υπευθυνότητα στη διαδικτυακή επικοινωνία και τη συμμετοχική μάθηση, όπου οι μαθητές εμπλέκονται ενεργά σε σενάρια επίλυσης προβλημάτων και προσομοιώσεις διαδικτυακών καταστάσεων.

Αξίζει επίσης να σημειωθεί ότι είναι κρίσιμη η συνεργασία και η ενίσχυση του ρόλου των γονέων και κηδεμόνων. Η καθοδήγηση από ενήλικες που όμως κατανοούν τα χαρακτηριστικά αυτών των μέσων και μπορούν να συνομιλήσουν ισότιμα με τους εφήβους είναι θεμελιώδους σημασίας αφού τα μέσα κοινωνικής δικτύωσης δεν είναι απλώς ένα τεχνολογικό εργαλείο, αποτελούν πεδίο πολιτισμικής διαπραγμάτευσης και κοινωνικής ταυτότητας για τους νέους.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η έρευνα επιβεβαιώνει ότι η χρήση των μέσων κοινωνικής δικτύωσης είναι θεμελιώδες στοιχείο της εφηβικής ζωής, με θετικά και αρνητικά αποτελέσματα. Αποτελούν πλέον αναπόσπαστο κομμάτι της καθημερινότητας των εφήβων, κυρίως για λόγους κοινωνικής αλληλεπίδρασης και ψυχαγωγίας. Ωστόσο, ενέχουν σημαντικούς κινδύνους, τους οποίους οι μαθητές γνωρίζουν σε θεωρητικό επίπεδο, αλλά συχνά δυσκολεύονται να διαχειριστούν στην πράξη.

Επιβεβαιώθηκε η ύπαρξη έμφυλων διαφοροποιήσεων τόσο στη βιωματική εμπειρία των κινδύνων όσο και στην αντίδραση απέναντί τους, με τις μαθήτριες να δείχνουν μεγαλύτερη ευαισθησία και εγρήγορση για θέματα ασφαλείας, αλλά και να εκτίθενται συχνότερα σε προβληματικές καταστάσεις.

Τα αποτελέσματα είναι παρόμοια με αυτά άλλων ερευνητικών αλλά και θεωρητικών εργασιών και υπογραμμίζουν την ανάγκη για συστηματική εκπαίδευση στον ψηφιακό γραμματισμό, όχι μόνο σε επίπεδο γνώσεων αλλά και σε επίπεδο δεξιοτήτων, στάσεων και συμπεριφορών.

Οι άξονες παρέμβασης πρέπει να περιλαμβάνουν ενίσχυση της ψηφιακής εκπαίδευσης εντός της σχολικής μονάδας, στοχευμένες παρεμβάσεις πρόληψης, λαμβάνοντας υπόψη τις διαφοροποιήσεις φύλου αλλά και συνεργασία μεταξύ εκπαιδευτικών, γονέων και ειδικών ψυχικής υγείας για τη δημιουργία ασφαλούς διαδικτυακού περιβάλλοντος.

ΠΡΟΤΑΣΕΙΣ ΓΙΑ ΜΕΛΛΟΝΤΙΚΗ ΕΡΕΥΝΑ

Στο πλαίσιο μελλοντικής έρευνας θα μπορούσαν να ενταχθούν η ποιοτική διερεύνηση εμπειριών μέσω συνεντεύξεων που θα εστιάζουν στην αποκάλυψη βαθύτερων στάσεων, συναισθημάτων και εμπειριών των μαθητών από την καθημερινή τους εμπλοκή στα μέσα κοινωνικής δικτύωσης, η διαχρονική μελέτη που θα επέτρεπε την καταγραφή αλλαγών στη χρήση των μέσων αλλά και την αντίληψη κινδύνων με την πάροδο του χρόνου, τη συγκριτική μελέτη ακόμη και μεταξύ σχολείων, αφού η σύγκριση μαθητών από διαφορετικές περιοχές (αστικές, ημιαστικές, αγροτικές) ή διαφορετικού τύπου σχολείων (ΓΕΛ, ΕΠΑΛ, ιδιωτικά) μπορεί να προσφέρει πληρέστερη εικόνα αλλά και πειραματικές παρεμβάσεις ψηφιακής ασφάλειας για εφήβους, με μετρήσιμα αποτελέσματα στην αλλαγή στάσεων και συμπεριφορών. με σχεδιασμό και αξιολόγηση.

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Η ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ: ΜΕΛΕΤΗ ΣΤΗΝ ΤΡΙΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ

Μπίρτσας Βασίλειος
Ακαδημαϊκός Υπότροφος
Τμήμα Βιοϊατρικών Επιστημών,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα
e-mail: birtsas@gmail.com

Καρκαλούσος Πέτρος
Αναπληρωτής Καθηγητής
Τμήμα Βιοϊατρικών Επιστημών,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

Μπατρίνου Ανθιμία
Επίκουρη Καθηγήτρια
Τμήμα Επιστήμης και Τεχνολογίας Τροφίμων,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

Κριεμπάρδης Αναστάσιος
Καθηγητής
Τμήμα Βιοϊατρικών Επιστημών,
Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

Παπαγεωργίου Ευσταθία
Καθηγήτρια
Τμήμα Βιοϊατρικών Επιστημών Πανεπιστήμιο Δυτικής Αττικής
Αιγάλεω, Ελλάδα

ΠΕΡΙΛΗΨΗ

Εισαγωγή: Η αξιοποίηση των νέων τεχνολογιών στη διδακτική πράξη έχει αναδιαμορφώσει την εκπαίδευση, προσφέροντας καινοτόμα εργαλεία που ενισχύουν τη μαθησιακή εμπειρία. Οι Τεχνολογίες της Πληροφορίας και της Επικοινωνίας (ΤΠΕ) επιτρέπουν την αλληλεπίδραση, τη συνεργασία και την πρόσβαση σε εκπαιδευτικούς. Παράλληλα, προάγουν την εξατομικευμένη μάθηση και τη δημιουργικότητα, ενώ υποστηρίζουν τους εκπαιδευτικούς στην οργάνωση και παρουσίαση της γνώσης. Ωστόσο, η αποτελεσματική ενσωμάτωσή τους απαιτεί κατάλληλη εκπαίδευση, τεχνική υποστήριξη και στρατηγική προσέγγιση, ώστε να αξιοποιηθούν πλήρως οι δυνατότητές τους.

Σκοπός: Η εργασία εξετάζει τη χρήση των ΤΠΕ στην τριτοβάθμια εκπαίδευση, αναλύοντας τα οφέλη, τις προκλήσεις και το βαθμό ενσωμάτωσής τους από τους καθηγητές τριτοβάθμιας εκπαίδευσης. Παράλληλα, διερευνά τις αντιλήψεις των εκπαιδευτικών σχετικά με τη χρησιμότητα, τις προκλήσεις και τις επιπτώσεις των ΤΠΕ στη διδασκαλία και τη μάθηση.

Μέθοδος: Η μελέτη πραγματοποιήθηκε με συμπλήρωση ερωτηματολογίου από 62 καθηγητές πανεπιστημίου σχετικά με την ενσωμάτωση των ΤΠΕ στην εκπαιδευτική διαδικασία.

Αποτελέσματα: Η πλειονότητα των καθηγητών (96,8%) έχει ενσωματώσει τις ΤΠΕ στις διδακτικές πρακτικές, με θετικές αντιλήψεις για τη χρησιμότητα, το ενδιαφέρον και την ασφάλεια των τεχνολογιών αυτών. Ωστόσο, αναδείχθηκαν εμπόδια, όπως η έλλειψη τεχνικής υποστήριξης, η ανεπάρκεια κατάλληλου λογισμικού και οι περιορισμοί χρόνου, ειδικά σε συγκεκριμένες ηλικιακές ομάδες. Παρά τη συχνή χρήση βασικών εργαλείων, όπως το διαδίκτυο και οι εφαρμογές γραφείου, πιο εξειδικευμένα εργαλεία, όπως οι διαδραστικοί πίνακες και τα λογισμικά ψηφιακών τεστ, παραμένουν ανεκμετάλλευτα. Επιπλέον, καταγράφηκε ισχυρή επιθυμία για περαιτέρω επιμόρφωση, εστιάζοντας σε προχωρημένες δεξιότητες υπολογιστών, ασφάλεια στο διαδίκτυο και αξιοποίηση εργαλείων Web 2.0.

Συμπεράσματα: Η μελέτη υπογραμμίζει τη σημαντική συμβολή των ΤΠΕ στη βελτίωση της εκπαιδευτικής διαδικασίας, ενώ ταυτόχρονα αναδεικνύει τα εμπόδια που περιορίζουν την πλήρη αξιοποίησή τους. Απαιτείται πρόσθετη υποστήριξη και στοχευμένη επιμόρφωση για την ενίσχυση των δεξιοτήτων τους. Ο σχεδιασμός προγραμμάτων κατάρτισης και η προσαρμογή εκπαιδευτικών πολιτικών στις ανάγκες των καθηγητών κρίνονται αναγκαία για τη βέλτιστη ενσωμάτωση των ΤΠΕ και τη βελτίωση της συνολικής εκπαιδευτικής εμπειρίας.

Λέξεις– κλειδιά: ΤΠΕ, Διδακτική Πράξη, Επιμόρφωση, Εμπόδια και προκλήσεις.

ΕΙΣΑΓΩΓΗ

Η ραγδαία εξέλιξη των Τεχνολογιών Πληροφορίας και Επικοινωνιών (ΤΠΕ) έχει διαμορφώσει ένα νέο εκπαιδευτικό περιβάλλον, στο οποίο η χρήση των τεχνολογικών εργαλείων δεν αποτελεί απλώς υποστηρικτικό μέσο, αλλά αναδεικνύεται ως καταλυτικός παράγοντας για την ενίσχυση της διδασκαλίας και της μάθησης. Ιδιαίτερα στο πλαίσιο της εκπαίδευσης, οι εκπαιδευτικοί καλούνται να ενσωματώσουν τις ΤΠΕ στην καθημερινή διδακτική πρακτική, γεγονός που απαιτεί τόσο επαρκή επιμόρφωση όσο και θετική στάση απέναντι στην καινοτομία. Η παρούσα εργασία εξετάζει το βαθμό ένταξης των ΤΠΕ στη διδακτική διαδικασία στην τριτοβάθμια εκπαίδευση, εστιάζοντας στην επιμόρφωση των εκπαιδευτικών, τις αντιλήψεις τους και τις προκλήσεις που αντιμετωπίζουν.

Το θεωρητικό πλαίσιο στηρίζεται σε σύγχρονες προσεγγίσεις για την επαγγελματική ανάπτυξη των εκπαιδευτικών (Bikos & Tzifopoulos, 2016· Yusuf et al., 2013), τη σημασία του τεχνολογικού γραμματισμού (Lagou & Voudouri, 2017· Onasanya et al., 2010), καθώς και στη συμβολή των ΤΠΕ στη μεταμόρφωση των συστημάτων εκπαίδευσης (Barakabitze et al., 2019· Oliver, 2002). Ιδιαίτερη έμφαση δίδεται στον ρόλο της επιμόρφωσης, καθώς οι μελέτες καταδεικνύουν ότι χωρίς συστηματική, ουσιαστική και βιωματική κατάρτιση, η τεχνολογία παραμένει αναξιοποίητη στην εκπαιδευτική διαδικασία. (Sergis & Koutroumanos, 2013· Komis et al., 2014)

Η ενσωμάτωση των ΤΠΕ στην εκπαίδευση αναδεικνύεται ως κρίσιμος παράγοντας αλλαγής και καινοτομίας στην εκπαίδευση παγκοσμίως (Yusuf et al., 2013; Oliver, 2002). Στην Αφρική και ιδιαίτερα στη Νιγηρία, οι ΤΠΕ θεωρούνται καταλύτης για τη βελτίωση της ποιότητας της εκπαίδευσης, αν και υπάρχουν σημαντικές προκλήσεις όπως η έλλειψη υποδομών, περιορισμένη επιμόρφωση εκπαιδευτικών και ανεπαρκής χρηματοδότηση (Adam, 2003; Barakabitze et al., 2019; Murgor, 2015).

Σε αγροτικές περιοχές της Νότιας Αφρικής, οι περιορισμοί στην πρόσβαση και οι τεχνικές δυσκολίες εμποδίζουν την αποτελεσματική χρήση των ΤΠΕ στη δευτεροβάθμια εκπαίδευση (Mathevula & Uwizeyimana, 2014).

Παρόμοια προβλήματα διαφαίνονται και στις ανώτερες εκπαιδευτικές δομές, όπου παρά την ευρεία αναγνώριση των ωφελειών των ΤΠΕ, η αποδοχή και χρήση τους από τους καθηγητές παραμένει περιορισμένη λόγω στάσεων, έλλειψης κινήτρων και τεχνολογικού γραμματισμού (Onasanya et al., 2010; Idowu & Esere, 2013).

Η επιμόρφωση των εκπαιδευτικών στην Ελλάδα αποτελεί θεμελιώδη παράμετρο για την επιτυχή ένταξη των ΤΠΕ στη διδασκαλία (Karras & Oikonomidis, 2015; Sergis & Koutroumanos, 2013). Μοντέλα μικτής και εξ αποστάσεως επιμόρφωσης προτείνονται ως αποτελεσματικά μέσα επαγγελματικής ανάπτυξης, ειδικά σε περιβάλλοντα πολυπολιτισμικής εκπαίδευσης (Komis et al., 2014; Bikos & Tzifopoulos, 2016). Ωστόσο, παραμένουν εμπόδια όπως οι ατομικοί και σχολικοί παράγοντες που επηρεάζουν τη χρήση των ΤΠΕ, όπως η τεχνοφοβία, η έλλειψη χρόνου και οι περιορισμένοι πόροι (Mitsiopoulou & Vekyri, 2011; Karipidis, 2013).

Επιπλέον, η ψηφιακή παιδεία και ο τεχνολογικός γραμματισμός των εκπαιδευτικών θεωρούνται βασικές δεξιότητες για την ένταξη των ΤΠΕ στη σχολική πρακτική, ιδιαίτερα στα πρωτοβάθμια σχολεία (Lagou & Voudouri, 2017). Οι στάσεις και αντιλήψεις των εκπαιδευτικών παίζουν καθοριστικό ρόλο στην επιτυχή υιοθέτηση καινοτόμων τεχνολογιών (Tzimogiannis & Komis, 2004; Ertmer et al., 2012).

Σε παγκόσμιο επίπεδο, η χρήση των ΤΠΕ συνδέεται με την ανάπτυξη της μαθησιακής διαδικασίας μέσω e-learning, την ευελιξία στην εκπαιδευτική διαδικασία, και την ενίσχυση των δεξιοτήτων των μαθητών (Mikre, 2011; Mahlangu, 2018; Dabbagh, 2023). Ωστόσο, σημαντικές προκλήσεις όπως η ανισότητα στην πρόσβαση, οι τεχνικές δυσκολίες και η ανάγκη συνεχούς υποστήριξης και επιμόρφωσης αναδεικνύονται σε όλες τις χώρες (UNESCO, 2009; Madaki et al., 2021).

Οι ΤΠΕ προσφέρουν πολλαπλά οφέλη στην εκπαιδευτική διαδικασία, αναφέρονται ενδεικτικά τα παρακάτω:

Αρχικά, η ενίσχυση της πρόσβασης στη γνώση, μέσω διαδικτυακών πηγών και ηλεκτρονικών μαθημάτων οι μαθητές και φοιτητές μπορούν να έχουν πρόσβαση σε πλούσιο εκπαιδευτικό υλικό ανεξάρτητα από γεωγραφικούς περιορισμούς (Olufunso & Tony, 2014; Ukpe, 2023).

Η προώθηση ενεργητικής μάθησης, καθώς οι τεχνολογίες επιτρέπουν διαδραστικές και πολυαισθητηριακές εμπειρίες μάθησης που αυξάνουν το ενδιαφέρον και την εμπλοκή των μαθητών (Shatri & Kelmendi, 2023).

Επίσης προσφέρουν ευελιξία στον χρόνο και χώρο μάθησης επειδή η εξ αποστάσεως εκπαίδευση και η ασύγχρονη μάθηση διευκολύνουν την προσαρμογή της εκπαίδευσης σε ατομικές ανάγκες και περιορισμούς (Bikos & Tzifopoulos, 2016; Mahlangu, 2018).

Επιπλέον των παραπάνω συμβάλλουν στη βελτίωση των δεξιοτήτων ψηφιακού γραμματισμού, με τη χρήση ΤΠΕ αναπτύσσει απαραίτητες δεξιότητες για τη σύγχρονη κοινωνία και αγορά εργασίας (Lagou & Voudouri, 2017).

Τέλος, δίνουν δυνατότητα εξατομίκευσης της μάθησης: Τα ψηφιακά εργαλεία επιτρέπουν την προσαρμογή της εκπαιδευτικής εμπειρίας ανάλογα με τις ανάγκες και ικανότητες του κάθε μαθητή (Dabbagh, 2023).

Εκτός από τα πλεονεκτήματα των ΤΠΕ στην εκπαίδευση, εύκολα μπορούμε να εντοπίσουμε και να καταγράψουμε και μια σειρά από δυσκολίες και αρκετές προκλήσεις, κυριότερες από τις οποίες φαίνονται παρακάτω

Πρωτίστως είναι η έλλειψη υποδομών και τεχνικών μέσων, με το πρόβλημα να εμφανίζεται ιδιαίτερα σε αγροτικές ή οικονομικά υποανάπτυκτες περιοχές καθώς η πρόσβαση σε τεχνολογίες είναι περιορισμένη ή ανύπαρκτη (Mathevula & Uwizeyimana, 2014; Butcher, 2014).

Ακολούθως, η αντίσταση και αρνητικές στάσεις των εκπαιδευτικών, αναμενόμενες ως ένα βαθμό, καθώς ο άνθρωπος έχει την τάση να αντιστέκεται σε αλλαγές όπως η τεχνοφοβία, η έλλειψη κινήτρων ή η αδυναμία προσαρμογής σε νέες μεθόδους εμποδίζουν κάποιες φορές την ουσιαστική ενσωμάτωση των ΤΠΕ (Tzimogiannis & Komis, 2004; Ertmer, 1999).

Άλλο ένα θέμα είναι τα ποικίλα προβλήματα επιμόρφωσης, στα οποία συμπεριλαμβάνονται η ανεπαρκής ή μη συστηματική επιμόρφωση των εκπαιδευτικών περιορίζει τη χρήση και αξιοποίηση των ΤΠΕ (Karras & Oikonomidis, 2015; Sergis & Koutroumanos, 2013).

Ο ψηφιακός αποκλεισμός, ιδίως σε όχι τόσο αναπτυγμένες κοινωνίες, αποτελεί έναν υπαρκτό κίνδυνο διεύρυνσης των κοινωνικών ανισοτήτων λόγω άνισης πρόσβασης σε τεχνολογικά μέσα (UNESCO, 2009).

Επίσης, οι τεχνικές δυσκολίες και υποστήριξη όπως η ανεπαρκής τεχνική υποστήριξη και προβλήματα λειτουργίας των συστημάτων επηρεάζουν αρνητικά την εκπαιδευτική διαδικασία (Madaki et al., 2021).

Μία τελευταία αλλά εξ' ίσου σημαντική πρόκληση, αποτελεί η πιθανή απομόνωση μαθητών: Η εξ αποστάσεως εκπαίδευση μπορεί να μειώσει την κοινωνική αλληλεπίδραση και να επηρεάσει αρνητικά την ψυχοκοινωνική ανάπτυξη (Mahlangu, 2018).

ΣΚΟΠΟΣ ΤΗΣ ΕΡΥΝΑΣ

Η παρούσα έρευνα πραγματοποιήθηκε με σκοπό να εξετάσει τη χρήση των ΤΠΕ στην τριτοβάθμια εκπαίδευση, αναλύοντας τα οφέλη, τις προκλήσεις και το βαθμό ενσωμάτωσής τους από τους καθηγητές τριτοβάθμιας εκπαίδευσης. Επιπλέον θέλησε να αναλύσει και να διερευνήσει τις αντιλήψεις των εκπαιδευτικών σχετικά με τη χρησιμότητα, τις προκλήσεις και τις επιπτώσεις των ΤΠΕ στη διδασκαλία και τη μάθηση.

Η έρευνα πραγματοποιήθηκε με τη συμπλήρωση των ερωτηματολογίων που διανεμήθηκε σε διδάσκοντες στην τριτοβάθμια εκπαίδευση από διάφορες περιοχές της Ελλάδας. Μέσω της ανάλυσης των απαντήσεων, διερευνώνται οι στάσεις των εκπαιδευτικών απέναντι στις ΤΠΕ, η ποιότητα της επιμόρφωσής τους, καθώς και τα εμπόδια που συναντούν, όπως ενδεικτικά η έλλειψη υλικοτεχνικής υποδομής, ο περιορισμένος χρόνος και η απουσία θεσμικής στήριξης. Ακολούθησε στατιστική ανάλυση με τη χρήση του λογισμικού SPSS 28. Για την ανάλυση των δεδομένων, χρησιμοποιήθηκαν τα περιγραφικά στατιστικά (descriptive statistics) για τον υπολογισμό των συχνοτήτων των απαντήσεων. Επιπλέον, πραγματοποιήθηκαν αναλύσεις με τη χρήση των δοκιμών Chi-square (χ^2) για τον προσδιορισμό σημαντικών συσχετίσεων μεταξύ των μεταβλητών και της One-way ANOVA για την εξερεύνηση σημαντικών διαφορών μεταξύ των ομάδων των συμμετεχόντων σε σχέση με τις διάφορες παραμέτρους της μελέτης.

Τα ευρήματα της μελέτης φανερώνουν ότι παρότι οι εκπαιδευτικοί αντιλαμβάνονται την αξία των ΤΠΕ, πολλοί δηλώνουν ανεπαρκώς προετοιμασμένοι να τις αξιοποιήσουν αποτελεσματικά. Οι περισσότεροι θεωρούν πως η υπάρχουσα επιμόρφωση είναι αποσπασματική ή θεωρητική, χωρίς άμεση εφαρμογή στην πράξη. Ωστόσο, διαπιστώνεται

και έντονο ενδιαφέρον για συνεχιζόμενη επιμόρφωση μέσω ευέλικτων μορφών όπως η εξ αποστάσεως εκπαίδευση (Bagakis, 2010· Mahlangu, 2018).

ΑΠΟΤΕΛΕΣΜΑΤΑ

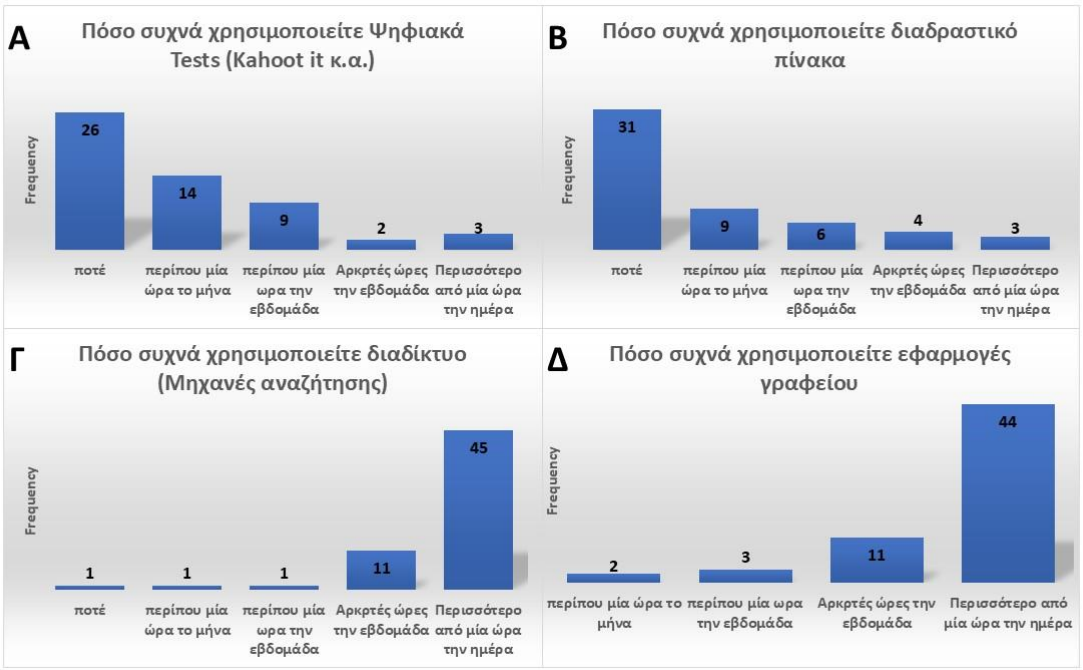
Από την ανάλυση των δεδομένων προέκυψε ότι η πλειονότητα των συμμετεχόντων καθηγητών χρησιμοποιεί ΤΠΕ στη διδασκαλία τους. Συγκεκριμένα, 60 από τους 62 καθηγητές (96,8%) δήλωσαν ότι ενσωματώνουν ΤΠΕ στη διδακτική τους πρακτική, ενώ μόνο 2 καθηγητές (3,2%) ανέφεραν ότι δεν χρησιμοποιούν καθόλου ΤΠΕ (Διάγραμμα 1). Το παραπάνω εύρημα υπογραμμίζει τη γενικευμένη υιοθέτηση των ΤΠΕ στην εκπαιδευτική διαδικασία, αναδεικνύοντας τη σημασία της τεχνολογίας ως εργαλείο υποστήριξης της διδασκαλίας στην τριτοβάθμια εκπαίδευση.

Διάγραμμα 1
Χρήση ΤΠΕ στη διδασκαλία.



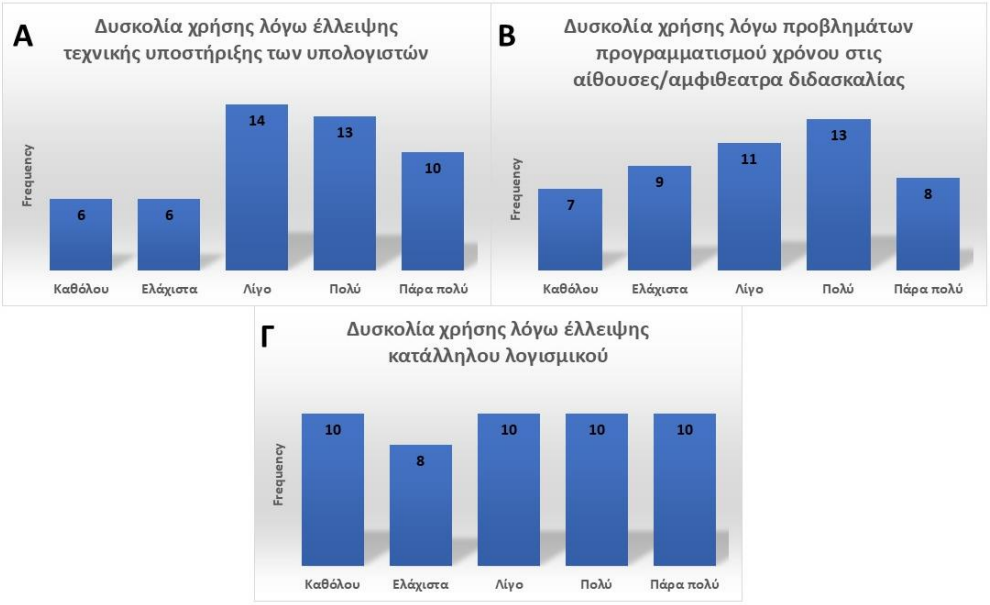
Η χρήση συγκεκριμένων εργαλείων ΤΠΕ στη Διδασκαλία από τους Καθηγητές φαίνεται στα ακόλουθα γραφήματα (διάγραμμα 2) τα οποία απεικονίζουν τη συχνότητα χρήσης διάφορων εργαλείων ΤΠΕ (όπως ψηφιακά τεστ, Kahoot it, διαδραστικοί πίνακες, διαδίκτυο και εφαρμογές γραφείου) από καθηγητές στη διδασκαλία τους. Τα δεδομένα παρουσιάζουν τις συχνότητες χρήσης αυτών των εργαλείων, αποκαλύπτοντας ποια εργαλεία χρησιμοποιούνται πιο συχνά και ποια σπανιότερα από το διδακτικό προσωπικό.

Διάγραμμα 2
Συχνότητα χρήσης συγκεκριμένων εργαλείων.



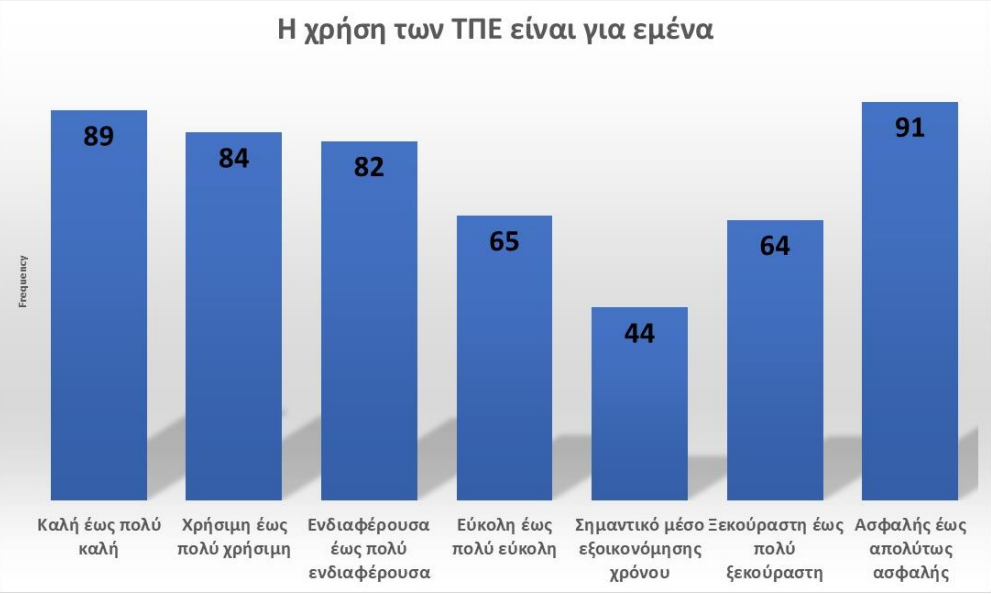
Τα συχνότερα εμπόδια που αντιμετωπίζουν οι καθηγητές στη χρήση των ΤΠΕ εμφανίζονται στα γραφήματα του διαγράμματος 3 με τα αντίστοιχα ποσοστά τους. Μεταξύ αυτών είναι η έλλειψη κατάλληλου λογισμικού, τεχνικής υποστήριξης, καθώς και τον προγραμματισμό χρόνου στις αίθουσες/αμφιθέατρα διδασκαλίας. Τα αποτελέσματα δείχνουν ότι η επιτυχής χρήση των ΤΠΕ εξαρτάται σε μεγάλο βαθμό από την παροχή τεχνικής υποστήριξης και την επαρκή οργάνωση των διδακτικών χώρων. Επιπλέον, υποδεικνύουν την ανάγκη για εξειδικευμένο λογισμικό, που να ανταποκρίνεται στις ανάγκες των καθηγητών. Η αντιμετώπιση αυτών των παραγόντων θα μπορούσε να ενισχύσει τις θετικές αντιλήψεις για τις ΤΠΕ και να αυξήσει τη συχνότητα χρήσης τους.

Διάγραμμα 3
Εμπόδια χρήσης συγκεκριμένων εργαλείων.



Εν συνεχεία στο διάγραμμα 4 εμφανίζονται οι αντιλήψεις των Καθηγητών σχετικά με τη χρήση των ΤΠΕ. Περιλαμβάνει αξιολογήσεις ως προς την ευκολία, τη χρησιμότητα, το ενδιαφέρον, την εξοικονόμηση χρόνου, και την ασφάλεια που παρέχουν τα ΤΠΕ, αναδεικνύοντας τη συνολική θετική στάση των εκπαιδευτικών προς τη χρήση τους. Τα αποτελέσματα αυτά υπογραμμίζουν την ευρεία αποδοχή των ΤΠΕ από τους εκπαιδευτικούς, τόσο ως λειτουργικό εργαλείο στη διδασκαλία όσο και ως μέσο που συμβάλλει στην αποτελεσματικότητα και την εξοικονόμηση χρόνου.

Διάγραμμα 4
Αντιλήψεις Καθηγητών σχετικά με τη χρήση ΤΠΕ.



Μια ακόμα παράμετρος που μελετήθηκε και αξιολογήθηκε ήταν η αναγκαιότητα Διδακτικής Κατάρτισης για τους Καθηγητές. Το διάγραμμα 5 απεικονίζει τη στάση των καθηγητών σχετικά με την ανάγκη για διδακτική κατάρτιση, πέρα από την επιστημονική. Η συντριπτική πλειοψηφία θεωρεί ότι η διδακτική κατάρτιση αποτελεί απαραίτητο χαρακτηριστικό για την αποτελεσματική άσκηση του έργου τους. Τα ευρήματα αυτά υπογραμμίζουν τη σημασία της επένδυσης στην ανάπτυξη τόσο επιστημονικών όσο και διδακτικών δεξιοτήτων για τη διασφάλιση ποιοτικής διδασκαλίας και υποστήριξης των μαθησιακών αναγκών.

Διάγραμμα 5
Αναγκαιότητα διδακτικής κατάρτισης, πέραν της επιστημονικής.



ΣΥΜΠΕΡΑΣΜΑΤΑ

Βασισμένοι στην έρευνα που πραγματοποιήσαμε, θα μπορούσαμε να καταγράψουμε ότι οι ΤΠΕ είναι αναπόσπαστο κομμάτι της εκπαιδευτικής διαδικασίας και θα έχουν αυξανόμενο ρόλο στο μέλλον. Επιπλέον, η επαυξημένη πραγματικότητα και η τεχνητή νοημοσύνη αποτελούν πλέον αναπόσπαστα εργαλεία της τέταρτης βιομηχανικής επανάστασης και επηρεάζουν ήδη κάθε πτυχή της ζωής μας, συμπεριλαμβανομένης της εκπαίδευσης. Ωστόσο, η ενσωμάτωση αυτών των τεχνολογιών απαιτεί προσεκτική προσέγγιση, με την ανάπτυξη δικλείδων ασφαλείας που θα εξασφαλίζουν την ηθική και υπεύθυνη χρήση τους. Η τεχνητή νοημοσύνη μπορεί να αναγνωρίζει, να μαθαίνει και να προσαρμόζεται, όμως αυτό που της λείπει – και ενδέχεται να της λείπει για αρκετό καιρό ακόμα – είναι η ψυχή, ο συναισθηματικός κόσμος και η φαντασία, που χαρακτηρίζουν τον άνθρωπο.

Συμπερασματικά, από τα δεδομένα μας, θα επισημαίναμε ότι οι ΤΠΕ έχουν σημαντική συμβολή στη βελτίωση της εκπαιδευτικής διαδικασίας, ενώ ταυτόχρονα αναδεικνύει τα εμπόδια που περιορίζουν την πλήρη αξιοποίησή τους, χρειάζεται, όμως, πρόσθετη υποστήριξη και στοχευμένη επιμόρφωση για την ενίσχυση των δεξιοτήτων των διδασκόντων. Οι τεχνολογικές εξελίξεις προχωρούν με ραγδαίους ρυθμούς, μεταμορφώνοντας διαρκώς το εκπαιδευτικό τοπίο. Αν και οι προκλήσεις είναι μεγάλες, οι ευκαιρίες που ανοίγονται είναι εξίσου εντυπωσιακές. Ο σχεδιασμός προγραμμάτων κατάρτισης και η προσαρμογή εκπαιδευτικών πολιτικών στις ανάγκες των καθηγητών κρίνονται αναγκαία, για τη βέλτιστη ενσωμάτωση των ΤΠΕ και τη βελτίωση της συνολικής εκπαιδευτικής εμπειρίας. Το κλειδί βρίσκεται στη διαρκή προσαρμογή, στην εκπαίδευση και στην καλλιέργεια ενός συνεργατικού πνεύματος ανάμεσα στον άνθρωπο και την τεχνολογία, με τελικό στόχο την πρόοδο της κοινωνίας μας.

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ΕΡΕΥΝΑ ΓΙΑ ΤΗΝ ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΠΛΗΡΟΦΟΡΙΑΣ ΚΑΙ ΕΠΙΚΟΙΝΩΝΙΩΝ ΑΠΟ ΤΟΥΣ ΕΚΠΑΙΔΕΥΤΙΚΟΥΣ ΤΗΣ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΟΥ ΝΟΜΟΥ ΙΩΑΝΝΙΝΩΝ

Μπρίτσα Ελεονώρα
Εκπαιδευτικός Πληροφορικός ΠΕ86-Med
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης
Ιωάννινα, Ελλάδα
e-mail:eleonbritsa@gmail.com

ΠΕΡΙΛΗΨΗ

Ο σκοπός της παρούσας εργασίας ήταν η διερεύνηση της αξιοποίησης των Τεχνολογιών Πληροφορίας και Επικοινωνιών από τους εκπαιδευτικούς που υπηρετούν στις σχολικές μονάδες της δευτεροβάθμιας εκπαίδευσης του Νομού Ιωαννίνων. Μέσα από τη συμμετοχή 139 εκπαιδευτικών διαφόρων ειδικοτήτων στη διαδικτυακή συμπλήρωση σχετικού ερωτηματολογίου εξετάστηκαν ζητήματα όπως: η διαθεσιμότητα και ο τρόπος πρόσβασης στον υλικοτεχνικό εξοπλισμό, το ποσοστό χρήσης των διαθέσιμων Τ.Π.Ε., ο τύπος δραστηριοτήτων στις οποίες αξιοποιούνται οι Τ.Π.Ε., το είδος μαθησιακού και διδακτικού υλικού που χρησιμοποιείται από τους εκπαιδευτικούς, βασικοί παράγοντες που επηρεάζουν αρνητικά τη χρήση των Τ.Π.Ε., η συμμετοχή των εκπαιδευτικών σε επιμορφωτικές δράσεις για τις Τ.Π.Ε. στη διδασκαλία, καθώς και οι απόψεις και στάσεις των εκπαιδευτικών σχετικά με τις Τ.Π.Ε. κατά τη διδασκαλία και γενικότερα στα πλαίσια της σχολικής μονάδας. Η συλλογή των δεδομένων του ερωτηματολογίου διεξήχθη κατά το προτελευταίο δίμηνο του έτους 2018. Πολλά από τα αποτελέσματα της έρευνας συμφωνούν με τα αντίστοιχα της τελευταίας έρευνας του ευρωπαϊκού δικτύου European Schoolnet. Μεταξύ των σημαντικότερων συμπερασμάτων της έρευνας συγκαταλέγονται τα εξής: υφίσταται ανεπάρκεια κατάλληλου υλικοτεχνικού εξοπλισμού για τη χρήση Τ.Π.Ε. που αποτελεί και τον πιο αρνητικό παράγοντα χρήσης τους στη διδασκαλία και τη μάθηση, υπάρχει μεγαλύτερη τάση αξιοποίησης των Τ.Π.Ε., οι εκπαιδευτικοί Θεωρητικών Σπουδών δημιουργούν συχνότερα δικό τους ψηφιακό υλικό λόγω πιθανής ανεπάρκειας έτοιμου αντίστοιχου υλικού και συμβουλεύονται περισσότερο το υλικό από το σχολικό δίκτυο και τις σχολικές βάσεις δεδομένων ενώ συνάμα επιμορφώνονται περισσότερο σε προσωπικό επίπεδο για τις Τ.Π.Ε. στον ελεύθερο χρόνο τους για να μπορέσουν να ανταπεξέλθουν στις σύγχρονες απαιτήσεις, η επιμόρφωση στις Τ.Π.Ε. από προσωπικό του σχολείου είναι πολύ σπάνια, αναδεικνύεται ο σημαντικός ρόλος της επιμόρφωσης λόγω συχνής εμπλοκής των εκπαιδευτικών με τα πεδία στα οποία επιμορφώθηκαν, η σημαντικότερη θετική συνεισφορά της χρήσης των Τ.Π.Ε. είναι η ενίσχυση της συνεργασίας των μαθητών, ενώ απαιτούνται ριζικές αλλαγές στα σχολεία για την πλήρη εκμετάλλευση των Τ.Π.Ε. στη διδασκαλία και τη μάθηση.

Λέξεις-κλειδιά: Τεχνολογίες Πληροφορίας και Επικοινωνιών (Τ.Π.Ε.), Χρήση και Αξιοποίηση των Τ.Π.Ε. στη Διδασκαλία, Δευτεροβάθμια Εκπαίδευση, Απόψεις, Στάσεις, Επιμόρφωση.

ΕΙΣΑΓΩΓΗ

Οι Τεχνολογίες Πληροφορίας και Επικοινωνιών (Τ.Π.Ε.) συνιστούν βασικό συστατικό της σύγχρονης κοινωνίας και αναπόσπαστο κομμάτι της σύγχρονης εκπαίδευσης. Η χρήση και αξιοποίησή τους στην εκπαιδευτική διαδικασία αποτέλεσε αντικείμενο πολλών ερευνών από την πρώτη κιόλας εμφάνισή τους. Πολλές από αυτές διαπραγματεύονται την επίδραση των Τ.Π.Ε. στο χώρο της δευτεροβάθμιας εκπαίδευσης μέσα από τις σκοπιές μαθητών, εκπαιδευτικών, διευθυντών και όλων γενικότερα των οντοτήτων του εκπαιδευτικού συστήματος. Η παρούσα εργασία μελετά τη χρήση και αξιοποίηση των Τ.Π.Ε. στις σχολικές μονάδες της δευτεροβάθμιας εκπαίδευσης του Νομού Ιωαννίνων, από πλευράς εκπαιδευτικών και περιλαμβάνει τρία κεφάλαια.

Στο ερευνητικό μέρος της εργασίας, το πρώτο κεφάλαιο παραθέτει τα βασικά στοιχεία της έρευνας, όπως ο σκοπός, ο πληθυσμός και το δείγμα, τα εργαλεία και η μεθοδολογία που χρησιμοποιήθηκε για τη διεξαγωγή της. Το επόμενο κεφάλαιο περιλαμβάνει τη στατιστική ανάλυση που πραγματοποιήθηκε στα δεδομένα που συλλέχθηκαν. Μέσα από την ανάλυση αυτήν περιγράφονται και οι συσχετίσεις που εντοπίστηκαν μεταξύ των υπό μελέτη μεταβλητών

Στο τελευταίο κεφάλαιο παρουσιάζονται αναλυτικά όλα τα συμπεράσματα που προέκυψαν από τη διεξαγωγή της έρευνας, μαζί με προτάσεις για πιθανή επέκταση της έρευνας.

ΕΡΕΥΝΑ

Έρευνα για τη χρήση των Τ.Π.Ε. στη Δευτεροβάθμια Εκπαίδευση

Σκοπός και στόχοι της έρευνας

Η παρούσα έρευνα βασίστηκε στη μελέτη του European Schoolnet (2019) για τη χρήση και τον αντίκτυπο των Τ.Π.Ε. στα ευρωπαϊκά σχολεία. Στόχος της ήταν η διερεύνηση της χρήσης, αξιοποίησης και στάσεων των εκπαιδευτικών της δευτεροβάθμιας εκπαίδευσης στην Ελλάδα, εστιάζοντας στη διαθεσιμότητα εξοπλισμού, τη χρήση Τ.Π.Ε., την επιμόρφωση και τις απόψεις για τη διδασκαλία με Τ.Π.Ε.

Εργαλεία έρευνας

Το κύριο εργαλείο της έρευνας ήταν ένα καλά σχεδιασμένο, πολύπλευρο ερωτηματολόγιο απευθυνόμενο σε όλους τους εκπαιδευτικούς της δευτεροβάθμιας εκπαίδευσης του νομού Ιωαννίνων. Η επιλογή του κρίθηκε κατάλληλη λόγω των διαθέσιμων μέσων και του περιορισμένου χρόνου, αποτελώντας ικανοποιητική μέθοδο για τη διερεύνηση των ζητούμενων, υποστηριζόμενη από προηγούμενη επιστημονικά τεκμηριωμένη ευρωπαϊκή έρευνα.

Ερευνητική μεθοδολογία

Η έρευνα ακολουθεί ποσοτική προσέγγιση, βασισμένη στη συλλογή και ανάλυση αριθμητικών δεδομένων για εξαγωγή στατιστικά τεκμηριωμένων συμπερασμάτων (Ζαφειρόπουλος, 2015). Τα δεδομένα συγκεντρώθηκαν μέσω δομημένου ερωτηματολογίου στο Google Forms, με θεματική οργάνωση σύμφωνα με τους ερευνητικούς άξονες και διασφάλιση ανωνυμίας. Πριν τη διάθεση, το ερωτηματολόγιο υποβλήθηκε σε πιλοτικό έλεγχο με δέκα εκπαιδευτικούς, χωρίς να απαιτηθούν τροποποιήσεις.

Πληθυσμός και δείγμα έρευνας – Δειγματοληψία

Η έρευνα πραγματοποιήθηκε μεταξύ των εκπαιδευτικών των 66 σχολείων δευτεροβάθμιας εκπαίδευσης του νομού Ιωαννίνων. Το ερωτηματολόγιο στάλθηκε αρχικά στους διευθυντές των σχολικών μονάδων μέσω ηλεκτρονικού ταχυδρομείου, με ενημέρωση για τους στόχους και τη διαδικασία της έρευνας. Οι διευθυντές προώθησαν στη συνέχεια τον υπερσύνδεσμο συμπλήρωσης στους εκπαιδευτικούς τους. Η πρόσβαση στο ερωτηματολόγιο προστατεύτηκε με κωδικό για να διασφαλιστεί η συμμετοχή μόνο του στοχευόμενου πληθυσμού. Η διαδικασία συμπλήρωσης ολοκληρώθηκε εντός του καθορισμένου χρονικού διαστήματος.

ΠΑΡΟΥΣΙΑΣΗ, ΑΝΑΛΥΣΗ ΚΑΙ ΣΧΟΛΙΑΣΜΟΣ ΤΩΝ ΑΠΟΤΕΛΕΣΜΑΤΩΝ

Παρουσιάζονται και αναλύονται τα αποτελέσματα από τις απαντήσεις των 139 εκπαιδευτικών. Τα δεδομένα καταγράφηκαν μέσω Google Forms, αναλύθηκαν με SPSS 17.0 και απεικονίστηκαν με Excel. Χρησιμοποιήθηκαν μέθοδοι Περιγραφικής Στατιστικής (πίνακες συχνοτήτων, διαγράμματα) και Επαγωγικής Στατιστικής (Pearson X^2 για σχέσεις μεταξύ μεταβλητών).

Α΄ Μέρος – Ατομικά στοιχεία

Στο πρώτο μέρος του ερωτηματολογίου καταγράφηκαν τα ατομικά στοιχεία των συμμετεχόντων στην έρευνα εκπαιδευτικών. Σύμφωνα με αυτά, οι περισσότεροι εκπαιδευτικοί (σε ποσοστό 62,6%) ήταν γυναίκες, αλλά υπήρχε και σημαντικό ποσοστό αντρών (της τάξεως του 37,4%). Όσο αφορά την ειδικότητα των εκπαιδευτικών, ανάμεσα στους τρεις βασικούς και γενικούς κλάδους της Πληροφορικής, των Θεωρητικών και των Θετικών Σπουδών, σχεδόν οι μισοί ερωτώμενοι ήταν εκπαιδευτικοί Πληροφορικής, αλλά και ένα μεγάλο ποσοστό (38,1%) ήταν εκπαιδευτικοί Θεωρητικών Σπουδών. Οι εκπαιδευτικοί Θετικών Σπουδών ανήλθαν στο χαμηλό αλλά όχι αμελητέο ποσοστό του 15,8%.

Στην έρευνα υπήρξε ικανοποιητική συμμετοχή από εκπαιδευτικούς που υπηρετούν και στους τρεις τύπους σχολείων της δευτεροβάθμιας εκπαίδευσης, ενώ όσο αφορά την ηλικία τους σχεδόν οι μισοί από τους ερωτώμενους ήταν από 46 μέχρι και 55 ετών. Μεταξύ των υπολοίπων ηλικιών, οι αμέσως επόμενες μεγαλύτερες συμμετοχές εκδηλώθηκαν από εκπαιδευτικούς ηλικίας από 36 μέχρι και 45 ετών, όπως και μεγαλύτερης των 55 ετών.

Το τελευταίο ερώτημα του πρώτου μέρους του ερωτηματολογίου είχε να κάνει με τα συνολικά έτη άσκησης διδακτικού έργου από τους συμμετέχοντες εκπαιδευτικούς. Οι περισσότεροι ερωτώμενοι διαθέτουν από 21 μέχρι και 30 έτη προϋπηρεσίας, ενώ αμέσως μετά έρχονται όσοι διαθέτουν από 11 μέχρι και 20 έτη. Εδώ παρατηρείται η αναλογία ποσοστών βάσει και του προηγούμενου ερωτήματος, καθώς κατά κύριο λόγο όσο μεγαλύτερη είναι η ηλικία ενός εκπαιδευτικού τόσο πιο πολλά έτη διδακτικής προϋπηρεσίας διαθέτει.

Β΄ Μέρος – Υλικοτεχνικός εξοπλισμός για την υποστήριξη της διδασκαλίας

Στο δεύτερο μέρος του ερωτηματολογίου εξετάστηκαν η διαθεσιμότητα και η πρόσβαση στον υλικοτεχνικό εξοπλισμό που διαθέτουν οι σχολικές μονάδες των ερωτώμενων. Όσο αφορά τη διαθεσιμότητα, η πλειονότητα του υλικοτεχνικού εξοπλισμού (ποσοστό 68,3%) διατίθεται για μαθητές και εκπαιδευτικό, ενώ μια σημαντική μερίδα εξοπλισμού διατίθεται μόνον για τον εκπαιδευτικό.

Για τον τρόπο πρόσβασης στο διαθέσιμο υλικοτεχνικό εξοπλισμό, παρατηρήθηκε αρχικά μια αρνητική εικόνα στη μη δυνατότητα πρόσβασης κατά ένα μεγάλο ποσοστό σε σταθερό ή φορητό υπολογιστή χωρίς πρόσβαση στο διαδίκτυο. Επίσης, αρνητική εικόνα δημιουργήθηκε και από τα χαμηλά ποσοστά μόνιμης πρόσβασης σε φορητά υπολογιστικά συστήματα. Ενθαρρυντικό όμως στοιχείο αποτελεί το γεγονός πως, σε πολύ μεγάλο βαθμό, στα εργαστήρια Η/Υ των σχολικών μονάδων οι εκπαιδευτικοί όλων των ειδικοτήτων έχουν μόνιμη πρόσβαση, ενώ σε μερικές περιπτώσεις απαιτείται και αίτημα πρόσβασης σε αυτά (π.χ. προφορική αίτηση χρήσης προς δ/ντή ή υπεύθυνο εργαστηρίου Η/Υ).

Γ΄ Μέρος – Χρήση Τ.Π.Ε. στη διδασκαλία

Στο επόμενο μέρος του ερωτηματολογίου εξετάστηκαν ζητήματα που αφορούν τη χρήση των Τ.Π.Ε. στη διδασκαλία. Αρχικά, σχεδόν ένας στους δύο ερωτώμενους έχει χρησιμοποιήσει υπολογιστές ή/και διαδίκτυο για περισσότερα από 6 έτη κατά τη διδακτική του υπηρεσία μέχρι πρότινος. Το μεγάλο αυτό ποσοστό δικαιολογείται και από τα αντίστοιχα μεγάλα ποσοστά του 3ου ερωτήματος, όπου αθροιστικά περίπου τρεις στους τέσσερις εκπαιδευτικούς δήλωσαν πως έχουν από 11 έτη και άνω διδακτική προϋπηρεσία.

Μεταξύ των δραστηριοτήτων στις οποίες εμπλέκεται η χρήση και αξιοποίηση των Τ.Π.Ε. στη διδασκαλία και τη μάθηση, οι ερωτηθέντες εκπαιδευτικοί φαίνεται να ασχολούνται σε καθημερινή ή σχεδόν καθημερινή βάση κυρίως με την περιήγηση και αναζήτηση πληροφοριών, ενώ η πιο σπάνια δραστηριότητα είναι αυτή της διαδικτυακής επικοινωνίας με τους γονείς των μαθητών τους. Σε μηνιαία βάση επικρατεί η δραστηριότητα της δημιουργίας ψηφιακού υλικού, η οποία προφανώς απαιτεί αρκετό χρόνο για την υλοποίησή της, ενώ σε εβδομαδιαία βάση οι εκπαιδευτικοί ασχολούνται με αρκετές από τις παρεχόμενες δραστηριότητες, όπως η χρήση εφαρμογών για προετοιμασία παρουσιάσεων, η περιήγηση και αναζήτηση πληροφοριών, η αναζήτηση μαθησιακών πόρων για τους μαθητές, η αξιολόγηση ψηφιακών μαθησιακών πόρων και η δημιουργία ψηφιακού υλικού.

Σχετικά με τον τύπο μαθησιακού και διδακτικού υλικού που αξιοποιούν οι εκπαιδευτικοί κατά τη διδασκαλία με χρήση Τ.Π.Ε., πρωτοπόρος αναδείχθηκε η γενική αναζήτηση στο διαδίκτυο, ενώ πολύ υψηλό ποσοστό συγκέντρωσαν οι εδραιωμένες εκπαιδευτικές πηγές.

Το ερωτηματολόγιο στόχευε και στην εξέταση μιας σειράς παραγόντων που μπορεί να επηρεάσουν αρνητικά τη χρήση των Τ.Π.Ε. στη διδασκαλία. Η πρώτη παρατήρηση που πρέπει να γίνει έγκειται στο γεγονός ότι όλοι οι παρεχόμενοι παράγοντες επηρεάζουν αρνητικά τη χρήση Τ.Π.Ε., τουλάχιστον κατά το ήμισυ, στο μέγιστο βαθμό. Τα μεγαλύτερα

ποσοστά αρνητικής επίδρασης καταγράφηκαν στους παράγοντες που σχετίζονται με την ανεπάρκεια υλικοτεχνικού εξοπλισμού, όπως ηλεκτρονικοί υπολογιστές, φορητοί ή μη, σύνδεση στο διαδίκτυο, αλλά και διαδραστικοί πίνακες. Στο αμέσως επόμενο επίπεδο αρνητικής επίδρασης τοποθετήθηκε η οργάνωση του σχολικού χώρου, ενώ τα υψηλότερα ποσοστά μη αρνητικής επίδρασης αφορούν παράγοντες όπως το ενδιαφέρον, οι τεχνολογικές δεξιότητες και η παιδαγωγική καθοδήγηση του εκπαιδευτικού.

Δ΄ Μέρος – Κατάρτιση/Επιμόρφωση για τη χρήση Τ.Π.Ε. στη διδασκαλία

Στον τομέα της επιμόρφωσης, σχεδόν επτά στους δέκα εκπαιδευτικούς δήλωσαν πως δεν είναι υποχρεωτική η επιμόρφωση/κατάρτισή τους στις Τ.Π.Ε. για την πραγματοποίηση της διδασκαλίας τους.

Επίσης, το κυρίαρχο πεδίο επιμόρφωσής τους κατά την τελευταία σχολική διετία ήταν η προσωπική μάθηση για τις Τ.Π.Ε. στον ελεύθερό τους χρόνο, ενώ τη δεύτερη θέση κατέλαβε το πεδίο της παιδαγωγικής χρήσης των Τ.Π.Ε. στη διδασκαλία και τη μάθηση, και την τελευταία θέση η επιμόρφωση στις Τ.Π.Ε. από προσωπικό του σχολείου.

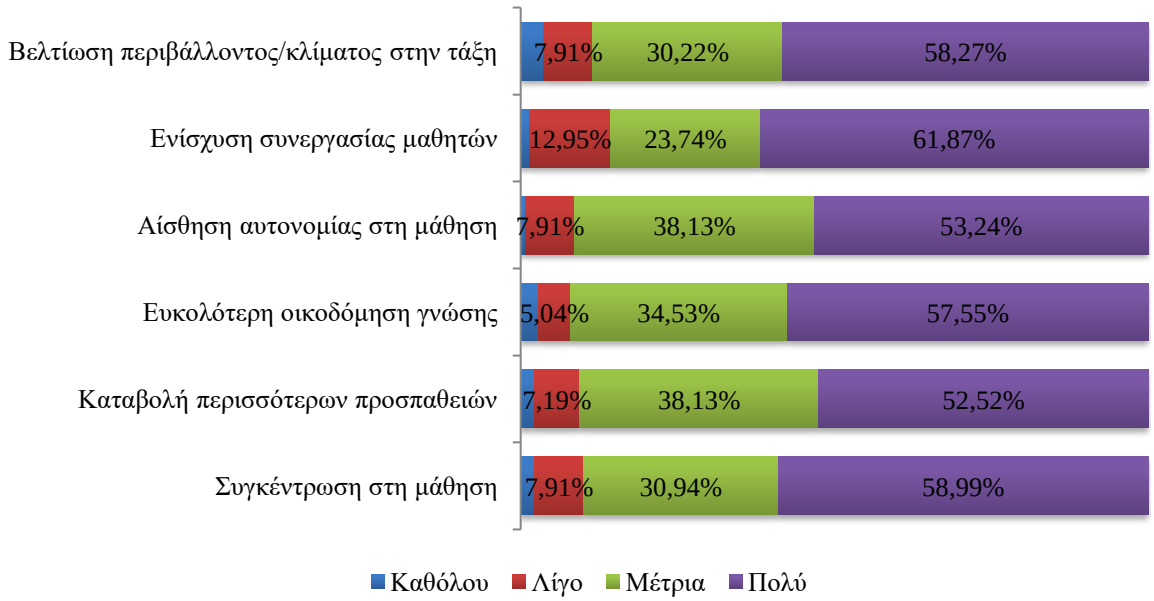
Σε μια προσπάθεια διερεύνησης του κατά πόσον η εμπλοκή με τα προηγούμενα πεδία επιμόρφωσης ήταν σύντομη ή μη, οι εκπαιδευτικοί δήλωσαν κατά πλειοψηφία ότι το χρονικό διάστημα εμπλοκής τους διήρκεσε παραπάνω από 6 ημέρες, ενώ πολύ λίγοι εκπαιδευτικοί (ποσοστό 4,32%) δεν ασχολήθηκαν καθόλου με τα πεδία στα οποία επιμορφώθηκαν.

Ε΄ Μέρος – Στάσεις/Απόψεις εκπαιδευτικών για τις Τ.Π.Ε.

Το τελευταίο τμήμα του ερευνητικού μας ερωτηματολογίου περιλαμβάνει δύο ερωτήματα που στοχεύουν στη διερεύνηση των απόψεων και των στάσεων των εκπαιδευτικών σχετικά με τη χρήση των Τ.Π.Ε. στη διδασκαλία και τη μάθηση.

Όπως φαίνεται και στην (Εικόνα 1) που απεικονίζει γραφικά τα ποσοστά απαντήσεων για το συγκεκριμένο ερώτημα, τη μεγαλύτερη θετική επίδραση (ποσοστό 61,87%) συγκέντρωσε ο παράγοντας της συνεργασίας μεταξύ των μαθητών.

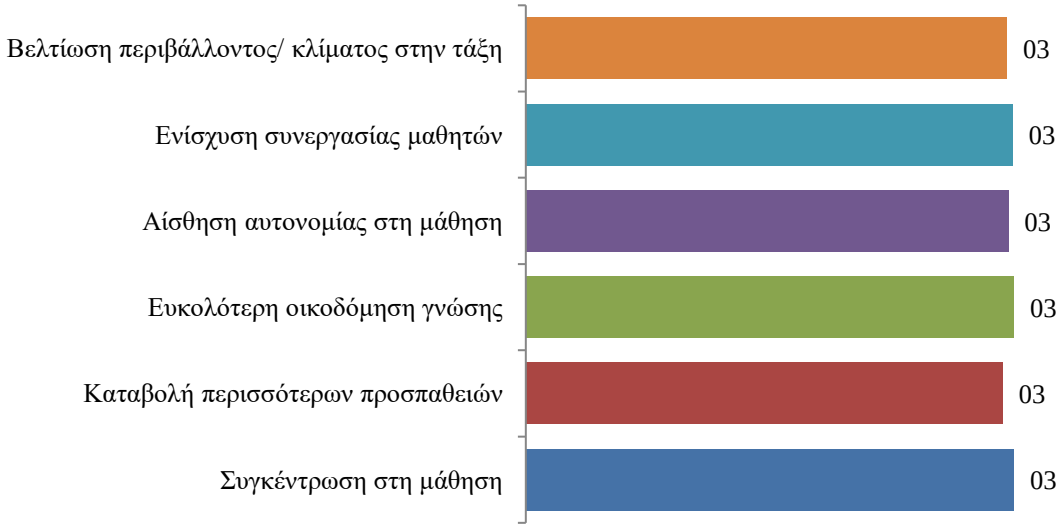
Εικόνα 1
Γραφική απεικόνιση ποσοστών απαντήσεων του ερωτήματος «Θετική επίδραση της χρήσης των Τ.Π.Ε. κατά τη διδασκαλία»



Αν συνυπολογιστεί στο σύνολο της θετικής επίδρασης και η μέτρια βαθμολόγηση που έδωσαν οι εκπαιδευτικοί, τότε τα αθροιστικά ποσοστά δείχνουν πως οι 8 με 9 στους 10 εκπαιδευτικούς θεωρούν πως η χρήση Τ.Π.Ε. στη διδασκαλία έχει όντως θετική επίδραση

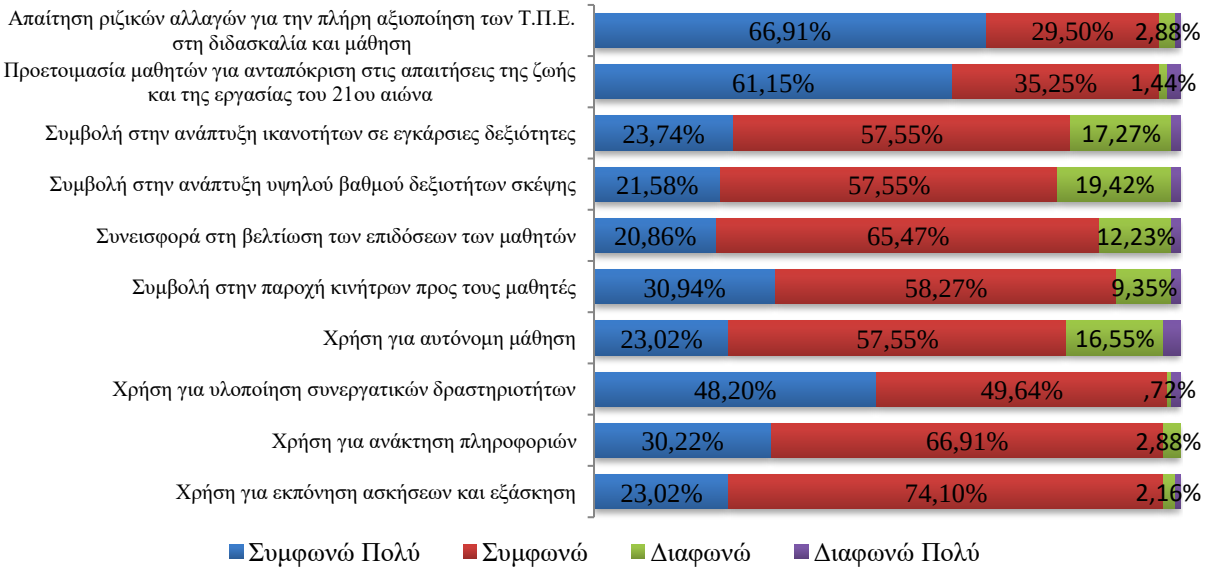
Αξιοσημείωτο είναι το γεγονός σε όλες τις ερωτήσεις καταγράφεται ιδιαίτερα θετική στάση των καθηγητών για τη χρήση των Τ.Π.Ε., όπως αυτή αποτυπώνεται από τους υψηλούς μέσους όρους (2).

Εικόνα 2
Μέσοι όροι απαντήσεων του ερωτήματος «Θετική επίδραση της χρήσης των Τ.Π.Ε. κατά τη διδασκαλία»



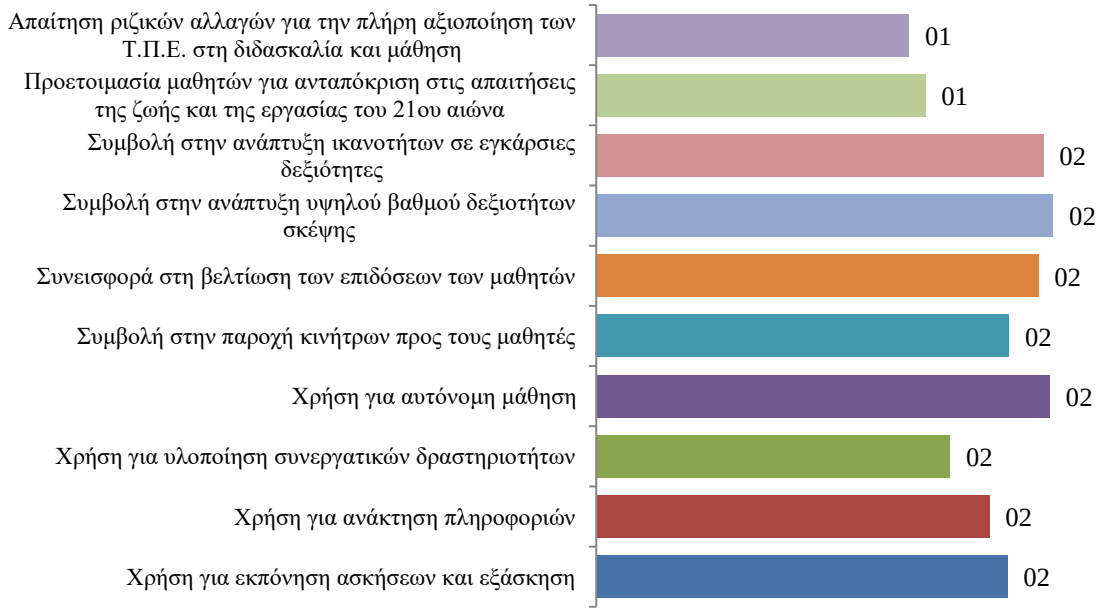
Το ερευνητικό μας ερωτηματολόγιο ολοκληρώνεται με ένα σημαντικό ερώτημα μέσα από το οποίο μελετάται η στάση των εκπαιδευτικών απέναντι στη χρήση των Τ.Π.Ε. στο σχολείο (Εικόνα 3) .

Εικόνα 3
Γραφική απεικόνιση ποσοστών απαντήσεων του ερωτήματος «Στάσεις των εκπαιδευτικών για τη χρήση των Τ.Π.Ε. στο σχολείο»



Στην (Εικόνα 4) αποτυπώνεται η γενικότερη τάση συμφωνίας των εκπαιδευτικών στα ερωτήματα που τέθηκαν στη συγκεκριμένη ενότητα.

Εικόνα 4
Μέσοι όροι απαντήσεων του ερωτήματος «Στάσεις των εκπαιδευτικών για τη χρήση των Τ.Π.Ε. στο σχολείο»



ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΤΑΣΕΙΣ

Μέσα από την έρευνα που περιγράφηκε στα προηγούμενα κεφάλαια της παρούσας εργασίας και την ανάλυση των αποτελεσμάτων που παρουσιάστηκαν, προκύπτουν χρήσιμα και ουσιαστικά συμπεράσματα σχετικά με τη χρήση και αξιοποίηση των Τεχνολογιών Πληροφορίας και Επικοινωνιών (Τ.Π.Ε.) από τους εκπαιδευτικούς της Δευτεροβάθμιας Εκπαίδευσης του Νομού Ιωαννίνων.

Αρχικά, το φύλο και ο τύπος σχολείου υπηρέτησης των εκπαιδευτικών δεν φάνηκε να επηρεάζουν σημαντικά τα υπό μελέτη ζητήματα, γεγονός που καταδεικνύει την ορθότητα και την αντιπροσωπευτικότητα της δειγματοληψίας. Αντίθετα, σε ό,τι αφορά την πρόσβαση στον υλικοτεχνικό εξοπλισμό, διαμορφώνεται μια αρνητική εικόνα, καθώς σημαντικό ποσοστό των εκπαιδευτικών δήλωσε ότι η πρόσβαση σε υπολογιστικά συστήματα στις σχολικές μονάδες δεν είναι επαρκής, γεγονός που λειτουργεί ανασταλτικά στη συστηματική αξιοποίηση των Τ.Π.Ε.

Αναφορικά με τη διάρκεια χρήσης υπολογιστών ή/και διαδικτύου για διδακτικούς σκοπούς, διαπιστώθηκε ότι οι μεγαλύτεροι σε ηλικία εκπαιδευτικοί εμφανίζουν μεγαλύτερη εμπειρία χρήσης, στοιχείο που ανατρέπει τη συνήθη αντίληψη ότι οι παλαιότεροι εκπαιδευτικοί υστερούν σε σχέση με τις νέες τεχνολογίες. Το εύρημα αυτό αποτυπώνει μια γενικότερη τάση αυξημένης αξιοποίησης των Τ.Π.Ε. από το σύνολο σχεδόν των εκπαιδευτικών και συνάδει με τα αποτελέσματα της έρευνας του European Schoolnet (2019), σύμφωνα με τα οποία η χρήση υπολογιστών στη διδασκαλία υπερβαίνει τον ευρωπαϊκό μέσο όρο.

Η συχνότερη δραστηριότητα που σχετίζεται με τη χρήση των Τ.Π.Ε. αφορά την αναζήτηση πληροφοριών και εκπαιδευτικού υλικού στο διαδίκτυο για την προετοιμασία των μαθημάτων, ενώ λιγότερο συχνή είναι η ανάρτηση εργασιών στη σχολική ιστοσελίδα, κυρίως από μεγαλύτερους σε ηλικία εκπαιδευτικούς. Το διαδίκτυο αναδεικνύεται ως το βασικό εργαλείο άντλησης μαθησιακού υλικού, σε αντίθεση με το μη διαδικτυακό ηλεκτρονικό υλικό, το οποίο χρησιμοποιείται σε περιορισμένο βαθμό.

Ιδιαίτερο ενδιαφέρον παρουσιάζουν τα συμπεράσματα που αφορούν την επιμόρφωση των εκπαιδευτικών. Οι εκπαιδευτικοί Θεωρητικών Σπουδών φαίνεται να επιμορφώνονται περισσότερο μέσω προσωπικής μάθησης στον ελεύθερο χρόνο τους, ενώ η διδακτική προϋπηρεσία συσχετίζεται με τη συμμετοχή σε επιμορφωτικές δράσεις, κυρίως σε θέματα παιδαγωγικής αξιοποίησης των Τ.Π.Ε. Τα ευρήματα αυτά αναδεικνύουν τη σημασία της επιμόρφωσης ως μιας συνεχούς και διαρκούς διαδικασίας.

Σε γενικό επίπεδο, οι εκπαιδευτικοί υπογραμμίζουν την αναγκαιότητα χρήσης των Τ.Π.Ε. από τους μαθητές, θεωρώντας ότι συμβάλλουν καθοριστικά στην προετοιμασία τους για τις απαιτήσεις της κοινωνίας και της αγοράς εργασίας του 21ου αιώνα. Παράλληλα, επισημαίνουν ότι η ουσιαστική αξιοποίηση των Τ.Π.Ε. προϋποθέτει ριζικές

αλλαγές στα σχολεία, με έμφαση στις κατάλληλες υποδομές, στον σύγχρονο εξοπλισμό και στη συστηματική υποστήριξη μέσω εκπαιδευτικών πολιτικών.

Τέλος, η παρούσα έρευνα θα μπορούσε να επεκταθεί σε πανελλαδικό επίπεδο και να εμπλουτιστεί με τη συμμετοχή των μαθητών, ενισχύοντας περαιτέρω τη διερεύνηση των παραγόντων που επηρεάζουν τη χρήση και αξιοποίηση των Τ.Π.Ε. στη σύγχρονη εκπαιδευτική πραγματικότητα.

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ΘΠ4: Ψηφιακό χάσμα και νέες ανισότητες

ΤΟ ΨΗΦΙΑΚΟ ΧΑΣΜΑ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ ΣΤΗΝ ΕΛΛΑΔΑ: ΠΡΟΚΛΗΣΕΙΣ, ΝΕΕΣ ΑΝΙΣΟΤΗΤΕΣ ΚΑΙ ΠΡΑΚΤΙΚΕΣ ΧΩΡΙΣ ΑΠΟΚΛΕΙΣΜΟΥΣ

Καστούρα Μαρία
Εκπαιδευτικός ΠΕ70
Δημοτικό Σχολείο Νέας Μεσημβρίας, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
e-mail: kastmara@yahoo.com

Μαργαρίτης Γεώργιος
Διευθυντής Δημοτικού Σχολείου, Εκπαιδευτικός ΠΕ70
Δημοτικό Σχολείο Νέας Μεσημβρίας, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
e-mail: eponymo.gmarg43@hotmail.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιοποίηση της εκπαίδευσης έχει αναδείξει ανισότητες στην πρόσβαση στην τεχνολογία, τον ψηφιακό γραμματισμό και τις εκπαιδευτικές υποδομές, ιδιαίτερα στην πρωτοβάθμια εκπαίδευση. Η παρούσα μελέτη διερευνά το ψηφιακό χάσμα στα ελληνικά δημοτικά σχολεία μέσα από βιβλιογραφική ανάλυση, εστιάζοντας στις προκλήσεις, τις νέες ανισότητες και τις συμπεριληπτικές πρακτικές που εφαρμόζονται για την άμβλυνσή του.

Η επισκόπηση της βιβλιογραφίας καταδεικνύει ότι η πρόσβαση στις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ) στα δημοτικά σχολεία της Ελλάδας είναι άνισα κατανεμημένη. Στα αστικά κέντρα, οι σχολικές μονάδες διαθέτουν περισσότερες τεχνολογικές υποδομές, ενώ τα αγροτικά σχολεία αντιμετωπίζουν σοβαρές ελλείψεις σε εξοπλισμό και συνδεσιμότητα. Ταυτόχρονα, οι μαθητές από οικογένειες χαμηλού εισοδήματος συχνά στερούνται πρόσβασης σε ηλεκτρονικές συσκευές και σταθερή σύνδεση στο διαδίκτυο, γεγονός που τους αποκλείει από σύγχρονες μαθησιακές πρακτικές.

Πέρα από την απλή πρόσβαση, η μελέτη αναδεικνύει την έννοια της "δευτερογενούς ψηφιακής ανισότητας", η οποία αφορά τις διαφορές στις δεξιότητες χρήσης της τεχνολογίας. Οι μαθητές από εύπορες οικογένειες τείνουν να αναπτύσσουν υψηλότερα επίπεδα ψηφιακού γραμματισμού, ενώ οι μαθητές από μειονεκτούντα περιβάλλοντα συχνά περιορίζονται σε στοιχειώδεις δεξιότητες, γεγονός που έχει μακροπρόθεσμες συνέπειες στην εκπαιδευτική και επαγγελματική τους πορεία.

Επιπλέον, η επιμόρφωση των εκπαιδευτικών στις ΤΠΕ παραμένει αποσπασματική και άνισα κατανεμημένη, επηρεάζοντας την αποτελεσματική ενσωμάτωση των τεχνολογικών εργαλείων στη διδασκαλία. Η έλλειψη συνεκτικής εκπαιδευτικής πολιτικής και η περιορισμένη κρατική χρηματοδότηση έχουν ως αποτέλεσμα τη χαμηλή υιοθέτηση των ΤΠΕ στην καθημερινή διδακτική πρακτική. Παρότι έχουν εφαρμοστεί προγράμματα ψηφιακής εκπαίδευσης, η εφαρμογή τους είναι συχνά αποσπασματική, με πολλά σχολεία να βασίζονται σε εξωτερικές χρηματοδοτήσεις και ιδιωτικές πρωτοβουλίες.

Για την αντιμετώπιση αυτών των προκλήσεων, αναπτύσσονται συμπεριληπτικές πρακτικές στην ελληνική πρωτοβάθμια εκπαίδευση. Τα προγράμματα επιμόρφωσης εκπαιδευτικών εστιάζουν στην ανάπτυξη ψηφιακών δεξιοτήτων, επιτρέποντας τη δημιουργία διαδραστικών και συμπεριληπτικών μαθησιακών εμπειριών. Οι σχολικές πρωτοβουλίες ψηφιακού γραμματισμού, όπως εργαστήρια κωδικοποίησης και διαδραστικά προγράμματα, συμβάλλουν στην ισότιμη πρόσβαση στην τεχνολογία. Παράλληλα, οι κοινοτικές συνεργασίες με ιδιωτικούς φορείς παρέχουν τεχνολογικό εξοπλισμό και οικονομική υποστήριξη στα σχολεία. Παρά τις θετικές πρωτοβουλίες, εξακολουθούν να υπάρχουν εμπόδια. Η απουσία ολοκληρωμένης εθνικής στρατηγικής για την ψηφιακή εκπαίδευση και η εξάρτηση από εξωτερικές χρηματοδοτήσεις εγείρουν ανησυχίες για τη βιωσιμότητα των δράσεων. Αν και οι ΤΠΕ μπορούν να βελτιώσουν τη διδασκαλία και τη μαθησιακή διαδικασία, η ελλιπής ή λανθασμένη ενσωμάτωσή τους μπορεί να διευρύνει περαιτέρω τις ανισότητες μεταξύ των μαθητών.

Συμπερασματικά, η μελέτη υπογραμμίζει την επείγουσα ανάγκη για συνολικές στρατηγικές γεφύρωσης του ψηφιακού χάσματος. Η άνιση πρόσβαση στην τεχνολογία, οι διαφοροποιήσεις στον ψηφιακό γραμματισμό και η ελλιπής υποστήριξη των εκπαιδευτικών διατηρούν τις εκπαιδευτικές ανισότητες. Ωστόσο, οι συμπεριληπτικές πρακτικές, όπως η στοχευμένη επιμόρφωση εκπαιδευτικών και τα σχολικά προγράμματα ψηφιακού γραμματισμού, μπορούν να προωθήσουν ένα πιο ισότιμο ψηφιακό μαθησιακό περιβάλλον. Για να επιτευχθεί πραγματική ψηφιακή ένταξη, απαιτείται μια συνεργατική προσέγγιση που να περιλαμβάνει εκπαιδευτικούς, πολιτικούς φορείς και την ευρύτερη κοινότητα.

Λέξεις – κλειδιά: Ψηφιακό Χάσμα, Πρωτοβάθμια Εκπαίδευση, Εκπαιδευτική Ανισότητα, Ψηφιακός Γραμματισμός, Πρόσβαση στις ΤΠΕ, Συμπεριληπτική Εκπαίδευση

ΕΙΣΑΓΩΓΗ

Η αυξανόμενη ψηφιοποίηση των κοινωνικών σχέσεων και της καθημερινής ζωής έχει φέρει στο προσκήνιο την έννοια του «ψηφιακού χάσματος», καθιστώντας την αντικείμενο ενδελεχούς εξέτασης στις δημόσιες, πολιτικές και ακαδημαϊκές συζητήσεις. Οι υπεύθυνοι χάραξης πολιτικής και οι ερευνητές διερευνούν τόσο την έκταση όσο και τις συνέπειες των ψηφιακών ανισοτήτων σε ποικίλες διαστάσεις της κοινωνικής ζωής, υπογραμμίζοντας τη σύνδεσή τους με βαθύτερες κοινωνικές, πολιτικές και οικονομικές ανισότητες.

Διευρύνοντας το ερευνητικό πεδίο του ψηφιακού χάσματος από τη δευτεροβάθμια στην πρωτοβάθμια εκπαίδευση, με επίκεντρο την Ελλάδα, το παρόν δοκίμιο επιδιώκει να συμβάλει στη συνεχιζόμενη επιστημονική συζήτηση για τις κοινωνικές, δομικές και ψηφιακές ανισότητες στην εκπαίδευση. Βασισμένο σε συστηματική βιβλιογραφική επισκόπηση ελληνικών και διεθνών μελετών, το δοκίμιο αναδεικνύει τις νέες προκλήσεις και ανισότητες που προκύπτουν από την ψηφιοποίηση στο πλαίσιο της πρωτοβάθμιας εκπαίδευσης.

Παρότι οι ψηφιακές ανισότητες έχουν ήδη συνδεθεί με τις μαθησιακές επιδόσεις και τις διαφοροποιήσεις στα εκπαιδευτικά αποτελέσματα, το παρόν δοκίμιο στοχεύει στην παραγωγή νέας, ποιοτικής γνώσης σχετικά με τις ψηφιακές ανισότητες στην Ελλάδα. Ο στόχος είναι να συμβάλει στην ανάπτυξη μιας πιο ολοκληρωμένης κατανόησης των πρακτικών χωρίς αποκλεισμούς, οι οποίες μπορούν να αμβλύνουν αυτές τις διαφορές.

Η απότομη μετάβαση στην ψηφιοποίηση πραγματοποιήθηκε χωρίς να ληφθούν υπόψη τα διαφοροποιημένα επίπεδα ψηφιακών δεξιοτήτων των εκπαιδευτικών, καθώς και οι ανισότητες στις τεχνολογικές υποδομές των δημοτικών σχολείων, γεγονός που όξυνε το ψηφιακό χάσμα εντός του σχολικού περιβάλλοντος. Ως εκ τούτου, καθίσταται επιτακτική η ανάγκη αντιμετώπισης αυτού του φαινομένου. Στο πλαίσιο αυτό, το δοκίμιο αποσκοπεί στην ανάδειξη των προκλήσεων και των ανισοτήτων που συνοδεύουν την ψηφιοποίηση της ελληνικής πρωτοβάθμιας εκπαίδευσης, καθώς και στην ανάλυση των νέων συνεκπαιδευτικών πρακτικών που αναδύονται για την άμβλυνσή τους.

ΚΑΤΑΝΟΗΣΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΧΑΣΜΑΤΟΣ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ

Ο όρος «ψηφιακό χάσμα» αναφέρεται στις άνισες ευκαιρίες πρόσβασης και χρήσης της ψηφιακής τεχνολογίας μεταξύ διαφορετικών κοινωνικών ομάδων. Στον τομέα της εκπαίδευσης, και ειδικά στην πρωτοβάθμια βαθμίδα, το ψηφιακό χάσμα επηρεάζει τις μαθησιακές πρακτικές και διαμορφώνει τις εκπαιδευτικές επιδόσεις. Ο όρος χρησιμοποιείται για να περιγράψει ανισότητες στις ψηφιακές δεξιότητες μαθητών και εκπαιδευτικών, οι οποίες σχετίζονται με κοινωνικά χαρακτηριστικά και οργανωτικές συνθήκες της εκπαίδευσης. Υπάρχει γενική παραδοχή ότι οι ΤΠΕ ενισχύουν τις εκπαιδευτικές ευκαιρίες, ιδίως όταν ενσωματώνονται στο πρόγραμμα σπουδών, ενώ η έλλειψη πρόσβασης αποτελεί σοβαρό μειονέκτημα στη σύγχρονη εκπαίδευση (Van et al., 2022).

Το ψηφιακό χάσμα στην ελληνική πρωτοβάθμια εκπαίδευση αντικατοπτρίζει τις ανισότητες που παρατηρούνται σε άλλες χώρες της ΕΕ. Είναι ιδιαίτερα έντονο μεταξύ μαθητών, εκπαιδευτικών και σχολικών ιδρυμάτων και απορρέει από κοινωνικοοικονομικές και γεωγραφικές ανισότητες. Έρευνες δείχνουν ότι παιδιά από οικογένειες με χαμηλό μορφωτικό επίπεδο ή χαμηλό εισόδημα, καθώς και όσα μιλούν διαφορετική γλώσσα από αυτήν του σχολείου, είναι πιο ευάλωτα στις συνέπειες του ψηφιακού χάσματος. Επιπλέον, σημαντικό ρόλο διαδραματίζει η γεωγραφική κατανομή των πόρων ΤΠΕ, με τις αγροτικές περιοχές να μειονεκτούν έναντι των αστικών (Dimopoulos et al., 2021).

Η ανάλυση των τρεχόντων δεδομένων και της εμπειρικής έρευνας αναδεικνύει σημαντικές ανισότητες στην πρόσβαση και χρήση των εργαλείων Τεχνολογίας Πληροφορικής και Επικοινωνιών (ΤΠΕ) στην ελληνική πρωτοβάθμια εκπαίδευση. Η διαθεσιμότητα υπολογιστών, διαδικτυακής σύνδεσης και εκπαιδευτικού λογισμικού συνδέεται αρνητικά με τη χαμηλή κοινωνικοοικονομική ανάπτυξη ορισμένων περιοχών. Η αντιμετώπιση αυτών των ανισοτήτων είναι κρίσιμη για τη δημιουργία ενός εκπαιδευτικού περιβάλλοντος χωρίς αποκλεισμούς, διασφαλίζοντας ότι όλοι οι μαθητές έχουν ίσες ευκαιρίες σε ένα ψηφιακό εκπαιδευτικό τοπίο. Η έλλειψη πρόσβασης στις ΤΠΕ λειτουργεί ως μορφή «αναπηρίας» με αρνητικές επιπτώσεις στα μαθησιακά αποτελέσματα, όπως καταδεικνύεται από σχετικές θεωρίες μάθησης και εμπειρικά δεδομένα (Linos et al., 2022).

Για τη γεφύρωση αυτού του τεχνολογικού χάσματος, απαιτείται συνεργασία σε πολλαπλά επίπεδα. Οι εκπαιδευτικοί ηγέτες διαδραματίζουν κρίσιμο ρόλο, υποστηρίζοντας βελτιώσεις υποδομής και την ένταξη των ΤΠΕ στο πρόγραμμα σπουδών. Παράλληλα, η συνεργασία με τοπικές κοινότητες και κυβερνητικούς φορείς μπορεί να ενισχύσει την ικανότητα των σχολείων να προσαρμοστούν στις τεχνολογικές εξελίξεις (Bandyopadhyay et al., 2021).

Η ένταξη των ΤΠΕ στην εκπαίδευση απαιτεί όχι μόνο πρόσβαση στα εργαλεία αλλά και την κατάλληλη κατάρτιση των εκπαιδευτικών. Είναι κρίσιμο να επενδυθεί στην επαγγελματική ανάπτυξη, ώστε οι εκπαιδευτικοί να αξιοποιούν αποτελεσματικά την τεχνολογία στη διδακτική τους πρακτική και να ανταποκρίνονται στις απαιτήσεις ενός ψηφιακά εμπλουτισμένου μαθησιακού περιβάλλοντος (Asad et al., 2021).

Η γεφύρωση του ψηφιακού χάσματος δεν αφορά μόνο οικονομικές παραμέτρους αλλά και την προώθηση της ισότητας στην εκπαίδευση. Αποτελεί μια προσπάθεια αναγνώρισης των δυνατοτήτων κάθε μαθητή και εξάλειψης των εμποδίων που περιορίζουν την πρόοδό του. Η διαμόρφωση ενός δικαιότερου εκπαιδευτικού συστήματος απαιτεί άμεση δράση και διαρκή δέσμευση (Howard et al., 2022).

Διεθνείς αξιολογήσεις αποκαλύπτουν έντονο ψηφιακό χάσμα μεταξύ μαθητών διαφορετικού κοινωνικοοικονομικού υποβάθρου στην Ελλάδα. Οι μαθητές από χαμηλότερα κοινωνικοοικονομικά στρώματα εμφανίζουν χαμηλότερα επίπεδα ψηφιακού γραμματισμού συγκριτικά με συνομηλίκους τους από ευνοϊκότερο περιβάλλον. Τοπικές μελέτες επιβεβαιώνουν αυτές τις αποκλίσεις, αποδεικνύοντας τη σαφή συσχέτιση μεταξύ του ψηφιακού γραμματισμού και της κοινωνικοοικονομικής θέσης. Παιδιά με πρόσβαση σε υπολογιστή ή Διαδίκτυο στο σπίτι έχουν μεγαλύτερη πιθανότητα ενασχόλησης με την τεχνολογία και σε σχολικά περιβάλλοντα (Gounopoulos, 2024).

Οι ανισότητες αυτές οδήγησαν σε αποσπασματικές πολιτικές, κυρίως κατά και μετά τα Μνημόνια, που επικεντρώθηκαν σε επιμέρους οικονομικές στρατηγικές, παραμελώντας την ανάγκη για συνεκτική ανάπτυξη και μακροπρόθεσμη στρατηγική στον τομέα της εκπαίδευσης (Conley et al., 2023).

ΠΡΟΚΛΗΣΕΙΣ ΠΟΥ ΑΝΤΙΜΕΤΩΠΙΖΟΥΜΕ ΣΤΗ ΓΕΦΥΡΩΣΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΧΑΣΜΑΤΟΣ

Το ψηφιακό χάσμα στην πρωτοβάθμια εκπαίδευση αποτελεί μια διαρκώς εντεινόμενη πρόκληση που επηρεάζει άμεσα την εκπαιδευτική διαδικασία και τις ευκαιρίες μάθησης των μαθητών. Έρευνες έχουν δείξει ότι οι πρωτοβουλίες για τη δημιουργία διαδικτυακών πόρων και η παροχή τεχνολογικής υποστήριξης, όπως εργαστήρια υπολογιστών τα Σαββατοκύριακα, μπορούν να ενισχύσουν τη συμπεριληπτικότητα στην εκπαίδευση. Ωστόσο, η ανισομερής ανάπτυξη των υποδομών υπογραμμίζει μια αυξανόμενη εκπαιδευτική ανισότητα: οι εύπορες περιοχές καταγράφουν ταχύτερη βελτίωση της πρόσβασης σε ψηφιακά εργαλεία, ενώ οι λιγότερο ευνοημένες περιοχές παραμένουν σε μειονεκτική θέση, γεγονός που απαιτεί άμεση παρέμβαση. Εμπειρικά δεδομένα καταδεικνύουν ότι πολλές οικογένειες αντιμετωπίζουν σοβαρά εμπόδια στην πρόσβαση στο διαδίκτυο, γεγονός που περιορίζει τις μαθησιακές τους δυνατότητες. Συγκεκριμένα, η έλλειψη προσωπικού υπολογιστή ή άλλης κατάλληλης συσκευής έχει αναφερθεί ως ένας από τους κυριότερους παράγοντες που παρεμποδίζουν την εκπαιδευτική πρόοδο των μαθητών. Επιπλέον, οι οικογένειες επισημαίνουν την ανεπαρκή ή ασταθή σύνδεση στο διαδίκτυο ως έναν κρίσιμο περιορισμό, ο οποίος επηρεάζει αρνητικά την πρόσβαση σε ψηφιακούς πόρους και βασικές εφαρμογές εκμάθησης, μειώνοντας έτσι τις δυνατότητες αξιοποίησης της διαδικτυακής εκπαίδευσης (Helsper, 2021).

Το συναισθηματικό άγχος και η ανασφάλεια σχετικά με τη χρήση του διαδικτύου αποτελούν πρόσθετους παράγοντες που εντείνουν το ψηφιακό χάσμα, επηρεάζοντας αρνητικά την εκπαιδευτική διαδικασία. Οι μαθητές που δεν διαθέτουν επαρκείς δεξιότητες πλοήγησης και χρήσης ψηφιακών εργαλείων δυσκολεύονται να αξιοποιήσουν τις διαθέσιμες τεχνολογικές δυνατότητες, γεγονός που τους τοποθετεί σε μειονεκτική θέση σε ένα εκπαιδευτικό περιβάλλον που εξαρτάται όλο και περισσότερο από την ψηφιακή μάθηση. Η αντιμετώπιση αυτών των προκλήσεων είναι ζωτικής σημασίας για την προώθηση ισότιμης πρόσβασης στην εκπαίδευση. Δεν πρόκειται απλώς για εκπαιδευτική ανάγκη, αλλά για κοινωνική υποχρέωση, προκειμένου να διασφαλιστεί ότι κάθε μαθητής έχει ίσες ευκαιρίες στη σύγχρονη ψηφιακή εποχή (Martzoukou, 2022).

Το ψηφιακό χάσμα στην εκπαίδευση είναι άμεσα συνδεδεμένο με τη χρόνια ανεπαρκή χρηματοδότηση των σχολείων σε τεχνολογικούς πόρους. Παρά τις εξαγγελίες για την ενίσχυση των ΤΠΕ και τις πρωτοβουλίες ψηφιοποίησης, η πραγματικότητα δείχνει ότι η απόκτηση των περισσότερων ψηφιακών εργαλείων εξακολουθεί να επιβαρύνει τις οικογένειες των μαθητών. Αυτή η ανισότητα είναι ιδιαίτερα έντονη στα δημοτικά σχολεία και τις αγροτικές περιοχές, όπου η πρόσβαση σε σύγχρονα ψηφιακά μέσα υστερεί σημαντικά σε σύγκριση με τα αστικά σχολεία και τα γυμνάσια (Stamopoulos et al., 2024).

Η οικονομική κρίση στην Ελλάδα έχει παρεμποδίσει σοβαρά την αναβάθμιση της τεχνολογικής υποδομής στα σχολεία. Το πρόβλημα επιτείνεται από την απροθυμία ή την αδυναμία πολλών εκπαιδευτικών να αξιοποιήσουν πλήρως τα ψηφιακά εργαλεία λόγω ελλιπούς κατάρτισης και πρακτικής εμπειρίας. Συχνά, οι εκπαιδευτικοί στερούνται των απαραίτητων δεξιοτήτων για την ενσωμάτωση του ψηφιακού περιεχομένου στη διδακτική διαδικασία, ιδίως όταν πρόκειται για μαθητές με ειδικές εκπαιδευτικές ανάγκες (Doris, 2023).

Η αποτελεσματική ενσωμάτωση των ψηφιακών εργαλείων προϋποθέτει σαφή καθορισμό ρόλων και ευθυνών μεταξύ των εκπαιδευτικών και διοικητικών στελεχών. Ένα επιτυχημένο εκπαιδευτικό ίδρυμα οφείλει να αξιοποιεί όλους τους διαθέσιμους πόρους και να ενθαρρύνει τη συνεργασία, ώστε να επιτυγχάνονται οι στρατηγικοί στόχοι του. Κεντρικός άξονας αυτής της διαδικασίας είναι η διδακτική μεθοδολογία. Ο διευθυντής του σχολείου, παρότι δεν έχει πλήρη αυτονομία στη διαμόρφωση μαθησιακών ομάδων, διαδραματίζει κρίσιμο ρόλο στην υποστήριξη μαθητών μέσω προγραμμάτων ένταξης και ενισχυτικής διδασκαλίας. Παράλληλα, είναι υπεύθυνος για την καταγραφή και κάλυψη ελλείψεων σε τεχνολογικό εξοπλισμό. Για παράδειγμα, η ανάγκη για έξι επιπλέον προβολείς οδήγησε σε συνεργασία με τον Σύλλογο Γονέων, ο οποίος ανέλαβε την προμήθειά τους, διασφαλίζοντας την ισότιμη πρόσβαση όλων των τάξεων στην τεχνολογία (Alenezi, 2023). Είναι απαραίτητη η συνεργασία με τις δημοτικές αρχές, τη Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης και το Υπουργείο Παιδείας για την εξασφάλιση πόρων και προγραμμάτων που θα μπορούσαν να στηρίξουν την απόκτηση νέων τεχνολογικών εργαλείων, όπως υπολογιστές και διαδραστικοί πίνακες. Η αποτελεσματική αξιοποίηση αυτών των πόρων απαιτεί συλλογική λήψη αποφάσεων και ορθολογική κατανομή του διδακτικού προσωπικού, σε ευθυγράμμιση με τους εκπαιδευτικούς στόχους (Challoumis, 2024).

ΕΜΦΑΝΙΣΗ ΝΕΩΝ ΑΝΙΣΟΤΗΤΩΝ ΣΤΗΝ ΨΗΦΙΑΚΗ ΕΠΟΧΗ

Το ψηφιακό χάσμα δεν αποτελεί απλώς συνέχεια του κοινωνικού αποκλεισμού, αλλά μια εξελισσόμενη μορφή ανισότητας που εντείνεται με την ενσωμάτωση των Τεχνολογιών Πληροφορίας και Επικοινωνιών (ΤΠΕ) στην καθημερινή ζωή. Η άνιση κατανομή της πρόσβασης και εκπαίδευσης στις ΤΠΕ μπορεί όχι μόνο να διατηρήσει αλλά και να εντείνει τις κοινωνικές ανισότητες, διαμορφώνοντας νέες μορφές αποκλεισμού (Heeks, 2022). Στην πρωτοβάθμια εκπαίδευση, το ψηφιακό χάσμα επηρεάζει τόσο τους μαθητές όσο και τους εκπαιδευτικούς, καθορίζοντας τις ακαδημαϊκές και κοινωνικές τους εμπειρίες. Οι μαθητές με περιορισμένη πρόσβαση σε ΤΠΕ δυσκολεύονται να ανταποκριθούν στις προσδοκίες των εκπαιδευτικών τους, γεγονός που αντανακλάται στην εκπαιδευτική τους επίδοση. Παράλληλα, το χάσμα αυτό επηρεάζει δυσανάλογα μαθητές από οικονομικά μειονεκτούσες περιοχές ή οικογένειες μεταναστών, ενισχύοντας την περιθωριοποίησή τους στην εκπαιδευτική διαδικασία (Vonitsanos et al., 2024).

Η ανάπτυξη των ψηφιακών δεξιοτήτων των μαθητών εξαρτάται σε μεγάλο βαθμό από την επάρκεια των εκπαιδευτικών. Η σύνδεση της μαθηματικής εκπαίδευσης με τη μεθοδολογία της Πληροφορικής μπορεί να ενισχύσει την ικανότητα των δασκάλων να καλλιεργήσουν ουσιαστικές ψηφιακές δεξιότητες στους μαθητές τους. Ωστόσο, όταν οι μαθητές δεν διαθέτουν τις απαιτούμενες δεξιότητες, το χάσμα μεταξύ των προσδοκιών των εκπαιδευτικών και των πραγματικών δυνατοτήτων των μαθητών γίνεται ακόμα πιο εμφανές, δημιουργώντας πρόσθετα εμπόδια στη μάθηση. Το ψηφιακό χάσμα εκδηλώνεται σε πολλαπλά επίπεδα: επηρεάζει την ακαδημαϊκή επίδοση, τη συμμετοχή στη μαθησιακή διαδικασία και τη δυνατότητα πρόσβασης σε εκπαιδευτικούς πόρους. Η ανεπαρκής ενσωμάτωση των ΤΠΕ επιδεινώνει τις προϋπάρχουσες ανισότητες, ιδίως για τους μαθητές που ήδη αντιμετωπίζουν κοινωνικοοικονομικές δυσκολίες (Vonitsanos et al., 2024).

Η τεχνολογία μπορεί να εντείνει τις κοινωνικές και γεωγραφικές ανισότητες, δημιουργώντας έναν φαύλο κύκλο ψηφιακού αποκλεισμού. Οι μαθητές με περιορισμένες ψηφιακές δεξιότητες δυσκολεύονται να συμβαδίσουν και να αξιοποιήσουν τεχνολογικούς πόρους, γεγονός που τους τοποθετεί σε μειονεκτική θέση. Οι ψηφιακές ικανότητες συνδέονται άμεσα με την κοινωνικοοικονομική κατάσταση των γονέων, κατατάσσοντας τους μαθητές σε επίπεδα δεξιοτήτων από χαμηλό έως υψηλό, ανάλογα με τη γνώση και τη συχνότητα χρήσης των υπολογιστών. Η ενσωμάτωση της τεχνολογίας στη διδασκαλία αποτελεί βασική παιδαγωγική πρόκληση. Οι εκπαιδευτικοί μπορούν να αξιοποιήσουν τους υπολογιστές για τη βελτίωση της διδασκαλίας και τη διευκόλυνση της πρόσβασης σε καινοτόμους εκπαιδευτικούς πόρους, λειτουργώντας ως φορείς συμπεριληπτικής εκπαίδευσης. Είναι κρίσιμο το ελληνικό εκπαιδευτικό σύστημα να διασφαλίσει ισότιμη πρόσβαση στην τεχνολογία, επιτρέποντας σε όλους τους μαθητές να επιτύχουν το μέγιστο των δυνατοτήτων τους (Ross et al., 2022).

ΠΡΑΚΤΙΚΕΣ ΧΩΡΙΣ ΑΠΟΚΛΕΙΣΜΟΥΣ ΓΙΑ ΤΗΝ ΑΝΤΙΜΕΤΩΠΙΣΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΧΑΣΜΑΤΟΣ

Το ψηφιακό χάσμα αποτελεί μια κρίσιμη πρόκληση στη σύγχρονη κοινωνία, καθιστώντας αναγκαία την υιοθέτηση χωρίς αποκλεισμούς μεθοδολογιών. Η ενίσχυση του ψηφιακού γραμματισμού, σε συνδυασμό με τη δίκαιη πρόσβαση στις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ), μπορεί να συμβάλει ουσιαστικά στη μείωση των εκπαιδευτικών ανισοτήτων. Για την καλλιέργεια ενός ανθεκτικού πλαισίου ψηφιακού γραμματισμού, είναι απαραίτητη η συνεργασία εκπαιδευτικών φορέων, τοπικών κοινοτήτων και παγκόσμιων αναπτυξιακών οργανισμών. Οι πρωτοβουλίες αυτές πρέπει να εμπλέκουν ενεργά εκπαιδευτικούς και κηδεμόνες, προωθώντας τη συμμετοχή των μαθητών σε ένα συμπεριληπτικό ψηφιακό περιβάλλον (Lazou & Tsinakos, 2023).

Η παρούσα ανάλυση επιχειρεί να αμφισβητήσει τη διάκριση μεταξύ του ψηφιακού χάσματος και του ψηφιακού γραμματισμού, διευκρινίζοντας συχνές παρερμηνείες που εξισώνουν την ψηφιακή προσβασιμότητα με την ανάπτυξη ψηφιακών δεξιοτήτων. Στην τελική ενότητα, εξετάζονται συγκεκριμένες ελληνικές πρωτοβουλίες των τελευταίων ετών, οι οποίες αναδεικνύουν υποδειγματικές πρακτικές και παρέχουν χρήσιμα συμπεράσματα για τη διαμόρφωση αποτελεσματικών πολιτικών που στοχεύουν στη γεφύρωση του ψηφιακού χάσματος (Sindakis, S. & Showkat, 2024).

Η επαγγελματική εξέλιξη των εκπαιδευτικών είναι κρίσιμη για την ενίσχυση της ψηφιακής δέσμευσης των μαθητών και την προετοιμασία τους ως ψηφιακών πολιτών. Δύο βασικές προϋποθέσεις για την επιτυχία του ψηφιακού γραμματισμού, όπως αναδεικνύεται από σχετικές μελέτες, είναι (α) η ενσωμάτωσή του στις εκπαιδευτικές πολιτικές και πρακτικές και (β) η θεμελίωσή του ως βασικού στοιχείου της μαθησιακής εμπειρίας. Τέσσερα τεκμηριωμένα προγράμματα παρέμβασης αξιοποιούν προσαρμοστικές τεχνολογίες για εξατομικευμένη διδασκαλία, προσαρμοσμένη στις διαφορετικές ανάγκες των μαθητών. Το προσαρμοστικό λογισμικό, αν και αναπτύχθηκε αρχικά ως βιομηχανικό εργαλείο, αποδεικνύεται ιδιαίτερα χρήσιμο στη δημιουργία μαθησιακών περιβαλλόντων χωρίς αποκλεισμούς. Η ικανότητά του να προσαρμόζεται δυναμικά στις ατομικές ανάγκες των μαθητών το καθιστά πολύτιμο εργαλείο για την εξατομίκευση της εκπαίδευσης και τη βελτίωση των μαθησιακών αποτελεσμάτων (Mokhtari, 2023).

Ένα βασικό πλεονέκτημα της προσαρμοστικής τεχνολογίας είναι η ικανότητά της να προσαρμόζεται στα διαφορετικά επίπεδα κατανόησης των μαθητών. Παρέχει δραστηριότητες που διατηρούν την πνευματική διέγερση χωρίς να γίνονται υπερβολικά απλοϊκές, ενισχύοντας έτσι τη μαθησιακή εμπειρία. Η αξιοποίησή της από τους εκπαιδευτικούς είναι κρίσιμη, καθώς επιτρέπει τη δημιουργία συμπεριληπτικών εκπαιδευτικών περιβαλλόντων σε τάξεις με μεγάλη ετερογένεια. Η πλήρης ένταξη των μαθητών απαιτεί όχι μόνο πρόσβαση σε τεχνολογικές συσκευές και αξιόπιστη διαδικτυακή σύνδεση αλλά και εκπαιδευτικό λογισμικό που προσαρμόζεται στις ατομικές τους ανάγκες. Η εξατομικευμένη μάθηση διευκολύνεται όταν το περιεχόμενο είναι σχολαστικά σχεδιασμένο ώστε να προσφέρει διαφοροποιημένες μαθησιακές διαδρομές. Κεντρικός στόχος είναι η συνεχής καινοτομία στην εκπαιδευτική διαδικασία, με τεχνολογίες που βελτιώνουν τη μαθησιακή εμπειρία και προωθούν ουσιαστική εμπλοκή των μαθητών (Rakap, 2024).

ΣΥΜΠΕΡΑΣΜΑ ΚΑΙ ΜΕΛΛΟΝΤΙΚΕΣ ΚΑΤΕΥΘΥΝΣΕΙΣ

Ο πρωταρχικός στόχος αυτής της εισήγησης ήταν να εξετάσει διεξοδικά την ύπαρξη και τη φύση του ψηφιακού χάσματος στην πρωτοβάθμια εκπαίδευση στην Ελλάδα, με έμφαση στη χαρτογράφηση και την τεκμηρίωση των διαφορετικών εμπειριών των μαθητών. Στο πλαίσιο αυτής της ανάλυσης, προκύπτει ένας περιορισμός, ο οποίος ωστόσο αποτελεί και μια ουσιαστική συμβολή: η παρούσα έρευνα αναδεικνύει μια «νέα» μορφή μαθησιακής ανισότητας. Είναι σημαντικό να σημειωθεί ότι η πλειονότητα της διεθνούς βιβλιογραφίας σε αυτόν τον τομέα αποτελείται κυρίως από θεωρητικές προσεγγίσεις και άρθρα πολιτικής. Αντιθέτως, οι εμπειρικές μελέτες που βασίζονται σε δεδομένα επικεντρώνονται κυρίως σε μαθητές πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης ανεπτυγμένων οικονομιών, αφήνοντας κενά στην κατανόηση του φαινομένου σε διαφορετικά εκπαιδευτικά πλαίσια. Αυτό το δοκίμιο επιδιώκει να καλύψει αυτό το κενό, παρέχοντας μια μαθητοκεντρική, εμπειρικά τεκμηριωμένη περιγραφή του ψηφιακού χάσματος στην ελληνική πρωτοβάθμια εκπαίδευση (Dimopoulos et al., 2021).

Η μελέτη τεκμηριώνει τις ανισότητες στην πρόσβαση και τη χρήση των ψηφιακών πόρων, οι οποίες διαμορφώνονται από το σχολικό και οικογενειακό περιβάλλον των μαθητών. Αυτές οι διαφορές έχουν άμεσο αντίκτυπο στον ψηφιακό γραμματισμό και την ηλεκτρονική ασφάλεια των μαθητών. Εφόσον το μέλλον της εκπαίδευσης είναι αναπόφευκτα ψηφιακό, είναι κρίσιμο οι υφιστάμενες εκπαιδευτικές και τεχνολογικές ανισότητες να μην αναπαραχθούν με νέες μορφές. Οι έντονες ψηφιακές διαφοροποιήσεις εντός του εκπαιδευτικού συστήματος μιας χώρας της ΕΕ αναδεικνύουν την αντιφατική φύση της τεχνολογίας, η οποία ενώ υπόσχεται ισότιμη πρόσβαση στη γνώση, συχνά οδηγεί σε ενίσχυση των κοινωνικών και εκπαιδευτικών αποκλεισμών (Susan & Kumar, 2021).

Από την οπτική της ασφάλειας, του κόστους και των παιδαγωγικών πρακτικών, η εισαγωγή, η βιβλιογραφική επισκόπηση και οι μεθοδολογικές ενότητες αυτού του δοκιμίου ανέδειξαν τις προκλήσεις που αντιμετωπίζουν οι μαθητές της ελληνικής πρωτοβάθμιας εκπαίδευσης στη διαδικασία ψηφιακής μάθησης. Η κριτική ανάλυση της βιβλιογραφίας αποκάλυψε ότι οι τεχνολογικές υποδομές όχι μόνο δεν εξάλειψαν τις εκπαιδευτικές ανισότητες αλλά, αντίθετα, τις επιτάχυναν, επεκτείνοντας τα προϋπάρχοντα χάσματα. Αυτή η πραγματικότητα δεν αντικατοπτρίζει έναν σταδιακό μετασχηματισμό προς ένα δικαιότερο εκπαιδευτικό περιβάλλον, αλλά μια αναπαραγωγή και όξυνση των υφιστάμενων αποκλεισμών. Κάθε ενότητα της ανάλυσης παρουσίασε με σαφήνεια τα πολλαπλά επίπεδα αυτών των ανισοτήτων, αποδεικνύοντας πώς διαμορφώνονται μέσα από τις εκπαιδευτικές δομές και τις κοινωνικοοικονομικές συνθήκες (Giannoulas et al., 2021).

Η διαπίστωση σημαντικά χαμηλότερων επιπέδων επάρκειας στην ηλεκτρονική ασφάλεια σε ορισμένες ομάδες μαθητών εγείρει σοβαρές ανησυχίες. Υποδηλώνει ότι η εντατική ψηφιακή παρακολούθηση, η οποία συχνά προβάλλεται ως μέτρο αντιμετώπισης του ψηφιακού χάσματος, μπορεί να εξελιχθεί σε παράγοντα περαιτέρω περιθωριοποίησης. Αν θεωρήσουμε ότι «η φτώχεια είναι μια τραγωδία», τότε η επέκταση της «ψηφιακής φτώχειας» και η συστηματική στέρηση των παιδιών από ψηφιακούς πόρους συνιστούν μια βαθιά δημοκρατική πρόκληση. Σε αυτό το πλαίσιο, η επιδίωξη της ψηφιακής ισότητας αντιμετωπίζει ένα διττό πρόβλημα: αν δεν εξετάσουμε επαρκώς τις πολυεπίπεδες ανισότητες που εντοπίζονται στην ψηφιακή εκπαίδευση, κινδυνεύουμε να συμβάλουμε άθελά μας στην αναπαραγωγή και εδραίωση αυτών των ανισοτήτων (Tsatsou).

Παρά τη συχνά αισιόδοξη ρητορική που περιβάλλει τον τεχνολογικό μετασχηματισμό στην εκπαίδευση, μια προσεκτικότερη εμπειρική ανάλυση αμφισβητεί την κυρίαρχη παγκόσμια αφήγηση περί αδιάλειπτης προόδου. Αντιθέτως, αναδεικνύει την ιστορική συνέχεια των εκπαιδευτικών προκλήσεων, αποκαλύπτοντας ότι πολλές από τις σημερινές δυσκολίες στην εκπαιδευτική τεχνολογία αποτελούν επαναλήψεις παλαιότερων ζητημάτων, ενταγμένων σε ένα πιο σύνθετο πλαίσιο. Το επιχείρημα που αναπτύχθηκε σε αυτή την ενότητα καταδεικνύει ότι οι τεχνολογικές εξελίξεις του 20ού και του 21ου αιώνα δεν συνιστούν ριζικό μετασχηματισμό, αλλά μάλλον μια προέκταση και αναπροσαρμογή προϋπαρχουσών παιδαγωγικών πρακτικών. Συνεπώς, η ανάλυση αυτή υπογραμμίζει την ανάγκη θεμελιωδών παρεμβάσεων για τη δημιουργία ενός πιο δίκαιου και συμπεριληπτικού εκπαιδευτικού μέλλοντος (Elf et al., 2022).

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ΨΗΦΙΑΚΟΣ ΜΕΤΑΣΧΗΜΑΤΙΣΜΟΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΕΥΚΑΙΡΙΕΣ, ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΑΝΑΔΥΟΜΕΝΕΣ ΑΝΙΣΟΤΗΤΕΣ ΣΤΗΝ ΕΠΟΧΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ

Μπαλωμένου Αθανασία
Περιφερειακή Επόπτρια Ποιότητας Εκπαίδευσης Δυτικής Ελλάδας, Σύμβουλος Εκπαίδευσης ΠΕ03 Αχαΐας,
Περιφερειακή Διεύθυνση Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης Δυτικής Ελλάδας,
Πάτρα, Ελλάδα
e-mail: smpalom@upatras.gr

Τσακουμάγκου Πηνελόπη
Εκπαιδευτικός ΠΕ05, Γαλλικής Φιλολογίας
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Κυκλάδων
Μύκονος, Ελλάδα
e-mail: ptsak21@gmail.com

Τσακουμάγκος Ιωάννης
Χημικός Μηχανικός
Πανεπιστήμιο Πατρών
Πάτρα, Ελλάδα
e-mail: giannistsak6@gmail.com

ΠΕΡΙΛΗΨΗ

Την τελευταία δεκαετία, η εκπαίδευση παγκοσμίως τείνει να μεταμορφωθεί ριζικά λόγω της ταχείας εξέλιξης των ψηφιακών τεχνολογιών. Ο ψηφιακός μετασχηματισμός δεν περιορίζεται στην υποστήριξη των παραδοσιακών διδακτικών μεθόδων, αλλά αναδιαμορφώνει ουσιαστικά τον τρόπο με τον οποίο αποκτάται, διαμοιράζεται και βιώνεται η γνώση, καθώς και η οργάνωση και διοίκηση των εκπαιδευτικών οργανισμών. Η ενσωμάτωση καινοτομιών, όπως η τεχνητή νοημοσύνη, η μηχανική μάθηση, τα MOOCs και οι εικονικές τάξεις, έχει ανοίξει νέους δρόμους στη μάθηση, προσφέροντας μεγαλύτερη προσβασιμότητα, εξατομίκευση και επεκτασιμότητα. Ωστόσο, αυτή η εξέλιξη συνοδεύεται από σοβαρές προκλήσεις. Παρά τις ευκαιρίες, ο ψηφιακός μετασχηματισμός μπορεί να εντείνει τις υφιστάμενες κοινωνικές και οικονομικές ανισότητες, δημιουργώντας ένα νέο «ψηφιακό χάσμα». Η άνιση πρόσβαση σε ψηφιακά εργαλεία, υποδομές και οι δεξιότητες, ιδίως σε ευάλωτες κοινωνικές ομάδες ή απομακρυσμένες κοινότητες, αποτελεί βασικό εμπόδιο για την ισότιμη εκπαίδευση. Η εργασία αυτή αναλύει τον διττό χαρακτήρα του ψηφιακού μετασχηματισμού και τονίζει την ανάγκη για συμμετοχικές, δίκαιες και συμπεριληπτικές πολιτικές. Υιοθετεί τη μεθοδολογία της βιβλιογραφικής ανασκόπησης και μελέτης κειμένων πολιτικής. Αναλύει τις βασικές προκλήσεις κατά το ψηφιακό μετασχηματισμό της εκπαίδευσης και στην τελευταία ενότητα προτείνει συγκεκριμένες στρατηγικές – όπως η επένδυση σε τεχνολογικές υποδομές και η ενίσχυση των ψηφιακών δεξιοτήτων μαθητών, εκπαιδευτικών και πολιτών – ώστε η τεχνολογία να συμβάλλει ουσιαστικά στη μείωση των εκπαιδευτικών ανισοτήτων.

Λέξεις κλειδιά: ψηφιακός μετασχηματισμός, πρωτοβάθμια και δευτεροβάθμια εκπαίδευση, ψηφιακό χάσμα, ψηφιακές ανισότητες.

ΕΙΣΑΓΩΓΗ

Στη σύγχρονη εποχή, τα εκπαιδευτικά συστήματα παγκοσμίως υπόκεινται σημαντική αλλαγή λόγω της ταχείας εξέλιξης των ψηφιακών τεχνολογιών. Αυτός ο ψηφιακός μετασχηματισμός δεν συνιστά απλώς μια ενίσχυση των παραδοσιακών διδακτικών πρακτικών με ψηφιακά μέσα. Αντιπροσωπεύει μια θεμελιώδη αναδιαμόρφωση του τρόπου πρόσβασης, οικοδόμησης και εμπειρίας της γνώσης. Από την ενσωμάτωση της τεχνητής νοημοσύνης και της μηχανικής μάθησης σε προσαρμοστικές πλατφόρμες μάθησης έως την επέκταση των μαζικών ανοικτών διαδικτυακών μαθημάτων (MOOC) και των εικονικών τάξεων, η ψηφιακή επανάσταση αναδιαμορφώνει κάθε πτυχή της εκπαίδευσης (Luckin et al., 2016). Ωστόσο, παρά τη δυνατότητά του να εκσυγχρονίσει τη μάθηση στην εποχή της τεχνητής νοημοσύνης και να διευρύνει την πρόσβαση, ο ψηφιακός μετασχηματισμός έχει επίσης εντείνει τις υπάρχουσες ανισότητες, εισάγοντας νέες μορφές αποκλεισμού και δημιουργώντας αυτό που οι μελετητές και οι υπεύθυνοι χάραξης πολιτικής αναφέρονται όλο και περισσότερο ως «ψηφιακό χάσμα» (van Dijk, 2020).

Η παρούσα εργασία διερευνά τη διττή φύση του ψηφιακού μετασχηματισμού στην εκπαίδευση: τις αξιοσημείωτες ευκαιρίες που παρουσιάζει και τις προκλήσεις που επιβάλλει, ιδίως για την ισότητα και την ένταξη. Συγκεκριμένα, εξετάζει την άνιση πρόσβαση σε ψηφιακά εργαλεία, υποδομές και δεξιότητες σε διάφορα κοινωνικά, οικονομικά, γεωγραφικά και δημογραφικά πλαίσια. Αναλύοντας κριτικά αυτές τις ανισότητες μέσα από το πρίσμα της τρέχουσας έρευνας, των παγκόσμιων περιπτωσιολογικών μελετών και των πολιτικών ψηφιακού γραμματισμού, η παρούσα μελέτη στοχεύει να συμβάλει σε μια βαθύτερη κατανόηση του τρόπου με τον οποίο οι ψηφιακές τεχνολογίες επηρεάζουν την εκπαιδευτική ισότητα.

Η κεντρική θέση αυτής της εργασίας είναι ότι ενώ ο ψηφιακός μετασχηματισμός προσφέρει επαναστατικές δυνατότητες για εξατομίκευση μάθηση, προσβασιμότητα και επεκτασιμότητα, ταυτόχρονα αναπαράγει - και σε ορισμένες περιπτώσεις επιδεινώνει - τις υπάρχουσες κοινωνικές και οικονομικές ανισότητες. Επιπλέον, εάν οι πολιτικές ψηφιακής εκπαίδευσης δεν σχεδιαστούν με γνώμονα τη συμμετοχικότητα και την ισότητα, το εκπαιδευτικό χάσμα θα συνεχίσει να αυξάνεται. Στην τελευταία ενότητα της παρούσας εργασίας διατυπώνονται προτάσεις για στοχευμένες εθνικές και διεθνείς στρατηγικές για τη γεφύρωση του ψηφιακού χάσματος, συμπεριλαμβανομένων των επενδύσεων σε υποδομές, της κατάρτισης σε ψηφιακές δεξιότητες μαθητών και εκπαιδευτικών και της χάραξης πολιτικής χωρίς αποκλεισμούς.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ - ΕΝΝΟΙΟΛΟΓΙΚΕΣ ΑΠΟΣΑΦΗΝΙΣΕΙΣ
ΨΗΦΙΑΚΟΣ ΜΕΤΑΣΧΗΜΑΤΙΣΜΟΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Ο όρος «ψηφιακός μετασχηματισμός στην εκπαίδευση» αναφέρεται στη συστηματική ενσωμάτωση ψηφιακών τεχνολογιών στις διαδικασίες διδασκαλίας, μάθησης και διοίκησης των εκπαιδευτικών οργανισμών, με στόχο τη βελτίωση της ποιότητας του παρεχόμενου εκπαιδευτικού έργου και της πρόσβασης στην εκπαίδευση (European Commission, 2020). Περιλαμβάνει, μεταξύ άλλων, την αξιοποίηση των Τεχνολογιών Πληροφορίας και Επικοινωνιών (ΤΠΕ) για εξατομικευμένη και διαφοροποιημένη μάθηση, υιοθέτηση μικτών μοντέλων μάθησης (blended learning), ανάπτυξη ψηφιακών δεξιοτήτων μαθητών και εκπαιδευτικών, καινοτομία στη διδασκαλία και αξιολόγηση, καθώς και στη διοίκηση εκπαιδευτικών οργανισμών. Σύμφωνα με τον Selwyn (2016), ο ψηφιακός μετασχηματισμός επηρεάζει θετικά την εξατομικευμένη μάθηση και την ανάπτυξη δεξιοτήτων και μπορεί να προωθήσει την κοινωνική δικαιοσύνη, υπό την προϋπόθεση ότι συνοδεύεται από πολιτικές ισότιμης πρόσβασης και ανάπτυξης δεξιοτήτων.

Η Υπόσχεση του Ψηφιακού Μετασχηματισμού στην Εκπαίδευση

Ο ψηφιακός μετασχηματισμός έχει τεράστιες δυνατότητες για την ενίσχυση των εκπαιδευτικών αποτελεσμάτων. Στον πυρήνα αυτής της πρόκλησης βρίσκεται η ικανότητα της τεχνολογίας να εξατομικεύει τις μαθησιακές εμπειρίες. Τα έξυπνα συστήματα διδασκαλίας και τα προσαρμοστικά λογισμικά και περιβάλλοντα μάθησης δημιουργούν εξατομικευμένες εμπειρίες που ανταποκρίνονται στο ρυθμό και το μαθησιακό στυλ κάθε μαθητή (Pane et al., 2017). Αυτά τα εργαλεία μπορούν να βοηθήσουν στην κάλυψη των μαθησιακών κενών, στη μείωση των ποσοστών εγκατάλειψης του σχολείου και στη βελτίωση της συνολικής απόδοσης των μαθητών.

Επιπλέον, η τεχνολογία μπορεί να ενισχύει την προσβασιμότητα. Οι μαθητές που είναι γεωγραφικά απομονωμένοι ή σωματικά ανίκανοι να παρακολουθήσουν παραδοσιακές αίθουσες διδασκαλίας μπορούν πλέον να έχουν πρόσβαση σε εκπαίδευση υψηλής ποιότητας μέσω διαδικτυακών πλατφορμών. Εργαλεία, όπως προγράμματα ανάγνωσης οθόνης, λογισμικά μετατροπής ομιλίας σε κείμενο και υπηρεσίες μετάφρασης σε πραγματικό χρόνο υποστηρίζουν τους μαθητές με αναπηρίες και όσους μαθαίνουν σε πολύγλωσσα περιβάλλοντα (UNESCO, 2021). Ως αποτέλεσμα, η εκπαίδευση γίνεται πιο συμπεριληπτική, ευέλικτη και ανταποκρίνεται σε ποικίλες ανάγκες εκπαιδευτών και εκπαιδευόμενων.

Η επεκτασιμότητα της ψηφιακής εκπαίδευσης συνιστά ένα επιπλέον πλεονέκτημα. Το εκπαιδευτικό υλικό μπορεί να διανεμηθεί με ελάχιστο κόστος σε χιλιάδες, ακόμη και εκατομμύρια, μαθητές. Τα MOOC, για παράδειγμα, διασφαλίζουν την πρόσβαση σε μαθήματα από αναγνωρισμένα πανεπιστήμια σε όλο τον πλανήτη, προσεγγίζοντας μαθητές σε περισσότερες από 190 χώρες (Liyanagunawardena et al., 2013). Κατά τη διάρκεια της πανδημίας COVID-19, οι πλατφόρμες αυτές διαδραμάτισαν κρίσιμο ρόλο στη διασφάλιση της συνέχειας της μάθησης, αναδεικνύοντας τη χρησιμότητά τους και σε περιόδους κρίσης (OECD, 2021).

Ωστόσο, ενώ τα οφέλη του ψηφιακού μετασχηματισμού είναι προφανή, δεν κατανέμονται ομοιόμορφα. Πολλοί μαθητές, ειδικά εκείνοι που προέρχονται από χαμηλότερα κοινωνικοοικονομικά στρώματα ή περιθωριοποιημένες κοινότητες, αντιμετωπίζουν περιορισμένη πρόσβαση σε ψηφιακά εργαλεία και συνδέσεις, γεγονός που οδηγεί σε χαμηλότερη συμμετοχή και επίδοση (DiMaggio & Hargittai, 2001). Ως εκ τούτου, η μετάβαση στην ψηφιακή μάθηση ενισχύει το εκπαιδευτικό χάσμα αντί να το μειώσει.

Επιπλέον, οι εκπαιδευτικοί συχνά δεν διαθέτουν την απαραίτητη εκπαίδευση και υποστήριξη για την υιοθέτηση ψηφιακών εργαλείων με παιδαγωγικό τρόπο (Eickelmann & Vennemann, 2017). Η ανάπτυξη των ψηφιακών δεξιοτήτων των εκπαιδευτικών είναι καθοριστική για τον περιορισμό του ψηφιακού χάσματος σε επίπεδο σχολικής τάξης (European Schoolnet, 2018).

ΨΗΦΙΑΚΟ ΧΑΣΜΑ (DIGITAL GAP)

Το ψηφιακό χάσμα (digital gap) αναφέρεται στη διαφορά μεταξύ ατόμων, κοινοτήτων ή εθνών όσον αφορά την πρόσβαση και την ικανότητα χρήσης ψηφιακών τεχνολογιών, όπως το διαδίκτυο, οι υπολογιστές και οι κινητές συσκευές. Αυτό το χάσμα μπορεί να υπάρχει λόγω διαφορών στο εισόδημα, τη γεωγραφία, την εκπαίδευση, την ηλικία ή τις υποδομές. Συνεπώς, το ψηφιακό χάσμα δεν αφορά μόνο την τεχνολογική διάσταση της πρόσβασης, αλλά και τις κοινωνικές και πολιτισμικές δυνατότητες των ομάδων να αξιοποιούν τις τεχνολογίες (Warschauer, 2004). Ο Van Dijk (2020) αναλύει το ψηφιακό χάσμα σε τέσσερις διαστάσεις: 1.Χάσμα Πρόσβασης – Ορισμένοι άνθρωποι δεν έχουν πρόσβαση στο διαδίκτυο ή σε ψηφιακές συσκευές λόγω κόστους ή διαθεσιμότητας, 2.Χάσμα Χρήσης – Ακόμα και αν υπάρχει πρόσβαση, κάποιοι μπορεί να μην διαθέτουν τις απαραίτητες δεξιότητες ή γνώσεις για να χρησιμοποιούν αποτελεσματικά τα ψηφιακά εργαλεία, 3.Χάσμα Ποιότητας – Η ταχύτητα και η αξιοπιστία των διαδικτυακών συνδέσεων διαφέρουν σημαντικά, επηρεάζοντας τις ευκαιρίες για εκπαίδευση και εργασία, 4. Χάσμα Περιεχομένου – Πολλοί διαδικτυακοί πόροι είναι διαθέσιμοι μόνο σε συγκεκριμένες γλώσσες ή μορφές, περιορίζοντας την πρόσβαση για ορισμένους χρήστες.

ΨΗΦΙΑΚΕΣ ΑΝΙΣΟΤΗΤΕΣ (DIGITAL DIVIDE): ΕΝΑ ΠΟΛΥΠΛΕΥΡΟ ΠΡΟΒΛΗΜΑ

Οι ψηφιακές ανισότητες (digital divide) δεν είναι ένα μονοδιάστατο ζήτημα, αλλά μια σύνθετη αλληλεπίδραση πολλαπλών μορφών μειονεξίας. Αυτές περιλαμβάνουν ανισότητες στην πρόσβαση σε υλικό (όπως φορητούς υπολογιστές, tablet κ.α.), την έλλειψη συνδεσιμότητας (διαθέσιμο και αξιόπιστο διαδίκτυο για όλους), τον ψηφιακό αναλφαβητισμό και την απουσία υποστηρικτικών περιβαλλόντων μάθησης. Τα ζητήματα αυτά συχνά έχουν τις ρίζες τους σε ευρύτερες κοινωνικοοικονομικές και διαρθρωτικές ανισότητες.

Κοινωνικοοικονομικές ανισότητες

Μία από τις πιο ορατές μορφές ψηφιακής ανισότητας σχετίζεται με το εισόδημα και την κοινωνικοοικονομική κατάσταση. Τα νοικοκυριά με χαμηλότερα επίπεδα εισοδήματος είναι σημαντικά λιγότερο πιθανό να έχουν πρόσβαση σε διαδίκτυο υψηλής ταχύτητας, σύγχρονες συσκευές και ήσυχους χώρους μάθησης. Μια έρευνα του 2020 αποκάλυψε ότι ενώ το 92% των νοικοκυριών στις ΗΠΑ που κερδίζουν πάνω από 75,000$ ετησίως είχαν ευρυζωνική σύνδεση στο σπίτι, ενώ μόνο το 56% εκείνων που κερδίζουν κάτω από 30,000$ είχαν την ίδια δυνατότητα (Atske & Perrin, 2021). Η έλλειψη πρόσβασης, ιδίως σε νοικοκυριά με παιδιά σχολικής ηλικίας, μπορεί να οδηγήσει σε εκτεταμένη απώλεια μάθησης και χαμηλές ακαδημαϊκές επιδόσεις.

Στο πλαίσιο του κλεισίματος των σχολείων κατά τη διάρκεια της πανδημίας COVID-19, οι ανισότητες αυτές έγιναν ακόμη πιο εμφανείς. Οι μαθητές από εύπορες οικογένειες ήταν πιο πιθανό να έχουν πρόσβαση σε πλατφόρμες εξ αποστάσεως μάθησης, σύνδεση στο διαδίκτυο, ατομικό εξοπλισμό ψηφιακών εργαλείων, δυνατότητα να παρακολουθήσουν εικονικές συνεδρίες διδασκαλίας και να επωφεληθούν από τη γονική υποστήριξη. Αντίθετα, οι μαθητές χαμηλού εισοδήματος συχνά υστερούσαν τόσο στον εξοπλισμό όσο και στην προσβασιμότητα λόγω έλλειψης των απαραίτητων πόρων (OECD, 2021).

Γεωγραφικές ανισότητες και ανισότητες υποδομών

Η γεωγραφική θέση διαδραματίζει επίσης σημαντικό ρόλο στον καθορισμό της πρόσβασης στην ψηφιακή εκπαίδευση. Οι αγροτικές και απομακρυσμένες περιοχές συχνά δεν διαθέτουν την ευρυζωνική υποδομή που απαιτείται για την υποστήριξη της ηλεκτρονικής μάθησης. Σε πολλά μέρη του Παγκόσμιου Νότου, η πρόσβαση στο διαδίκτυο παραμένει απαγορευτικά ακριβή ή εντελώς μη διαθέσιμη. Για παράδειγμα, η Παγκόσμια Τράπεζα (World Bank, 2019) σημείωσε ότι στην υποσαχάρια Αφρική, λιγότερο από το 30% των σχολείων είχαν πρόσβαση σε ηλεκτρική ενέργεια, πόσο μάλλον σε αξιόπιστο διαδίκτυο.

Ακόμη και στις ανεπτυγμένες χώρες, οι αγροτικές περιοχές υποφέρουν συχνά από ψηφιακή υπανάπτυξη. Στις Ηνωμένες Πολιτείες, εκατομμύρια νοικοκυριά σε αγροτικές περιοχές εξακολουθούν να στερούνται διαδικτύου υψηλής ταχύτητας παρά τις πρωτοβουλίες συνδεσιμότητας σε εθνικό επίπεδο. Αυτά τα κενά υποδομής περιορίζουν σημαντικά τις εκπαιδευτικές ευκαιρίες για τους μαθητές σε αυτές τις περιοχές, διαιωνίζοντας κύκλους υπανάπτυξης και μειονεξίας.

Στην Ελλάδα, σύμφωνα με δεδομένα της ΕΛΣΤΑΤ (2023), το 83% των νοικοκυριών διαθέτει πρόσβαση στο διαδίκτυο, αλλά το ποσοστό πέφτει στο 65% στις αγροτικές και παραμεθόριες ή ορεινές περιοχές. Επιπλέον, το 28% των μαθητών δηλώνει ότι δεν διαθέτει κατάλληλο χώρο ή εξοπλισμό για μελέτη στο σπίτι. Στην έρευνα αναφέρεται ότι περιοχές με το χαμηλότερο ποσοστό πρόσβασης είναι η Δυτική Μακεδονία και η Στερεά Ελλάδα.

Δημογραφικές ανισότητες στην ψηφιακή εκπαίδευση

Εκτός από τα κοινωνικοοικονομικά και γεωγραφικά εμπόδια, δημογραφικοί παράγοντες όπως η ηλικία, το φύλο και η εθνικότητα επηρεάζουν επίσης σημαντικά την πρόσβαση και τα αποτελέσματα της ψηφιακής εκπαίδευσης. Μια σημαντική ανησυχία είναι το ψηφιακό χάσμα μεταξύ των φύλων. Αν και η πρόσβαση στην εκπαίδευση έχει βελτιωθεί παγκοσμίως, τα κορίτσια εξακολουθούν να αντιμετωπίζουν άνιση πρόσβαση σε ψηφιακά εργαλεία και πλατφόρμες σε πολλές περιοχές. Η Διεθνής Ένωση Τηλεπικοινωνιών (ITU, 2020) αναφέρει ότι παγκοσμίως, το 55% των ανδρών χρησιμοποιούν το διαδίκτυο σε σύγκριση με μόλις το 48% των γυναικών, ένα χάσμα που είναι ακόμη μεγαλύτερο στις χώρες χαμηλού εισοδήματος. Αυτή η ανισότητα μπορεί να αποδοθεί σε πολλούς παράγοντες, συμπεριλαμβανομένων των πολιτιστικών προτύπων που αποθαρρύνουν τη συμμετοχή των γυναικών σε τομείς που σχετίζονται με την τεχνολογία, του χαμηλότερου ψηφιακού γραμματισμού μεταξύ των γυναικών και της μειωμένης αυτονομίας στη λήψη αποφάσεων στο νοικοκυριό. Όταν η πρόσβαση στη ψηφιακή εκπαίδευση περιορίζεται από έμφυλους περιορισμούς, ενισχύονται οι υφιστάμενες εκπαιδευτικές και οικονομικές ανισότητες και περιορίζεται η πλήρης και ισότιμη συμμετοχή των γυναικών στο κοινωνικό και οικονομικό γίγνεσθαι.

Η ηλικία αποτελεί μια άλλη δημογραφική μεταβλητή που επηρεάζει τη ψηφιακή πρόσβαση. Ενώ οι νέοι συχνά θεωρούνται «ψηφιακοί ιθαγενείς», αυτή η υπόθεση κρύβει σημαντικές διαφορές στα επίπεδα ψηφιακών δεξιοτήτων. Οι ενήλικες, συμπεριλαμβανομένων των εκπαιδευτικών, μπορεί επίσης να αντιμετωπίσουν δυσκολίες κατά τον ψηφιακό μετασχηματισμό (Eickelmann & Vennemann, 2017). Η ξαφνική μετάβαση στη διαδικτυακή διδασκαλία κατά τη διάρκεια της πανδημίας COVID-19 ανέδειξε σημαντικά κενά στην ετοιμότητα και τις ψηφιακές ικανότητες της πλειοψηφίας των εκπαιδευτικών να ανταποκριθούν στη μετάβαση στην επείγουσα εξ αποστάσεως διδασκαλία με αξιοποίηση διαδικτυακών πλατφορμών και ψηφιακών εργαλείων (König et al., 2020). Αυτή η απόκλιση εμπόδισε την αποτελεσματική και ισότιμη παροχή ψηφιακής μάθησης στους μαθητές και έθεσε πρόσθετα βάρη στους εκπαιδευτικούς που δεν είχαν εντρυφήσει ή εκπαιδευτεί σε εικονικές παιδαγωγικές προσεγγίσεις.

Η εθνικότητα και η φυλή επιδεινώνουν περαιτέρω τις ψηφιακές ανισότητες. Στις ΗΠΑ, για παράδειγμα, τα αφροαμερικανικά και ισπανόφωνα νοικοκυριά είναι λιγότερο πιθανό από τα λευκά νοικοκυριά να έχουν πρόσβαση σε διαδίκτυο υψηλής ταχύτητας και ψηφιακές συσκευές (Anderson &; Perrin, 2020). Στη χώρα μας, καθώς και σε άλλες βαλκανικές χώρες όπως η Βουλγαρία, αντίστοιχη ανισότητα υπάρχει έντονη στη φυλή των ρομά (European Commission: 2024.) Αυτές οι ανισότητες δεν είναι μόνο τεχνικές αλλά και κοινωνικές, καθώς αντικατοπτρίζουν μακροχρόνιες ανισότητες στον πλούτο, την εκπαίδευση και τις επενδύσεις σε υποδομές.

ΨΗΦΙΑΚΟΣ ΓΡΑΜΜΑΤΙΣΜΟΣ & ΧΑΣΜΑ ΨΗΦΙΑΚΩΝ ΔΕΞΙΟΤΗΤΩΝ

Πέρα από τη φυσική πρόσβαση στην τεχνολογία, η ικανότητα αποτελεσματικής χρήσης ψηφιακών εργαλείων – ο ψηφιακός γραμματισμός – είναι ένας κρίσιμος καθοριστικός παράγοντας των εκπαιδευτικών αποτελεσμάτων στη ψηφιακή εποχή (Raj & Gupta, 2025). Ο ψηφιακός γραμματισμός περιλαμβάνει ένα ευρύ φάσμα ικανοτήτων, συμπεριλαμβανομένης της πλοήγησης για εύρεση πληροφοριών, της κριτικής αξιολόγησης των πηγών, της διαδικτυακής επικοινωνίας και της δημιουργίας και χρήσης ψηφιακού περιεχομένου. Καθώς η εκπαίδευση εξαρτάται όλο και περισσότερο από τα ψηφιακά εργαλεία, οι εκπαιδευτικοί αλλά και οι μαθητές που δεν διαθέτουν αυτές τις ικανότητες αντιμετωπίζουν αυξανόμενα μειονεκτήματα.

Εστιάζοντας αρχικά στους μαθητές, πολυάριθμες μελέτες επισημαίνουν ότι τα επίπεδα ψηφιακών δεξιοτήτων ποικίλλουν ευρέως ανάλογα με την κοινωνικοοικονομική κατάσταση, την εκπαίδευση των γονέων και την ποιότητα του σχολείου. Για παράδειγμα, μελέτη της Ευρωπαϊκής Επιτροπής (European Comission, 2022) διαπίστωσε ότι μόνο το 56 % των μαθητών σε σχολεία χαμηλότερου εισοδήματος σε ολόκληρη την Ευρωπαϊκή Ένωση επέδειξαν επαρκείς ψηφιακές δεξιότητες, σε σύγκριση με πάνω από 85 % σε σχολεία υψηλού εισοδήματος. Αυτό το χάσμα οδηγεί σε άνιση συμμετοχή σε ψηφιακά περιβάλλοντα μάθησης και περιορίζει τις μελλοντικές ακαδημαϊκές και επαγγελματικές προοπτικές των μαθητών.

Επιπλέον, ο ψηφιακός γραμματισμός μαθητών συχνά θεωρείται δεδομένος και δε διδάσκεται ρητά. Πολλά εκπαιδευτικά ιδρύματα αναμένουν από τους μαθητές να πλοηγηθούν σε πολύπλοκες ψηφιακές πλατφόρμες χωρίς επαρκή κατάρτιση, γεγονός που επιδεινώνει τις ανισότητες. Το ζήτημα αυτό είναι ιδιαίτερα έντονο σε νεότερους μαθητές ή σε άτομα με ειδικές εκπαιδευτικές ανάγκες. Χωρίς στοχευμένη διδασκαλία στις ψηφιακές ικανότητες, τα πλεονεκτήματα της ψηφιακής εκπαίδευσης δεν μπορούν να υλοποιηθούν δίκαια.

Ο ΡΟΛΟΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΙΔΡΥΜΑΤΩΝ ΚΑΙ ΤΗΣ ΔΙΟΙΚΗΣΗΣ ΣΤΟΝ ΨΗΦΙΑΚΟ ΜΕΤΑΣΧΗΜΑΤΙΣΜΟ

Τα εκπαιδευτικά ιδρύματα και τα διοικητικά τους όργανα διαδραματίζουν καίριο ρόλο στην καθοδήγηση του ψηφιακού μετασχηματισμού. Η επιτυχής ενσωμάτωση της ψηφιακής τεχνολογίας απαιτεί κάτι περισσότερο από απλή πρόσβαση σε συσκευές - περιλαμβάνει τον επανασχεδιασμό του προγράμματος σπουδών, την επαγγελματική ανάπτυξη των εκπαιδευτικών και τη δημιουργία υποστηρικτικών ψηφιακών οικοσυστημάτων εντός των σχολείων.

Ένας από τους βασικούς παράγοντες που επηρεάζουν την επιτυχή ενσωμάτωση της ψηφιακής τεχνολογίας στον σχολικό οργανισμό είναι η ηγεσία (Kavitha & Kursheed 2024). Τα σχολεία με διορατικούς, ψηφιακά εγγράμματους ηγέτες-διευθυντές είναι πιο πιθανό να εφαρμόσουν αποτελεσματικές ψηφιακές στρατηγικές και να διασφαλίσουν ότι τόσο οι μαθητές όσο και οι εκπαιδευτικοί υποστηρίζονται καθ' όλη τη διάρκεια της μετάβασης. Σύμφωνα με τους Fullan και Langworthy (2014), η ισχυρή ηγεσία είναι απαραίτητη για την προώθηση μιας κουλτούρας καινοτομίας και τη συστηματική και στοχευμένη ανάπτυξη ψηφιακών πρωτοβουλιών με την πάροδο του χρόνου.

Η κατάρτιση των εκπαιδευτικών είναι ένας άλλος κρίσιμος τομέας. Η επαγγελματική εξέλιξη πρέπει να υπερβαίνει την τεχνική κατάρτιση και να περιλαμβάνει στρατηγικές και εργαλεία για παιδαγωγική αξιοποίηση ψηφιακών εργαλείων και τεχνητής νοημοσύνης για τη μάθηση. Η έρευνα δείχνει ότι οι εκπαιδευτικοί που λαμβάνουν συστηματική ψηφιακή κατάρτιση είναι πιο αποτελεσματικοί στην ενσωμάτωση της τεχνολογίας στις τάξεις τους (Darling-Hammond et al., 2017) και αισθάνονται ικανοί και επαρκείς ώστε να αξιοποιήσουν ψηφιακά μέσα στη διδασκαλία τους. Τα εκπαιδευτικά ιδρύματα κάθε βαθμίδας που επενδύουν σε τέτοιας μορφής κατάρτιση όχι μόνο βελτιώνουν την ποιότητα της εκπαίδευσης, αλλά συμβάλλουν επίσης στον μετριασμό των ανισοτήτων στα μαθησιακά αποτελέσματα των σπουδαστών τους.

Επιπλέον, κάθε κράτος πρέπει να υιοθετήσει πολιτικές που δίνουν προτεραιότητα στην ισότιμη ψηφιακή πρόσβαση και ένταξη για μαθησιακούς σκοπούς. Αυτό περιλαμβάνει τη εξασφάλιση δωρεάν εξοπλισμού σε μαθητές που έχουν ανάγκη, την επιδότηση της πρόσβασης στο διαδίκτυο και την παροχή στοχευμένης υποστήριξης σε ευάλωτες ομάδες. Χωρίς τέτοια μέτρα, οι θεσμικές προσπάθειες ενδέχεται ακούσια να διευρύνουν τα υφιστάμενα κενά.

ΑΠΑΝΤΗΣΕΙΣ ΠΟΛΙΤΙΚΗΣ ΚΑΙ ΠΑΓΚΟΣΜΙΕΣ ΣΤΡΑΤΗΓΙΚΕΣ

Για την αντιμετώπιση του ψηφιακού χάσματος στην εκπαίδευση, διάφορες κυβερνήσεις και διεθνείς οργανισμοί έχουν αναπτύξει στοχευμένες πολιτικές και προγράμματα. Αυτές αφορούν επενδύσεις σε υποδομές έως μεταρρυθμίσεις προγραμμάτων σπουδών και συμπράξεις δημόσιου-ιδιωτικού τομέα.

Για παράδειγμα, η εθνική στρατηγική της Φινλανδίας για την ψηφιακή εκπαίδευση δίνει έμφαση στην ψηφιακή ισότητα και τη διά βίου μάθηση. Η κυβέρνηση έχει επενδύσει σε διαδίκτυο υψηλής ταχύτητας για όλα τα σχολεία, έχει αναπτύξει εθνικά προγράμματα σπουδών που ενσωματώνουν ψηφιακές ικανότητες και έχει θεσπίσει προγράμματα κατάρτισης εκπαιδευτικών (Ministry of Education and Culture, Finland, 2020). Ως αποτέλεσμα, η Φινλανδία κατατάσσεται σταθερά μεταξύ των κορυφαίων χωρών όσον αφορά την ψηφιακή ετοιμότητα και τα εκπαιδευτικά αποτελέσματα.

Ομοίως, το Plan Ceibal της Ουρουγουάης παρέχει σε κάθε μαθητή και δάσκαλο φορητό υπολογιστή και δωρεάν πρόσβαση στο διαδίκτυο, συμβάλλοντας στη γεφύρωση του ψηφιακού χάσματος και στη βελτίωση των μαθησιακών αποτελεσμάτων σε όλες τις κοινωνικοοικονομικές ομάδες (Katz, 2017). Η επιτυχία του προγράμματος έγκειται όχι μόνο στη διανομή συσκευών, αλλά και στην ολοκληρωμένη προσέγγισή του στην κατάρτιση των εκπαιδευτικών, τη συμμετοχή των γονέων και την τοπική ανάπτυξη περιεχομένου.

Στην Ελλάδα, εστιάζοντας από το 2020 και μετά, υλοποιούνται πολυδιάστατες πολιτικές ψηφιακού γραμματισμού εκπαιδευτικών και μαθητών που συνδυάζουν: 1.Υποδομές (διαδραστικοί πίνακες, πλατφόρμες, πολλαπλό βιβλίο): Κάθε σχολείο στην Ελλάδα εξοπλίζεται με διαδραστικούς πίνακες, ενώ ταυτόχρονα εξασφαλίζεται η πρόσβαση όλων των σχολείων σε πλατφόρμες μάθησης όπως η e-me, η e-class, το ψηφιακό φροντιστήριο κ.α. Ταυτόχρονα, στο πλαίσιο εφαρμογής των νέων προγραμμάτων σπουδών (ΦΕΚ 136/Α/3-8-2021), είναι σε εξέλιξη πρόγραμμα του ΙΕΠ (κωδικός ΟΠΣ ΤΑ 5174140) για τη δημιουργία νέου ψηφιακού αποθετηρίου (kaleduscope) που θα περιλαμβάνει 15000 ανοικτούς εκπαιδευτικούς πόρους (OERs), καθώς και πληθώρα ολοκληρωμένων ψηφιακών σεναρίων διδασκαλίας και μάθησης για εκπαιδευτικούς και μαθητές, τα οποία θα υποστηρίζουν τόσο τη διδασκαλία όσο και την εξατομικευμένη μάθηση από το δημοτικό μέχρι και το λύκειο. Στην ίδια φιλοσοφία εντάσσεται και η καθιέρωση του πολλαπλού βιβλίου, όπου για κάθε διδακτικό αντικείμενο θα είναι διαθέσιμα περισσότερα του ενός διδακτικά βιβλία σε ψηφιακή μορφή. Σε κάθε εγκεκριμένο σχολικό βιβλίο περιλαμβάνεται, σε ποσοστό 30% τουλάχιστον, ψηφιακό υλικό ελεύθερα προσβάσιμο από μαθητές και εκπαιδευτικούς, 2. Ψηφιακές δεξιότητες (εκπαιδευτική και κοινωνική διάσταση): σε επίπεδο εκπαιδευτικής πολιτικής προβλέπονται δράσεις ψηφιακού γραμματισμού και επαγγελματικής ανάπτυξης εκπαιδευτικών που σχετίζονται τόσο με ψηφιακά εργαλεία και εργαλεία τεχνητής νοημοσύνης όσο και με εργαλεία παιδαγωγικής αξιοποίησης και ενσωμάτωσης των νέων τεχνολογιών στην καθημερινή διδακτική πρακτική. Το ΙΕΠ είναι κατεξοχήν ο αρμόδιος θεσμοθετημένος φορέας επιμόρφωσης εκπαιδευτικών. Ενδεικτικά αναφέρουμε τα προγράμματα κατάρτισης εκπαιδευτικών στη διαφοροποιημένη διδασκαλία, 3. Ταυτόχρονα, οι νέοι θεσμοί των Περιφερειακών Εποπτών Ποιότητας Εκπαίδευσης, Εποπτών Ποιότητας εκπαίδευσης και Συμβούλων εκπαίδευσης αναλαμβάνουν πρωτοβουλίες επιμόρφωσης και κατάρτισης εκπαιδευτικών , όπως προβλέπεται σύμφωνα με τον νόμο 4823/2021, 4. Εξ αποστάσεως διδασκαλία & μάθηση (για την υποστήριξη μαθητών και επιμόρφωση εκπαιδευτικών). Συνιστά «παράπλευρη ωφέλεια» της εποχής της πανδημίας η ανάδειξη των δυνατοτήτων των ψηφιακών τεχνολογιών για τη διδασκαλία και τη μάθηση. Ήδη η συντριπτική πλειοψηφία των Ελλήνων εκπαιδευτικών έχουν διαμορφώσει θετική αντίληψη σχετικά με την προστιθέμενη αξία της ενσωμάτωσης ψηφιακών εργαλείων στη διδασκαλία και μάθηση και έχουν υιοθετήσει στην καθημερινή τους πρακτική παιδαγωγικές στρατηγικές διδασκαλίας με αξιοποίηση νέων τεχνολογιών (όπως η ανεστραμμένη τάξη κ.α.), 5.Τοπικές & ευρωπαϊκά ευθυγραμμισμένες δράσεις (DigComp, VET). Γίνεται διάλογος για την ενσωμάτωση της Τεχνητής Νοημοσύνης στη διδασκαλία και μάθηση με τρόπο που δεν θα περιορίζει την ανθρώπινη νοημοσύνη ή τον ρόλο του δασκάλου, αλλά θα συμβάλλει στην ανάπτυξη της κριτικής σκέψης των μαθητών, στη βελτίωσης της διαδικασίας αξιολόγησης, στον περιορισμό του χρόνου των εκπαιδευτικών για διεκπεραίωση γραφειοκρατικών εργασιών κ.α.

Αρκετές από αυτές τις πολιτικές δείχνουν να μην περιορίζονται στην άνωθεν ρύθμιση, αλλά εμπλέκουν ενεργά εκπαιδευτικούς, σχολικές κοινότητες και μαθητές, με στόχο τη μείωση του ψηφιακού χάσματος σε όλες τις εκπαιδευτικές βαθμίδες και με ιδιαίτερη έμφαση στην κάλυψη ακόμα και της πιο απομακρυσμένης ή δυσπρόσιτης περιοχής της Ελλάδας.

Σε παγκόσμιο επίπεδο, διεθνείς οργανισμοί όπως η UNESCO και η Παγκόσμια Τράπεζα έχουν επίσης ξεκινήσει πρωτοβουλίες για την προώθηση της ψηφιακής ισότητας. Το πρόγραμμα «Εκπαίδευση για τη Βιώσιμη Ανάπτυξη» της UNESCO υποστηρίζει πολιτικές ψηφιακής εκπαίδευσης χωρίς αποκλεισμούς και τονίζει τη σημασία του τοπικού πλαισίου στον σχεδιασμό πολιτικής (UNESCO, 2021). Εν τω μεταξύ, η Παγκόσμια Τράπεζα έχει χρηματοδοτήσει έργα ψηφιακών υποδομών στην Αφρική, την Ασία και τη Λατινική Αμερική για τη στήριξη της εκπαίδευσης κατά τη διάρκεια και μετά την πανδημία COVID-19, ενώ ενδεικτικά αναφέρονται διασυνοριακές πρωτοβουλίες όπως το Έργο Roma Plus (2021–2024) για τον ψηφιακό γραμματισμό των ρομά σε Ελλάδα, Βόρεια Μακεδονία και Βουλγαρία (https://romaplus.eu/el/).

Ωστόσο, δεν είναι όλες οι προσπάθειες πολιτικής εξίσου επιτυχείς. Ορισμένα προγράμματα έχουν αποτύχει λόγω έλλειψης μακροπρόθεσμου σχεδιασμού, ανεπαρκούς υποστήριξης εκπαιδευτικών ή κακής εφαρμογής. Για να είναι αποτελεσματικές, οι πολιτικές ψηφιακής εκπαίδευσης πρέπει να βασίζονται σε τεκμηριωμένες μελέτες, συστηματικότητα και διάρκεια, να καθοδηγούνται από το ζητούμενο της καθολικής και ισότιμης πρόσβασης και να υποστηρίζονται από επαρκή χρηματοδότηση και μηχανισμούς παρακολούθησης.

Επιπτώσεις του Ψηφιακού Μετασχηματισμού στην Εμπειρία των Μαθητών και την Ποιότητα της Εκπαίδευσης

Η ταχεία στροφή προς την ψηφιακή εκπαίδευση έχει επηρεάσει βαθιά τις καθημερινές εμπειρίες των μαθητών, την ακαδημαϊκή συμμετοχή και την ψυχική ευεξία. Ενώ τα ψηφιακά περιβάλλοντα μάθησης προσφέρουν ευελιξία και αυτονομία, εισάγουν επίσης νέους στρεσογόνους παράγοντες, ιδιαίτερα για μαθητές με περιορισμένα συστήματα υποστήριξης. Πολλοί μαθητές έχουν αναφέρει δυσκολίες στη διατήρηση ή αύξηση των κινήτρων μάθησης, καθώς και στη συγκέντρωση και την αίσθηση της κοινότητας σε πλήρως διαδικτυακές ή υβριδικές τάξεις (Garris & Fleck, 2020). Οι προκλήσεις αυτές έχουν σημαντικές επιπτώσεις στις ακαδημαϊκές τους επιδόσεις και στα μακροπρόθεσμα εκπαιδευτικά αποτελέσματα.

Μια κρίσιμη διάσταση της εμπειρίας των μαθητών σχετίζεται με το επίπεδο διαδραστικότητας και ανατροφοδότησης σε ψηφιακά περιβάλλοντα. Μελέτες έχουν δείξει ότι οι μαθητές προοδεύουν όταν λαμβάνουν έγκαιρη, εξατομικευμένη ανατροφοδότηση και ευκαιρίες συνεργασίας (Martin et al., 2020). Τέτοια χαρακτηριστικά απαιτείται να υπάρχουν σε ψηφιακές πλατφόρμες ή προσβάσιμα σε όλους τους μαθητές. Επιπρόσθετα, σε χώρες με ανεπαρκείς ψηφιακούς πόρους, ή με σχολεία όπου η αναλογία μαθητών προς εκπαιδευτικούς είναι μεγάλη και ταυτόχρονα με περιορισμένη τεχνολογική υποδομή μπορεί να περιοριστεί η ουσιαστική συμμετοχή, διευρύνοντας το εκπαιδευτικό χάσμα.

Η ψυχική υγεία είναι μια άλλη παράμετρος ανησυχίας. Η ψηφιακή εκπαίδευση συχνά οδηγεί σε αυξημένο χρόνο οθόνης, κοινωνική απομόνωση και θολά, ή σε κάποιες περιπτώσεις ανύπαρκτα όρια χρήσης ψηφιακών εργαλείων και οθονών τόσο για τις ανάγκες του σχολείου, όσο και κατά την παραμονή των παιδιών εντός σπιτιού. Σύμφωνα με έρευνα της Αμερικανικής Ψυχολογικής Εταιρείας (American Psychological Association, 2021), οι μαθητές βίωσαν αυξημένο άγχος και κατάθλιψη κατά τη διάρκεια περιόδων εξ αποστάσεως μάθησης. Αυτά τα ζητήματα επηρέασαν δυσανάλογα τους μαθητές από ευάλωτα περιβάλλοντα που δεν διέθεταν ασφαλείς, ήσυχους χώρους για μελέτη ή συναισθηματική υποστήριξη στο σπίτι.

Η ποιότητα της διδασκαλίας είναι επίσης ένα διαρκές ζητούμενο κατά τον ψηφιακό μετασχηματισμό της εκπαίδευσης. Έρευνες δείχνουν ότι ενώ σχολικοί οργανισμοί έχουν προσαρμόσει επιτυχώς τα προγράμματα σπουδών σε διαδικτυακές μορφές, δυσκολεύονται να υιοθετήσουν τη νέα φιλοσοφία και συνήθως μεταφέρουν το υφιστάμενο διδακτικό υλικό σε ψηφιακή μορφή χωρίς τον απαιτούμενο επανασχεδιασμό, οδηγώντας σε μια παραδοσιακή διδασκαλία ντυμένη με στοιχεία τεχνολογίας. Απαιτούνται συστήματα αποτίμησης, πρωτοτυποποίησης και αξιολόγησης της ψηφιακής εκπαίδευσης για τη διασφάλιση της ποιότητας.

Ψηφιακή Εκπαίδευση και Ακαδημαϊκή Επίδοση

Οι ακαδημαϊκές επιδόσεις σε ψηφιακά περιβάλλοντα ποικίλλουν σημαντικά ανάλογα με την ποιότητα της παράδοσης, την ψηφιακή πρόσβαση και την ετοιμότητα των μαθητών. Η έρευνα που συγκρίνει τα διαδικτυακά και τα διά ζώσης μαθησιακά αποτελέσματα αποκαλύπτει μικτά αποτελέσματα. Άρθρο με συστηματική ανασκόπηση 18 μελετών που αξιολογούν την επίδραση της online μάθησης στην απόδοση και την εμπλοκή των μαθητών καταλήγει ότι σε περιπτώσεις όπου υπήρχε καλή πρόσβαση, υψηλό κίνητρο και διαδραστική προσέγγιση διδασκαλίας, οι επιδόσεις συχνά βελτιώνονταν. Ωστόσο, παρουσιάζονται και προβλήματα όπως απογοήτευση, απομόνωση και μειωμένη αλληλεπίδραση με τον εκπαιδευτικό και με τους συμμαθητές (Akpen, et al. 2024). Στην πρωτοβάθμια και δευτεροβάθμια εκπαίδευση, οι μαθητές που δεν έχουν πρόσβαση σε αξιόπιστο διαδίκτυο, υποστηρικτικά μαθησιακά περιβάλλοντα ή δεν διαθέτουν ισχυρές δεξιότητες ψηφιακού γραμματισμού τείνουν να υστερούν σε διαδικτυακά περιβάλλοντα (Kuhfeld et al., 2020). Η απώλεια μάθησης, ιδιαίτερα στα μαθηματικά και τις φυσικές επιστήμες, έχει τεκμηριωθεί σε πολλές χώρες κατά τη διάρκεια παρατεταμένων περιόδων ψηφιακής διδασκαλίας.

Οι πρακτικές αξιολόγησης συνιστούν επίσης μία μεγάλη πρόκληση. (Çekiç & Bakla 2021). Οι διαδικτυακές εξετάσεις εγείρουν ανησυχίες σχετικά με την ακαδημαϊκή ακεραιότητα, την προσβασιμότητα και την αξιοπιστία των υφιστάμενων τεχνολογιών. Επιπλέον, πολλές αξιολογήσεις δεν έχουν προσαρμοστεί ώστε να καταγράφουν δεξιότητες κριτικής σκέψης. Ως εκ τούτου, η αξιολόγηση στην ψηφιακή εκπαίδευση παραμένει ένας τομέας που χρειάζεται εξέλιξη.

Θεσμική Διασφάλιση Ποιότητας στην Ψηφιακή Εποχή

Η διασφάλιση της ποιότητας των εκπαιδευτικών εμπειριών στην ψηφιακή εποχή αποτελεί αυξανόμενη ανησυχία για τους υπεύθυνους χάραξης πολιτικής και τους εμπλεκόμενους στη διδακτική και μαθησιακή διαδικασία. Τα παραδοσιακά πλαίσια διασφάλισης της ποιότητας είναι συχνά ακατάλληλα για την αξιολόγηση διαδικτυακών και υβριδικών μοντέλων μάθησης, καθιστώντας αναγκαία την ανάπτυξη νέων σημείων αναφοράς και εργαλείων παρακολούθησης.

Εγείρονται ποικίλα ερωτήματα και προκλήσεις διασφάλισης ψηφιακής ποιότητας που σχετίζονται με: 1. *Προσβασιμότητα:* Τα ψηφιακά μέσα μπορούν να χρησιμοποιηθούν από όλους τους μαθητές, συμπεριλαμβανομένων των ατόμων με αναπηρίες; 2. *Παιδαγωγική Αρτιότητα:* Ο σχεδιασμός του ψηφιακού μαθήματος υποστηρίζει την αποτελεσματική μάθηση; 3. *Εγκυρότητα Αξιολόγησης:* Οι αξιολογήσεις ευθυγραμμίζονται με τους μαθησιακούς στόχους και παρέχονται δίκαια; 4. *Ετοιμότητα Εκπαιδευτικών:* Εκπαιδεύονται οι εκπαιδευτές στην ηλεκτρονική παιδαγωγική και την παιδαγωγική αξιοποίηση τεχνολογικών εργαλείων; 5. *Υποστήριξη Μαθητών:* Υπάρχουν ισχυρά συστήματα ακαδημαϊκής συμβουλευτικής, ψυχικής υγείας και τεχνικής βοήθειας;

Οργανισμοί, όπως η Quality Matters (2022) και η European Association for Quality Assurance in Higher Education (ENQA), έχουν αναπτύξει πλαίσια για την αξιολόγηση της ποιότητας της ψηφιακής εκπαίδευσης, αλλά η υιοθέτηση αυτών των συστημάτων είναι ζητούμενο, ώστε τα εκπαιδευτικά πρότυπα να ενσωματώνουν μετρήσιμους δείκτες ποιότητας, καθώς και διαδικασίες διαπίστευσης ενταγμένες στον στρατηγικό προγραμματισμό κάθε σχολικού οργανισμού.

Η ΣΗΜΑΣΙΑ ΤΟΥ ΚΕΝΤΡΙΚΟΥ ΣΧΕΔΙΑΣΜΟΥ ΚΑΙ ΤΩΝ ΣΤΡΑΤΗΓΙΚΩΝ ΧΩΡΙΣ ΑΠΟΚΛΕΙΣΜΟΥΣ

Για την αντιμετώπιση της ψηφιακής ανισότητας, οι ad hoc ή αποσπασματικές λύσεις είναι ανεπαρκείς. Ο ψηφιακός μετασχηματισμός της εκπαίδευσης απαιτεί ολοκληρωμένες, μακρόπνοες στρατηγικές που συνδυάζουν την ανάπτυξη υποδομών, πολιτικών χωρίς αποκλεισμούς και συστημική μεταρρύθμιση. Ο κεντρικός σχεδιασμός είναι ιδιαίτερα σημαντικός για τη διασφάλιση ότι οι αποφάσεις είναι δίκαιες και βιώσιμες.

Μια πολύπλευρη στρατηγική θα πρέπει να περιλαμβάνει: 1.*Επέκταση Υποδομών:* Οι κυβερνήσεις πρέπει να επενδύσουν στην επέκταση της ευρυζωνικότητας, ειδικά σε αγροτικές και υποεξυπηρετούμενες περιοχές, και να διασφαλίσουν ότι κάθε μαθητής έχει πρόσβαση σε τουλάχιστον μια συσκευή που υποστηρίζει την ψηφιακή εκπαίδευση, 2. *Εκπαίδευση σε Ψηφιακές Δεξιότητες:* Τα σχολεία θα πρέπει να ενσωματώσουν τον ψηφιακό γραμματισμό σε όλα τα προγράμματα σπουδών, ξεκινώντας από τις πρώτες τάξεις φοίτησης και επεκτείνοντας το πλάνο στην εκπαίδευση ενηλίκων και την κατάρτιση των εκπαιδευτικών, 3. *Μοντέλα Χρηματοδότησης με Βάση τα Ίδια Κεφάλαια:* Η εκπαιδευτική χρηματοδότηση πρέπει να αναδιαρθρωθεί για να υποστηρίξει ιδρύματα που εξυπηρετούν ευάλωτες κοινωνικές ομάδες και πληθυσμούς, επιτρέποντας τη δίκαιη ανάπτυξη ψηφιακών πόρων, 4. *Συμπράξεις Δημόσιου-Ιδιωτικού Τομέα:* Η συνεργασία με εταιρείες τεχνολογίας μπορεί να επιταχύνει την ανάπτυξη υποδομών και περιεχομένου, αλλά πρέπει να διέπεται από αυστηρά πρότυπα ποιότητας, ισότητας και προστασίας της ιδιωτικής ζωής, 5. *Συνεχής Παρακολούθηση και Αξιολόγηση:* Οι πολιτικές πρέπει να καθοδηγούνται από δεδομένα, να προσαρμόζονται με βάση την αποτελεσματικότητα, τη συμμετοχικότητα και τις εξελισσόμενες ανάγκες των μαθητών.

Δεδομένου ότι η τεχνολογική πρόοδος υπερβαίνει τα σύνορα, απαιτούνται συντονισμένες παγκόσμιες προσπάθειες για την ανταλλαγή βέλτιστων πρακτικών, την παροχή οικονομικής στήριξης σε χώρες χαμηλού εισοδήματος και την πρόληψη της εμβάθυνσης των παγκόσμιων εκπαιδευτικών ανισοτήτων.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Ο ψηφιακός μετασχηματισμός στην εκπαίδευση παρουσιάζει τόσο πρωτοφανείς ευκαιρίες όσο και σοβαρές προκλήσεις. Από τη μία πλευρά, η τεχνολογία επιτρέπει εξατομικευμένη, προσβάσιμη και κλιμακούμενη μάθηση. Από την άλλη, κινδυνεύει να εδραιώσει τις υφιστάμενες ανισότητες και να δημιουργήσει νέες μορφές αποκλεισμού εάν δεν εφαρμοστεί προσεκτικά.

Αυτή η εργασία διερευνά την πολυπλοκότητα της ψηφιακής ανισότητας στην εκπαίδευση μέσα από πολλαπλές οπτικές: κοινωνικοοικονομικές, γεωγραφικές, δημογραφικές, θεσμικές και καθοδηγούμενες από την εκάστοτε εκπαιδευτική πολιτική. Στο πλαίσιο αυτό, αναδείχτηκε ότι η ψηφιακή πρόσβαση και επιτυχία δεν καθορίζεται μόνο από την παρουσία συσκευών ή συνδέσεων στο διαδίκτυο, αλλά και από τις ψηφιακές δεξιότητες εκπαιδευτών και

εκπαιδευόμενων, την ποιότητα των παιδαγωγικών εργαλείων και τεχνικών, την ηγεσία του σχολικού οργανισμού και τη συνεχή δέσμευση της εκάστοτε πολιτικής ηγεσία.

Για να διασφαλιστεί ότι τα οφέλη του ψηφιακού μετασχηματισμού κατανέμονται δίκαια, πρέπει να υιοθετηθεί μια ολιστική και χωρίς αποκλεισμούς προσέγγιση - μια προσέγγιση που δίνει προτεραιότητα στις υποδομές και την κατάρτιση, διασφαλίζει την ποιότητα της εκπαίδευσης και αντιμετωπίζει τους κοινωνικούς ανασταλτικούς παράγοντες της ψηφιακής επιτυχίας. Καθώς το παγκόσμιο εκπαιδευτικό σύστημα συνεχίζει να εξελίσσεται, η ισότητα πρέπει να παραμείνει στο επίκεντρο των στρατηγικών ψηφιακής εκπαίδευσης. Χωρίς μια τέτοια δράση, ο ψηφιακός μετασχηματισμός μπορεί να γίνει εργαλείο διαστρωμάτωσης και όχι ισότητας.

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ΨΗΦΙΑΚΕΣ ΑΝΙΣΟΤΗΤΕΣ ΜΕ ΤΗΝ ΕΛΕΥΣΗ ΤΟΥ 21ΟΥ ΑΙΩΝΑ

Ροντογιάννης Άγγελος
Εκπαιδευτικός Πληροφορικής – Μουσικής (ΠΕ86 –ΤΕ16) MSc
Υ.παι.θ., Ελλάδα
Email: arondo@sch.gr

Δρ. Πλασκασοβίτη Αμαλία
Εκπαιδευτικός Γερμανικής Φιλολογίας (ΠΕ07)
Υ.παι.θ, Ελλάδα
Email: amaliaplaskoviti@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εστιάζεται στο ψηφιακό χάσμα (ψηφιακός αναλφαβητισμός) και τις ανισότητες που προκύπτουν και αφορά στη θεμελιώδη γνώση που σχετίζεται με τη χρήση του διαδικτύου, τη χρήση ψηφιακών εργαλείων (επεξεργασία κειμένων, αποστολή ηλεκτρονικής αλληλογραφίας κ.λπ.). Σε ένα σύγχρονο περιβάλλον υπέρ-πληροφόρησης και τεχνολογικής επανάστασης με την έλευση του 21ου αιώνα το να μην είναι σε θέση ένα άτομο να χρησιμοποιεί σωστά μια ψηφιακή συσκευή (κινητό) ή να μην μπορεί να χρησιμοποιήσει ένα ηλεκτρονικό υπολογιστή στη καθημερινότητα ακούγεται απίθανο και έρχεται σε σύγκρουση με την κοινή λογική.

Ο ψηφιακός αναλφαβητισμός είναι η αδυναμία του ατόμου να χρησιμοποιήσει την ψηφιακή τεχνολογία και τις δυνατότητες που προσφέρει μέσω των εφαρμογών της στην καθημερινότητα (εργασία, εκπαίδευση, επικοινωνία, γεγονότα που επηρεάζουν και διαμορφώνουν τη ζωή). Η αδυναμία της γνώσης των ψηφιακών τεχνολογιών και δυνατοτήτων επιφέρει σοβαρές συνέπειες σε κοινωνικό και οικονομικό επίπεδο (εκπαίδευση, εργασία, κοινωνική συμμετοχή). Αυτό ως συνέπεια έχει πρακτικό και κοινωνικό αντίκτυπο στο ψηφιακό αναλφάβητο άτομο με τη δημιουργία ανισότητας και μη ίσης αντιμετώπισης σε διάφορες πτυχές της καθημερινότητας του.

Η εργασία μας εστιάζεται στην έρευνα που υλοποιήθηκε στο σχολείο μας (2ο Πειραματικό Λύκειο Λευκάδας «Άγγελος Σικελιανός») κατά την τρέχουσα σχολική χρονιά (2024-2025) στα πλαίσια των δράσεων του ενεργού πολίτη (δράσεις ενίσχυσης της Ενεργού Πολιτειότητας του Ινστιτούτου Εκπαιδευτικής Πολιτικής – ΙΕΠ). Ο σκοπός της δράσης ήταν οι μαθητές/τριες που έχουν αναπτύξει τεχνολογικές δεξιότητες (ως ένα βαθμό) να βοηθήσουν και άλλα άτομα (γονείς, παπούδες , συγγενείς κ.λπ.) να αποκτήσουν βασικές ψηφιακές δεξιότητες (επικοινωνία με τους οικείους του, με δημόσιες υπηρεσίες και τράπεζες), οι οποίες να είναι χρήσιμες για τη ζωή τους. Επίσης οι μαθητές/τριες μέσα από τη διαδικασία της έρευνας να αντιληφθούν και οι ίδιοι / ίδιες τις μορφές, τις αιτίες και τους τρόπους μείωσης των ψηφιακών ανισοτήτων που υπάρχουν (πρόσβαση, επιρροή και δημιουργία σε περιεχόμενο και συμμετοχή, εκπαίδευση , βελτίωση υποδομών, τεχνολογικές πολιτικές).

Η μεθοδολογία της έρευνας στηρίχθηκε στα στάδια της επιλογής συμμετεχόντων από διάφορες κοινωνικές ομάδες (ηλικία, φύλο, περιοχές, οικονομικό επίπεδο, εκπαίδευση) με τη χρήση ερωτηματολογίων (διαδικτυακά ή δια ζώσης) με κλειστές ερωτήσεις, προσωπικών συναντήσεων και ανάλυση των ποσοτικών δεδομένων, καθώς και τη μελέτη δεδομένων από διάφορους οργανισμούς (Unesco, Eurostat) και δημοσίων βάσεων πληροφοριών και τη σύγκριση τους με τη έρευνα των μαθητών. Οι μαθητές/τριες συμμετείχαν σε όλες τις φάσεις υλοποίησης της εργασίας, τον καθορισμό των στόχων της δράσης μέσω της καταγραφής και ανάλυσης της υπάρχουσας κατάστασης, τη συλλογή-ανάλυση των δεδομένων, τη συμμετοχή με εμπλεκόμενους φορείς (δημόσιων αρχών και ιδιωτικού τομέα) και της ευαισθητοποίησης. Τέλος, οι μαθητές / μαθήτριες, στηριζόμενοι στα αποτελέσματα της ανάλυσης των δεδομένων για τη βελτίωση του ψηφιακού γραμματισμού και τη μείωση του ψηφιακού χάσματος διατύπωσαν και κατέγραψαν τις δικές τους προτάσεις.

Η έρευνα υπογραμμίζει τη σημασία της ανάπτυξης ψηφιακών δεξιοτήτων στους μαθητές, καθώς η τεχνολογία αποτελεί πλέον βασικό εργαλείο μάθησης και εξέλιξης. Μπορεί να εξασφαλίσει μια πιο δίκαιη κοινωνία, όπου όλα τα άτομα θα έχουν τα εργαλεία που χρειάζονται για να επιτύχουν σε έναν ψηφιακό κόσμο. Η μείωση των ψηφιακών ανισοτήτων αλλά και ταυτόχρονα η ενίσχυση της ισότιμης πρόσβασης σε ψηφιακές τεχνολογίες και ψηφιακές ευκαιρίες ενισχύει τη κοινωνική συνοχή και καινοτομία σε όλες τις κοινωνικές ομάδες.

Λέξεις–κλειδιά: Ψηφιακός γραμματισμός – αναλφαβητισμός, ψηφιακό χάσμα, ανισότητες στη χρήση της τεχνολογίας, e-skills.

ΕΙΣΑΓΩΓΗ

Η τεχνολογική πρόοδος του 21ου αιώνα έχει επηρεάσει σε βάθος την κοινωνική, εκπαιδευτική και επαγγελματική ζωή. Ωστόσο, η άνιση πρόσβαση και χρήση των τεχνολογιών δημιουργεί ένα νέο είδος κοινωνικής ανισότητας: τις ψηφιακές ανισότητες. Ο ψηφιακός αναλφαβητισμός, δηλαδή η αδυναμία χρήσης βασικών ψηφιακών εργαλείων, αποτελεί σημαντικό εμπόδιο στη συμμετοχή των πολιτών στη σύγχρονη κοινωνία. Η ψηφιακή τεχνολογία εξελίσσεται ραγδαία και επηρεάζει όλους τους τομείς της ανθρώπινης δραστηριότητας: εκπαίδευση, εργασία, επικοινωνία, πολιτική συμμετοχή. Ωστόσο, δεν έχουν όλοι οι πολίτες τις ίδιες δυνατότητες πρόσβασης ή επάρκειας στη χρήση των τεχνολογιών. Η «ψηφιακή ανισότητα» αποτελεί πλέον έναν από τους σημαντικότερους παράγοντες κοινωνικού αποκλεισμού.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Ο όρος "ψηφιακό χάσμα" (digital divide) περιγράφει την απόσταση μεταξύ εκείνων που έχουν πρόσβαση και γνώσεις στις ψηφιακές τεχνολογίες και εκείνων που στερούνται αυτών. Οι ψηφιακές δεξιότητες (e-skills) είναι πλέον απαραίτητες για την πρόσβαση σε πληροφορίες, την επικοινωνία, την εργασία και την εκπαίδευση. Η έλλειψή τους οδηγεί σε κοινωνικό αποκλεισμό και διεύρυνση των ανισοτήτων. Ο ψηφιακός αναλφαβητισμός αναφέρεται στην αδυναμία χρήσης βασικών ψηφιακών μέσων και εργαλείων (ηλεκτρονικό ταχυδρομείο, πλοήγηση στο διαδίκτυο, χρήση εφαρμογών). Τα αίτια μπορεί να σχετίζονται με το μορφωτικό επίπεδο, την ηλικία, το φύλο, το γεωγραφικό περιβάλλον και το οικονομικό υπόβαθρο. Οι επιπτώσεις εκτείνονται σε κοινωνικό, επαγγελματικό και πολιτικό επίπεδο.

ΜΕΘΟΔΟΛΟΓΙΑ ΕΡΕΥΝΑΣ

Η έρευνα διεξήχθη στο 2ο Πειραματικό Λύκειο Λευκάδας «Άγγελος Σικελιανός» τη σχολική χρονιά 2024–2025, στο πλαίσιο του προγράμματος Ενεργού Πολιτειότητας του ΙΕΠ.

- **Δείγμα:** Μαθητές/τριες Α’, Β’ Λυκείου και ενήλικες (γονείς, παππούδες, συγγενείς).
- **Μέσα συλλογής δεδομένων:** Ερωτηματολόγια (ηλεκτρονικά και έντυπα), προσωπικές συνεντεύξεις, παρατήρηση.
- **Στάδια:**
    1. Καταγραφή υπάρχουσας κατάστασης
    2. Εκπαίδευση μαθητών σε βασικές δεξιότητες διδασκαλίας
    3. Διδασκαλία ενηλίκων από μαθητές
    4. Ανάλυση ποσοτικών και ποιοτικών δεδομένων

Σύνοψη δεδομένων
Μεταβλητές:

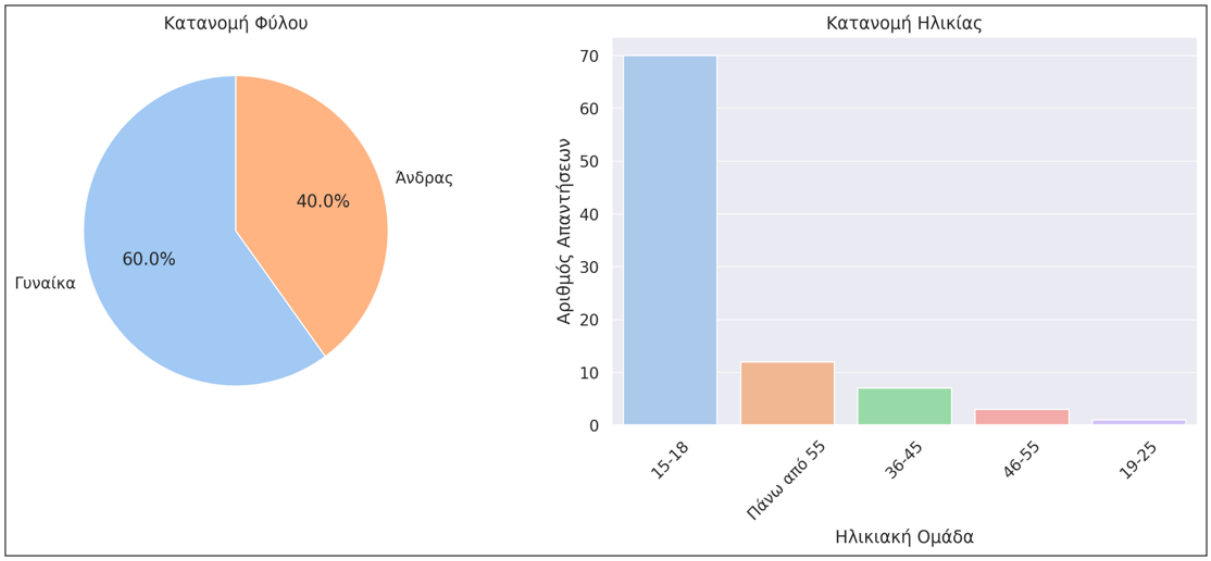
- Φύλο: Άνδρας / Γυναίκα
- Ηλικιακή ομάδα: 15-18, 19-25, 36-45, 46-55, Πάνω από 55
- Τύπος δυσκολίας:
- Η έλλειψη βασικών δεξιοτήτων χρήσης ψηφιακών εργαλείων
- Η αδυναμία ανάγνωσης και γραφής στο διαδίκτυο
- Η μη πρόσβαση σε υπολογιστές και ίντερνετ
- Συχνότητα εμφάνισης: Ποτέ, Σπάνια, Συχνά, Πολύ συχνά
- Επίπεδο άνεσης: Καθόλου άνετος/η, Λίγο άνετος/η, Άνετος/η, Πολύ άνετος/η

ΑΝΑΛΥΣΗ ΕΡΕΥΝΑΣ

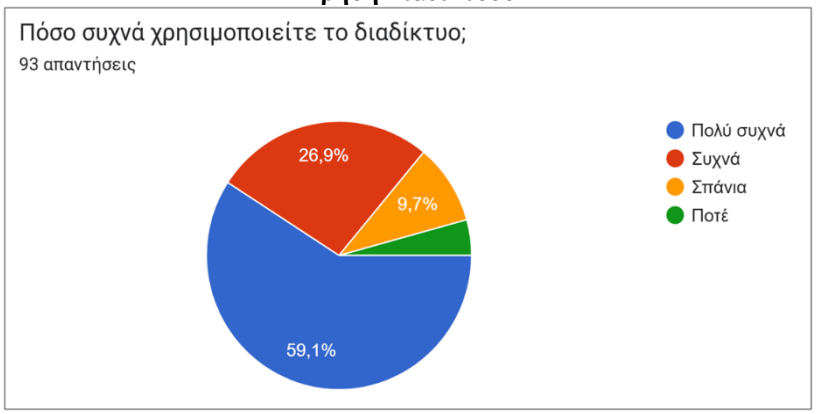
Το ερωτηματολόγιο της έρευνας δημιουργήθηκε για να ανιχνευθούν δεδομένα και πληροφορίες σχετικά με τον **αντίκτυπο του ψηφιακού αναλφαβητισμού στην κοινωνία**, με δημογραφικά στοιχεία (φύλο, ηλικία), απόψεις, και εμπειρίες των συμμετεχόντων.

Δημογραφική Ανάλυση (Εικόνα 5)**:**
Φύλο: Η πλειοψηφία των απαντήσεων προέρχεται από **Γυναίκες**.
Ηλικία: Η πιο συχνή ηλικιακή ομάδα είναι **15-18 ετών**, ενώ υπάρχουν και απαντήσεις από μεγαλύτερες ηλικίες, όπως **άνω των 55**. Το συμπέρασμα είναι ότι το φαινόμενο αφορά **πολλές ηλικιακές ομάδες**, με κυρίαρχη εκπροσώπηση από τη νεολαία.

Εικόνα 6
Δημογραφικά Στοιχεία

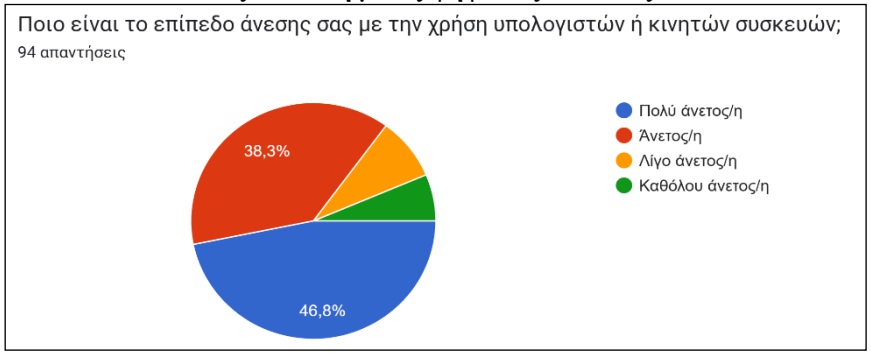


Εικόνα 7
Χρήση Διαδικτύου



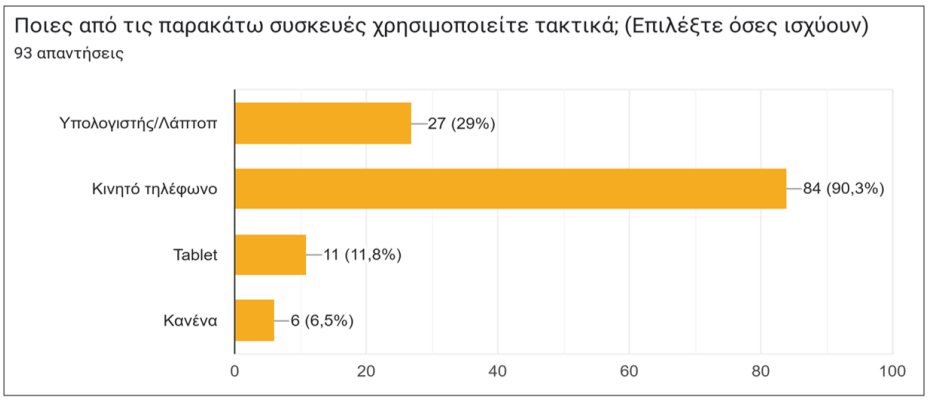
Η πλειοψηφία των συμμετεχόντων δήλωσε ότι χρησιμοποιεί το διαδίκτυο **συχνά** ή **πολύ συχνά**. Λίγοι δήλωσαν **σπάνια** χρήση, κάτι που δείχνει ότι η **ψηφιακή πρόσβαση** είναι γενικά διαδεδομένη και παρά την πρόσβαση, ο ψηφιακός αναλφαβητισμός ενδέχεται να σχετίζεται με **ποιότητα χρήσης**, όχι μόνο με συχνότητα. Το **συ**μπέρασμα είναι ότι η πρόσβαση στο διαδίκτυο είναι **ευρέως διαδεδομένη**, το πρόβλημα του ψηφιακού αναλφαβητισμού **δεν έγκειται στην πρόσβαση**, αλλά στη **χρήση και κατανόηση**.

Εικόνα 8
Εξοικείωση με τις ψηφιακές συσκευές



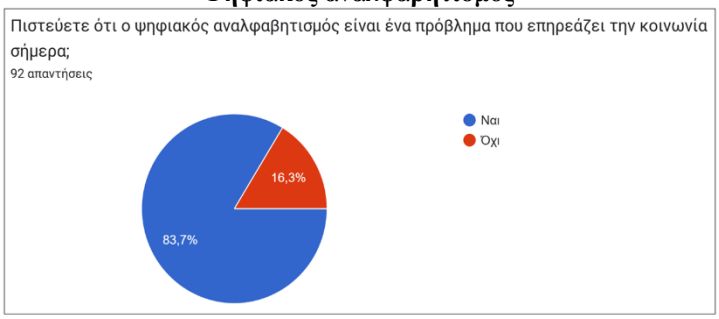
Οι περισσότεροι συμμετέχοντες δήλωσαν ότι νιώθουν **πολύ άνετα** ή **αρκετά άνετα** με τα τεχνολογικά μέσα. Ωστόσο, καταγράφηκε και ένα **ποσοστό που δηλώνει μικρή ή καθόλου άνεση**, ιδιαίτερα σε μεγαλύτερες ηλικίες. Παρά τη συχνή χρήση, **δεν νιώθουν όλοι εξοικειωμένοι** με την τεχνολογία. Υπάρχει **σημαντικό ποσοστό με χαμηλή ψηφιακή αυτοπεποίθηση**, ιδίως σε **μεγαλύτερες ηλικίες**.

Εικόνα 9
Χρήση Ψηφιακής Συσκευής



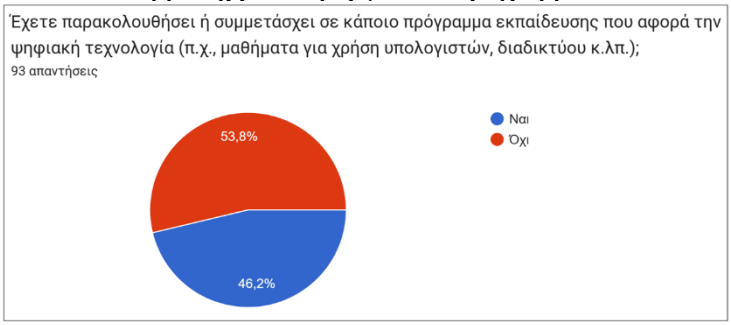
Το μεγαλύτερο ποσοστό των ερωτηθέντων χρησιμοποιεί το κινητό τηλέφωνο ως ψηφιακή συσκευή για τη διεκπεραίωση διαφόρων αναγκών της καθημερινότητας (επικοινωνία, αναζήτηση πληροφοριών, παραγγελία προϊόντων κλπ). Προφανώς το κινητό τηλέφωνο εξυπηρετεί και προσφέρει τεράστια γκάμα ψηφιακών δυνατότητων με αποτέλεσμα να είναι η πιο δημοφιλής ηλεκτρονική συσκευή. Ακολουθεί **ο φορητός υπολογιστής/υπολογιστής** με ικανοποιητικό ποσοστό, ο οποίος χρησιμοποιείται για εργασίες που απαιτούν αυξημένες υπολογιστικές ανάγκες (σχεδιασμό προϊόντων, αρχιτεκτονικά/μηχανολογικά σχέδια κλπ.).

Εικόνα 10
Ψηφιακός αναλφαβητισμός

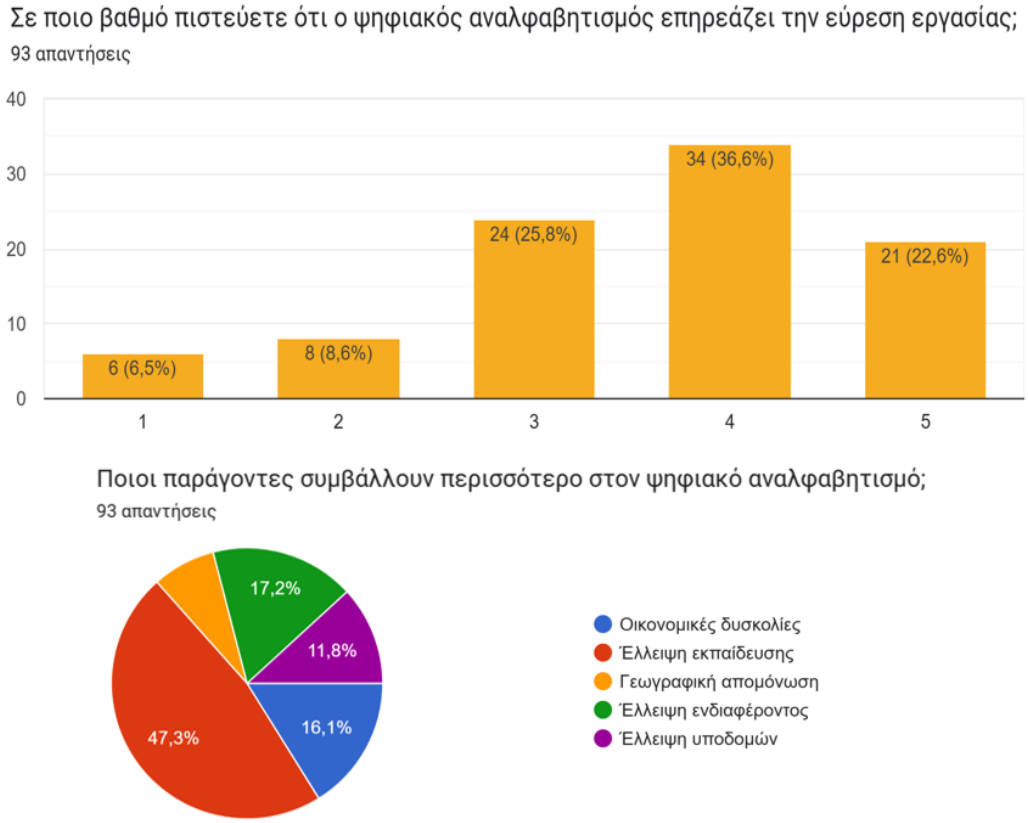


Το μεγαλύτερο ποσοστό έχει αντιληφθεί ότι ο ψηφιακός αναλφαβητισμός επηρεάζει άμεσα την καθημερινότητα και το τρόπο αλληλεπίδρασης με τον ιστό της κοινωνίας. Η **τεράστια πλειοψηφία** χρησιμοποιεί καθημερινά ή πολύ συχνά το διαδίκτυο, γεγονός που δείχνει **ευρεία πρόσβαση** στην τεχνολογία. Άρα, το πρόβλημα του ψηφιακού αναλφαβητισμού **δεν σχετίζεται με την πρόσβαση**, αλλά με **τον τρόπο χρήσης και τις δεξιότητες**.

Εικόνα 11
Συμμετοχή σε επιμορφωτικά προγράμματα



Εικόνα 12
Εύρεση εργασίας και παραγοντες ψηφιακού αναφαλβητισμού



Το μεγαλύτερο ποσοστό (36,6%) των ερωτηθέντων θεωρεί ο ψηφιακός αναλφαβητισμός επηρεάζει την εύρεση εργασίας, ενώ ως βασικό παράγοντα του ψηφιακού αναλφαβητισμού αναφέρθηκε **η έλλειψη εκπαίδευσης (σε ποσοστό (47,3%).** Η εύρεση εργασίας πλέον στο παρόν και στο μέλλον θα έχει να κάνει με τις ψηφιακές δεξιότητες που θα διαθέτει κάποιος και που θα μπορεί να αξιοποίησει. Επίσης η έλλειψη εκπαίδευσης είναι το πιο σημαντικό μέρος το οποίο θα πρέπει να βρεθεί λύση ώστε να μην αποκλείονται κοινωνικές ομάδες.

Εικόνα 13
Συνέπειες και προτάσεις



Η έλλειψη εκπαίδευσης στη χρήση ψηφιακών δεξιοτήτων οδηγεί σύμφωνα με το παραπάνω διάγραμμα σε μειωμένες επαγγελματικές ευκαιρίες και προοπτικές αλλά και σε κοινωνική απομόνωση των ανθρώπων. Όπως προκύπτει από την έρευνα, η δημιουργία εκπαιδευτικών προγραμμάτων, δωρεάν μαθημάτων και επιμορφωτικών προγραμμάτων πρέπει να αποτελέσει σημαντική μέριμνα ώστε να μειωθούν οι ψηφιακές ανισότητες και να υπάρξει μια μεγαλύτερη ισορροπία όσον αφορά τις ψηφιακές δεξιότητες των ανθρώπων.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η πλειονότητα των συμμετεχόντων δήλωσε σημαντική βελτίωση στις βασικές έννοιες των ψηφιακών δεξιοτήτων. Οι μαθητές / μαθήτριες ανέπτυξαν αυξημένη κατανόηση του κοινωνικού ρόλου της τεχνολογίας και της έννοιας της ισότητας στην πρόσβαση. Η σύγκριση με διεθνή δεδομένα ανέδειξε την Ελλάδα ως χώρα με μέτρια ψηφιακή ετοιμότητα, αλλά υψηλό ενδιαφέρον για συμπερίληψη.

- Σημαντικό ποσοστό ενηλίκων (ειδικά μεγαλύτερης ηλικίας) δεν γνώριζε τη χρήση email, ψηφιακών εφαρμογών επικοινωνίας και πρόσβασης σε δημόσιες υπηρεσίες.
- Οι μαθητές / μαθήτριες ανέπτυξαν δεξιότητες συνεργασίας, ενσυναίσθησης και κοινωνικής προσφοράς.
- Οι ενήλικες ανέφεραν βελτίωση στην καθημερινή τους αυτονομία (π.χ. χρήση gov.gr, τραπεζικών συναλλαγών, επικοινωνία με συγγενείς).
- Ο ψηφιακός αναλφαβητισμός δεν είναι απλώς τεχνολογικό, αλλά κοινωνικό ζήτημα.
- Απαιτεί **συντονισμένη δράση** από εκπαίδευση, τοπική αυτοδιοίκηση και κράτος.
- Η εξάλειψή του θα οδηγήσει σε μεγαλύτερη ισότητα, συμμετοχή και ευκαιρίες.

ΣΥΖΗΤΗΣΗ – ΣΥΜΠΕΡΑΣΜΑΤΑ

Η έρευνα ανέδειξε τη σημασία της εκπαίδευσης στον ψηφιακό γραμματισμό, τόσο για τη μείωση του κοινωνικού αποκλεισμού όσο και για την ενίσχυση της διαγενεακής συνεργασίας. Η δράση αυτή προσέφερε ένα πρότυπο εκπαιδευτικής παρέμβασης με πρακτικό και κοινωνικό αντίκτυπο. Η μείωση του ψηφιακού αναλφαβητισμού είναι ζωτικής σημασίας για την ισότιμη κοινωνική συμμετοχή. Η προώθηση του ψηφιακού γραμματισμού συμβάλλει στη δημοκρατική λειτουργία, την καινοτομία και τη συνοχή των κοινωνιών. Τα σχολεία μπορούν να αποτελέσουν κόμβους γνώσης και δράσης για την επίτευξη αυτού του στόχου.

Η εκπαίδευση μπορεί να λειτουργήσει ως βασικός μοχλός για τη γεφύρωση του ψηφιακού χάσματος. Η ενεργός συμμετοχή των μαθητών σε δράσεις κοινωνικής ωφέλειας ενισχύει τη διαγενεακή συνεργασία και προωθεί την έννοια της ψηφιακής υπευθυνότητας. Η ενσωμάτωση παρόμοιων προγραμμάτων σε εθνικό επίπεδο θα μπορούσε να συμβάλει στη μείωση των ανισοτήτων. Η καταπολέμηση του ψηφιακού αναλφαβητισμού δεν είναι μόνο τεχνικό ζήτημα αλλά και κοινωνικό. Η ενίσχυση των ψηφιακών δεξιοτήτων αποτελεί κρίσιμο παράγοντα για την ενδυνάμωση των πολιτών, την κοινωνική συνοχή και την προώθηση της καινοτομίας.

ΠΡΟΤΑΣΕΙΣ – ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΕΚΤΑΣΕΙΣ

Κύριες Προκλήσεις στη Χρήση της Τεχνολογίας

Οι κύριες προκλήσεις που αντιμετωπίζονται κατά τη χρήση της τεχνολογίας είναι:

- **Κακή σύνδεση στο διαδίκτυο:** Έλλειψη υποδομών.
- **Έλλειψη εκπαίδευσης:** Η βασική πρόκληση για πολλούς.
- **Τεχνικά προβλήματα:** Δυσκολίες που προκύπτουν από τη χρήση της τεχνολογίας.
- **Έλλειψη υποδομών:** Γενικότερο πρόβλημα, εκτός από τη σύνδεση.

Προτεινόμενες Δράσεις για την Ενίσχυση της Ψηφιακής Εκπαίδευσης

Για την ενίσχυση της ψηφιακής εκπαίδευσης στην κοινότητα, προτείνονται:

- **Δωρεάν σεμινάρια/προγράμματα εκμάθησης ψηφιακών δεξιοτήτων:** Για όλες τις ηλικίες.
- **Ενίσχυση της σχολικής εκπαίδευσης στην πληροφορική:** Περισσότερες ώρες, πιο ενδιαφέρον μάθημα.
- **Δημοτικές δράσεις και ενημέρωση:** Ενημερωτικές καμπάνιες και μαθήματα από τους δήμους.
- **Οικονομική υποστήριξη για απόκτηση συσκευών και πρόσβασης στο διαδίκτυο**.
- **Ειδική επιμόρφωση για ηλικιωμένους και ευάλωτες ομάδες**.

Προτάσεις για τη Μείωση του Ψηφιακού Αναλφαβητισμού

Οι προτάσεις για τη μείωση του ψηφιακού αναλφαβητισμού συνοψίζονται σε:

- **Δωρεάν και προσβάσιμα προγράμματα εκπαίδευσης:** Για όλες τις ηλικίες, με έμφαση στους ηλικιωμένους.
- **Ενίσχυση της πληροφορικής στα σχολεία:** Με καλύτερα βιβλία, περισσότερες ώρες και πρακτική εφαρμογή.
- **Κρατικά προγράμματα και επιχορηγήσεις:** Για πρόσβαση στο διαδίκτυο και απόκτηση συσκευών.
- **Ενημερωτικές καμπάνιες:** Για την ευαισθητοποίηση του κοινού.

- **Δημιουργία κινήτρων για εκμάθηση:** Να γίνει η τεχνολογία πιο ενδιαφέρουσα για όλους.
- **Βελτίωση των υποδομών:** Ειδικά σε απομακρυσμένες περιοχές.

Συνοψίζοντας, η έρευνα αναδεικνύει την αναγνώριση του ψηφιακού αναλφαβητισμού ως ένα σοβαρό κοινωνικό πρόβλημα, με πολλαπλές συνέπειες στην καθημερινότητα και την επαγγελματική ζωή. Οι προτάσεις στρέφονται κυρίως προς την ενίσχυση της εκπαίδευσης σε όλες τις ηλικίες, τη βελτίωση των υποδομών και την παροχή κινήτρων για την ψηφιακή ένταξη.

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ΠΑΡΑΡΤΗΜΑΤΑ

Ερωτηματολόγιο: Ψηφιακό Χάσμα στην Τρίτη Ηλικία
Σκοπός: Κατανόηση του βαθμού εξοικείωσης και των δυσκολιών που αντιμετωπίζουν οι ηλικιωμένοι με τις ψηφιακές τεχνολογίες.

Μέρος Α: Δημογραφικά Στοιχεία

Ομάδα εργασίας:	**Τμήμα:**
1ο: ……	
2ο: ……	
3ο:	

1. Φύλο:
   ☐ Άνδρας
   ☐ Γυναίκα
   ☐ Άλλο
2. Ηλικία:
   ☐ 60–64
   ☐ 65–69
   ☐ 70–74
   ☐ 75–79
   ☐ 80+
3. Εκπαιδευτικό επίπεδο:
   ☐ Πρωτοβάθμια
   ☐ Δευτεροβάθμια
   ☐ Ανώτερη/Ανώτατη
   ☐ Δεν πήγα σχολείο

Μέρος Β: Πρόσβαση & Χρήση Τεχνολογιών

4. Έχετε στο σπίτι σας: (επιλέξτε όλα όσα ισχύουν)
   ☐ Υπολογιστή (desktop/laptop)
   ☐ Tablet
   ☐ Έξυπνο κινητό (smartphone)
   ☐ Σύνδεση στο διαδίκτυο (Internet)
5. Χρησιμοποιείτε ηλεκτρονικό υπολογιστή ή κινητό τηλέφωνο;
   ☐ Καθημερινά
   ☐ Μερικές φορές την εβδομάδα
   ☐ Σπάνια
   ☐ Ποτέ
6. Χρησιμοποιείτε το διαδίκτυο;
   ☐ Καθόλου
   ☐ Σπάνια
   ☐ Τακτικά
   ☐ Καθημερινά

7. Για ποιους λόγους χρησιμοποιείτε την τεχνολογία; (επιλέξτε όλα όσα ισχύουν)
   ☐ Επικοινωνία με οικογένεια/φίλους (π.χ. Viber, WhatsApp)
   ☐ Ανάγνωση ειδήσεων
   ☐ Πληρωμές/συναλλαγές (e-banking)
   ☐ Ιατρικές υπηρεσίες (π.χ. myHealth, ραντεβού)
   ☐ Ψυχαγωγία (π.χ. YouTube, παιχνίδια)
   ☐ Δεν χρησιμοποιώ
8. Ποια από τις παρακάτω δραστηριότητες έχετε κάνει στο διαδίκτυο; (επιλέξτε όσες ισχύουν)
   ☐ Αναζήτηση πληροφοριών (π.χ. Google)
   ☐ Παρακολούθηση βίντεο (π.χ. YouTube)

☐ Επικοινωνία (Viber, WhatsApp)
☐ Ηλεκτρονικές υπηρεσίες (π.χ. gov.gr, e-banking)
☐ Κανένα από τα παραπάνω

Μέρος Γ: Δυσκολίες & Αντιλήψεις

7. Πόσο άνετα αισθάνεστε με τη χρήση της τεχνολογίας;
   ☐ Πολύ άνετα
   ☐ Αρκετά άνετα
   ☐ Όχι ιδιαίτερα άνετα
   ☐ Καθόλου άνετα
8. Ποιες δυσκολίες αντιμετωπίζετε;
   ☐ Δυσκολία στην κατανόηση της λειτουργίας
   ☐ Φόβος μήπως κάνω λάθος
   ☐ Έλλειψη υποστήριξης από άλλους
   ☐ Οικονομικό κόστος
   ☐ Καμία ιδιαίτερη δυσκολία
9. Θα θέλατε να παρακολουθήσετε κάποιο πρόγραμμα εκμάθησης τεχνολογιών;
   ☐ Ναι
   ☐ Όχι
   ☐ Ίσως, ανάλογα με τον τρόπο και τον τόπο διεξαγωγής
10. Πιστεύετε ότι η τεχνολογία μπορεί να βελτιώσει την ποιότητα ζωής σας;
    ☐ Ναι
    ☐ Όχι
    ☐ Δεν είμαι σίγουρος/η
11. Πιστεύετε ότι οι ψηφιακές δεξιότητες είναι σημαντικές για την καθημερινή ζωή;
    ☐ Ναι
    ☐ Όχι
    ☐ Δεν είμαι σίγουρος/η
12. Θα θέλατε να μάθετε περισσότερα για την τεχνολογία;
    ☐ Ναι
    ☐ Όχι
    ☐ Ίσως

Ανοιχτές Ερωτήσεις

10. Ποιο είναι το μεγαλύτερο εμπόδιο που αντιμετωπίζετε στη χρήση της τεχνολογίας;
    .....
11. Ποια θέματα θα θέλατε να μάθετε καλύτερα;
    .....

ΘΠ5: Ψηφιακός-Οπτικός Γραμματισμός

Η ΕΦΑΡΜΟΓΗ ΤΗΣ ΠΟΛΥΤΡΟΠΙΚΟΤΗΤΑΣ ΣΤΟ ΠΛΑΙΣΙΟ ΤΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΤΟΥ ΓΛΩΣΣΙΚΟΥ ΜΑΘΗΜΑΤΟΣ: ΜΙΑ ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ ΤΗΣ ΒΙΒΛΙΟΓΡΑΦΙΑΣ

Μαυραγάνης Βασίλειος
Εκπαιδευτικός ΠΕ70&ΠΕ02 ,Υποψήφιος διδάκτωρ ΤΕΕΑΠΗ Πανεπιστήμιο Πατρών
Πανεπιστήμιο Πατρών
Πάτρα, Ελλάδα
email: vmavragan@gmail.com

ΠΕΡΙΛΗΨΗ

Η πολυτροπικότητα θεωρείται μια καινοτόμος προσέγγιση στον τομέα της εκπαίδευσης, καθώς ενσωματώνει ποικιλία σημειωτικών πόρων, με στόχο να ενισχυθεί η μάθηση και η κατανόηση. Η πολυτροπικότητα παρέχει μια πιο ολοκληρωμένη προσέγγιση στη μάθηση, καθώς επιτρέπει στη μαθητική κοινότητα να αλληλεπιδρά με το εκπαιδευτικό υλικό, μέσα από πολλούς και διαφορετικούς τρόπους. Αυτή η μαθησιακή προσέγγιση δεν περιορίζεται μόνο στο γραπτό κείμενο, αλλά επεκτείνεται σε άλλες μορφές αναπαράστασης όπως είναι οι εικόνες και η ψηφιακή τεχνολογία, που αποτελούν αναπόσπαστο κομμάτι του σύγχρονου κόσμου. Μέσω της πολυτροπικότητας οι μαθητές και οι μαθήτριες μπορούν να αναπτύξουν μια βαθύτερη κατανόηση των εννοιών και να βελτιώσουν τις γλωσσικές δεξιότητές τους, ενώ ταυτοχρόνως να καλλιεργήσουν την κριτική σκέψη και τη δημιουργικότητά τους. Σκοπός της παρούσας μελέτης είναι η διερεύνηση της εφαρμογής της πολυτροπικότητας στο μάθημα της γλώσσας στην πρωτοβάθμια εκπαίδευση, μέσα από την ανάπτυξη των επιπτώσεων που επιφέρει στη μαθητική και εκπαιδευτική κοινότητα. Η έρευνα στηρίζεται σε βιβλιογραφική ανασκόπηση, η οποία πραγματοποιήθηκε μέσω της αναζήτησης πρωτογενών πηγών. Το σύνολο των επιλεγμένων πηγών που χρησιμοποιήθηκαν ήταν 33 έρευνες ποιοτικές, ποσοτικές και μικτές. Επιπροσθέτως οι έρευνες έπρεπε να είναι γραμμένες είτε στην ελληνική, είτε στην αγγλική γλώσσα και να έχουν δημοσιευθεί από το 2000 έως το 2025, ενώ οι λέξεις κλειδιά που χρησιμοποιήθηκαν στις μηχανές αναζήτησης έπρεπε να συνδέονται με τον τίτλο ή και το περιεχόμενο της έρευνας. Όσον αφορά τα κριτήρια αποκλεισμού των ερευνών, αποκλείστηκαν όσες πρωτογενείς έρευνες δεν ήταν σχετικές με το ερευνητικό θέμα, δεν είχαν σαφώς καθορισμένο ερευνητικό δείγμα, το δείγμα ήταν περιορισμένο και δεν περιλάμβαναν ποσοτικά ή ποιοτικά δεδομένα. Τα ευρήματα της έρευνας αναδεικνύουν τη θετική επίδραση της πολυτροπικότητας στη διδασκαλία της γλώσσας στην πρωτοβάθμια εκπαίδευση. Η χρήση πολυτροπικών κειμένων και διαδραστικών εργαλείων συμβάλλει σημαντικά στη βελτίωση της αναγνωστικής ικανότητας των μαθητών/-τριών, καθώς επιτρέπει την παρουσίαση πληροφοριών μέσα από διαφορετικούς τρόπους, ενισχύοντας την κατανόηση, την απομνημόνευση και τη διατήρηση της γνώσης. Οι μαθητές και οι μαθήτριες που εκτίθενται σε πολυτροπικά μέσα δείχνουν μεγαλύτερη εμπλοκή και ενδιαφέρον στη γλωσσική διδασκαλία, ενώ παράλληλα αναπτύσσουν την κριτική τους σκέψη μέσα από τη σύνθεση και την ανάλυση των πληροφοριών. Επίσης, η ενσωμάτωση πολυτροπικών στοιχείων στα σχολικά βιβλία, όπως εικόνες, διαδραστικές ιστορίες και εκπαιδευτικά λογισμικά, έχει διαπιστωθεί ότι ενισχύει τη σχέση των μαθητών/-τριών με τα γλωσσικά κείμενα, καθιστώντας τη μάθηση πιο ελκυστική, προσβάσιμη και αποτελεσματική. Παράλληλα, η έρευνα κατέδειξε ότι η εφαρμογή της πολυτροπικότητας παρουσιάζει προκλήσεις. Πολλοί εκπαιδευτικοί δε διαθέτουν την απαραίτητη κατάρτιση στη χρήση πολυτροπικών εργαλείων και λογισμικών, γεγονός που περιορίζει την αποτελεσματική τους εφαρμογή στην τάξη. Επίσης, η έλλειψη υποδομών, η αδυναμία πρόσβασης σε σύγχρονα τεχνολογικά μέσα και ο περιορισμένος χρόνος διδασκαλίας συχνά καθιστούν δύσκολη την ενσωμάτωση πολυτροπικών δραστηριοτήτων. Παρόλα αυτά, η συνεχής τεχνολογική εξέλιξη και οι νέες εκπαιδευτικές πολιτικές δείχνουν ότι η πολυτροπικότητα κερδίζει έδαφος και αναμένεται να διαδραματίσει σημαντικό ρόλο στη μελλοντική διδασκαλία της γλώσσας. Η ανάπτυξη στοχευμένων επιμορφωτικών προγραμμάτων για τους/τις εκπαιδευτικούς, η ενσωμάτωση πολυτροπικών μεθόδων στη διδακτική πράξη και η βελτίωση των πολυτροπικών λογισμικών, θεωρούνται καίρια βήματα για την αποτελεσματική εφαρμογή αυτής της προσέγγισης στην πρωτοβάθμια εκπαίδευση.

Λέξεις κλειδιά: Πολυτροπικότητα, γλωσσική διδασκαλία, πρωτοβάθμια εκπαίδευση.

ΕΙΣΑΓΩΓΗ

Είναι κοινώς αποδεκτό ότι η εκπαιδευτική διαδικασία βρίσκεται σε μια διαρκή εξέλιξη, καθώς προσαρμόζεται στις ανάγκες και τις προκλήσεις του σύγχρονου κόσμου. Μία από τις σημαντικότερες εξελίξεις στον τομέα της εκπαίδευσης είναι η ενσωμάτωση της πολυτροπικότητας, η οποία αναφέρεται στη χρήση πολλαπλών τρόπων επικοινωνίας, όπως ο γραπτός και ο προφορικός λόγος, οι εικόνες, οι ήχοι, τα βίντεο και τα ψηφιακά μέσα (Cope & Kalantzis, 2021). Η πολυτροπικότητα συγκαταλέγεται στους πιο σύγχρονους και πολυσυζητημένους όρους της εκπαιδευτικής κοινότητας, ειδικά σε τομείς όπως η γλωσσική διδασκαλία, καθώς επηρεάζει ουσιαστικά τον τρόπο με τον οποίο οι μαθητές και οι μαθήτριες μαθαίνουν και επικοινωνούν (Kress,2010). Η πολυτροπικότητα παρέχει μια πιο ολοκληρωμένη προσέγγιση στη μάθηση, εφόσον επιτρέπει στη μαθητική κοινότητα να αλληλεπιδρά με το εκπαιδευτικό υλικό, μέσα από πολλούς και διαφορετικούς τρόπους. Αυτή η μαθησιακή προσέγγιση δεν περιορίζεται μόνο στο γραπτό κείμενο, αλλά επεκτείνεται σε άλλες μορφές αναπαράστασης όπως είναι οι εικόνες και η ψηφιακή τεχνολογία, που αποτελούν αναπόσπαστο κομμάτι του σύγχρονου κόσμου (Bezemer & Kress, 2016). Μέσα από την πολυτροπικότητα οι μαθητές/-τριες μπορούν να αναπτύξουν μια βαθύτερη κατανόηση των εννοιών και να βελτιώσουν τις γλωσσικές δεξιότητές τους, ενώ ταυτοχρόνως να καλλιεργήσουν την κριτική σκέψη τη δημιουργικότητά τους (Tomlinson, 2017).

Η πολυτροπικότητα επιδρά βαθιά στον τρόπο με τον οποίο τα άτομα διδάσκονται και μαθαίνουν. Αναλυτικότερα, μέσω της πολυτροπικότητας, αναγνωρίζεται μια πιο ολιστική προσέγγιση όσον αφορά τη μάθηση, καθώς πλέον είναι ευρέως αποδεκτό, ότι οι μαθητές/-τριες δεν μαθαίνουν μόνο μέσω της γλώσσας, αλλά και με τη χρήση άλλων μορφών αναπαράστασης (Cope & Kalantzis, 2009). Πληθώρα ερευνών έχει καταδείξει ότι οι μαθητές/-τριες μπορούν να κατανοούν ένα πολύπλοκο επιστημονικό θέμα καλύτερα, μέσα από συνδυασμό κειμένου και γραφημάτων ή εικόνων (Cope & Kalantzis, 2009; Cope & Kalantzis, 2021; Serafini, 2012). Επιπροσθέτως υποστηρίζεται η διαφοροποίηση της διδασκαλίας μέσω της πολυτροπικότητας, καθώς επιτρέπει στους/στις εκπαιδευτικούς την προσαρμογή των μαθησιακών υλικών και δραστηριοτήτων στις ανάγκες και στα ενδιαφέροντα της μαθητικής κοινότητας (Bezemer & Kress, 2016). Η εφαρμογή της πολυτροπικότητας ωστόσο δεν λαμβάνει χώρα χωρίς προκλήσεις. Η ανάγκη επιμόρφωσης της εκπαιδευτικής κοινότητας, η ανεπάρκεια σε επίπεδο τεχνολογικών υποδομών για αναθεώρηση των εκπαιδευτικών πρακτικών, αποτελούν σημαντικά εμπόδια, τα οποία πρέπει να ξεπεραστούν για την επίτευξη της αποτελεσματικής ενσωμάτωσης των πολυτροπικών δραστηριοτήτων στην εκπαιδευτική πράξη (Walsh, 2010). Ωστόσο παρά τις δυσκολίες εφαρμογής της πολυτροπικότητας οι προοπτικές που επιφέρει στην εκπαίδευση είναι ιδιαίτερα θετικές, μιας και προσφέρει πλούσιες ευκαιρίες για να ενισχυθεί η μαθησιακή εμπειρία για να προωθηθεί μια πιο συνεργατική και δημιουργική εκπαιδευτική κουλτούρα (Jewitt, 2013).

Αντικείμενο της παρούσας μελέτης είναι η διερεύνηση της έννοιας της πολυτροπικότητας και της σημασίας της για τη σύγχρονη εκπαιδευτική διαδικασία, με έμφαση στην πρωτοβάθμια εκπαίδευση και ειδικότερα στο μάθημα της γλώσσας. Μέσω συστηματικής βιβλιογραφικής ανασκόπησης, αναλύονται οι επιπτώσεις της πολυτροπικής διδασκαλίας στο γλωσσικό μάθημα, οι συνέπειες της εφαρμογής της στη μαθητική και εκπαιδευτική κοινότητα, καθώς και οι προκλήσεις που ανακύπτουν από την υιοθέτηση της συγκεκριμένης προσέγγισης. Παράλληλα, εξετάζονται οι προοπτικές για την επιτυχή ενσωμάτωση της πολυτροπικότητας στην εκπαιδευτική πράξη. Η μελέτη επικεντρώνεται στα εξής ερευνητικά ερωτήματα:

1. Ποιες είναι οι επιδράσεις της πολυτροπικής διδασκαλίας στο γλωσσικό μάθημα της πρωτοβάθμιας εκπαίδευσης, τόσο στη μαθητική όσο και στην εκπαιδευτική κοινότητα;
2. Πώς αξιοποιούν οι εκπαιδευτικοί της πρωτοβάθμιας εκπαίδευσης τα πολυτροπικά και ψηφιακά μέσα στη διδασκαλία της γλώσσας και ποιες είναι οι επιπτώσεις αυτής της αξιοποίησης στη μαθησιακή διαδικασία;

Με σκοπό να απαντηθούν τα ερευνητικά ερωτήματα της παρούσας εργασίας, πραγματοποιήθηκε βιβλιογραφική ανασκόπηση στις ηλεκτρονικές βάσεις δεδομένων «Scopus» και «Google Scholar». Η χρονική περίοδος που κάλυψε η αναζήτηση ήταν από το 2000 έως και το 2025.. Χρησιμοποιήθηκαν λέξεις κλειδιά όπως: «Multimodality», «Primary education», «Literacy» και «language lesson». Αρχικά εντοπίστηκαν 446 μελέτες, από τις οποίες επιλέχθηκαν τελικά 33 πρωτογενείς ποσοτικές, ποιοτικές και μεικτές έρευνες, βάσει συγκεκριμένων κριτηρίων ένταξης και αποκλεισμού. Οι μελέτες αυτές αναλύθηκαν για να διαφανούν οι επιδράσεις της πολυτροπικότητας στη γλωσσική διδασκαλία στην πρωτοβάθμια εκπαίδευση, καθώς και οι προκλήσεις που αντιμετωπίζουν οι εκπαιδευτικοί κατά την εφαρμογή της.

ΑΠΟΤΕΛΕΣΜΑΤΑ ΕΡΕΥΝΑΣ

ΠΟΛΥΤΡΟΠΙΚΑ/ΨΗΦΙΑΚΑ ΜΕΣΑ ΠΟΥ ΧΡΗΣΙΜΟΠΟΙΟΥΝ ΟΙ ΕΚΠΑΙΔΕΥΤΙΚΟΙ ΠΡΩΤΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΚΑΤΑ ΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΟΥ ΜΑΘΗΜΑΤΟΣ ΤΗΣ ΓΛΩΣΣΑΣ

Η παρούσα έρευνα κατέδειξε ότι οι εκπαιδευτικοί της πρωτοβάθμιας εκπαίδευσης εκτός από τα παραδοσιακά μέσα, όπως είναι το γραπτό κείμενο, χρησιμοποιούν διάφορες πολυτροπικές προσεγγίσεις που διευκολύνουν την ενεργή συμμετοχή των μαθητών/-τριών και την καλλιέργεια των γλωσσικών δεξιοτήτων. Αναλυτικότερα οι εκπαιδευτικοί κάνουν χρήση διαδραστικών λευκών πινάκων (Interactive Whiteboards - IWBs), οι οποίοι τους επιτρέπουν να συνδυάζουν κείμενο, εικόνα, βίντεο ή και ήχο κατά τη διδασκαλία της γλώσσας (Beauchamp & Kennewell, 2010). Οι διαδραστικοί πίνακες ενισχύουν τη συμμετοχή της μαθητικής κοινότητας, παρέχοντάς της έναν ευέλικτο τρόπο παρουσίασης των πολυτροπικών κειμένων. Επίσης οι διαδραστικοί πίνακες επιτρέπουν στους/στις εκπαιδευτικούς να ενισχύουν τη συμμετοχή των μαθητών/-τριών, καθώς τους παρέχουν ένα εργαλείο για τον τρόπο παρουσίασης και διαχείρισης των πολυτροπικών κειμένων (Beauchamp & Kennewell, 2010). Μέσω της χρήσης των διαδραστικών πινάκων οι μαθητές/-τριες δεν είναι απλοί αποδέκτες κάποιας πληροφορίας, αλλά μπορούν να συμμετέχουν ενεργά στη διδασκαλία, μετακινώντας στοιχεία από την οθόνη, απαντώντας σε ερωτήσεις, δημιουργώντας τα δικά τους κείμενα και παρουσιάσεις. Ωστόσο οι εκπαιδευτικοί δεν εκμεταλλεύονται πλήρως τις δυνατότητες των διαδραστικών πινάκων, λόγω της έλλειψης κατάλληλης κατάρτισης και υποστήριξης (Türel, 2010).

Επιπροσθέτως κατά τη διδασκαλία της γλώσσας, γίνεται χρήση από τους/τις εκπαιδευτικούς πληθώρας λογισμικών και εφαρμογών. Οι εκπαιδευτικές εφαρμογές περιλαμβάνουν διαδραστικές ιστορίες ή παιχνίδια λέξεων, τα οποία ενισχύουν την κατανόηση και την χρήση της γλώσσας από τους/τις μαθητές/-τριες (Neumann, 2016). Τα εκπαιδευτικά λογισμικά που σχεδιάζονται για την πρωτοβάθμια εκπαίδευση, εμπεριέχουν διαδραστικές ασκήσεις, παιχνίδια λέξεων ή γλωσσικά στοιχεία που λειτουργούν ενισχυτικά της κατανόησης και της χρήσης της γλώσσας από τους/τις μαθητές/-τριες. Αυτά τα λογισμικά παρέχουν στους/στις μαθητές/-τριες ευκαιρίες για εξατομικευμένη μάθηση, καθώς μαθαίνουν με τον δικό τους ρυθμό και αναπτύσσουν γλωσσικές δεξιότητες μέσω επαναληπτικών των δραστηριοτήτων (Neumann, 2016). Επίσης οι εκπαιδευτικοί κατά τη διδασκαλία τους εφαρμόζουν λογισμικά που περιλαμβάνουν διαδραστικές ιστορίες, επιτρέποντας στους/στις μαθητές/-τριες να αλληλεπιδράσουν με το περιεχόμενο του κειμένου, να επιλέξουν την πορεία της ιστορίας, να συμμετέχουν σε δραστηριότητες που σχετίζονται με αυτό. Αυτές οι εφαρμογές ενισχύουν την κατανόηση της αφήγησης και βοηθούν τους/τις μαθητές/-τριες να αναπτύξουν κριτική σκέψη και να λάβουν αποφάσεις που επηρεάζουν την εξέλιξη της ιστορίας (Neumann, 2016).

Αντιστοίχως στο μάθημα της γλώσσας οι εκπαιδευτικοί εφαρμόζουν πολυτροπικά παιχνίδια, όπως σταυρόλεξα και αναγραμματισμούς, τα οποία θεωρούνται ιδιαίτερα αποτελεσματικά για την εκμάθηση λεξιλογίου. Τα προαναφερόμενα παιχνίδια δεν είναι μόνο διασκεδαστικά, αλλά θεωρούνται εξαιρετικά χρήσιμα για την επανάληψη και την ενίσχυση της ορθογραφίας, της σημασίας και της χρήσης των λέξεων. Μέσα από την επίλυση γλωσσικων προβλημάτων και την πρόκληση του νου, οι μαθητές/-τριες μπορούν να βελτιώσουν τις γλωσσικές δεξιότητές τους με έναν ενθαρρυντικό και ελκυστικό τρόπο (Wu et al., 2013). Συνάμα, τα βίντεο και οι πολυμεσικές παρουσιάσεις χρησιμοποιούνται ευρέως για να εμπλουτιστεί η διδασκαλία των γλωσσικών εννοιών. Η χρήση πολυτροπικών εργαλείων μπορεί να βοηθήσει τους/τις μαθητές/-τριες να συνδέσουν το γραπτό κείμενο με οπτικά και ακουστικά ερεθίσματα, ενισχύοντας την πολυτροπική του κατανόηση, ειδικότερα όταν πρόκειται για τη διδασκαλία σύνθετων γλωσσικών εννοιών. Οι εκπαιδευτικοί χρησιμοποιούν τα βίντεο καθώς τους/τις επιτρέπουν να παρέχουν στους/στις μαθητές/-τριες συνδυασμό πληροφοριών μέσα από πολλά αισθητηριακά κανάλια, διευκολύνοντας την κατανόηση και τη διατήρηση των πληροφοριών αυτών. Τα βίντεο επιτρέπουν στους/στις μαθητές/-τριες να επεξεργάζονται πληροφορίες μέσω διαφορετικών καναλιών, περιορίζοντας την πιθανότητα υπερφόρτωσης ενός συγκεκριμένου καναλιού, όπως είναι για παράδειγμα ο γραπτός λόγος, με αποτέλεσμα να παρεμποδίζεται η γνωστική υπερφόρτωση του/της μαθητή/-τριας (Dalton, 2012). Τα βίντεο δημιουργούν ένα πλούσιο πλαίσιο (context) για τη γλωσσική μάθηση, αφού παρουσιάζουν ρεαλιστικά σενάρια και πολιτισμικά παραδείγματα, συνθήκη που επιτρέπει στους/στις μαθητές/-τριες να βιώνουν τη γλώσσα σε πραγματικά περιβάλλοντα, ενισχύοντας την κατανόηση της πρακτικής εφαρμογής της και προάγοντας την πολιτισμική συνείδηση (Dalton, 2012).

Αντιστοίχως οι πολύμεσικές παρουσιάσεις χρησιμοποιούνται από τους/τις εκπαιδευτικούς, γιατί τους/τις επιτρέπουν να ενσωματώνουν διάφορα μέσα σε μια ενιαία παρουσίαση. Ο συνδυασμός κειμένου, εικόνας και ήχου, ενισχύει την γλωσσική ανάπτυξη των μαθητών/-τριών και διευκολύνει την κατανόηση και την απομνημόνευση των πληροφοριών. Παράλληλα οι πολυμεσικές παρουσιάσεις παρέχουν ευέλικτο πλαίσιο διδασκαλίας, επιτρέποντας στους/στις εκπαιδευτικούς να προσαρμόζονται εύκολα στις ανάγκες των μαθητών/-τριών, ενισχύοντας παράλληλα τη διαφοροποιημένη μάθηση. Ομοίως οι πολυμεσικές παρουσιάσεις περιλαμβάνουν δραστηριότητες όπως τα κουΐζ, οι

ερωτήσεις πολλαπλής επιλογής και δραστηριότητες αντιστοίχισης, οι οποίες επιτρέπουν στους/στις μαθητές/-τριες να συμμετέχουν ενεργά στη μάθηση της γλώσσας (Wu et al., 2013).

Οι εκπαιδευτικοί επίσης στο πλαίσιο της διδασκαλίας τους κάνουν χρήση ψηφιακών βιβλίων και e-books, τα οποία επιτρέπουν στους/στις μαθητές/-τριες να αλληλεπιδρούν με το κείμενο με νέους τρόπους. Για παράδειγμα οι μαθητές/-τριες χρησιμοποιώντας ψηφιακά βιβλία μπορούν να ακούσουν το κείμενο, να το διαβάσουν ή να βλέπουν κινούμενες εικόνες που συνοδεύουν την αφήγηση (Hutchison, Beschorner & Schmidt-Crawford, 2012). Τα ψηφιακά βιβλία χρησιμοποιούνται καθώς αυτά περιλαμβάνουν πολυτροπικά στοιχεία όπως είναι για παράδειγμα οι υπερσυνδέσεις, λεξικά και σημειώσεις, που οι μαθητές/-τριες μπορούν να χρησιμοποιήσουν, ώστε να εμβαθύνουν και να κατανοήσουν το κείμενο. Η προαναφερόμενη αλληλεπίδραση βοηθά τους/τις μαθητές/-τριες να συνδέσουν νέες πληροφορίες με προϋπάρχουσες γνώσεις, διευκολύνοντας την κριτική σκέψη και την κατανόηση σε βάθος, κάτι που βοηθά ιδιαίτερα το έργο των εκπαιδευτικών (Larson, 2010).

Αντιστοίχως η χρήση των e-books από την πλευρά των εκπαιδευτικών, συμβάλλει ώστε οι μαθητές/-τριες να αποφασίσουν τον ρυθμό και τη διδασκαλία της μάθησης τους. Οι μαθητές/-τριες μπορούν να επιστρέψουν σε προηγούμενες σελίδες, να επαναλαμβάνουν την ακρόαση ενός τμήματος του βιβλίου, να διαβάσουν πιο γρήγορα ή πιο αργά, αναλόγως του επιπέδου κατανόησης και των ενδιαφερόντων τους. Σύμφωνα με έρευνα που πραγματοποιήθηκε διαπιστώθηκε ότι αυτή η μορφή μάθησης προάγει την αυτονομία των μαθητών/-τριών και αυξάνει την αίσθηση ελέγχου στη μαθησιακή διαδικασία. Ωστόσο πρέπει να επισημανθεί ότι η χρήση των ψηφιακών βιβλίων και των e-books από την πλευρά των εκπαιδευτικών, τους/τις φέρνει αντιμέτωπους με ορισμένες προκλήσεις, με σημαντικότερη όλων, την εξασφάλιση ισότιμης πρόσβασης όλων των μαθητών/-τριών σε ψηφιακές συσκευές και πόρους, καθώς και την ανάγκη για κατάλληλη εκπαίδευση στη χρήση αυτών των εργαλείων. Οι εκπαιδευτικοί επίσης πρέπει να είναι κατάλληλα προετοιμασμένοι να ενσωματώνουν τα ψηφιακά βιβλία με τέτοιο τρόπο που να ενισχύει την εκπαιδευτική διαδικασία και όχι απλώς να αντικαθιστούν τα παραδοσιακά μέσα διδασκαλίας (Larson, 2015).

Οι πλατφόρμες όπως είναι το Google Classroom ή το Edmodo χρησιμοποιούνται στο πλαίσιο της προώθησης της συνεργατικής μάθησης στην πρωτοβάθμια εκπαίδευση, καθώς οι μαθητές/-τριες μπορούν να συμμετέχουν σε συζητήσεις, να μοιράζονται κείμενα και εικόνες και να συνεργάζονται κατά την πραγματοποίηση έργων. Η χρήση των κοινωνικών δικτύων στη γλωσσική διδασκαλία, ενισχύει την αλληλεπίδραση μεταξύ μαθητών/-τριών και προάγει την ανάπτυξη των γλωσσικών δεξιοτήτων τους (Greenhow & Lewin, 2016). Αντιστοίχως οι εκπαιδευτικοί χρησιμοποιούν τις προαναφερόμενες πλατφόρμες, προκειμένου να ενισχύουν τη συνεργατική μάθηση, η οποία επιτρέπει στους/στις μαθητές/-τριες να αναπτύσσουν γλωσσικές δεξιότητες με ποικίλους τρόπους. Παραδείγματος χάρη οι μαθητές/-τριες μπορούν να γράφουν και να διορθώνουν κείμενα μαζί, να συζητούν ζητήματα που αφορούν τη γλώσσα και τη γραμματική μέσω forum και να παρουσιάζουν τα έργα τους ομαδικά. Η παραπάνω μορφή συνεργατικής δραστηριότητας, ενισχύει όχι μόνο τις γραπτές, αλλά και τις προφορικές δεξιότητες των μαθητών/-τριών, ενισχύοντας παράλληλα την αυτοπεποίθησή τους στη χρήση της γλώσσας (Greenhow & Lewin, 2016; Mills & Chandra, 2011). Αντιστοίχως οι εκπαιδευτικοί έχουν τη δυνατότητα να παρέχουν άμεση αξιολόγηση στους/στις μαθητές/-τριες και να βελτιώνουν τις γλωσσικές δεξιότητές τους σε πραγματικό χρόνο (Chen, Lambert, & Guidry, 2010). Ωστόσο και σε αυτή την περίπτωση η κύρια πρόκληση που αντιμετωπίζουν οι εκπαιδευτικοί κατά την εφαρμογή των εκπαιδευτικών πλατφορμών είναι η κατάλληλη κατάρτιση, ώστε να μπορούν να αξιοποιήσουν πλήρως τις δυνατότητες αυτών των εργαλείων, όπως επίσης απαιτείται η διασφάλιση ότι όλοι οι μαθητές/-τριες έχουν πρόσβαση στις απαραίτητες τεχνολογίες και στο διαδίκτυο για να συμμετέχουν ισότιμα στις δραστηριότητες (Ertmer & Ottenbreit-Leftwich, 2010). Παρά ωστόσο τις προκλήσεις, οι εκπαιδευτικές πλατφόρμες παρέχουν τεράστιες προοπτικές για τη βελτίωση της γλωσσικής διδασκαλίας και μάθησης, ιδιαίτερα σε ένα περιβάλλον που απαιτεί διαρκή αλληλεπίδραση και συνεργασία (Greenhow & Lewin, 2016).

ΤΡΟΠΟΙ ΧΡΗΣΗΣ ΤΩΝ ΠΟΛΥΤΡΟΠΙΚΩΝ-ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ ΑΠΟ ΤΟΥΣ ΕΚΠΑΙΔΕΥΤΙΚΟΥΣ ΠΡΩΤΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ

Η χρήση πολυτροπικών και ψηφιακών μέσων στη διδασκαλία του μαθήματος της γλώσσας στην πρωτοβάθμια εκπαίδευση, έχει μεταβάλλει πραγματικά τον τρόπο με τον οποίο οι εκπαιδευτικοί προσεγγίζουν τη μάθηση. Τα πολυτροπικά και ψηφιακά μέσα παρέχουν πληθώρα πόρων και τρόπων (modes), που μπορούν να χρησιμοποιήσουν οι εκπαιδευτικοί για να ενισχύσουν την κατανόηση, την αφομοίωση της νέας γνώσης και την κριτική σκέψη των μαθητών/-τριών (Chen, Lambert, & Guidry, 2010). Αναλυτικότερα οι εκπαιδευτικοί όπως επισημάνθηκε, χρησιμοποιούν εικόνες και βίντεο για την ενίσχυση και την κατανόηση των μαθητών/-τριών σχετικά με ένα κειμένο. Για παράδειγμα πριν την ανάγνωση ενός κειμένου είναι σύνηθες οι εκπαιδευτικοί να παρουσιάζουν ένα σύντομο βίντεο που σχετίζεται με το θέμα του κειμένου, ώστε να αναπτύξουν οι μαθητές/-τριες αναπαραστάσεις και να κατανοήσουν το περιεχόμενο του κειμένου (Larson, 2015). Αντιστοίχως μέσω της χρήσης των διαδραστικών λογισμικών, οι εκπαιδευτικοί επιτρέπουν στους/στις μαθητές/-τριες να αλληλεπιδρούν με το κείμενο, εμπλεκόμενοι σε δραστηριότητες όπως είναι η αντιστοίχιση εικόνων με

λέξεις ή η τοποθέτηση γεγονότων στη σωστή χρονική σειρά. Τα προαναφερόμενα εργαλεία λειτουργούν υποστηρικτικά της γλωσσικής κατανόησης, ειδικότερα για τους/τις μαθητές/-τριες που παρουσιάζουν δυσκολίες ανάγνωσης ή προτιμούν διαφορετικούς τρόπους μάθησης (Beauchamp & Kennewell, 2010).

Στην προσπάθεια για αφόρμηση και κέντρισμα του ενδιαφέροντος, οι εκπαιδευτικοί κάνουν χρήση ψηφιακό κόμικς και διαδραστικών ιστοριών, τα οποία χρησιμοποιούνται συχνά για τη διδασκαλία των γλωσσικών εννοιών. Μέσω των προαναφερόμενων, οι εκπαιδευτικοί επιτρέπουν στους/στις μαθητές/-τριες να βλέπουν τη γλώσσα σε χρήση, εντός ενός ενδιαφέροντος και διαδραστικού πλαισίου, στοιχεία που κεντρίζουν το ενδιαφέρον τούς μέσα από την αφήγηση και τα οπτικά στοιχεία που χρησιμοποιούν (Walsh, 2015). Παράλληλα τα εκπαιδευτικά βιβλία και παιχνίδια που ενσωματώνουν λέξεις και φράσεις σχετικές με τη γλώσσα, χρησιμοποιούνται από τους εκπαιδευτικούς για να προσεγγίζουν τους/τις μαθητές/-τριες και να τους/τις ενθαρρύνουν, να εξερευνήσουν το γλωσσικό περιεχόμενο με ένα διασκεδαστικό τρόπο (Neumann, 2016). Στην προσπάθεια εφαρμογής της νέας γνώσης μέσω της πολυτροπικότητας, οι εκπαιδευτικοί δημιουργούν ψηφιακές παρουσιάσεις όπως προαναφέρθηκε, προκειμένου να αναπαραστήσουν το νέο γνωστικό κεφάλαιο. Οι παρουσιάσεις αυτές περιλαμβάνουν κείμενο, εικόνες, βίντεο και ήχο, θέλοντας με αυτό τον τρόπο η μαθητική κοινότητα να χρησιμοποιήσει ποικίλα μέσα έκφρασης των ιδεών της (Rowsell & Walsh, 2011). Παράλληλα οι εκπαιδευτικοί προάγουν τη συγγραφή από την πλευρά των μαθητών/-τριών παρουσιάσεων και ιστοριών, οι οποίες τους επιτρέπουν να εφαρμόσουν με δημιουργικό τρόπο τη νέα γνώση. Αυτές οι δραστηριότητες προωθούν τη συνεργατική μάθηση και την εμπλοκή των μαθητών/-τριών σε ένα διαδραστικό περιβάλλον μέσω κειμένου, εικόνας και ήχου (Larson, 2015).

Η αξιολόγηση και η ανατροφοδότηση μέσω της χρήσης πλατφορμών αξιολόγησης και διαδραστικών κουίζ, αποτελούν ακόμη τρόπους προώθησης της πολυτροπικότητας στην πρωτοβάθμια εκπαίδευση. Οι εκπαιδευτικοί χρησιμοποιούν τα προαναφερόμενα εργαλεία προκειμένου να αξιολογήσουν το επίπεδο κατανόησης των μαθητών/-τριών σε πραγματικό χρόνο, προσφέροντας τους άμεση τροφοδότηση μετά την ολοκλήρωση των δραστηριοτήτων (Greenhow & Lewin, 2016). Συνάμα στο πλαίσιο της αξιολόγησης και της ανατροφοδότησης της μαθητικής κοινότητας προάγεται η χρήση εργαλείων συνεργατικής μάθησης (π.χ. Google Classroom), τα οποία παρέχουν τη δυνατότητα στους/στις εκπαιδευτικούς να προβαίνουν σε αναθέσεις εργασιών, σε συλλογή εργασιών και σε ηλεκτρονική ανατροφοδότηση. Οι μαθητές/-τριες από την πλευρά τους μπορούν να υποβάλλουν εργασίες που περιλαμβάνουν κείμενο, εικόνες και βίντεο, παρέχοντας στους/στις εκπαιδευτικούς μια πλήρη εικόνα των γλωσσικών ικανοτήτων τους (Hutchison, Beschorner & Schmidt-Crawford, 2012).

Τέλος η ανάπτυξη της κριτικής σκέψης των μαθητών/-τριών προάγεται από την πλευρά των εκπαιδευτικών μέσω της ανάλυσης πολυτροπικών κειμένων, της δημιουργίας και της ανάλυσης ψηφιακών έργων. Πιο συγκεκριμένα, οι εκπαιδευτικοί ενθαρρύνουν τους/τις μαθητές/-τριες να αναλύουν πολυτροπικά κείμενα όπως διαφημίσεις, αφίσες ή ιστοσελίδες, αναζητώντας τους τρόπους με τους οποίους τα διάφορα μέσα επικοινωνίας αλληλεπιδρούν, για να δημιουργήσουν νόημα. Μέσω τον προαναφερόμενων, οι μαθητές/-τριες αναπτύσσουν την κριτική σκέψη και την ικανότητα ερμηνείας πολυτροπικών αναπαραστάσεων (Jewitt, 2013). Ολοκληρώνοντας, οι εκπαιδευτικοί δημιουργούν ψηφιακά έργα όπως blogs, βίντεο ή αφίσες, τα οποία επιτρέπουν στους/στις μαθητές/-τριες να εφαρμόσουν την κριτική σκέψη και να συνθέσουν πολυτροπικά κείμενα. Οι εκπαιδευτικοί καθοδηγούν τους/τις μαθητές/-τριες στην ανάλυση των επιλογών τους και των επιπτώσεων που έχουν αυτές στην επικοινωνία του μηνύματος (Larson, 2015).

ΕΠΙΠΤΩΣΕΙΣ ΤΗΣ ΠΟΛΥΤΡΟΠΙΚΟΤΗΤΑΣ ΣΤΗ ΜΑΘΗΤΙΚΗ ΚΟΙΝΟΤΗΤΑ

Συνοψίζοντας διαπιστώθηκε ότι τα πολυτροπικά κείμενα που συνδυάζουν διαφορετικούς τρόπους επικοινωνίας (κείμενο, εικόνα και ήχο), συμβάλουν στον εμπλουτισμό του γλωσσικού μαθήματος και στην καλύτερη κατανόηση (Nelson & Johnson, 2014; Malini, & Saundravalli, 2016) και ανάπτυξη της κριτικής σκέψης των μαθητών/-τριών. Η πολυτροπικότητα ενισχύει τη διδασκαλία του μαθήματος της γλώσσας στην πρωτοβάθμια εκπαίδευση και βοηθά ώστε αυτό να γίνει περισσότερο ενδιαφέρον και προσιτό (Fterniati, 2011; Bao, 2017; Handayani, 2018), με αποτέλεσμα να είναι περισσότερο προσηλωμένοι και πρόθυμοι να εμπλακούν ενεργά στην ανάγνωση (Bao, 2017). Επίσης η επεξεργασία των πολυτροπικών κειμένων κατά τη διδασκαλία του μαθήματος, παρέχει πολλαπλά οφέλη στους/στις μαθητές/-τριες, καθώς αυτοί ενισχύουν την κατανόηση της γλώσσας, προωθείται η δημιουργική έκφραση (Dahlström, 2016), αναπτύσσεται η πολυτροπική γραμματική ικανότητα και η δημιουργικότητα (Nelson & Johnson, 2014; Bao, 2017).

Αντιστοίχως η επιτυχής ενσωμάτωση της πολυτροπικότητας στα εκπαιδευτικά λογισμικά μπορεί να συμβάλει σημαντικά στην ανάπτυξη του πολύγραμματισμού στους/στις μαθητές/-τριες. Η ανάπτυξη αυτή θεωρείται ιδιαίτερα κρίσιμη, καθώς η μαθητική κοινότητα καλείται να λειτουργήσει σε ένα παγκόσμιο περιβάλλον, στο οποίο η επικοινωνία δεν περιορίζεται μόνο στο γραπτό ή προφορικό λόγο, αλλά περιλαμβάνει και πολυτροπικές μορφές (Fterniati & Trokalli, 2020). Έχει διαπιστωθεί ερευνητικά ότι οι μαθητές/-τριες που εκτίθεται σε πολυτροπικά κείμενα, παρουσιάζουν

σημαντικά καλύτερη κατανόηση και κατακτούν πληρέστερα τη δεξιότητα της ανάγνωσης, σε σύγκριση με όσους εκτίθενται μόνο σε παραδοσιακές μεθόδους διδασκαλίας στο μάθημα της γλώσσας (Baharani και Ghafournia, 2015; Bao, 2017; Ganapathy, 2016; Theodotou, 2019). Η χρήση πολυτροπικών μέσων όπως εικόνων, βίντεο, ήχου, βοηθούν τους/τις μαθητές/-τριες να κατανοήσουν καλύτερα το περιεχόμενο και το πλαίσιο του κείμενου με το οποίο έρχονται σε επαφή, καθιστώντας την ανάγνωση μια πιο ολοκληρωμένη και εμπλουτισμένη εμπειρία (Nelson & Johnson, 2014; Bao, 2017; Ganapathy, 2016). Ακόμη και η απλή χρήση των εικόνων που εμπεριέχονται σε πολυτροπικά κείμενα, ενθαρρύνει τις συζητήσεις στην τάξη, ενώ αντιστοίχως η χρήση σύνθετων οπτικών αφηγήσεων, εμπλέκει τους/τις μαθητές/-τριες σε δημιουργικές δραστηριότητες, με τις εικόνες να παρέχουν ποικίλες ευκαιρίες για εμπλουτισμό της μαθησιακής εμπειρίας (Ganapathy, 2016).

Οι μαθητές/-τριες της πρωτοβάθμιας εκπαίδευσης που εμπλέκονται σε πολυτροπικές δραστηριότητες, μπορούν να συνδέσουν τον γλωσσικό μάθημα με τις εμπειρίες τους από τον πραγματικό κόσμο. Μέσω της πολυτροπικότητας, οι μαθητές/-τριες μπορούν να διαπιστώσουν πως τα διάφορα επικοινωνιακά μέσα αλληλοσυμπληρώνονται και να αναπτύξουν δεξιότητες που τους είναι απαραίτητες να έχουν, στον πολυδιάστατο κόσμο της επικοινωνίας (Fterniati, 2011). Συνάμα διαπιστώθηκε ο καταλυτικός ο ρόλος της εικόνας στα γλωσσικά κείμενα της πρωτοβάθμιας εκπαίδευσης, εφόσον η εικόνα όχι μόνο υποστηρίζει την κατανόηση των κειμένων από τους/τις μαθητές/-τριες, αλλά τους βοηθά να διαμορφώσουν την αισθητική αντίληψη τους και να ενισχύσουν τη συναισθηματική εμπλοκή τους με τα κείμενα (Malini & Saundravalli, 2016; Draina, 2020).

Οι πολυτροπικές μεταφορές κειμένου βοηθούν επίσης στην ανάπτυξη της κριτικής σκέψης των μαθητών/-τριών, αφού εκτίθενται σε πολλαπλούς τρόπους αναπαράστασης, με συνέπεια να ενθαρρύνονται να αναλύσουν και να συνθέσουν πληροφορίες από διαφορετικές πηγές, βελτιώνοντας έτσι την κριτική τους ικανότητα (Baharani & Ghafourni, 2015; Bao, 2017; Ganapathy, 2016). Αντιστοίχως έχει διαπιστωθεί, ότι η πολυτροπικότητα προάγει την ικανότητα των μαθητών/-τριών να εξετάζουν πληροφορίες από διαφορετικές οπτικές γωνίες και να αναλύουν τα κείμενα σύμφωνα με τις αναπαραστάσεις του περιεχομένου τους (Bao, 2017). Παράλληλα ενισχύεται αυτή η δεξιότητα των μαθητών/-τριών καθώς χρησιμοποιούν ποικίλες μορφές αναπαράστασης για να δημιουργήσουν και να παράγουν πολυδιάστατες αφηγήσεις. Η παραπάνω δυνατότητα επιτρέπει στους/στις μαθητές/-τριες να εκφράζουν τις ιδέες τους με δημιουργικότερους και αυθεντικότερους τρόπους (Nelson, & Johnson, 2014; Dahlström, 2016).

Συνάμα οι μαθητές/-τριες που εμπλέκονται σε πολυτροπικές δραστηριότητες ενθαρρύνονται να σκέφτονται πέρα από το παραδοσιακό γραπτό κείμενο, αφού έρχονται σε επαφή με οπτικά, ακουστικά και κινητικά στοιχεία κατά τη διάρκεια των αφηγήσεων (Dahlström, 2016). Ομοίως μέσω της πολυτροπικότητας ενισχύεται η συνεργασία μεταξύ των μαθητών/-τριών, καθώς συνεργάζονται για να συνδυάσουν διαφορετικά μέσα και να αναπτύξουν νέες αφηγήσεις. Στο πλαίσιο αυτής της συνεργασίας τα πολυτροπικά κείμενα συμβάλλουν στην κοινωνική μάθηση και στην καλλιέργεια των διαπροσωπικών δεξιοτήτων των μαθητών/-τριών (Dahlström, 2016; Theodotou, 2019). Επίσης κατά την εμπλοκή τους σε πολυτροπικές προσεγγίσεις οι μαθητές/-τριες έχουν την ευκαιρία να χρησιμοποιήσουν ψηφιακά μέσα, γεγονός που ενισχύει όχι μόνο τις γλωσσικές δεξιότητές τους, αλλά και τους εξοικειώνει με τις ψηφιακές τεχνολογίες που είναι απαραίτητες στον σύγχρονο κόσμο (Ganapathy, 2016; Malini, & Saundravalli, 2016). Εκτός από την καλλιέργεια των προαναφερόμενων δεξιοτήτων τα πολυτροπικά κείμενα συμβάλλουν στην ενίσχυση της πολιτισμικής κατανόησης των μαθητών/τριών. Ειδικότερα οι μαθητές/-τριες της πρωτοβάθμιας εκπαίδευσης μέσω της εικόνας, μπορούν να κατανοήσουν πολιτισμικά στοιχεία, τα οποία είναι ιδιαίτερα δύσκολο να μεταδοθούν μόνο με το γραπτό ή τον προφορικό λόγο. Αυτή η δυνατότητα καθιστά την εικόνα στο πλαίσιο του πολιτιστικού κειμένου είναι χρήσιμο εργαλείο για τη διδασκαλία της πολιτισμικής ποικιλομορφίας και την ανάπτυξη της διαπολιτισμικής ευαισθησίας των μαθητών/-τριών (Dahlström, 2016).

ΕΠΙΠΤΩΣΕΙΣ ΤΗΣ ΠΟΛΥΤΡΟΠΙΚΟΤΗΤΑΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΚΟΙΝΟΤΗΤΑ

Η εφαρμογή της πολυτροπικότητας στην εκπαιδευτική κοινότητα έχει επιτύχει σημαντικές αλλαγές στον τρόπο διδασκαλίας και μάθησης, επηρεάζοντας με θετικό τρόπο τη μαθησιακή εμπειρία, ενώ ταυτοχρόνως δημιουργεί νέες προκλήσεις στους/στις εκπαιδευτικούς. Η έρευνα έχει επισημάνει ότι η πολυτροπική γραμματιστική ικανότητα των εκπαιδευτικών, θεωρείται ιδιαίτερα χρήσιμη για την εφαρμογή πολυτροπικών στρατηγικών στη διδασκαλία της γλώσσας. Οι εκπαιδευτικοί που έχουν αναπτύξει πολυτροπικές προσεγγίσεις, μπορούν να ενσωματώνουν ποικίλα μέσα στη διδασκαλία τους, εμπλουτίζοντας την εμπειρία της μάθησης (Eksi & Yakisik, 2015). Οι εκπαιδευτικοί που χρησιμοποιούν πολυτροπικά υλικά, επιτρέπουν στους/στις μαθητές/-τριες τη δυνατότητα διάδρασης με το μαθησιακό περιεχόμενο, μέσω της χρήσης πολλαπλών τρόπων, γεγονός που βοηθά σε καλύτερη κατανόηση της ύλης. Για παράδειγμα οι εκπαιδευτικοί που ενσωματώνουν βίντεο ή διαδραστικές εφαρμογές κατά τη διδασκαλία της γλώσσας, μετατρέπουν τη μάθηση σε πιο ενδιαφέρουσα και συναρπαστική διαδικασία, η οποία συμβάλλει στην αύξηση της προσοχής και της συμμετοχής των μαθητών/-τριών (Walsh, 2015). Συνάμα η πολυτροπικότητα ενθαρρύνει τη δημιουργικότητα των εκπαιδευτικών και την

αλληλεπίδραση με τη μαθητική κοινότητα. Οι μαθητές/-τριες εμπλεκόμενοι σε πολυτροπικές δραστηριότητες ενισχύουν την κριτική σκέψη, όπως επίσης έχουν τη δυνατότητα συνδυασμού πληροφοριών από διαφορετικές πηγές. Οι παραπάνω δυνατότητες βοηθούν τους/τις εκπαιδευτικούς να παρέχουν στους/στις μαθητές/-τριες εκπαιδευτικές εμπειρίες, καθώς δεν περιορίζονται σε παραδοσιακές μορφές έκφρασης όπως είναι για παράδειγμα το γραπτό κείμενο (Mills & Exley, 2014).

Παράλληλα η πολυτροπικότητα διευκολύνει την εξατομικευμένη διδασκαλία. Οι εκπαιδευτικοί μπορούν να προσαρμόζουν το υλικό και τη διδασκαλία τους με βάση τις ανάγκες και τα ενδιαφέροντα του κάθε μαθητή/-τρια. Για παράδειγμα οι μαθητές/-τριες που μαθαίνουν καλύτερα μέσω της ακουστικής πρόληψης, μπορούν να επωφεληθούν από τη χρήση ηχητικών βιβλίων ή podcast, ενώ κάποιοι άλλοι προτιμούν την οπτική πρόσληψη είναι διαγράμματα και βίντεο (Eksi & Yakisik, 2015). Η πολυτροπικότητα επίσης συμβάλλει, ώστε να βελτιωθεί η επικοινωνία της εκπαιδευτικής κοινότητας. Οι μαθητές/-τριες και οι εκπαιδευτικοί έχουν τη δυνατότητα να επικοινωνούν και να συνεργάζονται μέσω πληθώρας καναλιών, όπως είναι για παράδειγμα οι ψηφιακές πλατφόρμες, τα κοινωνικά δίκτυα και οι πολυμεσικές παρουσιάσεις. Η προαναφερόμενη πολυδιάστατη προσέγγιση συμβάλει ενισχυτικά της συνεργατικής μάθησης και της δημιουργίας ενός πιο δυναμικού εκπαιδευτικού περιβάλλοντος (Walsh, 2015).

Ωστόσο η εφαρμογή της πολυτροπικότητας επιφέρει προκλήσεις στην εκπαιδευτική κοινότητα. Αναλυτικότερα οι εκπαιδευτικοί πρέπει να προσαρμόζονται στις νέες τεχνολογίες και μεθόδους διδασκαλίας, κάτι που απαιτεί επιπλέον χρόνο και κατάρτιση. Επίσης πρέπει να εξοικειώνονται με διάφορα μέσα, ώστε να μπορούν να ενσωματώσουν αποτελεσματικά τη διδασκαλία τους. Στις προαναφερόμενες προκλήσεις θα πρέπει επίσης να αναφερθεί η έλλειψη κατάλληλης υποδομής και η ανισότητα πρόσβασης σε τεχνολογικά μέσα, συνθήκη που μπορεί να δημιουργήσει προκλήσεις στην εφαρμογή της πολυτροπικότητας (Mills & Exley, 2014). Τέλος η αξιολόγηση της μαθησιακής προόδου, μπορεί να γίνει περισσότερο πολύπλοκη μέσω της εφαρμογής της πολυτροπικότητας, καθώς περιλαμβάνει ποικίλα μέσα και τρόπους έκφρασης των μαθητών/-τριών. Η ποσοτικοποίηση και η σύγκριση της απόδοσης των μαθητών/-τριών κατά την εφαρμογή πολυτροπικών δραστηριοτήτων θεωρείται πιο δύσκολη, καθώς απαιτούνται νέοι μέθοδοι αξιολόγησης, που να λαμβάνουν υπόψη τα διαφορετικά μαθησιακά αποτελέσματα (Walsh, 2015).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Συνοψίζοντας, κατανοείται από τα όσα προαναφέρθηκαν ότι η πολυτροπικότητα εντάσσεται σε συχνές και αποτελεσματικές προσεγγίσεις της διδασκαλίας, καθώς επιφέρει σημαντικές αλλαγές στο εκπαιδευτικό σύστημα (Jewitt, 2013). Μέσα από την ενσωμάτωση διαφορετικών τρόπων επικοινωνίας όπως είναι το κείμενο, η εικόνα, ο ήχος και το βίντεο, οι εκπαιδευτικοί πρωτοβάθμιας εκπαίδευσης μπορούν να παρέχουν μια πιο πλούσια και πιο ολοκληρωμένη μαθησιακή εμπειρία, η οποία ενισχύει την κατανόηση και την αφομοίωση της γνώσης από τους/τις μαθητές/-τριες (Serafini, 2014). Εστιάζοντας στο μάθημα της γλώσσας, η πολυτροπικότητα συμβάλλει στη βελτίωση των γλωσσικών δεξιοτήτων των μαθητών/-τριών, καθώς ενθαρρύνεται η κριτική σκέψη τους και προάγεται η δημιουργικότητα (Nelson & Johnson, 2014). Η διατήρηση της γλωσσικής κατανόησης των μαθητών/-τριών προέρχεται από τη συνδυαστική χρήση κειμένου, εικόνας, ήχου και άλλων πολυτροπικών μέσων (Serafini, 2012a). Οι μαθητές/-τριες εκτιθέμενοι σε ποικίλα ερεθίσματα μέσω της εμπλοκής τους σε πολυτροπικές δραστηριότητες, κατακτούν αποτελεσματικότερα την αναγνωστική δεξιότητα (Nelson & Johnson, 2014). Επιπροσθέτως κατανοούν καλύτερα έννοιες και γεγονότα που περιγράφονται, με αποτέλεσμα η μάθηση να γίνεται περισσότερο προσβάσιμη και κατανοητή (Unsworth, 2020). Η εφαρμογή της πολυτροπικής προσέγγισης στο μάθημα της γλώσσας προάγει τη γλωσσική παραγωγή, αφού οι μαθητές/-τριες ενθαρρύνονται να δημιουργήσουν τα δικά τους πολυτροπικά κείμενα, στα οποία χρησιμοποιούν και συνδυάζουν διάφορες μορφές επικοινωνίας. Η προαναφερόμενη δυνατότητα βοηθά τους/τις μαθητές/-τριες να κατανοήσουν καλύτερα τον τρόπο λειτουργίας της γλώσσας, σε συνδυασμό με άλλα μέσα και να βελτιώσουν τις δεξιότητές τους στην προφορική έκφραση (Arizpe & Styles, 2016).

Η προαγωγή της κριτικής σκέψης λαμβάνει χώρα μέσω της ανάλυσης και της ερμηνείας πληροφοριών από διαφορετικές πηγές και μέσα (Serafini, 2012a), διαδικασία που αναγκάζει τους/τις μαθητές/-τριες να σκέφτονται πιο σύνθετα, εξετάζοντας τα διάφορα στοιχεία τους και αλληλεπιδρώντας μεταξύ τους για τη δημιουργία νοήματος. Οι μαθητές/-τριες μαθαίνουν να αξιολογούν πως οι διαφορετικοί επικοινωνιακοί τρόποι συμβάλλουν στη διαμόρφωση της αντίληψής τους και στην κριτική αξιολόγηση των πληροφοριών που λαμβάνουν (Bao, 2017). Παράλληλα μέσω της πολυτροπικότητας οι μαθητές/-τριες αναπτύσσουν την ικανότητα συνδυασμού πληροφοριών από διάφορες πηγές, με συνέπεια να εκφράζουν τις ιδέες τους με πολλούς και διαφορετικούς τρόπους. Η προαναφερόμενη δυνατότητα βοηθά στην κατανόηση του πολυδιάστατου επικοινωνιακού κόσμου και στην ενίσχυση των κοινωνικών και διαπολιτισμικών δεξιοτήτων της μαθητικής κοινότητας (Dahlström, 2016). Εκτός των προαναφερομένων η εμπλοκή των μαθητών/τριών σε πολυτροπικά κείμενα κατά τη διδασκαλία του γλωσσικού μαθήματος, συμβάλει στην εξατομίκευση της μάθησης, καθώς οι μαθητές/-τριες μπορούν να προσεγγίσουν το μαθησιακό υλικό με τρόπο που να ταιριάζει καλύτερα στη μαθησιακό τους προφίλ, ενώ οι εκπαιδευτικοί μπορούν να προσαρμόσουν τις δραστηριότητες και τα υλικά τους, ώστε να

ανταποκρίνονται στις ανάγκες και στα ενδιαφέροντα της μαθητικής κοινότητας (Hutchison, Beschorner & Schmidt-Crawford, 2012; Bezemer & Kress, 2016). Συνάμα η πολυτροπική γλωσσική διδασκαλία ενισχύει τη συνεργατική μάθηση, καθώς οι μαθητές/-τριες συνεργάζονται σε ομαδικές δραστηριότητες, όπως για παράδειγμα τη δημιουργία ψηφιακών αφηγήσεων ή πολυμεσικών παρουσιάσεων (Greenhow & Lewin, 2016). Επίσης βοηθά στην ενίσχυση της πολιτισμικής κατανόησης των μαθητών/-τριών, αφού τα πολυτροπικά κείμενα περιλαμβάνουν εικόνες και πολυμέσα από διάφορους πολιτισμούς, με συνέπεια οι μαθητές/-τριες να αποκτούν μια πιο σφαιρική αντίληψη της παγκόσμιας ποικιλομορφίας (Greenhow & Lewin, 2016).

Ωστόσο η εφαρμογή της πολυτροπικότητας συνοδεύεται από προκλήσεις όπως για παράδειγμα την ανάγκη των εκπαιδευτικών για κατάρτιση, την έλλειψη τεχνολογικών υποδομών, την προσαρμογή των εκπαιδευτικών πρακτικών στις πολυτροπικές μεθόδους (Eksi & Yakisik, 2015; Beauchamp & Kennewell, 2010). Επιπροσθέτως η αξιολόγηση της μαθησιακής προόδου μέσω των πολυτριπικών δραστηριοτήτων αποτελεί μια σύνθετη και απαιτητική διαδικασία, αφού είναι αναγκαία η εφαρμογή νέων αξιολογικών μεθόδων που να ανταποκρίνονται στις πολυτροπικές μεθόδους διδασκαλίας. Παρά τις προκλήσεις ωστόσο με τις οποίες έρχεται αντιμέτωπη η εκπαιδευτική κοινότητα, οι προοπτικές για την εφαρμογή της πολυτροπικότητας είναι θετικές. Η συνεχής τεχνολογική εξέλιξη, σε συνδυασμό με την ενίσχυση της επαγγελματικής ανάπτυξης των εκπαιδευτικών, μπορεί να βοηθήσουν καθοριστικά στην επιτυχή ενσωμάτωση πολυτροπικών δραστηριοτήτων στην πρωτοβάθμια εκπαίδευση. Η πολυτροπικότητα δεν αποτελεί μόνο ένα εργαλείο για να ενισχυθεί η μάθηση, αλλά ένα σημαντικό μέσο για να προωθηθεί μια πιο συνεργατική και δημιουργική εκπαιδευτική κουλτούρα (Mills & Exley, 2014).

ΠΡΟΟΠΤΙΚΕΣ ΕΡΕΥΝΑΣ

Η παρούσα έρευνα αναδεικνύει την ανάγκη αναθεώρησης των διδακτικών πρακτικών, με στόχο την ουσιαστική ενσωμάτωση της πολυτροπικότητας στη γλωσσική διδασκαλία, μέσω της συστηματικής χρήσης πολυτροπικών λογισμικών και στρατηγικών που ενθαρρύνουν τη δημιουργική εμπλοκή των μαθητών/-τριών (Fterniati & Trokalli, 2020). Η διαφοροποίηση και εξατομίκευση των δραστηριοτήτων, βάσει των αναγκών και ενδιαφερόντων των μαθητών/-τριών, κρίνεται αναγκαία για την ενίσχυση της ενεργούς μάθησης (Serafini, 2012· Handayani, 2018· Draina, 2020). Σε ένα επικοινωνιακά πολυσύνθετο περιβάλλον, η πολυτροπικότητα προτείνεται ως βασικό εργαλείο προσαρμογής της διδασκαλίας της ανάγνωσης στις σύγχρονες απαιτήσεις, υποστηρίζοντας την ανάπτυξη γνωστικών, συναισθηματικών και κοινωνικών δεξιοτήτων (Bao, 2017· Theodotou, 2019). Τέλος, τονίζεται η ανάγκη για σχεδιασμό και αξιολόγηση πολυτροπικών δραστηριοτήτων στο πλαίσιο των αναλυτικών προγραμμάτων σπουδών (Eksi & Yakisik, 2015), ενισχύοντας την παραγωγή πολυτροπικών κειμένων και την ολιστική μαθησιακή εμπειρία.

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ΠΟΛΥΓΡΑΜΜΑΤΙΣΜΟΙ ΣΤΗ ΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΑΞΙΟΠΟΙΩΝΤΑΣ ΨΗΦΙΑΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ ΕΝΝΟΙΟΛΟΓΙΚΗΣ ΧΑΡΤΟΓΡΑΦΗΣΗΣ

Τοτόλου Αγγελική
Εκπαιδευτικός ΠΕ70, ΠΕ78
Υποψήφια Διδάκτωρ, Ιόνιο Πανεπιστήμιο
Αργοστόλι, Ελλάδα
e-mail: antotolou@gmail.com

Ηλιάδης Γεώργιος
Αναπληρωτής Καθηγητής
Ιόνιο Πανεπιστήμιο
Αργοστόλι, Ελλάδα
e-mail: g.heliades@gmail.com

ΠΕΡΙΛΗΨΗ

Αντικείμενο της παρούσας μελέτης είναι η πραγμάτευση διαγραμματικών αναπαραστάσεων της γνώσης και ειδικότερα της εννοιολογικής χαρτογράφησης. Στην ψηφιακή εποχή τα περιβάλλοντα μάθησης μετασχηματίζονται προκειμένου να ανταποκριθούν στις νέες προκλήσεις. Η διαδικασία μάθησης αποδεσμεύεται από χωροχρονικούς περιορισμούς και εξελίσσεται διαρκώς με απώτερο στόχο την αναβάθμιση της μαθησιακής εμπειρίας. Αδιαμφισβήτητα, η διάδραση συνιστά κεντρικό ζήτημα αλλά και ζητούμενο συγχρόνως. Στο πλαίσιο αυτό, η έννοια των πολυγραμματισμών αποκτά νέες διαστάσεις και προοπτικές. Ξεκινώντας από την αξιοποίηση της εννοιολογικής χαρτογράφησης στη διδασκαλία και τη μάθηση θα παρουσιαστούν συνοπτικά τα οφέλη αυτής της προσέγγισης. Η εννοιολογική χαρτογράφηση αξιοποιείται σε διάφορα γνωστικά αντικείμενα. Το πεδίο εφαρμογής αντλείται από το μάθημα της Κοινωνικής και Πολιτικής Αγωγής, το οποίο περιλαμβάνει μεγάλο εύρος θεμάτων και εννοιών. Έμφαση δίνεται στην προώθηση της νοηματοδοτούμενης μάθησης. Επίσης, αναλύονται οι δυνατότητες αξιοποίησης της εννοιολογικής χαρτογράφησης για την επεξεργασία και σύνθεση πληροφοριών, την ανάπτυξη ιδεών και εννοιών, την κατάκτηση νέας γνώσης, την ανάπτυξη κριτικής σκέψης και δημιουργικότητας. Ιδιαίτερα σημαντικό είναι πως η εννοιολογική χαρτογράφηση προσφέρει τη δυνατότητα οπτικοποίησης σχέσεων μεταξύ εννοιών, γεγονός που συμβάλλει στην εις βάθος κατανόηση του υπό μελέτη θέματος. Ως επακόλουθο, αναδεικνύεται η εννοιολογική χαρτογράφηση, ως εκπαιδευτική στρατηγική που μπορεί να αναδείξει καινοτόμους εκπαιδευτικούς σχεδιασμούς σε ψηφιακά περιβάλλοντα μάθησης.

Λέξεις – κλειδιά: πολυγραμματισμοί, πολυτροπικότητα, εννοιολογική χαρτογράφηση, ψηφιακά μέσα.

ΕΙΣΑΓΩΓΗ

Οι ταχύτατες εξελίξεις στον τομέα της τεχνολογίας επηρεάζουν το πλαίσιο της επικοινωνίας, αλλά και της μάθησης. Στις μέρες μας παρατηρούνται αλλαγές στον τρόπο επικοινωνίας, λόγω της εκτεταμένης χρήσης της εικόνας. Η κυριαρχία του γραπτού λόγου δεν μπορεί να μείνει ανεπηρέαστη (Kress, 2000). Οι προφορικές και γραπτές γλωσσικές μορφές είναι σημαντικές. Όμως, αποτελούν μέρος ενός συνόλου που είναι πολυτροπικό. Με την εξέλιξη της επικοινωνίας που υποστηρίζεται από τις νέες τεχνολογίες και τα μέσα ενημέρωσης, «δεν είναι πλέον δυνατή η κατανόηση της γλώσσας και των χρήσεών της, χωρίς να κατανοήσουμε την επίδραση όλων των τρόπων επικοινωνίας που συνυπάρχουν σε οποιοδήποτε κείμενο» (Kress, 2000:337). Αδιαμφισβήτητα, οι δύο αυτές έννοιες - επικοινωνία και μάθηση - είναι αλληλένδετες. Πώς η επικοινωνία και η μάθηση συνδέονται, πώς επηρεάζει η επικοινωνία τη μάθηση και το αντίστροφο, πώς καταλήγουν σε σύνθεση και δημιουργία νοήματος; Είναι αλήθεια ότι η διδασκαλία σχετίζεται με σημαντικές πτυχές της επικοινωνιακής διαδικασίας. Η σχολική τάξη λειτουργεί ως κοινωνικό περιβάλλον όπου λαμβάνουν χώρα η επικοινωνία και η μάθηση. Ζητούμενο είναι να μάθουν τα παιδιά πώς να μαθαίνουν. Αδιαμφισβήτητα, η πολυτροπική επικοινωνία (Multimodal Communication) και η ανάπτυξη της αντίστοιχης ικανότητας αποκτούν ιδιαίτερη σημασία στο σχολείο του 21ου αιώνα. Χάρη στις νέες τεχνολογίες αξιοποιούνται και μπορούν να συνυπάρχουν διάφορες μορφές επικοινωνίας και γραμματισμού. Άλλωστε, πριν από την έναρξη της σχολικής εκπαίδευσης τα παιδιά προσεγγίζουν το θέμα του γραμματισμού μέσω διαφόρων δραστηριοτήτων. Ο Kress (1997) επισημαίνει την ανάγκη για επανεκτίμηση του φαινομένου του γραμματισμού και κατά συνέπεια μια σημαντική αλλαγή στην εκπαιδευτική πρακτική. Εστιάζοντας στην ποικιλία των αντικειμένων που δημιουργούν τα παιδιά (όπως σχέδια, κολάζ), ο Kress αναδεικνύει τη συνοχή των πράξεων των παιδιών πριν την κατάκτηση γλώσσας και γραφής. Πρόκειται για ενέργειες των παιδιών που νοηματοδοτούν τις πράξεις τους. Για τον λόγο αυτό, η ενασχόληση με τον γραμματισμό θα πρέπει να θεωρείται διάσταση της ευρύτερης ενασχόλησης με δραστηριότητες επικοινωνιακού χαρακτήρα που έχουν νόημα για το ίδιο το παιδί.

Πράγματι, οι πολυγραμματισμοί - οι διαστάσεις του γραμματισμού - παρέχουν ένα πλαίσιο για τη διδασκαλία και τη μάθηση προσφέροντας νέες προοπτικές. Επίσης, η συνδυαστική χρήση εννοιολογικής χαρτογράφησης (Concept Mapping) σε ψηφιακά περιβάλλοντα και πολυγραμματισμών (Multiliteracies Approach) ενισχύει τη μαθησιακή εμπειρία καθιστώντας τη μάθηση πιο διαδραστική. Στο πλαίσιο αντιμετώπισης αυτών των προκλήσεων έρχεται να συνεισφέρει η παρούσα μελέτη η οποία εστιάζει στη συνέργεια εννοιολογικής χαρτογράφησης και πολυγραμματισμών με πεδίο εφαρμογής το γνωστικό αντικείμενο της Κοινωνικής και Πολιτικής Αγωγής. Το άρθρο διαρθρώνεται ως εξής: Μετά την εισαγωγή ακολουθεί το θεωρητικό πλαίσιο όπου αναλύονται οι έννοιες «πολυγραμματισμοί» και «εννοιολογική χαρτογράφηση». Στη δεύτερη ενότητα παρουσιάζεται η σύνδεση πολυγραμματισμών και εννοιολογικής χαρτογράφησης και πώς αυτή μπορεί να αξιοποιηθεί για την ανάλυση και κριτική προσέγγιση σύνθετων εννοιών στο σχολείο και συγκεκριμένα στο μάθημα της Κοινωνικής και Πολιτικής Αγωγής. Εξετάζονται τα οφέλη στη διδασκαλία και τη μάθηση. Ακολουθούν τα συμπεράσματα.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η θεωρία των πολυγραμματισμών διευρύνει την παραδοσιακή έννοια του γραμματισμού ως απλής ικανότητας ανάγνωσης και γραφής. Αναγνωρίζει ότι στη σύγχρονη κοινωνία, το νόημα παράγεται και προσλαμβάνεται μέσω πολλών και διαφορετικών τρόπων. Η έννοια των πολυγραμματισμών έρχεται να συμπληρώσει ήδη υπάρχουσες πρακτικές διδασκαλίας γραμματισμού. Θεμελιώνεται στις δυνατότητες μιας εκπαίδευσης γραμματισμού στον 21ο αιώνα που λαμβάνει υπόψη σε ποιους απευθύνεται, τη σημασία της πολιτισμικής και γλωσσικής ποικιλομορφίας, αλλά και τις καθημερινές πρακτικές κατασκευής νοήματος. Από τη στιγμή που διευρύνονται τα πολυτροπικά κανάλια επικοινωνίας μετασχηματίζεται όχι μόνο ο τρόπος επικοινωνίας, αλλά και μάθησης. Κατά συνέπεια, η παιδαγωγική καλείται να διαμορφώσει προσεγγίσεις και πρακτικές στο νέο αυτό σχολικό συγκείμενο (Kalantzis and Cope, 2001). Πρέπει ακόμα να σημειωθεί πως οι νέες τεχνολογίες επικοινωνίας επηρεάζουν τον τρόπο δημιουργίας νοήματος. Έτσι, το νόημα διαμορφώνεται πλέον εμπεριέχοντας σχήματα νοήματος οπτικά και ηχητικά. Ως επακόλουθο, η σύνδεσή του με τον γραπτό λόγο ακολουθεί φθίνουσα πορεία. Από την άλλη, ο οπτικός γραμματισμός συνδέεται ολοένα και περισσότερο με την οπτική επικοινωνία, περιλαμβάνοντας - μεταξύ άλλων - διεπιφάνειες πολυμέσων, τεχνολογίες επικοινωνίας μέσω οθόνης. Αναπόφευκτα, οι εξελίξεις αυτές επιδρούν στη διδασκαλία της γλώσσας και του γραμματισμού. Στο επίκεντρο του ενδιαφέροντος τίθεται η ανάπτυξη δεξιοτήτων με απώτερο στόχο την κριτική κατανόηση και παραγωγή κειμένων που συνδυάζουν διαφορετικά σημειωτικά μέσα και πόρους. Για τη δημιουργία κειμένου αξιοποιούνται διαθέσιμοι πόροι. Αυτή η διαδικασία περιλαμβάνει αναζήτηση, επιλογή και σύνθεση πληροφοριών διαφόρων μορφών που προέρχονται από διαφορετικές πηγές. Η θεωρία των πολυγραμματισμών έχει τη δυνατότητα να υποστηρίξει παιδαγωγικές πρακτικές που προσελκύουν το ενδιαφέρον των μαθητών/τριών και επιπλέον ενθαρρύνουν και ενισχύουν την ενεργό εμπλοκή τους στη μαθησιακή διαδικασία. Οι Bezemer και Kress (2016) εστιάζουν στην ανάλυση της μάθησης και της επικοινωνίας στη σύγχρονη εποχή ως ένα ολοκληρωμένο ενιαίο πεδίο. Ειδικότερα, τονίζουν τη σύνδεση μεταξύ πολυτροπικότητας (multimodality), μάθησης και επικοινωνίας που οδηγεί στη νοηματοδότηση. Συνεπώς, για τη μελέτη του νοήματος χρειάζεται να δοθεί προσοχή σε όλους τους σημειωτικούς πόρους που χρησιμοποιήθηκαν για τη δημιουργία ενός πλήρους

συνόλου (Bezemer and Jewitt, 2018). Η πολυτροπικότητα αποκτά ιδιαίτερη σημασία λόγω του ότι βασίζεται στην αλληλεπίδραση διαφορετικών σημειωτικών πόρων και εν τέλει στη δημιουργία νοήματος.

Η εκπαιδευτική σημασία των αναπαραστάσεων συνάδει με την εποικοδομιστική θεώρηση των διαδικασιών μάθησης και τις κοινωνικοπολιτισμικές θεωρήσεις της γνώσης και της μάθησης. Για τη σχεδίαση υπολογιστικών περιβαλλόντων μάθησης αντλούνται στοιχεία από τη θεωρία του εποικοδομισμού (Karasavvidis & Komis, 2008). Όσον αφορά στην εποικοδομιστική μάθηση (constructive learning), οι εκπαιδευόμενοι οργανώνουν τις νέες γνώσεις σε σχέση με πρότερες γνώσεις και σε συνέχεια αυτών επιδιώκοντας τον σχηματισμό ολοκληρωμένων εννοιών. Σύμφωνα με αυτή τη θεώρηση η νόηση αναπτύσσεται μέσω της κοινωνικής αλληλεπίδρασης μεταξύ παιδιών και ενηλίκων (Vygotsky, 1978), ενώ η γνώση δεν μεταδίδεται, ακριβώς επειδή πρόκειται για διαδικασία προσωπικής δόμησης της γνώσης (Psycharis & Kalovrektis, 2018). Η προσέγγιση αυτή υποστηρίζει την ανακάλυψη και την άμεση απόκτηση μαθησιακών εμπειριών. Η χρήση νέων τεχνολογιών αναδεικνύει την επικοινωνία διδασκομένων και διδασκόντων, ενώ συγχρόνως διευκολύνει τις διαδικασίες μάθησης (Kampourakis & Loukis, 2006). Οι νέες τεχνολογίες παρέχουν εργαλεία, τα οποία καθιστούν ευκολότερη τη δημιουργία περιβαλλόντων μάθησης που βασίζονται στην ερευνητική διαδικασία και μπορούν να διαχειριστούν οι μαθητές/τριες. Επιπρόσθετα, η δυνατότητα οπτικοποίησης δυσνόητων εννοιών ή φαινομένων και η μετάβαση από στατικά σε δυναμικά μοντέλα έχει σημαντικές επιδράσεις όχι μόνο στην έρευνα, αλλά και στις διαδικασίες μάθησης (US-National Research Council, Committee on Social Research and Education, 2006).

Η εννοιολογική χαρτογράφηση αναπτύχθηκε από τον John Novak (Novak, 1977; Novak, 1998) με βάση τις ψυχολογικές απόψεις του David Ausubel (1978) σχετικά με τη νοηματοδοτούμενη μάθηση (Meaningful Learning Theory). Σύμφωνα με αυτή τη θεώρηση η γνώση σχετίζεται με έννοιες και αναπαραστάσεις που προϋπάρχουν σε γνωστικές δομές. Έτσι αποκτούν νόημα. Ο Novak εφάρμοσε την προσέγγιση του Ausubel εντάσσοντας πρότερες γνώσεις σε εννοιολογικούς χάρτες και δημιούργησε δίκτυα εννοιών και σχέσεων. Ο εννοιολογικός χάρτης συνιστά μια ιεραρχικά διαρθρωμένη γραφική αναπαράσταση συσχετίσεων μεταξύ εννοιών (Novak, 1990; Novak and Gowin, 1984). Οι συνδεδεμένες έννοιες και οι σύνδεσμοι δημιουργούν προτάσεις και επιτρέπουν να διαβαστεί ο εννοιολογικός χάρτης από έννοια σε έννοια (Novak and Cañas, 2008). Ας σημειωθεί ακόμη ότι οι εννοιολογικοί χάρτες παρουσιάζουν ομοιότητες με τη δομή του δικτύου γνώσης του μανθάνοντα. Σύμφωνα με τις γνωστικές και κονστρουκτιβιστικές θεωρίες, η απόκτηση γνώσης περιλαμβάνει την κατασκευή ιεραρχικών ρυθμίσεων μεταξύ κεντρικών και περιφερειακών εννοιών που συνδέονται μεταξύ τους (Jacobs-Lawson and Hershey, 2002). Η εννοιολογική χαρτογράφηση, όπως και η νοητική χαρτογράφηση σε υπολογιστικό περιβάλλον αξιοποιεί δυνατότητες για τη διαχείριση πληροφοριών στην ψηφιακή εποχή. Με διαρκώς αυξανόμενο τον όγκο πληροφοριών που καλούνται διαχειριστούν οι άνθρωποι, αλλά και με την ταχύτητα με την οποία πρέπει να διαχειρίζονται αυτές τις πληροφορίες, καθίσταται αναγκαία η χρήση τεχνολογιών και εργαλείων που συνάδουν με τον τρόπο λειτουργίας του εγκεφάλου (Buzan T. and Buzan B., 2010).

ΑΞΙΟΠΟΙΗΣΗ ΤΗΣ ΕΝΝΟΙΟΛΟΓΙΚΗΣ ΧΑΡΤΟΓΡΑΦΗΣΗΣ ΚΑΙ ΤΩΝ ΠΟΛΥΓΡΑΜΜΑΤΙΣΜΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΚΑΙ ΤΗ ΜΑΘΗΣΗ

Είναι αλήθεια πως σημαντικό μέρος της σχολικής μάθησης συνδέεται με την απομνημόνευση μεγάλου όγκου πληροφοριών με μικρή διαφοροποίηση των «μεγάλων ιδεών». Όμως, αυτές οι ιδέες έχουν ιδιαίτερη σημασία και μπορούν να βοηθήσουν τους/τις μαθητές/τριες να αναπτύξουν ισχυρές δομές γνώσης. Για αυτόν τον λόγο, η δημιουργία εννοιολογικού χάρτη κατά τη διάρκεια μελέτης ενός θέματος σε οποιονδήποτε τομέα μπορεί να είναι εξαιρετικά χρήσιμη τόσο για μαθητές/τριες όσο και για εκπαιδευτικούς (Novak, 2011). Ο εννοιολογικός χάρτης περιλαμβάνει κόμβους (που αναπαριστούν έννοιες) και συνδέσμους (που αναπαριστούν σχέσεις μεταξύ των εννοιών) προσφέροντας τη δυνατότητα αναπαράστασης εννοιών και επιπλέον οπτικοποίησης σχέσεων μεταξύ των εννοιών. Έτσι, υποστηρίζεται η οργάνωση και αναπαράσταση της γνώσης και ακόμη η ουσιαστική μάθηση.

Η εννοιολογική χαρτογράφηση έχει αξιοποιηθεί στο πλαίσιο της σχολικής εκπαίδευσης ήδη από τη δεκαετία του 1980 με θετικά αποτελέσματα (Heinze-Fry and Novak, 1990; Novak, Gowin and Johansen, 1983) για διάφορους σκοπούς. Διαπιστώθηκε ότι η εννοιολογική χαρτογράφηση, ως παιδαγωγικό εργαλείο, μπορεί να ενισχύσει την κατανόηση επιστημονικών εννοιών, αλλά και του τρόπου σύνδεσης με άλλες έννοιες. Έρευνα που διεξήχθη σε μαθητές/τριες δευτεροβάθμιας εκπαίδευσης στις ΗΠΑ προκειμένου να αντιμετωπιστεί το πρόβλημα των χαμηλών επιδόσεων στο μάθημα της Φυσικής, έδειξε ότι βελτιώθηκε σημαντικά η επίδοση με τη χρήση της εννοιολογικής χαρτογράφησης έναντι της άμεσης διδασκαλίας (Pankratius, 1990). Τα αποτελέσματα έρευνας σχετικά με τη χρήση εννοιολογικής χαρτογράφησης στη διδασκαλία των Μαθηματικών έδειξαν ότι οι μαθητές/τριες εντόπισαν και κατανόησαν σχέσεις μεταξύ μαθηματικών εννοιών δημιουργώντας εννοιολογικό χάρτη. Όπως χαρακτηριστικά αναφέρουν, μόνο αφού φτιάξουν τον εννοιολογικό χάρτη είναι σε θέση να «δουν τη δομή των αντίστοιχων μαθηματικών γνώσεων» (Brinkmann, 2003:46). Όπως φαίνεται η γραφική απεικόνιση των εννοιών βοήθησε τους/τις μαθητές/τριες να οργανώσουν τις γνώσεις τους. Μελέτη διάρκειας δώδεκα ετών σε μαθητές/τριες που χρησιμοποίησαν λογισμικό εννοιολογικής χαρτογράφησης στις φυσικές επιστήμες - από το δημοτικό σχολείο μέχρι και τη δευτεροβάθμια

εκπαίδευση - αναδεικνύει τη θετική επίδραση που είχε στα μαθησιακά αποτελέσματα (Novak, 2004; Novak, 2005). Επίσης, από έρευνα που διεξήχθη σε μαθητές/τριες δημοτικού σχολείου στην Ελλάδα προκύπτει ότι η ενσωμάτωση της εννοιολογικής χαρτογράφησης στο πεδίο των επιστημών λειτουργεί ως αποτελεσματικό γνωστικό εργαλείο για την οργάνωση της επιστημονικής γνώσης και την οικοδόμηση της γνώσης (Bakouli and Jimoyiannis, 2014). Από τα αποτελέσματα έρευνας σε μαθητές/τριες ΣΤ΄ τάξης δημοτικού στην Ελλάδα (Koufou, 2011), με σκοπό τη διερεύνηση της συνεργατικής και ατομικής οικοδόμησης της γνώσης μέσω εννοιολογικής χαρτογράφησης σε υπολογιστικό περιβάλλον, αποτυπώθηκε η αποτελεσματικότητα της χρήσης εννοιολογικού χάρτη ως εργαλείο αξιολόγησης της μαθησιακής διαδικασίας σε ατομικό, αλλά και ομαδικό επίπεδο. Ακόμη, διαπιστώθηκε ότι η χρήση εννοιολογικού χάρτη συνέβαλε στη βελτίωση της επίδοσης μαθητή με ειδικές μαθησιακές δυσκολίες (δυσλεξία). Σύμφωνα με τα παραπάνω αναδεικνύεται η προσθετική αξία της ενσωμάτωσης της εννοιολογικής χαρτογράφησης στη διδασκαλία, τη μάθηση και την αξιολόγηση.

Συνέργεια εννοιολογικής χαρτογράφησης και πολυγραμματισμών

Ο εννοιολογικός χάρτης βασίζεται στην αρχή ότι ουσιαστική μάθηση συμβαίνει όταν ο εκπαιδευόμενος δομεί τη γνώση ιεραρχικά και διερευνά τη συσχέτιση μεταξύ εννοιών. Η προσθετική αξία της χρήσης εννοιολογικού χάρτη στη διδασκαλία και τη μάθηση ενισχύεται όταν η χρήση του συνδέεται με επίλυση συγκεκριμένων προβλημάτων, αφού με αυτόν τον τρόπο οι μαθητές/τριες έχουν την ευκαιρία να θέσουν υπό αμφισβήτηση εσφαλμένες αντιλήψεις και να οικοδομήσουν νέες. Ιδιαίτερη σημασία έχει η συνεργατική δημιουργία εννοιολογικού χάρτη, διότι προωθεί την ανάπτυξη δεξιοτήτων επικοινωνίας και συνεργασίας, επίλυσης προβλημάτων και διαμορφώνει κατάλληλα το πλαίσιο για την ανάπτυξη διαλόγου. Ακόμη, τα σύγχρονα περιβάλλοντα εννοιολογικής χαρτογράφησης απελευθερώνουν χρόνο για ενεργό εμπλοκή των μαθητών/τριών στη διαδικασία μάθησης και διευκολύνουν την προσέγγιση πολύπλοκων συσχετίσεων μεταξύ εννοιών. Επιπλέον, οι πολυγραμματισμοί επιτρέπουν στους/στις μαθητές/τριες να αναπτύξουν την κατανόηση μέσω γραπτού λόγου, οπτικών αναπαραστάσεων, ψηφιακών δημιουργιών, προφορικών παρουσιάσεων και άλλων μορφών επικοινωνίας. Αξίζει να σημειωθεί πως με αυτόν τον τρόπο εμπλουτίζεται και αναβαθμίζεται η μαθησιακή εμπειρία.

Συνδυάζοντας την εννοιολογική χαρτογράφηση με τη χρήση ψηφιακών μέσων και τη δημιουργία πολυτροπικών κειμένων, διαγράφονται νέες προοπτικές για τη διδασκαλία και τη μάθηση. Οι πολυτροπικοί εννοιολογικοί χάρτες δύνανται να λειτουργήσουν ενισχυτικά στο πλαίσιο της πολυτροπικής μάθησης και να ενθαρρύνουν την ενεργό εμπλοκή όλων των μαθητών/τριών. Η σύνδεση της εννοιολογικής χαρτογράφησης με ποικίλες διαστάσεις του γραμματισμού προσφέρει ένα δυναμικό πλαίσιο για τον εμπλουτισμό της εκπαιδευτικής διαδικασίας. Η προσέγγιση των πολυγραμματισμών διευκολύνει την επικοινωνία και τη μάθηση, αφού αξιοποιούνται κατά περίπτωση προφορικός και γραπτός λόγος, εικόνες, ψηφιακά μέσα κλπ.

Η εννοιολογική χαρτογράφηση εντάσσεται στην εκπαιδευτική διαδικασία: α) ως μέσο διδασκαλίας, β) ως μέσο μάθησης, γ) ως εργαλείο αξιολόγησης. Επίσης, μπορεί να αξιοποιηθεί στη διδασκαλία διαφόρων γνωστικών αντικειμένων. Το πεδίο εφαρμογής αντλείται από το μάθημα της Κοινωνικής και Πολιτικής Αγωγής, το οποίο στην Ελλάδα περιλαμβάνεται στα Προγράμματα Σπουδών Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης.

Κοινωνική και Πολιτική Αγωγή: Σκοπός και Προκλήσεις

Σύμφωνα με το Πρόγραμμα Σπουδών, γενικός σκοπός του μαθήματος της Κοινωνικής και Πολιτικής Αγωγής είναι η ανάπτυξη αξιών, γνώσεων, δεξιοτήτων και στάσεων στους/στις μαθητές/τριες προκειμένου να γίνουν ενεργοί δημοκρατικοί πολίτες με κριτική ικανότητα και συμμετοχική δράση. Βασικό σκοπό του μαθήματος της Κοινωνικής και Πολιτικής Αγωγής στο Δημοτικό Σχολείο αποτελεί η ενδυνάμωση της δημοκρατικής ταυτότητας των μαθητών/τριών και η ανάπτυξη της δημοκρατικής συνείδησης και δράσης. Επιδιώκεται η ανάπτυξη δεξιοτήτων και ικανοτήτων που συνδέονται με την κριτική σκέψη, τη δημιουργική φαντασία, τη λογική ανάλυση και τη συναισθηματική επίγνωση ώστε να έχουν τη δυνατότητα, μέσω της κατανόησης και ερμηνείας της κοινωνικής πραγματικότητας, να συμμετέχουν ως ενεργοί πολίτες στην κοινωνία (Ministerial Decision 10537/2023). Στο πλαίσιο του μαθήματος ανά βαθμίδα εκπαίδευσης μελετώνται θέματα, όπως: α) Στο Δημοτικό Σχολείο: σεβασμός των ανθρωπίνων δικαιωμάτων και θεμελιωδών ελευθεριών, αξίες δημοκρατίας, δικαίου, ισότητας (Ministerial Decision 10537/2023), β) Στο Γυμνάσιο: επικοινωνία, κοινωνικοί ρόλοι, πολιτικοί θεσμοί, πολιτικές ταυτότητες, δικαιώματα-υποχρεώσεις, νόμοι, δημοκρατία, πολίτης (Ministerial Decision 4318/2023), γ) Στο Γενικό Λύκειο: θεσμοί οργάνωσης της κοινωνίας και της πολιτείας, ανθρώπινα δικαιώματα, ηθικές αξίες, η αειφορία ως μοντέλο οικονομικής και κοινωνικής οργάνωσης (Ministerial Decision 4009/2023).

Λαμβάνοντας υπόψη την διεπιστημονική φύση και τη σημασία των θεμάτων που εξετάζονται στο μάθημα της Κοινωνικής και Πολιτικής Αγωγής, αλλά και τον σημαντικό ρόλο που διαδραματίζει το συγκεκριμένο μάθημα στην εξέλιξη των μαθητών/τριών ως ενεργών και υπεύθυνων πολιτών, το σχολείο καλείται να αντιμετωπίσει νέες προκλήσεις. Ενδεικτικά αναφέρουμε την πολυπλοκότητα των κοινωνικών και πολιτικών ζητημάτων στις σύγχρονες πολυπολιτισμικές κοινωνίες, την αυξανόμενη ετερογένεια του μαθητικού πληθυσμού και την ανάγκη για συστηματική και επιστημονική προσέγγιση των διαφόρων θεμάτων αξιοποιώντας Τεχνολογίες της Πληροφορίας και της Επικοινωνίας. Για την αντιμετώπιση αυτών των προκλήσεων, προτείνεται η χρήση εννοιολογικής χαρτογράφησης και πολυγραμματισμών τόσο για δραστηριότητες εντός όσο και για δραστηριότητες εκτός τάξης.

Αξιοποίηση εννοιολογικής χαρτογράφησης και πολυγραμματισμών στο μάθημα της Κοινωνικής και Πολιτικής Αγωγής

Το μάθημα της Κοινωνικής και Πολιτικής Αγωγής περιλαμβάνει μεγάλο εύρος θεμάτων και εννοιών. Η ενσωμάτωση της εννοιολογικής χαρτογράφησης σε αυτό το μάθημα με διάφορους τρόπους και για διάφορους σκοπούς δύναται να συμβάλλει στην αναβάθμιση της εκπαιδευτικής διαδικασίας και την επίτευξη των προσδοκώμενων μαθησιακών αποτελεσμάτων. Ιδιαίτερα σημαντικό είναι πως οι εννοιολογικοί χάρτες αξιοποιούνται για την ανάλυση κοινωνικών φαινομένων προσφέροντας τη δυνατότητα παρουσίασης διαφόρων πτυχών του θέματος, σύγκρισης διαφορετικών οπτικών, εντοπισμού συνδέσεων και σχέσεων μεταξύ εννοιών. Επιπρόσθετα, η ενσωμάτωση ψηφιακών εργαλείων εννοιολογικής χαρτογράφησης στην εκπαιδευτική διαδικασία προωθεί την ενεργό εμπλοκή των μαθητών/τριών και την ανάπτυξη δεξιοτήτων μάθησης 21ου αιώνα (δημιουργικότητα, συνεργασία, επικοινωνία, κριτική σκέψη).

Με στόχο την κατανόηση σύνθετων εννοιών οι μαθητές/τριες μπορούν να δημιουργήσουν εννοιολογικούς χάρτες για να οργανώσουν και να συνδέσουν βασικές έννοιες μιας θεματικής ενότητας (π.χ. κράτος, έθνος, κυβέρνηση), αλλά και για να διακρίνουν θεμελιώδεις έννοιες όπως ελευθερία, ισότητα, δικαιοσύνη. Επίσης, η διαφοροποίηση της σημασίας μιας έννοιας ανάλογα με το πλαίσιο μπορεί να αποτυπωθεί με τη χρήση εννοιολογικού χάρτη (π.χ. παρουσίαση της έννοιας των δημοκρατικών αξιών στο σχολείο, την κοινωνία). Η ανάλυση κοινωνικών φαινομένων ή/και προβλημάτων επιτρέπει τη σύγκριση, τον εντοπισμό σχέσεων, αιτίων, αντιθέσεων και συνεπειών ενός κοινωνικού ή πολιτικού γεγονότος (π.χ. εξέταση παραγόντων που οδήγησαν σε ένα κοινωνικό πρόβλημα και επιπτώσεις στην κοινότητα). Αξίζει να σημειωθεί ότι η συνεργατική δημιουργία εννοιολογικών χαρτών προάγει τη συνεργασία, την επικοινωνία και την ενεργό συμμετοχή. Από την άλλη, οι εννοιολογικοί χάρτες δύνανται να χρησιμοποιηθούν και ως σημείο αναφοράς για συζητήσεις στην τάξη βοηθώντας τους/τις μαθητές/τριες να εκφράσουν τις σκέψεις τους και να αναπτύξουν διάλογο. Λόγου χάρη, για το θέμα των Μέσων Μαζικής Ενημέρωσης δημιουργείται εννοιολογικός χάρτης αναφορικά με τον ρόλο τους στη διαμόρφωση της κοινής γνώμης, τις επιπτώσεις της παραπληροφόρησης, αλλά και ζητήματα δεοντολογίας. Για παράδειγμα, αρχικά δίνεται η κεντρική έννοια και ακολουθεί η δημιουργία εννοιολογικού χάρτη ή γίνεται συμπλήρωση ή επέκταση με συνδέσμους και έννοιες. Έτσι, η εννοιολογική χαρτογράφηση αναπτύσσεται ως ευέλικτη τεχνική και δυναμικό μέσο για την προαγωγή της κατανόησης, της κριτικής σκέψης, της συνεργασίας και της επικοινωνίας εμπλουτίζοντας τη διδασκαλία και προσδίδοντας στη μάθηση ουσιαστικό νόημα. Επιπλέον, η δημιουργία πολυτροπικών εννοιολογικών χαρτών προσφέρει την ευκαιρία στους/στις μαθητές/τριες να αναπτύξουν την κατανόησή τους μέσω γραπτού λόγου, οπτικών αναπαραστάσεων, ψηφιακών δημιουργιών, προφορικών παρουσιάσεων και άλλων μορφών επικοινωνίας.

Οι Θεματικές Ενότητες του μαθήματος της Κοινωνικής και Πολιτικής Αγωγής στην Ε΄ και τη ΣΤ΄ τάξη Δημοτικού αναπτύσσονται γύρω από τρεις άξονες/Θεματικά Πεδία: α) Η ζωή στο σπίτι μου, β) Η ζωή στο σχολείο μου, και γ) Η ζωή στην κοινότητα και στον ευρύτερο κόσμο (Ministerial Decision 10537/2023). Στη συνέχεια παρουσιάζονται διδακτικές προσεγγίσεις για τη συνδυαστική χρήση εννοιολογικής χαρτογράφησης και πολυγραμματισμών στη διδασκαλία και τη μάθηση. Επιλέγεται για τη ΣΤ΄ Τάξη από το Γ΄ Θεματικό Πεδίο η 3η ενότητα «Ιθαγένεια και εθνική ταυτότητα» και ειδικότερα το θέμα που αφορά στην ιδιότητα του ενεργού πολίτη. Στο πλαίσιο αυτό μελετώνται η ιδιότητα του ενεργού πολίτη, καθώς και ο ρόλος που έχουν οι ίδιοι ως Έλληνες πολίτες στο σχολείο και την ευρύτερη κοινότητα. Αξιοποιώντας το διαδικτυακό λογισμικό Coggle (https://coggle.it/) δημιουργήσαμε εννοιολογικό χάρτη με θέμα τον ρόλο του ενεργού πολίτη στη σύγχρονη εποχή (Διάγραμμα 1). Στον εννοιολογικό χάρτη αποτυπώνονται προβλήματα, αλλά και προκλήσεις που αντιμετωπίζει ο πολίτης στις μέρες μας και παράλληλα αναδεικνύεται η ιδιότητα της ενεργού πολιτειότητας. Επιπλέον, αυτή η ενότητα της Κοινωνικής και Πολιτικής Αγωγής συνδέθηκε με το Πρόγραμμα Σπουδών «Δράσεις Ενεργού Πολίτη» που εφαρμόζεται στην Πρωτοβάθμια και Δευτεροβάθμια Εκπαίδευση από το σχολικό έτος 2024-2025, επειδή σκοπός του είναι «να προετοιμάσει πολίτες με δεξιότητες κριτικής σκέψης, συνεργασίας και κοινωνικής υπευθυνότητας οι οποίοι συμβάλλουν ενεργά στη δημιουργία μιας βιώσιμης κοινωνίας, βασισμένης στην αειφορία, την κοινωνική δικαιοσύνη και την περιβαλλοντική προστασία» (Ministerial Decision 130372/2024). Στον συγκεκριμένο εννοιολογικό χάρτη η σύνδεση μεταξύ των εννοιών, η χρήση χρωμάτων, εικόνας και η σύνδεση με ψηφιακούς πόρους δημιουργούν ένα ελκυστικό περιβάλλον μάθησης, το οποίο προσφέρεται για επεξεργασία από τους/τις

μαθητές/τριες σε ατομικό ή/και ομαδικό επίπεδο προκειμένου αυτό να συνδεθεί με τις εμπειρίες τους και τα πραγματικά προβλήματα διαμορφώνοντας περιβάλλον αυθεντικής μάθησης. Ο εννοιολογικός χάρτης είναι διαθέσιμος στον ακόλουθο σύνδεσμο https://coggle.it/diagram/Z-5gj-qwsN-jtU1h/t/-/16cf475f9e559c50defc6168ad9fc90d267def8dca7fbc36578925c217be1683

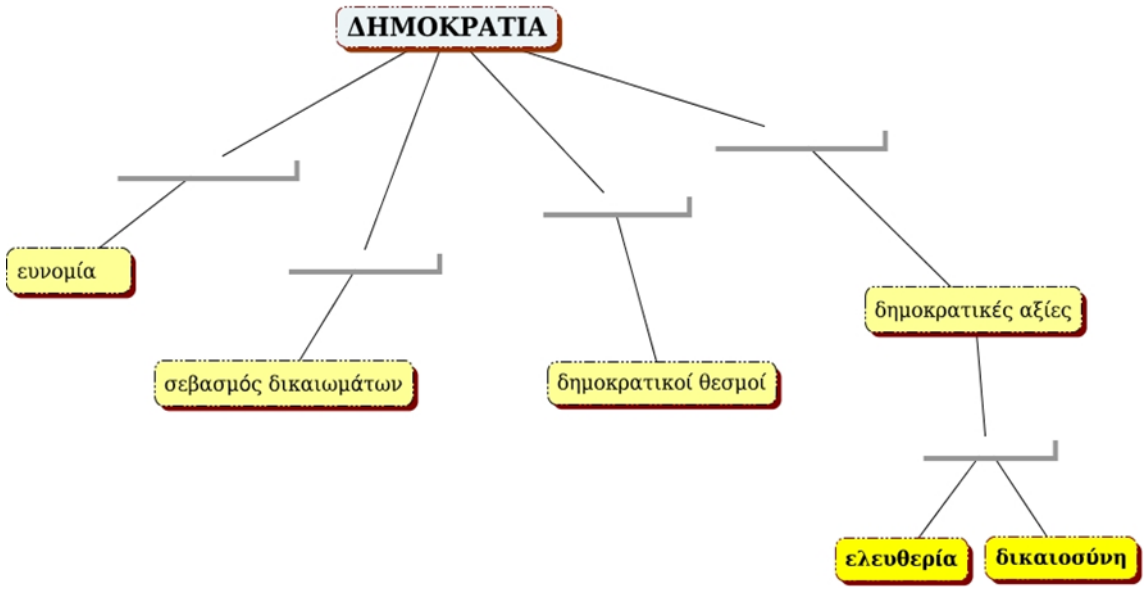
Διάγραμμα 1
Εννοιολογικός χάρτης: Ο ρόλος του ενεργού πολίτη.



Μια ακόμη διδακτική εφαρμογή της εννοιολογικής χαρτογράφησης στο μάθημα της Κοινωνικής και Πολιτικής Αγωγής έχει ως θέμα τη θεμελιώδη έννοια της δημοκρατίας. Στόχος είναι να κατανοήσουν οι μαθητές/τριες τη σύνθετη έννοια της δημοκρατίας, τους θεσμούς που τη στηρίζουν, αλλά και τις προκλήσεις που αντιμετωπίζουν οι δημοκρατικές κοινωνίες στη σύγχρονη εποχή. Για τον σκοπό αυτό, προτείνεται η δημιουργία εννοιολογικού χάρτη συνεργατικά. Οι μαθητές/τριες χωρίζονται σε ομάδες. Κάθε ομάδα καλείται να δημιουργήσει εννοιολογικό χάρτη έχοντας ως κεντρική έννοια τη «δημοκρατία». Οι μαθητές/τριες συνδέουν την έννοια της δημοκρατίας με άλλες σχετικές έννοιες όπως: ευνομία, σεβασμός δικαιωμάτων, δημοκρατικοί θεσμοί, δημοκρατικές αξίες. Χρησιμοποιούνται γραμμές και λέξεις - συνδέσεις (π.χ. διασφαλίζει) για να αποτυπωθούν σχέσεις μεταξύ εννοιών (π.χ. η «δημοκρατία» διασφαλίζει « σεβασμό των δικαιωμάτων»). Οι μαθητές/τριες ενθαρρύνονται να εμπλουτίσουν και να επεκτείνουν τον εννοιολογικό χάρτη, αξιοποιώντας διάφορες διαστάσεις του γραμματισμού. Για παράδειγμα, προτείνεται να χρησιμοποιήσουν διαφορετικά χρώματα, σχήματα και εικόνες, να παραπέμπουν σε πρωτογενείς πηγές. Ακολουθεί παρουσίαση από κάθε ομάδα του εννοιολογικού χάρτη που δημιούργησε και συζήτηση στην ολομέλεια της τάξης. Έμφαση δίνεται στην ανάλυση και τη σύνδεση μεταξύ των εννοιών και στους λόγους που οδήγησαν σε αυτή, με τον/την εκπαιδευτικό σε ρόλο διευκολυντικό και υποστηρικτικό. Εάν κριθεί σκόπιμο, δίνεται η ευκαιρία εμπλουτισμού και αναθεώρησης του εννοιολογικού χάρτη. Επιπρόσθετα, ως επέκταση όλης αυτής της διεργασίας μπορεί να δημιουργηθεί ένας κοινός εννοιολογικός χάρτης, ως αποτέλεσμα σύνθεσης που θα αντιπροσωπεύει την τάξη. Στο πλαίσιο αυτής της προσέγγισης δίνεται ο ακόλουθος εννοιολογικός χάρτης με θέμα τη δημοκρατία (Διάγραμμα 2). Ο εννοιολογικός αυτός χάρτης δημιουργήθηκε με IHMC Cmap Tools (https://cmap.ihmc.us/cmap-cloud/) και είναι διαθέσιμος στον παρακάτω σύνδεσμο https://cmapscloud.ihmc.us:443/rid=1SG381PZY-1GMLGRF-107LH0Z

Το σημαντικότερο από όλα είναι ότι μέσω της εννοιολογικής χαρτογράφησης οι μαθητές/τριες έχουν τη δυνατότητα να αποτυπώσουν την πολυδιάστατη έννοια της δημοκρατίας και να κατανοήσουν σε βάθος τη σημασία των δημοκρατικών αξιών και θεσμών. Οι μαθητές/τριες εμπλέκονται ενεργά στη διαδικασία μάθησης, καθώς αναλύουν, αξιολογούν πληροφορίες και δημιουργούν πολυτροπικά κείμενα αναπτύσσοντας έτσι κριτική σκέψη.

Διάγραμμα 2
Εννοιολογικός χάρτης: Δημοκρατία.



ΣΥΜΠΕΡΑΣΜΑΤΑ

Η εννοιολογική χαρτογράφηση, ως εκπαιδευτική στρατηγική, αξιοποιώντας διαστάσεις του γραμματισμού και ψηφιακά περιβάλλοντα μάθησης, δύναται να υποστηρίξει την ουσιαστική μάθηση και καινοτόμους εκπαιδευτικούς σχεδιασμούς. Οι εννοιολογικοί χάρτες χρησιμεύουν ως εργαλείο για τη διδασκαλία, τη μάθηση και επιπλέον την αξιολόγηση. Επιτρέπουν στους/στις εκπαιδευτικούς να αποτιμήσουν τον βαθμό κατανόησης οπτικοποιώντας τον τρόπο με τον οποίο οι μαθητές/τριες οργανώνουν τη γνώση και εντοπίζουν τομείς προς βελτίωση. Ιδιαίτερα σημαντικό είναι πως η εννοιολογική χαρτογράφηση ενισχύει τη γνωστική εμπλοκή των μαθητών/τριών, το ενδιαφέρον για μάθηση και τον κριτικό στοχασμό. Παράλληλα, ενθαρρύνεται η επικοινωνία, η συνεργασία και η ανταλλαγή ιδεών. Αξίζει να αναφερθεί ότι η χρήση ψηφιακών μέσων και η δυνατότητα έκφρασης με ποικίλους τρόπους (λέξεις, εικόνες κλπ.) διευκολύνουν τη διαδικασία μάθησης για μαθητές/τριες με διαφορετικά στυλ μάθησης. Οι προοπτικές της αξιοποίησης εννοιολογικής χαρτογράφησης και πολυγραμματισμών στη διδασκαλία του μαθήματος της Κοινωνικής και Πολιτικής Αγωγής παρουσιάζουν ιδιαίτερο ενδιαφέρον.

Εν κατακλείδι, η σύνδεση της εννοιολογικής χαρτογράφησης με τους πολυγραμματισμούς προσφέρει ένα δυναμικό πλαίσιο για την αναβάθμιση της διδασκαλίας και της μάθησης. Προτείνεται περαιτέρω μελέτη και διερεύνηση της ενσωμάτωσης της εννοιολογικής χαρτογράφησης σε γνωστικά αντικείμενα που διδάσκονται στην Πρωτοβάθμια και Δευτεροβάθμια Εκπαίδευση.

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ΘΠ6: Ψηφιακή Ηθική

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΗΘΙΚΗ: ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΛΥΣΕΙΣ

Σαμωνάς Κωνσταντίνος
Εκπαιδευτικός ΠΕ02
ΔΔΕ Πρέβεζας, Γυμνάσιο Λούρου
Πρέβεζα, Ελλάδα
e-mail: samkon@sch.gr

ΠΕΡΙΛΗΨΗ

Το παρόν άρθρο εστιάζει στη θεματική της Ψηφιακής Ηθικής και ιδιαίτερα στον τομέα της Ηθικής στην Τεχνητή Νοημοσύνη (ΤΝ) και τις προκλήσεις που ανακύπτουν από την εισαγωγή της στην εκπαίδευση. Αρχικά γίνεται μια παρουσίαση των όρων ΤΝ. Έπειτα παρουσιάζονται οι τρόποι που η ΤΝ έχει εισχωρήσει στην εκπαίδευση και τα θετικά που μπορεί να επιφέρει σε ζητήματα διοίκησης και διαχείρισης, στη διδασκαλία και στη μάθηση, όπως η προσωποποιημένη μάθηση, η δημιουργία ποιοτικού παιδαγωγικού περιεχομένου με δυνατότητα προσαρμογής στις ανάγκες των μαθητών/τριών, η έγκυρη και έγκαιρη αξιολόγηση και ανατροφοδότηση, προβλέψεις και παρεμβάσεις για μαθητές/τριες που δυσκολεύονται. Στη συνέχεια αναδεικνύονται τα πιο σημαντικά προβλήματα σχετικά με την εισαγωγή και τη χρήση της ΤΝ στην εκπαίδευση, όπως η ιδιωτικότητα, η προστασία των δεδομένων, η μεροληψία και η αδιαφάνεια των αλγορίθμων, το ψηφιακό χάσμα, ο πλαγιαρισμός και γενικότερα οι κίνδυνοι για την ακαδημαϊκή ακεραιότητα. Έπειτα, αφού παρουσιαστούν το πλαίσιο των ηθικών σχολών της δεοντολογίας, του ωφελιμισμού και των αρετών, γίνεται διερεύνηση των υφιστάμενων κανόνων δεοντολογίας με έμφαση σε εκείνους των διεθνών και διακρατικών θεσμών της UNICEF, του ΟΑΣΑ και της Ευρωπαϊκής Ένωσης, αλλά και του νομικού πλαισίου που έχει αναπτυχθεί στην Ευρωπαϊκή Ένωση (ΕΕ) -ΓΚΠΔ και Κανονισμός σχετικά με την ΤΝ-, που αναδεικνύει ότι οι κώδικες δεοντολογίας αδυνατούν να επιφέρουν τα επιδιωκόμενα αποτελέσματα για διάφορες αιτίες, όπως ο ανταγωνισμός μεταξύ εταιρειών ή κρατών και η εξάρτηση της επιστημονικής προόδου από τη χρηματοδότηση επενδυτών με πιθανόν ιδιοτελείς σκοπούς, και ότι απαιτείται η ενίσχυση της θεσμικής θωράκισης. Τέλος, γίνεται αναφορά στον ρόλο του σχολείου για την καλλιέργεια όχι μόνο γνώσεων και δεξιοτήτων που είναι απαραίτητες για τη δημιουργική αξιοποίηση της ΤΝ αλλά και την ηθική συνείδηση κατά την εφαρμογή της από τους/τις μαθητές/τριες ως ενήλικες, ώστε να περιοριστούν αρνητικές πρακτικές και αποτελέσματα που θα βλάψουν την κοινωνία, και η ανάγκη για επιμόρφωση των εκπαιδευτικών στα αντίστοιχα θέματα, ώστε να αποτελέσουν πρότυπα για τους/τις μαθητές/τριες.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Ηθική, Εκπαίδευση

ΕΙΣΑΓΩΓΗ

Το 1950 ο Alan Turing εισηγήθηκε την πιθανότητα οι μηχανές να μπορούν να σκεφτούν. Από τότε έχει υπάρξει σημαντική επιστημονική πρόοδος που οδήγησε σε μία σειρά από καινοτομίες που χρησιμοποιούμε στην καθημερινότητά μας, χωρίς να γνωρίζουμε ότι ανήκουν στον χώρο της ΤΝ, όπως για παράδειγμα οι μηχανές αναζήτησης, τα ρομπότ συζήτησης (chatbots). Όταν το 2022 η εταιρεία OpenAI παρουσίασε το ChatGPT, το ενδιαφέρον για την ΤΝ και για το τι είχε να προσφέρει σε διάφορους τομείς κορυφώθηκε. Ταυτόχρονα διατυπώθηκαν μια σειρά από ενδοιασμούς σχετικά με την ΤΝ. Στο παρόν άρθρο γίνεται μια προσπάθεια να απαντηθούν κάποια ερωτήματα: Τι είναι η ΤΝ; Ποια οφέλη και ποιοι κίνδυνοι ανακύπτουν από τη χρήση της στην εκπαίδευση; Υπάρχει κάποιο ηθικό υπόβαθρο στο οποίο μπορούμε να στηριχτούμε, για να μειωθούν οι αρνητικές συνέπειες της ΤΝ; Εκφράζονται αυτά σε κάποια κείμενα (δεοντολογίας, νόμοι) με γενικό χαρακτήρα; Πώς μπορεί η εκπαίδευση να βοηθήσει στην καλλιέργεια ηθικής σκέψης και δράσης;

ΟΡΙΣΜΟΙ ΤΗΣ ΤΝ

Δεν υφίσταται ένας κοινά αποδεκτός από ερευνητές της ΤΝ ορισμός της, όπως επισήμαναν οι Legg & Hutter (2007) στη συλλογή ορισμών της έννοιας νοημοσύνη. Οι εισηγητές του όρου McCarthy et al. (1955) τον όρισαν ως «κάνοντας μία μηχανή να συμπεριφέρεται με τρόπο που θα μπορούσε να χαρακτηριστεί ευφυής, αν ένας άνθρωπος συμπεριφερόταν παρομοίως» (όπως αναφέρεται στο Ahmad & al., 2021: 2). Ορισμοί που εστιάζουν στην αναπαραγωγή ή μίμηση της ανθρώπινης ευφυΐας για συγκρότηση συλλογισμών, δημιουργικότητα, επίλυση προβλημάτων, μάθηση, αυτοβελτίωση, δόθηκαν από τους Whitby (2009), Coppin (2004), Zachos et al (2015), Bailey (2023), Akgun & Greenhow (2022), Harkut & al. (2019), Γεωργούλη (Georgouli,2015). Σύμφωνα με τη unicef (2021: 16) η ΤΝ «αναφέρεται σε συστήματα μηχανών τα οποία δύνανται, με βάση ένα σύνολο στόχων καθορισμένων από άνθρωπο, να κάνουν προβλέψεις, προτάσεις ή να λάβουν αποφάσεις που επηρεάζουν υλικά ή εικονικά περιβάλλοντα. Τα συστήματα ΤΝ αλληλοεπιδρούν μαζί μας και δρουν στο περιβάλλον μας, είτε άμεσα ή έμμεσα. Συχνά, φαίνεται να ενεργούν αυτόνομα και δύνανται να προσαρμόζουν τη συμπεριφορά τους μαθαίνοντας το εννοιολογικό πλαίσιο». Παραπλήσια ορίζεται στον Κανονισμό 2024/1689 της ΕΕ (άρθρο 3) ένα σύστημα ΤΝ ως «μηχανικό σύστημα που έχει σχεδιαστεί, για να λειτουργεί με διαφορετικά επίπεδα αυτονομίας και μπορεί να παρουσιάζει προσαρμοστικότητα μετά την εφαρμογή του και το οποίο, για ρητούς ή σιωπηρούς στόχους, συνάγει, από τα στοιχεία εισόδου που λαμβάνει, πώς να παράγει στοιχεία εξόδου, όπως προβλέψεις, περιεχόμενο, συστάσεις ή αποφάσεις που μπορούν να επηρεάσουν υλικά ή εικονικά περιβάλλοντα». Με τους ορισμούς αυτούς αποφεύγεται η αναφορά στον όρο «ευφυΐα» που δύσκολα προσδιορίζεται και η προσοχή στρέφεται στον ρόλο του ανθρώπου, στα αναμενόμενα από τη λειτουργία των συστημάτων ΤΝ και στο ότι δύνανται να ασκήσουν επιρροή σε διάφορα περιβάλλοντα.

ΤΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΟΦΕΛΗ

Κάθε τεχνολογική εξέλιξη επηρεάζει όλους τους τομείς μιας κοινωνίας και αναπόφευκτα η εκπαίδευση είναι ένας από αυτούς. Η ΤΝ δύναται να προσφέρει αρκετά οφέλη σε ποικίλους τομείς (EU, 2020, Bailey, 2023, Ahmad et al., 2021, Akgun & Greenhow, 2021, Chen et al., 2020, Jyothi Sreedhar et al., 2023, Harry, 2023, Eden et al. 2024):

- **Διδασκαλία μαθητών/τριών**. Π.χ. παροχή ακολουθίας εργασιών για κατανόηση, λήψη εξατομικευμένης εκπαίδευσης, εκμάθηση ξένης γλώσσας.
- **Υποστήριξη μαθητών/τριών**. Π.χ. επισήμανση σημείων για βελτίωση, προσαρμογή της διδασκαλίας στις ανάγκες των μαθητών/τριών, επεξήγηση δύσκολων εννοιών για επίτευξη των μαθησιακών στόχων, παιγνιοποίηση, κριτική για γραπτές και άλλες εργασίες.
- **Υποστήριξη εκπαιδευτικών**. Π.χ. αυτόματη αξιολόγηση, σχολιασμός εργασιών, δημιουργία σχεδίων μαθημάτων, υλικού διαφοροποιημένης διδασκαλίας, φύλλων εργασίας, εντοπισμός μαθητών/τριών που αντιμετωπίζουν δυσκολίες, αναστοχασμός σχετικά με το υλικό, τις μεθόδους και τις πρακτικές διδασκαλίας.
- **Υποστήριξη συστήματος**. Π.χ. υποστήριξη επικοινωνίας με γονείς και κηδεμόνες και άλλους φορείς, οργάνωση τάξεων, βέλτιστη κατανομή πόρων, καθοδήγηση μαθητών/τριών για τη μελλοντική ακαδημαϊκή πορεία τους, παρακολούθηση του σχολικού κλίματος.
- **Υποστήριξη γονέων και κηδεμόνων**. Π.χ. δημιουργία αιτημάτων προς τη διεύθυνση, εποπτεία της επίδοσης, βοήθεια για διερεύνηση ακαδημαϊκής εξέλιξης.

ΤΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΠΡΟΚΛΗΣΕΙΣ

Όπως όλες οι καινοτομίες, έτσι και η είσοδος της ΤΝ στην εκπαίδευση εγείρει μια σειρά από ζητήματα που σχετίζονται τόσο με τον τρόπο δόμησης και λειτουργίας των συστημάτων ΤΝ όσο και τη χρήση τους. Οι κυριότεροι κίνδυνοι είναι (Borenstein & Howard, 2020, Bailey, 2023, Akgun & Greenhow: 2021, Holmes et al., 2022):

- **Ισότιμη πρόσβαση**. Π.χ. αποκλεισμός μειονοτήτων, κοινωνικά περιθωριακών ομάδων, ΑΜεΑ, ή λόγω του κοινωνικοοικονομικού πλαισίου και γεωγραφικών περιορισμών.
- **Ψηφιακό χάσμα**. Π.χ. ανισότιμη πρόσβαση σε τεχνολογική υποδομή και αξιόπιστη σύνδεση στο Διαδίκτυο.
- **Προστασία προσωπικών δεδομένων**. Π.χ. διαρροή και κακόβουλη επεξεργασία των εκπαιδευτικών δεδομένων, ιδίως των ευαίσθητων προσωπικών δεδομένων.
- **Ιδιωτικότητα**. Π.χ. διαρκής επιτήρηση της δραστηριότητας των χρηστών.
- **Αυτονομία**. Π.χ. αδυναμία των χρηστών να ενεργούν σύμφωνα με τις δικές τους αρχές και τα δικά τους συμφέροντα.
- **Πιθανές προκαταλήψεις**. Π.χ. διατήρηση και ενίσχυση ανισοτήτων ως προς το φύλο, την εθνικότητα κι άλλα, λόγω μεροληψιών στις βάσεις δεδομένων.
- **Διαφάνεια και λογοδοσία**. Π.χ. αδιαφάνεια στον τρόπο σχεδιασμού των αλγορίθμων, στην ποιότητα των βάσεων δεδομένων, στη λογική λήψης αποφάσεων.
- **Αμεροληψία, εγκυρότητα και ισότητα**. Π.χ. πιθανές προκαταλήψεις και διακρίσεις στην περίπτωση αξιολόγησης μαθητών/τριών και λήψης αποφάσεων για την ακαδημαϊκή πορεία τους.
- **Υπερβολική εμπιστοσύνη**. Π.χ. μη έλεγχος της ακρίβειας και της εγκυρότητας των αποτελεσμάτων των συστημάτων ΤΝ.
- **Εξαπάτηση/Πλαγιαρισμός**. Π.χ. χρήση των συστημάτων ΤΝ για επίλυση εργασιών με αποτέλεσμα τη μη εκμάθηση της διδασκόμενης ύλης και τη μη απόκτηση απαραίτητων δεξιοτήτων.

Αναπόφευκτα, για τους λόγους αυτούς αναφύονται θέματα ηθικής συμπεριφοράς τόσο των δημιουργών όσο και των χρηστών των συστημάτων ΤΝ.

ΗΘΙΚΗ: ΔΕΟΝΤΟΛΟΓΙΚΗ, ΩΦΕΛΙΜΙΣΤΙΚΗ ΚΑΙ ΑΡΕΤΩΝ

Στην αντιμετώπιση των προκλήσεων αυτών μπορεί να βοηθήσει η Ηθική, ο πρακτικός κλάδος της Φιλοσοφίας ο οποίος μελετά το σύστημα που διέπει τη συμπεριφορά μας, στοχεύει στη μείωση του κακού ή της ζημιάς και εμπεριέχει τους ηθικούς κανόνες, τα ηθικά ιδανικά και τις ηθικές αρετές (Audi, 1999, Dokas, 1981). Μέσω της Ηθικής επιδιώκεται η διατύπωση κανόνων οι οποίοι καθορίζουν τη συμπεριφορά και τις αποφάσεις μας, ώστε αυτά να είναι σύμφωνα με τις ηθικές αξίες. Τρία από τα ρεύματα της Ηθικής είναι η δεοντολογική, ο ωφελιμισμός και η ηθική των αρετών. Η **δεοντολογική** ηθική είναι κανονιστική, επειδή επιζητά να ορίσει τις καθολικές ηθικές αρχές βάσει των οποίων οι άνθρωποι οφείλουν να ενεργούν σε κάθε περίσταση. Κριτήριο για την ηθική αξία των ενεργειών μας είναι οι εσωτερικές αρχές τους κι όχι τα αποτελέσματά τους (Larry & Moore, 2024, Blackburn, χχ, Audi, 1999). Βάση των κανόνων είναι ο ορθολογισμός (Audi, 1999, Dokas, 1981). Ο Καντ εισηγήθηκε την κατηγορική προσταγή βάσει της οποίας καθένας/καθεμία από εμάς οφείλει να ενεργεί με τρόπο που η δική του/της συμπεριφορά να μπορεί να γίνει ο καθολικός κανόνας της κοινωνίας και η ανθρωπότητα να χρησιμοποιείται πάντα ως σκοπός κι όχι απλά ως μέσο (Rohlf, 2024, Blackburn, χχ, Dokas, 1981). Αντίθετα, ο **ωφελιμισμός** προωθεί την επίτευξη ευτυχίας για τον μεγαλύτερο δυνατό αριθμό ανθρώπων που επηρεάζονται από τις ενέργειές μας, και θεμελιώνεται στη λογική αγαθοεργία (Audi, 1999, Blackburn, χχ, Sinnott-Armstrong, 2023, Dokas, 1981). Κριτήριο για την ηθική αξία των ενεργειών μας είναι τα αποτελέσματά τους (Blackburn, χχ, Sinnott-Armstrong, 2023). Τέλος, η **ηθική των αρετών** εστιάζει στην καλλιέργεια του χαρακτήρα και των αρετών, των εξαιρετικών ιδιοτήτων του χαρακτήρα οι οποίες αναπτύσσονται μέσω της εξάσκησης στις συγκεκριμένες αρετές (Audi, 1999, Blackburn, χχ, Hursthouse & Pettigrove, 2023). Απαιτείται η ανάπτυξη της κριτικής ικανότητας, για να διακρίνουμε και να κάνουμε ανεξάρτητα ό,τι είναι ηθικά απαιτούμενο ή να πραγματώσουμε ό,τι είναι άριστο (Audi, 1999, Blackburn, χχ). Επιδιώκεται μια ζωή ευτυχισμένη και ενάρετη (Blackburn, χχ). Επομένως, ως λογικά και κοινωνικά όντα κρίνουμε, επιλέγουμε και ενεργούμε με βάση κανόνες και αρχές που χαρακτηρίζονται ως ηθικοί ή μη. Το ίδιο ισχύει και στην περίπτωση των συστημάτων ΤΝ τόσο για τους δημιουργούς τους όσο και για τους χρήστες τους.

ΔΕΟΝΤΟΛΟΓΙΚΑ ΚΑΙ ΝΟΜΙΚΑ ΚΕΙΜΕΝΑ

Για να περιοριστούν οι αρνητικές συνέπειες από τη χρήση των συστημάτων ΤΝ και να ωφελούνται οι χρήστες τους τα μέγιστα, είναι αναγκαίο αυτά να είναι αξιόπιστα, ιδιότητα που στηρίζεται σε τρεις συνιστώσες σύμφωνα με την Ομάδα Εμπειρογνωμόνων Υψηλού Επιπέδου για την ΤΝ (ΟΕΥΕ, 2019). Πρώτον, τα συστήματα ΤΝ πρέπει να είναι **σύννομα**, δηλαδή να τηρούν τις νομοθετικές και κανονιστικές ρυθμίσεις. Δεύτερον, πρέπει να είναι **δεοντολογικά**, δηλαδή να τηρούν τους κανόνες δεοντολογίας. Τρίτον, πρέπει να είναι **στιβαρά**, δηλαδή να εξασφαλίζουν την ασφάλεια και την προστασία των χρηστών τόσο σε τεχνολογικό όσο και κοινωνικό επίπεδο. Καμία από τις ιδιότητες αυτές δεν επαρκεί από μόνη της, αλλά και οι τρεις συνεργούν και αλληλοεπικαλύπτονται, επειδή (α) το υφιστάμενο νομοθετικό πλαίσιο δεν συμβαδίζει πάντα με τις τεχνολογικές εξελίξεις, βρίσκεται σε σύγκρουση με τη δεοντολογία και ίσως δεν είναι το κατάλληλο για την επίλυση ζητημάτων που ανακύπτουν και, επομένως, είναι αναγκαίο να υφίσταται ένα ισχυρό

δεοντολογικό πλαίσιο και (β) η ύπαρξη τέτοιου πλαισίου δεν επαρκεί, για να αποτρέψει κινδύνους από ακούσια βλάβη. Αποτέλεσμα της αξιοπιστίας των συστημάτων ΤΝ είναι ότι εξασφαλίζεται η υπεύθυνη ανταγωνιστικότητα σχετικά με αυτά. Για το λόγο αυτό έχουν υιοθετηθεί ποικίλα δεοντολογικά κείμενα από εταιρείες που ερευνούν και αναπτύσσουν συστήματα ΤΝ, από κρατικούς, διακρατικούς και διεθνείς φορείς και έχουν θεσπιστεί νόμοι για τη ρύθμιση του πεδίου.

Το πρώτο χρονολογικά διακυβερνητικό πρότυπο για την ΤΝ υιοθετήθηκε από το Συμβούλιο του ΟΑΣΑ (OECD) το 2019 με τον τίτλο *Recommendation of the Council on Artificial Intelligence* και αναθεωρήθηκε το 2024 (OECD, 2025). Στην *Πρόταση* αναπτύσσονται (α) οι αρχές για υπεύθυνη επιστασία της αξιόπιστης ΤΝ και (β) οι εθνικές πολιτικές και η διεθνής συνεργασία. Οι αρχές που προτείνονται είναι:

- **Συμπεριληπτική οικονομική μεγέθυνση, αειφόρος ανάπτυξη και ευημερία** με επιδίωξη την αύξηση των ανθρώπινων ικανοτήτων, την ενίσχυση δημιουργικότητας, την προώθηση της συμπερίληψης, τη μείωση των ανισοτήτων και την προστασία του φυσικού περιβάλλοντος.
- Σεβασμός στο κράτος δικαίου, στα ανθρώπινα δικαιώματα και τις δημοκρατικές αρχές, συμπεριλαμβανομένων της αμεροληψίας και της ιδιωτικότητας με επιδίωξη την αποφυγή διακρίσεων, την ισότητα, την ελευθερία, την αξιοπρέπεια, την αυτονομία, την προστασία των δεδομένων, τη διαφορετικότητα, την κοινωνική δικαιοσύνη και τα εργατικά δικαιώματα και την προστασία από την παραπληροφόρηση.
- **Διαφάνεια και επεξηγησιμότητα** (explainability) με επιδίωξη την καλλιέργεια της γενικής κατανόησης για τις ικανότητες και τους περιορισμούς των συστημάτων ΤΝ, την επίγνωση των χρηστών ότι διεπιδρούν με συστήματα ΤΝ, την παροχή πληροφοριών σχετικά με τις πηγές δεδομένων, τη διαδικασία και τη λογική που διαμόρφωσαν τις εκροές, και τη δυνατότητα να αμφισβητήσουν τις εκροές εκείνοι που επηρεάζονται δυσμενώς.
- **Στιβαρότητα, ασφάλεια και προστασία** με επιδίωξη την ορθή λειτουργία, την αποφυγή αδικαιολόγητων κινδύνων, τη δυνατότητα διόρθωσης και παροπλισμού των συστημάτων που επιδεικνύουν ανεπιθύμητη συμπεριφορά και την ακεραιότητα πληροφοριών.
- **Λογοδοσία** με επιδίωξη την εξασφάλιση ιχνηλασιμότητας, τη διαρκή διαχείριση κινδύνου σε όλες τις φάσεις ζωής ενός συστήματος ΤΝ και την υπεύθυνη αντιμετώπιση κινδύνων.

Στον τομέα των εθνικών πολιτικών και της διεθνούς συνεργασίας προτείνονται (α) η επένδυση στην έρευνα και την ανάπτυξη της ΤΝ, (β) η καλλιέργεια συμπεριληπτικού οικοσυστήματος που διευκολύνει την ΤΝ, (γ) η διαμόρφωση διευκολυντικής διαλειτουργικής διακυβέρνησης και πολιτικού περιβάλλοντος για την ΤΝ, (δ) η ανάπτυξη ικανοτήτων και η προετοιμασία για μετασχηματισμό της αγοράς εργασίας, και (ε) η διεθνής συνεργασία για αξιόπιστη ΤΝ.

Η Ευρωπαϊκή Ένωση (ΕΕ) δημοσίευσε τις *Κατευθυντήριες Γραμμές Δεοντολογίας για αξιόπιστη ΤΝ* οι οποίες συντάχθηκαν το 2018 από την ανεξάρτητη ΟΕΥΕ για την ΤΝ. Στο κείμενο προσδιορίστηκαν πέντε θεμελιώδη ανθρώπινα δικαιώματα: (α) ο σεβασμός της ανθρώπινης αξιοπρέπειας, (β) η ελευθερία του ατόμου, (γ) ο σεβασμός της δημοκρατίας, της δικαιοσύνης και του κράτους δικαίου, (δ) η ισότητα, απαγόρευση των διακρίσεων και αλληλεγγύη, (ε) τα δικαιώματα πολιτών. Από αυτά πηγάζουν τέσσερις δεοντολογικές αρχές:

- **Σεβασμός της ανθρώπινης αυτονομίας** η οποία προσδιορίζεται ως αυτοδιάθεση, συμμετοχή στις δημοκρατικές διαδικασίες, ενίσχυση των δεξιοτήτων και εποπτεία των συστημάτων ΤΝ.
- **Πρόληψη βλάβης** η οποία προσδιορίζεται ως προστασία της ανθρώπινης αξιοπρέπειας και της σωματικής και πνευματικής ακεραιότητας, συμπερίληψη ευάλωτων ανθρώπων και κοινωνικών ομάδων και προστασία του φυσικού περιβάλλοντος.
- **Δικαιοσύνη** η οποία προσδιορίζεται ως δίκαιη κατανομή ωφελειών και κόστους, αμεροληψία, αποφυγή διακρίσεων, ισότιμες ευκαιρίες, αποφυγή εξαπάτησης και έννομη προστασία απέναντι σε αποφάσεις που λαμβάνονται από συστήματα ΤΝ.
- **Επεξηγησιμότητα** η οποία προσδιορίζεται ως διαφάνεια στις διαδικασίες επεξεργασίας των δεδομένων και λήψης απόφασης, επίγνωση των χρηστών για τις δυνατότητες και τον σκοπό των συστημάτων ΤΝ και επεξήγηση με σαφήνεια σε εκείνους που θα υποστούν τις συνέπειες των αποφάσεων αυτών.

Σε παγκόσμιο επίπεδο η unicef, εκκινώντας από τη διαπίστωση ότι, παρά την πληθώρα δεοντολογικών κειμένων και εθνικών πολιτικών για τα συστήματα ΤΝ και τη θεμελίωσή τους στα ανθρώπινα δικαιώματα, δεν λαμβάνονται υπόψη τα ιδιαίτερα χαρακτηριστικά και δικαιώματα των παιδιών, εξέδωσε το 2021 το *Policy guidance on AI for children 2.0* το οποίο ήταν αποτέλεσμα των εργασιών ομάδας συντακτών και επιτροπής συμβούλων ποικίλης προέλευσης και υπόβαθρου, διαβούλευσης και αναθεώρησης από εθνικές κυβερνήσεις, οργανισμούς της κοινωνίας των πολιτών και εταιρείες από διάφορα μέρη της γης, ενώ λήφθηκε υπόψη και η γνώμη 250 παιδιών που συμμετείχαν σε εννέα εργαστήρια σε πέντε χώρες. Στο κείμενο αναγνωρίζεται ότι η ΤΝ συνοδεύεται από οφέλη και κινδύνους για την ανάπτυξη των παιδιών και εισάγεται η έννοια της παιδοκεντρικής ΤΝ η οποία σχεδιάζεται για παιδιά με κύρια επιδίωξη τη μεγιστοποίηση των ευκαιριών για ανάπτυξη των παιδιών, την ελαχιστοποίηση των κινδύνων σε βάρος των παιδιών και την ενίσχυση της διεπίδρασης μεταξύ των παιδιών και των συστημάτων ΤΝ.

Βάσει της *Σύμβασης για τα Δικαιώματα του Παιδιού* καθορίζονται ως θεμέλια για μια παιδοκεντρική ΤΝ (α) η **Προστασία** από κάθε επιβλαβή και μεροληπτική επίπτωση των συστημάτων ΤΝ και από κάθε βλάβη και εκμετάλλευση, (β) η **Πρόβλεψη (ωφέλεια)** ότι οι ευκαιρίες που πηγάζουν από τα συστήματα ΤΝ για την εκπαίδευση, την υγεία και το παιχνίδι, πρέπει να ενισχυθούν, όταν είναι κατάλληλη η χρήση των συστημάτων ΤΝ για τα παιδιά, και (γ) η **Συμμετοχή (συμπερίληψη όλων των παιδιών)** στη διαμόρφωση των συστημάτων ΤΝ και στη λήψη λελογισμένων αποφάσεων σχετικά με τη χρήση τους και τον αντίκτυπο που μπορεί να έχουν στη ζωή τους (unicef, 2021). Βασιζόμενη στις αρχές αυτές η unicef προτείνει εννέα απαιτήσεις για μια παιδοκεντρική ΤΝ, οι οποίες συνοδεύονται από συγκεκριμένες προτάσεις:

- **Υποστήριξη της ανάπτυξης των παιδιών και της ευημερίας τους**. Προτείνεται (α) ο σχεδιασμός πολιτικών και πρακτικών σχετικά με την ΤΝ βάσει των επιπτώσεων και των κινδύνων για τα παιδιά, (β) ο σχεδιασμός συστημάτων ΤΝ εστιασμένων στα δικαιώματα των παιδιών, (γ) ο περιορισμός των αρνητικών συνεπειών στο περιβάλλον και (δ) ο σχεδιασμός ποιοτικής αξιολόγησης των συστημάτων ΤΝ που να ελέγχει τις εμπειρίες των παιδιών κατά τη διεπίδρασή τους με αυτά.
- **Εξασφάλιση της συμμετοχής των παιδιών και για τα παιδιά**. Προτείνεται (α) η διαφοροποίηση εκείνων που εμπλέκονται στο σχεδιασμό, την ανάπτυξη συστημάτων ΤΝ, για να περιορίζεται η μεροληψία, (β) η αποφυγή κάθε είδους αποκλεισμού (ηλιακού, φύλου, ικανοτήτων, γεωγραφικού και πολιτισμικού) και (γ) η εμπλοκή των παιδιών στη διαμόρφωση των πολιτικών και στο σχεδιασμό και την ανάπτυξη των συστημάτων ΤΝ.
- **Προτεραιοποίηση της αμεροληψίας και των μη διακρίσεων σε βάρος των παιδιών**. Προτείνεται (α) η υποστήριξη περιθωριοποιημένων παιδιών, ευάλωτων ομάδων και προσφύγων, με σεβασμό στις πολιτισμικές, κοινωνικές και τοπικές διαφορές, (β) η δημιουργία βάσεων δεδομένων που να διασφαλίζουν την ποικιλομορφία, με ορθότητα, συνέπεια, εγκυρότητα και ποιότητα και (γ) η τροποποίηση των αλγόριθμων για την επίτευξη αμεροληψίας.
- **Προστασία των δεδομένων και της ιδιωτικότητας των παιδιών**. Προτείνεται (α) ο περιορισμός των δεδομένων στα όσο το δυνατόν λιγότερα, ταυτόχρονα όμως επαρκή για τη λειτουργία των συστημάτων ΤΝ προς όφελος των παιδιών, (β) να είναι τα παιδιά κύριοι των προσωπικών δεδομένων ανάλογα με τη φάση ανάπτυξή τους, (γ) η προστασία της ιδιωτικότητας από τον σχεδιασμό, βάσει των αρχών για επεξεργασία των δεδομένων για συγκεκριμένο σκοπό, για διαφάνεια στην επεξεργασία των «κρυφών» δεδομένων, και για διατήρησή τους για ελάχιστο χρονικό διάστημα και (δ) η μη δημιουργία προφίλ βασισμένου σε συλλογικά χαρακτηριστικά.
- **Ασφάλεια για τα παιδιά**. Προτείνεται (α) η ανάπτυξη πολιτικών και στρατηγικών για την ΤΝ που να μετριάζουν τις επιβλαβείς για τα παιδιά πρακτικές της, (β) η διαρκής εποπτεία σε όλο τον κύκλο ζωής των συστημάτων ΤΝ των επιπτώσεών τους στα κοινωνικά συστήματα και στις δομές, όπως και στην ανάπτυξη και στο γνωστικό επίπεδο των παιδιών, (γ) ο έλεγχος των συστημάτων ΤΝ σε ζητήματα ασφάλειας, προστασίας και στιβαρότητας και (δ) η χρήση των συστημάτων ΤΝ για προστασία των παιδιών από κινδύνους (π.χ. απαγωγή, πορνογραφία).
- **Παροχή διαφάνειας, επεξηγησιμότητας και λογοδοσίας για τα παιδιά**. Προτείνεται (α) η προώθηση της επεξηγησιμότητας και της διαφάνειας των συστημάτων ΤΝ, (β) η χρήση γλώσσας κατανοητής από τα παιδιά ανάλογα με την ηλικία τους, (γ) η σαφής ενημέρωσης των παιδιών και των γονέων και κηδεμόνων τους ότι διεπιδρούν με σύστημα ΤΝ, (δ) η σύννομη λειτουργία των συστημάτων ΤΝ, για να προστατεύουν και να ενισχύουν τα παιδιά, (ε) ο έλεγχος, η ανανέωση και η εξέλιξη του ρυθμιστικού πλαισίου με συμπερίληψη των δικαιωμάτων των παιδιών και (στ) η διαρκής επίβλεψη της ΤΝ για πιθανές παραβιάσεις των δικαιωμάτων των παιδιών.
- **Ενίσχυση κυβερνήσεων και εταιρειών σχετικά με τη γνώση της ΤΝ και των δικαιωμάτων των παιδιών**. Προτείνεται (α) η καλλιέργεια της επίγνωσης των διαμορφωτών πολιτικών, των διοικητικών στελεχών και των δημιουργών ΤΝ στο ζήτημα των δικαιωμάτων των παιδιών, (β) η αποκόμιση κέρδους με προώθηση του αιτήματος για αξιόπιστη και διαφανή ΤΝ για τα παιδιά και (γ) η δέσμευση για δημιουργία μιας παιδοκεντρικής ΤΝ.
- **Προετοιμασία των παιδιών για εξελίξεις της ΤΝ στο παρόν και στο μέλλον**. Προτείνεται (α) η ανάπτυξη προγραμμάτων εκπαίδευσης για τα παιδιά σε θέματα τεχνικά και δεξιοτήτων (π.χ. κριτική σκέψη, ενσυναίσθηση), (β) η ανάπτυξη δεξιοτήτων των εκπαιδευτικών σχετικά με τις κοινωνικές και προσωπικές επιπτώσεις της ΤΝ για τα παιδιά, (γ) η ενίσχυση της χρήσης των συστημάτων ΤΝ στην εκπαίδευση, όταν αυτά δεν θέτουν σε κίνδυνο τα παιδιά και παρέχουν ευκαιρίες σε περιθωριοποιημένες ομάδες, ευάλωτα άτομα, (δ) η διευκόλυνση της συνεργασίας μεταξύ εκπαιδευτικών ιδρυμάτων και εταιρειών και (ε) εκστρατείες ενημέρωσης προς γονείς και κηδεμόνες και προς την κοινωνία συνολικά σχετικά με το ποια δεδομένα πρέπει τα παιδιά να διαμοιράζονται, γιατί, με ποιον και πού, και ποια συστήματα ΤΝ να χρησιμοποιούν.
- **Δημιουργία ενός διευκολυντικού περιβάλλοντος**. Προτείνεται (α) η υποστήριξη για την ανάπτυξη τεχνικής υποδομής, ώστε να διαμοιράζονται τα οφέλη της ΤΝ ισότιμα, (β) η χρηματοδότηση για πολιτικές και στρατηγικές εστιασμένες στην παιδοκεντρική ΤΝ, (γ) η υποστήριξη της έρευνα για την ΤΝ για τα παιδιά και

μαζί με αυτά και (δ) η συνεργασία για τη δημιουργία λογισμικού ανοικτού κώδικα, ανοικτών βάσεων δεδομένων, ανοικτών μοντέλων ΤΝ.

Παρά την κριτική ότι το κείμενο της unicef παρουσιάζει ανακολουθίες και συγκρούσεις τόσο μεταξύ των απαιτήσεων όσο και μεταξύ των προτάσεων, ανεπαρκή συμπερίληψη και αντιπροσωπευτικότητα, διατήρηση του ψηφιακού χάσματος, ασάφειες σχετικά με την ανταπόκριση των φύλων και των ηλικιών των παιδιών που συμμετείχαν στα εργαστήρια, είναι το πρώτο διεθνές κείμενο που επιχειρεί να αντιμετωπίσει το κενό σχετικά με τις επιπτώσεις της ΤΝ στα παιδιά, ενώ επιχειρήθηκε να συμπεριληφθεί η γνώμη χωρών του αναπτυσσόμενου κόσμου και των παιδιών (Liu & Ding, 2024).

Όπως είναι λογικό, τα δεοντολογικά κείμενα συνδέονται στενά με τη δεοντολογική ηθική, επειδή επιδιώκουν να διαμορφώσουν ένα κοινό πλαίσιο κανόνων συμπεριφοράς. Παρόλο που έχουν ιδιαίτερη αξία και λειτουργούν ως οδηγοί για τη λήψη αποφάσεων, όποτε ανακύπτουν ηθικά ζητήματα που δεν καλύπτονται από νόμους και διατάξεις, δεν είναι δεσμευτικά και η τήρησή τους εναπόκειται στη συνείδηση εκείνου/ης που αντιμετωπίζει τα ζητήματα αυτά (Borestein & Howard, 2021). Επιπλέον, οι διεθνείς και διακρατικοί οργανισμοί που τα υιοθετούν δεν διαθέτουν κάποιον μηχανισμό επιβολής τους σε περίπτωση παραβιάσεων των αρχών τους (Hagendorff, 2020). Αντίθετα, οι εταιρείες παραγωγής και έρευνας συστημάτων ΤΝ πρόθυμα υιοθετούν ή διαμορφώνουν δικούς τους κώδικες δεοντολογίας, γιατί με τον τρόπο αυτόν αποφεύγουν από τη μία μεριά τη δέσμευση και από την άλλη την εισαγωγή νομοθετικών και κανονιστικών ρυθμίσεων που πιθανόν θα περιορίσουν το έργο τους, και για να αποκρύψουν τις πρακτικές τους από το κοινό-«ηθικό ξέπλυμα» (Hagendorff, 2020). Από την έρευνα έχει αποδειχθεί ότι οι ηθικοί κώδικες και η δεοντολογία δεν επηρεάζουν τις αποφάσεις των δημιουργών λογισμικού (McNamara & al., 2018). Οι κύριες αιτίες για την ανεπάρκεια των δεοντολογικών κειμένων είναι ο ανταγωνισμός κρατών, η επιδίωξη οικονομικού κέρδους από τις εταιρείες, τα ατομικά χαρακτηριστικά γνωρίσματα των δημιουργών, τα χαρακτηριστικά του οργανωσιακού περιβάλλοντος, τα χαρακτηριστικά του ηθικού ζητήματος και φυσικά το γενικότερο οικονομικό σύστημα (Hagendorff, 2020, McNamara & al., 2018).

Για τους λόγους αυτούς είναι αναγκαία η ανάπτυξη νομικών κειμένων. Σε επίπεδο ΕΕ έχουν εκδοθεί δύο *Κανονισμοί* με τα οποία επιχειρήθηκε να ρυθμιστούν ζητήματα σχετικά με την επεξεργασία προσωπικών δεδομένων το πρώτο και την ΤΝ το δεύτερο. Ο *Κανονισμός 2016/679* του Ευρωπαϊκού Κοινοβουλίου και Συμβουλίου (EU, 2016), γνωστός ως *Γενικός Κώδικας για την Προστασία Δεδομένων* (ΓΚΠΔ-GDPR), προβλέπει την προστασία των φυσικών προσώπων από την επεξεργασία των δεδομένων προσωπικού χαρακτήρα κυρίως σε θέματα που σχετίζονται με τον τομέα της αγοράς. Αρχές που πρέπει να διέπουν την επεξεργασία των προσωπικών δεδομένων είναι η νομιμότητα, η αντικειμενικότητα και διαφάνεια, ο περιορισμός του σκοπού, η ελαχιστοποίηση των δεδομένων, η ακρίβεια, ο περιορισμός της περιόδου αποθήκευσης, η ακεραιότητα και η εμπιστευτικότητα, η λογοδοσία (άρθρο 5). Η νομιμότητα στηρίζεται στη συναίνεση του υποκειμένου της επεξεργασίας (άρθρο 6). Για τα παιδιά ως ελάχιστο ηλιακό όριο συγκατάθεσης έχει οριστεί το 16 έτος, ενώ κάτω αυτού τους έτους η συγκατάθεση παρέχεται από τους γονείς και κηδεμόνες, ενώ επιτρέπεται στα κράτη-μέλη να ορίσουν άλλο ηλικιακό όριο αλλά όχι κάτω των 13 ετών (άρθρο 8). Η επεξεργασία ευαίσθητων προσωπικών δεδομένων (φυλετική ή εθνοτική καταγωγή, θρησκευτικές ή φιλοσοφικές πεποιθήσεις, συνδικαλιστική δράση, γενετικά δεδομένα, βιομετρικά δεδομένα, δεδομένα υγείας, σεξουαλική ζωή και γενετήσιος προσανατολισμός) απαγορεύεται με μερικές εξαιρέσεις (άρθρο 9). Το υποκείμενο των δεδομένων δικαιούται να έχει πρόσβαση στα δεδομένα του (άρθρο 15), να αιτηθεί τη διόρθωσή τους (άρθρο 16), τη διαγραφή τους (άρθρο 17), τον περιορισμό της επεξεργασίας τους (άρθρο 18), τη μεταφορά τους σε άλλον υπεύθυνο επεξεργασίας (άρθρο 20), να εναντιωθεί στην επεξεργασία των δεδομένων του και στην αυτοματοποιημένη λήψη αποφάσεων και την κατάρτιση προφίλ (άρθρο 22). Τα δικαιώματα αυτά ισχύουν και στον χώρο της εκπαίδευσης και τα δεδομένα που δημιουργούνται από τους/τις μαθητές/τριες κατά την αλληλεπίδρασή τους με τα συστήματα ΤΝ.

Το 2024 το Ευρωπαϊκό Κοινοβούλιο και το Ευρωπαϊκό Συμβούλιο δημοσίευσαν τον *Κανονισμό 2024/1689* (EU, 2024) *για τη θέσπιση εναρμονισμένων κανόνων σχετικά με την τεχνητή νοημοσύνη*. Εκκινώντας από τις διαπιστώσεις ότι τα συστήματα ΤΝ εξελίσσονται ραγδαία, ότι είναι αναγκαία η οικοδόμηση εμπιστοσύνης προς την ΤΝ στην κοινωνία, ότι απαιτείται να προστατευτούν τα δημόσια συμφέροντα στην υγεία, την ασφάλεια και τα θεμελιώδη δικαιώματα, ότι είναι αναγκαία η θέσπιση κοινών κανόνων στην ΕΕ, ότι είναι δυνατή η αντικανονική χρήση των συστημάτων ΤΝ για τη χειραγώγηση, την εκμετάλλευση και τον κοινωνικό έλεγχο, ότι τα συστήματα ΤΝ επηρεάζουν σημαντικούς τομείς της κοινωνίας και της οικονομίας, όπως η εκπαίδευση, η εργασία, οι δημόσιες υπηρεσίες, η απονομή δικαιοσύνης, οι δημοκρατικές εκλογές, και βάσει των κατευθυντήριων γραμμών δεοντολογίας για αξιόπιστη ΤΝ που δημοσιοποιήθηκαν το 2019 από τον ΟΕΥΕ για την ΤΝ, το Ευρωπαϊκό Κοινοβούλιο και το Ευρωπαϊκό Συμβούλιο:

- Όρισαν ως σκοπό την υιοθέτηση ανθρωποκεντρικής και αξιόπιστης ΤΝ (άρθρο 1).
- Απαγόρευσαν πρακτικές της ΤΝ, όπως η παραπλάνηση, η χειραγώγηση, η εκμετάλλευση, η εκτίμηση κινδύνου φυσικών προσώπων για την τέλεση αξιόποινης πράξης κ.λπ. (άρθρο 5).

- Προσδιόρισαν τα κριτήρια χαρακτηρισμού ενός συστήματος ΤΝ ως υψηλού κινδύνου (άρθρο 6), διαφοροποιώντας το από ένα μοντέλο γενικού σκοπού (άρθρο 53). Ως υψηλού κινδύνου απαριθμούνται στο Παράρτημα ΙΙΙ εκείνα που σχετίζονται με τη βιομετρική ταυτοποίηση και κατηγοριοποίηση, την αναγνώριση συναισθημάτων, την εκπαίδευση και την επαγγελματική κατάρτιση, την απασχόληση, πρόσβαση και απόλαυση ιδιωτικών και δημόσιων υπηρεσιών, την επιβολή του νόμου, τη διαχείριση της μετανάστευσης, την απονομή δικαιοσύνης και τις δημοκρατικές διαδικασίας.
- Καθόρισαν τις απαιτήσεις που είναι αναγκαίες για την ορθή λειτουργία ενός συστήματος ΤΝ υψηλού κινδύνου, όπως (α) η ύπαρξη συστήματος διαχείρισης κινδύνου σε όλον τον κύκλο ζωής του συστήματος ΤΝ (άρθρο 9), (β) η συλλογή, επεξεργασία και χρήση των δεδομένων που χρησιμοποιούνται στην εκπαίδευση, η επικύρωση και δοκιμή των συστημάτων ΤΝ σύμφωνα με τον σκοπό (άρθρο 10), (γ) η τήρηση αρχείων καταγραφής συμβάντων για ιχνηλασιμότητα (άρθρο 12), (δ) η διαφάνεια στον σχεδιασμό και την ανάπτυξη συστημάτων ΤΝ (άρθρο 13), (ε) η ύπαρξη κατάλληλων εργαλείων διεπαφής ανθρώπου-μηχανής, ώστε να εξασφαλίζεται η εποπτεία από τον άνθρωπο (άρθρο 14), και (στ) να εξασφαλίζεται η ακρίβεια, η στιβαρότητα και η κυβερνοασφάλεια σε όλον τον κύκλο ζωής των συστημάτων ΤΝ (άρθρο 15).
- Επίσης, προσδιόρισαν τις υποχρεώσεις των παρόχων συστημάτων ΤΝ γενικού σκοπού (άρθρο 53) να συμμορφώνονται με τους κανονισμούς για τα πνευματικά δικαιώματα και να γνωστοποιούν το περιεχόμενο με το οποίο έγινε η εκπαίδευση του μοντέλου.
- Τέλος, ορίστηκαν σώματα για την παρακολούθηση της εφαρμογής του Κανονισμού τόσο σε επίπεδο Ευρωπαϊκής Επιτροπής με τη σύσταση Συμβουλίου ΤΝ όσο και σε εθνικό επίπεδο (άρθρα 64-70), παρακολούθηση των συστημάτων ΤΝ μετά την αγορά, αναφορά σοβαρών συμβάντων και εποπτεία της αγοράς (άρθρα 72-94) και κώδικες δεοντολογίας και κατευθυντήριες γραμμές (άρθρα 95-96).

Ο *Κανονισμός* είναι αποτέλεσμα της ανάγκης να τεθεί ένα πλαίσιο κανόνων στην ανάπτυξη των συστημάτων ΤΝ και στη διάθεση τους στην αγορά, να διασφαλιστεί ότι αυτά χρησιμοποιούνται προς όφελος συνολικά όλων των χρηστών τους, να μειωθούν οι πιθανές ανησυχίες της κοινωνίας των πολιτών, χωρίς όμως να εμποδίζεται η εξέλιξή τους και η καινοτομία (άρθρα 57-63), και ακολουθεί τις δεοντολογικές αρχές που έχει ορίσει ο ΟΕΥΕ για την ΤΝ.

Τόσο τα δεοντολογικά όσο και τα νομικά κείμενα ακολουθούν την επιστημονική έρευνα σχετικά με τις προκλήσεις που ανακύπτουν με την είσοδο της ΤΝ στην εκπαίδευση και προσπαθούν να περιορίσουν τις αρνητικές συνέπειες (Borenstein & Howard, 2020), υιοθετώντας θέσεις, όπως η συμπερίληψη και η πρόσβαση όλων στα συστήματα ΤΝ, η τήρηση του νομικού πλαισίου για την επεξεργασία των προσωπικών δεδομένων, η υιοθέτηση πολιτικών και πρακτικών για την προστασία, τη συλλογή και την επεξεργασία των προσωπικών και εκπαιδευτικών δεδομένων, η καλλιέργεια του ψηφιακού γραμματισμού, ο κριτικός έλεγχος των αλγόριθμων και των βάσεων δεδομένων για την αποφυγή προκαταλήψεων, η διαφάνεια, η ιχνηλασιμότητα, η επεξηγησιμότητα, η λογοδοσία, η αμεροληψία (Eden et al., 2024).

ΕΚΠΑΙΔΕΥΣΗ ΓΙΑ ΚΑΛΛΙΕΡΓΕΙΑ ΗΘΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΣΧΕΤΙΚΑ ΜΕ ΤΗ ΤΝ

Η εκπαίδευση επηρεάζεται θετικά και αρνητικά από τη χρήση των συστημάτων ΤΝ. Ο ρόλος της στο θέμα αυτό είναι σημαντικός σε δύο επίπεδα. Πρώτον, για την καλλιέργεια του γραμματισμού στην ΤΝ, του γραμματισμού 4η γενιάς κατά τη Γαβριηλίδου (Gavriilidou, 2024) σύμφωνα με την οποία βασική δεξιότητα είναι η μεταγνώση, ώστε ο/η μαθητής/τρια να είναι σε θέση να αξιολογεί την ποιότητα των μαθησιακών πόρων και δεδομένων που προσφέρονται από τα συστήματα ΤΝ, και σκοπός είναι να μπορούν οι μαθητές/τριες να προσαρμόζονται στο διαρκώς μεταβαλλόμενο περιβάλλον, να προβλέπουν μελλοντικά προβλήματα και να αναζητούν βιώσιμες λύσεις λαμβάνοντας υπόψη τις συνέπειες των αποφάσεών τους. Δεύτερο, για τη διαμόρφωση της ηθικής συνείδησης και πρακτικής των μαθητών/τριών, ώστε να κάνουν ορθή χρήση της ΤΝ τόσο κατά τη συνολική ακαδημαϊκή πορεία τους όσο κι αργότερα ως πολίτες και επαγγελματίες.

Η εκπαιδευτική διαδικασία και η μάθηση εξελίσσεται μεταξύ δύο μερών, εκείνο των εκπαιδευτικών και εκείνο των μαθητών/τριών. Από την πλευρά των εκπαιδευτικών, από την έρευνα αποδεικνύεται ότι οι ίδιοι δεν θεωρούν ότι είναι κατάλληλα προετοιμασμένοι να καθοδηγήσουν τους/τις μαθητές/τριες τους (Holmes et al., 2021). Επομένως, απαιτείται να ενισχυθεί η επαγγελματική νοοτροπία τους σε θέματα ηθικής αξιοποίησης των συστημάτων ΤΝ (Borenstein & Howard, 2021). Με τον τρόπο αυτό θα είναι σε θέση να λειτουργούν ως παράδειγμα για τους/τις μαθητές/τριες τους τόσο ως χρήστες των συστημάτων αυτών όσο και ως μελλοντικοί/ές δημιουργοί τέτοιων συστημάτων (Borenstein & Howard, 2021). Στο πλαίσιο αυτό η ΕΕ εξέδωσε τις *Δεοντολογικές Κατευθυντήριες Γραμμές σχετικά με τη Χρήση Τεχνητής Νοημοσύνη (ΤΝ) και δεδομένων στη Διδασκαλία και τη Μάθηση για Εκπαιδευτικούς* (2022) στις οποίες αναγνωρίζεται ότι ο ρόλος των εκπαιδευτικών είναι σημαντικός. Για την υποβοήθησή τους σε μία κριτική προσέγγιση των συστημάτων ΤΝ καλούνται οι εκπαιδευτικοί να θέτουν μια σειρά από ερωτήματα σχετικά με τις βασικές απαιτήσεις για μια αξιόπιστη ΤΝ:

- **Ανθρώπινη παρέμβαση και εποπτεία**. Π.χ. ποιος είναι ο ρόλος του εκπαιδευτικού και κατά πόσο επηρεάζεται από το σύστημα ΤΝ; Ποιες οι δυνατότητες του εκπαιδευτικού να παρεμβαίνει; Πώς περιορίζεται η υπέρμετρη εμπιστοσύνη στο σύστημα ΤΝ;
- **Διαφάνεια**. Π.χ. ποιες μέθοδοι και ποια χαρακτηριστικά της ΤΝ χρησιμοποιούνται; Πώς λειτουργούν οι συγκεκριμένοι αλγόριθμοι αξιολόγησης και εξατομίκευσης; Πόσο αξιόπιστες είναι οι αξιολογήσεις του συστήματος;
- **Πολυμορφία, απαγόρευση των διακρίσεων και δικαιοσύνη**. Π.χ. έχουν όλοι/ες πρόσβαση στα συστήματα ΤΝ; Είναι η διεπαφή κατάλληλη; Αποφεύγονται οι διακρίσεις προς τους χρήστες; Πώς αντιμετωπίζονται περιπτώσεις μεροληψίας;
- **Κοινωνική και περιβαλλοντική ευημερία**. Π.χ. πώς επηρεάζεται η ευημερία των μαθητών/τριών και των εκπαιδευτικών; Είναι σαφές ότι οι χρήστες διεπιδρούν με ένα σύστημα που δεν διαθέτει συναισθήματα ή ενσυναίσθηση;
- **Ιδιωτική ζωή και διακυβέρνηση των δεδομένων**. Π.χ. ανωνυμοποιούνται τα ευαίσθητα προσωπικά δεδομένα; Ποιος έχει πρόσβαση στα δεδομένα και πώς ελέγχεται αυτό; Τα εκπαιδευτικά δεδομένα χρησιμοποιούνται μόνο για τον σκοπό για τον οποίο συλλέχθηκαν;
- **Τεχνική στιβαρότητα και ασφάλεια**. Π.χ. αποκλείονται οι παραβιάσεις των δεδομένων; Ελέγχεται επαρκώς και διαρκώς το σύστημα ΤΝ για το κατά πόσο επιτυγχάνει τους στόχους του; Συλλέγονται και αποθηκεύονται μόνο τα αναγκαία δεδομένα;
- **Λογοδοσία**. Π.χ. ποιος είναι υπεύθυνος για την παρακολούθηση των αποτελεσμάτων που παράγει το σύστημα ΤΝ; Ποιος έχει την ευθύνη για την τελική απόφαση για την προμήθεια και εγκατάσταση του συστήματος;

Τέλος, σχετικά με τον ρόλο και την ευθύνη των εκπαιδευτικών είναι αναγκαίο να αναπτυχθούν προγράμματα επιμόρφωσης. Μπορεί να προσφέρεται μια πληθώρα προγραμμάτων σύντομης επιμόρφωσης σε θέματα ΤΝ προς εκπαιδευτικούς (π.χ. ΕΚΠΑ, Πανεπιστήμιο Πελοποννήσου, seminars.etwinning.gr), όμως τα περισσότερα από αυτά είναι επί πληρωμή και δεν είναι σαφές κατά πόσο αναπτύσσουν επαρκώς τα ηθικά ζητήματα που συνδέονται με τη χρήση συστημάτων ΤΝ. Χρειάζεται να οργανωθεί ένα μαζικό πρόγραμμα ευαισθητοποίησης από κρατικούς φορείς με εστίαση κυρίως στα ηθικά ζητήματα.

Από την άλλη πλευρά, για τη διαμόρφωση της νοοτροπίας των μαθητών/τριών είναι αναγκαίο να αναπτυχθούν δραστηριότητες που να στοχεύουν στην εξοικείωσή τους με τον ηθικό σχεδιασμό των αλγόριθμων, τη συλλογή και αξιοποίηση των δεδομένων με ηθικό τρόπο, και στη διδασκαλία με ηθικό περιεχόμενο σε ποικίλες περιπτώσεις και διαθεματικά. Το επιδιωκόμενο αποτέλεσμα είναι να καλλιεργηθεί η κριτική σκέψη και ηθικά αιτιολογημένη λήψη αποφάσεων (Borenstein & Howard, 2021) και η καλλιέργεια ηθικών αξιών που να συνδέονται με την ηθική χρήση της ΤΝ (Gavriilidou, 2024). Επειδή τα δεοντολογικά κείμενα αναφέρονται γενικόλογα σε ηθικές αρχές, ενώ τα συστήματα ΤΝ είναι σύνθετα, χρήσιμο θα ήταν οι μαθητές/τριες να εξοικειώνονται σταδιακά και τμηματικά με τα ηθικά θέματα ενός τέτοιου συστήματος, όπως της τεχνολογίας, των μηχανών, των υπολογιστών, της πληροφορίας και των δεδομένων (Hagendorff, 2020). Επίσης, η ηθική εκπαίδευση των μαθητών/τριών είναι απαραίτητο να συνδυάζει τη δεοντολογική ηθική, όπως εκφράζεται μέσα από τα δεοντολογικά και νομικά κείμενα, αλλά και να επιδιώκει την καλλιέργεια των ιδιαίτερων στοιχείων στον χαρακτήρα και στις προδιαθέσεις στη συμπεριφορά του καθενός και καθεμίας από αυτούς/ές, όπως η ειλικρίνεια, η δικαιοσύνη, το κουράγιο, η ενσυναίσθηση, η μεγαλοθυμία κ.λπ., ώστε να μεταβληθούν οι στάσεις τους, να ενισχυθεί η υπευθυνότητά τους και η διάθεσή τους να αποφεύγουν ανήθικες δράσεις (Hagendorff, 2020). Τέλος, μέσω της διασποράς της ηθικής ευθύνης προς το άτομο απαιτείται να καλλιεργηθεί η αίσθηση της ατομικής ευθύνης για την επίτευξη του κοινού οφέλους, όπως πρεσβεύει ο ωφελιμισμός.

Σε πρακτικό επίπεδο, χρήσιμο είναι να αναπτυχθούν ανοικτής πρόσβασης πόροι σχετικά με την ΤΝ και την ηθική, ώστε να διευκολυνθούν και να καθοδηγηθούν οι εκπαιδευτικοί στο έργο τους, και οι πόροι αυτοί είναι αναγκαίο να είναι προσαρμοσμένοι στο γνωστικό και αναπτυξιακό επίπεδο των μαθητών/τριών. Χαρακτηριστικό παράδειγμα είναι το project "AI for Oceans" του οργανισμού code.org στο οποίο χρησιμοποιείται ένα μοντέλο μάθησης μηχανών. Μέσω των δραστηριοτήτων οι μαθητές/τριες μαθαίνουν βιωματικά σχετικά με την ΤΝ, τους αλγόριθμους, τη μάθηση μηχανών και τις προκαταλήψεις και προβληματίζονται για την ακρίβεια των συστημάτων ΤΝ, πώς γίνεται η εκπαίδευσή τους, ποια είναι τα όρια τους και για τους κινδύνους που αναφύονται, όταν οι βάσεις δεδομένων βάσει των οποίων γίνεται η εκπαίδευση εμπεριέχουν προκαταλήψεις. Επίσης, το MIT Media Lab προσφέρει ένα πρόγραμμα σπουδών ανοικτής πρόσβασης με τον τίτλο "AI and Ethics Curriculum" το οποίο απευθύνεται σε μαθητές/τριες της μέσης εκπαίδευσης. Μέσω των δραστηριοτήτων οι μαθητές/τριες μαθαίνουν σε συνεργατικό πλαίσιο για τα συστατικά ενός συστήματος ΤΝ (αλγόριθμοι, βάσεις δεδομένων κ.λπ.) και προβληματίζονται για πιθανές προκαταλήψεις στους αλγόριθμους, τους ποικίλους ενδιαφερόμενους για την ΤΝ και τα ιδιαίτερα κίνητρα, στόχους και αξίες τους (Akgun & Greenhow, 2022).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η ΤΝ υπάρχει παντού γύρω μας και αναπόφευκτα χρησιμοποιείται στην εκπαίδευση. Τα οφέλη που προσφέρει είναι σημαντικά υποβοηθώντας τους/τις μαθητές/τριες στη διδασκαλία και στη μάθηση, τους εκπαιδευτικούς στην προετοιμασία και την αξιολόγηση των μαθητών/τριών, τη διοίκηση στη διαχείριση των πόρων, και τους γονείς και κηδεμόνες σε θέματα προόδου των παιδιών τους. Η χρήση όμως των συστημάτων ΤΝ δεν είναι απαλλαγμένη από κινδύνους, όπως η μεροληψία, οι προκαταλήψεις, ο αποκλεισμός ευάλωτων ατόμων και κοινωνικών ομάδων, η διεύρυνση του ψηφιακού χάσματος. Για την αντιμετώπιση αυτών βάση μπορεί να αποτελέσει η Ηθική και κυρίως τρεις σχολές, η δεοντολογική ηθική, ο ωφελιμισμός και η ηθική των αρετών. Τα κείμενα δεοντολογίας και οι νόμοι που έχουν συνταχθεί αντλούν από τους χώρους της Ηθικής και της ακαδημαϊκής έρευνας, προσπαθώντας να θέσουν ένα πλαίσιο για την έρευνα, την ανάπτυξη και τη λειτουργία των συστημάτων ΤΝ, χωρίς όμως να ανακόψουν την ανάπτυξή τους, και επιδιώκοντας το γενικό καλό. Για την ανάπτυξη με ηθικό τρόπο των συστημάτων ΤΝ και την ηθική χρήση τους είναι σημαντικός ο ρόλος της εκπαίδευσης. Απαιτείται, λοιπόν, από τη μία μεριά να ενισχυθεί η επίγνωση των εκπαιδευτικών σχετικά με τους κινδύνους από τη χρήση των συστημάτων ΤΝ και η κριτική ικανότητά τους σχετικά με την υιοθέτηση και χρήση τους κατά τη διδασκαλία, και από την άλλη μεριά να διαμορφωθούν εκείνα τα χαρακτηριστικά στους/στις μαθητές/τριες που θα τους κάνουν να χρησιμοποιούν με ηθικό τρόπο της ΤΝ ως πολίτες και να συμμετέχουν με ηθικό τρόπο στη χρήση και την ανάπτυξή τους.

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ΘΠ7: Ψηφιακή πολιτειότητα (Digital Citizenship)

ΕΝΕΡΓΟΣ ΠΟΛΙΤΕΙΟΤΗΤΑ ΚΑΙ ΨΗΦΙΑΚΟΣ ΚΟΣΜΟΣ Ο ΡΟΛΟΣ ΤΗΣ ΕΚΠΑΙΔΕΥΣΗΣ ΣΤΗ ΔΙΑΜΟΡΦΩΣΗ ΕΝΕΡΓΩΝ ΜΑΘΗΤΩΝ-ΠΟΛΙΤΩΝ ΣΤΟΝ ΨΗΦΙΑΚΟ ΔΗΜΟΣΙΟ ΧΩΡΟ

Δημακοπούλου Φωτεινή
Σύμβουλος Εκπαίδευσης Κοινωνικών Επιστημών M.Ed/M.Sc
Επόπτρια Ποιότητας της Εκπαίδευσης
Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας

Δημακοπούλου Μαρία
Νηπιαγωγός
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Αχαΐας

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει την έννοια της ενεργού πολιτειότητας στο σύγχρονο ψηφιακό κόσμο, εστιάζοντας στον καθοριστικό ρόλο της εκπαίδευσης στη διαμόρφωση ενεργών, υπεύθυνων και κριτικά σκεπτόμενων μαθητών-πολιτών. Μέσα από θεωρητική και εννοιολογική ανάλυση, διερευνώνται οι μετασχηματισμοί της ιδιότητας του πολίτη υπό το πρίσμα της ψηφιοποίησης, της παγκοσμιοποίησης και της πολυπολιτισμικότητας, καθώς και η ανάδυση της ψηφιακής πολιτειότητας ως βασικής διάστασης της σύγχρονης δημοκρατικής συμμετοχής. Ιδιαίτερη έμφαση δίνεται στη σύνδεση της ψηφιακής πολιτειότητας με την ψηφιακή νοημοσύνη, η οποία περιλαμβάνει γνωστικές, κοινωνικές, συναισθηματικές και ηθικές δεξιότητες απαραίτητες για την ασφαλή και υπεύθυνη συμμετοχή στον ψηφιακό δημόσιο χώρο. Η μελέτη δείχνει ότι η εκπαίδευση οφείλει να υπερβεί την απλή καλλιέργεια τεχνικών δεξιοτήτων και να υιοθετήσει μια ολιστική προσέγγιση, που ενισχύει την κριτική σκέψη, την ψηφιακή ηθική και την ενεργό συμμετοχή. Συμπερασματικά, η εκπαίδευση για την ψηφιακή πολιτειότητα αποτελεί βασική προϋπόθεση για την ενδυνάμωση της δημοκρατίας και την οικοδόμηση μιας συμπεριληπτικής και υπεύθυνης ψηφιακής κοινωνίας.

Λέξεις-κλειδιά: ενεργός πολιτειότητα, ψηφιακός πολίτης, ψηφιακή νοημοσύνη εκπαίδευση ψηφιακού πολίτη.

ΕΙΣΑΓΩΓΗ

Στον 21ο αιώνα, η κοινωνία βασίζεται όλο και περισσότερο στη γνώση, την πληροφορία και τις παγκόσμιες διασυνδέσεις, γεγονός που μεταμορφώνει την έννοια της ιδιότητας του πολίτη. Οι ΤΠΕ έχουν διεισδύσει σε κάθε πτυχή της ζωής – από την επικοινωνία και την κοινωνική αλληλεπίδραση έως την ενημέρωση, την εκπαίδευση και την εργασία – δημιουργώντας ένα νέο κοινωνικό πλαίσιο με κύριο χαρακτηριστικό τη συνεχή ροή πληροφοριών (Panagiotakopoulos, 2020). Για να προσαρμοστεί και να ανταπεξέλθει σε αυτό το δυναμικό και απαιτητικό περιβάλλον, ο σύγχρονος πολίτης πρέπει να αναπτύξει ψηφιακές δεξιότητες, να συμμετέχει ενεργά στη δημιουργία, διαχείριση και αξιοποίηση της πληροφορίας και να λαμβάνει υπόψη τις ηθικές και πολιτισμικές διαστάσεις των τεχνολογιών (Marinaki, 2015).

Η ΙΔΙΟΤΗΤΑ ΤΟΥ ΠΟΛΙΤΗ: ΕΝΝΟΙΟΛΟΓΙΚΗ ΑΠΟΣΑΦΗΝΙΣΗ

Η ιδιότητα του πολίτη ή πολιτειότητα, (citizenship), είναι μια έννοια που διαθέτει πολλές σημασίες. Είναι μια έννοια πολυσήμαντη και δύσκολη να προσδιοριστεί. Συνδέεται με τη συγκρότηση δύο παραδόσεων: την *πολιτική-δημοκρατική* με άξονα την «πόλη», την πολιτική συμμετοχή και τη δημοκρατία («δήμος», democracy) και τη *φιλελεύθερη-κοσμοπολίτικη*, με άξονες τον «κόσμο», το φιλελευθερισμό (liberalism) και τον κοσμοπολιτισμό (cosmopolitanism) (Delanty,2007). Η ιδιότητα του πολίτη, ως μια από τις πιο επίμαχες έννοιες της δυτικής πολιτικής φιλοσοφίας, είναι μια έννοια με μεταβαλλόμενο περιεχόμενο διότι απηχεί τις κοινωνικές σχέσεις που συνθέτουν κάθε κοινωνία και τη δυναμική συνύπαρξη πολλαπλών λόγων περί ιδιότητας του πολίτη, ειδικά στις φιλελεύθερες δημοκρατίες (Balias, 2008). Επομένως θα μπορούσαμε να πούμε ότι υπάρχουν τόσοι τύποι πολιτών όσοι και τύποι κρατών (Canivez, 2000).

Αναλυτικότερα, η έννοια του «πολίτη», γεννήθηκε στην αρχαία Ελλάδα στο πλαίσιο της *«πόλεως»*. Σύμφωνα με τον Αριστοτέλη, ο πολίτης, «*δι' απλώς ουδέν των άλλων ορίζεται ή τω μετέχειν κρίσεως και αρχής*» (Μάραντος & Οικονόμου, 2004). Στον αντίποδα της αριστοτελικής παράδοσης η νεωτερική-φιλελεύθερη πολιτική παράδοση θέτει στο επίκεντρο τις ελευθερίες και τα δικαιώματα του ατόμου, ενώ στην κοινωνία της παγκοσμιοποίησης η ιδιότητα του πολίτη αποκτά μια οικουμενική διάσταση. Στο πλαίσιο μιας κοινωνίας με υπερεθνικά χαρακτηριστικά, η έννοια του πολίτη συνδέεται με νέες έννοιες όπως είναι η *μετα-εθνική πολιτειότητα* (post-national citizenship), η *ευρωπαϊκή διακυβέρνηση*, (european governance), η *παγκόσμια κοινωνία των πολιτών*, (global civil society) και ο *κοσμοπολιτισμός* (cosmopolitanism) (Beck,2000·Habermas,2001·Featherstone, 2002).

Τις τελευταίες δεκαετίες το ενδιαφέρον των επιστημόνων στράφηκε έντονα προς τη μελέτη της έννοιας του πολίτη, ενισχύθηκε ο προβληματισμός αναφορικά με την ερμηνεία της, τη νοηματοδότηση του όρου «ενεργός πολίτης», τη συσχέτισή της με τον αποτελεσματικό και δημοκρατικό πολίτη, τη σχέση της με την κοινωνία των πολιτών και τις επιταγές της πολυπολιτισμικής συμβίωσης (Karakatsani, 2005·Balias, 2008).Σε πολλές περιπτώσεις παρατηρείται μια στροφή στο κλασσικό ορισμό του Marsall (1949, όπ. αναφ. στο Marsall & Bottomore,1995), ο οποίος αναφέρει:

Η ιδιότητα του πολίτη είναι μια κοινωνική θέση που απονέμεται σε όλους, όσοι είναι πλήρη μέλη μιας κοινότητας. Όλοι όσοι την κατέχουν είναι ίσοι ως προς τα δικαιώματα και τις υποχρεώσεις, με τις οποίες έχει εμπλουτιστεί αυτή η θέση. Δεν υπάρχει καθολική αρχή που να καθορίζει ποια θα είναι αυτά τα δικαιώματα και οι υποχρεώσεις (σελ.62).

Ο Marshall κάνει λόγο για την «εκ συμμετοχής ιδιότητα του πολίτη» και προτείνει τη διάκριση της ιδιότητας του πολίτη σε τρία συστατικά στοιχεία: α) το ατομικό στοιχείο (δικαιώματα απαραίτητα για την ελευθερία του ατόμου – προσωπική ελευθερία, ελευθερία έκφρασης, σκέψης, πίστης κ.λπ.), β) το πολιτικό στοιχείο (δικαίωμα συμμετοχής στην άσκηση της πολιτικής δύναμης) και γ) το κοινωνικό στοιχείο (όλο το φάσμα δικαιωμάτων της ζωής ενός πολιτισμένου όντος σύμφωνα με το επίπεδο ζωής που γίνεται αποδεκτό στη συγκεκριμένη κοινωνία). Οι διατυπώσεις του Marshall παρά τα χρόνια που έχουν περάσει, αποτελούν σημείο αναφοράς και συνεχίζουν να επηρεάζουν τις κοινωνιολογικές μελέτες πολλών χωρών.

Ο Oldfield (1990) προσδίδει στην ιδιότητα του πολίτη δύο μορφές: τη νομική και την πρακτική. Η πρώτη περιλαμβάνει τα δικαιώματα του πολίτη ως μέλους μιας κοινωνίας, που του επιτρέπουν να συμμετέχει στα κοινά (να είναι κανείς πολίτης) και η δεύτερη αναφέρεται στη λειτουργία του κάθε μέλους μίας δημοκρατικής κοινωνίας, δηλαδή να ενεργεί κανείς ως πολίτης.

Κατά τον Weil (όπ. αναφ. στο Canivez, 2000) αυτό που καθορίζει τη δημοκρατία είναι το κράτος, στο οποίο κάθε πολίτης θεωρείται «*δυνάμει κυβερνών»* και όλοι μπορούν να διεκδικήσουν μια υπεύθυνη πολιτική θέση. Αυτό σημειώνει ότι η ελευθερία και η πολιτική ισότητα δεν ενυπάρχουν μόνο στην καθολική ψηφοφορία, αλλά ουσιαστικά και στο ότι κανένας πολίτης δεν αποκλείεται, εκ των προτέρων, από την άσκηση κυβερνητικών λειτουργημάτων. ΄Οψεις και πλευρές μιας «εναλλακτικής ιδιότητας του πολίτη», χωρίς κλειστή ταυτότητα, με έντονο το κριτήριο της πολιτικής συμμετοχής και με τα χαρακτηριστικά του νομαδικού υποκειμένου, ήδη τίθεται στη δημόσια σφαίρα (Braidotti, 2004).

Γι' αυτό λοιπόν, το ζητούμενο σήμερα διεθνώς είναι η εκπαίδευση για μια δημοκρατική ιδιότητα του πολίτη, για έναν πολίτη με δημοκρατικές αρχές και πεποιθήσεις. Στο σχετικό κείμενο της Ευρωπαϊκής Επιτροπής με τίτλο «Education and active citizenship in the European Union» εισάγεται μια διευρυμένη έννοια της ταυτότητας και της ιδιότητας του πολίτη, η οποία συμπεριλαμβάνει τις ακόλουθες διαστάσεις: α) τη *νομική διάσταση,* η οποία περιέχει ένα δίκτυο πολιτειακών, κοινωνικών και πολιτικών δικαιωμάτων, β) τη *συναισθηματική διάσταση*, η οποία συνδέεται με την προαγωγή της κοινωνικής ένταξης και συνοχής καθώς και με θέματα ταυτότητας και αξιών, γ) τη *γνωστική διάσταση*, η οποία συνδέεται με θέματα πληροφόρησης και γνώσης και δ) την *πρακτική διάσταση*, η οποία αφορά στη δραστηριοποίηση και τη συμμετοχή του πολίτη στα κοινά.

Οι κυρίαρχες αυτές αντιλήψεις για την ιδιότητα του πολίτη δεν καλύπτουν όμως τις σύγχρονες ανάγκες. Η ιδιότητα του πολίτη στην κυρίαρχη εννοιολόγησή της, και παρά τον οικουμενικό φαινομενικά χαρακτήρα της, καθόλου δε συμβιβάζεται με την διαφορετικότητα και την πολυμορφία, την ανάπτυξης των νέων τεχνολογιών και τον ψηφιακό κόσμο. Εξάλλου όπως υποστηρίζει η Αβδελά (Avdela, 1998),οι διαδικασίες μέσα από τις οποίες συγκροτήθηκε το περιεχόμενο της ιδιότητας του πολίτη παρήγαγαν αποκλεισμούς και προσέδωσαν στην έννοια μια ψευδή οικουμενικότητα.

Αναγνωρίζοντας τους περιορισμούς των κύριων παραδόσεων για την ιδιότητα του πολίτη που προαναφέρθηκαν, υπογραμμίζουμε πως μια συνθετική προσέγγιση της έννοιας που θα περιέχει στοιχεία των κύριων ιστορικών παραδόσεων είναι αναγκαία. Θα πρέπει, λοιπόν, να προβληματιστούμε ως προς το τι σημαίνει να είναι κανείς πολίτης, σε μια εποχή που χαρακτηρίζεται ως εποχή της μετανεωτερικότητας, της πολυπολιτισμικότητας, της ψηφιοποίησης, της παγκοσμιοποίησης. Με αυτά τα δεδομένα ο πολίτης στον 21ο αι. θα πρέπει να έχει υιοθετήσει τις αρχές της κοινωνικής δικαιοσύνης, της κοινωνικής συνοχής, της συνεργασίας, με δεδομένο ότι η κοινωνία διακρίνεται για την πολιτιστική ποικιλία της και να διαθέτει ένα κριτικό, δημιουργικό, αυτόνομο και συστηματικό τρόπο σκέψης. Ο πολίτης σήμερα θα πρέπει να διακρίνεται για συνεργατικό πνεύμα, δυνατότητα ευελιξίας, αυτόνομη σκέψη, κρίση και δράση. Το βάρος της έννοιας μετατοπίζεται στα νόμιμα δικαιώματα, στην έννοια της κοινωνικής διαδικασίας, και αναδύεται και η έννοια του κοσμοπολίτη, που χαρακτηρίζεται από κινητικότητα, εκκοσμίκευση, αποδοχή της υβριδικότητας και ανεκτικότητα (Isin,2000) .

Η ιδιότητα έτσι του πολίτη προκύπτει σαν μία δυναμική έννοια στο κέντρο της οποίας βρίσκεται η ιδέα της ανθρώπινης εμπρόθετης δράσης, έτσι όπως διατυπώνεται από την Lister (1999), εννοιολόγηση την οποία υιοθετούμε και στην παρούσα μελέτη. Μια τέτοια προσέγγιση της έννοιας του πολίτη είναι ιδιαίτερα σημαντική γιατί συνενώνει την πολιτική συμμετοχή με την ευρεία έννοια, την απόλαυση των αναγκαίων δικαιωμάτων για εμπρόθετη δράση, την πραγματοποίηση του πλήρους δυναμικού της νομικής κατάστασης του ατόμου, την δραστηριοποίηση σε όλους τους τομείς της κοινότητας στην οποία ζει, την πορεία αυτό-πραγμάτωσης και αυτό-ανάπτυξης του ατόμου. Ο πολίτης με αυτή την έννοια είναι αυτόνομο δρων υποκείμενο ενδυναμωμένο, πολυδύναμο, πολυδιάστατο και πολυεπίπεδο. Από αυτή την οπτική γωνία, η νέα εμπνευσμένη πολιτειότητα δυνητικά προάγει τον ουσιαστικό «εκδημοκρατισμό της δημοκρατίας» (Giddens, όπ. αναφ. στο Tsekeris & Katrivesis,, 2007-2008), τη λογική της δικαιωματικής συμμετοχής όλων στις κοινωνικοπολιτικές διαδικασίες (βάσει της οικουμενικής ανθρώπινης ιδιότητας) και την εικόνα του «ενδυναμωμένου» (empowered) και «πολυδύναμου» (modular) πολίτη, ο οποίος κινείται ταυτόχρονα στο ιδιωτικό και στο δημόσιο, στο τοπικό και στο παγκόσμιο, στο ψηφιακό και φυσικό κόσμο (Tsekeris & Katrivesis, 2007-2008).

Λαμβάνοντας υπόψη ότι το Διαδίκτυο ως «ψηφιακός δημόσιος χώρος», ενισχύει την πρόσβαση στην πληροφορία και διευκολύνει τη διαμόρφωση κοινών απόψεων, συμβάλλοντας στην ενεργή πολιτειότητα και την ενδυνάμωση του πολίτη (Papacharissi, 2010; Mossberger, Tolbert & McNeal, 2008) γίνεται αντιληπτό ότι η ψηφιακή συμμετοχή, υπό την έννοια της ψηφιακής πολιτειότητας, αποτελεί κρίσιμο παράγοντα για την ενίσχυση της δημοκρατίας, καθώς παρέχει στους χρήστες εργαλεία για την άσκηση των δικαιωμάτων τους και την κοινωνική συνοχή (Isin & Ruppert, 2020· Ribble, 2011). Ωστόσο, η πραγματική δυναμική του Διαδικτύου ως δημόσιου χώρου προϋποθέτει ουσιαστική άσκηση πολιτειότητας, καλλιέργεια της ψηφιακής νοημοσύνης και εκπαίδευση που προάγει τη συμπερίληψη όλων των πολιτών.

ΨΗΦΙΑΚΗ ΠΟΛΙΤΕΙΟΤΗΤΑ: ΕΝΝΟΙΟΛΟΓΙΚΗ ΑΠΟΣΑΦΗΝΙΣΗ

Οι Hobbs και Jensen (2009, όπως αναφέρει η Μαρινάκη, 2015), ορίζουν την ψηφιακή πολιτειότητα ως «τις δεξιότητες και τις γνώσεις εκείνες οι οποίες κρίνονται απαραίτητες προκειμένου το άτομο να μπορεί να λειτουργεί αποτελεσματικά σε ένα ολοένα και πιο απαιτητικό περιβάλλον κοινωνικής δικτύωσης (social media environment), εντός του οποίου ο διαχωρισμός [….] της δημόσιας από την ιδιωτική σφαίρα παραμένει αδιόρατος, αναδεικνύοντας νέες προκλήσεις σε ήθη (ethical challenges) και ταυτόχρονα ένα (διαφορετικό) πλέγμα ευκαιριών» στο σύνολο του (ηλικιακού) πληθυσμού που βρίσκεται σε άμεση και καθημερινή επαφή με τις νέες τεχνολογίες. Η Collier (2009) αλλά και ο Ribble (2012), ορίζουν την ψηφιακή πολιτειότητα ως «κριτική σκέψη και ηθική επιλογή για το περιεχόμενο και τον

αντίκτυπο στον ίδιο τον εαυτό, τους άλλους και την κοινότητα του τι ο καθένας βλέπει, λέει και παράγει μέσω της χρήσης των συσκευών και των τεχνολογιών». Οι Ribble, Baily και Ross (2004) ορίζουν τη σύγχρονη εκδοχή της ιδιότητας του πολίτη ως πρακτική ως συνεπή και υπεύθυνη συμπεριφορά σε συνάρτηση με τη χρήση της τεχνολογίας, στα πλαίσια του σύγχρονου, παγκοσμιοποιημένου, δικτυωμένου κοινωνικού και πολιτικού συγκείμενου, ως μια συμπεριφορική τυπολογία που σχετίζεται με την «ενεργό χρήση της τεχνολογίας».

Διεξάγεται έτσι το συμπέρασμα ότι η ψηφιακή πολιτειότητα ορίζεται ως η ηθική, δεοντολογική και υπεύθυνη χρήση της τεχνολογίας για να διασφαλιστεί η ασφάλεια του ατόμου όταν συνεργάζεται σε μια όλο και περισσότερο ψηφιακή, δικτυωμένη και παγκόσμια κοινωνία (Ribble, 2009). Περιλαμβάνει την υπεύθυνη χρήση των τεχνολογιών, την ψηφιακή διακυβέρνηση, την προστασία των δεδομένων και την ενεργό συμμετοχή στην ηλεκτρονική κοινωνία (Mossberger et al., 2008).

Σύμφωνα με τη διεθνή βιβλιογραφία , στηρίζεται σε εννέα τομείς/πρότυπα συμπεριφοράς (Σχήμα 1). Συγκεκριμένα:

Ψηφιακή Πρόσβαση (Digital Access): αφορά τη δίκαιη και ισότιμη πρόσβαση στα ψηφιακά μέσα και τεχνολογίες, χωρίς κοινωνικό ή οικονομικό αποκλεισμό (Ribble, 2015). Σύμφωνα με την UNESCO (2018), το ψηφιακό χάσμα (digital divide) παραμένει κρίσιμο ζήτημα, ιδιαίτερα σε αναπτυσσόμενες χώρες. Η έρευνα του OECD (2020) υπογραμμίζει ότι η έλλειψη πρόσβασης σε υψηλής ταχύτητας διαδίκτυο περιορίζει τις εκπαιδευτικές και οικονομικές ευκαιρίες.

Ψηφιακό εμπόριο (Digital Commerce): αναφέρεται στην ασφαλή και ηθική συμμετοχή στην ηλεκτρονική αγορά και πώληση αγαθών (Ribble & Bailey, 2007). To Global E-commerce Report (2023) εκτιμά ότι το 24% του παγκόσμιου εμπορίου πραγματοποιείται ηλεκτρονικά. Μελέτες (Eurostat, 2022) καταγράφουν αυξημένα κινδύνους (π.χ. απάτες, κλοπή δεδομένων), ιδιαίτερα σε απροστάτευτους καταναλωτές.

Ψηφιακές Επικοινωνίες (Digital Communication): περιλαμβάνει τις ηθικές και αποτελεσματικές πρακτικές επικοινωνίας μέσω email, κοινωνικών δικτύων και άλλων ψηφιακών μέσων (Ohler, 2010).

Ψηφιακός Εγγραμματισμός (*DigitalLiteracy*): η ικανότητα κριτικής αξιολόγησης και δημιουργικού χειρισμού ψηφιακού περιεχομένου (Gilster, 1997). Είναι η ικανότητα **εύρεσης, αξιολόγησης και χρήσης** ψηφιακών πληροφοριών με κριτική σκέψη (Hobbs, 2017).

Ψηφιακή Δεοντολογία (*DigitalEtiquette*): η έννοια της **Ψηφιακής Δεοντολογίας (Digital Citizenship)** αναφέρεται στον **ηθικό, υπεύθυνο και ασφαλή χρήση των ψηφιακών τεχνολογιών** και καλύπτει πολυδιάστατες πτυχές της διαδικτυακής συμπεριφοράς.

Ψηφιακό Δίκαιο (*DigitalLaw)*: περιλαμβάνει τις **νομικές υποχρεώσεις** και τις συνέπειες της παράνομης ψηφιακής συμπεριφοράς (π.χ. πειρατεία, χάκερ) (Solove, 2021).

Ψηφιακή Ασφάλεια (*DigitalSecurity*): αφορά την **προστασία των δεδομένων, των συσκευών και της ταυτότητας** από κλοπές, ιούς και άλλες απειλές (Schneier, 2020).

Ψηφιακή υγεία και ευεξία (*DigitalHealth&Wellness):* αναφέρεται στην **ισορροπημένη χρήση** της τεχνολογίας για την αποφυγή ψυχολογικών και σωματικών βλαβών (Twenge, 2018).

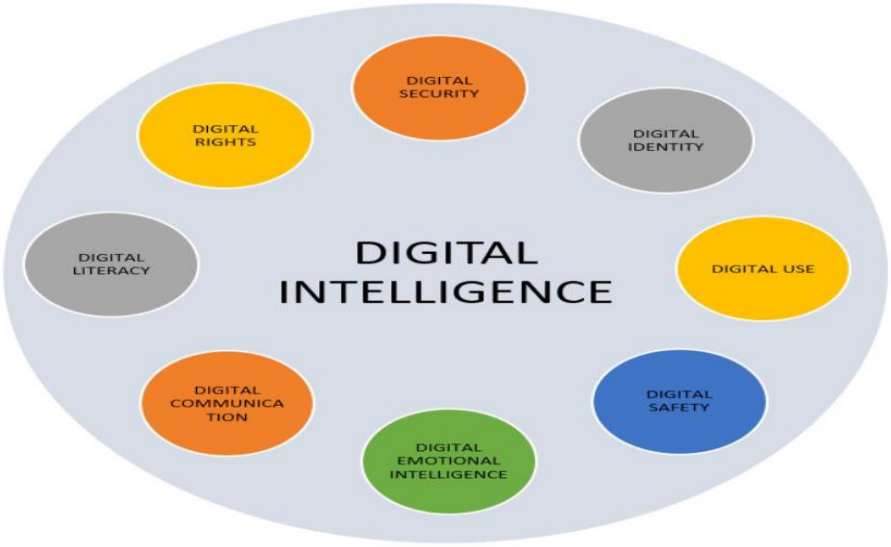
Ψηφιακά Δικαιώματα και Υποχρεώσεις (*DigitalRights&Responsibilities):* περιλαμβάνει τα **δικαιώματα (π.χ. ιδιωτικότητα, έκφραση)** και τις **υποχρεώσεις (π.χ. σεβασμός, πληρωμή για υπηρεσίες)** των ψηφιακών πολιτών (Bennett, 2018).

ΨΗΦΙΑΚΗ ΝΟΗΜΟΣΥΝΗ

Η έννοια της ψηφιακής πολιτειότητας συνδέεται στενά με την ψηφιακή νοημοσύνη (digital intelligence), καθώς αμφότερες προϋποθέτουν την ανάπτυξη σύνθετων γνωστικών, κοινωνικών και ηθικών δεξιοτήτων για την υπεύθυνη και ασφαλή συμμετοχή στο ψηφιακό περιβάλλον. Η ψηφιακή νοημοσύνη ορίζεται ως η ικανότητα ενός ατόμου να χρησιμοποιεί την τεχνολογία με τρόπο ηθικό, συναισθηματικά ώριμο και κοινωνικά υπεύθυνο (Park, 2019), ενώ η ψηφιακή πολιτειότητα εμπεριέχει την καλλιέργεια αξιών και στάσεων που προάγουν τον ενεργό και συνειδητό ρόλο του πολίτη στον ψηφιακό δημόσιο χώρο (Ribble, 2011). Οι δύο έννοιες συγκλίνουν ως προς την καλλιέργεια της ενσυναίσθησης, της κριτικής σκέψης και της ψηφιακής ηθικής, αποτελώντας αναπόσπαστα στοιχεία της εκπαιδευτικής

διαδικασίας που στοχεύει στην ενδυνάμωση των πολιτών της ψηφιακής εποχής (UNESCO, 2021). Η ενοποιημένη προσέγγιση αυτών των εννοιών καθίσταται απαραίτητη για την οικοδόμηση ενός πολιτισμού ψηφιακής υπευθυνότητας και κοινωνικής συνοχής.

Σχήμα 1.
Ψηφιακή νομημοσύνη. Πηγή: YuhyunPark, 2016



Σύμφωνα με τον ορισμό της Alena Plháková (2003**)**, η νοημοσύνη μπορεί να θεωρηθεί ως το ατομικό επίπεδο και η ποιότητα των πνευματικών λειτουργιών, το οποίο εκδηλώνεται μέσω της ικανότητας επίλυσης προβλημάτων. Αυτή η έννοια δεν είναι στατική, αλλά εξελίσσεται συνεχώς υπό την επίδραση εσωτερικών και εξωτερικών παραγόντων, κάτι που έχει σημαντικές επιπτώσεις στην παιδαγωγική πρακτική.

Η Yuhyun Park (2016) εισάγει τον όρο ψηφιακή νοημοσύνη (DQ – Digital Intelligence Quotient), ορίζοντάς την ως το σύνολο των κοινωνικών, συναισθηματικών και γνωστικών ικανοτήτων που επιτρέπουν στα άτομα να προσαρμόζονται και να ανταποκρίνονται αποτελεσματικά στις απαιτήσεις της ψηφιακής εποχής. Αυτή η ικανότητα διακρίνεται σε οκτώ βασικές διαστάσεις, οι οποίες αλληλεπιδρούν και ενισχύουν η μία την άλλη. Ειδικότερα:

i. Ψηφιακή Ταυτότητα: η ικανότητα διαμόρφωσης και διαχείρισης μιας συνεπούς και υπεύθυνης ηλεκτρονικής παρουσίας, με επίγνωση των επιπτώσεων που μπορεί να έχει η διαδικτυακή συμπεριφορά στη μακροπρόθεσμη εικόνα του ατόμου.
ii. Ψηφιακή Χρήση: η ικανότητα χρήσης τεχνολογικών εργαλείων με τρόπο ισορροπημένο, διασφαλίζοντας ότι η ψηφιακή δραστηριότητα δεν επηρεάζει αρνητικά τη σωματική, ψυχική και κοινωνική ευεξία.
iii. **Ψηφιακή Ασφάλεια: η** ικανότητα αναγνώρισης και αντιμετώπισης διαδικτυακών κινδύνων, όπως η ψηφιακή παρενόχληση, η έκθεση σε βίαιο ή προσβλητικό περιεχόμενο και η προστασία από αυτά.
iv. **Ψηφιακή Προστασία: η** ικανότητα αντιμετώπισης απειλών του κυβερνοχώρου (π.χ. hacking, απάτες, κακόβουλο λογισμικό) μέσω της υιοθέτησης αποτελεσματικών μεθόδων ασφαλείας και της προστασίας των προσωπικών δεδομένων.
v. **Ψηφιακή Συναισθηματική Νοημοσύνη: η** ικανότητα κατανόησης και διαχείρισης των συναισθημάτων στη ψηφιακή αλληλεπίδραση, καθώς και η ανάπτυξη ενσυναίσθησης και θετικών σχέσεων στο διαδικτυακό περιβάλλον.
vi. **Ψηφιακή Επικοινωνία: η** ικανότητα αποτελεσματικής επικοινωνίας και συνεργασίας μέσω ψηφιακών πλατφορμών, με σεβασμό στις διαφορετικές απόψεις και πολιτισμικές διαφορές.
vii. **Ψηφιακή Παιδεία: η** ικανότητα κριτικής ανάλυσης, δημιουργίας και διαχείρισης ψηφιακού περιεχομένου, καθώς και η ανάπτυξη υπολογιστικής σκέψης (computational thinking) για την επίλυση πολύπλοκων προβλημάτων.
viii. **Ψηφιακά Δικαιώματα: η** γνώση και η υπεράσπιση των δικαιωμάτων του ψηφιακού πολίτη, όπως ο σεβασμός της ιδιωτικότητας, η πνευματική ιδιοκτησία, η ελευθερία έκφρασης και η προστασία από το διαδικτυακό μίσος.

Η ψηφιακή νοημοσύνη (digital intelligence) αποτελεί κρίσιμο θεμέλιο για την εκπαίδευση στον 21ο αιώνα, καθώς εφοδιάζει τους μαθητές με το σύνολο των γνωστικών, τεχνολογικών, συναισθηματικών και ηθικών δεξιοτήτων που απαιτούνται για την ασφαλή, υπεύθυνη και δημιουργική συμμετοχή στον ψηφιακό κόσμο (Park, 2019). Η

ενσωμάτωση της ψηφιακής νοημοσύνης στα εκπαιδευτικά προγράμματα δεν περιορίζεται στη διδασκαλία ψηφιακών εργαλείων, αλλά επεκτείνεται στην καλλιέργεια στάσεων όπως ο ψηφιακός αυτοέλεγχος, η διαχείριση της ψηφιακής ταυτότητας, η ανθεκτικότητα σε κινδύνους και η ψηφιακή ενσυναίσθηση (DQ Institute, 2020). Μέσω της εκπαίδευσης, η ψηφιακή νοημοσύνη μπορεί να λειτουργήσει ως βασικός μηχανισμός κοινωνικοποίησης των μαθητών σε ένα παγκοσμιοποιημένο και τεχνολογικά διαμεσολαβημένο περιβάλλον (UNESCO, 2021), ενισχύοντας τη δια βίου μάθηση, την πολιτειακή ενδυνάμωση και την κοινωνική ένταξη.

ΨΗΦΙΑΚΗ ΠΟΛΙΤΕΙΟΤΗΤΑ ΚΑΙ ΕΚΠΑΙΔΕΥΣΗ: ΜΙΑ ΟΛΙΣΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Κατά την ανάλυση των εννέα διαστάσεων της ψηφιακής πολιτειότητας σε συνάρτηση με τις απαιτούμενες ψηφιακές δεξιότητες που θεωρούνται αναγκαίες για την προσωπική ολοκλήρωση και την κοινωνικο-επαγγελματική εξέλιξη του σύγχρονου ατόμου, αναδεικνύεται ο καθοριστικός ρόλος της στην εκπαιδευτική διαδικασία. Η τεχνολογία δεν λειτουργεί μόνο ως αντικείμενο γνωστικού πεδίου, αλλά και ως εργαλείο διδασκαλίας και μέσο πρόσβασης στη γνώση (Ribble, 2011). Η επίδραση των Τεχνολογιών Πληροφορίας και Επικοινωνίας (ΤΠΕ) στην κοινωνική ζωή των νέων χρήζει ιδιαίτερης κριτικής προσέγγισης, ιδίως όταν εξετάζονται οι κοινωνικές, οικονομικές και πολιτισμικές παράμετροι της ψηφιακής αλληλεπίδρασης (Ananiadou & Claro, 2009:11). Οι επιπτώσεις αυτών των παραμέτρων καταδεικνύουν την ανάγκη για την καλλιέργεια σύνθετων, ευέλικτων και συνεχώς ανανεούμενων δεξιοτήτων, ικανών να ανταποκρίνονται στις απαιτήσεις της διαρκώς μεταβαλλόμενης ψηφιακής πραγματικότητας.

Επιπλέον η ψηφιοποίηση της πολιτικής συμμετοχής δεν αποτελεί απλώς ένα «σύγχρονο» φαινόμενο των δυτικών δημοκρατιών, αλλά μια παγκόσμια πραγματικότητα που επηρεάζεται από πολιτισμικούς, τεχνολογικούς, οικονομικούς και κοινωνικούς παράγοντες (Işıklı, 2014). Η ψηφιακή ιδιότητα του πολίτη δεν περιορίζεται σε τεχνικές δεξιότητες, αλλά απαιτεί κριτική συνείδηση των δικαιωμάτων, των κινδύνων και των ηθικών ορίων του διαδικτυακού χώρου. Ένας καταρτισμένος ψηφιακός πολίτης γνωρίζει τους περιορισμούς πρόσβασης και τους κανόνες δημοσίευσης (π.χ. απαγόρευση παιδικής πορνογραφίας, hacking, hate speech), τις νομικές και ηθικές επιπτώσεις παραβιάσεων (εθνική ασφάλεια, προσωπικά δεδομένα, πνευματική ιδιοκτησία) και τις ψηφιακές πρακτικές, από τη δημιουργία ιστολογίων έως τη συμμετοχή σε διαδικτυακές κοινότητες και τη διασφάλιση της ασφάλειας των δεδομένων του (Işıklı, 2014). Αυτές οι δεξιότητες που απαιτούνται δεν είναι στατικές· εξελίσσονται παράλληλα με τις τεχνολογικές και κοινωνικές αλλαγές. Και η εκπαίδευση αποτελεί τον πυρήνα αυτής της διαδικασίας, καθώς συνδέει την τεχνολογική γνώση με την αξιοποίησή της για δημοκρατικούς σκοπούς (Ribble, 2011). Μόνο έτσι μπορεί να διαμορφωθεί μια ενεργή, ενημερωμένη και ηθική ψηφιακή κοινωνία, ικανή να αντιμετωπίσει τις προκλήσεις του 21ου αιώνα.

ΣΥΜΠΕΡΑΣΜΑ

Η ψηφιακή πολιτειότητα εμφανίζεται ως δυναμική διαδικασία που απαιτεί συνεχή προσαρμογή. Σε έναν κόσμο όπου η τεχνολογία επηρεάζει όλες τις πτυχές της ανθρώπινης δραστηριότητας, η ανάπτυξη ενός ολοκληρωμένου εκπαιδευτικού μοντέλου που συνδυάζει τεχνικές δεξιότητες, κριτική σκέψη και ηθική ευαισθητοποίηση αποτελεί απαραίτητη προϋπόθεση για τη δημιουργία ενός δίκαιου, συμμετοχικού και ασφαλούς ψηφιακού μέλλοντος.

Η ικανότητα ενός πολίτη να αξιοποιεί τα ψηφιακά εργαλεία για πολιτική συμμετοχή δεν εξαρτάται αποκλειστικά από τεχνικές δεξιότητες. Η ουσία της ψηφιακής πολιτειότητας έγκειται στη θέληση του ατόμου να ενεργοποιηθεί πολιτικά, χρησιμοποιώντας κάθε δυνατότητα – συμπεριλαμβανομένου του διαδικτύου – για να διαμορφώσει τη σύγχρονη έκφραση της πολιτικής του συμμετοχής. Επιπλέον, η ηθική πλευρά της ψηφιακής δραστηριότητας, όπως ο σεβασμός της ιδιωτικότητας και των δικαιωμάτων των άλλων, συνδέεται άμεσα με την ψηφιακή παιδεία (Yuhyun Park, 2016).

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ΘΠ8: Συμπεριληπτική ψηφιακή εκπαίδευση

ΗΧΗΤΙΚΑ ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΜΑΘΗΜΑΤΙΚΩΝ ΓΙΑ ΜΑΘΗΤΕΣ ΜΕ ΟΠΤΙΚΗ ΑΝΑΠΗΡΙΑ: ΑΝΑΛΥΣΗ ΕΦΑΡΜΟΓΩΝ ΚΑΙ ΜΙΑ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ.

Δημάκης Ευθύμιος
Υποψήφιος Διδάκτωρ, - Μαθηματικός Ειδικής Αγωγής
Π.Τ.Δ.Ε. Πανεπιστημίου Ιωαννίνων - Δευτεροβάθμια Διεύθυνση Εκπαίδευσης Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: efdimakis@gmail.com

Αγιαννίτου Διαλεχτή
Μαθηματικός Ειδικής Αγωγής
Δευτεροβάθμια Διεύθυνση Εκπαίδευσης Λέσβου
Ιωάννινα, Ελλάδα
e-mail: dagiannitou@gmail.com@gmail.com

Σούλης Σπυρίδων - Γεώργιος
Καθηγητής Ειδικής Αγωγής, - Διευθυντής Εργαστηρίου Ειδικής Αγωγής και Εκπαίδευσης
Π.Τ.Δ.Ε. Πανεπιστημίου Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: ssoulis@uoi.gr

ΠΕΡΙΛΗΨΗ

Η εκπαίδευση των μαθητών που αντιμετωπίζουν προβλήματα όρασης αποτελεί έναν περίπλοκο και δυναμικά εξελισσόμενο τομέα, όπου απαιτούνται εξειδικευμένες προσεγγίσεις για να εξασφαλιστεί η αποτελεσματική μάθηση, η ένταξη και η ενδυνάμωση. Οι προσπάθειες για την ενσωμάτωση των μαθητών με οπτική αναπηρία στα κανονικά εκπαιδευτικά περιβάλλοντα έχουν αποκτήσει δυναμικό ώθησης. Η έρευνα υπογραμμίζει τη σημασία της προσβασιμότητας τόσο στο φυσικό όσο και στο ψηφιακό περιβάλλον. Η πολυτροπικότητα στη μάθηση αναφέρεται στο γεγονός ότι οι μαθητές επεξεργάζονται τη γνώση μέσα από διαφορετικά αισθητηριακά κανάλια. Στην περίπτωση των μαθητών με οπτική αναπηρία, το ακουστικό κανάλι αποκτά πρωταγωνιστικό ρόλο, καθώς λειτουργεί ως κύριο μέσο πρόσληψης και οργάνωσης της πληροφορίας. Επιπλέον, σύμφωνα με τον κονστρουκτιβισμό, η μάθηση δεν είναι μια παθητική διαδικασία αλλά ένα ενεργό χτίσιμο γνώσεων μέσα από αλληλεπίδραση με το περιβάλλον. Τα ψηφιακά εργαλεία ήχου δίνουν τη δυνατότητα στους μαθητές με οπτική αναπηρία να αλληλεπιδρούν με το εκπαιδευτικό υλικό, να διερευνούν έννοιες και να κατασκευάζουν τη γνώση μέσα από την ακουστική και αισθητηριακή εμπειρία. Η αξιοποίηση των ψηφιακών τεχνολογιών στη διδασκαλία μαθητών με οπτική αναπηρία έχει σημαντική συμβολή στη βελτίωση της πρόσβασής τους στη γνώση. Τα εργαλεία που βασίζονται στον ήχο, επιτρέπουν την κατανόηση μαθηματικών και άλλων επιστημονικών εννοιών μέσω ακουστικών πληροφοριών. Τα λογισμικά μετατροπής κειμένου σε ομιλία (TTS), οι ηχητικές ετικέτες και οι διαδραστικές εφαρμογές με ηχητική καθοδήγηση ενισχύουν την αυτονομία των μαθητών, ενώ τα ηχητικά διαγράμματα και οι περιγραφικές αφηγήσεις διευκολύνουν την πρόσληψη σύνθετων πληροφοριών. Επιπλέον, οι τεχνολογίες αφής σε συνδυασμό με ηχητική ανάδραση παρέχουν πολυαισθητηριακή υποστήριξη, διευκολύνοντας τη μαθησιακή διαδικασία. Η χρήση αυτών των εργαλείων προάγει τη συμπεριληπτική εκπαίδευση, επιτρέποντας την ενεργό συμμετοχή των μαθητών με οπτική αναπηρία στην τάξη και ενισχύοντας τη μαθησιακή τους εμπειρία.

Στην παρούσα εργασία, εξετάζονται σύγχρονα ηχητικά εργαλεία που ενισχύουν τη μαθησιακή διαδικασία, με έμφαση στη διδασκαλία μαθηματικών και επιστημονικών εννοιών. Παρουσιάζονται εργαλεία που κυκλοφορούν και γίνεται ιδιαιτερη αναφορά σε αυτά που μπορούν να έχουν οι μαθητές αλλά και οι εκπαιδευτικοί δωρεάν. Για την πρακτική διερεύνηση της αποτελεσματικότητας αυτών των εργαλείων πραγματοποιήθηκε και παρουσιάζεται μια μελέτη περίπτωσης. Ο μαθητής της Γ γυμνασίου Φ.Δ. με μερική απώλεια όρασης συμμετείχε σε ένα πρόγραμμα ενισχυμένης μαθηματικής διδασκαλίας με τη χρήση ψηφιακών εργαλείων. Η εκπαιδευτική προσέγγιση περιλαμβάνει τη χρήση του λογισμικού NVDA για την ανάγνωση μαθηματικών συμβόλων, Desmos για την ηχητική ανατροφοδότηση για γραφήματα συναρτήσεων, διαδραστικών εφαρμογών αφής για την κατανόηση γεωμετρικών σχημάτων και την ενσωμάτωση ηχητικών περιγραφών σε διαδραστικά μαθησιακά περιβάλλοντα. Τα αποτελέσματα καταδεικνύουν τη βελτίωση της κατανόησης και της συμμετοχής του μαθητή, υπογραμμίζοντας τη σημασία της ενσωμάτωσης τεχνολογιών προσαρμοσμένης μάθησης.

Λέξεις – κλειδιά: ειδική αγωγή, ηχητικά ψηφιακά μέσα, μελέτη περίπτωσης, οπτική αναπηρία

ΕΙΣΑΓΩΓΗ

Η πρόσβαση στην εκπαίδευση αποτελεί θεμελιώδες ανθρώπινο δικαίωμα και βασική προϋπόθεση για την κοινωνική ένταξη και την προσωπική ανάπτυξη όλων των μαθητών. Στο πλαίσιο της συμπεριληπτικής εκπαίδευσης, η διασφάλιση ισότιμων μαθησιακών ευκαιριών για μαθητές με αναπηρία δεν περιορίζεται μόνο στη φυσική παρουσία στο σχολικό περιβάλλον, αλλά επεκτείνεται στη δυνατότητα ουσιαστικής πρόσβασης στο εκπαιδευτικό περιεχόμενο, στη συμμετοχή και στην ενεργή οικοδόμηση της γνώσης. Για τους μαθητές με οπτική αναπηρία, τα εμπόδια πρόσβασης είναι συχνά εντονότερα, καθώς μεγάλο μέρος της σχολικής πληροφορίας βασίζεται στην οπτική αναπαράσταση (Hersh & Johnson, 2008).

Ιδιαίτερα στη διδασκαλία των μαθηματικών, η κυριαρχία οπτικών στοιχείων, όπως σύμβολα, γραφήματα, γεωμετρικά σχήματα και πίνακες, μπορεί να περιορίσει σημαντικά την κατανόηση και την ενεργό συμμετοχή των μαθητών με οπτική αναπηρία. Η απουσία προσβάσιμων εναλλακτικών αναπαραστάσεων συχνά οδηγεί σε γνωστικά κενά, μειωμένη αυτονομία και χαμηλή αυτοεκτίμηση. Για τον λόγο αυτό, η ανάγκη για διαφοροποιημένες διδακτικές προσεγγίσεις και αξιοποίηση κατάλληλων τεχνολογικών εργαλείων καθίσταται κρίσιμη, ώστε να διασφαλίζεται η ισότιμη συμμετοχή όλων των μαθητών στη μαθησιακή διαδικασία (Sapp, 2009).

Η αξιοποίηση ψηφιακών τεχνολογιών και ειδικότερα εργαλείων που ενσωματώνουν αρχές καθολικού σχεδιασμού μπορεί να συμβάλει ουσιαστικά στη βελτίωση της προσβασιμότητας του εκπαιδευτικού περιεχομένου. Οι προσεγγίσεις του Universal Design for Learning (UDL) και του Universal Design of Instruction τονίζουν τη σημασία της παροχής πολλαπλών τρόπων παρουσίασης της πληροφορίας, έκφρασης και εμπλοκής, ώστε να ανταποκρίνονται στις διαφορετικές μαθησιακές ανάγκες των μαθητών (Al-Azawei et al., 2016). Στο πλαίσιο αυτό, τα ηχητικά ψηφιακά εργαλεία αποκτούν ιδιαίτερη παιδαγωγική αξία για τους μαθητές με οπτική αναπηρία, καθώς μετατρέπουν την πληροφορία σε προσβάσιμη ακουστική μορφή και ενισχύουν τη λειτουργική ανεξαρτησία.

Παράλληλα, η τεχνολογία δεν λειτουργεί απλώς ως τεχνικό βοήθημα, αλλά ως μέσο ενδυνάμωσης της μαθησιακής εμπειρίας, όταν ενσωματώνεται σε ένα παιδαγωγικά σχεδιασμένο πλαίσιο. Η αποτελεσματική χρήση προσβάσιμων ψηφιακών εργαλείων προϋποθέτει σαφείς διδακτικούς στόχους, κατάλληλη καθοδήγηση και προσαρμογή στις ανάγκες του μαθητή, ώστε να ενισχύεται η ενεργή συμμετοχή και η κατανόηση των εννοιών. Η διεθνής βιβλιογραφία επισημαίνει ότι η συστηματική αξιοποίηση βοηθητικής τεχνολογίας μπορεί να βελτιώσει όχι μόνο τις μαθησιακές επιδόσεις, αλλά και την αυτοπεποίθηση και την αυτονόμηση των μαθητών με οπτική αναπηρία (Hersh & Johnson, 2008).

ΣΤΟΧΟΣ ΚΑΙ ΕΡΕΥΝΗΤΙΚΑ ΕΡΩΤΗΜΑΤΑ ΤΗΣ ΕΡΓΑΣΙΑΣ

Στόχος της παρούσας εργασίας είναι η διερεύνηση και η ανάλυση ψηφιακών εργαλείων με ηχητική ανατροφοδότηση που μπορούν να υποστηρίξουν τη διδασκαλία των μαθηματικών σε μαθητές με οπτική αναπηρία. Η εργασία εστιάζει σε εργαλεία που συμβάλλουν στην προσβασιμότητα του μαθησιακού περιεχομένου και ευθυγραμμίζονται με αρχές καθολικού σχεδιασμού, ώστε να προάγεται η ισότιμη συμμετοχή και η ενεργή εμπλοκή των μαθητών στη μαθησιακή διαδικασία (Al-Azawei et al., 2016).

Παράλληλα, επιδιώκεται να αναδειχθεί η παιδαγωγική αξία της βοηθητικής τεχνολογίας ως μέσου ενδυνάμωσης, αυτονομίας και βελτίωσης της μαθησιακής εμπειρίας, ειδικά σε γνωστικά αντικείμενα υψηλών απαιτήσεων όπως τα μαθηματικά (Hersh & Johnson, 2008). Ιδιαίτερη έμφαση δίνεται στις προϋποθέσεις παιδαγωγικής αξιοποίησης των εργαλείων αυτών, ώστε να εντάσσονται λειτουργικά στη διδασκαλία και να μην εφαρμόζονται αποσπασματικά ή περιστασιακά.

Ακόμα, παρουσιάζεται μια μελέτη περίπτωσης από τη Δευτεροβάθμια Εκπαίδευση, η οποία εστιάζει στην ένταξη τέτοιων εργαλείων στο πλαίσιο ενός εξατομικευμένου μαθησιακού προγράμματος με επίκεντρο τη γεωμετρία και τη χωρική αναγνώριση. Μέσα από αυτήν τη μελέτη, αναδεικνύονται τόσο οι δυνατότητες των ψηφιακών ηχητικών μέσων όσο και οι πρακτικές προκλήσεις που προκύπτουν κατά την εφαρμογή τους στην καθημερινή διδακτική πράξη.

Η εργασία επιδιώκει να συμβάλει στην ενίσχυση της προσβασιμότητας και της παιδαγωγικής αποτελεσματικότητας στην εκπαίδευση μαθητών με οπτική αναπηρία, προσφέροντας χρήσιμα παραδείγματα και προτάσεις σε εκπαιδευτικούς, ειδικούς παιδαγωγούς και δημιουργούς εκπαιδευτικού λογισμικού.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η διδασκαλία των μαθηματικών σε μαθητές με οπτική αναπηρία αποτελεί ένα σύνθετο παιδαγωγικό πεδίο, καθώς το μάθημα βασίζεται σε μεγάλο βαθμό σε οπτικές αναπαραστάσεις και συμβολικές μορφές πληροφορίας. Έννοιες όπως τα γραφήματα συναρτήσεων, οι γεωμετρικές σχέσεις, οι πίνακες δεδομένων, καθώς και η ίδια η συμβολική γραφή των μαθηματικών, συχνά παρουσιάζονται με τρόπο που προϋποθέτει οπτική πρόσβαση. Αυτό έχει ως αποτέλεσμα οι μαθητές με οπτική αναπηρία να αντιμετωπίζουν δυσκολίες όχι μόνο στην κατανόηση, αλλά και στην οργάνωση της σκέψης τους κατά την επίλυση προβλημάτων, καθώς χρειάζονται εναλλακτικούς τρόπους ανάγνωσης και επεξεργασίας του μαθηματικού περιεχομένου (Shoaib et al., 2023). Επομένως, η διδασκαλία απαιτεί προσαρμογές τόσο στο περιεχόμενο όσο και στη διαδικασία, με αξιοποίηση προσβάσιμων εργαλείων και μεθόδων που επιτρέπουν στον μαθητή να αλληλεπιδρά ενεργά με τις έννοιες, χωρίς να αποκλείεται λόγω της απουσίας οπτικής πληροφορίας (Maćkowski et al., 2023).

Η πολυτροπικότητα στη μάθηση αναφέρεται στην αξιοποίηση πολλαπλών τρόπων πρόσληψης και επεξεργασίας της πληροφορίας, όπως ο ήχος, η αφή, η κίνηση και η γλώσσα, σε συνδυασμό με τις δυνατότητες της τεχνολογίας. Για τους μαθητές με οπτική αναπηρία, η πολυτροπική προσέγγιση δεν αποτελεί απλώς μία ενίσχυση της διδασκαλίας, αλλά προϋπόθεση ισότιμης πρόσβασης, καθώς μεταφέρει το μαθησιακό περιεχόμενο από το αποκλειστικά οπτικό πεδίο σε εναλλακτικές μορφές που μπορούν να γίνουν λειτουργικές και κατανοητές (Shoaib et al., 2023).

Ειδικότερα στα μαθηματικά, η μετατροπή της πληροφορίας σε ακουστικές ή απτικές μορφές (π.χ. περιγραφή, ηχητική ανατροφοδότηση, δομημένη πλοήγηση συμβόλων) μπορεί να διευκολύνει τον μαθητή να σχηματίσει νοητικές αναπαραστάσεις, να οργανώσει σχέσεις και να αναγνωρίσει μοτίβα. Η προσβασιμότητα, επομένως, δεν αφορά μόνο την ανάγνωση του υλικού, αλλά και την ουσιαστική δυνατότητα κατανόησης, διερεύνησης και επεξεργασίας των μαθηματικών εννοιών με τρόπους ισότιμους ως προς τη γνωστική απαίτηση (Maćkowski et al., 2023).

Η ενεργητική μάθηση προϋποθέτει ότι ο μαθητής δεν λειτουργεί ως παθητικός δέκτης, αλλά εμπλέκεται στη διερεύνηση, στη δοκιμή, στον έλεγχο και στην οικοδόμηση της γνώσης. Στην περίπτωση των μαθητών με οπτική αναπηρία, η ενεργητική εμπλοκή αποκτά ιδιαίτερη σημασία, διότι η κατανόηση των μαθηματικών εννοιών δεν μπορεί να στηριχθεί σε παρατήρηση σχημάτων ή γραφημάτων, αλλά απαιτεί εναλλακτικές εμπειρίες αλληλεπίδρασης με το περιεχόμενο. Η βιβλιογραφία αναδεικνύει ότι οι τεχνολογικές λύσεις μπορούν να λειτουργήσουν ως κανάλια δράσης, επιτρέποντας στον μαθητή να εξερευνά έννοιες μέσω ακουστικής ή απτικής ανατροφοδότησης και να ελέγχει τη σκέψη του μέσα από συνεχή αλληλεπίδραση (Shoaib et al., 2023).

Η δυνατότητα χειρισμού μαθηματικών αντικειμένων, η άμεση ανατροφοδότηση και η επαναληπτική διερεύνηση ενισχύουν τη διαδικασία κατανόησης και συμβάλλουν στη δημιουργία σταθερότερων γνωστικών δομών. Επιπλέον, τέτοιες πρακτικές ενισχύουν την αυτονομία του μαθητή, καθώς μειώνουν την πλήρη εξάρτηση από τη διαμεσολάβηση του εκπαιδευτικού και επιτρέπουν μεγαλύτερο βαθμό ανεξάρτητης μαθησιακής δράσης (Maćkowski et al., 2023).

Η τεχνολογία στην ειδική αγωγή μπορεί να λειτουργήσει ως παράγοντας ένταξης και ενδυνάμωσης, όταν αξιοποιείται όχι ως υποκατάστατο, αλλά ως εργαλείο που ανοίγει νέους δρόμους πρόσβασης στη γνώση. Στην εκπαίδευση μαθητών με οπτική αναπηρία, οι βοηθητικές τεχνολογίες και τα ψηφιακά εργαλεία προσβασιμότητας μπορούν να ενισχύσουν τη συμμετοχή στην τάξη, να διευκολύνουν την κατανόηση του περιεχομένου και να υποστηρίξουν την ισότιμη εμπλοκή σε μαθησιακές δραστηριότητες που διαφορετικά θα ήταν δυσπρόσιτες (Shoaib et al., 2023).

Ταυτόχρονα, η ένταξη της τεχνολογίας προϋποθέτει παιδαγωγική οργάνωση και κατάλληλη προσαρμογή στις ανάγκες του μαθητή και στο πλαίσιο της τάξης. Μπορεί να αποτελέσει ισχυρό μέσο συμπερίληψης, εφόσον συνδυαστεί με στοχευμένη διδακτική παρέμβαση και συνεχή υποστήριξη, ώστε να ενισχύει όχι μόνο την πρόσβαση αλλά και την ουσιαστική μαθησιακή πρόοδο (Maćkowski et al., 2023).

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα εργασία υιοθετεί μια περιγραφική και εφαρμοσμένη προσέγγιση, με στόχο την ανάδειξη του ρόλου των ψηφιακών εργαλείων με ηχητική ανατροφοδότηση στη διδασκαλία μαθηματικών για μαθητές με οπτική αναπηρία. Συγκεκριμένα, η μεθοδολογία βασίζεται σε δύο συμπληρωματικούς άξονες: (α) την παρουσίαση και ανάλυση επιλεγμένων ψηφιακών εργαλείων προσβασιμότητας και (β) την εφαρμογή τους σε μια σύντομη μελέτη περίπτωσης, προκειμένου να διερευνηθεί πρακτικά η λειτουργικότητά τους και η παιδαγωγική τους αξία στο πλαίσιο της υποστηρικτικής διδασκαλίας. Η επιλογή αυτής της μεθοδολογικής κατεύθυνσης κρίνεται κατάλληλη, καθώς η διεθνής βιβλιογραφία υπογραμμίζει ότι οι τεχνολογίες υποστήριξης για μαθητές με οπτική αναπηρία χρειάζονται αξιολόγηση όχι

μόνο ως προς τα τεχνικά χαρακτηριστικά τους, αλλά κυρίως ως προς την εκπαιδευτική τους αξιοποίηση σε πραγματικές συνθήκες μάθησης (Shoaib et al., 2023).

ΕΡΓΑΛΕΙΑ ΠΟΥ ΠΑΡΟΥΣΙΑΖΟΝΤΑΙ

Η επιλογή των εργαλείων έγινε βάσει κριτηρίων όπως η προσβασιμότητα, η παιδαγωγική καταλληλότητα και η δυνατότητα χρήσης τους από μαθητές Δευτεροβάθμιας Εκπαίδευσης. Ο διαχωρισμός τους γίνεται σε δύο κύριες κατηγορίες.

- Λογισμικά Ανάγνωσης και Πλοήγησης (Screen Readers & Visual Assistance Apps): Εργαλεία που διευκολύνουν την πλοήγηση στο ψηφιακό περιβάλλον, την πρόσβαση σε κείμενα και την εκτέλεση βασικών εντολών με ηχητική ανατροφοδότηση.

- Ειδικά Εργαλεία Μαθηματικής Ηχητικής Αναπαράστασης (Sonification Tools): Λογισμικά που μετατρέπουν μαθηματικές πληροφορίες και δεδομένα (π.χ. γραφήματα, σχήματα) σε ηχητικά μοτίβα και περιγραφές.

Α. Λογισμικά Ανάγνωσης και Πλοήγησης:
- NonVisual Desktop Access (NVDA)
- TalkBack (Android)
- Seeing AI
- Be My Eyes

Β. Ειδικά Εργαλεία Μαθηματικής Ηχητικής Αναπαράστασης (Sonification):
- Desmos Audio Graphing Calculator
- MathMelody
- SAS Graphics Accelerator
- Sonification Sandbox
- Audio Geometry (Geoboard Simulation)

Η αξιολόγηση των εργαλείων βασίζεται στα εξής βασικά κριτήρια:
- Προσβασιμότητα
- Συμβατότητα με μαθησιακά περιβάλλοντα
- Παιδαγωγική αξία
- Αυτονομία του μαθητή

ΛΟΓΙΣΜΙΚΑ ΑΝΑΓΝΩΣΗΣ ΚΑΙ ΠΛΟΗΓΗΣΗΣ

1. NonVisual Desktop Access (NVDA)
Ανοικτού κώδικα πρόγραμμα ανάγνωσης οθόνης για Windows με υποστήριξη ελληνικής γλώσσας.
Ιστοσελίδα: https://www.nvaccess.org/

2. TalkBack (Android)
Ενσωματωμένη λύση για κινητά Android, διευκολύνει την προσβασιμότητα με φωνητικές οδηγίες και απτική πλοήγηση.
Ιστοσελίδα: https://support.google.com/accessibility/android/answer/6283677

3. Seeing AI
Εφαρμογή της Microsoft για αναγνώριση κειμένων, ανθρώπων και αντικειμένων μέσω κάμερας κινητού.
Ιστοσελίδα: https://www.microsoft.com/en-us/ai/seeing-ai

4. Be My Eyes
Πλατφόρμα που συνδέει χρήστες με προβλήματα όρασης με εθελοντές για υποστήριξη σε πραγματικό χρόνο.
Ιστοσελίδα: https://www.bemyeyes.com/

ΕΙΔΙΚΑ ΕΡΓΑΛΕΙΑ ΜΑΘΗΜΑΤΙΚΗΣ ΗΧΗΤΙΚΗΣ ΑΝΑΠΑΡΑΣΤΑΣΗΣ

1. Desmos Audio Graphing Calculator
Παρέχει ηχητική καθοδήγηση σε μαθηματικά γραφήματα και δυναμικές απεικονίσεις μέσω πληκτρολογίου.
Ιστοσελίδα: https://www.desmos.com/accessibility

2. MathMelody
Χρησιμοποιεί μουσικά μοτίβα για τη διδασκαλία μαθηματικών εννοιών σε μαθητές με προβλήματα όρασης.
Ιστοσελίδα: https://mathmelody.net/

3. SAS Graphics Accelerator
Επιτρέπει την ηχητική εξερεύνηση στατιστικών γραφημάτων και πολυδιάστατων δεδομένων.
Ιστοσελίδα: https://www.sas.com/en_us/software/graphics-accelerator.html

4. Sonification Sandbox
Διαδραστικό εργαλείο που μετατρέπει συναρτήσεις σε ήχο, επιτρέποντας την πειραματική ακρόαση μαθηματικών μεταβολών.
Ιστοσελίδα: https://ccom.ucsd.edu/sonification-sandbox.html

5. Audio Geometry (Geoboard Simulation)
Προσομοιώνει γεωμετρικές δομές με χρήση ήχου και απτικής ανάδρασης, υποστηρίζοντας τη χωρική αντίληψη.
Ιστοσελίδα: https://inclusiveeducation.ca/resources/audio-geometry

ΣΥΓΚΡΙΤΙΚΟΣ ΠΙΝΑΚΑΣ ΕΡΓΑΛΕΙΩΝ

Ο παρακάτω πίνακας (Πίνακας 1) περιλαμβάνει όλα τα εργαλεία που παρουσιάστηκαν στις προηγούμενες ενότητες, με σύγκριση ως προς τη χρήση, την προσβασιμότητα, το κόστος και τη γενική τους εκπαιδευτική αξιολόγηση:

Πίνακας 1
Σύγκριση Εργαλείων

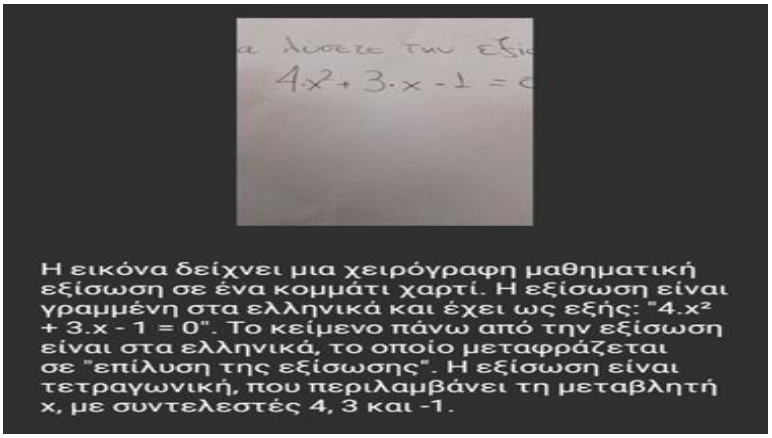
Εργαλείο	Χρήση στη Μελέτη/Πράξη	Δυνατότητα Προσβασιμότητας	Κόστος	Σχολιασμός
NVDA	Πλοήγηση σε υπολογιστή	Υψηλή	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Ιδανικό για περιβάλλον Windows
TalkBack	Πλοήγηση σε Android	Υψηλή	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Απαραίτητο για κινητές συσκευές
Seeing AI	Υποστήριξη & αναγνώριση	Άμεση	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Συνοδευτική εφαρμογή αναγνώρισης
Be My Eyes	Υποστήριξη από εθελοντές	Υψηλή (ανθρώπινη παροχή)	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Χρήσιμη για απλές καθημερινές χρήσεις
Desmos Audio Graphing Calc.	Ανίχνευση γραφημάτων	Υψηλή	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Ακρίβεια σε συναρτήσεις
MathMelody	Εισαγωγή σε αριθμούς	Πολύ εύκολο	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Κατάλληλο για αρχάριους
SAS Graphics Accelerator	Ανάλυση γραφημάτων	Πολυτροπική (ήχος + κείμενο)	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Πολύτιμο σε στατιστικές έννοιες
Sonification Sandbox	Εξερεύνηση μαθηματικών δομών	Τεχνικό, ευέλικτο	Δωρεάν	Ιδανικό για πειραματισμό και ανάλυση
Audio Geometry	Ηχητική γεωμετρία	Υψηλή	Δωρεάν (χωρίς επί πληρωμή έκδοση)	Ενισχύει τη χωρική κατανόηση

ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΜΑΘΗΤΗ ΜΕ ΟΠΤΙΚΗ ΑΝΑΠΗΡΙΑ

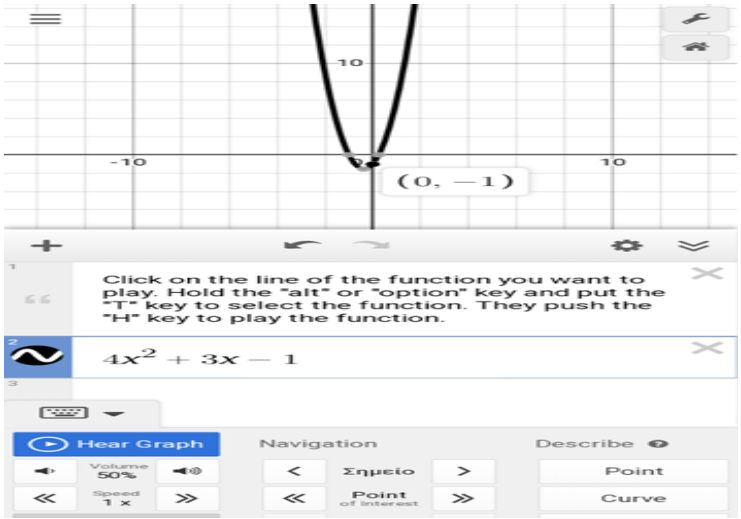
Ο μαθητής Δ.Φ. είναι αγόρι που φοιτά στη Γ' Γυμνασίου σε Γυμνάσιο στην επαρχία. Είναι αλβανικής καταγωγής και διαμένει με την οικογένειά του σε ένα μικρότερο χωριό της περιοχής, με περιορισμένο πληθυσμό. Οι γονείς του δεν εμπλέκονται ιδιαίτερα στις σχολικές δραστηριότητες, όμως ο μαθητής είναι πλήρως αποδεκτός από τους συμμαθητές του.

Έχει σοβαρού βαθμού οπτική αναπηρία, με διάγνωση VOD 1/20sc και VOS 1/20sc, καθώς και κολοβώματα στην ίριδα, στον κρυσταλλοειδή φακό και στον χοριοαμφιβληστροειδή και των δύο οφθαλμών. Βρίσκεται σε υποστήριξη παράλληλης στήριξης τα τελευταία δύο σχολικά έτη.

Εικόνα 1
Ανάγνωση με Seeing AI



Εικόνα 2
Ανάγνωση με Desmos Audio Graphing Calculator



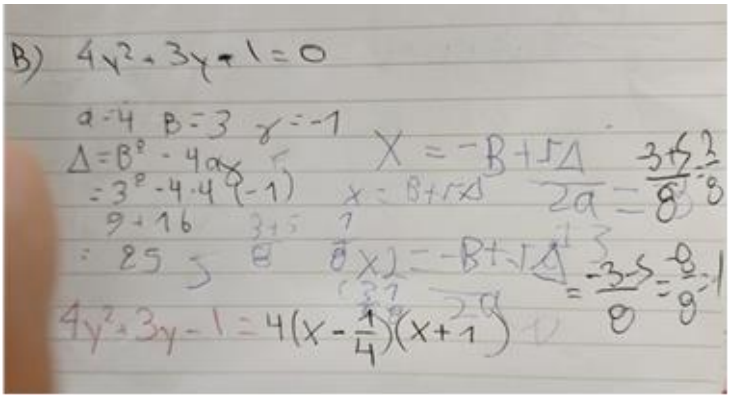
Κατά τη φετινή σχολική χρονιά, η πρόοδος του μαθητή ήταν εντυπωσιακή, με τη συμβολή των δύο εκπαιδευτικών παράλληλης στήριξης. Ο μαθητής προσπαθεί με επιμονή, μελετά με δυσκολία και συγκέντρωση, και αναπτύσσει προσωπικές στρατηγικές γραφής που του επιτρέπουν να γίνεται κατανοητός. Κατά τη φετινή σχολική χρονιά, η πρόοδος του μαθητή υπήρξε ιδιαίτερα εντυπωσιακή, γεγονός που αποδίδεται σε μεγάλο βαθμό στη συστηματική υποστήριξη και συνεργασία των δύο εκπαιδευτικών παράλληλης στήριξης. Παρότι ο μαθητής αντιμετωπίζει σημαντικές δυσκολίες στη μελέτη, κυρίως λόγω της αυξημένης γνωστικής προσπάθειας που απαιτείται για τη συγκέντρωση και την επεξεργασία της πληροφορίας χωρίς οπτική πρόσβαση, επιδεικνύει σταθερά επιμονή, θετική στάση και διάθεση για βελτίωση. Με την πάροδο του χρόνου, ανέπτυξε προσωπικές στρατηγικές γραφής και καταγραφής, οι οποίες του επιτρέπουν να οργανώνει τα βήματα της σκέψης του και να γίνεται κατανοητός τόσο από τους εκπαιδευτικούς όσο και

από το περιβάλλον της τάξης. Η εξέλιξη αυτή δεν αφορά μόνο την επίδοση, αλλά και την ενίσχυση της αυτονομίας και της αυτοπεποίθησής του ως μαθητή.

Στο πλαίσιο της διδασκαλίας της δευτεροβάθμιας εξίσωσης, παρατηρήθηκε αρχικά ότι ο μαθητής δυσκολευόταν σε βασικά σημεία της διαδικασίας. Συγκεκριμένα, αδυνατούσε να εντοπίσει με ακρίβεια τους συντελεστές α, β, γ μέσα από την αλγεβρική μορφή της εξίσωσης, ενώ παράλληλα δεν μπορούσε να κατανοήσει με σαφήνεια τον τρόπο υπολογισμού της διακρίνουσας Δ και τη σημασία της για την ύπαρξη και το πλήθος των ριζών. Επιπλέον, του ήταν εξαιρετικά δύσκολο να αποκτήσει μια "γεωμετρική" ή γραφική αντίληψη της έννοιας, δηλαδή να συνδέσει τη δευτεροβάθμια εξίσωση με την παραβολή και τη θέση της ως προς τους άξονες. Το συμβατικό διδακτικό υλικό (έντυπες ασκήσεις, πίνακας, τυπικές εξηγήσεις) δεν μπορούσε να του προσφέρει επαρκή στήριξη, καθώς βασιζόταν κυρίως σε οπτικές αναπαραστάσεις και σε γρήγορη αναγνώριση συμβόλων, κάτι που για τον μαθητή λειτουργούσε ως εμπόδιο.

Για τον λόγο αυτό, η παρέμβαση σχεδιάστηκε με στόχο να υποστηρίξει βήμα-βήμα τόσο την προσβασιμότητα όσο και την ουσιαστική κατανόηση, μετατρέποντας την εκφώνηση και τη γραφική αναπαράσταση σε μορφές που ο μαθητής μπορούσε να επεξεργαστεί λειτουργικά. Στο πρώτο στάδιο αξιοποιήθηκε η εφαρμογή Seeing AI, ώστε ο μαθητής να αποκτήσει άμεση πρόσβαση στην έντυπη εκφώνηση της εξίσωσης. Με χρήση του κινητού του τηλεφώνου, σάρωσε το φύλλο εργασίας και άκουσε φωνητικά το μαθηματικό περιεχόμενο. Η διαδικασία αυτή δεν λειτούργησε απλώς ως ανάγνωση, αλλά ως κρίσιμο βήμα για να μπορέσει ο μαθητής να εντοπίσει σωστά τα δεδομένα της άσκησης. Με τη βοήθεια του εκπαιδευτικού, κατέγραψε με ακρίβεια τους αριθμητικούς συντελεστές και διδάχθηκε συστηματικά να τους αναγνωρίζει ώστε να αποκτήσει σταδιακά σταθερό τρόπο οργάνωσης της εξίσωσης. Σε αυτό το στάδιο δόθηκε ιδιαίτερη έμφαση στην κατανόηση της δομής της εξίσωσης, ώστε ο μαθητής να μην απομνημονεύει μηχανικά, αλλά να αναγνωρίζει κάθε στοιχείο στη σωστή θέση.

Εικόνα 3.
Αλγεβρική Επίλυση



Στο δεύτερο στάδιο, χρησιμοποιήθηκε το Desmos Audio Graphing Calculator, το οποίο αποτέλεσε το βασικό εργαλείο για την ανάπτυξη της γραφικής και εννοιολογικής κατανόησης. Ο μαθητής εισήγαγε την εξίσωση στο περιβάλλον της εφαρμογής και στη συνέχεια εξερεύνησε την ηχητική αναπαράσταση της γραφικής παράστασης. Μέσα από τις ακουστικές πληροφορίες που δίνει το εργαλείο (περιγραφή της καμπύλης, εντοπισμός σημείων, μεταβολές), ο μαθητής μπόρεσε να αντιληφθεί βασικά χαρακτηριστικά της παραβολής: το άνοιγμά της, τη γενική μορφή της καμπύλης, καθώς και τη σχέση της με τους άξονες. Ιδιαίτερα σημαντικό ήταν ότι μπόρεσε να συνδέσει τα σημεία τομής με τον άξονα xxx με την έννοια των ριζών, δηλαδή να καταλάβει ότι όταν η παραβολή "ακουμπά" ή "κόβει" τον άξονα, τότε η εξίσωση έχει λύσεις. Η εμπειρία αυτή ενεργοποίησε τη φαντασία του, κέντρισε το ενδιαφέρον του και τον βοήθησε ουσιαστικά να "δει" τη συνάρτηση με βάση τον ήχο, κάτι που μέχρι τότε δεν ήταν εφικτό μέσω της συμβατικής διδασκαλίας.

Η συνολική παρέμβαση οργανώθηκε με παιδαγωγική συνέπεια και περιλάμβανε συγκεκριμένα βήματα υποστήριξης:

- Καθοδήγηση βήμα-βήμα από τον εκπαιδευτικό παράλληλης στήριξης, με σαφή διάσπαση της διαδικασίας σε μικρά, διαχειρίσιμα στάδια.
- Επαναλαμβανόμενη ακρόαση του ηχητικού γραφήματος και επεξήγηση των στοιχείων που προκύπτουν από αυτό, ώστε ο μαθητής να σταθεροποιήσει την κατανόηση της μορφής της παραβολής.

- Συζήτηση με ερωτήσεις ενεργοποίησης, όπως: «Τι σημαίνει όταν η παραβολή δεν τέμνει τον άξονα;», «Πότε περιμένουμε δύο ρίζες;», «Πώς σχετίζεται η διακρίνουσα με αυτό που ακούμε;», με σκοπό να ενισχυθεί η σύνδεση μεταξύ αλγεβρικής και γραφικής σκέψης.
- Μεταφορά της εμπειρίας σε αλγεβρική επίλυση στο χαρτί, ώστε ο μαθητής να εφαρμόσει τα συμπεράσματα της ακουστικής διερεύνησης σε τυπικές διαδικασίες (υπολογισμός Δ, εύρεση ριζών), οργανώνοντας τη λύση του με σαφή βήματα.

ΣΥΖΗΤΗΣΗ

Η συνεργασία με τον μαθητή καθ' όλη τη διάρκεια της εκπαιδευτικής παρέμβασης υπήρξε ιδιαίτερα θετική και παραγωγική. Από τις πρώτες κιόλας διδακτικές συναντήσεις παρατηρήθηκε ότι ο μαθητής ανταποκρινόταν με συνέπεια στις οδηγίες, διατηρούσε θετική στάση απέναντι στη μαθησιακή διαδικασία και επιδίωκε να ολοκληρώσει τις δραστηριότητες, ακόμη και όταν απαιτούνταν αυξημένη προσπάθεια. Η συνολική του συμπεριφορά μέσα στο μάθημα έδειξε διάθεση συνεργασίας, αποδοχή της υποστήριξης και προθυμία να δοκιμάσει νέους τρόπους προσέγγισης του μαθηματικού περιεχομένου.

Κατά τη χρήση των εργαλείων προσβασιμότητας και ηχητικής αναπαράστασης παρατηρήθηκε εμφανής αύξηση της κινητοποίησης και της ενεργούς συμμετοχής του. Ο μαθητής έδειχνε πιο συγκεντρωμένος, διατηρούσε μεγαλύτερη διάρκεια προσοχής και συμμετείχε ουσιαστικά στη διαδικασία διερεύνησης, καθώς η τεχνολογία μετέτρεπε ένα δυσπρόσιτο μαθηματικό αντικείμενο σε εμπειρία που μπορούσε να κατανοήσει και να χειριστεί. Η δυνατότητα να προσεγγίσει τη δευτεροβάθμια εξίσωση μέσω ακουστικής αναπαράστασης φαίνεται ότι λειτούργησε ενισχυτικά για την αυτοεικόνα του ως μαθητή, καθώς κάθε επιτυχής αναγνώριση δεδομένων και κάθε σωστή ερμηνεία του ηχητικού γραφήματος ενδυνάμωνε την αυτοπεποίθησή του και του έδινε αίσθηση ελέγχου της μαθησιακής διαδικασίας.

Ιδιαίτερα σημαντικό στοιχείο αποτέλεσε το γεγονός ότι η μετάβαση από την ηχητική αναπαράσταση στην αλγεβρική λύση πραγματοποιήθηκε με ομαλό τρόπο και με σαφή δείγματα εσωτερίκευσης των βασικών εννοιών. Ο μαθητής δεν περιορίστηκε στο να «ακούει» τη γραφική μορφή της συνάρτησης, αλλά κατάφερε να μεταφέρει την εμπειρία αυτή σε οργανωμένη μαθηματική σκέψη, εντοπίζοντας με μεγαλύτερη ακρίβεια τους συντελεστές, κατανοώντας τη σχέση της διακρίνουσας με τον αριθμό των ριζών και εφαρμόζοντας σταδιακά τα βήματα της επίλυσης στο χαρτί. Η εξέλιξη αυτή δείχνει ότι τα εργαλεία δεν λειτούργησαν απλώς ως τεχνική διευκόλυνση, αλλά ως ουσιαστική υποστήριξη της κατανόησης και της μαθησιακής οικοδόμησης.

Παράλληλα, ο μαθητής φάνηκε να απολαμβάνει τη διαδικασία. Δήλωσε ρητά ότι «του άρεσε» να δουλεύει με αυτά τα εργαλεία και εξέφρασε ενδιαφέρον να τα αξιοποιήσει και σε άλλα κεφάλαια, γεγονός που αποτελεί ένδειξη εσωτερικού κινήτρου και θετικής σύνδεσης με τη μαθησιακή εμπειρία. Σε αντίθεση με άλλες διδακτικές στιγμές, κατά τη διάρκεια της παρέμβασης η στάση του ήταν πιο ενεργή και συμμετοχική: ζητούσε διευκρινίσεις, διατύπωνε ερωτήσεις, επιχειρούσε να προβλέψει αποτελέσματα και προσπαθούσε να εξηγήσει με δικά του λόγια όσα κατανοούσε. Αυτό δείχνει ότι το μαθησιακό περιβάλλον έγινε πιο "ανοιχτό" και προσβάσιμο για εκείνον, επιτρέποντάς του να λειτουργεί όχι μόνο ως εκτελεστής οδηγιών αλλά ως μαθητής που διερευνά και οικοδομεί νόημα.

Συνολικά, η απόδοσή του στο συγκεκριμένο γνωστικό αντικείμενο βελτιώθηκε σημαντικά, τόσο ως προς τη σωστή εφαρμογή της διαδικασίας όσο και ως προς τη γενικότερη κατανόηση της έννοιας. Το μάθημα απέκτησε για τον ίδιο προσωπικό νόημα, καθώς ένιωσε ότι μπορεί να συμμετέχει ισότιμα και να κατανοήσει κάτι που προηγουμένως του φαινόταν δυσπρόσιτο. Η εμπειρία αυτή τον ώθησε σε μεγαλύτερη εμπλοκή με το μαθηματικό περιεχόμενο και ενίσχυσε τη διάθεσή του να προσπαθήσει περισσότερο, γεγονός που αποτελεί σημαντικό παιδαγωγικό κέρδος, ιδιαίτερα στο πλαίσιο της συμπεριληπτικής εκπαίδευσης και της παράλληλης στήριξης. Συνοπτικά τα σχόλια του μαθητή ήταν:

«Στην αρχή δεν καταλάβαινα τι σημαίνουν οι αριθμοί. Όταν το άκουσα στο Desmos, κατάλαβα πού ακουμπάει η γραμμή και τι κάνει η εξίσωση. Μετά ήταν πιο εύκολο να τη λύσω μόνος μου.»

«Μου άρεσε να ακούω τα γραφήματα. Ήταν σαν να τα βλέπω με τον ήχο. Δεν είχα κάνει ποτέ κάτι τέτοιο στα μαθηματικά.»

«Θέλω να χρησιμοποιώ ξανά αυτά τα προγράμματα και σε άλλα μαθήματα.»

«Δεν ήξερα ότι μπορώ να μάθω μαθηματικά χωρίς να βλέπω καθαρά.»

«Θέλω να μου δείξετε κι άλλα τέτοια. Τα μαθηματικά είναι δύσκολα αλλά έτσι γίνονται σαν παιχνίδι.».

Τα παραπάνω αποδεικνύουν πως τα προσβάσιμα εργαλεία δεν λειτουργούν απλώς ως τεχνικά βοηθήματα, αλλά ως μέσα ενίσχυσης της αυτονομίας και της ενεργητικής μάθησης. και προσβάσιμης διδασκαλίας μέσω κατάλληλων τεχνολογικών εργαλείων, τα οποία μπορούν να προσαρμοστούν στις ανάγκες των μαθητών με οπτική αναπηρία.

ΠΕΡΙΟΡΙΣΜΟΙ ΚΑΙ ΜΕΛΛΟΝΤΙΚΕΣ ΚΑΤΕΥΘΥΝΣΕΙΣ

Παρά την επιτυχία της παρέμβασης, καταγράφηκαν ορισμένοι περιορισμοί που είναι σημαντικό να ληφθούν υπόψη. Αρχικά, υπάρχουν τεχνολογικοί περιορισμοί, καθώς η χρήση εργαλείων όπως το Desmos και το Seeing AI απαιτεί πρόσβαση σε κινητές συσκευές και σταθερή σύνδεση στο διαδίκτυο, κάτι που δεν είναι δεδομένο σε όλα τα σχολεία, ιδιαίτερα στην ύπαιθρο. Επιπλέον, η αποτελεσματικότητα της παρέμβασης βασίστηκε σε μεγάλο βαθμό στην ψηφιακή επάρκεια και την προσωπική πρωτοβουλία των εκπαιδευτικών, γεγονός που δυσκολεύει τη γενίκευση όταν δεν υπάρχει οργανωμένη επιμόρφωση. Τέλος, η εφαρμογή τέτοιων εργαλείων απαιτεί περισσότερο χρόνο προετοιμασίας και εξατομικευμένης διδασκαλίας, κάτι που δεν εντάσσεται πάντα εύκολα στο τυπικό ωρολόγιο πρόγραμμα.

Ως μελλοντικές κατευθύνσεις προτείνεται η ανάπτυξη οργανωμένου εκπαιδευτικού υλικού και οδηγιών χρήσης προσαρμοσμένων στο ελληνικό πλαίσιο, καθώς και η συστηματική επιμόρφωση εκπαιδευτικών σε προσβάσιμες τεχνολογίες. Παράλληλα, είναι χρήσιμη η συνεργασία με πανεπιστήμια και φορείς για αξιολόγηση της αποτελεσματικότητας σε μεγαλύτερη κλίμακα. Τέλος, προτείνονται πιλοτικές εφαρμογές της ηχητικής και πολυτροπικής προσέγγισης και σε άλλες μαθηματικές έννοιες, όπως η στατιστική και η γεωμετρία.

ΕΠΙΛΟΓΟΣ

Η παρούσα έρευνα ανέδειξε τη σημασία των πολυτροπικών και ηχητικών εργαλείων στη μαθησιακή διαδικασία για μαθητές με οπτικη αναπηρία. Η στοχευμένη εκπαιδευτική παρέμβαση δεν βελτίωσε μόνο τις επιδόσεις του μαθητή, αλλά ενίσχυσε την αυτοεκτίμηση, το ενδιαφέρον και τη συμμετοχή του.

Ιδιαίτερα σημαντική ήταν και η παρουσίαση των εργαλείων προσβασιμότητας και ηχητικής αναπαράστασης, η οποία ανέδειξε τη λειτουργικότητα, τη διδακτική αξιοποίηση και την προσβασιμότητά τους. Η χρήση και αξιολόγηση των λογισμικών ενίσχυσε την ερευνητική τεκμηρίωση της παρέμβασης και προσέφερε εναλλακτικές προτάσεις ένταξης στην καθημερινή εκπαιδευτική πράξη.

Η ενσωμάτωση προσβάσιμων τεχνολογιών, όταν συνοδεύεται από κατάλληλη παιδαγωγική καθοδήγηση, μπορεί να αποτελέσει ισχυρό όχημα για την ισότιμη συμμετοχή όλων των μαθητών στα μαθηματικά. Το ζητούμενο πλέον είναι η θεσμική και οργανωμένη στήριξη τέτοιων παρεμβάσεων, ώστε να περάσουμε από τη μεμονωμένη προσπάθεια στην καθολική συμπερίληψη. και ηχητικών εργαλείων στη μαθησιακή διαδικασία για μαθητές με προβλήματα όρασης. Η στοχευμένη εκπαιδευτική παρέμβαση δεν βελτίωσε μόνο τις επιδόσεις του μαθητή, αλλά ενίσχυσε την αυτοεκτίμηση, το ενδιαφέρον και τη συμμετοχή του.

Η ενσωμάτωση προσβάσιμων τεχνολογιών, όταν συνοδεύεται από κατάλληλη παιδαγωγική καθοδήγηση, μπορεί να αποτελέσει ισχυρό όχημα για την ισότιμη συμμετοχή όλων των μαθητών στα μαθηματικά. Το ζητούμενο πλέον είναι η θεσμική και οργανωμένη στήριξη τέτοιων παρεμβάσεων, ώστε να περάσουμε από τη μεμονωμένη προσπάθεια στην καθολική συμπερίληψη.

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ΑΝΑΖΗΤΩΝΤΑΣ ΤΟ ΣΧΟΛΕΙΟ ΓΙΑ ΟΛΟΥΣ: ΠΟΛΥΣΗΜΙΑ, ΣΤΑΔΙΑ ΠΡΑΓΜΑΤΩΣΗΣ ΚΑΙ ΥΛΙΚΟΣ/ΨΗΦΙΑΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

Χαρούπιας Αριστείδης
Σ.Ε.Π. Τεχνολογίας στην Ειδική Εκπαίδευση
Πανεπιστήμιο Λευκωσίας
Αθήνα, Ελλάδα
email: acharoupias@gmail.com

Ημέλλου Όλγα
Σ.Ε. Ειδικής Αγωγής και Ενταξιακής Εκπαίδευσης
ΔΙ.Π.Ε. Α΄ Αθήνας
Αθήνα, Ελλάδα
email:olgimellou@sch.gr

ΠΕΡΙΛΗΨΗ

Στην ελληνική εκπαιδευτική πραγματικότητα, η μετάβαση στο νέο υπόδειγμα του σχολείου για όλους/ες τους/τις μαθητές/τριες, συχνά, εμφανίζεται να παρεμποδίζεται από ζητήματα ορολογίας. Ως κεντρικό σημείο εστίασης των εμποδίων αυτών καταγράφεται η αδιαφοροποίητη απόδοση στην ελληνική γλώσσα του όρου «inclusion». Ο όρος «inclusion», ο οποίος αποτελεί κεντρική έννοια του νέου υποδείγματος, στην ελληνική βιβλιογραφία αποδίδεται αδιαφοροποίητα με όρους όπως: ενσωμάτωση, ένταξη, συμπερίληψη, συνεκπαίδευση, κ.τ.ό., συνθήκη που καθιστά δυσχερή την επικοινωνία για σχετικά ζητήματα και, συχνά, οδηγεί σε αδιέξοδο τους/τις επαγγελματίες και τους/τις ερευνητές/τριες του πεδίου. Συνεκτιμώντας τις ραγδαίες εξελίξεις που σχετίζονται με τη δυνατότητα πρόσβασης στο διαδίκτυο μέσω σταθερών/κινητών συσκευών και την εμφάνιση και εξάπλωση της Τεχνητής Νοημοσύνης (ΤΝ) στην κοινωνία, την εργασία και την εκπαίδευση, η εκπαιδευτική κοινότητα επιδεικνύει αυξημένο ενδιαφέρον για τις Τεχνολογίες Πληροφορίας και Επικοινωνιών (ΤΠΕ) στο σχολικό/διδακτικό πλαίσιο. Λαμβάνοντας υπόψη: (α) τη συστηματική κατάταξη της χώρας μας κάτω από τον διεθνή μέσο όρο των χωρών που συμμετέχουν στο Πρόγραμμα Διεθνούς Αξιολόγησης Μαθητών (PISA), (β) το ψηφιακό χάσμα και (γ) την τάση ενίσχυσης της αξιοποίησης των πληροφοριών, των υπηρεσιών, της ψυχαγωγίας και της κοινωνικής αλληλεπίδρασης που προσφέρουν οι ΤΠΕ και η ΤΝ, εξετάζονται τα αναγκαία προαπαιτούμενα υλοποίησης του υλικού και του ψηφιακού σχεδιασμού στο σχολείο για όλους/ες τους/τις μαθητές/τριες, με έμφαση στη νοηματοδότηση του όρου «inclusion». Τα αποτελέσματα της βιβλιογραφικής μας έρευνας παρουσιάζονται συνθετικά και σχολιάζονται κριτικά. Η εργασία ολοκληρώνεται με συζήτηση και σχετικές προτάσεις. Η διασάφηση της πολυσημίας του όρου «inclusion» προτείνεται να πραγματοποιείται μέσα από μια προσέγγιση τεσσάρων επιπέδων/σταδίων, τα οποία προσδιορίζουν ολιστικά και περιγράφουν αναλυτικά το σχολείο για όλους/ες τους/τις μαθητές/τριες, τόσο στην υλική όσο και στην υποστηριζόμενη ψηφιακά εκδοχή του. Στην πορεία προς το 2030, η νέα πραγματικότητα καθιστά επείγουσα την προτεραιοποίηση της μετάβασης προς την εκπαίδευση για όλους/ες τους/τις μαθητές/τριες, με τη διασφάλιση επαρκών εγγυήσεων/πόρων, προκειμένου… κανείς/καμία μαθητής/τρια να μην αφεθεί πίσω. Μέσα από την προσπάθεια σχεδίασης και υλοποίησης του νέου υποδείγματος, διεκδικούνται εγγυήσεις ενσωμάτωσης στις κατευθυντήριες γραμμές των εθνικών προγραμμάτων σπουδών και στα προγράμματα κατάρτισης εκπαιδευτικών, νέων θεσμών εκπαίδευσης όπως ο θεσμός του Center for Applied Special Technology (CAST) των ΗΠΑ, οι οποίοι με κεντρική σχεδίαση και πειραματική υλοποίηση, θα έχουν τη δυνατότητα να υποστηρίζουν τη μετάβαση προς το νέο υπόδειγμα με επιλογές εύλογης χρήσης της τεχνολογίας, διαμορφωτικής/τελικής αξιολόγησης των αναγκαίων υπηρεσιών και, απαραιτήτως, αναστοχασμού προς βελτίωση του νέου αναθεωρημένου υποδείγματος.

Λέξεις – κλειδιά: Ειδική/Ενταξιακή Εκπαίδευση, inclusion, Τεχνολογίες Πληροφορίας και Επικοινωνιών, Ψηφιακό χάσμα, Τεχνητή Νοημοσύνη, CAST, PISA.

ΕΙΣΑΓΩΓΗ

Από συγκροτήσεως της νεώτερης ειδικής αγωγής και εκπαίδευσης στο ελληνικό υπόδειγμα, με τον Νόμο 1143/1981, η σχεδίαση της εκπαιδευτικής πολιτικής βασίζεται σε κατευθύνσεις που επηρεάζονται από το Βρετανικό, κατά κύριο λόγο, υπόδειγμα, όπως τροποποιήθηκε μετά την επιδρασιακή έκθεση της επιτροπής Warnock (The Warnock Report, 1978). Το 1994 στη Σαλαμάνκα της Ισπανίας σύνεδροι από ολόκληρο τον κόσμο διατύπωσαν τις βασικές αρχές για τη σχεδίαση και σταδιακή υλοποίηση ενός νέου οράματος για τα σχολεία της υφηλίου (UNESCO, 1994). Η αποσπασματική, αστήρικτη και αυθαίρετη, τις περισσότερες φορές, μεταφορά μικρού μόνο μέρους των κατευθύνσεων και η ανεπιτυχής προσπάθεια προσαρμογής και μεταφοράς της ορολογίας και των καλών πρακτικών στο περιβάλλον κουλτούρας του ελληνικού υποδείγματος, δημιούργησε και συνεχίζει να δημιουργεί εστίες αναποτελεσματικότητας (Imellou, 2022α· Charoupias, 2024· Imellou & Charoupias, 2025). Οι εστίες αυτές επηρεάζουν τις κατά διαστήματα αξιολογήσεις του ελληνικού εκπαιδευτικού συστήματος που «…βρίσκεται σταθερά στην τρίτη και τελευταία ομάδα χωρών, με επιδόσεις κάτω από τον μέσο όρο του Οργανισμού Οικονομικής Συνεργασίας και Ανάπτυξης (ΟΟΣΑ) στα μαθηματικά, την κατανόηση κειμένου και τις θετικές επιστήμες» (Lakasas, 2023). Στην αναποτελεσματικότητα συνεισφέρει και η αδυναμία του ελληνικού υποδείγματος να βρει και να προσαρμόσει αρμονικά προς την ενεργή κουλτούρα όρους και έννοιες που επηρεάζουν καθοριστικά την κατανόηση της πραγματικότητας, τη διαπίστωση των υστερήσεων και την επιτυχή υιοθέτηση των θετικών στοιχείων άλλων υποδειγμάτων και, κατά προτίμηση, εκείνων που κρίνονται συμβατά με την εντόπια κουλτούρα, τη βελτιώνουν ή/και την αναβαθμίζουν. Σύμφωνα με τον Βιώσιμο Στόχο Ανάπτυξης 4 (ΒΣΑ4), κάθε κράτος-μέλος της UNESCO, μεταξύ των οποίων και η Ελλάδα, δεσμεύεται να διασφαλίσει, μέχρι το 2030, «inclusive και ισότιμη (equitable) ποιοτική εκπαίδευση» για όλους/ες τους/τις μαθητές/τριες, συμπεριλαμβανομένων των μαθητών/τριών με αναπηρία ή/και ειδικές εκπαιδευτικές ανάγκες (α/εεα) (UNESCO, 2016).

Στην Ελλάδα, όπως και σε άλλες χώρες, παρατηρείται ένα σημαντικό ψηφιακό χάσμα (Giavrimis, 2023). Σε επίπεδο τεχνολογίας, τα πιο ευάλωτα μέλη της κοινωνίας -τα άτομα με α/εεα, οι μετανάστες και τα άτομα με περιορισμένη εκπαίδευση- συχνά αποκλείονται από την πρόσβαση στις διευκολύνσεις ή/και τις βελτιώσεις της (Hartnett, 2022). Οι σύγχρονες τεχνολογίες Τεχνητής Νοημοσύνης στην Εκπαίδευση (ΤΝΕ) υπόσχονται να παρέχουν νέα είδη/επίπεδα επιστημονικής ακρίβειας στην ανάλυση της εκπαιδευτικής δραστηριότητας, δηλαδή βαθύτερη και περισσότερο λεπτομερή κατανόηση του πώς «συμβαίνει» η μάθηση για κάθε μαθητή/τρια. Υπόσχονται, ακόμα, ευρεία, ολιστική και καθολική εκπαίδευση για όλους/ες (Knox, Wang & Gallagher, 2019). Η βελτίωση της ψηφιακής υποστήριξης θέτει, ωστόσο, σειρά βασικών προτεραιοτήτων. Αυτές οι προτεραιότητες στοχεύουν στη δημιουργία ενός δημοκρατικού, δίκαιου και τεχνολογικά προηγμένου εκπαιδευτικού περιβάλλοντος που καλύπτει τις διαφορετικές ανάγκες όλων των μαθητών/τριών, συμπεριλαμβανομένων των μαθητών/τριών με α/εεα, των προσφύγων και εκείνων που προέρχονται από περιθωριοποιημένα περιβάλλοντα.

Ο όρος «inclusion» χρησιμοποιείται ευρέως σε διάφορους τομείς, όπως η εκπαίδευση, η κοινωνική πολιτική και οι επιχειρήσεις. Ωστόσο, η μεταφορά των ιδιαιτεροτήτων του όρου σε άλλες κουλτούρες, με εννοιολογική σαφήνεια, εμφανίζεται περίπλοκη, λόγω των διαφορών στα πρότυπα που επικρατούν, τις αξίες και την ιδιαιτερότητα των εκπαιδευτικών συστημάτων. Οι διαφορετικές κουλτούρες αναμένεται να παράγουν και διαφορετικές αντιλήψεις για την αναπηρία, τις ειδικές εκπαιδευτικές ανάγκες, τη διαφορετικότητα και την αλληλοαποδοχή. Λέξεις και φράσεις που χρησιμοποιούνται για την περιγραφή και τη διευκρίνιση της έννοιας «inclusion» ενδέχεται να μην έχουν άμεσο ισοδύναμο σε άλλες γλώσσες, οδηγώντας, ενδεχομένως, σε παρεξηγήσεις ή απώλεια των νοηματικών αποχρώσεων (Sun, 2025). Σύμφωνα με τον Wittgenstein, «η γενική έννοια της σημασίας των λέξεων περιβάλλει τη λειτουργία της γλώσσας με μια αχλύ, που κάνει αδύνατη την καθαρή θέα. Η καταχνιά διαλύεται όταν μελετάμε τα φαινόμενα της γλώσσας στους πρωτόγονους τρόπους χρήσης της, όπου μπορούμε να δούμε καθαρά τον σκοπό και τη λειτουργία των λέξεων» (Wittgenstein, 1977: 27).

ΤΟ ΣΧΟΛΕΙΟ ΓΙΑ ΟΛΟΥΣ: ΔΕΔΟΜΕΝΑ ΚΑΙ ΖΗΤΟΥΜΕΝΑ

Στην ελληνική εκπαιδευτική πραγματικότητα, η μετάβαση στο νέο υπόδειγμα του «σχολείου για όλους», συχνά, παρεμποδίζεται από ζητήματα ορολογίας. Ο Αντισθένης τονίζει τη σημασία της ορθής επιλογής και χρήσης ονομάτων και όρων, κάτι που ισχύει ιδιαίτερα στους τομείς της έρευνας και της εκπαίδευσης (Prince, 2015: 543· Mamarasulova, 2024). Για να διαπιστώσουμε το εύρος και το βάθος της επιρροής που μπορεί να έχει η επιλογή ορολογίας, την προσεγγίζουμε πολυεπίπεδα: ως κατανόηση/ερμηνεία, ως μεθοδολογία, ως διάδοση/πρακτική εφαρμογή της γνώσης και ως εκπαιδευτική πολιτική/λήψη αποφάσεων. Σε επίπεδο κατανόησης/ερμηνείας, οι όροι προσδιορίζουν το πλαίσιο και τα όρια της έρευνας και της διδασκαλίας (Greene & Dolnicar, 2024· Adeleke-Adeoye & Adong, 2023). Σε επίπεδο μεθοδολογίας, η κατάλληλη ορολογία μπορεί να επηρεάσει την επιλογή των μεθόδων/εργαλείων που χρησιμοποιούνται, ενώ κατά την ανάλυση δεδομένων, η χρήση σαφών και κατανοητών όρων διευκολύνει την κατηγοριοποίηση και την ερμηνεία των αποτελεσμάτων (Gernsbacher & Hargreaves, 2019· Trombley & Cottenie, 2019). Σε επίπεδο

διάδοσης/πρακτικής εφαρμογής της γνώσης, η χρήση κατανοητής ορολογίας διευκολύνει την επικοινωνία και τη διάδοση της γνώσης μεταξύ ερευνητών/τριών, εκπαιδευτικών και του ευρύτερου κοινού (Colquhoun, Leeman & Michie, 2014). Στην εκπαιδευτική πρακτική, η χρήση κατάλληλων όρων μπορεί να οδηγήσει σε πιο αποτελεσματικές προσεγγίσεις της διεργασίας διδασκαλίας-μάθησης και περισσότερο αποτελεσματικές παρεμβάσεις (Hiebert, Gallimore & Stigler, 2002). Τέλος, σε επίπεδο εκπαιδευτικής πολιτικής, η κατάλληλη ορολογία διαθέτει δυναμική καθοδήγησης στη λήψη αποφάσεων που σχετίζονται με τη διαμόρφωση πολιτικών, την υλοποίηση προγραμμάτων, την κατανομή πόρων και την ανάπτυξη στρατηγικών εκπαιδευτικής παρέμβασης (Popham, 2008).

Ο όρος «inclusion», ο οποίος αποτελεί κεντρική έννοια του νέου υποδείγματος, στην ελληνική βιβλιογραφία, συχνά αποδίδεται αδιαφοροποίητα, με όρους όπως: ενσωμάτωση, ένταξη, συμπερίληψη, συνεκπαίδευση, κ.τ.ό. (Charoupias, 1997: 58· Imellou, 2017: 47), συνθήκη η οποία καθιστά δυσχερή την επικοινωνία για σχετικά ζητήματα και, συχνά, οδηγεί τους/τις επαγγελματίες και τους/τις ερευνητές/τριες του υποπεδίου της ειδικής εκπαίδευσης σε αδιέξοδο. Στη διεθνή βιβλιογραφία/αρθρογραφία διαπιστώνεται ευρεία χρήση του όρου «inclusion», με νοηματοδοτήσεις της έννοιας οι οποίες ποικίλλουν. Σύμφωνα με την UNESCO, ο όρος «inclusion» αντιστοιχεί σε τρόπο ανταπόκρισης στη διαφορετικότητα των μαθητών/τριών, ενώ η ίδια η έννοια προσεγγίζεται δυναμικά περισσότερο ως ευκαιρία για εμπλουτισμό της μάθησης και λιγότερο ως θεώρηση των ατομικών διαφορών με την έννοια του προβλήματος (UNESCO, 2009). Οι Ainscow, Booth και Dyson ξεπερνούν το επίπεδο της απλής τοποθέτησης των μαθητών/τριών με α/εεα σε τάξεις γενικού σχολείου, δηλώνοντας ότι η έννοια «inclusion» αφορά περισσότερο την κατάργηση των πρακτικών διαχωρισμού και, ταυτόχρονα, την ανάδειξη της συμμετοχής ως βασικού της συστατικού. Οι συγγραφείς υποστηρίζουν τη δημιουργία περιβάλλοντος μάθησης, όπου οι μαθητές/τριες με α/εεα ενεργά συμμετέχουν στην κουλτούρα, τα προγράμματα σπουδών και τις κοινότητες των σχολείων τους (Ainscow, Booth, & Dyson, 2006). Η Lorella Terzi σε εργασία της διερευνά την έννοια «inclusion» από την άποψη της δικαιοσύνης και της ισότητας. Η Terzi τονίζει τη σημασία της δημιουργίας αισθημάτων ανήκειν και κοινότητας για όλους/ες τους/τις μαθητές/τριες (Terzi, 2008). Στο έργο τους «Index for Inclusion», οι Booth και Ainscow προωθούν μια διαδικασία σχολικής ανάπτυξης που εστιάζει στην αύξηση της συμμετοχής, στην άρση των εμποδίων στη μάθηση και στη μείωση του αποκλεισμού (Booth & Ainscow, 2011). Η Lani Florian συζητά για την «inclusive» παιδαγωγική και για την ανάγκη αντιμετώπισης των εμποδίων στη μάθηση, ενώ ταυτόχρονα δίνει έμφαση στη συμμετοχή όλων των μαθητών/τριών (Florian, 2014). Σύμφωνα με τον Roger Slee, η έννοια «inclusion» δεν αφορά μια στατική κατάσταση, αλλά μια συνεχή διαδικασία σχολικού μετασχηματισμού, η οποία συμπεριλαμβάνει αλλαγές στην κουλτούρα, τις πολιτικές και τις πρακτικές, για την καλύτερη κάλυψη των αναγκών όλων των μαθητών/τριών. Σύμφωνα με τον ερευνητή, η έννοια «inclusion» αφορά τη διασφάλιση και την εγγύηση του δικαιώματος όλων των παιδιών στην πρόσβαση, την παρουσία, τη συμμετοχή και την επιτυχία στο σχολείο της γειτονιάς τους. Ο Slee ασκεί κριτική στις πρακτικές διαχωρισμού, επικρίνει την ενέργεια της απλής τοποθέτησης των μαθητών/τριών με α/εεα σε συνηθισμένες τάξεις, χωρίς την εκ των προτέρων και συστημική αντιμετώπιση των εμποδίων, και υποστηρίζει σταθερά τη δημιουργία σχολικών κοινοτήτων χωρίς διαχωρισμούς, οι οποίες προάγουν την κοινωνική δικαιοσύνη (Slee, 2011· 2018). Ο Peter Westwood στην εργασία του προωθεί την έννοια «inclusion» ως μια συνεχή διαδικασία και υποδεικνύει πρακτικές που βασίζονται σε ενδείξεις (evidence-based) για την υποστήριξη διαφορετικών μαθητών/τριών, υπογραμμίζοντας τη σημασία των ακαδημαϊκών αποτελεσμάτων σε «inclusive» περιβάλλοντα μάθησης (Westwood, 2017). Τέλος, σύμφωνα με τους Göransson και Nilholm, οι ορισμοί του όρου «inclusion», όπως αυτοί καταγράφονται στην αγγλόφωνη βιβλιογραφία, διαμορφώνουν μια τυπολογία τεσσάρων επιπέδων: (α) ορισμοί τοποθέτησης των μαθητών/τριών με α/εεα σε τάξεις γενικού σχολείου, (β) ορισμοί εξειδικευμένης εξατομίκευσης και ανταπόκρισης στις κοινωνικές και ακαδημαϊκές ανάγκες των μαθητών/τριών με α/εεα, (γ) ορισμοί γενικής εξατομίκευσης και ανταπόκρισης στις κοινωνικές και ακαδημαϊκές ανάγκες όλων των μαθητών/τριών και (δ) ορισμοί κοινότητας και δημιουργία κοινοτήτων με συγκεκριμένα χαρακτηριστικά (Göransson & Nilholm, 2014· Nilholm & Göransson, 2017).

ΥΛΙΚΗ/ΨΗΦΙΑΚΗ ΣΧΕΔΙΑΣΗ ΤΟΥ ΣΧΟΛΕΙΟΥ ΓΙΑ ΟΛΟΥΣ

Οι αποδόσεις του όρου «inclusion» εντάσσονται στην ελληνική γλώσσα ως μετάφραση και για τον λόγο αυτό είναι σημαντικό να αφομοιωθούν «... σαν τις γνήσιες ελληνικές λέξεις, έτσι που κανείς μας να μην τις αισθάνεται σαν ξένες», για να αποφευχθούν έτσι φαινόμενα που παράγουν ασυμμόρφωτες λέξεις, οι οποίες «...με τις ξενικές συντάξεις (...) λειτουργούν παράλληλα και αδιάκριτα μαζί με τις γνήσιες ελληνικές, δίνοντας την εικόνα μιας γλώσσας κρεολής» (Tompaidis, 1998: 12 & 29). Σε μια προσπάθεια αξιοποίησης των προτάσεων των μελετητών του πεδίου και των προτεινόμενων στρατηγικών για την αποτελεσματική μεταφορά των διαφορετικών νοηματοδοτήσεων, προτείνουμε τέσσερα επίπεδα/στάδια νοηματοδότησης της έννοιας «inclusion». Κατανέμουμε την έννοια «inclusion» των μαθητών/τριών με α/εεα, στους οποίους/ες εστιάζουμε, κατά κύριο λόγο, σε τέσσερα επίπεδα/στάδια: (α) ένταξη, (β) συμπερίληψη και κοινωνική αλληλεπίδραση (γ) ισότιμη συνεκπαίδευση/εκπαίδευση και (δ) κοινότητες μάθησης και πρακτικής. Τα τέσσερα επίπεδα/στάδια συνυπάρχουν στην εκπαιδευτική καθημερινότητα, στο σύνολο της ελληνικής επικράτειας, και αντιστοιχούν σε υπαρκτές εφαρμογές και σε πραγματικές συνθήκες περιβαλλόντων μάθησης σχολικών τάξεων ή/και σχολείων. Σε επίπεδο πρακτικής, το κάθε επίπεδο/στάδιο, εκτός του πρώτου, προϋποθέτει όλα τα προηγούμενα.

(α) *Ένταξη μαθητών/τριών με α/εεα*. Στο 1ο επίπεδο/στάδιο προτείνεται η εστίαση στη μετάβαση, προκειμένου να υπάρξει φυσική παρουσία των μαθητών/τριών με α/εεα σε σχολικά περιβάλλοντα γενικής εκπαίδευσης. Ο όρος «*ένταξη*» υποδηλώνει τοποθέτηση, ενώ πρόδρομος του όρου «ένταξη», με ευρεία χρήση, ήταν ο όρος «ενσωμάτωση» (integration). Σύμφωνα με το λεξικό του Τριανταφυλλίδη, «ένταξη [éndaksi] είναι η ενέργεια ή το αποτέλεσμα του εντάσσω· τοποθέτηση (κατά σειρά, τάξη κτλ.) μέσα σε συγκροτημένο σύνολο, κατηγορία κτλ.· (πρβ. κατάταξη)» (Triantafyllidis, 1998). Μπορούμε, ωστόσο, να μιλάμε για «ένταξη» για τους/τις μαθητές/τριες που ήδη βρίσκονται στον σχολικό θεσμό; Αν και το σύνολο των μαθητών/τριών, σύμφωνα με τα διαθέσιμα στοιχεία, βρίσκεται εντός του σχολικού θεσμού, ένας περιορισμένος αριθμός μαθητών/τριών, συνεχίζει να παραμένει στο σπίτι, σε νοσηλευτικά ιδρύματα και σε άσυλα (World Bank Group, 2025). Ενώ η «ένταξη» αποτελεί προαπαιτούμενο και απαραίτητο σημείο εκκίνησης κάθε παρέμβασης, όλοι/ες οι ερευνητές/τριες εστιάζονται, στις εργασίες τους, πέρα από την απλή τοποθέτηση των μαθητών/τριών στον σχολικό θεσμό. Απλή τοποθέτηση στον σχολικό θεσμό, χωρίς συστημική και εκ των προτέρων αντιμετώπιση των εμποδίων/πρακτικών διαχωρισμού, δεν ισοδυναμεί με «inclusion» (Ainscow, Booth & Dyson, 2006· Slee, 2018).

(β) *Συμπερίληψη και κοινωνική αλληλεπίδραση μαθητών/τριών με α/εεα*. Στο 2ο επίπεδο/στάδιο δίνεται έμφαση στην ενεργό συμμετοχή των μαθητών/τριών με α/εεα σε κοινωνικές και μαθησιακές δραστηριότητες. Ο όρος «*συμπερίληψη*» υποδηλώνει τόσο απλή τοποθέτηση, όσο και οργανωμένη και ενεργά υποστηριζόμενη κοινωνική αλληλεπίδραση, η οποία επιτρέπει στους/στις μαθητές/τριες με α/εεα να συγχρωτίζονται με τους/τις συνομηλίκους τους, βοηθά στην ανάπτυξη κοινωνικών δεξιοτήτων και ενισχύει το αίσθημα του ανήκειν. Σύμφωνα με το Ελληνικό wiktionary, «συμπερίληψη < συμπεριλαμβάνω + -ψη < ελληνιστική κοινή συμπεριλαμβάνω <σύν + περί + αρχαία ελληνική λαμβάνω, η ενέργεια του ρήματος συμπεριλαμβάνω (ειδικότερα, νεολογισμός): η ενεργή και συνειδητή διαδικασία ενσωμάτωσης όλων των ατόμων στο κοινωνικό σύνολο, με σεβασμό στις διαφορετικές ταυτότητες και ιδιαιτερότητές τους, εξαλείφοντας κάθε μορφή αποκλεισμού ή διάκρισης (Wiktionary, χ.χ.). Σε ορισμένες περιπτώσεις «συμπερίληψης», οι σχολικοί θεσμοί αναλαμβάνουν την ευθύνη, ώστε οι μαθητές/τριες ‘σε ανάγκη’ να απολαμβάνουν υπηρεσίες που τους επιτρέπουν την απλή παραμονή τους στο σχολικό περιβάλλον, χωρίς εγγυήσεις διασφάλισης της διαθεσιμότητας και της διάρκειας και χωρίς μετρήσιμα στοιχεία της αποτελεσματικότητας των υπηρεσιών. Οι μαθητές/τριες, στις συγκεκριμένες περιπτώσεις, παραμένουν στον χώρο της τάξης και του σχολείου και πραγματοποιούν από κοινού ορισμένες δραστηριότητες. Σπάνια, υλοποιούνται συστηματικά προγράμματα ενίσχυσης της κοινωνικής αλληλεπίδρασης των συγκεκριμένων μαθητών/τριών με τους/τις συμμαθητές/τριες τους (Pettigrew & Tropp, 2006). Επίσης, μη συστηματικές είναι και οι προσπάθειες παροχής στοιχειωδών υπηρεσιών εκπαίδευσης. Ακόμα και στις περιπτώσεις που οι μαθητές/τριες, ενδεχομένως, δέχονται εξειδικευμένες υπηρεσίες, όπως εκείνες του Τμήματος Ένταξης, οι υπηρεσίες παραμένουν, ως επί το πλείστον, διαχωριστικές ή αφορούν τη μη συστηματική προσπάθεια κοινωνικής αλληλεπίδρασης (Rea, McLaughlin & Walther-Thomas, 2002). Η «συμπερίληψη», επικοινωνιακά, συγκροτεί μια έννοια εννοιολογικά ουδέτερη, δεν παραπέμπει σε συστηματική, ενεργή και σκόπιμη δράση, προκειμένου ο/η κάθε μαθητής/τρια να υποστηριχθεί επαρκώς από εξειδικευμένο προσωπικό, ώστε να επωφεληθεί τόσο κοινωνικά όσο και εκπαιδευτικά από την παρουσία του/της στον χώρο της τάξης και του σχολείου γενικότερα. Η «συμπερίληψη», ωστόσο, δεν είναι απαραίτητα μια επαρκώς ικανοποιητική συνθήκη. Η άκριτη και άνευ όρων συμμόρφωση με την πεποίθηση πως ο εσωτερικός διαχωρισμός ή η απομάκρυνση από το σχολείο της γειτονιάς ορισμένων μαθητών/τριών με χαρακτηριστικά νευροποικιλότητας δεν μπορεί να είναι αποδεκτή, επειδή οδηγεί σε καινοφανείς διακρίσεις μεταξύ διαφορετικών τύπων μαθητών/τριών, και είναι καιρός να αναπλαισιωθεί. Ωστόσο, είναι εξίσου αναγκαίο να αναγνωριστεί πως η εγκατάλειψη, στην πράξη, της επάρκειας/καταλληλότητας του περιβάλλοντος μάθησης, των Προγραμμάτων Σπουδών και της εμπειρογνωμοσύνης των εκπαιδευτικών εγείρουν σημαντικά ερωτήματα, τα οποία σχετίζονται με την καταλληλότητα και την ποιότητα των υπηρεσιών εκπαίδευσης στα σχολεία. Η ιδιαιτερότητα με την οποία οι εκπαιδευτικοί, τα σχολεία ως οργανισμοί και η ηγεσία εντός αυτών, ανταποκρίνονται στους/στις μαθητές/τριες με α/εεα αντικατοπτρίζεται στην κουλτούρα του σχολείου. Η κουλτούρα του σχολείου επηρεάζεται καθοριστικά από πολιτικές/πρακτικές αναγνώρισης της διαφοράς, επιλεξιμότητας ως προς το δικαίωμα σε υπηρεσίες, συνέπειας στην έγκαιρη και αποτελεσματική διασφάλιση υπηρεσιών/μέσων/εργαλείων, συνέπειας παροχών κατά τις μεταβάσεις από βαθμίδα σε βαθμίδα ή/και αποκλεισμού από αυτές. Η απλή παρουσία και η ενδεχομενικότητα της παροχής των υπηρεσιών εκπαίδευσης δεν μπορούν να διασφαλίσουν την καταλληλότητα και την ποιότητα των υπηρεσιών για τους/τις μαθητές/τριες με α/εεα (Ainscow, Booth & Dyson, 2006· Booth & Ainscow, 2011· Florian, 2014).

(γ) *Ισότιμη συνεκπαίδευση/εκπαίδευση μαθητών/τριών με α/εεα*. Στο 3ο επίπεδο/στάδιο η εστίαση βρίσκεται στην επίτευξη ακαδημαϊκών αποτελεσμάτων για τους/τις μαθητές/τριες με α/εεα. Ο όρος «συνεκπαίδευση» υποδηλώνει τη διαδικασία εκπαίδευσης διαφορετικών ομάδων μαθητών/τριών στο ίδιο εκπαιδευτικό περιβάλλον, ανεξάρτητα από τις ατομικές τους διαφορές. Η «συνεκπαίδευση» και η «ισότιμη συνεκπαίδευση» είναι δύο εκπαιδευτικές προσεγγίσεις, οι οποίες αφορούν τη διδασκαλία μαθητών/τριών με και χωρίς α/εεα στην ίδια τάξη, αλλά έχουν κάποιες διαφορές ως προς τους σκοπούς, τους στόχους και την εφαρμογή αυτών στην πράξη. Ο όρος «*συνεκπαίδευση*» αναφέρεται στην παροχή ίσων ευκαιριών μάθησης σε όλους/ες τους/τις μαθητές/τριες, ανεξαρτήτως των αναγκών ή/και των δυνατοτήτων τους.

Στόχος είναι να εξασφαλιστεί ότι όλοι/ες οι μαθητές/τριες έχουν πρόσβαση στα ίδια εκπαιδευτικά εργαλεία, υλικά και πόρους και ότι το περιεχόμενο διδάσκεται με τρόπο που είναι προσιτός και κατανοητός για όλους/ες, χωρίς ωστόσο να λαμβάνονται προληπτικά μέτρα γι' αυτό. Σε επίπεδο επαγγελματιών, η «συνεκπαίδευση» αναφέρεται στη συνεργασία δύο εκπαιδευτικών -ενός εκπαιδευτικού ειδικής αγωγής και εκπαίδευσης/ορθοπαιδαγωγού και ενός εκπαιδευτικού γενικής εκπαίδευσης- για τη διδασκαλία από κοινού των μαθητών/τριών με και χωρίς α/εεα στην ίδια τάξη (Wikipedia, χ.χ.). Οι δύο εκπαιδευτικοί συνεργάζονται ενδεχομένως προς παροχή υποστηρικτικών και διαφοροποιημένων μαθημάτων, αλλά οι ρόλοι τους μπορεί να είναι ασύμμετροι, με τον/την εκπαιδευτικό γενικής εκπαίδευσης να έχει τον κύριο ρόλο στη διδασκαλία και τον/την εκπαιδευτικό ειδικής αγωγής και εκπαίδευσης να παρέχει πρόσθετη υποστήριξη, αποκλειστικά σχεδόν σε εκ των προτέρων προσδιορισμένους μαθητές/τριες. Με λίγα λόγια, στη «συνεκπαίδευση», όπως λειτουργεί σε παρόντα χρόνο, προτείνεται η «ένταξη» των μαθητών/τριών με α/εεα στη γενική εκπαίδευση και η παροχή της υποστήριξης που χρειάζονται, ώστε να συμμετέχουν και να επιτυγχάνουν, χωρίς τον απαραίτητο προκαταρκτικό σχεδιασμό και χωρίς προσεκτική ανάλυση της κατάστασης σε επίπεδο τάξης. Η «συνεκπαίδευση» αναφέρεται στην παρουσία και μόνο των μαθητών/τριών στην τάξη και την ασυντόνιστη ή ευκαιριακά συντονιζόμενη συνδιδασκαλία από περισσότερους/ες του/της ενός/μίας εκπαιδευτικούς, ανάλογα με τις εμφανιζόμενες ανάγκες. Η «συνεκπαίδευση» διαπιστώνεται πως πραγματοποιείται, από την εφαρμογή του Νόμου 2817/2000 και μετά, σε εκατοντάδες τάξεις σε όλη την ελληνική επικράτεια. Η «*ισότιμη συνεκπαίδευση*» συγκροτεί μια επαρκώς μελετημένη και εξελιγμένη μορφή «συνεκπαίδευσης», όπου οι δύο εκπαιδευτικοί μοιράζονται ισότιμα τις ευθύνες της διδασκαλίας και αναλαμβάνουν ρόλο ισότιμο στη σχεδίαση, υλοποίηση και διαμορφωτική και τελική αξιολόγηση της διεργασίας διδασκαλίας-μάθησης (Charoupias, 1997: 58; Charoupias, 2004; Imellou, 2011). Η συνέργειά τους αφορά το σύνολο των προκαταρκτικών ενεργειών, τις λειτουργίες στην τάξη και τη διαχείριση της σχέσης με τη διοίκηση του σχολείου και με τις οικογένειες των μαθητών/τριών (UNESCO, 2009· Westwood, 2017). Στον οδηγό της UNESCO με τίτλο «A Guide for Ensuring Inclusion and Equity in Education», ενσωματώνονται οι όροι «inclusion» and «equity» (ισοτιμία), ενώ παρέχεται ένα πλαίσιο για την αξιολόγηση και τη βελτίωση των πολιτικών, στο οποίο διασφαλίζεται ότι κάθε μαθητής/τρια έχει εξίσου σημασία (UNESCO, 2017). Για την κατάλληλη και αποτελεσματική λειτουργία της «ισότιμης συνεκπαίδευσης» στο σχολείο για όλους/ες, είναι αναγκαίο να διασφαλιστεί πως η συνέχεια των εκπαιδευτικών υπηρεσιών λειτουργεί αποτελεσματικά. Το συνεχές των υπηρεσιών αναφέρεται σε μια σειρά από ενέργειες υποστήριξης και υπηρεσίες, οι οποίες διασφαλίζουν σε κάθε μαθητή/τρια με α/εεα πρόσβαση στο πρόγραμμα σπουδών και πλήρη και ολοκληρωμένη συμμετοχή στις σχολικές δραστηριότητες, χωρίς την ανάγκη προσφυγής σε διαχωρισμένα πλαίσια (American Federation of Teachers, 2020). Στην ίδια λογική με την «ισότιμη συνεκπαίδευση», η «*ισότιμη εκπαίδευση*» αποτελεί συνειδητή και προγραμματισμένη διαφοροποίηση της πρώτης. Αναφέρεται σε περιπτώσεις σκόπιμα διαχωρισμένων σχολικών μονάδων, στις οποίες προβλέπεται να φοιτούν μαθητές/τριες με σύνθετες και σοβαρές α/εεα και ιδιαιτερότητες υγείας/διαβίωσης. Οι μαθητές/τριες με σοβαρές ή σύνθετες α/εεα έχουν ανάγκη από εξειδικευμένες παρεμβάσεις, οι οποίες είναι δύσκολο να διασφαλιστούν σε πλαίσια γενικής εκπαίδευσης. Στις περιπτώσεις αυτές, ο τόπος παροχής των υπηρεσιών εκπαίδευσης διαφοροποιείται, προς διασφάλιση της παροχής εξειδικευμένων υποστηρικτικών βοηθημάτων μετακίνησης, επικοινωνίας και υποστήριξης της διεργασίας διδασκαλίας-μάθησης (Edyburn, 2000). Στις συγκεκριμένες σχολικές μονάδες λειτουργούν εξειδικευμένα προγράμματα, τα οποία υλοποιούνται από εξαιρετικά εξειδικευμένο και έμπειρο προσωπικό. Στο πλαίσιο της «ισότιμης εκπαίδευσης», είναι επιθυμητό, επίσης, να υλοποιούνται προσεκτικά σχεδιασμένα προγράμματα «ανάστροφης ισότιμης εκπαίδευσης», στα οποία οι μαθητές/τριες των γενικών σχολείων επισκέπτονται προγραμματισμένα τις διαχωρισμένες σχολικές μονάδες και πραγματοποιούν επιλεγμένο μέρος του ετήσιου εκπαιδευτικού και κοινωνικού προγραμματισμού τους (Schoger, 2006· Connor, 2014).

(δ) *Κοινότητες Μάθησης και Πρακτικής (ΚΜΠ) για μαθητές/τριες με α/εεα*. Στο 4ο επίπεδο/στάδιο η έμφαση τοποθετείται στη δημιουργία σχολικών κοινοτήτων χωρίς διαχωρισμούς, οι οποίες προάγουν την κοινωνική δικαιοσύνη για όλους/ες τους/τις μαθητές/τριες, συμπεριλαμβανομένων των μαθητών/τριών με α/εεα (Ainscow, Booth & Dyson, 2006· Terzi, 2008· Slee, 2018). Οι *ΚΜΠ* είναι ομάδες συλλογικά εργαζόμενων εκπαιδευτικών, οι οποίες από κοινού προσπαθούν να βελτιώσουν τις διδακτικές πρακτικές τους, προκειμένου να αναβαθμίσουν τα μαθησιακά αποτελέσματα των μαθητών/τριών τους. Στα βασικά χαρακτηριστικά των ΚΜΠ συμπεριλαμβάνονται: η κουλτούρα συλλογικής εργασίας, η μαθητοκεντρική εστίαση, η συνεχιζόμενη μάθηση, η λήψη αποφάσεων βάσει ενδείξεων και το υποστηρικτικό περιβάλλον. Ως προς την κουλτούρα συλλογικής εργασίας, οι εκπαιδευτικοί μοιράζονται ιδέες, στρατηγικές και πόρους για να βελτιώσουν τις μαθησιακές εμπειρίες των μαθητών/τριών τους. Ως προς τη μαθητοκεντρική εστίαση, πρωταρχικός συλλογικός στόχος είναι η βελτίωση των μαθησιακών αποτελεσμάτων των μαθητών/τριών και η δέσμευση πως κάθε συλλογική απόφαση βασίζεται στη συνεπή υλοποίηση του πρωταρχικού συλλογικού στόχου. Ως προς τη συνεχιζόμενη μάθηση, έμφαση δίνεται στη συνεχή επαγγελματική ανάπτυξη και στην αποφυγή περιορισμένου πρακτικού ενδιαφέροντος εκπαιδευτικών συνεδριών. Ως προς τη λήψη αποφάσεων βάσει ενδείξεων, οι εκπαιδευτικοί χρησιμοποιούν τα διαθέσιμα δεδομένα για να εντοπίσουν τομείς προς βελτίωση και να παρακολουθήσουν την πρόοδο των μαθητών/τριών. Τέλος, ως προς το υποστηρικτικό περιβάλλον, έμφαση δίνεται στην εμπιστοσύνη, την αμοιβαία ενθάρρυνση και την εποικοδομητική ανατροφοδότηση μεταξύ των μελών (Vescio, Ross & Adams, 2008).

Η νέα διεθνής πραγματικότητα επιβάλλει την υλοποίηση ενός νέου προτάγματος σταδιακής μετακίνησης προς την υλοποίηση του σχολείου για όλους, με τη διασφάλιση επαρκών εγγυήσεων, ώστε… να μην αφεθεί κανείς/καμία μαθητής/τρια πίσω (UNESCO, 2016). Μέσα από την πραγμάτωση του νέου προτάγματος, διεκδικούνται εγγυήσεις διασφάλισης της συγκρότησης και λειτουργίας θεσμών, οι οποίοι με κεντρική σχεδίαση και πειραματική υλοποίηση, θα είναι σε θέση να υποστηρίξουν την εγκαθίδρυση και διεύρυνση μιας επιλογής ψηφιοποίησης και εύλογης χρήσης των τεχνολογιών (Charoupias, 2023), της διαμορφωτικής/τελικής αξιολόγησης των υπηρεσιών που παρέχονται και, απαραιτήτως, του αναστοχασμού προς βελτίωση του νέου εμπλουτισμένου υποδείγματος. Για τη βελτίωση της τεχνολογικής υποδομής των σχολείων, προτείνεται η διασφάλιση πρόσβασης σε σύγχρονους υπολογιστές/tablets, η προμήθεια αναβαθμισμένου λογισμικού, η παροχή διαδικτύου υψηλής ταχύτητας και η αξιόπιστη συνδεσιμότητα. Επιζητείται εκτενής αναθεώρηση του υποδείγματος εκπαίδευσης, το οποίο να βασίζεται σε ένα κατάλληλο και αποτελεσματικό περιβάλλον μάθησης, με λειτουργική χρήση χειραπτικών (Kamii, 2000) και άλλων γνωσιακών βοηθημάτων (Pressley & Woloshyn, 1995), το οποίο να είναι ψηφιακά υποστηριζόμενο (Jonassen, 2000). Το νέο υπόδειγμα αναμένεται να χρησιμοποιεί τις ΚΜΠ, προκειμένου να οργανώσει ένα σχολείο ισορροπημένα αυτόνομο, επαρκώς χρηματοδοτούμενο, αυτοαξιολογούμενο και εξελισσόμενο μέσω του αναστοχασμού των επαγγελματιών του και των υποστηρικτικών του θεσμών (Leithwood, Louis, Anderson, & Wahlstrom, 2004· DuFour, DuFour, Eaker, & Many, 2010).

Στο προτεινόμενο υπόδειγμα εκπαίδευσης προσεγγίζουμε την αναλογική/ψηφιακή τάξη ως τον θεμέλιο λίθο, ως ένα δομημένο περιβάλλον που σχεδιάζεται με στόχο την άρση κάθε εμποδίου συμμετοχής/μάθησης των μαθητών/τριών. Πρόκειται για τη δημιουργία ενός περιβάλλοντος μάθησης, όπου τόσο τα παραδοσιακά, πρακτικά/αναλογικά εργαλεία όσο και οι σύγχρονες ψηφιακές τεχνολογίες ενσωματώνονται σκόπιμα για την υποστήριξη διαφορετικών μαθητών/τριών (Mayer, 2009). Στο πλαίσιο αυτό, η ΤΝΕ γίνεται ένα διαδραστικό μέσο που απαιτεί από τους/τις μαθητές/τριες τη συμμετοχή, την κριτική σκέψη και την εφαρμογή. Μέσω της ΤΝΕ, η μάθηση σχεδιάζεται να μην είναι πλέον μια μονόδρομη διαδικασία μετάδοσης, αλλά μια διμερής αλληλεπίδραση, όπου ο/η μαθητής/τρια είναι ο/η πρωταγωνιστής/τρια (Woolf, Lane & Gordon, 2018). Η ΤΝΕ δύναται να ενεργεί ως δάσκαλος σε καθεστώς εξατομίκευσης, ως δημιουργικός συνεργάτης, ως βοηθός έρευνας ή ως μια αμμοδόχος (sandbox) ανάπτυξης δεξιοτήτων για τον/τη μαθητή/τρια (Dawson & Siemens, 2014· Jovanovic, Gasevic, Dawson, Pardo & Mirriahi, 2017). Η ΤΝΕ, με ψηφιακά εργαλεία όπως το ChatGPT, συγκροτεί πλέον ένα ισχυρό, νοήμον γλωσσικό μοντέλο, με το οποίο αλληλεπιδρούν άμεσα οι μαθητές/τριες, προκειμένου να αυξήσουν τις δυνατότητές τους και να επιταχύνουν τη μάθησή τους μέσω: (α) εξατομικευμένης πρακτικής, (β) βρόχων ανατροφοδότησης, (γ) γνωστικών σκαλωσιών, (δ) δημιουργικής εξερεύνησης και (ε) ανάπτυξης δεξιοτήτων (Aleven, 2018· Long & Magerko, 2020). Αν και η ΤΝΕ μπορεί να συνεισφέρει στην επίτευξη του ΒΣΑ4 για τους/τις μαθητές/τριες με α/εεα, είναι σημαντικό, τόσο σε επίπεδο εκπαιδευτικής πολιτικής όσο και σε επίπεδο εκπαιδευτικής πρακτικής, να συνυπολογίζονται σχετικοί προβληματισμοί σε θέματα χρήσης της τεχνολογίας (Charoupias, 2023), αλλά και φιλοσοφίας της εκπαίδευσης για τα άτομα με α/εεα (Imellou, 2022β). Εντός της αναλογικής/ψηφιακής τάξης, η τεχνολογία γενικά, αλλά και η ΤΝΕ ειδικότερα αναμένεται να στοχεύουν στην απόδοση εκπαιδευτικής δικαιοσύνης (Imellou, 2024), στη δεοντολογική και ηθική πρόταξη της ισότιμης συνεκπαίδευσης/εκπαίδευσης και να συγκροτούν μια διαθέσιμη λύση οικονομική, προσιτή, προσεκτικά βαθμονομημένη και ευαίσθητη στη μαθητική νευροποικιλότητα. Μέσα από την προσπάθεια υλικής/ψηφιακής σχεδίασης/υλοποίησης του νέου υποδείγματος, διεκδικούνται εγγυήσεις ενσωμάτωσης θεσμών εκπαίδευσης, όπως ο θεσμός του Center for Applied Special Technology (CAST) των ΗΠΑ, οι οποίοι με κεντρική σχεδίαση και πειραματική υλοποίηση έχουν τη δυνατότητα να υποστηρίζουν τη μετάβαση προς το νέο υπόδειγμα με επιλογές Καθολικού Σχεδιασμού για Μάθηση (ΚΣΜ) (Universal Design for Learning-UDL), εύλογης χρήσης της τεχνολογίας, διαμορφωτικής/τελικής αξιολόγησης των υπηρεσιών και, απαραιτήτως, αναστοχασμού προς βελτίωση του νέου αναθεωρημένου υποδείγματος. Ο ΚΣΜ είναι μια προληπτική προσέγγιση στον σχεδιασμό και τη διδασκαλία του προγράμματος σπουδών, η οποία στοχεύει να κάνει τη μάθηση προσβάσιμη σε όλους/ες από την αρχή, διεκδικώντας ταυτόχρονα κατάλληλα προσαρμοσμένο φυσικό χώρο μάθησης. Οι τρεις αρχές του ΚΣΜ είναι κεντρικές στην υλική/ψηφιακή σχεδίαση και υλοποίηση του νέου υποδείγματος, διασφαλίζοντας πολλαπλά μέσα εμπλοκής, αναπαράστασης και δράσης/έκφρασης (Meyer, Rose, & Gordon, 2014;· Imellou, 2016). Ο ρόλος της τεχνολογίας στο πλαίσιο του ΚΣΜ είναι εργαλειακός, ενσωματωμένος στο ευρύτερο εκπαιδευτικό οικοσύστημα, με στόχο τη βελτίωση της προσβασιμότητας, της εμπλοκής και της εξατομίκευσης για όλους/ες τους/τις μαθητές/τριες.

ΣΥΖΗΤΗΣΗ-ΣΥΜΠΕΡΑΣΜΑΤΑ

Η μετάβαση από την ιδέα στη συνεπή πρακτική εφαρμογή των τεσσάρων επιπέδων/σταδίων της έννοιας «inclusion». Η προτεινόμενη προσέγγιση των τεσσάρων επιπέδων/σταδίων είναι κεντρική στην επίλυση του εντοπισμένου «αδιεξόδου» επικοινωνίας των ενεργών παραγόντων του ελληνικού εκπαιδευτικού συστήματος. Ο πολυεπίπεδος ορισμός της έννοιας «inclusion», αν κατανοηθεί, εφαρμοστεί και διαδοθεί με συνέπεια, θα επιτρέψει τη σαφήνεια και ενάργεια στην επικοινωνία μεταξύ των ενεργών παραγόντων, ενώ η αποκατάσταση της επικοινωνίας θα επιτρέψει τη μετάβαση σε παραγωγικά μοντέλα συνεργασίας και επαγγελματικής ανάπτυξης (π.χ. εντός των ΚΜΠ). Τα

διαθέσιμα μέσα πολιτικής θα μπορούν να αξιοποιηθούν, στη συνέχεια, από τους ενεργούς παράγοντες, προκειμένου να διασφαλιστεί ότι η γνώση για τα τέσσερα προτεινόμενα επίπεδα/στάδια δεν θα περιοριστεί στην επιφανειακή αναφορά των όρων, αλλά θα επεκταθεί σε εσωτερικευμένη/αξιόπιστη γνώση με χρήση στην καθημερινή πρακτική και στον δημόσιο/ιδιωτικό λόγο. Το νέο υπόδειγμα, βασισμένο σε σαφή ορολογία και στην υπεύθυνη ψηφιακή πολιτειότητα, θα μπορεί να διασφαλίζει ότι η ΤΝΕ εξυπηρετεί τους στόχους της έννοιας «inclusion» σε κάθε επίπεδο/στάδιο και όχι το αντίστροφο. Ο προσδιορισμός, ωστόσο, του βέλτιστου 'μείγματος', το οποίο μεγιστοποιεί την απόκτηση/διατήρηση δεξιοτήτων και εγγυάται ότι η ΤΝΕ συμπληρώνει και δεν υποκαθιστά άλλες πολύτιμες μεθόδους μάθησης, θα χρειαστεί προσεκτικό σχεδιασμό, πειραματική εφαρμογή, διαμορφωτική/τελική αξιολόγηση και αναστοχασμό.

Ο προτεινόμενος θεσμός τύπου CAST μπορεί να λειτουργήσει ως κινητήριος μοχλός σαφήνειας και συστημικής εφαρμογής των όρων. Ο θεσμός τύπου CAST είναι ένας ισχυρός μηχανισμός προληπτικής προετοιμασίας του εκπαιδευτικού συστήματος. Δύναται να διαδραματίσει μοναδικό ρόλο στην άμεση αντιμετώπιση του ζητήματος της ορολογίας και στη διασφάλιση της συστηματικής εφαρμογής των στοιχείων του νέου υποδείγματος. Με τον κεντρικό σχεδιασμό και την πειραματική εφαρμογή, μπορεί να συνεισφέρει συγκεκριμένα και καταλυτικά στην υιοθέτηση και στη συνεπή εφαρμογή των τεσσάρων επιπέδων/σταδίων της έννοιας «inclusion». Με ερευνητικές πρωτοβουλίες και στρατηγικές διάδοσης, η παρούσα πρόταση μπορεί να αξιοποιηθεί στην ενσωμάτωση αυτής της κατανόησης στα εθνικά προγράμματα σπουδών, στην κατάρτιση των εκπαιδευτικών και στην ανάπτυξη του καθολικού ψηφιακού/υλικού σχεδιασμού για μάθηση. Επιπλέον, η εκλογίκευση του όλου συστήματος μπορεί να λειτουργήσει θετικά στην αντιμετώπιση των διαχρονικά εγκατεστημένων στο πεδίο ζητημάτων/προκλήσεων, όπως η σταθερότητα χρηματοδότησης, η πολιτική ανεξαρτησία, η ένταξη σε υπάρχουσες εκπαιδευτικές δομές, κ.λπ. Ο θεσμός τύπου CAST μπορεί να προωθήσει και να εγγυηθεί την εξασφάλιση επαρκών εγγυήσεων/πόρων για τον υλικό και ψηφιακό σχεδιασμό, διασφαλίζοντας τη γεφύρωση του χάσματος από τη φιλοδοξία στην πραγματικότητα. Με την δημιουργία ενός πλαισίου υποστήριξης, ασφάλειας, συστηματικής διανομής των απαραίτητων οικονομικών και ανθρωπίνων πόρων και παροχής σχετικής μόχλευσης, ο θεσμός τύπου CAST μπορεί να διασφαλίσει προσβασιμότητα για όλους/ες στα ελληνικά σχολεία, ενώ η πραγματικότητα της τάξης και του σχολείου μπορεί να συνδεθεί με τον προκαταρκτικό σχεδιασμό, τον πειραματικό έλεγχο και την αποτίμηση των μεταρρυθμίσεων (OECD, 2015). Στηρίζοντας τις ΚΜΠ, ο θεσμός τύπου CAST μπορεί να διασφαλίσει την αειφορία στις καινοτόμες πρακτικές και την προώθηση της εμπειρογνωμοσύνης των επαγγελματιών εντός της σχολικής κοινότητας, με τις ελάχιστα δυνατές μετακινήσεις. Ουσιαστικά, το προτεινόμενο μοντέλο δράσης δημιουργεί έναν δυναμικό βρόχο ανατροφοδότησης: ο θεσμός τύπου CAST παρέχει τις θεμελιώδεις γνώσεις και τα εργαλεία. Οι ΚΜΠ προσαρμόζουν και εφαρμόζουν τις γνώσεις και τα εργαλεία, δημιουργώντας πρακτικές και τελειοποιώντας την τεχνογνωσία. Οι πρακτικές μπορούν, στη συνέχεια, να ανατροφοδοτήσουν τον κεντρικό σχεδιασμό για περαιτέρω ανάπτυξη (Desimone, 2009). Πρόκειται για μια εξαιρετικά αποτελεσματική, βιώσιμη και ενδυναμωτική προσέγγιση της εκπαιδευτικής μεταρρύθμισης, ιδιαίτερα ζωτικής σημασίας για τη σύνθετη πορεία μετάβασης προς το «σχολείο για όλους» στην Ελλάδα. Η νέα προοπτική αναγνωρίζει το αυξανόμενο ενδιαφέρον για τις ΤΠΕ, αλλά δεν παραβλέπει το ψηφιακό χάσμα. Η συζήτηση για το νέο υπόδειγμα αναμένεται να συνδέσει ρητά τον τρόπο με τον οποίο η ξεκάθαρη κατανόηση της έννοιας «inclusion» ενημερώνει άμεσα και βελτιστοποιεί την ηθική και δίκαιη ενσωμάτωση της ΤΝΕ και των ΤΠΕ για όλους/ες τους/τις μαθητές/τριες, ανάλογα με τις ανάγκες τους (European Commission, 2019). Θετική πολιτική προς αυτή την κατεύθυνση θεωρούμε τα έργα «Υποστήριξη της Ψηφιακής Εκπαίδευσης στην Ελλάδα» και «Ελλάδα 2.0» του Εθνικού Σχεδίου Ανάκαμψης και Ανθεκτικότητας, τα οποία χρηματοδοτούνται από την Ευρωπαϊκή Ένωση και στοχεύουν στη βελτίωση της τεχνολογικής υποδομής στα ελληνικά σχολεία, το πρώτο, και στη συγκρότηση ενός κεντρικού «Εργαστηρίου Καινοτομίας» στο Ινστιτούτο Τεχνολογίας Υπολογιστών και Εκδόσεων (ΙΤΥΕ) με δεκατρία περιφερειακά «Κέντρα Καινοτομίας», σύμφωνα με τον Νόμο 5094/2024, το δεύτερο (European Schoolnet, 2021· European Union, 2025).

Θεωρούμε πως η εκπαίδευση και η ενταξιακή ειδική εκπαίδευση, ειδικότερα, ως χαρακτηριστικό στρυφνό πρόβλημα (Imellou & Charoupias, 2025), θα μπορούσε να ξεκινήσει ανάστροφη αναγεννητική πορεία απομάκρυνσης από τη «σκοτεινή ζώνη» των χωρών του ΟΟΣΑ με τις χαμηλότερες επιδόσεις. Συνεκτιμώντας τις κατευθύνσεις της διεθνούς έρευνας, επιλέγουμε κεντρικές μεταρρυθμίσεις που αν εφαρμοστούν συνεκτικά και με μακροπρόθεσμο όραμα, έχουν τη δύναμη να μετασχηματίσουν την ελληνική εκπαίδευση από ένα, συχνά, άκαμπτο και ανεπαρκώς υποστηρικτικό σύστημα, σε ένα δυναμικό, ισότιμα συνεκπαιδευτικό και προσαρμοστικό περιβάλλον μάθησης, που ανταποκρίνεται στις ανάγκες του 21ου αιώνα. Οι κεντρικές επιλογές που συγκροτούν τους πυλώνες για ένα εκπαιδευτικό σύστημα που θα είναι πραγματικά καθολικά σχεδιασμένο είναι: (α) η επένδυση στους/στις εκπαιδευτικούς με ολιστική αναμόρφωση της αρχικής εκπαίδευσης και της επαγγελματικής τους ανάπτυξης, με επίκεντρο την ισότιμη συνεκπαίδευση, τις ΚΜΠ και τις σύγχρονες παιδαγωγικές, (β) η δέσμευση στη θεσμοθέτηση εθνικού συστήματος αξιολόγησης και λογοδοσίας, με έμφαση στην ποιότητα της εκπαίδευσης και την υποστήριξη όλων των μαθητών/τριών και (γ) η αξιοποίηση της τεχνολογίας με στρατηγική ενσωμάτωση της ΤΝΕ και του ΚΣΜ για προσβασιμότητα και εξατομίκευση (OECD, 2013).

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ΣΥΜΠΕΡΙΛΗΠΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ ΜΕ ΨΗΦΙΑΚΑ ΜΕΣΑ ΓΙΑ ΜΑΘΗΤΕΣ ΜΕ ΔΑΦ ΜΕ ΒΑΣΙΚΗ ΑΝΑΦΟΡΑ ΤΟ ΠΡΟΓΡΑΜΜΑ TEACCH.

Κραββαρίτης Χριστόφορος
Εκπαιδευτικός ΠΕ04.01.ΕΑΕ
Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο Λύκειο Μεσολογγίου

Πατρόπουλος Αθανάσιος
Εκπαιδευτικός ΠΕ86.ΕΑΕ
Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο Λύκειο Μεσολογγίου

Δομουχτσής Νίκος
Εκπαιδευτικός ΠΕ83.ΕΑΕ
Ενιαίο Ειδικό Επαγγελματικό Γυμνάσιο Λύκειο Μεσολογγίου

Κωνσταντίνου Γεώργιος
Εκπαιδευτικός ΠΕ11
Διευθυντής 1ο Δημοτικό Σχολείο Θεστιέων

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει τη Συμπεριληπτική Εκπαίδευση μαθητών με Διαταραχή Αυτιστικού Φάσματος (ΔΑΦ) μέσω της αξιοποίησης ψηφιακών μέσων, με βασικό άξονα το εκπαιδευτικό πρόγραμμα TEACCH. Στόχος είναι η διερεύνηση των προκλήσεων που αντιμετωπίζουν οι μαθητές με ΔΑΦ στο εκπαιδευτικό σύστημα και η αξιολόγηση της συμβολής των ψηφιακών εργαλείων στη βελτίωση της μαθησιακής τους εμπειρίας.

Η μεθοδολογία που ακολουθήθηκε βασίστηκε στη βιβλιογραφική ανασκόπηση και στη συλλογή ποιοτικών δεδομένων μέσω συζητήσεων με ειδικούς στον τομέα της εκπαίδευσης ατόμων με ΔΑΦ. Εξετάστηκαν οι θεμελιώδεις δυσκολίες των μαθητών, η δομή και η εφαρμογή του προγράμματος TEACCH, καθώς και η συμβολή των ψηφιακών τεχνολογιών στη διδασκαλία.

Τα αποτελέσματα της έρευνας αναδεικνύουν ότι η χρήση δομημένων εκπαιδευτικών προσεγγίσεων, όπως το TEACCH, σε συνδυασμό με ψηφιακά εργαλεία, διευκολύνει τη μαθησιακή διαδικασία και ενισχύει την κοινωνική ένταξη των μαθητών με ΔΑΦ. Συγκεκριμένα, η εφαρμογή αυτών των μεθόδων στη διδασκαλία της Ρομποτικής και των Φυσικών Επιστημών δείχνει ότι η οπτικοποίηση και η σαφής δομή των δραστηριοτήτων συμβάλλουν στη βελτίωση της κατανόησης και της αυτονομίας των μαθητών.

Η έρευνα υπογραμμίζει τη σημασία των δομημένων προσεγγίσεων στην εκπαίδευση μαθητών με ΔΑΦ, καθώς διευκολύνουν την επικοινωνία, την κοινωνική αλληλεπίδραση και τη συμπεριφορά τους. Η τεχνολογία συμβάλλει στην εξατομικευμένη μάθηση και την κοινωνική ένταξη, με τους εκπαιδευτικούς να παίζουν καθοριστικό ρόλο στην εφαρμογή προγραμμάτων όπως το TEACCH και τα ψηφιακά εργαλεία.

Στις Φυσικές Επιστήμες, οι μαθητές με ΔΑΦ επωφελούνται από σαφείς, οπτικοποιημένες οδηγίες σε πειράματα και εργαστηριακές ασκήσεις, ενώ στη Ρομποτική, η χρήση οπτικών διαγραμμάτων διευκολύνει τη συναρμολόγηση και τον προγραμματισμό. Η συνέπεια στη χρήση οπτικών εργαλείων στις δύο θεματικές ενότητες ενισχύει τη μαθησιακή εμπειρία και διευκολύνει τη γενίκευση της γνώσης.

Συμπερασματικά, η ενσωμάτωση του προγράμματος TEACCH με τις δυνατότητες που παρέχουν τα ψηφιακά μέσα αποτελεί μια αποτελεσματική προσέγγιση για την ενίσχυση της εκπαιδευτικής εμπειρίας των μαθητών με ΔΑΦ. Η τεχνολογία επιτρέπει την εξατομίκευση της διδασκαλίας, προάγει τη συνεργασία των εμπλεκόμενων φορέων (εκπαιδευτικών, γονέων, ειδικών) και διευκολύνει τη μετάβαση των μαθητών σε διαφορετικά γνωστικά αντικείμενα. Μάλιστα, δίνεται η δυνατότητα στα παιδιά με ΔΑΦ να συμμετέχουν ενεργά και να κατανοούν πολύπλοκες έννοιες μέσα από μια δομημένη ψηφιακή ή δια ζώσης προσέγγιση, ενώ παράλληλα το πρόγραμμα TEACCH συμπληρώνεται και εμπλουτίζεται εντός της τάξης, και επεκτείνεται στη συνολική καθημερινή ζωή του παιδιού μέσω του EarlyBird και Cygnet.

Λέξεις –κλειδιά: Διαταραχή Αυτιστικού Φάσματος, Συμπεριληπτική Εκπαίδευση, Ψηφιακά Μέσα, TEACCH, EarlyBird, Ολιστική Προσέγγιση

ΚΛΙΝΙΚΟ ΠΡΟΦΙΛ ΤΩΝ ΑΤΟΜΩΝ ΜΕ «ΔΙΑΤΑΡΑΧΗ ΑΥΤΙΣΤΙΚΟΥ ΦΑΣΜΑΤΟΣ» (ΔΑΦ)

Η Διαταραχή Αυτιστικού Φάσματος χαρακτηρίζεται από σοβαρά ελλείμματα σε διάφορους τομείς της ανάπτυξης του ατόμου ταυτόχρονα. Τα σοβαρά ελλείμματα παρουσιάζονται κυρίως στις κοινωνικές αλληλεπιδράσεις και στις δεξιότητες επικοινωνίας και χαρακτηρίζονται από στερεοτυπικές μορφές συμπεριφοράς, ενδιαφερόντων και δραστηριοτήτων (Kakouros & Maniadaki, 2002).

Η Διαταραχή Αυτιστικού Φάσματος εμφανίζεται νωρίς στη ζωή ενός ατόμου και επηρεάζει τον τρόπο με τον οποίο το άτομο αντιλαμβάνεται τον κόσμο, τον εαυτό του, την καθημερινότητα. Επιπλέον χαρακτηριστικά που συμπληρώνουν το κλινικό προφίλ ενός παιδιού με Διαταραχή Αυτιστικού Φάσματος είναι η στερεοτυπική συμπεριφορά, η ιδιόρρυθμη σχέση που μπορεί να εμφανίζει ως προς τα αντικείμενά του, η εκδήλωση άγχους και οι ακραίες εκδηλώσεις δραστηριότητας, η απουσία μιμητικής ικανότητας και ικανότητας παραληρηματικών ιδεών/ψευδαισθήσεων (Happe, 2003).

Η Happe (1998) αναφερόμενη στην «τριάδα» των ανεπαρκειών του αυτισμού, υπογραμμίζει πως «τα προβλήματα την κοινωνικοποίησης, της επικοινωνίας και της δημιουργικής φαντασίας είναι επαρκή και αναγκαία για να ταιριάζουν αρκετά με την συμπεριφορά που βρέθηκε να είναι ειδική και καθολική στον αυτισμό». Πιο συγκεκριμένα, κάποια από τα χαρακτηριστικά του μαθητή που μελετάμε σε τούτη την εργασία, είναι κοινά με χαρακτηριστικά συμπεριφοράς παιδιών με αυτισμό όπως περιγράφονται από τον Kanner (1943) στο Στασινός (Stasinos, 2013): «Σοβαρή κοινωνική απομόνωση, άτυπη γλώσσα, εμμονή για την διατήρηση της ομοιότητας, επαναληπτική και στερεοτυπική συμπροφορά, έλλειμμα φαντασίας, δημιουργικότητας και χιούμορ, σοβαρά ξεσπάσματα συμπεριφοράς, (σπάνιες) μεμονωμένες ικανότητες, νοητική υστέρηση και συσχετιζόμενα χαρακτηριστικά.»

Στα πλαίσια της επικοινωνίας το παιδί με αυτισμό μοιάζει να είναι κλεισμένο στον εαυτό του και τις περισσότερες φορές να μην ενδιαφέρεται για τα άτομα που υπάρχουνε γύρω του. Μένει παντελώς αποκομμένο από τα ερεθίσματα του περιβάλλοντός του και δεν εμφανίζει κάποιου είδους συναισθηματικό δέσιμο ούτε με τους γονείς του αλλά ούτε με τους γύρω του (Stasinos, 2013).

Αναφορικά με την δημιουργική φαντασία η Κοιλίαρη (Koiliari, 2009) παρατηρεί ένα «ιδιόρρυθμο και ασυνήθιστο» παιχνίδι με τα αντικείμενα, χαρακτηριζόμενο από εμμονές σε τμήματα των παιχνιδιών (π.χ. κοιτούν τις ρόδες αυτοκινήτων ή το πλυντήριο που γυρίζει) ή απλή παράταξή τους βάσει κριτηρίου (είδος, μέγεθος, χρώμα, κ.λ.π.), ενώ απουσιάζει το συμβολικό παιχνίδι.

Τέλος, η κοινωνικοποίηση των παιδιών με αυτισμό παρουσιάζει πολλά χαρακτηριστικά προβλήματα. Συγκεκριμένα, παρατηρούνται σοβαρά ελλείμματα κοινωνικής αλληλεπίδρασης, ενώ η βλεμματική επαφή φανερώνει άτομα με σοβαρή κοινωνική απομόνωση στην συμπεριφορά τους. Πολλές φορές είναι απομονωμένα σε κάποιο σημείο του χώρου και απασχολούνταν με μικροαντικείμενα για μεγάλο χρονικό διάστημα.

ΕΚΠΑΙΔΕΥΤΙΚΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ- ΠΡΟΓΡΑΜΜΑ TEACCH

Υπάρχει μια πληθώρα επιστημονικά τεκμηριωμένων θεραπευτικών προσεγγίσεων για την Διαταραχή Αυτιστικού Φάσματος. Μια σωστά οργανωμένη θεραπευτική παρέμβαση με προσεκτική καταγραφή του κλινικού προφίλ του παιδιού από την διεπιστημονική ομάδα, φέρει βελτίωση σε αρκετούς τομείς του παιδιού με αυτισμό (Stasinos, 2013). Τα προγράμματα παρέμβασης για άτομα με Διαταραχή Αυτιστικού Φάσματος αφορούν την εκπαίδευση ενός παιδιού ή ενήλικα σε συνδυασμό ή ξεχωριστά από την ιατρική θεραπευτική αντιμετώπιση λοιπών δυσλειτουργιών. Συμπληρωματικά, σε αρκετές περιπτώσεις, συνδυάζονται με υποστήριξη και εκπαίδευση της οικογένειας. Παρακάτω, θα αναφέρουμε, ενδεικτικά και επιγραμματικά μερικά από αυτά τα προγράμματα.

Υπάρχουν, λοιπόν, γενικά εκπαιδευτικά προγράμματα, όπως το Πρόγραμμα EarlyBird ή το Πρόγραμμα TEACCH. Πιο συγκεκριμένα το πρόγραμμα EarlyBird της NationalAutistic Society (NAS) της Μεγάλης Βρετανίας για την εκπαίδευση γονέων παιδιών προσχολικής ηλικίας με διαταραχές του αυτιστικού φάσματος. Το πρόγραμμα βοηθά τους γονείς να κατανοήσουν τον αυτισμό του παιδιού τους, να δομήσουν την αλληλεπίδραση μαζί του, να χρησιμοποιήσουν στρατηγικές επίλυσης προβλημάτων και έτσι να επανακτήσουν τον έλεγχο (Noesi, 2011). Ενώ το Πρόγραμμα TEACCH (μεταφράζεται "Θεραπεία και Εκπαίδευση Παιδιών με Αυτισμό και Διαταραχές Επικοινωνίας") αποτελεί ένα πρόγραμμα εναλλακτικής εκπαίδευσης, για παιδιά με διαταραχές του αυτιστικού φάσματος, που ενσωματώνει παρεμβάσεις σε περιβάλλον, ημερήσιο πρόγραμμα και αντικείμενο εργασίας, και επικοινωνία (Noesi, 2006). Ειδικότερα, σχεδιάζεται ένα εξατομικευμένο πρόγραμμα αντιμετώπισης των δυσκολιών του παιδιού με συμβουλές

που δίνονται στους γονείς για το χειρισμό του παιδιού στις διαφορές καταστάσεις του σπιτιού. Μάλιστα, το πρόγραμμα, εφαρμόζεται στο ειδικό ή γενικό σχολείο, με δυνατότητα προσαρμογής του (Stasinos, 2013). Εδώ για το Πρόγραμμα TEACCH, πρέπει να αναφέρουμε και πως, σύμφωνα με τον Νότα (Notas, 2013) «παρόλη τη διαδεδομένη χρήση στην εκπαίδευση παιδιών με αυτισμό στη Μ. Βρετανία και αλλού, υπάρχει μικρή αξιολογική έρευνα για τα αποτελέσματα του TEACCH. Οι περισσότερες μελέτες που αναφέρονται δεν έχουν επαρκείς ελέγχους κι έτσι τα θετικά αποτελέσματα που βρέθηκαν δε μπορούν να αποδοθούν αποκλειστικά στην επίδραση του προγράμματος. Αυτό σημαίνει ότι τα θετικά αποτελέσματα μπορεί να οφείλονται στην γονική εμπλοκή ή στην ένταση της εκπαιδευτικής παρέμβασης παρά στο TEACCH. Δεδομένου του υψηλού προφίλ αυτής της προσέγγισης στη Μ. Βρετανία, είναι σημαντικό να διεξαχθούν καλύτερες μεθοδολογικά μελέτες για να καθορίσουν την αποτελεσματικότητά της έναντι άλλων προσεγγίσεων». Αναφορικά με το Πρόγραμμα TEACCH ο Schopler (1997) στο Stasinos (2013) αποβλέπει σε μια συνεκτική παιδαγωγική μεταχείριση του εν λόγω παιδιού.

Η εμπλοκή των γονέων σε όλη την διαδικασία του εκπαιδευτικού και θεραπευτικού προγράμματος είναι καθοριστικής σημασίας για την αποτελεσματική διεξαγωγή του προγράμματος και την ικανοποιητική προσέγγιση των διδακτικών και εκπαιδευτικών στόχων. Οι γονείς, οφείλουν να έχουν αποδεχτεί το παιδί, να το στηρίζουν και να συμπαραστέκονται, επιδιώκοντας να ξεπερνούν τις οπουδήποτε δυσκολίες που προκύπτουν μέσα στην καθημερινότητά τους. Διότι, όπως σημειώνει η Σταύρου (Stavrou, 2011) «Ακόμη και στην περίπτωση σημαντικής νοητικής καθυστέρησης, η καθαρή αντίληψη και αποδοχή του γεγονότος από τον γονιό μπορεί να βοηθήσει σημαντικά στην εξέλιξη του παιδιού. Ήδη από την βρεφική ηλικία τα βρέφη αντιλαμβάνονται τις διαθέσεις των γονιών, ιδιαίτερα της μητέρας. Και ως την εφηβεία, τα παιδιά προσπαθούν να ικανοποιούν αυτές τις επιθυμίες. Η αντίληψη της διαφορετικότητας του παιδιού, ως αυτόνομου ατόμου με τα δικά του χαρακτηριστικά, είναι δύσκολη και προαπαιτεί την ψυχική ωριμότητα του γονιού (παρ. 10 & 11)».

Παράλληλα με τα γενικά εκπαιδευτικά προγράμματα, όπως αυτά που προαναφέραμε (TEACCH), υπάρχουν και άλλου είδους προγράμματα, που στοχεύουν στην αισθητηριακή αντίληψη, την αισθησιοκινητικότητα, την παρέμβαση μέσω της τέχνης (όπως χοροθεραπεία ή κινητική θεραπεία, μουσικοθεραπεία κ.α). Επίσης, έχουν αναπτυχτεί και έχουν εφαρμοστεί με θετικά θεραπευτικά αποτελέσματα σε άτομα με Διαταραχή Αυτιστικού Φάσματος προγράμματα παρέμβασης μέσω παιχνιδιού, ανάπτυξης κοινωνικών σχέσεων, θεραπεία μέσω σωματικής επαφής (δεσμού), αλλά και προγράμματα παρέμβασης μέσω επαφής με ζώα (σκύλους, άλογα, δελφίνια κ.α.).

Σπάνια, η χορήγησης ψυχοφαρμάκων αξιοποιείται ως θεραπευτική προσέγγιση για τη θεραπεία της Διαταραχή Αυτιστικού Φάσματος. Όπως αναφέρει ο Στασινός (Stasinos, 2013) «Σπάνια σε περιπτώσεις χορηγούνται ψυχοφάρμακα για την ελάττωση των επιπέδων σεροτονίνης. Μια τέτοια φαρμακευτική αγωγή συστήνεται μόνο σε ορισμένες περίπτωσης για την αντιμετώπιση σοβαρών διαταραχών συμπεριφοράς του παιδιού, όπως επιθετικότητα, αυτοτραυματισμού σε στιγμές κρίσης και έντονες ψυχικές εξάρσεις» (σελ 155).

ΓΕΝΙΚΟΙ ΚΑΙ ΕΙΔΙΚΟΙ ΣΤΟΧΟΙ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΠΑΡΕΜΒΑΣΗΣ

Στην περίπτωση μαθητή με Διαταραχή Αυτιστικού Φάσματος η θεραπευτική και εκπαιδευτική παρέμβαση που θα ακολουθήσουμε προϋποθέτει αφενός το σχεδιασμό και αφετέρου την διαμόρφωση ενός κατάλληλου περιβάλλοντος, που θα απευθύνεται σε μαθητή με Διαταραχή Αυτιστικού Φάσματος. Επίσης οι δραστηριότητες που θα λαμβάνουν χώρα, θα πρέπει να είναι κατάλληλα δομημένες για αν φέρουν το καλύτερο δυνατόν αποτέλεσμα. Η ύπαρξης γενικών και ειδικών στόχων παρέμβασης στο εκπαιδευτικό ή θεραπευτικό πλαίσιο είναι κεντρικής σημασίας, όπως θα τους αναπτύξουμε παρακάτω.

Επίσης η θεραπευτική και εκπαιδευτική παρέμβαση πρέπει να συνεισφέρει στα στοιχεία που αναφέρουμε παρακάτω, σύμφωνα πάντα με όσα αναφέραμε ή αναλύσαμε έως τώρα, λαμβάνοντας σοβαρά υπόψη τους γενικούς και ειδικούς στόχους παρέμβασης στο σχολικό πλαίσιο. Αναφορικά λοιπόν με τους ειδικούς και γενικούς στόχους η παρέμβαση πρέπει να:

- Δίνει έμφαση στις γνωστικές και κοινωνικές δεξιότητες του παιδιού.
- Δίνει έμφαση στην επικοινωνία και την κοινωνική αλληλεπίδραση του παιδιού με άλλα παιδιά, με την τάξη του, με άλλες τάξεις, με τους δασκάλους, με γονείς, με άλλα παιδιά με Διαταραχή Αυτιστικού Φάσματος.
- Να διδάσκει ή/και να αξιοποιεί αποδεκτά κοινωνικά πρότυπα / μοντέλα συμπεριφοράς που μπορεί να υιοθετήσει το παιδί.
- Να διδάξει κοινωνικές και καθημερινές δεξιότητες, έτσι ώστε το παιδί να μπορέσει να κοινωνικοποιηθεί και να αυτονομηθεί ως άτομο.

Η ΕΚΠΑΙΔΕΥΤΙΚΗ ΡΟΜΠΟΤΙΚΗ ΩΣ ΕΡΓΑΛΕΙΟ ΥΠΟΣΤΗΡΙΞΗΣ ΠΑΙΔΙΩΝ ΜΕ ΑΥΤΙΣΜΟ

Η Διαταραχή του Αυτιστικού Φάσματος (ΔΑΦ) επηρεάζει σημαντικά την καθημερινή ζωή και τη μάθηση πολλών παιδιών παγκοσμίως. Στο πλαίσιο της ειδικής αγωγής, η τεχνολογία έχει αποδειχθεί πολύτιμη, προσφέροντας καινοτόμες λύσεις υποστήριξης. Ένα από τα πιο επιτυχημένα προγράμματα είναι το TEACCH, το οποίο στηρίζεται στη δομημένη μάθηση. Η ένταξη της εκπαιδευτικής ρομποτικής και του οπτικού προγραμματισμού σε αυτό το πλαίσιο μπορεί να ενισχύσει ουσιαστικά τη μαθησιακή διαδικασία.

Ο οπτικός προγραμματισμός, μέσω εργαλείων όπως το Scratch και το LegoWeDo, δίνει τη δυνατότητα στα παιδιά να προγραμματίζουν χρησιμοποιώντας εικόνες και σύμβολα αντί για γραμμές κώδικα. Τα παιδιά με αυτισμό, που συνήθως ανταποκρίνονται θετικά σε οπτικά και προβλέψιμα ερεθίσματα, ευνοούνται από αυτή την προσέγγιση, η οποία ενισχύει την κατανόηση και την αυτονομία τους.

Το LegoWeDo αποτελεί ένα ιδιαίτερα προσβάσιμο εργαλείο ρομποτικής, με εφαρμογές ειδικά σχεδιασμένες για παιδιά με αυτισμό. Προάγει τη δημιουργική σκέψη, τη μαθηματική κατανόηση και τη δεξιότητα επίλυσης προβλημάτων. Μέσα από διαδραστικές δραστηριότητες, τα παιδιά έχουν την ευκαιρία να αναπτύξουν κοινωνικές δεξιότητες και να βελτιώσουν την επικοινωνία τους, καθώς και να μεταφέρουν όσα μαθαίνουν σε καθημερινές καταστάσεις.

Μία από τις βασικές δραστηριότητες που υλοποιήθηκαν είχε τίτλο *«Φιλία και Κοινωνικές Δεξιότητες»*. Σκοπός της ήταν η ενίσχυση της επικοινωνίας και της συνεργασίας. Τα παιδιά κατασκεύασαν και προγραμμάτισαν ρομπότ σε μικρές ομάδες, συμμετέχοντας σε σενάρια κοινωνικής αλληλεπίδρασης, όπως το «Ρομποτικό Ταχυδρόμο» ή το «Συναισθηματικό Ρομπότ», όπου το ρομπότ ανταποκρινόταν σε εκφράσεις και συναισθήματα.

Τα μαθησιακά αποτελέσματα της παρέμβασης ήταν ενθαρρυντικά. Πρώτον, παρατηρήθηκε αξιοσημείωτη πρόοδος στις μαθηματικές και λογικές δεξιότητες. Τα παιδιά ανέπτυξαν κατανόηση εννοιών όπως η ακολουθία, η αιτιότητα και η χρονική σειρά ενεργειών. Δεύτερον, υπήρξε αισθητή βελτίωση στην κοινωνική αλληλεπίδραση. Οι μαθητές συνεργάστηκαν, αντάλλαξαν ιδέες και ανέπτυξαν σχέσεις εμπιστοσύνης μέσα από τη συλλογική προσπάθεια.

Επιπλέον, η δραστηριότητα συνέβαλε στην ανάπτυξη συναισθηματικών δεξιοτήτων. Τα παιδιά εξασκήθηκαν στην αναγνώριση και έκφραση συναισθημάτων, καθώς το ρομπότ λειτουργούσε ως ουδέτερος και ασφαλής δέκτης της έκφρασης τους. Παράλληλα, βελτιώθηκε η κατανόηση βασικών εννοιών προγραμματισμού και τεχνολογίας, δίνοντας στα παιδιά τα πρώτα τους εφόδια στον τομέα της πληροφορικής.

Τέλος, σημειώθηκε αύξηση στην αυτοεκτίμηση και την αυτοπεποίθηση των παιδιών. Η δυνατότητα να κατασκευάσουν και να δουν το ρομπότ τους να «ζωντανεύει» ενίσχυσε την αίσθηση επιτυχίας και ενθάρρυνε τη συμμετοχή τους σε νέες προκλήσεις.

Συμπερασματικά, η εκπαιδευτική ρομποτική, και ειδικότερα το LEGO WeDo, αποδείχθηκε αποτελεσματικό εργαλείο ενίσχυσης της μάθησης και της κοινωνικής ανάπτυξης σε παιδιά με αυτισμό. Η συνδυαστική χρήση τεχνολογίας, παιχνιδιού και συνεργασίας προσφέρει ένα ασφαλές, δομημένο και ταυτόχρονα δημιουργικό περιβάλλον, μέσα στο οποίο τα παιδιά μπορούν να αναπτύξουν τις δεξιότητές τους και να εκφράσουν τον εαυτό τους με τρόπους που συχνά δεν είναι δυνατοί με τις παραδοσιακές μεθόδους διδασκαλίας.

ΚΑΡΤΕΣ ΟΔΗΓΙΩΝΓΙΑ ΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΡΟΜΠΟΤΙΚΗ

Κάρτα 1: Συναρμολόγηση του Ρομπότ "Ο Βοηθός"

Βήματα:

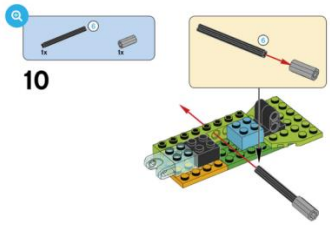
1. Βγάλε όλα τα κομμάτια από το κουτί και τοποθέτησέ τα μπροστά σου.

Εικόνα 14
Προετοιμασία για τη δραστηριότητα:
Ταξινόμηση των εξαρτημάτων LEGO WeDo από το κουτί για την έναρξη της κατασκευής



2. Χρησιμοποίησε τις εικόνες για να συνδέσεις τα τουβλάκια και να δημιουργήσεις τη βάση του ρομπότ.

Εικόνα 15
Βήμα συναρμολόγησης:
Χρήση οπτικών οδηγιών για τη σύνδεση των τουβλάκια και τη δημιουργία της βάσης του ρομπότ



3. Πρόσθεσε τους αισθητήρες (π.χ. κλίσης ή απόστασης) σύμφωνα με το σχέδιο.

Εικόνα 16
Σύνδεση των αισθητήρων στη σωστή θέση πάνω στο Hub του ρομπότ



Εικόνα 17
Σύνδεση του μοτέρ στη σωστή θέση πάνω στο Hub του ρομπότ



4. Σύνδεσε το μοτέρ στη σωστή θέση.

5. ☑ Βεβαιώσου ότι το ρομπότ είναι έτοιμο για προγραμματισμό!

Εικόνα 18
Το ρομπότ ολοκληρωμένο και έτοιμο για τη διαδικασία του προγραμματισμού



Κάρτα 2: Προγραμματισμός Κίνησης του Ρομπότ

Βήματα:

1. Άνοιξε την εφαρμογή LEGO WeDo 2.0 στο τάμπλετ ή στον υπολογιστή.

Εικόνα 19
Άνοιγμα της εφαρμογής
LEGO WeDo 2.0 στο tablet για την έναρξη του οπτικού προγραμματισμού



2. Σύρε το εικονίδιο της πράσινης σημαίας για να ξεκινήσεις το πρόγραμμα.

Εικόνα 20
Δημιουργία κώδικα με χρήση οπτικών συμβόλων



Εικόνα 21
Δημιουργία κώδικα με χρήση οπτικών συμβόλων



3. Πρόσθεσε το μπλοκ "Προχώρα μπροστά για 5 δευτερόλεπτα".

4. Πρόσθεσε ένα μπλοκ "Περίμενε 2 δευτερόλεπτα".

Εικόνα 22
Δημιουργία κώδικα με χρήση οπτικών συμβόλων



Εικόνα 23
Δημιουργία κώδικα με χρήση οπτικών συμβόλων



5. Πρόσθεσε το μπλοκ "Στρίψε αριστερά".

6. Πάτησε το πράσινο κουμπί για να δοκιμάσεις την κίνηση του ρομπότ.

Εικόνα 24
Δημιουργία κώδικα με χρήση οπτικών συμβόλων



Κάρτα 3: Το Συναισθηματικό Ρομπότ

Βήματα:
1. Πρόσθεσε το μπλοκ "Όταν πατηθεί το κουμπί".
2. Σύνδεσε ένα μπλοκ "Παίξε ήχο χαράς".
3. Αν το παιδί πει "ευχαριστώ", το ρομπότ θα παίξει έναν χαρούμενο ήχο.
4. Αν το παιδί πει "γεια σου", το ρομπότ θα αναβοσβήσει με μπλε φως.
5. Δοκίμασε διαφορετικές εντολές και δες τις αντιδράσεις του ρομπότ!

Κάρτα 4: Συνεργασία με Φίλο – "Ο Ρομποτικός Ταχυδρόμος"

Βήματα:
1. Το παιδί Α γράφει ένα μήνυμα σε μια κάρτα (π.χ. "Καλημέρα!").

Εικόνα 25
Ο Μαθητής Α γράφει ένα μήνυμα σε χαρτί



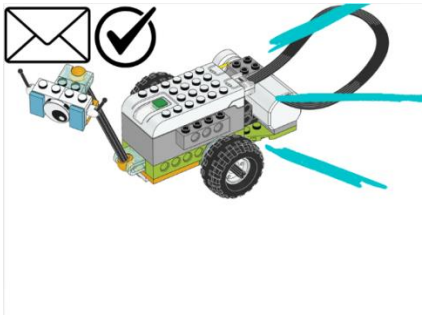
Εικόνα 26
Ο Μαθητής Β προγραμματίζει το ρομπότ μέσω του tablet για να μεταφέρει το μήνυμα στον συμμαθητή του



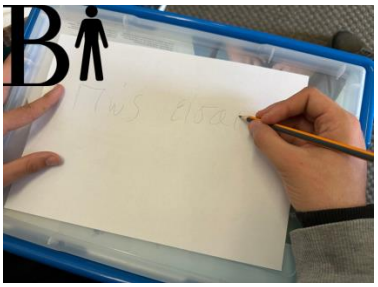
2. 🤖 Το παιδί Β προγραμματίζει το ρομπότ να μεταφέρει την κάρτα σε έναν συμμαθητή.

3. 🚚 Το ρομπότ κινείται και παραδίδει το μήνυμα.

Εικόνα 27
Το ρομπότ εκτελεί την εντολή και κινείται για να παραδώσει το μήνυμα, επιβεβαιώνοντας την επιτυχή συνεργασία



Εικόνα 28.
Ο παραλήπτης του μηνύματος απαντά γραπτώς, συνεχίζοντας τον κύκλο επικοινωνίας.



4. 💌 Ο συμμαθητής απαντάει με ένα νέο μήνυμα και η διαδικασία επαναλαμβάνεται.

Σενάριο 1: Ο Ρομποτικός Ταχυδρόμος
Στόχος: Ενίσχυση επικοινωνίας και συνεργασίας.
Τα παιδιά προγραμματίζουν το ρομπότ να παραδώσει ένα θετικό μήνυμα (π.χ. «Καλημέρα!») σε έναν συμμαθητή. Μέσω εικόνων και απλών εντολών (κίνησης, σταματήματος), μαθαίνουν τη σημασία της θετικής επικοινωνίας. Παρακολουθούν την πορεία του ρομπότ, συζητούν το αποτέλεσμα και εκφράζουν το συναίσθημά τους για το μήνυμα. Η δραστηριότητα ολοκληρώνεται με εικόνες φιλικής αλληλεπίδρασης.

Σενάριο 2: Οδηγός Συνεργασίας
Στόχος: Καλλιέργεια λεκτικής επικοινωνίας και ομαδικότητας.
Δύο παιδιά συνεργάζονται: το ένα δίνει προφορικές οδηγίες (π.χ. «στρίψε αριστερά»), το άλλο τις μεταφράζει σε εντολές στην εφαρμογή. Το ρομπότ καλείται να φτάσει σε έναν προορισμό και να παραδώσει ένα αντικείμενο. Μέσα από εικόνες και καθαρές φράσεις, τα παιδιά εξασκούνται στην ακρίβεια, στον συντονισμό και στην ενσυναίσθηση.

Σενάριο 3: Το Συναισθηματικό Ρομπότ
Στόχος: Ανάπτυξη συναισθηματικής νοημοσύνης.
Το ρομπότ προγραμματίζεται να αντιδρά σε εκφράσεις όπως «ευχαριστώ» ή «συγγνώμη», δείχνοντας συναισθήματα (χαμόγελο, ήχο, φως). Τα παιδιά βλέπουν σχετικές εικόνες, παρατηρούν τις αντιδράσεις και εξασκούνται στην έκφραση θετικών συναισθημάτων. Η δραστηριότητα ενισχύει τη συναισθηματική αναγνώριση και την επικοινωνία.

ΠΑΡΑΔΕΙΓΜΑ ΕΦΑΡΜΟΓΗΣ: ΠΕΙΡΑΜΑ ΧΗΜΕΙΑΣ ΜΕ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ ΚΑΙ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ TEACCH ΓΙΑ ΜΑΘΗΤΕΣ ΜΕ ΔΑΦ

Στο πλαίσιο της εργασίας μας με θέμα «Συμπεριληπτική Εκπαίδευση με Ψηφιακά Μέσα για Μαθητές με ΔΑΦ», σχεδιάσαμε και υλοποιήσαμε μια δραστηριότητα διδασκαλίας του μαθήματος της Χημείας, εστιασμένη στις ανάγκες

μαθητών με Διαταραχή Αυτιστικού Φάσματος. Η εκπαιδευτική παρέμβαση βασίστηκε στο Πρόγραμμα **TEACCH (Treatment and Education of Autistic and related Communication-handicapped Children)**, το οποίο αποτελεί ένα ευρέως εφαρμοζόμενο και επιστημονικά τεκμηριωμένο πλαίσιο υποστήριξης μαθητών με ΔΑΦ.

Ο σχεδιασμός της παρέμβασης στηρίχθηκε σε τρεις βασικές αρχές του TEACCH:

- **Δομημένο μαθησιακό περιβάλλον** με σαφή αρχή, μέση και τέλος,
- **Οπτική υποστήριξη** μέσω καρτελών και ψηφιακού υλικού,
- **Αυτονομία και προβλεψιμότητα**, ώστε οι μαθητές να γνωρίζουν κάθε στιγμή τι αναμένεται από αυτούς.

ΣΤΟΧΟΣ ΚΑΙ ΠΕΡΙΓΡΑΦΗ ΤΗΣ ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ

Η εκπαιδευτική δραστηριότητα σχεδιάστηκε γύρω από ένα απλό αλλά εντυπωσιακό πείραμα Χημείας: **τη δημιουργία φυσικού δείκτη pH από κόκκινο λάχανο** και την παρατήρηση της αλλαγής χρώματος του δείκτη ανάλογα με την οξύτητα ή τη βασικότητα των υγρών. Η επιλογή του θέματος έγινε με βάση τη δυνατότητα **οπτικής κατανόησης των εννοιών**, την απλότητα των υλικών και την ευκολία χειρισμού.

Για την υποστήριξη των μαθητών κατά τη διάρκεια της δραστηριότητας δημιουργήθηκαν δύο παράλληλα εργαλεία:

1. Ένα **διαδραστικό ψηφιακό παιχνίδι** που αναπαριστά τα βήματα του πειράματος σε απλή, κατανοητή μορφή, μέσω της πλατφόρμας **e-me**: https://content.e-me.edu.gr/wp-admin/admin-ajax.php?action=h5p_embed&id=1478637
2. Μια σειρά **έντυπων καρτελών**, οι οποίες οπτικοποιούν κάθε στάδιο της διαδικασίας και παρέχουν σαφείς, βήμα-βήμα οδηγίες.

ΑΝΑΛΥΤΙΚΗ ΠΑΡΟΥΣΙΑΣΗ ΚΑΡΤΕΛΩΝ – ΣΤΑΔΙΑ ΠΕΙΡΑΜΑΤΟΣ

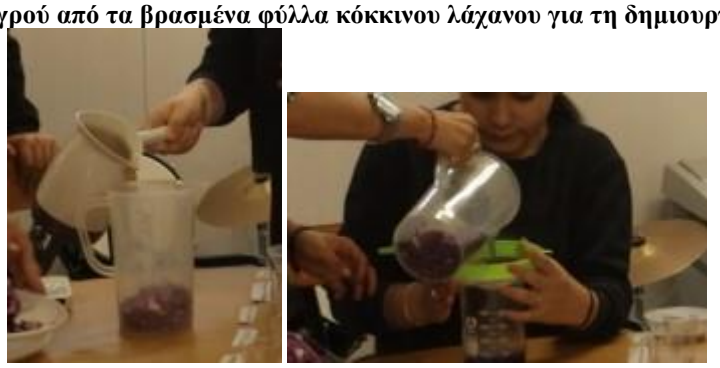
Η δραστηριότητα οργανώθηκε σε εννέα διακριτές φάσεις:

1. **Καρτέλα 1 – Κανόνες Ασφαλείας**
   Ορίζονται οι βασικοί κανόνες που πρέπει να τηρούν οι μαθητές: «Δεν αγγίζουμε τα υγρά», «Δεν τα μυρίζουμε», «Φοράμε γάντια και ποδιά», «Ακολουθούμε τις οδηγίες του εκπαιδευτικού».
2. **Καρτέλα 2 – Τι θα κάνουμε;**
   Περιγράφεται ο σκοπός του πειράματος: να φτιάξουμε έναν φυσικό δείκτη από λάχανο και να δούμε πώς αυτός αλλάζει χρώμα ανάλογα με το pH.

3–5. **Παρασκευή του δείκτη (σε τρία στάδια)**

3. Κόβουμε το κόκκινο λάχανο σε μικρά κομμάτια.
4. Το τοποθετούμε σε ζεστό νερό.
5. Φιλτράρουμε το μπλε υγρό – ο δείκτης είναι πλέον έτοιμος προς χρήση.

Εικόνα 29
Διαδικασία φιλτραρίσματος:
Διαχωρισμός του μωβ υγρού από τα βρασμένα φύλλα κόκκινου λάχανου για τη δημιουργία του φυσικού δείκτη



6. **Καρτέλα 6 – Τοποθέτηση των υγρών**

Οι μαθητές οργανώνουν τα δοκιμαστικά υγρά σε σειρά στα ποτηράκια.

Εικόνα 30
Προετοιμασία δειγμάτων:
Τοποθέτηση των υγρών σε σειρά πριν την προσθήκη του δείκτη



7. **Καρτέλα 7 – Πείραμα**

Προσθέτουν τον δείκτη στα υγρά και παρατηρούν πώς αλλάζει το χρώμα ανάλογα με τη σύσταση του κάθε διαλύματος.

Εικόνα 31.
Εκτέλεση πειράματος:
Προσθήκη του δείκτη λάχανου στα διαφανή ποτήρια για τον έλεγχο της οξύτητας των διαλυμάτων



8. **Καρτέλα 8 – Χρώματα και pH**

Μετρούν το pH με πεχαμετρικό χαρτί και αντιστοιχούν τα χρώματα με την κατηγορία:

- Κόκκινο = Όξινο,
- Πράσινο = Βασικό,
- Μπλε = Ουδέτερο.

9. **Καρτέλα 9 – Τι Μάθαμε;**

Γίνεται ανακεφαλαίωση της εμπειρίας: κατανοούν ότι το pH επηρεάζει το χρώμα του δείκτη και μαθαίνουν βασικές επιστημονικές έννοιες μέσα από βιωματικό πείραμα.

ΕΚΠΑΙΔΕΥΤΙΚΑ ΟΦΕΛΗ ΚΑΙ ΠΑΡΑΤΗΡΗΣΕΙΣ

Η εφαρμογή αυτής της δραστηριότητας σε μαθητές με ΔΑΦ είχε εξαιρετικά θετικά αποτελέσματα. Οι μαθητές παρουσίασαν:

- Αυξημένη **συγκέντρωση και προσοχή**, λόγω της σαφούς δομής και της συνέπειας των βημάτων,
- **Ενίσχυση της κατανόησης** μέσω της οπτικοποίησης και της επανάληψης,
- **Αυτονομία**, καθώς οι καρτέλες και το ψηφιακό υλικό παρείχαν ξεκάθαρους οδηγούς για κάθε βήμα,
- **Ενεργή συμμετοχή**, γεγονός που ενίσχυσε το ενδιαφέρον τους για το μάθημα και καλλιέργησε θετική στάση απέναντι στις φυσικές επιστήμες.

Επιπλέον, η αξιοποίηση των **ψηφιακών μέσων**, ειδικά του διαδραστικού παιχνιδιού, διευκόλυνε τη διαφοροποίηση της διδασκαλίας και την παροχή κινήτρων σε μαθητές που συχνά δυσκολεύονται να εμπλακούν με τα παραδοσιακά μέσα.

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ΣΥΜΠΕΡΙΛΗΠΤΙΚΗ ΨΗΦΙΑΚΗ ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΠΟΛΙΤΙΣΤΙΚΗ ΚΛΗΡΟΝΟΜΙΑ: ΜΙΑ ΚΑΙΝΟΤΟΜΟΣ ΠΡΟΣΕΓΓΙΣΗ ΓΙΑ ΤΗ ΜΟΥΣΕΙΑΚΗ ΕΚΠΑΙΔΕΥΣΗ ΣΕ ΣΩΦΡΟΝΙΣΤΙΚΑ ΚΑΤΑΣΤΗΜΑΤΑ

Παπανδρίτσα Άρτεμη
Early Career Fellow in Hellenic Studies 2024-2025, CHS Harvard University
Μεταδιδακτορική Ερευνήτρια Μουσειολογίας
Τμήμα Αρχειονομίας, Βιβλιοθηκονομίας και Μουσειολογίας,
Ιόνιο Πανεπιστήμιο
email: artpapandr@yahoo.gr

Παπαϊωάννου Γεώργιος
Καθηγητής Μουσειολογίας
Τμήμα Αρχειονομίας, Βιβλιοθηκονομίας και Μουσειολογίας,
Ιόνιο Πανεπιστήμιο
email: gpapaioa@ionio.gr

ΠΕΡΙΛΗΨΗ

Η συμπεριληπτική ψηφιακή εκπαίδευση αποτελεί βασικό άξονα των σύγχρονων εκπαιδευτικών πρακτικών, καθώς στοχεύει στη διασφάλιση ισότιμης πρόσβασης στη γνώση για όλους, ανεξαρτήτως κοινωνικών ή γεωγραφικών περιορισμών (Ainscow, 2020). Στο πλαίσιο αυτό, η αξιοποίηση ψηφιακών μέσων για τη διδασκαλία σε ευάλωτες κοινωνικές ομάδες, όπως οι έγκλειστοι σε Σωφρονιστικά Καταστήματα, λαμβάνει ιδιαίτερη σημασία. Το ερευνητικό πρόγραμμα "*Museum Tours for Inmates -the ancient Greek encounters*" (*MuTourIn*), για την υλοποίηση του οποίου έχει ληφθεί Υποτροφία από το Κέντρο Ελληνικών Σπουδών του Πανεπιστημίου του Harvard, αποτέλεσε μια καινοτόμο πρωτοβουλία που αξιοποίησε την πολιτιστική κληρονομιά και την ψηφιακή τεχνολογία για την εκπαίδευση και την κοινωνική ενσωμάτωση των εγκλείστων.

Το *MuTourIn* αποτελεί συνέχεια και εξέλιξη του επιτυχημένου προγράμματος «*Μουσειακοί Ψίθυροι στο Πανοπτικόν*», το οποίο αξιοποίησε ψηφιακές πλατφόρμες για την παροχή ψηφιακών ξεναγήσεων σε μουσεία από όλο τον κόσμο. Το νέο αυτό εγχείρημα, εστίασε στη διασύνδεση της αρχαίας ελληνικής πολιτιστικής κληρονομιάς με την εκπαίδευση των εγκλείστων. Μέσα από τον συνδυασμό ψηφιακών ξεναγήσεων και διαδραστικών συζητήσεων, το MuTourIn επιδίωξε να προάγει τη γνωστική ανάπτυξη, την πολιτισμική κατανόηση και την ενίσχυση δεξιοτήτων του 21ου αιώνα, όπως η κριτική σκέψη και η επικοινωνία (Kidd, 2019). Η πρωτοβουλία αυτή ανέδειξε τον ρόλο της ψηφιακής πολιτιστικής κληρονομιάς ως εργαλείου εκπαίδευσης και κοινωνικής ενσωμάτωσης, γεφυρώνοντας το χάσμα ανάμεσα στους έγκλειστους και τον ευρύτερο πολιτιστικό και ακαδημαϊκό χώρο και βελτίωσε την πρόσβαση στην εκπαίδευση, ενισχύοντας δεξιότητες όπως η συνεργασία και η πολιτισμική κατανόηση. Ακολούθως, η ενσωμάτωση της πολιτιστικής κληρονομιάς στην εκπαίδευση των εγκλείστων προσέφερε πολλαπλά οφέλη, καθώς ενίσχυσε τη δια βίου μάθηση και δημιούργησε γέφυρες επικοινωνίας μεταξύ των μουσείων και των Σχολείων Δεύτερης Ευκαιρίας των Σωφρονιστικών Καταστημάτων (Lupo et al., 2023). Παρόλο που σχετικές έρευνες υπογραμμίζουν τη θετική επίδραση της τέχνης και της εκπαίδευσης στη διαδικασία κοινωνικής επανένταξης, η σύνδεση μουσείων, κλασικών σπουδών και σωφρονιστικών περιβαλλόντων παραμένει ένας σχετικά ανεξερεύνητος τομέας (McGregor, 2020).

Οι προκλήσεις που προέκυψαν αφορούν στην τεχνολογική υποδομή, τις παιδαγωγικές προσεγγίσεις και την ανάγκη θεσμικής υποστήριξης για τη βιώσιμη ανάπτυξη τέτοιων πρωτοβουλιών. Ωστόσο, το *MuTourIn* μέσω των ποιοτικών δεδομένων που εξήχθησαν από συνεντεύξεις εγκλείστων σε 7 από τα 12 Σχολεία -τα οποία η ερευνήτρια επισκέφθηκε δια ζώσης, ενώ στην τελευταία ξενάγηση διασυνδέθηκαν και τα 12 σχολεία- που λειτουργούν σε Σωφρονιστικά Καταστήματα στη χώρα μας και παρακολούθησαν τις εν λόγω μουσειακές ψηφιακές ξεναγήσεις, παρέχει πολύτιμα δεδομένα που μπορούν να αξιοποιηθούν για τη διαμόρφωση βιώσιμων στρατηγικών, συνδυάζοντας την ψηφιακή πολιτιστική κληρονομιά με την κοινωνική ένταξη.

Συνοψίζοντας, η χρήση ψηφιακών ξεναγήσεων και η αξιοποίηση της πολιτιστικής κληρονομιάς ως εκπαιδευτικού εργαλείου διαμορφώνουν νέες προοπτικές για τη συμπεριληπτική εκπαίδευση. Το *MuTourIn* απέδειξε πως η τεχνολογία μπορεί να λειτουργήσει ως γέφυρα ανάμεσα σε διαφορετικές κοινωνικές ομάδες, προωθώντας την εκπαίδευση και τον κοινωνικό μετασχηματισμό μέσα από την αλληλεπίδραση με τον πολιτισμό.

Λέξεις – κλειδιά: Συμπεριληπτική εκπαίδευση, πολιτιστική κληρονομιά, μουσειακές ψηφιακές ξεναγήσεις, Σωφρονιστικά Καταστήματα

ΕΙΣΑΓΩΓΗ

Η εκπαιδευτική διαδικασία εντός των Σωφρονιστικών Ιδρυμάτων συχνά υπονομεύεται από κοινωνικούς αποκλεισμούς, θεσμικές αδυναμίες και περιορισμένους παιδαγωγικούς πόρους (McGregor, 2020). Παρόλο που η εκπαίδευση στις φυλακές αναγνωρίζεται ως βασικός παράγοντας επανένταξης και προσωπικής ενδυνάμωσης (Lupo et al., 2023), η πρόσβαση σε ποιοτικά πολιτιστικά και εκπαιδευτικά προγράμματα παραμένει ανεπαρκής. Το πρόγραμμα *MuTourIn* επιχείρησε να αντιμετωπίσει αυτές τις προκλήσεις, αξιοποιώντας την πολιτιστική κληρονομιά και την ψηφιακή τεχνολογία για να εμπλουτίσει την εκπαιδευτική εμπειρία των εγκλείστων.

Η συγκεκριμένη δράση βασίστηκε στην αρχή ότι η πολιτιστική μάθηση μπορεί να λειτουργήσει ως εργαλείο αυτογνωσίας, κοινωνικής συνείδησης και διαλόγου (Kidd, 2019). Η παρουσίαση αυτής της καινοτόμου πρακτικής εντάσσεται σε ένα ευρύτερο πλαίσιο συμπεριληπτικής και διαπολιτισμικής εκπαίδευσης που προάγει την κοινωνική δικαιοσύνη, την ενσυναίσθηση και τον αναστοχασμό (Ainscow, 2020).

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η θεωρητική προσέγγιση του προγράμματος *MuTourIn* άντλησε στοιχεία από το συγκερασμό πεδίων όπως η κριτική μουσειολογία, η συμπεριληπτική εκπαίδευση ενηλίκων, η σωφρονιστική παιδαγωγική και η θεωρία της μετασχηματιστικής μάθησης. Βασικό υπόβαθρο αποτέλεσε η έννοια της συμπερίληψης, η οποία δεν αφορά μόνο την πρόσβαση στην εκπαίδευση, αλλά την ουσιαστική συμμετοχή όλων των ατόμων σε ένα εκπαιδευτικό περιβάλλον που προάγει την αξιοπρέπεια και τη διαφορετικότητα (Ainscow, 2020).

Παράλληλα, η θεωρία της μετασχηματιστικής μάθησης του Mezirow (1991) αναγνωρίζει τη δυνατότητα των ενηλίκων να αναστοχαστούν πάνω στις εμπειρίες τους και να αναδομήσουν τις απόψεις τους για τον κόσμο, γεγονός που βρίσκει ιδιαίτερο έρεισμα στο σωφρονιστικό πλαίσιο. Σημαντική είναι και η συμβολή της κριτικής παιδαγωγικής του Freire (1970), η οποία αντιμετωπίζει την εκπαίδευση ως πράξη ελευθερίας και κοινωνικού μετασχηματισμού.

Από τη σκοπιά της μουσειολογίας, η έννοια του εξουσιοδοτημένου λόγου για την κληρονομιά (Authorized Heritage Discourse), ως βασική θεωρητική συνεισφορά στις Κριτικές Σπουδές για την Πολιτιστική Κληρονομιά και με κύριο εισηγητή τον Laurajane Smith (ιδίως στο έργο της *Uses of Heritage*, 2006), περιγράφει ένα ηγεμονικό και θεσμοποιημένο είδος λόγου γύρω από την κληρονομιά, που επικυρώνεται από κρατικούς, επιστημονικούς ή θεσμικούς φορείς και καθορίζει τι θεωρείται «κληρονομιά», ποιος τη διαχειρίζεται, και ποιος έχει δικαίωμα να μιλήσει για αυτήν. Συνεπώς, εδώ αμφισβητείται, δίνοντας έμφαση στην επανανοηματοδότηση της πολιτιστικής εμπειρίας από ομάδες που βρίσκονται στο περιθώριο της επίσημης αφήγησης (Smith, 2006).

Το πρόγραμμα ενσωμάτωσε επίσης στοιχεία από τη διαλογική μουσειακή παιδαγωγική, που βασίζεται στην ενεργό συμμετοχή και τη δημιουργία νοήματος από τον ίδιο τον επισκέπτη (Waterton and Smith, 2010), αφού μετατοπίζει το επίκεντρο της μουσειακής εμπειρίας από την παθητική πρόσληψη πληροφοριών στην ενεργό δημιουργία νοήματος από τον ίδιο τον ξεναγούμενο. Στο πλαίσιο αυτό, ο επισκέπτης δεν θεωρείται παθητικός δέκτης ενός αυθεντικού και εξουσιοδοτημένου λόγου για την κληρονομιά, αλλά συνδιαμορφωτής της ερμηνείας, εμπλεκόμενος σε μια διαδικασία προσωπικής, κοινωνικής και πολιτισμικής νοηματοδότησης (Waterton and Smith, 2010).

Το μουσείο κατ' επέκταση αντιμετωπίζεται ως χώρος διαλόγου και συμπερίληψης, όπου διαφορετικές φωνές, εμπειρίες και αφηγήσεις μπορούν να συνυπάρξουν και να αλληλεπιδράσουν. Αυτή η προσέγγιση συνάδει με τις αρχές της κριτικής παιδαγωγικής, της πολιτισμικής δημοκρατίας και των συμμετοχικών πρακτικών στην πολιτιστική κληρονομιά.

Συνολικά, το θεωρητικό πλαίσιο του MuTourIn ευθυγραμμίστηκε με τις αρχές της εκπαιδευτικής δικαιοσύνης και της πολιτισμικά προσανατολισμένης μάθησης, προτείνοντας ένα εναλλακτικό, ανθρώπινο πρότυπο εκπαίδευσης σε περιβάλλον εγκλεισμού.

ΠΛΑΙΣΙΟ ΕΡΕΥΝΑΣ

Η παρούσα παρουσίαση βασίστηκε σε μεταδιδακτορική έρευνα με αντικείμενο τη διασύνδεση των μουσείων με τη Σωφρονιστική Εκπαίδευση, διερευνώντας τη συμβολή της πολιτιστικής εμπειρίας στην ενδυνάμωση και εκπαιδευτική κινητοποίηση των εγκλείστων. Η έρευνα, με τίτλο «*Μουσειακή Σωφρονιστική Εκπαίδευση: η εκπαιδευτική αξία και η σημαντικότητα της δημιουργίας μουσειακών δράσεων και μουσειακών χώρων εντός Καταστημάτων Κράτησης, σε συνδυασμό με τα Σχολεία Δεύτερης Ευκαιρίας*», επιχείρησε να αναδείξει τη σημασία της εισαγωγής της πολιτιστικής μάθησης στο σωφρονιστικό περιβάλλον.

Εστίασε στην αναγκαιότητα δημιουργίας μουσειακών δράσεων και πολιτιστικών χώρων με σαφή εκπαιδευτικό και επανενταξιακό προσανατολισμό εντός των Καταστημάτων Κράτησης, με σκοπό την υποστήριξη των μαθητών των Σχολείων Δεύτερης Ευκαιρίας. Κεντρικό θεμέλιο της έρευνας αποτέλεσε το όραμα ενός σχολείου εντός του σωφρονιστικού πλαισίου, το οποίο μετασχηματίζει δημιουργικά την πολιτιστική κληρονομιά σε παιδαγωγικό εργαλείο, προάγοντας την εκπαιδευτική εμπειρία, ενδυναμώνοντας την προσωπική ανάπτυξη και διευρύνοντας τις κοινωνικές προοπτικές των εκπαιδευομένων.

ΜΕΘΟΔΟΛΟΓΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Η μεθοδολογική προσέγγιση της παρούσας έρευνας εντάσσεται στο πλαίσιο της ποιοτικής ερμηνευτικής ερευνητικής παράδοσης, η οποία δίνει έμφαση στις προσωπικές εμπειρίες, τις αφηγήσεις και τα νοήματα που αποδίδουν οι συμμετέχοντες στις κοινωνικές τους πρακτικές (Creswell and Poth, 2018). Η μελέτη βασίστηκε σε συμμετοχική παρατήρηση, ημι-δομημένες συνεντεύξεις και ανάλυση περιεχομένου, επιδιώκοντας τη σε βάθος κατανόηση των βιωμάτων και των στάσεων των εγκλείστων αναφορικά με την πολιτιστική μάθηση.

Η έρευνα υλοποιήθηκε δια ζώσης σε εφτά Σχολεία Δεύτερης Ευκαιρίας, στα οποία παρακολούθησε και η ίδια η ερευνήτρια τις ψηφιακές ξεναγήσεις και ακολούθως πραγματοποιήθηκαν και οι συνεντεύξεις, εντός Καταστημάτων Κράτησης στην Ελλάδα -ενώ τα υπόλοιπα τηλε- συνδέθηκαν στην τελευταία ξενάγηση- με τη συμμετοχή περισσότερων από 300 εκπαιδευομένων διαφορετικής ηλικίας, εθνικότητας και μορφωτικού επιπέδου. Οι ψηφιακές ξεναγήσεις συνδυάστηκαν με βιωματικές παιδαγωγικές προσεγγίσεις (Kolb, 1984) και διαλογικές συζητήσεις στο πνεύμα της παιδαγωγικής του Freire (1970), με στόχο την ενεργό συμμετοχή, την ενίσχυση της αυτοέκφρασης και την καλλιέργεια κριτικής σκέψης των συμμετεχόντων.

Τέλος, η επιλογή συμμετοχικών και μη-ιεραρχικών μεθόδων συντάσσεται με τις αρχές της κριτικής εκπαιδευτικής έρευνας (Kokkos, 2020), όπου ο εκπαιδευόμενος λειτουργεί ως συμμέτοχος της γνώσης και όχι ως παθητικός δέκτης. Η ερευνητική διαδικασία εμπεριείχε στοιχεία ενδυνάμωσης και ενσυναίσθησης, αποφεύγοντας την αναπαραγωγή της εξουσιαστικής σχέσης μεταξύ ερευνητή και υποκειμένου.

ΣΥΜΠΕΡΙΛΗΠΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΜΑΘΗΣΗ ΧΩΡΙΣ ΑΠΟΚΛΕΙΣΜΟΥΣ

Η Συμπεριληπτική Εκπαίδευση ορίζεται ως μια ανοικτή και διαρκής διαδικασία βελτίωσης του σχολικού κλίματος, των διαπροσωπικών σχέσεων και της ποιότητας της μάθησης, με στόχο όλα τα πρόσωπα να απολαμβάνουν με αξιοπρέπεια, ισότητα και δημοκρατία το δικαίωμα στην εκπαίδευση. Ο όρος συνδέεται στενά -και συχνά ταυτίζεται- με τις έννοιες του «*Σχολείου για Όλους*», του «*Δημοκρατικού Σχολείου*» και του «*Καθολικού Σχεδιασμού της Μάθησης*» (Institute of Educational Policy (IEP), 2024). Πρόκειται για ένα παιδαγωγικό όραμα που επιδιώκει τη δημιουργία ενός εκπαιδευτικού περιβάλλοντος χωρίς αποκλεισμούς, όπου η διαφορετικότητα αναγνωρίζεται ως πλούτος και κανείς δεν μένει πίσω.

Σύμφωνα με την Ευρωπαϊκή Επιτροπή, ως κοινωνικά ευάλωτες ομάδες ορίζονται τα άτομα ή οι ομάδες που διατρέχουν αυξημένο κίνδυνο φτώχειας και κοινωνικού αποκλεισμού. Οι παράγοντες που ενισχύουν τον αποκλεισμό περιλαμβάνουν την ανεργία, το χαμηλό εισόδημα, την ανεπαρκή πρόσβαση σε βασικές υπηρεσίες, καθώς και τις διακρίσεις που συνδέονται με χαρακτηριστικά όπως η ηλικία, το φύλο, η εθνικότητα ή η αναπηρία. Η έννοια της ευαλωτότητας δεν περιορίζεται σε μία στατική κατηγορία, αλλά αντικατοπτρίζει τη δυναμική σχέση μεταξύ κοινωνικών συνθηκών και ατομικών χαρακτηριστικών που περιορίζουν τη δυνατότητα πλήρους συμμετοχής στην κοινωνική και εκπαιδευτική ζωή (European Commission, 2020).

Στο πλαίσιο της σωφρονιστικής πολιτικής, η αναγνώριση και προστασία των δικαιωμάτων των κρατουμένων αποτελεί θεμελιώδη προϋπόθεση για την ομαλή λειτουργία των καταστημάτων κράτησης. Το «*Αλφαβητάρι του Κρατούμενου*», έκδοση της Γενικής Γραμματείας Αντεγκληματικής Πολιτικής του Υπουργείου Δικαιοσύνης, λειτουργεί ως εκπαιδευτικό και ενημερωτικό εργαλείο για τα δικαιώματα και τις υποχρεώσεις των έγκλειστων πολιτών. Όπως χαρακτηριστικά αναφέρεται, «η φυλακή αποτελεί έναν χώρο κοινής συμβίωσης, όπου η καθημερινότητα ρυθμίζεται από ένα πλέγμα δικαιωμάτων και κανόνων». Ανάμεσα σε αυτά τα δικαιώματα ξεχωρίζει το δικαίωμα στην εκπαίδευση, το οποίο κατοχυρώνεται νομικά και συνιστά βασικό μέσο προσωπικής ανάπτυξης, κοινωνικής ένταξης και μελλοντικής επανένταξης (Ministry of Justice, 2021). Η εκπαιδευτική διάσταση της φυλάκισης δεν αποτελεί προνόμιο, αλλά αναφαίρετο δικαίωμα που ενισχύει την αξιοπρέπεια και την ανθρώπινη υπόσταση κάθε έγκλειστου, ανεξαρτήτως αδικήματος ή ποινικής κατάστασης (Costelloe, 2022).

ΥΛΟΠΟΙΗΣΗ ΚΑΙ ΣΤΟΧΟΙ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ

Το πρόγραμμα *MuTourIn*, το οποίο υλοποιήθηκε με την υποστήριξη του Center for Hellenic Studies του Πανεπιστημίου Harvard (2024–2025), συνιστά φυσική συνέχεια του επιτυχημένου πιλοτικού εγχειρήματος «*Μουσειακοί Ψίθυροι στο Πανοπτικόν*». Με στόχο την παροχή ισότιμης πρόσβασης στον πολιτισμό για έγκλειστα άτομα, αξιοποίησε ψηφιακά εργαλεία για την πραγματοποίηση διαδραστικών ξεναγήσεων σε μουσεία διεθνούς εμβέλειας, ενισχύοντας τη συμμετοχική πολιτιστική εμπειρία. Στο πρόσφατο στάδιο υλοποίησης, το *MuTourIn* επικεντρώθηκε στην αξιοποίηση της αρχαίας ελληνικής πολιτιστικής κληρονομιάς ως πεδίου γνωστικής και αξιακής ενδυνάμωσης για τους εκπαιδευόμενους των Σχολείων Δεύτερης Ευκαιρίας εντός Καταστημάτων Κράτησης. Μέσω ψηφιακών ξεναγήσεων, και βιωματικού διαλόγου, επιδίωξε την καλλιέργεια δεξιοτήτων του 21ου αιώνα, όπως η κριτική σκέψη και η επικοινωνία, ενισχύοντας την πολιτισμική αυτογνωσία και τη δυνατότητα κοινωνικής επανένταξης (UNESCO, 2021).

Επί παραδείγματι, η πρώτη ψηφιακή ξενάγηση στο πλαίσιο του προγράμματος *MuTourIn* πραγματοποιήθηκε από το Αρχαιολογικό Μουσείο Κέρκυρας, εγκαινιάζοντας έναν κύκλο εξ αποστάσεως επαφής των εκπαιδευομένων με την αρχαία ελληνική πολιτιστική κληρονομιά. Το εισαγωγικό κείμενο που συνόδευε κάθε περιήγηση, μέσω του οποίου ενημερώνονταν λίγες ημέρες πριν για το περιεχόμενο της τηλε- ξενάγησης οι συμμετέχοντες και προετοίμαζαν ενδεχόμενες ερωτήσεις, υπογράμμιζε τον διαχρονικό ρόλο του ελληνικού πολιτισμού στη διαμόρφωση αξιών και ιδεών που παραμένουν επίκαιρες: ελευθερία, σκέψη, αισθητική, δημοκρατία και φιλοσοφία. Η επιλεγμένη, αντιστοίχως, πρώτη περιήγηση, με έμφαση στο παλαιότερο σωζόμενο λίθινο αέτωμα της ελληνικής αρχαιότητας (παράσταση της Γοργούς), ανέδειξε την παιδαγωγική διάσταση της μουσειακής εμπειρίας, η οποία λειτούργησε ως ερέθισμα για γνωστική εμπλοκή, πολιτισμική αναγνώριση και αισθητική συγκίνηση (Hooper-Greenhill, 2000). Η δομημένη παρουσίαση από τον έμπειρο ξεναγό μας, ενίσχυσε την προσβασιμότητα και την ουσιαστική αλληλεπίδραση των εκπαιδευομένων με το ψηφιακό υλικό, στο πλαίσιο μιας συμμετοχικής, συμπεριληπτικής μουσειακής αγωγής.

Κατά τη διάρκεια του προγράμματος *MuTourIn*, πραγματοποιήθηκαν ποικίλες ψηφιακές ξεναγήσεις, ενισχύοντας την πολιτισμική πρόσβαση εκπαιδευομένων σε Σχολεία Δεύτερης Ευκαιρίας (ΣΔΕ) ανά την Ελλάδα. Οι ξεναγήσεις αυτές περιλάμβαναν σημαντικά μουσεία, όπως το Αρχαιολογικό Μουσείο Κέρκυρας, το Μουσείο της Νικόπολης Πρέβεζας, το Μουσείο Ιστορίας των Ολυμπιακών Αγώνων στην Αρχαία Ολυμπία, το Αρχαιολογικό Μουσείο Άρτας και το Μουσείο Μπενάκη. Οι δράσεις πραγματοποιήθηκαν χάρη στη αφιλοκερδή συμβολή εξειδικευμένων αρχαιολόγων και διπλωματούχων ξεναγών, οι οποίοι διαμόρφωσαν ένα προσιτό, παιδαγωγικά πλούσιο περιβάλλον για τους έγκλειστους-εκπαιδευομένους. Η ευρεία γεωγραφική κάλυψη (από Κέρκυρα και Πάτρα έως Δομοκό και Σέρρες) ανέδειξε τη δυνατότητα της τεχνολογίας να γεφυρώνει αποστάσεις και να δημιουργεί ισότιμες ευκαιρίες πρόσβασης στην πολιτιστική κληρονομιά για κοινωνικά ευάλωτες ομάδες (UNESCO, 2021).

Οι στόχοι του προγράμματος *MuTourIn* ανέδειξαν μια πολυεπίπεδη προσέγγιση στην πολιτισμική εκπαίδευση εντός των σωφρονιστικών ιδρυμάτων. Αφετηρία αποτέλεσε η σύνδεση των φυλακών με τις κλασικές σπουδές, ώστε να ενισχυθεί η κατανόηση του τρόπου με τον οποίο η αρχαία ελληνική σκέψη εξακολουθεί ακόμη και σήμερα να επηρεάζει τη σύγχρονη κοινωνία. Παράλληλα, επιδιώχθηκε ο εξανθρωπισμός των φυλακών μέσω της προώθησης της αυτογνωσίας και της αυτοανάπτυξης των εγκλείστων με εργαλείο τον αρχαίο ελληνικό πολιτισμό. Η εκπαίδευση και η έναρξη πολιτιστικών διαλόγων συνιστούσαν βασικό άξονα, ενώ ιδιαίτερη έμφαση δόθηκε στην καλλιέργεια προσωπικής ανάπτυξης, ενσυναίσθησης και κοινωνικής ένταξης. Το πρόγραμμα φιλοδόξησε να γεφυρώσει το χάσμα ανάμεσα στον ακαδημαϊκό χώρο, τα μουσεία και τις φυλακές, αναδεικνύοντας την ανάγκη θεσμικών παρεμβάσεων και τροποποιήσεων στις πολιτικές που αφορούν τη συμμετοχή των εγκλείστων στην πολιτιστική ζωή (Falk and Dierking, 2013· European Court of Human Rights, 2020).

ΠΡΟΚΛΗΣΕΙΣ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ

Η υλοποίηση και η βιωσιμότητα ενός καινοτόμου εκπαιδευτικού προγράμματος, όπως το *MuTourIn*, απαιτεί την υπέρβαση σημαντικών προκλήσεων σε τρία βασικά επίπεδα: τεχνολογική υποδομή, παιδαγωγική προσαρμογή και θεσμική υποστήριξη. Αρχικά, οι τεχνολογικές υποδομές στα σωφρονιστικά καταστήματα παραμένουν ελλιπείς, καθιστώντας δύσκολη την αξιοποίηση των ψηφιακών εργαλείων, γεγονός που έχει επισημανθεί και σε σχετικές έρευνες (UNESCO, 2021).

Επιπλέον, η παιδαγωγική προσέγγιση οφείλει να λαμβάνει υπόψη το ιδιαίτερο κοινωνικο-πολιτισμικό περιβάλλον της φυλακής, προσαρμόζοντας τη διδακτική μεθοδολογία σε συνθήκες περιορισμού και ψυχολογικής επιβάρυνσης (Costelloe and Warner, 2014). Τέλος, απαραίτητη είναι η θεσμική αναγνώριση και υποστήριξη των πρωτοβουλιών αυτών από την πολιτεία, ώστε να διασφαλίζεται η συνέχειά τους και να εντάσσονται οργανικά στο πλαίσιο της δια βίου μάθησης (European Commission, 2020).

ΚΟΙΝΩΝΙΚΗ ΕΝΤΑΞΗ ΚΑΙ ΜΑΘΗΣΗ

Το *MuTourIn* υπηρέτησε τους στόχους της κοινωνικής ένταξης μέσω της δια βίου μάθησης, αξιοποιώντας την πολιτιστική κληρονομιά ως εργαλείο ενδυνάμωσης. Η επαφή των εγκλείστων με την αρχαία ελληνική πολιτισμική παράδοση δεν αποτέλεσε μόνο μορφωτική εμπειρία, αλλά και πράξη αποκατάστασης της αξιοπρέπειας και του δικαιώματος στη μάθηση (Eaton and Gamage, 2011). Τα μουσεία και τα Σχολεία Δεύτερης Ευκαιρίας λειτούργησαν ως γέφυρες επικοινωνίας, δημιουργώντας χώρους διαλόγου και στοχασμού. Στο πλαίσιο αυτό, η πολιτιστική εκπαίδευση συνέβαλλε και συμβάλλει εν γένει ενεργά στην προετοιμασία για την επανένταξη, ενισχύοντας δεξιότητες, αυτοεκτίμηση και κοινωνικό ρόλο (Kirk, 2019).

ΑΠΟΤΕΛΕΣΜΑΤΑ ΤΗΣ ΕΡΕΥΝΑΣ

Τα αποτελέσματα της έρευνας καταδεικνύουν ότι η ψηφιακή πρόσβαση στην πολιτιστική κληρονομιά μπορεί να λειτουργήσει ως καταλύτης ενδυνάμωσης και αυτοπραγμάτωσης για άτομα σε συνθήκες εγκλεισμού. Μέσα από το πρόγραμμα *MuTourIn*, οι συμμετέχοντες απέκτησαν τη δυνατότητα να επαναπροσδιορίσουν τη σχέση τους με τον πολιτισμό, ενισχύοντας την αίσθηση του ανήκειν, την αυτοεκτίμηση και την προοπτική του προσωπικού μετασχηματισμού (Kidd, 2019· Watkins and Mortimore, 2022).

Η εκπαιδευτική εμπειρία δεν περιορίστηκε στη γνωστική διάσταση, αλλά άγγιξε συναισθηματικές και υπαρξιακές πτυχές των συμμετεχόντων, ενισχύοντας την κοινωνική ταυτότητα και την ηθική ανασυγκρότηση (Mezirow, 1991· McGregor, 2020). Οι ψηφιακές ξεναγήσεις αποτέλεσαν όχι μόνο μέσο απόδρασης από τη ρουτίνα του εγκλεισμού, αλλά και πεδίο νοηματοδότησης, όπου οι εκπαιδευόμενοι είχαν τη δυνατότητα να αρθρώσουν προσωπικές ερμηνείες και να συμμετάσχουν σε έναν πολιτισμικό διάλογο.

Η ερευνητική πρωτοβουλία *MuTourIn* επιβεβαιώνει ότι η συμπεριληπτική πολιτιστική εκπαίδευση, όταν αξιοποιεί τεχνολογικά μέσα και συμμετοχικές μεθόδους, μπορεί να λειτουργήσει ως ισχυρό εργαλείο κοινωνικής επανένταξης και ως θεμέλιο για τη δια βίου μάθηση και την ενεργό πολιτειότητα (Ainscow, 2020· Freire, 1970).

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ΘΠ9: Αειφόρο ψηφιακό σχολείο

ΤΟ ΑΕΙΦΟΡΟ ΨΗΦΙΑΚΟ ΣΧΟΛΕΙΟ: ΕΝΑ ΜΟΝΤΕΛΟ ΕΚΠΑΙΔΕΥΣΗΣ ΓΙΑ ΤΟΝ 21Ο ΑΙΩΝΑ

Γούναρη Νεκταρία
Φιλόλογος 1ο ΓΕΛ Σαλαμίνας, ΕΛ.Ε.ΕΤ.Π.Ε,Α.
ngounari@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιοποίηση της εκπαίδευσης και η ανάγκη για αειφορία αποτελούν δύο κρίσιμους πυλώνες για την ανάπτυξη ενός σύγχρονου εκπαιδευτικού μοντέλου. Το παρόν άρθρο προτείνει το μοντέλο του «Αειφόρου Ψηφιακού Σχολείου», το οποίο συνδυάζει την τεχνολογία με αρχές αειφορίας για την προώθηση μιας ολιστικής, συμπεριληπτικής και περιβαλλοντικά υπεύθυνης εκπαίδευσης. Μέσα από τη θεωρητική ανάλυση και την παρουσίαση πρακτικών εφαρμογών, το άρθρο διερευνά πώς η ενσωμάτωση ψηφιακών εργαλείων, η εκπαίδευση για την κλιματική αλλαγή και η συμμετοχική μάθηση μπορούν να δημιουργήσουν ένα βιώσιμο εκπαιδευτικό περιβάλλον για τον 21ο αιώνα.

Λέξεις – κλειδιά: Αειφορία, ψηφιακή εκπαίδευση, αειφόρο σχολείο, τεχνολογία στην εκπαίδευση, 21ος αιώνας.

ΕΙΣΑΓΩΓΗ

Η εκπαίδευση του 21ου αιώνα καλείται να ανταποκριθεί σε πολλαπλές προκλήσεις: την ταχεία τεχνολογική εξέλιξη, την κλιματική κρίση και την ανάγκη για συμπεριληπτική και ισότιμη πρόσβαση στη μάθηση (UNESCO, 2017). Το «Αειφόρο Ψηφιακό Σχολείο» προκύπτει ως απάντηση σε αυτές τις προκλήσεις, συνδυάζοντας την ψηφιακή καινοτομία με τις αρχές της αειφορίας. Στόχος του είναι η δημιουργία ενός εκπαιδευτικού πλαισίου που όχι μόνο αξιοποιεί την τεχνολογία για τη βελτίωση της μαθησιακής εμπειρίας, αλλά και προάγει την περιβαλλοντική ευαισθητοποίηση και τη βιώσιμη ανάπτυξη (Sterling, 2001).

Το παρόν άρθρο εξετάζει το θεωρητικό υπόβαθρο του μοντέλου, τις βασικές του διαστάσεις και τις πρακτικές εφαρμογές του, ενώ προτείνει στρατηγικές για την υλοποίησή του σε σχολεία παγκοσμίως. Η ανάλυση βασίζεται σε διεθνή βιβλιογραφία και μελέτες περιπτώσεων, με έμφαση στην Ελλάδα.

ΘΕΩΡΗΤΙΚΌ ΠΛΑΊΣΙΟ

Η ανάπτυξη του μοντέλου του Αειφόρου Ψηφιακού Σχολείου βασίζεται σε δύο θεμελιώδεις πυλώνες: την εκπαίδευση για την αειφορία (Education for Sustainable Development - ESD) και την ψηφιακή εκπαίδευση. Οι δύο αυτοί πυλώνες, αν και φαινομενικά ανεξάρτητοι, διασταυρώνονται στη δημιουργία ενός ολιστικού εκπαιδευτικού πλαισίου που ανταποκρίνεται στις προκλήσεις του 21ου αιώνα, όπως η κλιματική κρίση, η τεχνολογική πρόοδος και η κοινωνική ανισότητα. Η ενότητα αυτή αναλύει τις θεωρητικές βάσεις του μοντέλου, διερευνώντας την έννοια της αειφορίας στην εκπαίδευση, τον ρόλο της ψηφιακής τεχνολογίας και τις διασυνδέσεις τους.

Η Έννοια της Αειφορίας στην Εκπαίδευση

Η εκπαίδευση για την αειφορία (ESD) αποτελεί μια διεθνώς αναγνωρισμένη προσέγγιση που προωθεί την κατανόηση και την εφαρμογή των αρχών της βιώσιμης ανάπτυξης στο εκπαιδευτικό σύστημα (UNESCO, 2014). Σύμφωνα με τον Sterling (2001), η αειφορία στην εκπαίδευση δεν περιορίζεται στην περιβαλλοντική ευαισθητοποίηση, αλλά περιλαμβάνει τρεις διαστάσεις: την περιβαλλοντική, την κοινωνική και την οικονομική. Αυτή η ολιστική προσέγγιση στοχεύει στη δημιουργία πολιτών ικανών να λαμβάνουν τεκμηριωμένες αποφάσεις για την αντιμετώπιση παγκόσμιων προκλήσεων, όπως η κλιματική αλλαγή, η φτώχεια και η ανισότητα.

Η UNESCO (2017) υπογραμμίζει ότι η ESD προάγει δεξιότητες του 21ου αιώνα, όπως η κριτική σκέψη, η επίλυση προβλημάτων, η συνεργασία και η διαπολιτισμική κατανόηση. Αυτές οι δεξιότητες είναι απαραίτητες για την προετοιμασία των μαθητών να ανταποκριθούν σε ένα διαρκώς μεταβαλλόμενο παγκόσμιο περιβάλλον. Για παράδειγμα, η διδασκαλία της κλιματικής αλλαγής μέσω διεπιστημονικών προσεγγίσεων (π.χ. συνδυασμός επιστήμης, γεωγραφίας και κοινωνικών επιστημών) επιτρέπει στους μαθητές να κατανοούν την πολυπλοκότητα του προβλήματος και να προτείνουν βιώσιμες λύσεις (Nolet, 2009).

Επιπλέον, η ESD δεν εστιάζει μόνο στο περιεχόμενο της διδασκαλίας, αλλά και στη μεθοδολογία. Ο Tilbury (2011) υποστηρίζει ότι οι συμμετοχικές και μαθητοκεντρικές μέθοδοι, όπως η μάθηση μέσω έργων (project-based learning) και η διερευνητική μάθηση (inquiry-based learning), ενισχύουν την ενεργό εμπλοκή των μαθητών και καλλιεργούν τη δέσμευσή τους για την αειφορία. Στο πλαίσιο του Αειφόρου Ψηφιακού Σχολείου, αυτές οι μέθοδοι ενισχύονται μέσω της τεχνολογίας, η οποία επιτρέπει τη δημιουργία διαδραστικών και συνεργατικών μαθησιακών εμπειριών.

Μια κρίσιμη πτυχή της ESD είναι η ενσωμάτωση της τοπικής διάστασης. Όπως επισημαίνει ο Wals (2012), η εκπαίδευση για την αειφορία πρέπει να προσαρμόζεται στις τοπικές περιβαλλοντικές, κοινωνικές και πολιτισμικές συνθήκες. Στην Ελλάδα, για παράδειγμα, η ESD μπορεί να επικεντρωθεί σε ζητήματα όπως η διαχείριση των υδάτινων πόρων, η προστασία της βιοποικιλότητας της Μεσογείου και η προώθηση της κυκλικής οικονομίας, τα οποία είναι ιδιαίτερα σχετικά με το εθνικό πλαίσιο (Koutsouris, 2018).

Ψηφιακή Εκπαίδευση και Τεχνολογία

Η ψηφιακή εκπαίδευση έχει αναδειχθεί ως ένας από τους βασικούς πυλώνες της εκπαιδευτικής μεταρρύθμισης στον 21ο αιώνα. Σύμφωνα με τον Selwyn (2016), η εισαγωγή ψηφιακών τεχνολογιών στα σχολεία έχει μετασχηματίσει τη διδασκαλία και τη μάθηση, προσφέροντας δυνατότητες για εξατομικευμένη εκπαίδευση, παγκόσμια συνδεσιμότητα και πρόσβαση σε τεράστιο όγκο πληροφοριών. Εργαλεία όπως οι διαδραστικοί πίνακες, οι πλατφόρμες ηλεκτρονικής μάθησης (π.χ. Moodle, Google Classroom) και οι εφαρμογές επαυξημένης πραγματικότητας (AR) έχουν διευρύνει τις δυνατότητες των εκπαιδευτικών να προσαρμόσουν το περιεχόμενο στις ανάγκες των μαθητών.

Ωστόσο, η ψηφιακή εκπαίδευση δεν είναι απαλλαγμένη από προκλήσεις. Ο Berkhout και η Hertin (2004) επισημαίνουν ότι η μαζική χρήση τεχνολογίας οδηγεί σε περιβαλλοντικές επιπτώσεις, όπως η αυξημένη κατανάλωση ενέργειας, η παραγωγή ηλεκτρονικών αποβλήτων και η εξάντληση φυσικών πόρων για την κατασκευή συσκευών. Επιπλέον, το ψηφιακό χάσμα (digital divide) παραμένει σημαντικό εμπόδιο, καθώς οι μαθητές από μειονεκτούσες κοινωνικοοικονομικές ομάδες ή απομακρυσμένες περιοχές συχνά στερούνται πρόσβασης σε τεχνολογία υψηλής ποιότητας (Warschauer, 2003). Το Αειφόρο Ψηφιακό Σχολείο αντιμετωπίζει αυτές τις προκλήσεις προτείνοντας τη χρήση «πράσινων» τεχνολογιών, όπως συσκευές χαμηλής κατανάλωσης ενέργειας, λογισμικά ανοιχτού κώδικα και συστήματα ανακύκλωσης ηλεκτρονικών αποβλήτων.

Η θεωρία του συνδετισμού (connectivism), όπως την εισήγαγε ο Siemens (2005), αποτελεί κρίσιμη θεωρητική βάση για την ψηφιακή εκπαίδευση στο πλαίσιο του Αειφόρου Ψηφιακού Σχολείου. Ο συνδετισμός υποστηρίζει ότι η μάθηση στον ψηφιακό κόσμο βασίζεται στη δημιουργία δικτύων γνώσης μέσω της τεχνολογίας. Οι μαθητές δεν μαθαίνουν μόνο από παραδοσιακές πηγές, αλλά και μέσα από τη συνεργασία και την ανταλλαγή πληροφοριών σε ψηφιακές πλατφόρμες. Για παράδειγμα, η χρήση διαδικτυακών φόρουμ ή κοινωνικών μέσων μπορεί να διευκολύνει τη συζήτηση για την κλιματική αλλαγή, επιτρέποντας στους μαθητές να συνδεθούν με συνομηλίκους από άλλες χώρες και να ανταλλάξουν ιδέες για βιώσιμες πρακτικές.

Διασύνδεση Αειφορίας και Ψηφιακής Εκπαίδευσης

Η διασύνδεση της αειφορίας και της ψηφιακής εκπαίδευσης αποτελεί τον πυρήνα του προτεινόμενου μοντέλου. Η τεχνολογία μπορεί να λειτουργήσει ως καταλύτης για την προώθηση της ESD, προσφέροντας εργαλεία για τη διδασκαλία περιβαλλοντικών θεμάτων και την ευαισθητοποίηση των μαθητών. Για παράδειγμα, οι προσομοιώσεις κλιματικών μοντέλων επιτρέπουν στους μαθητές να κατανοήσουν τις επιπτώσεις της υπερθέρμανσης του πλανήτη, ενώ οι εφαρμογές Internet of Things (IoT) μπορούν να χρησιμοποιηθούν για την παρακολούθηση της κατανάλωσης ενέργειας σε σχολικούς κήπους ή κτίρια (Koutsouris, 2018).

Παράλληλα, η αειφορία μπορεί να καθοδηγήσει την ψηφιακή εκπαίδευση προς πιο υπεύθυνες πρακτικές. Όπως υποστηρίζει ο Rattle (2010), η υιοθέτηση πράσινων τεχνολογιών, όπως ηλιακά πάνελ για την τροφοδοσία σχολικών υπολογιστών ή η χρήση ανακυκλώσιμων υλικών για την κατασκευή συσκευών, μπορεί να μειώσει το περιβαλλοντικό αποτύπωμα της ψηφιακής εκπαίδευσης. Επιπλέον, η εκπαίδευση των μαθητών για την υπεύθυνη χρήση της τεχνολογίας, όπως η αποφυγή υπερκατανάλωσης δεδομένων ή η σωστή διαχείριση ηλεκτρονικών αποβλήτων, αποτελεί κρίσιμη πτυχή του μοντέλου.

Η διασύνδεση αυτή υποστηρίζεται και από τη θεωρία της οικολογικής μάθησης (ecological learning), όπως την περιγράφει ο Orr (1992). Σύμφωνα με τον Orr, η εκπαίδευση πρέπει να καλλιεργεί μια βαθύτερη κατανόηση της αλληλεξάρτησης μεταξύ ανθρώπων, τεχνολογίας και φυσικού περιβάλλοντος. Το Αειφόρο Ψηφιακό Σχολείο ενσωματώνει αυτή τη φιλοσοφία, χρησιμοποιώντας την τεχνολογία όχι μόνο ως εργαλείο μάθησης, αλλά και ως μέσο για την καλλιέργεια περιβαλλοντικής συνείδησης και υπευθυνότητας.

Κριτική Προσέγγιση και Μελλοντικές Κατευθύνσεις

Παρά τα πλεονεκτήματα της διασύνδεσης αειφορίας και ψηφιακής εκπαίδευσης, υπάρχουν και περιορισμοί. Η υπερβολική εξάρτηση από την τεχνολογία μπορεί να οδηγήσει σε αποξένωση από το φυσικό περιβάλλον, ενώ η έλλειψη κατάλληλης επιμόρφωσης των εκπαιδευτικών μπορεί να περιορίσει την αποτελεσματικότητα των ψηφιακών εργαλείων (Selwyn, 2016). Επιπλέον, η ESD απαιτεί μακροπρόθεσμη δέσμευση και πολιτική υποστήριξη, κάτι που συχνά απουσιάζει σε εθνικά εκπαιδευτικά συστήματα με περιορισμένους πόρους (Wals, 2012).

Για να ξεπεραστούν αυτά τα εμπόδια, το Αειφόρο Ψηφιακό Σχολείο προτείνει μια ισορροπημένη προσέγγιση που συνδυάζει την τεχνολογία με βιωματικές δραστηριότητες, όπως η κηπουρική ή οι επισκέψεις σε φυσικούς χώρους, και επενδύει στην επαγγελματική ανάπτυξη των εκπαιδευτικών. Μελλοντικές έρευνες θα μπορούσαν να επικεντρωθούν στην ανάπτυξη μεθόδων αξιολόγησης της αποτελεσματικότητας αυτού του μοντέλου, καθώς και στη διερεύνηση του τρόπου με τον οποίο οι τοπικές πολιτισμικές αξίες μπορούν να ενσωματωθούν στην ψηφιακή εκπαίδευση για την αειφορία.

ΤΟ ΜΟΝΤΕΛΟ ΤΟΥ ΑΕΙΦΟΡΟΥ ΨΗΦΙΑΚΟΥ ΣΧΟΛΕΙΟΥ

Το μοντέλο του Αειφόρου Ψηφιακού Σχολείου αποτελεί μια ολοκληρωμένη προσέγγιση που συνδυάζει τις αρχές της αειφορίας με την ψηφιακή τεχνολογία, με στόχο τη δημιουργία ενός εκπαιδευτικού πλαισίου που προάγει την

περιβαλλοντική ευαισθητοποίηση, την κοινωνική δικαιοσύνη και την καινοτόμο μάθηση. Το μοντέλο βασίζεται σε τρεις βασικούς πυλώνες: (1) την ψηφιακή υποδομή και την πράσινη τεχνολογία, (2) τη διδακτική της αειφορίας και (3) τη συμμετοχική μάθηση. Αυτοί οι πυλώνες λειτουργούν συνεργιστικά για να εξασφαλίσουν ότι το σχολείο όχι μόνο ανταποκρίνεται στις σύγχρονες εκπαιδευτικές ανάγκες, αλλά και συμβάλλει στη δημιουργία ενός βιώσιμου μέλλοντος (Sterling, 2001). Η ενότητα αυτή αναλύει λεπτομερώς κάθε πυλώνα, παρουσιάζει πρακτικές εφαρμογές και διερευνά στρατηγικές υλοποίησης, με έμφαση στο ελληνικό εκπαιδευτικό σύστημα και διεθνή παραδείγματα.

Ψηφιακή Υποδομή και Πράσινη Τεχνολογία

Ο πρώτος πυλώνας του μοντέλου επικεντρώνεται στη δημιουργία μιας ψηφιακής υποδομής που είναι ταυτόχρονα αποδοτική και περιβαλλοντικά υπεύθυνη. Η ψηφιακή εκπαίδευση απαιτεί τη χρήση συσκευών όπως υπολογιστές, ταμπλέτες και διαδραστικούς πίνακες, καθώς και πρόσβαση σε διαδικτυακές πλατφόρμες. Ωστόσο, η μαζική χρήση τεχνολογίας μπορεί να επιφέρει σημαντικές περιβαλλοντικές επιπτώσεις, όπως η αυξημένη κατανάλωση ενέργειας και η παραγωγή ηλεκτρονικών αποβλήτων (Berkhout & Hertin, 2004). Για την αντιμετώπιση αυτών των προκλήσεων, το Αειφόρο Ψηφιακό Σχολείο προτείνει τη χρήση πράσινων τεχνολογιών, όπως:

- Ενεργειακά αποδοτικές συσκευές: Επιλογή συσκευών με πιστοποιήσεις ενεργειακής απόδοσης, όπως το Energy Star, για τη μείωση της κατανάλωσης ηλεκτρικής ενέργειας (Rattle, 2010).
- Ανανεώσιμες πηγές ενέργειας: Εγκατάσταση φωτοβολταϊκών πάνελ ή μικρών ανεμογεννητριών στα σχολεία για την τροφοδοσία των ψηφιακών υποδομών, όπως εφαρμόζεται σε σχολεία της Δανίας (European Commission, 2021).
- Λογισμικά ανοιχτού κώδικα: Χρήση δωρεάν και ελαφρών λογισμικών, όπως το Linux ή το Moodle, που μειώνουν την εξάρτηση από ενεργοβόρες εμπορικές πλατφόρμες (Wheeler, 2015).
- Προγράμματα ανακύκλωσης: Δημιουργία σταθμών ανακύκλωσης ηλεκτρονικών αποβλήτων στα σχολεία, με τη συμμετοχή των μαθητών, για την προώθηση της κυκλικής οικονομίας (Koutsouris, 2018).

Στην Ελλάδα, όπου η ψηφιακή υποδομή στα σχολεία παραμένει περιορισμένη σε πολλές περιοχές, η υλοποίηση αυτού του πυλώνα απαιτεί συνεργασία με τοπικές αρχές και ευρωπαϊκά προγράμματα χρηματοδότησης, όπως το Ταμείο Ανάκαμψης και Ανθεκτικότητας (European Commission, 2021). Για παράδειγμα, η εγκατάσταση ηλιακών πάνελ σε σχολεία απομακρυσμένων νησιών, όπως η Τήλος, που ήδη λειτουργεί ως «πράσινο νησί», θα μπορούσε να αποτελέσει πρότυπο για την εφαρμογή του μοντέλου.

Διδακτική Αειφορία

Ο δεύτερος πυλώνας του μοντέλου επικεντρώνεται στην ενσωμάτωση της αειφορίας στο πρόγραμμα σπουδών, με στόχο την καλλιέργεια περιβαλλοντικής συνείδησης και δεξιοτήτων για βιώσιμες πρακτικές. Η διδακτική της αειφορίας βασίζεται στις αρχές της Εκπαίδευσης για την Αειφορία (ESD), όπως ορίζονται από την UNESCO (2014), και περιλαμβάνει τη διδασκαλία θεμάτων όπως η κλιματική αλλαγή, η βιοποικιλότητα, η διαχείριση αποβλήτων και η κοινωνική δικαιοσύνη. Η χρήση ψηφιακών εργαλείων ενισχύει τη διδακτική διαδικασία, καθιστώντας τη πιο διαδραστική και ελκυστική.

Οι βασικές στρατηγικές περιλαμβάνουν:

- Διεπιστημονικές προσεγγίσεις: Η κλιματική αλλαγή, για παράδειγμα, μπορεί να διδαχθεί μέσω συνδυασμού μαθημάτων φυσικών επιστημών, γεωγραφίας και κοινωνικών επιστημών, με τη χρήση ψηφιακών προσομοιώσεων που δείχνουν τις επιπτώσεις της υπερθέρμανσης του πλανήτη (Nolet, 2009).
- Βιωματική μάθηση: Δημιουργία σχολικών κήπων ή προγραμμάτων ανακύκλωσης, με τη χρήση αισθητήρων Internet of Things (IoT) για την παρακολούθηση περιβαλλοντικών δεδομένων, όπως η υγρασία του εδάφους ή η ποιότητα του αέρα (Koutsouris, 2018).
- Ψηφιακό υλικό για την αειφορία: Χρήση διαδραστικών εφαρμογών, όπως το “Climate Kids” της NASA ή το “Eco-Schools Digital Toolkit”, για τη διδασκαλία περιβαλλοντικών θεμάτων με τρόπο προσιτό στους μαθητές (Hellenic Society for the Protection of Nature, 2020).

Στο ελληνικό πλαίσιο, η διδακτική της αειφορίας μπορεί να ενσωματωθεί μέσω προγραμμάτων όπως το «Οικολογικά Σχολεία» (Eco-Schools), που ήδη εφαρμόζεται σε πολλά σχολεία της χώρας. Για παράδειγμα, σχολεία στη Θεσσαλονίκη έχουν δημιουργήσει ψηφιακές πλατφόρμες όπου οι μαθητές καταγράφουν τις δράσεις τους για την ανακύκλωση και την εξοικονόμηση ενέργειας, ενισχύοντας τη συμμετοχή και την ευαισθητοποίηση της σχολικής κοινότητας (Hellenic Society for the Protection of Nature, 2020). Επιπλέον, η ενσωμάτωση θεμάτων όπως η προστασία της Μεσογείου ή η διαχείριση των υδάτινων πόρων στο πρόγραμμα σπουδών μπορεί να συνδεθεί με το τοπικό περιβάλλον, καθιστώντας τη μάθηση πιο σχετική και ελκυστική για τους μαθητές.

Συμμετοχική Μάθηση

Ο τρίτος πυλώνας του μοντέλου εστιάζει στη συμμετοχική μάθηση, η οποία βασίζεται στη θεωρία του συνδετισμού (connectivism) του Siemens (2005). Σύμφωνα με αυτή τη θεωρία, η μάθηση στον ψηφιακό κόσμο βασίζεται στη δημιουργία δικτύων γνώσης μέσω της συνεργασίας και της ανταλλαγής πληροφοριών. Η συμμετοχική μάθηση στο Αειφόρο Ψηφιακό Σχολείο προάγει την ενεργό εμπλοκή των μαθητών, των εκπαιδευτικών και της ευρύτερης κοινότητας, χρησιμοποιώντας ψηφιακές πλατφόρμες για τη διευκόλυνση της συνεργασίας.

Οι βασικές πρακτικές περιλαμβάνουν:

- Διαδικτυακά συνεργατικά έργα: Οι μαθητές μπορούν να συμμετέχουν σε διεθνή προγράμματα, όπως το "eTwinning", όπου συνεργάζονται με συνομηλίκους από άλλες χώρες για τη δημιουργία έργων με θέμα την αειφορία, όπως η μείωση του πλαστικού ή η εξοικονόμηση νερού (European Commission, 2021).
- Ψηφιακά φόρουμ και κοινωνικά δίκτυα: Χρήση πλατφορμών όπως το Edmodo ή ειδικών ομάδων στα κοινωνικά μέσα για τη συζήτηση περιβαλλοντικών ζητημάτων και την ανταλλαγή βέλτιστων πρακτικών μεταξύ μαθητών και εκπαιδευτικών.
- Εικονικές ανταλλαγές και τηλεδιασκέψεις: Οι μαθητές μπορούν να συνδεθούν με σχολεία σε άλλες χώρες μέσω τηλεδιασκέψεων για να συζητήσουν λύσεις για την κλιματική αλλαγή, μειώνοντας το περιβαλλοντικό αποτύπωμα που θα προέκυπτε από φυσικές μετακινήσεις (Lehtonen et al., 2018).

Στην Ελλάδα, η συμμετοχική μάθηση μπορεί να ενισχυθεί μέσω της αξιοποίησης υπαρχουσών πλατφορμών, όπως το Πανελλήνιο Σχολικό Δίκτυο, για τη δημιουργία διαδικτυακών κοινοτήτων μάθησης. Για παράδειγμα, ένα σχολείο στην Κρήτη θα μπορούσε να συνεργαστεί με ένα σχολείο στη Σουηδία για τη δημιουργία ενός κοινού ψηφιακού έργου με θέμα τη διαχείριση των παράκτιων οικοσυστημάτων, χρησιμοποιώντας εργαλεία όπως το Zoom ή το Microsoft Teams.

Πρακτικές Εφαρμογές και Παραδείγματα

Για να καταδειχθεί η εφαρμοσιμότητα του μοντέλου, παρουσιάζονται παρακάτω συγκεκριμένες πρακτικές εφαρμογές:

- Ψηφιακές πλατφόρμες για την αειφορία: Σχολεία μπορούν να χρησιμοποιούν πλατφόρμες όπως το Moodle για τη δημιουργία μαθημάτων με θέματα όπως η ανακύκλωση ή η εξοικονόμηση ενέργειας. Για παράδειγμα, το πρόγραμμα "Eco-Schools Digital Toolkit" παρέχει διαδραστικά εργαλεία για την παρακολούθηση της κατανάλωσης ενέργειας στα σχολεία (Hellenic Society for the Protection of Nature, 2020).
- Σχολικοί κήποι με τεχνολογία IoT: Σχολεία στη Γερμανία χρησιμοποιούν αισθητήρες IoT για την παρακολούθηση της υγρασίας και της θερμοκρασίας σε σχολικούς κήπους, διδάσκοντας στους μαθητές τη σημασία της βιώσιμης γεωργίας (Koutsouris, 2018). Παρόμοια προγράμματα θα μπορούσαν να εφαρμοστούν σε ελληνικά σχολεία, ιδιαίτερα σε αγροτικές περιοχές.
- Εικονικές περιηγήσεις και επαυξημένη πραγματικότητα (AR): Εφαρμογές AR, όπως το Google Expeditions, επιτρέπουν στους μαθητές να εξερευνούν οικοσυστήματα όπως ο Αμαζόνιος ή η Μεσόγειος, συνδέοντας τη θεωρητική γνώση με βιωματικές εμπειρίες.
- Διαγωνισμοί και hackathons: Οργάνωση διαδικτυακών διαγωνισμών όπου οι μαθητές προτείνουν λύσεις για περιβαλλοντικά προβλήματα, όπως η μείωση των πλαστικών απορριμμάτων, χρησιμοποιώντας εργαλεία κωδικοποίησης ή σχεδιασμού (Lehtonen et al., 2018).

Στρατηγικές Υλοποίησης

Η επιτυχής εφαρμογή του μοντέλου απαιτεί συντονισμένες ενέργειες σε πολλαπλά επίπεδα:

- Επιμόρφωση εκπαιδευτικών: Οι εκπαιδευτικοί πρέπει να εκπαιδευτούν στη χρήση ψηφιακών εργαλείων και στη διδακτική της αειφορίας, μέσω προγραμμάτων επαγγελματικής ανάπτυξης (Darling-Hammond et al., 2017).
- Συνεργασία με την κοινότητα: Η συμμετοχή γονέων, τοπικών αρχών και περιβαλλοντικών οργανώσεων ενισχύει την υλοποίηση του μοντέλου. Για παράδειγμα, συνεργασίες με οργανισμούς όπως η WWF Ελλάς μπορούν να υποστηρίξουν τη δημιουργία σχολικών κήπων ή προγραμμάτων ανακύκλωσης.
- Χρηματοδότηση: Η αξιοποίηση ευρωπαϊκών προγραμμάτων, όπως το Erasmus+ ή το Horizon Europe, μπορεί να καλύψει το κόστος εγκατάστασης πράσινων τεχνολογιών και ψηφιακών υποδομών (European Commission, 2021).

Κριτική Ανάλυση και Προκλήσεις

Παρά τα πλεονεκτήματα του μοντέλου, η υλοποίησή του αντιμετωπίζει προκλήσεις, όπως το υψηλό αρχικό κόστος εγκατάστασης πράσινων τεχνολογιών, η έλλειψη ψηφιακών δεξιοτήτων στους εκπαιδευτικούς και το ψηφιακό χάσμα σε απομακρυσμένες περιοχές (Warschauer, 2003). Για την αντιμετώπιση αυτών των προκλήσεων, προτείνονται:

- Πιλοτικά προγράμματα: Ξεκινώντας από μικρής κλίμακας εφαρμογές σε επιλεγμένα σχολεία, π.χ. στην Αττική ή τη Θεσσαλονίκη, για τη δοκιμή του μοντέλου πριν την ευρύτερη εφαρμογή.
- Ενίσχυση της ψηφιακής ισότητας: Διάθεση δωρεάν συσκευών και πρόσβασης στο διαδίκτυο σε μαθητές από μειονεκτούσες ομάδες.
- Δημιουργία εθνικών κατευθυντήριων γραμμών: Το Υπουργείο Παιδείας θα μπορούσε να αναπτύξει έναν οδηγό για την εφαρμογή του Αειφόρου Ψηφιακού Σχολείου, με βάση διεθνή πρότυπα.

ΜΕΛΕΤΕΣ ΠΕΡΙΠΤΩΣΕΩΝ

Οι μελέτες περιπτώσεων αποτελούν κρίσιμο εργαλείο για την κατανόηση της πρακτικής εφαρμογής του μοντέλου του Αειφόρου Ψηφιακού Σχολείου, καθώς παρέχουν συγκεκριμένα παραδείγματα υλοποίησης και αποκαλύπτουν τόσο τα οφέλη όσο και τις προκλήσεις του. Η ενότητα αυτή παρουσιάζει τέσσερις μελέτες περιπτώσεων: δύο διεθνείς (το πρόγραμμα Eco-Schools και το πρόγραμμα Climate.now στη Φινλανδία) και δύο ελληνικές (ένα υπαρκτό παράδειγμα από το πρόγραμμα Eco-Schools στην Ελλάδα και ένα υποθετικό σενάριο εφαρμογής σε ένα ελληνικό νησιωτικό σχολείο). Κάθε μελέτη αναλύει τον τρόπο με τον οποίο το μοντέλο ενσωματώνει την ψηφιακή τεχνολογία και την αειφορία, ενώ αξιολογεί την αποτελεσματικότητα και τις δυνατότητες κλιμάκωσης.

Το Πρόγραμμα Eco-Schools: Μια Διεθνής Πρωτοβουλία

Το πρόγραμμα Eco-Schools, που υλοποιείται από το Ίδρυμα για την Περιβαλλοντική Εκπαίδευση (Foundation for Environmental Education - FEE), αποτελεί μια από τις πιο επιτυχημένες πρωτοβουλίες για την προώθηση της εκπαίδευσης για την αειφορία σε παγκόσμιο επίπεδο, με συμμετοχή από περισσότερες από 50 χώρες και πάνω από 50.000 σχολεία (Hellenic Society for the Protection of Nature, 2020). Το πρόγραμμα ενσωματώνει αρχές της αειφορίας, όπως η εξοικονόμηση ενέργειας, η διαχείριση αποβλήτων και η προστασία της βιοποικιλότητας, μέσω ενός επταβάθμιου μεθοδολογικού πλαισίου που περιλαμβάνει τη δημιουργία σχολικών επιτροπών, την αξιολόγηση περιβαλλοντικών επιπτώσεων και την ανάπτυξη δράσεων.

Στο πλαίσιο του Αειφόρου Ψηφιακού Σχολείου, το πρόγραμμα Eco-Schools έχει προσαρμοστεί για να ενσωματώνει ψηφιακά εργαλεία. Για παράδειγμα, σχολεία στη Δανία χρησιμοποιούν το "Eco-Schools Digital Toolkit", μια διαδικτυακή πλατφόρμα που επιτρέπει στους μαθητές να παρακολουθούν την κατανάλωση ενέργειας και νερού του σχολείου τους μέσω αισθητήρων IoT και εφαρμογών ανάλυσης δεδομένων (Koutsouris, 2018). Οι μαθητές καταγράφουν δεδομένα, όπως η κατανάλωση ηλεκτρικής ενέργειας από φωτισμό ή υπολογιστές, και προτείνουν μέτρα εξοικονόμησης, όπως η μετάβαση σε λαμπτήρες LED ή η χρήση χρονοδιακοπτών. Επιπλέον, η πλατφόρμα περιλαμβάνει διαδραστικά μαθήματα για την κλιματική αλλαγή και την κυκλική οικονομία, τα οποία συνδυάζουν βίντεο, κουίζ και προσομοιώσεις.

Η επιτυχία του προγράμματος αποδίδεται στη συμμετοχική του φύση, καθώς οι μαθητές αναλαμβάνουν ενεργό ρόλο στη λήψη αποφάσεων. Ωστόσο, προκλήσεις όπως η έλλειψη ψηφιακής υποδομής σε σχολεία χαμηλού εισοδήματος και η ανάγκη για συνεχή εκπαίδευση των εκπαιδευτικών περιορίζουν την κλιμάκωση του προγράμματος (Wals, 2012). Στην Ελλάδα, το πρόγραμμα Eco-Schools εφαρμόζεται από την Ελληνική Εταιρεία Προστασίας της Φύσης και μπορεί να αποτελέσει βάση για την ευρύτερη υιοθέτηση του μοντέλου του Αειφόρου Ψηφιακού Σχολείου.

Το Πρόγραμμα Climate.now στη Φινλανδία

Η Φινλανδία, γνωστή για το πρωτοποριακό εκπαιδευτικό της σύστημα, αποτελεί παράδειγμα εφαρμογής ψηφιακών τεχνολογιών για την προώθηση της αειφορίας. Το πρόγραμμα "Climate.now", που αναπτύχθηκε από το Πανεπιστήμιο του Ελσίνκι, είναι μια διαδικτυακή πλατφόρμα που παρέχει διδακτικό υλικό για την κλιματική αλλαγή, προσαρμοσμένο σε μαθητές δευτεροβάθμιας εκπαίδευσης (Lehtonen et al., 2018). Η πλατφόρμα περιλαμβάνει διαδραστικά εργαλεία, όπως προσομοιώσεις κλιματικών μοντέλων, βίντεο με ειδικούς και φόρουμ συζήτησης, που επιτρέπουν στους μαθητές να εξερευνήσουν τις αιτίες και τις συνέπειες της κλιματικής αλλαγής.

Στο πλαίσιο του Αειφόρου Ψηφιακού Σχολείου, το Climate.now ενσωματώνει τον πυλώνα της διδακτικής της αειφορίας και της συμμετοχικής μάθησης. Για παράδειγμα, οι μαθητές καλούνται να αναλύσουν δεδομένα από κλιματικά μοντέλα και να προτείνουν λύσεις για τη μείωση του ανθρακικού αποτυπώματος του σχολείου τους, όπως η χρήση ανανεώσιμων πηγών ενέργειας ή η προώθηση της ποδηλασίας. Επιπλέον, η πλατφόρμα ενθαρρύνει τη συνεργασία μέσω διαδικτυακών ομάδων, όπου μαθητές από διαφορετικά σχολεία ανταλλάσσουν ιδέες και παρουσιάζουν τα αποτελέσματα των έργων τους.

Η επιτυχία του προγράμματος στη Φινλανδία οφείλεται στην υψηλή ψηφιακή υποδομή και την κουλτούρα συνεργασίας στο εκπαιδευτικό σύστημα. Ωστόσο, η εφαρμογή του σε χώρες με λιγότερο ανεπτυγμένες υποδομές, όπως

η Ελλάδα, απαιτεί προσαρμογές, όπως η παροχή δωρεάν πρόσβασης σε διαδικτυακές πλατφόρμες και η επιμόρφωση των εκπαιδευτικών στη χρήση ψηφιακών εργαλείων (Darling-Hammond et al., 2017). Το Climate.now αποτελεί πρότυπο για την ανάπτυξη παρόμοιων πλατφορμών σε εθνικό επίπεδο, με δυνατότητα προσαρμογής σε τοπικά περιβαλλοντικά ζητήματα, όπως η διάβρωση των ακτών στην Ελλάδα.

Εφαρμογή του Eco-Schools στην Ελλάδα: Το Παράδειγμα του 1ου Γυμνασίου Χαλανδρίου

Στην Ελλάδα, το πρόγραμμα Eco-Schools έχει εφαρμοστεί με επιτυχία σε πολλά σχολεία, με χαρακτηριστικό παράδειγμα το 1ο Γυμνάσιο Χαλανδρίου στην Αττική. Το σχολείο αυτό έχει λάβει τη διάκριση της «Πράσινης Σημαίας» για τις δράσεις του στην αειφορία, οι οποίες περιλαμβάνουν τη δημιουργία ενός σχολικού κήπου, την εγκατάσταση συστημάτων ανακύκλωσης και την ευαισθητοποίηση της σχολικής κοινότητας για την εξοικονόμηση ενέργειας (Hellenic Society for the Protection of Nature, 2020).

Στο πλαίσιο του Αειφόρου Ψηφιακού Σχολείου, το 1ο Γυμνάσιο Χαλανδρίου έχει ενσωματώσει ψηφιακά εργαλεία για την ενίσχυση των δράσεών του. Οι μαθητές χρησιμοποιούν μια διαδικτυακή πλατφόρμα για να καταγράφουν την κατανάλωση ενέργειας και νερού του σχολείου, ενώ συμμετέχουν σε διαδραστικά μαθήματα για την κλιματική αλλαγή μέσω του Moodle. Επιπλέον, το σχολείο συνεργάζεται με άλλα σχολεία μέσω του προγράμματος eTwinning, ανταλλάσσοντας ιδέες για τη μείωση των πλαστικών απορριμμάτων και την προστασία της τοπικής βιοποικιλότητας.

Η περίπτωση του 1ου Γυμνασίου Χαλανδρίου καταδεικνύει τη δυνατότητα εφαρμογής του μοντέλου σε αστικά σχολεία με περιορισμένους πόρους. Ωστόσο, προκλήσεις όπως η έλλειψη χρηματοδότησης για την εγκατάσταση προηγμένων ψηφιακών εργαλείων και η περιορισμένη επιμόρφωση των εκπαιδευτικών απαιτούν συντονισμένες προσπάθειες από το Υπουργείο Παιδείας και τοπικές αρχές. Η επιτυχία του σχολείου μπορεί να αποτελέσει πρότυπο για άλλα αστικά σχολεία στην Ελλάδα, ιδιαίτερα σε περιοχές με υψηλή περιβαλλοντική ευαισθητοποίηση.

Υποθετικό Σενάριο: Εφαρμογή σε Νησιωτικό Σχολείο της Τήλου

Για να διερευνηθεί η δυνατότητα εφαρμογής του μοντέλου σε διαφορετικά περιβάλλοντα, παρουσιάζεται ένα υποθετικό σενάριο υλοποίησης του Αειφόρου Ψηφιακού Σχολείου στο Γυμνάσιο της Τήλου, ενός μικρού νησιού που έχει αναδειχθεί ως πρότυπο αειφορίας λόγω της χρήσης ανανεώσιμων πηγών ενέργειας. Το σχολείο θα μπορούσε να υιοθετήσει το μοντέλο μέσω των εξής δράσεων:

- Ψηφιακή Υποδομή: Εγκατάσταση ηλιακών πάνελ για την τροφοδοσία υπολογιστών και διαδραστικών πινάκων, αξιοποιώντας την υπάρχουσα υποδομή του νησιού ως «πράσινο νησί» (European Commission, 2021). Χρήση λογισμικών ανοιχτού κώδικα, όπως το Moodle, για τη μείωση του κόστους.
- Διδακτική Αειφορίας: Ενσωμάτωση μαθημάτων για την προστασία της Μεσογείου και τη διαχείριση των υδάτινων πόρων, με τη χρήση εφαρμογών επαυξημένης πραγματικότητας που επιτρέπουν στους μαθητές να εξερευνούν το θαλάσσιο οικοσύστημα της Τήλου.
- Συμμετοχική Μάθηση: Δημιουργία ενός διαδικτυακού έργου μέσω του eTwinning, όπου οι μαθητές της Τήλου συνεργάζονται με μαθητές από τη Μάλτα για την ανάπτυξη στρατηγικών προστασίας των παράκτιων περιοχών. Οι μαθητές χρησιμοποιούν τηλεδιασκέψεις και διαδικτυακά φόρουμ για την ανταλλαγή ιδεών.

Το υποθετικό αυτό σενάριο καταδεικνύει τη δυνατότητα προσαρμογής του μοντέλου σε νησιωτικά σχολεία με περιορισμένους πόρους. Η επιτυχία του εξαρτάται από τη χρηματοδότηση μέσω ευρωπαϊκών προγραμμάτων, όπως το Erasmus+, και τη συνεργασία με τοπικούς φορείς, όπως ο Δήμος Τήλου. Προκλήσεις, όπως η περιορισμένη πρόσβαση στο διαδίκτυο σε απομακρυσμένες περιοχές, μπορούν να αντιμετωπιστούν με την εγκατάσταση δορυφορικού διαδικτύου ή την παροχή κινητών hotspot.

Κριτική Αξιολόγηση των Μελετών Περιπτώσεων

Οι παραπάνω μελέτες περιπτώσεων καταδεικνύουν τη δυνατότητα εφαρμογής του μοντέλου του Αειφόρου Ψηφιακού Σχολείου σε διαφορετικά περιβάλλοντα, από ανεπτυγμένα εκπαιδευτικά συστήματα, όπως της Φινλανδίας, μέχρι μικρά νησιωτικά σχολεία στην Ελλάδα. Τα κύρια οφέλη περιλαμβάνουν την ενίσχυση της περιβαλλοντικής ευαισθητοποίησης, την ανάπτυξη ψηφιακών δεξιοτήτων και την προώθηση της συνεργασίας μεταξύ μαθητών και κοινοτήτων. Ωστόσο, οι προκλήσεις παραμένουν σημαντικές:

- Οικονομικοί περιορισμοί: Η εγκατάσταση πράσινων τεχνολογιών και ψηφιακών υποδομών απαιτεί αρχική επένδυση, η οποία μπορεί να είναι απαγορευτική για σχολεία σε χώρες με περιορισμένους πόρους (Warschauer, 2003).

- Εκπαίδευση εκπαιδευτικών: Η επιτυχία των προγραμμάτων εξαρτάται από την ικανότητα των εκπαιδευτικών να χρησιμοποιούν ψηφιακά εργαλεία και να ενσωματώνουν την αειφορία στη διδασκαλία τους (Darling-Hammond et al., 2017).
- Πολιτισμικές διαφορές: Η προσαρμογή του μοντέλου σε τοπικά περιβάλλοντα απαιτεί ευαισθησία στις πολιτισμικές και περιβαλλοντικές ιδιαιτερότητες κάθε περιοχής (Wals, 2012).

Για την αντιμετώπιση αυτών των προκλήσεων, προτείνεται η δημιουργία πιλοτικών προγραμμάτων σε επιλεγμένα σχολεία, η αξιοποίηση ευρωπαϊκών κονδυλίων και η ανάπτυξη εθνικών κατευθυντήριων γραμμών για την εφαρμογή του μοντέλου. Οι μελέτες περιπτώσεων καταδεικνύουν ότι, με την κατάλληλη υποστήριξη, το Αειφόρο Ψηφιακό Σχολείο μπορεί να αποτελέσει πρότυπο για τη μελλοντική εκπαίδευση.

ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΛΥΣΕΙΣ

Η υλοποίηση του μοντέλου του Αειφόρου Ψηφιακού Σχολείου, αν και πολλά υποσχόμενη, αντιμετωπίζει πολλαπλές προκλήσεις που σχετίζονται με την τεχνολογική υποδομή, την οικονομική βιωσιμότητα, την εκπαίδευση των εκπαιδευτικών και την κοινωνική ισότητα. Οι προκλήσεις αυτές είναι ιδιαίτερα έντονες σε χώρες όπως η Ελλάδα, όπου οι περιορισμοί στους πόρους και η άνιση πρόσβαση στην τεχνολογία περιπλέκουν την εφαρμογή καινοτόμων εκπαιδευτικών μοντέλων. Η ενότητα αυτή αναλύει τις κύριες προκλήσεις, αξιολογεί τις επιπτώσεις τους και προτείνει συγκεκριμένες λύσεις, βασισμένες σε διεθνή παραδείγματα και το ελληνικό πλαίσιο, για την επιτυχή υλοποίηση του μοντέλου.

Οικονομικοί Περιορισμοί

Πρόκληση: Η εγκατάσταση πράσινων τεχνολογιών, όπως φωτοβολταϊκά πάνελ, συσκευές χαμηλής κατανάλωσης ενέργειας και συστήματα ανακύκλωσης ηλεκτρονικών αποβλήτων, απαιτεί σημαντική αρχική επένδυση. Στην Ελλάδα, όπου τα σχολεία συχνά λειτουργούν με περιορισμένους προϋπολογισμούς, η χρηματοδότηση τέτοιων υποδομών αποτελεί μείζον εμπόδιο (Warschauer, 2003). Επιπλέον, η συντήρηση και η αναβάθμιση των ψηφιακών συστημάτων προσθέτει μακροπρόθεσμο κόστος, το οποίο μπορεί να επιβαρύνει τις τοπικές αρχές ή τα σχολεία. Προτεινόμενες λύσεις θα μπορούσαν να είναι οι παρακάτω:

- Αξιοποίηση ευρωπαϊκών κονδυλίων: Προγράμματα όπως το Horizon Europe και το Ταμείο Ανάκαμψης και Ανθεκτικότητας παρέχουν χρηματοδότηση για έργα που συνδυάζουν την αειφορία και την ψηφιακή καινοτομία (European Commission, 2021). Για παράδειγμα, το πρόγραμμα LIFE της ΕΕ έχει υποστηρίξει την εγκατάσταση ηλιακών πάνελ σε σχολεία της Πορτογαλίας, ένα μοντέλο που θα μπορούσε να εφαρμοστεί στην Ελλάδα.
- Συμπράξεις δημόσιου-ιδιωτικού τομέα: Συνεργασίες με ιδιωτικές εταιρείες τεχνολογίας, όπως εταιρείες που ειδικεύονται σε ανανεώσιμες πηγές ενέργειας ή λογισμικά ανοιχτού κώδικα, μπορούν να μειώσουν το κόστος. Στην Ελλάδα, εταιρείες όπως η ΔΕΗ θα μπορούσαν να συνεργαστούν με σχολεία για την παροχή φωτοβολταϊκών συστημάτων σε προνομιακές τιμές.
- Πιλοτικά προγράμματα: Η εφαρμογή του μοντέλου σε μικρή κλίμακα, π.χ. σε 10-15 σχολεία σε αστικές και νησιωτικές περιοχές, μπορεί να μειώσει το αρχικό κόστος και να επιτρέψει την αξιολόγηση της αποτελεσματικότητας πριν την ευρύτερη κλιμάκωση.
- Χρήση λογισμικών ανοιχτού κώδικα: Η υιοθέτηση δωρεάν λογισμικών, όπως το Moodle ή το Linux, μειώνει το κόστος σε σχέση με εμπορικές πλατφόρμες, όπως αποδεικνύεται από την επιτυχή χρήση τέτοιων εργαλείων σε σχολεία της Ινδίας (Wheeler, 2015).

Έλλειψη Εκπαίδευσης Εκπαιδευτικών

Πρόκληση: Η επιτυχία του Αειφόρου Ψηφιακού Σχολείου εξαρτάται από την ικανότητα των εκπαιδευτικών να χρησιμοποιούν ψηφιακά εργαλεία και να ενσωματώνουν την αειφορία στη διδασκαλία τους. Ωστόσο, πολλοί εκπαιδευτικοί, ιδιαίτερα σε χώρες όπως η Ελλάδα, στερούνται επαρκούς επιμόρφωσης σε ψηφιακές δεξιότητες και μεθόδους διδακτικής της αειφορίας (Darling-Hammond et al., 2017). Αυτό περιορίζει την αποτελεσματικότητα των ψηφιακών πλατφορμών και την ικανότητα των εκπαιδευτικών να εμπνεύσουν τους μαθητές για περιβαλλοντικά και κοινωνικά ζητήματα. Η δεδομένη κατάσταση θα μπορούσε να αντιμετωπιστεί με:

- Προγράμματα επαγγελματικής ανάπτυξης: Η οργάνωση τακτικών σεμιναρίων επιμόρφωσης, τόσο δια ζώσης όσο και διαδικτυακά, μπορεί να ενισχύσει τις δεξιότητες των εκπαιδευτικών. Για παράδειγμα, το πρόγραμμα Erasmus+ προσφέρει ευκαιρίες για επιμόρφωση σε θέματα όπως η χρήση ψηφιακών εργαλείων και η διδασκαλία της αειφορίας (European Commission, 2021).

- Διαδικτυακά μαθήματα και κοινότητες πρακτικής: Η δημιουργία διαδικτυακών κοινοτήτων, όπως μέσω του Πανελληνίου Σχολικού Δικτύου, μπορεί να διευκολύνει την ανταλλαγή βέλτιστων πρακτικών μεταξύ

εκπαιδευτικών. Παρόμοιες πρωτοβουλίες, όπως το "TeachSDGs" στις ΗΠΑ, έχουν αποδειχθεί αποτελεσματικές (Nolet, 2009).

- Συνεργασία με πανεπιστήμια: Ελληνικά πανεπιστήμια, όπως το Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών, μπορούν να αναπτύξουν προγράμματα επιμόρφωσης για εκπαιδευτικούς, εστιάζοντας στη διασύνδεση της αειφορίας και της ψηφιακής εκπαίδευσης.
- Μικροπιστοποιήσεις (micro-credentials): Η παροχή μικροπιστοποιήσεων για την ολοκλήρωση μαθημάτων σε ψηφιακά εργαλεία ή διδακτική της αειφορίας μπορεί να ενθαρρύνει τους εκπαιδευτικούς να συμμετάσχουν, όπως εφαρμόζεται σε χώρες όπως η Φινλανδία (Lehtonen et al., 2018).

Ψηφιακό Χάσμα και Κοινωνική Ανισότητα

Πρόκληση: Το ψηφιακό χάσμα, δηλαδή η άνιση πρόσβαση σε τεχνολογία και διαδίκτυο, αποτελεί σημαντικό εμπόδιο για την εφαρμογή του μοντέλου, ιδιαίτερα σε απομακρυσμένες ή οικονομικά μειονεκτούσες περιοχές της Ελλάδας, όπως τα μικρά νησιά ή οι αγροτικές περιοχές της Ηπείρου (Warschauer, 2003). Οι μαθητές από χαμηλού εισοδήματος οικογένειες συχνά δεν διαθέτουν προσωπικές συσκευές ή αξιόπιστη σύνδεση στο διαδίκτυο, γεγονός που περιορίζει τη συμμετοχή τους σε ψηφιακές δραστηριότητες και επιδεινώνει τις εκπαιδευτικές ανισότητες. Προκειμένου να επιλυθεί το παραπάνω πρόβλημα, προτείνονται τα εξής:

- Παροχή δωρεάν συσκευών και διαδικτύου: Η διανομή ταμπλετών ή ανακαινισμένων υπολογιστών σε μαθητές από ευάλωτες ομάδες, όπως εφαρμόζεται σε προγράμματα της Πορτογαλίας, μπορεί να μειώσει το ψηφιακό χάσμα. Στην Ελλάδα, το Υπουργείο Παιδείας θα μπορούσε να συνεργαστεί με οργανισμούς όπως η UNICEF για την υλοποίηση τέτοιων πρωτοβουλιών.
- Επέκταση της διαδικτυακής πρόσβασης: Η εγκατάσταση δορυφορικού διαδικτύου ή κινητών hotspot σε απομακρυσμένες περιοχές, όπως τα νησιά του Αιγαίου, μπορεί να εξασφαλίσει καθολική πρόσβαση. Το πρόγραμμα WiFi4EU της ΕΕ αποτελεί παράδειγμα επιτυχούς επέκτασης του διαδικτύου σε απομακρυσμένες κοινότητες (European Commission, 2021).
- Κέντρα ψηφιακής μάθησης: Η δημιουργία κοινοτικών κέντρων με δωρεάν πρόσβαση σε υπολογιστές και διαδίκτυο, όπως εφαρμόζεται στην Ινδία, μπορεί να υποστηρίξει μαθητές που δεν έχουν πρόσβαση στο σπίτι τους (Wheeler, 2015).
- Ενίσχυση της ψηφιακής παιδείας: Προγράμματα εκπαίδευσης για γονείς και μαθητές σχετικά με τη χρήση ψηφιακών εργαλείων μπορούν να ενισχύσουν τη συμμετοχή, μειώνοντας την ψηφιακή ανισότητα.

Περιβαλλοντικές Επιπτώσεις της Τεχνολογίας

Πρόκληση: Η μαζική χρήση ψηφιακών τεχνολογιών, όπως υπολογιστές, διακομιστές και συσκευές IoT, συνεπάγεται περιβαλλοντικές επιπτώσεις, όπως η αυξημένη κατανάλωση ενέργειας και η παραγωγή ηλεκτρονικών αποβλήτων (Berkhout & Hertin, 2004). Αυτό το παράδοξο, όπου η τεχνολογία που χρησιμοποιείται για την προώθηση της αειφορίας μπορεί να επιβαρύνει το περιβάλλον, αποτελεί σημαντικό εμπόδιο για το μοντέλο. Για τον λόγο αυτόν προτείνονται τα εξής:

- Χρήση πράσινων τεχνολογιών: Η υιοθέτηση συσκευών χαμηλής κατανάλωσης ενέργειας και η τροφοδοσία σχολικών υποδομών με ανανεώσιμες πηγές ενέργειας, όπως ηλιακή ή αιολική, μπορούν να μειώσουν το περιβαλλοντικό αποτύπωμα. Η Τήλος, για παράδειγμα, έχει ήδη εφαρμόσει τέτοιες τεχνολογίες σε κοινοτικό επίπεδο, οι οποίες θα μπορούσαν να επεκταθούν στα σχολεία (European Commission, 2021).
- Προγράμματα ανακύκλωσης ηλεκτρονικών αποβλήτων: Η δημιουργία σταθμών ανακύκλωσης στα σχολεία, με τη συμμετοχή μαθητών, μπορεί να προωθήσει την κυκλική οικονομία. Παρόμοια προγράμματα έχουν εφαρμοστεί με επιτυχία στη Γερμανία (Koutsouris, 2018).
- Εκπαίδευση για υπεύθυνη χρήση τεχνολογίας: Η διδασκαλία μαθημάτων για την περιβαλλοντική επίδραση της τεχνολογίας, όπως η σημασία της μείωσης της κατανάλωσης δεδομένων ή της σωστής απόρριψης συσκευών, μπορεί να ενισχύσει την περιβαλλοντική συνείδηση (Rattle, 2010).
- Σχεδιασμός ενεργειακά αποδοτικών πλατφορμών: Η ανάπτυξη ψηφιακών πλατφορμών με χαμηλές ενεργειακές απαιτήσεις, όπως το Moodle, μπορεί να μειώσει την κατανάλωση ενέργειας από τη χρήση διακομιστών.

Πολιτισμικές και Κοινωνικές Προκλήσεις

Πρόκληση: Η εφαρμογή του μοντέλου απαιτεί προσαρμογή στις τοπικές πολιτισμικές και κοινωνικές συνθήκες, κάτι που μπορεί να είναι δύσκολο σε περιοχές με χαμηλή περιβαλλοντική ευαισθητοποίηση ή αντίσταση στην υιοθέτηση νέων τεχνολογιών. Στην Ελλάδα, για παράδειγμα, η παραδοσιακή προσέγγιση στη διδασκαλία και η περιορισμένη εμπλοκή της κοινότητας σε περιβαλλοντικά ζητήματα μπορεί να περιορίσουν την αποδοχή του μοντέλου (Wals, 2012). Αυτό θα μπορούσε να αντιμετωπιστεί με:

- Ευαισθητοποίηση της κοινότητας: Η οργάνωση εκδηλώσεων, όπως ημερίδες ή εργαστήρια, για γονείς και τοπικούς φορείς μπορεί να ενισχύσει την αποδοχή του μοντέλου. Στην Κρήτη, για παράδειγμα, σχολεία έχουν συνεργαστεί με περιβαλλοντικές οργανώσεις, όπως η WWF Ελλάς, για την προώθηση προγραμμάτων αειφορίας.
- Προσαρμογή στο τοπικό πλαίσιο: Η ενσωμάτωση τοπικών περιβαλλοντικών ζητημάτων, όπως η προστασία της Μεσογείου ή η διαχείριση των υδάτινων πόρων, μπορεί να κάνει το μοντέλο πιο σχετικό και ελκυστικό για την τοπική κοινότητα (Koutsouris, 2018).
- Συμμετοχή μαθητών στη λήψη αποφάσεων: Η δημιουργία μαθητικών επιτροπών, όπως στο πρόγραμμα Eco-Schools, μπορεί να ενισχύσει τη δέσμευση των μαθητών και να προωθήσει την αποδοχή του μοντέλου από την ευρύτερη κοινότητα (Hellenic Society for the Protection of Nature, 2020).

Κριτική Αξιολόγηση και Μελλοντικές Κατευθύνσεις

Οι προκλήσεις που παρουσιάστηκαν υπογραμμίζουν την πολυπλοκότητα της υλοποίησης του Αειφόρου Ψηφιακού Σχολείου, ιδιαίτερα σε περιβάλλοντα με περιορισμένους πόρους. Ωστόσο, οι προτεινόμενες λύσεις, όπως η αξιοποίηση ευρωπαϊκών κονδυλίων, η επιμόρφωση των εκπαιδευτικών και η προσαρμογή στο τοπικό πλαίσιο, μπορούν να εξασφαλίσουν την επιτυχία του μοντέλου. Η Ελλάδα, με τη συμμετοχή της σε διεθνή προγράμματα όπως το Eco-Schools και την πρόσβαση σε ευρωπαϊκή χρηματοδότηση, έχει τη δυνατότητα να γίνει πρότυπο για την εφαρμογή του μοντέλου σε περιφερειακό επίπεδο.

Μελλοντικές κατευθύνσεις περιλαμβάνουν τη διεξαγωγή ποσοτικών ερευνών για την αξιολόγηση των περιβαλλοντικών και εκπαιδευτικών οφελών του μοντέλου, καθώς και την ανάπτυξη εθνικών κατευθυντήριων γραμμών από το Υπουργείο Παιδείας. Επιπλέον, η συνεργασία με διεθνείς οργανισμούς, όπως η UNESCO, μπορεί να ενισχύσει την κλιμάκωση του μοντέλου σε παγκόσμιο επίπεδο.

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΜΕΛΛΟΝΤΙΚΕΣ ΚΑΤΕΥΘΥΝΣΕΙΣ

Το μοντέλο του Αειφόρου Ψηφιακού Σχολείου αποτελεί μια καινοτόμο και ολιστική προσέγγιση που συνδυάζει την ψηφιακή τεχνολογία με τις αρχές της αειφορίας για να ανταποκριθεί στις πολυδιάστατες προκλήσεις της εκπαίδευσης του 21ου αιώνα. Μέσα από την ανάλυση του θεωρητικού πλαισίου, των πυλώνων του μοντέλου, των μελετών περιπτώσεων και των προκλήσεων, το άρθρο κατέδειξε τη δυνατότητα του μοντέλου να προάγει την περιβαλλοντική ευαισθητοποίηση, να ενισχύσει τις ψηφιακές δεξιότητες και να καλλιεργήσει τη συνεργασία μεταξύ μαθητών, εκπαιδευτικών και κοινότητας. Η ενότητα αυτή συνοψίζει τα κύρια συμπεράσματα, αξιολογεί κριτικά την εφαρμοσιμότητα του μοντέλου και προτείνει μελλοντικές κατευθύνσεις για την έρευνα, την υλοποίηση και την κλιμάκωσή του τόσο στο ελληνικό πλαίσιο όσο και τη διεθνή προοπτική.

Συμπεράσματα

Το Αειφόρο Ψηφιακό Σχολείο βασίζεται σε τρεις πυλώνες: την ψηφιακή υποδομή και την πράσινη τεχνολογία, τη διδακτική της αειφορίας και τη συμμετοχική μάθηση. Αυτοί οι πυλώνες, όπως αναλύθηκαν στις προηγούμενες ενότητες, δημιουργούν ένα συνεκτικό πλαίσιο που ενσωματώνει την τεχνολογία ως εργαλείο για την προώθηση της Εκπαίδευσης για την Αειφορία (ESD) και την ενίσχυση της μαθησιακής εμπειρίας (UNESCO, 2014). Η χρήση πράσινων τεχνολογιών, όπως φωτοβολταϊκά πάνελ και λογισμικά ανοιχτού κώδικα, μειώνει το περιβαλλοντικό αποτύπωμα της ψηφιακής εκπαίδευσης, ενώ η διδακτική της αειφορίας καλλιεργεί δεξιότητες όπως η κριτική σκέψη και η επίλυση προβλημάτων (Sterling, 2001). Παράλληλα, η συμμετοχική μάθηση, βασισμένη στη θεωρία του συνδετισμού (Siemens, 2005), ενθαρρύνει τη συνεργασία και την ανταλλαγή γνώσεων μέσω ψηφιακών πλατφορμών.

Οι μελέτες περιπτώσεων, όπως το πρόγραμμα Eco-Schools, το Climate.now στη Φινλανδία και η περίπτωση του 1ου Γυμνασίου Χαλανδρίου, καταδεικνύουν την πρακτική εφαρμοσιμότητα του μοντέλου σε διαφορετικά περιβάλλοντα. Αυτά τα παραδείγματα υπογραμμίζουν ότι η επιτυχία του μοντέλου εξαρτάται από τη συνεργασία μεταξύ εκπαιδευτικών, μαθητών, τοπικών αρχών και διεθνών οργανισμών, καθώς και από την προσαρμογή στις τοπικές συνθήκες (Wals, 2012). Στην Ελλάδα, το μοντέλο μπορεί να αξιοποιήσει υπάρχουσες πρωτοβουλίες, όπως το πρόγραμμα Eco-Schools, και να επεκταθεί σε νησιωτικές ή αγροτικές περιοχές, όπως η Τήλος, με τη χρήση ευρωπαϊκών κονδυλίων (European Commission, 2021).

Παρά τα πλεονεκτήματα, το μοντέλο αντιμετωπίζει προκλήσεις, όπως το υψηλό αρχικό κόστος, η έλλειψη ψηφιακών δεξιοτήτων στους εκπαιδευτικούς, το ψηφιακό χάσμα και οι περιβαλλοντικές επιπτώσεις της τεχνολογίας. Οι προτεινόμενες λύσεις, όπως η αξιοποίηση ευρωπαϊκών προγραμμάτων, η επιμόρφωση των εκπαιδευτικών και η προώθηση της ψηφιακής ισότητας, μπορούν να αντιμετωπίσουν αυτά τα εμπόδια και να εξασφαλίσουν τη βιωσιμότητα

του μοντέλου (Darling-Hammond et al., 2017; Warschauer, 2003). Συνολικά, το Αειφόρο Ψηφιακό Σχολείο προσφέρει ένα οραματικό πλαίσιο που προετοιμάζει τους μαθητές να γίνουν ενεργοί πολίτες σε έναν κόσμο που αντιμετωπίζει κλιματικές και κοινωνικές προκλήσεις.

Κριτική Αξιολόγηση

Η κριτική αξιολόγηση του μοντέλου αποκαλύπτει τόσο τις δυνατότητές του όσο και τους περιορισμούς του. Από τη θετική πλευρά, το μοντέλο ανταποκρίνεται στις σύγχρονες εκπαιδευτικές ανάγκες, ενσωματώνοντας δεξιότητες του 21ου αιώνα, όπως η ψηφιακή εγγραμματοσύνη, η συνεργασία και η περιβαλλοντική συνείδηση (UNESCO, 2017). Η ευελιξία του επιτρέπει την προσαρμογή σε διαφορετικά εκπαιδευτικά συστήματα και πολιτισμικά περιβάλλοντα, όπως καταδεικνύεται από τις μελέτες περιπτώσεων στη Φινλανδία και την Ελλάδα. Επιπλέον, η χρήση πράσινων τεχνολογιών και η έμφαση στη συμμετοχική μάθηση το καθιστούν σύμφωνο με τους Στόχους Βιώσιμης Ανάπτυξης (SDGs) του ΟΗΕ, ιδιαίτερα τον Στόχο 4 (Ποιοτική Εκπαίδευση) και τον Στόχο 13 (Δράση για το Κλίμα).

Ωστόσο, η εφαρμογή του μοντέλου αντιμετωπίζει σημαντικούς περιορισμούς. Η εξάρτηση από την τεχνολογία μπορεί να οδηγήσει σε αποξένωση από το φυσικό περιβάλλον, αν δεν συνοδεύεται από βιωματικές δραστηριότητες, όπως η κηπουρική ή οι επισκέψεις σε φυσικούς χώρους (Selwyn, 2016). Επιπλέον, η επιτυχία του μοντέλου εξαρτάται από τη δέσμευση των πολιτικών φορέων και την επαρκή χρηματοδότηση, κάτι που μπορεί να είναι δύσκολο σε χώρες με οικονομικούς περιορισμούς, όπως η Ελλάδα (Wals, 2012). Τέλος, η έλλειψη ποσοτικών δεδομένων για την αποτελεσματικότητα του μοντέλου σε μακροπρόθεσμη βάση περιορίζει την ικανότητα αξιολόγησης των εκπαιδευτικών και περιβαλλοντικών του οφελών.

Μελλοντικές Κατευθυνσεις

Για την περαιτέρω ανάπτυξη και κλιμάκωση του Αειφόρου Ψηφιακού Σχολείου, προτείνονται οι ακόλουθες μελλοντικές κατευθύνσεις, οι οποίες χωρίζονται σε τρεις βασικούς άξονες: έρευνα, υλοποίηση και πολιτική υποστήριξη.

Ερευνητικές Κατευθύνσεις

Η έρευνα αποτελεί κρίσιμο στοιχείο για την τεκμηρίωση της αποτελεσματικότητας του μοντέλου και την ενίσχυση της αξιοπιστίας του. Οι προτεινόμενες ερευνητικές κατευθύνσεις περιλαμβάνουν:

- Ποσοτικοποίηση των οφελών: Διεξαγωγή μακροχρόνιων μελετών για τη μέτρηση των περιβαλλοντικών και εκπαιδευτικών οφελών του μοντέλου, όπως η μείωση του ανθρακικού αποτυπώματος των σχολείων ή η βελτίωση της μαθησιακής απόδοσης. Τέτοιες μελέτες μπορούν να βασιστούν σε μετρήσεις κατανάλωσης ενέργειας ή στατιστικά στοιχεία για τη συμμετοχή των μαθητών (Koutsouris, 2018).
- Συγκριτική ανάλυση: Διερεύνηση της εφαρμογής του μοντέλου σε διαφορετικά εκπαιδευτικά συστήματα, π.χ. συγκρίνοντας την Ελλάδα με τη Φινλανδία ή τη Σιγκαπούρη, για την ανάδειξη βέλτιστων πρακτικών και την προσαρμογή σε διαφορετικά πολιτισμικά περιβάλλοντα (Lehtonen et al., 2018).
- Ανάπτυξη εργαλείων αξιολόγησης: Δημιουργία πλαισίων αξιολόγησης για τη μέτρηση της αποτελεσματικότητας της διδακτικής της αειφορίας και της συμμετοχικής μάθησης, όπως κλίμακες για την περιβαλλοντική ευαισθητοποίηση ή την ψηφιακή εγγραμματοσύνη των μαθητών (Nolet, 2009).
- Μελέτη μακροπρόθεσμων επιπτώσεων: Εξέταση του τρόπου με τον οποίο το μοντέλο επηρεάζει τη συμπεριφορά των μαθητών ως ενήλικες, π.χ. την υιοθέτηση βιώσιμων πρακτικών στην καθημερινότητά τους ή τη συμμετοχή τους σε περιβαλλοντικές πρωτοβουλίες.

Στρατηγικές Υλοποίησης

Η επιτυχής υλοποίηση του μοντέλου απαιτεί πρακτικές στρατηγικές που μπορούν να εφαρμοστούν σε εθνικό και διεθνές επίπεδο:

- Πιλοτικά προγράμματα στην Ελλάδα: Η εφαρμογή του μοντέλου σε επιλεγμένα σχολεία, όπως σε αστικά κέντρα (π.χ. Αθήνα, Θεσσαλονίκη) και νησιωτικές περιοχές (π.χ. Κρήτη, Τήλος), μπορεί να λειτουργήσει ως δοκιμαστικό στάδιο για την αξιολόγηση και τη βελτιστοποίηση του μοντέλου. Το Υπουργείο Παιδείας θα μπορούσε να συνεργαστεί με την Ελληνική Εταιρεία Προστασίας της Φύσης για την υποστήριξη αυτών των προγραμμάτων (Hellenic Society for the Protection of Nature, 2020).

- Ενίσχυση της ψηφιακής υποδομής: Η επέκταση της πρόσβασης στο διαδίκτυο σε απομακρυσμένες περιοχές μέσω προγραμμάτων όπως το WiFi4EU και η παροχή δωρεάν συσκευών σε μαθητές από ευάλωτες ομάδες μπορούν να μειώσουν το ψηφιακό χάσμα (European Commission, 2021).

- Ενσωμάτωση στο εθνικό πρόγραμμα σπουδών: Η αειφορία και η ψηφιακή εκπαίδευση θα μπορούσαν να ενσωματωθούν στο ελληνικό πρόγραμμα σπουδών μέσω διεπιστημονικών μαθημάτων, όπως προτείνεται από τη UNESCO (2014). Για παράδειγμα, η διδασκαλία της κλιματικής αλλαγής μπορεί να ενταχθεί στα μαθήματα της Γεωγραφίας, της Βιολογίας και της Κοινωνικής Εκπαίδευσης.
- Δημιουργία κοινοτήτων πρακτικής: Η ανάπτυξη διαδικτυακών κοινοτήτων για εκπαιδευτικούς, μέσω πλατφορμών όπως το Πανελλήνιο Σχολικό Δίκτυο, μπορεί να διευκολύνει την ανταλλαγή ιδεών και την υποστήριξη της υλοποίησης (Siemens, 2005).

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ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΕΠΙΧΕΙΡΗΜΑΤΙΚΟΤΗΤΑ ΣΤΗΝ ΕΠΟΧΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΔΙΑΚΥΒΕΡΝΗΣΗΣ

Δρ Κλεοπάτρα Ν. Βασιλείου
Διευθύντρια στην Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Άρτας
email: kleopatravasileiou@gmail.com

Νικόλαος Σκέντος
Αν/τής Προϊστάμενος Οικονομικού Τμήματος-
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Άρτας
email: nskentos@hotmail.com

ΠΕΡΙΛΗΨΗ

Οι τεχνολογικές εξελίξεις στο πεδίο της επιχειρηματικότητας είναι ραγδαίες ως αποτέλεσμα του ψηφιακού μετασχηματισμού της οικονομίας. Οι σύγχρονες σχολικές μονάδες καλούνται να αναπροσαρμόσουν τις διδακτικές και εν γένει εκπαιδευτικές στρατηγικές τους στα πλαίσια λειτουργίας του αειφόρου σχολείου. Επιπρόσθετα το επιχειρείν αποτελεί ουσιώδη και απαραίτητη δεξιότητα για τους αυριανούς πολίτες και ωφελεί τόσο την προσωπική τους όσο και την επαγγελματική τους εξέλιξη. Η εκπαίδευση σε θέματα επιχειρηματικότητας παίζει καίριο ρόλο στην ανταγωνιστικότητα μιας χώρας και στη διαρκή ανάπτυξη της οικονομίας και της ανταγωνιστικότητας της. Η προώθηση της επιχειρηματικότητας στην εκπαίδευση ενθαρρύνει και καθοδηγεί τους μαθητές/τριες στο να αναπτύξουν επιχειρηματικό πνεύμα και να διαμορφώνουν καινοτόμες λύσεις. Η βασική ιδέα είναι η κατανόηση βασικών οικονομικών εννοιών από πλευράς των μαθητών/τριών όπως για παράδειγμα η διαχείριση χρημάτων που εντάσσεται στα πλαίσια του οικονομικού εγγραματισμού και επιχειρηματικότητας και η απόκτηση δεξιοτήτων για την δημιουργία της δικής τους ψηφιακής επιχείρησης. Η φιλοσοφία ενός οργανισμού μάθησης όπως και το σχολείο είναι να μαθαίνουμε πώς να μαθαίνουμε. Οι μαθητές/τριες εκπαιδεύονται να εργάζονται σε ομάδες, να καταθέτουν ιδέες και προτάσεις με βάση τα ενδιαφέροντα τους και να συλλαμβάνουν επιχειρηματικές ιδέες τις οποίες μέσω της συνεργασίας και της ομαδοσυνεργατικότητας μέσω χάραξης και προσομοίωσης ενός απλού και πρότυπου επιχειρηματικού σχεδίου που θα οδηγήσει στην υλοποίηση της αρχικής τους ιδέας με την χρήση σύγχρονων καινοτόμων ψηφιακών εργαλείων. Σκοπός της παρούσας έρευνας είναι η βιβλιογραφική ανασκόπηση και η δευτερογενή ανάλυση δεδομένων, βιβλιογραφίας, μέσω της επεξεργασίας υφιστάμενων ερευνών και στατιστικών που σχετίζονται με τις εξελίξεις της εφαρμογής της επιχειρηματικότητας στην εκπαίδευση στα πλαίσια της ψηφιακής διακυβέρνησης και η καταγραφή καλών πρακτικών στην θεματική Δημιουργώ και Καινοτομώ-Δημιουργική σκέψη και πρωτοβουλία, στον τομέα της επιχειρηματικότητας, τόσο σε εγχώριο όσο και σε Διεθνές επίπεδο. Το ερευνητικό κείμενο αποσκοπεί στην ανάδειξη των προκλήσεων που προκύπτουν για τα σχολεία στην εποχή της ψηφιακής διακυβέρνησης στον τομέα της επιχειρηματικότητας και της εφαρμογής της ενεργούς πολιτειότητας μέσα από δράσεις ενίσχυσης της σε συνδυασμό με τα εργαστήρια δεξιοτήτων.

Λέξεις-κλειδιά: επιχειρηματικότητα, εκπαίδευση, δημιουργική σκέψη, ψηφιακά περιβάλλοντα

ΕΙΣΑΓΩΓΗ

Η επιχειρηματικότητα διαδραματίζει αναμφίβολα σημαντικό ρόλο στην ανάπτυξη και ενίσχυση της ανταγωνιστικότητα της κοινωνίας μέσω της ανάληψης πρωτοβουλιών. Το συγκριτικό πλεονέκτημα μπορεί να μετατραπεί σε ανταγωνιστικό μέσα από την ορθή ανάληψη επιχειρηματικών δράσεων στο πλαίσιο ενός ολοκληρωμένου πλέγματος πολιτικών και κινήτρων από πλευράς της πολιτείας (Martin 2006).

Στο κείμενο «European Commission» (2018, σ. 13), η επιχειρηματική ικανότητα ορίζεται ως ακολούθως: Η επιχειρηματική ικανότητα αναφέρεται στη δυνατότητα να ενεργεί κανείς σε ευκαιρίες και ιδέες και να τις μετατρέπει σε αξίες για τους άλλους. Η ικανότητα αυτή θεμελιώνεται στη δημιουργικότητα, στην κριτική σκέψη και την επίλυση προβλημάτων, αναλαμβάνοντας πρωτοβουλίες με επιμονή και δυνατότητα συνεργασίας για τον σχεδιασμό και τη διαχείριση έργων που έχουν πολιτιστική, κοινωνική ή οικονομική αξία.

Κρίνεται αναγκαίο για όλες τις χώρες που επιδιώκουν να ενισχύσουν την ανταγωνιστικότητα, τη μεγέθυνση και την δημιουργία θέσεων εργασίας να δώσουν μεγάλη έμφαση στην επιχειρηματικότητα και στην καινοτομία (Ε.Ε., 2002). Η εκπαίδευση κατέχει σημαντική θέση στην εκπλήρωση των προαναφερθέντων στόχων μιας και είναι η μόνη που δύναται να καλλιεργήσει την εκάστοτε επιχειρηματική κουλτούρα στις κοινωνίες και να παρέχει, ειδικότερα σε ό,τι αφορά τη νέα γενιά, όλα τα απαραίτητα προσόντα, ικανότητες και δεξιότητες που απαιτούνται στην σύγχρονη αγορά εργασίας. Εξάλλου, η πλήθος εμπειρικών ερευνών έχουν αποδείξει ότι η η επιχειρηματικότητα μπορεί να διδαχθεί ή τουλάχιστον να ενθαρρυνθεί στα πλαίσια μιας οργανωμένης επιχειρηματικής εκπαίδευσης (Kuratko, 2003).

Η εκπαίδευση στην επιχειρηματικότητα αποστασιοποιείται πλέον και από τη συμπεριφορά καθαυτή (ίδρυση επιχειρήσεων) και αφορά στον συνολικό νεανικό πληθυσμό, στις ικανότητές του και στη μετέπειτα επαγγελματική του ζωή σε διάφορα εργασιακά περιβάλλοντα. Συσχετίζεται δε με το πρόσφατο πλαίσιο των «δεξιοτήτων ζωής», LifeComp, της Ευρωπαϊκής Επιτροπής (Sala et al., 2020) και την ευζωία, όπως και με το πρόσφατο πλαίσιο επίσης των «δεξιοτήτων αειφορίας» (GreenComp, Bianchi, Pisiotis & Giraldez, 2022).

Η στρατηγική «Ευρώπη 2020» έχοντας ως κύριο άξονα μελέτης τις προτάσεις του «Entrepreneurship 2020 Action Plan» καθιστά σαφές ότι η εκπαίδευση στην επιχειρηματικότητα είναι απαραίτητη για μια ολοκληρωμένη στρατηγική ευρωπαϊκής ανάπτυξης, όπου οι διάφορες «συμπληρωματικές» πολιτικές ενίσχυσης της επιχειρηματικότητας (για νεοφυείς και μικρομεσαίες επιχειρήσεις) θα πρέπει να συμβαδίζουν με τη βασική πολιτική της Ευρωπαϊκής Επιτροπής για την εκπαίδευση. Τα παραδοσιακά συστήματα δευτεροβάθμιας εκπαίδευσης είναι προσανατολισμένα στην παροχή κυρίως μαθημάτων γενικής παιδείας και στην εξειδίκευση σε ορισμένους τομείς αλλά σε καμία περίπτωση στην προετοιμασία νέων επιχειρηματιών. Βέβαια στις περισσότερες ευρωπαϊκές χώρες, το Λύκειο διαθέτει τις εξής δύο δυνατότητες: την παροχή γνώσεων γενικής παιδείας για εισαγωγή στην τριτοβάθμια εκπαίδευση και επαγγελματικής-τεχνικής παιδείας για ενσωμάτωση στην αγορά εργασίας ή περαιτέρω σπουδές (Παντίδης-Πασσιάς, 2003). Στην τριτοβάθμια εκπαίδευση το τοπίο είναι σαφώς διαφορετικό στις περισσότερες χώρες εφόσον η επιχειρηματική εκπαίδευση κερδίζει ολοένα και περισσότερο έδαφος σε παγκόσμιο επίπεδο (Kuratko, 2005) αν και βέβαια η επιχειρηματική-οικονομική εκπαίδευση εντάχθηκε στα αναλυτικά προγράμματα σπουδών της ανώτερης εκπαίδευσης το 1947 στο Πανεπιστήμιο του Χαρβαρντ (Katz, 2003).

Η καινοτομία διαδραματίζει τον δικό της ρόλο στην ανάδειξη της επιχειρηματικότητας. Ο όρος «καινοτομία» είναι κάπως ασαφής και διφορούμενος : στην τρέχουσα γλώσσα σημαίνει τόσο μια διαδικασία όσο και το αποτέλεσμά της. Σύμφωνα με τον ορισμό της καινοτομίας που προτείνει ο ΟΟΣΑ, πρόκειται για την μετατροπή μιας ιδέας σε εμπορεύσιμο προϊόν ή υπηρεσία, λειτουργική μέθοδο παραγωγής ή διανομής – νέα ή βελτιωμένη- ή ακόμα σε νέα μέθοδο παροχής κοινωνικής υπηρεσίας. Με τον τρόπο αυτόν ο όρος αναφέρεται στην διαδικασία. Επιπροσθέτως, όταν με τη λέξη «καινοτομία» υποδηλώνεται ένα νέο ή βελτιωμένο προϊόν, εξοπλισμός, η υπηρεσία που διαχέεται επιτυχώς στην αγορά, η έμφαση δίνεται στο αποτέλεσμα της διαδικασίας (εγχειρίδιο Frascati). Επομένως, η επανασύνδεση της επιχειρηματικότητας με την καινοτομία, η οποία υιοθετεί χαρακτηριστικά από το ευρύτερο πεδίο της δημιουργικότητας, δικαιολογεί την αναδιατύπωση της έννοιας του επιχειρείν το 2000 (Shane & Venkataraman, 2000), συμπεριλαμβάνοντας τόσο τα στοιχεία του οικονομικού περιβάλλοντος όσο και τα ατομικά χαρακτηριστικά των επιχειρηματιών (βλ. ενδ. Rauch & Frese, 2007)

Στην εκπαιδευτική διαδικασία όμως η έννοια περιλαμβάνει πρωτίστως τις διαδικασίες και τις τεχνικές που συμβάλλουν στην αποτελεσματικότερη διδασκαλία της επιχειρηματικότητας αλλά και στην καλλιέργεια δεξιοτήτων και ικανοτήτων (soft skills) που κρίνονται ως απαραίτητα εφόδια για την ανάπτυξη του επιχειρείν (OECD, 2009b). Επιπροσθέτως, το 2016, η Ευρωπαϊκή Επιτροπή δημοσίευσε το πλαίσιο της επιχειρηματικότητας ως ικανότητας (entrepreneurial competence), το οποίο είναι γνωστό με το αντίστοιχο ακρωνύμιο EntreComp72 (Bacigalupo et al., 2016).

Το EntreComp στοχεύει να εξηγήσει, από εκπαιδευτική σκοπιά, το αντικείμενο της εκπαίδευσης στην επιχειρηματικότητα, που είναι η ικανότητα στο επιχειρείν, και τις μαθησιακές προσδοκίες για τους εκπαιδευομένους από πλευράς τόσο των εκπαιδευτικών, όσο και των εκπαιδευτικών οργανισμών

Η ΕΛΛΗΝΙΚΗ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Στην Πρωτοβάθμια εκπαίδευση υπήρχαν σκέψεις και ιδέες πριν την εφαρμογή και ανάπτυξη των εργαστηρίων δεξιοτήτων αλλά σε αρκετά πρώιμο στάδιο, ειδικά σε ό,τι αφορά την εξέλιξη στην χώρα μας, με αποτέλεσμα να παραμείνει ατελέσφορη η όλη διαδικασία και προσέγγιση. Το Λύκειο στην σύγχρονη ελληνική πραγματικότητα βρίσκεται σε μια δυναμική διαδικασία αλλαγής που δεν έχει ολοκληρωθεί ακόμα με επιτυχία. Το Νέο Τεχνολογικό Λύκειο σαν θεσμός προς υλοποίηση, πάγωσε τις όποιες διαδικασίες του πριν καν ακόμα ξεκινήσει η διαδικασία εφαρμογής του. Το Ενιαίο Λύκειο έχει σαφώς σαν κύριο στόχο την παροχή μαθημάτων γενικής παιδείας και προετοιμασίας για την ένταξη των αποφοίτων του στην τριτοβάθμια εκπαίδευση. Το Επαγγελματικό Λύκειο παρέχει εξειδίκευση και επαγγελματική εκπαίδευση, προετοιμάζοντας τους αποφοίτους του για να ενταχθούν ομαλά στην αγορά εργασίας, εφοδιασμένοι με τα κατάλληλα προσόντα, γνώσεις και δεξιότητες που απαιτούνται για να ανταποκριθούν στις απαιτήσεις και ανάγκες της αγοράς εργασίας. Στο Ενιαίο Λύκειο τα οικονομικά μαθήματα εντάχθηκαν το 1999 στα πλαίσια μιας γενικότερης τάσης και ευρωπαϊκής διάστασης που επιδιώχθηκε στην ελληνική Δευτεροβάθμια εκπαίδευση με βάση το ψήφισμα του Συμβουλίου της Ευρώπης για μια «Ευρωπαϊκή διάσταση στην εκπαίδευση».

Στην Τριτοβάθμια εκπαίδευση την τελευταία σχεδόν δεκαετία πραγματοποιείται μια συστηματική προσπάθεια από τα ελληνικά πανεπιστημιακά ιδρύματα για αναπροσαρμογή του προγράμματος σπουδών τους με παράλληλη ένταξη δομών, δράσεων και μαθημάτων προσανατολισμένες στο επιχειρείν, κυρίως από οικονομικές σχολές και όχι μόνο. Καινοτόμες δράσεις διδασκαλίας και δομές αναπτύσσονται και δραστηριοποιούνται τα τελευταία χρόνια με απώτερο στόχο την ομαλή μετάβαση των νέων στην αγορά εργασίας και την ενίσχυση του επιχειρηματικού κλίματος.

Η επιχειρηματικότητα στην Πρωτοβάθμια εκπαίδευση με βάση τα εργαστήρια δεξιοτήτων εστιάζει επίσης στην παροχή όλων των απαραίτητων εργαλείων, δεξιοτήτων και ικανοτήτων στους φοιτητές του πανεπιστημίου, οι οποίοι ως μελλοντικοί εκπαιδευτικοί θα έχουν την ευθύνη να καλλιεργήσουν την ιδέα της επιχειρηματικότητας στους μαθητές του δημοτικού σχολείου. Στόχος των εργαστηρίων δεξιοτήτων είναι η ανάδειξη του ρόλου της καινοτομίας στην εκπαιδευτική διαδικασία, στην διδασκαλία του μαθήματος της επιχειρηματικότητας μέσω καινοτόμων διδακτικών μεθόδων (μοντέλα προσομοίωσης και επιχειρηματικά παιχνίδια, μελέτες περιπτώσεων, εικονικές επιχειρήσεις, έρευνες αγοράς, επιχειρηματικά σχέδια), τόσο σε επίπεδο σχολείου όσο και σε ακαδημαϊκό επίπεδο. Η συμβολή της επιχειρηματικότητας στη διαμόρφωση επιχειρηματικών δεξιοτήτων και προσόντων μαθητών και φοιτητών έχει ως αποτέλεσμα την ενδυνάμωση της επιχειρηματικής εκπαίδευσης, της ενίσχυσης της ανταγωνιστικότητας και την διάχυση του αποτελέσματος στην τοπική κοινωνία, καθώς δημιουργεί προστιθέμενη αξία για το κοινωνικό σύνολο, τη σύνδεση της εκπαίδευσης, ειδικότερα της Τριτοβάθμιας, με την καινοτομία και την ανταγωνιστικότητα στην αγορά εργασίας. Ο ρόλος των τεχνολογικών πάρκων, των ΜΚΕ, των θερμοκοιτίδων και των business clusters στην διάχυση και εφαρμογή της καινοτομίας στο επιχειρείν είναι άξιος αναφοράς σε όλο το πλαίσιο ανάπτυξης.

ΚΑΛΕΣ ΠΡΑΚΤΙΚΕΣ ΓΙΑ ΤΟ ΕΠΙΧΕΙΡΕΙΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ:

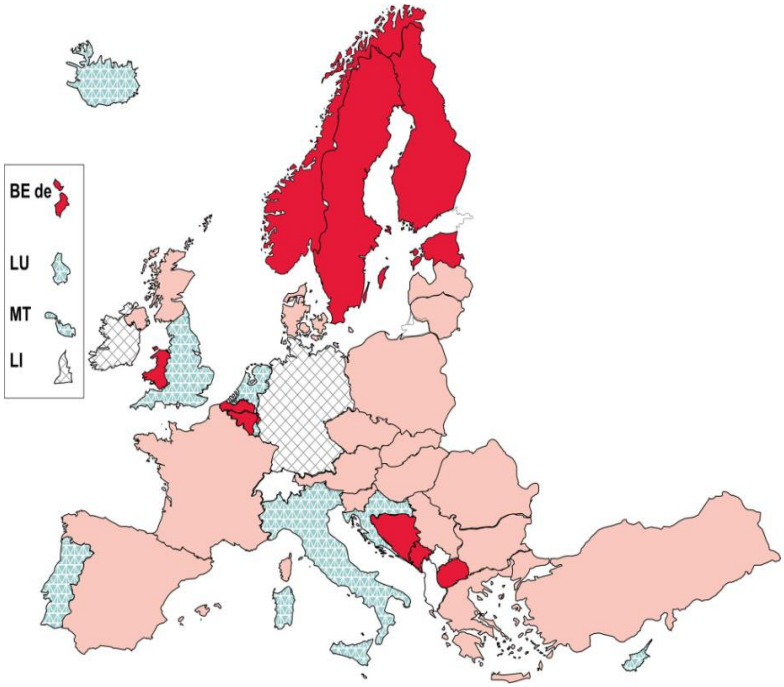
Το παράδειγμα της Ουαλίας

Το 2014/15, 29 από τις 38 χώρες/περιφέρειες που συμμετείχαν στην έρευνα για το Επιχειρείν, έχουν είτε ειδικές είτε ευρύτερες στρατηγικές που περιλαμβάνουν ειδικές συνδέσεις με την Εκπαίδευση στο Επιχειρείν. Πέρα από τις 11 χώρες/περιφέρειες που διαθέτουν ειδική στρατηγική, υπάρχουν 18 με μια ευρύτερη στρατηγική που σχετίζεται με την Εκπαίδευση στο Επιχειρείν. Συναφείς εθνικές στρατηγικές δεν υπάρχουν σε εννέα χώρες/περιφέρειες [Κροατία, Ιταλία, Κύπρος, Λουξεμβούργο, Κάτω Χώρες, Μάλτα, Πορτογαλία, Ηνωμένο Βασίλειο (Αγγλία) και Ισλανδία]. Η Κύπρος δεν έχει καμία υφιστάμενη στρατηγική, αλλά έχει μια ειδική στρατηγική για την ανάπτυξη, ενώ η Σλοβενία έχει ήδη μια ευρύτερη στρατηγική που συνδέεται με την Εκπαίδευση στο Επιχειρείν και επί του παρόντος αναπτύσσει μια ειδική στρατηγική (Ευριδίκη, 2016). Οι έρευνες δείχνουν ότι η εκπαίδευση στην επιχειρηματικότητα στην Ευρώπη ακολούθησε ανάλογη πορεία διάδοσης με αυτήν των ΗΠΑ μετά τη δεκαετία του 2000. Αντίθετα όμως με την πρώτη, στην Ευρώπη ακολουθούνται σε μεγάλο βαθμό οι οδηγίες της Ευρωπαϊκής Επιτροπής. Στο Ηνωμένο Βασίλειο, η εκπαίδευση αυτή διαδόθηκε μαζικά στα τριτοβάθμια ιδρύματα και ίσως νωρίτερα από την υπόλοιπη Ευρώπη, (NCEE, https://ncee.org.uk/).

Ιδιαίτερη έμφαση πρέπει να δοθεί και να αποτελέσει καλή πρακτική προς υιοθέτηση η στρατηγική του Ηνωμένου Βασιλείου (Ουαλία) που συνδέει επίσης το έργο αυτό με την πολιτική για την αποτελεσματικότητα του σχολείου και την επαγγελματική σταδιοδρομία. Η Ουαλία έχει δώσει έμφαση στην ενσωμάτωση της επιχειρηματικότητας στην εκπαίδευση, με στόχο την ανάπτυξη δεξιοτήτων και στάσεων που προωθούν την καινοτομία και την επιχειρηματική δράση στους μαθητές. Αυτό περιλαμβάνει την εισαγωγή προγραμμάτων επιχειρηματικότητας σε όλα τα επίπεδα

εκπαίδευσης, την ενθάρρυνση της συνεργασίας μεταξύ εκπαιδευτικών ιδρυμάτων και επιχειρήσεων, και την παροχή ευκαιριών για πρακτική εμπειρία και ανάπτυξη δεξιοτήτων. Πράγματι, η Ουαλία περιλαμβάνει λεπτομερή χάρτη της πολιτικής που υποδεικνύει πώς η στρατηγική της Εκπαίδευσης στο Επιχειρείν είναι μια γέφυρα μεταξύ του κόσμου της εκπαίδευσης, της νεολαίας, της απασχόλησης, της ένταξης και των πολιτικών ανταγωνιστικότητας. Στον παρακάτω πίνακα παρουσιάζονται στοιχεία για την υιοθέτηση της επιχειρηματικής εκπαίδευσης μέσω χρωματικών χαρτών ανά χώρα, με δεδομένα που συνδυάζουν ψηφιακή, πράσινη και ανθεκτική στρατηγική σε ευρωπαϊκό επίπεδο. (NCEE, https://ncee.org.uk/).

Εικόνα 1
Κατάταξη της επιχειρηματικής εκπαίδευσης στην Ευρώπη (EISMEA, 2021)



Η Περίπτωση των Εργαστηρίων Δεξιοτήτων στο Δημοτικό Σχολείο

Η εισαγωγή των Εργαστηρίων Δεξιοτήτων στο ελληνικό εκπαιδευτικό σύστημα αποτελεί μια από τις πλέον πρόσφατες καινοτομίες του Ινστιτούτου Εκπαιδευτικής Πολιτικής (Ι.Ε.Π.), στο πλαίσιο της προσπάθειας ενίσχυσης της ολιστικής ανάπτυξης των μαθητών και της ευθυγράμμισης της εκπαίδευσης με τις απαιτήσεις της κοινωνίας της γνώσης και της ψηφιακής διακυβέρνησης. Από το σχολικό έτος 2022-2023, τα Εργαστήρια Δεξιοτήτων ενσωματώθηκαν οργανικά στο εβδομαδιαίο ωρολόγιο πρόγραμμα των δημοτικών σχολείων, προωθώντας ένα μοντέλο μάθησης βασισμένο στην ενεργητική συμμετοχή, την καινοτομία και την ανάπτυξη βασικών κοινωνικών και γνωστικών δεξιοτήτων (ΙΕΠ, 2022). Ένας από τους βασικούς θεματικούς άξονες των Εργαστηρίων είναι το πεδίο «Δημιουργώ και Καινοτομώ – Δημιουργική Σκέψη και Πρωτοβουλία», το οποίο περιλαμβάνει την ενότητα «Επιχειρηματικότητα – Αγωγή Σταδιοδρομίας – Γνωριμία με τα Επαγγέλματα». Ο εν λόγω άξονας επιδιώκει να ενισχύσει στους μαθητές δεξιότητες όπως η ανάληψη πρωτοβουλίας, ο σχεδιασμός δράσεων, η ικανότητα λήψης αποφάσεων, η συνεργασία και η υπευθυνότητα, καθώς και η καλλιέργεια της δημιουργικής σκέψης ως θεμελίου της καινοτομίας (ΙΕΠ, 2023).

Η προσέγγιση της επιχειρηματικότητας στο δημοτικό σχολείο δεν ταυτίζεται με την οικονομική εκπαίδευση με τη στενή έννοια, αλλά προσανατολίζεται προς την ανάπτυξη της επιχειρηματικής σκέψης, της προσαρμοστικότητας και της επίλυσης προβλημάτων. Μέσα από οργανωμένες διδακτικές πρακτικές, οι μαθητές συμμετέχουν σε ομαδοσυνεργατικά σενάρια μάθησης, αναλαμβάνουν ρόλους και σχεδιάζουν μικρής κλίμακας σχέδια δράσης (projects) που έχουν αρχή, μέση και τέλος. Παραδείγματα τέτοιων δραστηριοτήτων περιλαμβάνουν τη δημιουργία εικονικών προϊόντων ή υπηρεσιών, τη μελέτη επαγγελμάτων της τοπικής κοινότητας, καθώς και δράσεις με κοινωνικό προσανατολισμό (elearning.iep.edu.gr, 2023). Η παιδαγωγική μεθοδολογία που προτείνεται από το ΙΕΠ βασίζεται σε αρχές της βιωματικής μάθησης, της διαφοροποιημένης διδασκαλίας και της ενσωμάτωσης ψηφιακών εργαλείων, ενώ ιδιαίτερη έμφαση δίνεται στον αναστοχασμό και στην ενεργή εμπλοκή των μαθητών. Τα Εργαστήρια Δεξιοτήτων, ως καινοτόμος θεσμός, υποστηρίζονται από ψηφιακή πλατφόρμα (https://elearning.iep.edu.gr), η οποία περιέχει εγκεκριμένα εκπαιδευτικά σενάρια, προτεινόμενα φύλλα εργασίας και υποστηρικτικό υλικό για εκπαιδευτικούς.

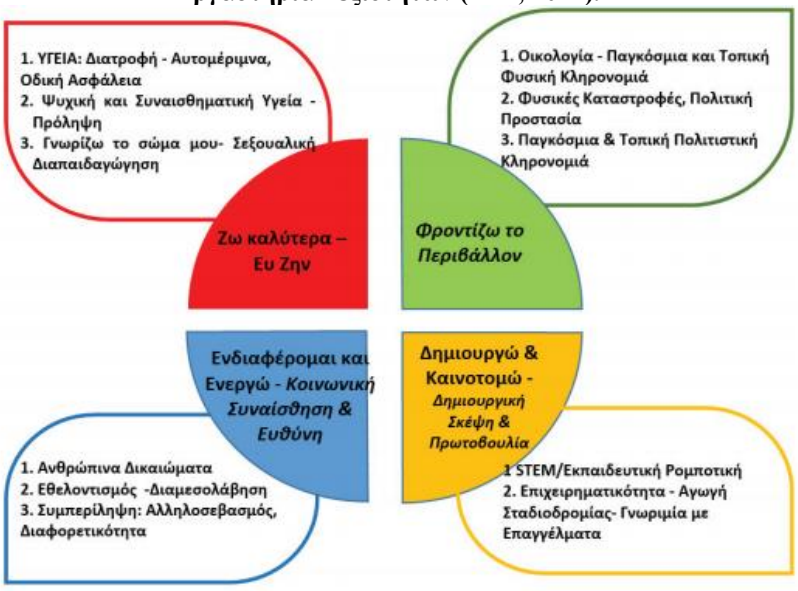
Παράλληλα με την εφαρμογή των εργαστηρίων, από το 2022 υλοποιήθηκαν επτά διαδοχικές επιμορφωτικές περίοδοι για τους εκπαιδευτικούς, μέσω εξ αποστάσεως σύγχρονης και ασύγχρονης μάθησης. Η συμμετοχή υπήρξε μαζική, με πάνω από 87.000 εκπαιδευτικούς να έχουν εγγραφεί και περισσότεροι από 71.000 να έχουν ολοκληρώσει επιτυχώς το πρόγραμμα έως τις αρχές του 2023 (Υπουργείο Παιδείας, 2023). Η επιμόρφωση εστίασε τόσο στις θεωρητικές διαστάσεις των δεξιοτήτων του 21ου αιώνα όσο και σε πρακτικές εφαρμογές στο σχολικό περιβάλλον.

Ωστόσο, η εκπαιδευτική κοινότητα έχει εκφράσει προβληματισμούς σχετικά με την εφαρμογή των Εργαστηρίων. Σύμφωνα με μεταπτυχιακή έρευνα της Πραδάκη (Pradaki, 2022), οι εκπαιδευτικοί αποδέχονται τη σημασία του νέου θεσμού, ωστόσο επισημαίνουν την ανάγκη για περισσότερο ευέλικτο και εξατομικευμένο υλικό, ενώ υπογραμμίζουν τον αυξημένο διοικητικό και διδακτικό φόρτο που προκαλεί η προετοιμασία των εργαστηρίων. Παράλληλα, διαπιστώνεται άνιση κατανομή των ψηφιακών και παιδαγωγικών πόρων μεταξύ των σχολικών μονάδων, γεγονός που δημιουργεί προβλήματα στην ομοιόμορφη εφαρμογή του θεσμού.

Κριτική ανάλυση του υλικού του ΙΕΠ από πανεπιστημιακές μελέτες έχει αναδείξει την ανάγκη ευρύτερης παιδαγωγικής ευελιξίας και ελευθερίας στη διαμόρφωση του διδακτικού πλαισίου. Ο Καραγιάννης (Karagiannis, 2023) επισημαίνει ότι η επιχειρηματικότητα δεν μπορεί να περιορίζεται σε προκαθορισμένες δραστηριότητες, αλλά απαιτεί ανοιχτό, δημιουργικό και παιγνιώδες περιβάλλον μάθησης που ανταποκρίνεται στις ανάγκες των ίδιων των μαθητών και του τοπικού κοινωνικού πλαισίου.

Συνοψίζοντας, τα Εργαστήρια Δεξιοτήτων συνιστούν μια σύγχρονη εκπαιδευτική πρωτοβουλία με στόχο τη συστηματική ανάπτυξη κρίσιμων δεξιοτήτων και την εισαγωγή της επιχειρηματικής λογικής στην πρωτοβάθμια εκπαίδευση. Παρά τις προκλήσεις που αφορούν την εφαρμογή τους, η εμπειρία έως τώρα δείχνει ότι οι μαθητές αποκτούν δεξιότητες αυτόνομης δράσης, καινοτομίας και συνεργασίας. Η σύνδεση των εργαστηρίων με τις απαιτήσεις της ψηφιακής διακυβέρνησης ενισχύει τη σημασία τους στο πλαίσιο της διαρκώς μεταβαλλόμενης κοινωνικής και οικονομικής πραγματικότητας. Η συνέχιση του θεσμού, σε συνδυασμό με ουσιαστική ανατροφοδότηση και συνεχή επιμόρφωση των εκπαιδευτικών, αποτελεί κρίσιμο παράγοντα για τη βιωσιμότητα και την αποτελεσματικότητά του. Στην παρακάτω εικόνα εμπεριέχεται ο διαχωρισμός σε τέσσερις θεματικούς άξονες —**Ζω καλύτερα – Ευ Ζην**, **Φροντίζω το Περιβάλλον**, **Ενδιαφέρομαι και Ενεργώ**, **Δημιουργώ & Καινοτομώ**— και αποτυπώνονται οι επίσημοι θεματικοί κύκλοι των Εργαστηρίων Δεξιοτήτων του Ινστιτούτου Εκπαιδευτικής Πολιτικής (ΙΕΠ). Το σχήμα απεικονίζει τους τέσσερις κύριους άξονες και τις αντίστοιχες υποενότητες για κάθε θεματική ενότητα, όπως αναφέρονται στην επίσημη υλοποίηση των Εργαστηρίων Δεξιοτήτων (Ινστιτούτο Εκπαιδευτικής Πολιτικής). Ανήκει σε επίσημο υλικό του ΙΕΠ, το οποίο παρουσιάζει κατάλογο και περιγραφή των τεσσάρων κύριων θεματικών ενοτήτων των Εργαστηρίων Δεξιοτήτων (Ζω καλύτερα – Ευ Ζην, Φροντίζω το Περιβάλλον, Ενδιαφέρομαι και Ενεργώ, Δημιουργώ & Καινοτομώ) (Ινστιτούτο Εκπαιδευτικής Πολιτικής, ojs.lib.uom.gr).

Εικόνα 2
Εργαστήρια Δεξιοτήτων (ΙΕΠ, 2021).



Στην επόμενη εικόνα υπάρχει ο πίνακας κατανομής των υποθεματικών αξόνων των Εργαστηρίων Δεξιοτήτων στην Πρωτοβάθμια εκπαίδευση (Νηπιαγωγείο - Δημοτικό) κατ' αντιστοιχία με τον επίσημο πίνακα του Ινστιτούτου Εκπαιδευτικής Πολιτικής, όπως περιγράφεται στον πρακτικό οδηγό και στο «Πλαίσιο Προγράμματος Σπουδών» για τα Εργαστήρια (Φ.31/94185/Δ1/2021, Β΄3791).

Εικόνα 3
Πίνακας κατανομής υποθεματικών αξόνων Εργαστηρίων Δεξιοτήτων (ΙΕΠ, 2021).

	ΝΗΠΙΑΓΩΓΕΙΟ	ΔΗΜΟΤΙΚΟ					
1. ΖΩ ΚΑΛΥΤΕΡΑ – ΕΥ ΖΗΝ		Α	Β	Γ	Δ	Ε	ΣΤ
1. ΥΓΕΙΑ: Διατροφή- Αυτομέριμνα, Οδική Ασφάλεια	Χ	Χ			Χ		
2. Ψυχική και Συναισθηματική Υγεία - Πρόληψη			Χ			Χ	
3. Γνωρίζω το σώμα μου- Σεξουαλική Διαπαιδαγώγηση				Χ			Χ
2. ΦΡΟΝΤΙΖΩ ΤΟ ΠΕΡΙΒΑΛΛΟΝ							
1. Οικολογία - Παγκόσμια και τοπική Φυσική κληρονομιά	Χ	Χ			Χ		
2. Φυσικές Καταστροφές, Πολιτική προστασία			Χ			Χ	
3. Παγκόσμια και τοπική Πολιτιστική Κληρονομιά				Χ			Χ
3. ΕΝΔΙΑΦΕΡΟΜΑΙ ΚΑΙ ΕΝΕΡΓΩ - Κοινωνική Συναίσθηση και Ευθύνη							
1. Ανθρώπινα δικαιώματα	Χ	Χ			Χ		
2. Εθελοντισμός διαμεσολάβηση			Χ			Χ	
3. Συμπερίληψη: Αλληλοσεβασμός, διαφορετικότητα				Χ			Χ
4. ΔΗΜΙΟΥΡΓΩ ΚΑΙ ΚΑΙΝΟΤΟΜΩ - Δημιουργική Σκέψη και Πρωτοβουλία							
1 STEM - Εκπαιδευτική Ρομποτική	Χ	Χ			Χ	Χ	
2. Επιχειρηματικότητα - Αγωγή Σταδιοδρομίας- Γνωριμία με επαγγέλματα			Χ	Χ			Χ

Βιωσιμότητα και Εκπαίδευση-Συμπεράσματα

Η έννοια της βιωσιμότητας στην επιχειρηματικότητα, όταν προσεγγίζεται μέσα από το εκπαιδευτικό πρίσμα, αποκτά σύνθετη παιδαγωγική, κοινωνική και τεχνολογική διάσταση. Η εκπαιδευτική επιχειρηματικότητα δεν αφορά απλώς στην ανάπτυξη οικονομικών δεξιοτήτων, αλλά συνδέεται με την καλλιέργεια αξιών, στάσεων και νοοτροπιών που διαμορφώνουν υπεύθυνους, καινοτόμους και κοινωνικά συνειδητοποιημένους πολίτες. Η βιωσιμότητα, με βάση τον τριπλό πυλώνα περιβάλλοντος, κοινωνίας και διακυβέρνησης (ESG), ενσωματώνεται στην εκπαίδευση με στόχο τη δημιουργία ενός νέου μοντέλου μάθησης που συνδέει τη δημιουργικότητα, την κοινωνική ευθύνη και τη χρήση της τεχνολογίας για το κοινό καλό.

Η ψηφιακή διακυβέρνηση λειτουργεί ως επιταχυντής αυτής της διαδικασίας. Η ανάπτυξη ολοκληρωμένων ψηφιακών υποδομών και η διασύνδεση των δημόσιων υπηρεσιών με την εκπαιδευτική κοινότητα επιτρέπουν την υλοποίηση και διάχυση δράσεων επιχειρηματικού χαρακτήρα, με τρόπο διαφανή, ασφαλή και προσβάσιμο. Το παράδειγμα της Ελλάδας, μέσω της στρατηγικής «Ψηφιακή Βίβλος 2021–2025», αποτυπώνει την πρόθεση μετασχηματισμού του δημόσιου τομέα σε διαλειτουργικό και καινοτόμο σύστημα που ενισχύει τη συμμετοχική κουλτούρα (Υπουργείο Ψηφιακής Διακυβέρνησης, 2022).

Σε αυτό το πλαίσιο, η βιώσιμη επιχειρηματικότητα στην εκπαίδευση δεν αναφέρεται μόνο στη διατήρηση ενός εγχειρήματος στο χρόνο, αλλά και στην ικανότητα του σχολείου να προσαρμόζεται, να ενσωματώνει σύγχρονα ψηφιακά εργαλεία, να ευαισθητοποιεί περιβαλλοντικά και να δημιουργεί κοινωνικό κεφάλαιο. Έρευνες δείχνουν ότι η ενίσχυση της ψηφιακής ωριμότητας στις σχολικές μονάδες συνδέεται με υψηλότερα επίπεδα συνεργασίας, καινοτομίας και συμμετοχής σε κοινοτικές δράσεις με αναπτυξιακό πρόσημο (Iosifidis, 2023). Ειδικά στο πλαίσιο της πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης, η διασύνδεση της μαθησιακής εμπειρίας με έννοιες όπως η κοινωνική επιχειρηματικότητα, η κυκλική οικονομία και η περιβαλλοντική καινοτομία διευρύνει τη νοηματοδότηση της επιχειρηματικής δράσης, απομακρύνοντάς την από τη στενή εμπορική λογική.

Η επιτυχής και βιώσιμη ενσωμάτωση της επιχειρηματικότητας στην εκπαίδευση απαιτεί συγκεκριμένες προϋποθέσεις: επιμορφωμένο και ενδυναμωμένο εκπαιδευτικό προσωπικό, ανοιχτή παιδαγωγική κουλτούρα, ψηφιακά υποστηριζόμενο περιβάλλον μάθησης και θεσμική αναγνώριση της δημιουργικής πρωτοβουλίας. Ο ρόλος του κράτους, μέσω της ψηφιακής διακυβέρνησης, είναι κρίσιμος στην παροχή εργαλείων, κινήτρων και δομών για την ενίσχυση αυτών των προϋποθέσεων. Η ενσωμάτωση εργαλείων συμμετοχικού σχεδιασμού, ανοιχτών δεδομένων και διαλειτουργικών εκπαιδευτικών πλατφορμών ενισχύει την εκπαιδευτική καινοτομία και επιτρέπει στους μαθητές να ασκηθούν σε ρεαλιστικά περιβάλλοντα λήψης αποφάσεων (OECD, 2023).

Η βιωσιμότητα στην εκπαιδευτική επιχειρηματικότητα προϋποθέτει επίσης τη διαρκή ανατροφοδότηση και αξιολόγηση. Σύμφωνα με σύγχρονες προσεγγίσεις, η επιχειρηματικότητα δεν είναι μόνο περιεχόμενο μάθησης αλλά και μέθοδος, ένα "πλαίσιο σκέψης" που ενδυναμώνει τη μαθησιακή αυτονομία, την καινοτομία και τη συνεργατική πρακτική (Kirkwood et al., 2022). Έτσι, η εκπαιδευτική επιχειρηματικότητα μπορεί να συμβάλει ουσιαστικά στην κοινωνική συνοχή, την οικολογική συνείδηση και την οικονομική αυτονομία, όταν εντάσσεται σε ένα ψηφιακά ενισχυμένο και παιδαγωγικά ευέλικτο περιβάλλον.

Συνοψίζοντας, η βιωσιμότητα της επιχειρηματικότητας στην εκπαίδευση δεν είναι αποτέλεσμα στατικής εφαρμογής ενός προγράμματος, αλλά προϊόν διαρκούς εξέλιξης, διαλόγου και προσαρμογής. Η ψηφιακή διακυβέρνηση, με τα εργαλεία και τις πολιτικές που προσφέρει, μπορεί να λειτουργήσει καταλυτικά στη διαμόρφωση ενός εκπαιδευτικού οικοσυστήματος που προάγει την υπευθυνότητα, την καινοτομία και τη συμμετοχική μάθηση. Μέσα σε αυτό το πλαίσιο, η εκπαιδευτική επιχειρηματικότητα αποκτά βιώσιμο χαρακτήρα, ως πράξη διαρκούς ενδυνάμωσης της σχολικής κοινότητας και κοινωνικής εμπλοκής των νέων πολιτών του ψηφιακού κόσμου.

Επομένως, η επιχειρηματικότητα μπορεί να ενσωματωθεί στη βιωσιμότητα μέσω της ανάπτυξης "υπεύθυνων επιχειρηματικών δεξιοτήτων" που εστιάζουν όχι μόνο στη δημιουργία οικονομικής αξίας, αλλά και στην επίλυση κοινωνικών και περιβαλλοντικών προβλημάτων, εντός ενός παιδαγωγικού πλαισίου που καλλιεργεί την καινοτομία, την κοινωνική συνείδηση και την περιβαλλοντική ευαισθησία.

Αυτό μπορεί να υλοποιηθεί:

- -με την ένταξη της κοινωνικής και περιβαλλοντικής επιχειρηματικότητας στα σχολικά προγράμματα,
- -με τη χρήση σεναρίων μάθησης που αφορούν στην επίλυση προβλήματος, όπως για παράδειγμα πώς να μειώσουμε τα απορρίμματα στο σχολείο μέσω μιας "μαθητικής startup",
- -και με την αξιοποίηση ψηφιακών εργαλείων για την παρακολούθηση του κοινωνικού και περιβαλλοντικού αντίκτυπου των δράσεων των μαθητών.

Συνεπώς, η επιχειρηματικότητα δύναται να λειτουργήσει ως μέσο και όχι ως σκοπός: ως όχημα για να αναπτύξουν οι μαθητές δεξιότητες που είναι απαραίτητες για έναν κόσμο που αλλάζει, με κριτήριο όχι μόνο την αποδοτικότητα, αλλά και τη βιωσιμότητα.

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Η ΠΡΑΣΙΝΗ, ΨΗΦΙΑΚΗ ΓΕΙΤΟΝΙΑ ΤΟΥ ΝΗΠΙΑΓΩΓΕΙΟΥ

Τσιγγερλιώτη Άννα
Νηπιαγωγός
Med στη «Διδακτική των Μαθηματικών» του Πανεπιστημίου Δυτικής Μακεδονίας
33ο Νηπιαγωγείο Ευόσμου
e-mail: atsiggerlioti@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία αφορά την συμμετοχή του 33ου Νηπιαγωγείου Ευόσμου στο Εκπαιδευτικό Πρόγραμμα ηλεκτρονικής μάθησης «Πράσινες γειτονιές» το οποίο υλοποιήθηκε από τη Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Δυτικής Θεσσαλονίκης, δια της Υπευθύνου Περιβαλλοντικής Εκπαίδευσης σε συνεργασία με το NOUS, Ινστιτούτο Ψηφιακής Μάθησης και Επικοινωνίας. Σκοπός του εκπαιδευτικού προγράμματος είναι η ευαισθητοποίηση των μαθητών/τριών σε θέματα που αφορούν στην ανάγκη διατήρησης και προστασίας του πράσινου στο άμεσο περιβάλλον τους, τη γειτονιά τους και η ανάπτυξη της συμμετοχής σε ενέργειες, που αποσκοπούν στη βελτίωση του περιβάλλοντος και την αναβάθμιση της ποιότητας ζωής τους. Παρουσιάζονται τα βήματα που ακολουθήθηκαν για την υλοποίηση του προγράμματος αξιοποιώντας ψηφιακά εργαλεία όπως το Google earth και το Google Lens, για την δημιουργία ενός ψηφιακού συνεργατικού χάρτη όπου απεικονίζεται από τους μαθητές/τριες η γειτονιά του σχολείου όπως θα ήθελαν να είναι αναφορικά με το πράσινο. Οι μαθητές/τριες μέσω της διερευνητικής μάθησης και της συμμετοχής σε παιγνιώδες δραστηριότητες ενθαρρύνονται να αναπτύξουν πρωτοβουλία, υπευθυνότητα και δράση για το περιβάλλον του σχολείου. Έχοντας συλλέξει τεκμήρια από την μελέτη στο πεδίο, τα παιδιά ευαισθητοποιούνται και λαμβάνουν αποφάσεις για τις ευρύτερες συνθήκες στην γειτονιά τους.

Δίνεται έμφαση στις δυνατότητες που μπορεί να παρέχει το ψηφιακό μέσο για τον εμπλουτισμό της μαθησιακής εμπειρίας, της επικοινωνίας μεταξύ των μαθητών/τριών ενώ παράλληλα διατυπώνεται η ανάγκη για μια κριτική τοποθέτηση απέναντι στα χαρακτηριστικά της αξιοποίησής του. Τα παιδιά εξοικειώνονται με την χρήση ψηφιακών εργαλείων και μέσων, επικοινωνούν τις ιδέες του με άλλα σχολεία και μοιράζονται πραγματικές εμπειρίες. Παράλληλα προάγεται η μαθησιακή εμπειρία και υποστηρίζεται η ολόπλευρη ανάπτυξη των παιδιών καθώς παρέχονται ευκαιρίες ώστε να αναπτύξουν ψηφιακές δεξιότητες και στάσεις για την χρήση της τεχνολογίας.

Το πρόγραμμα υλοποιήθηκε στο πλαίσιο μετασχηματισμού του νηπιαγωγείου σε αειφόρο σχολείο, υιοθετώντας μια ολιστική προσέγγιση σε πρακτικές σύμφωνες με τις αξίες της αειφορίας σε παιδαγωγικό, κοινωνικό και περιβαλλοντικό πεδίο.

Λέξεις – κλειδιά: ψηφιακός χάρτης, αειφόρο σχολείο, νηπιαγωγείο

ΕΙΣΑΓΩΓΗ

Η σύγχρονη προσχολική εκπαίδευση βιώνει μια σημαντική μεταβολή με την ενσωμάτωση των Νέων Τεχνολογιών και των ΤΠΕ (Τεχνολογίες Πληροφορίας και Επικοινωνίας), οι οποίες λειτουργούν ως εργαλεία για τη διεύρυνση των μαθησιακών εμπειριών και την ανάπτυξη δεξιοτήτων του 21ου αιώνα καθώς ενισχύουν τη δημιουργικότητα και την αυτονομία του παιδιού. (Prensky, 2001; Papert, 2020). Οι ΤΠΕ δεν περιορίζονται στην απλή παρουσίαση πληροφοριών· αντίθετα, παρέχουν εφαρμογές που ενσωματώνουν στρατηγικές όπως ανατροφοδότηση και διαφοροποιημένη διδασκαλία και ενισχύουν τη διερευνητική μάθηση, τη δημιουργικότητα, την ανάπτυξη ψηφιακού γραμματισμού και την συνεργασία μεταξύ των παιδιών (Papadakis & Kalogiannakis, 2019). Στο πλαίσιο αυτό, η προσχολική ηλικία αναδεικνύεται ως κρίσιμη περίοδος, κατά την οποία η αξιοποίηση ψηφιακών εργαλείων μπορεί να συμβάλλει στη διαμόρφωση θετικών στάσεων απέναντι στη μάθηση και το περιβάλλον, ενώ παράλληλα ενισχύει την κοινωνικο-συναισθηματική και γνωστική ανάπτυξη των παιδιών.

Σύμφωνα με τον Piaget (1972), η γνωστική ανάπτυξη των παιδιών πραγματοποιείται μέσα από συγκεκριμένα στάδια και μηχανισμούς ανάπτυξης τονίζοντας την ανάγκη για κατάλληλα σχεδιασμένα μαθησιακά περιβάλλοντα που σέβονται το αναπτυξιακό στάδιο κάθε παιδιού, επομένως η τεχνολογία, όταν χρησιμοποιείται σωστά, μπορεί να ενισχύσει τη μάθηση, τη λογική σκέψη και τη δημιουργικότητα των παιδιών, ενώ η υπερβολική χρήση της μπορεί να περιορίσει την κοινωνική αλληλεπίδραση και τη σωματική δραστηριότητα. Η θεωρία του Vygotsky (1978) τονίζει τη σημασία της κοινωνικής αλληλεπίδρασης και της καθοδήγησης από ενήλικες και πιο ικανούς συνομηλίκους στη ζώνη επικείμενης ανάπτυξης (ZEA) για την μάθηση και την ανάπτυξη δεξιοτήτων. Σύμφωνα λοιπόν με την θεωρία του η τεχνολογία μπορεί να λειτουργήσει ως κοινωνικό και παιδαγωγικό εργαλείο που ενισχύει τη μάθηση μέσα από καθοδήγηση και συνεργασία. Μέσω διαδραστικών εφαρμογών, πλατφορμών μάθησης και συνεργατικών ψηφιακών δραστηριοτήτων, τα παιδιά μπορούν να αποκτήσουν δεξιότητες που διαφορετικά θα ήταν δύσκολο να αναπτύξουν μόνα τους, ενώ η σωστή χρήση της τεχνολογίας ενισχύει την κοινωνική αλληλεπίδραση και τη γνωστική ανάπτυξη. Η προσέγγιση του Dewey (1986) για τη βιωματική μάθηση αναδεικνύει τη σημασία της εμπλοκής των παιδιών σε αυθεντικές δραστηριότητες που συνδέονται με την καθημερινή ζωή και όπως ο ίδιος προτείνει, η τεχνολογία μπορεί να υποστηρίξει τη μάθηση μέσω εμπειρίας, παρέχοντας διαδραστικά εργαλεία και πλατφόρμες που ενισχύουν την ενεργή συμμετοχή, τη συνεργασία και την εφαρμογή της γνώσης στην πράξη

Σε αυτό το πλαίσιο, οι νέες τεχνολογίες περιλαμβάνοντας εργαλεία όπως ψηφιακούς χάρτες, Google Earth, και εφαρμογές όπως το Google Lens, τα οποία χρησιμοποιήθηκαν στο πρόγραμμα, επιτρέπουν στα νήπια να διερευνούν το φυσικό και κοινωνικό περιβάλλον της γειτονιάς τους και να αναζητούν σχετικές πληροφορίες. Οι πρακτικές αυτές προάγουν την περιβαλλοντική ευαισθησία, ενισχύουν την βιώσιμη εκπαίδευση και την πρόσβαση σε περιβαλλοντικές πληροφορίες και προάγουν την κοινωνική υπευθυνότητα, σύμφωνα με τις αρχές της Εκπαίδευσης για την Αειφόρο Ανάπτυξη (ESD) (UNESCO, 2017; Sterling, 2010).

Η μαθηματική εκπαίδευση στην προσχολική ηλικία αποτελεί επίσης σημαντικό πεδίο στην διαδικασία ανάπτυξης των παιδιών καθώς τα νήπια μέσα από δραστηριότητες προσέγγισης των εννοιών του χώρου "*βοηθιούνται να βελτιώσουν την χωρική τους αντίληψη, να εισαχθούν στην αριθμητική και γεωμετρική σκέψη, να αναπτύξουν την έννοια της κανονικότητας και να βελτιώσουν την σημειωτική τους δραστηριότητα."* (Tzekaki, 2010). Η ενσωμάτωση ψηφιακών εργαλείων στις δραστηριότητες αυτές δίνει στα παιδιά τη δυνατότητα να παρατηρούν, να καταγράφουν και να αναλύουν δεδομένα με δημιουργικό και διαδραστικό τρόπο. Παράλληλα να κατανοούν, να αναπαριστούν και να επεξεργάζονται θέσεις και διαδρομές, και να εξοικειωθούν με τους χάρτες χρησιμοποιώντας λεκτικές περιγραφές ή σχεδιάζοντας καταστάσεις από μνήμης

Διεθνείς έρευνες αναδεικνύουν τη χρήση των ψηφιακών μέσων στην προσχολική εκπαίδευση καθώς φαίνεται να ενισχύει σημαντικά την ενεργό συμμετοχή και την ανάπτυξη των κοινωνικών δεξιοτήτων Τα ευρήματα της μελέτης των (Marsh et al, 2018) δείχνουν ότι οι ψηφιακές εφαρμογές μπορούν να υποστηρίξουν το παιχνίδι και τη δημιουργικότητα των παιδιών προσχολικής ηλικίας, αρκεί να είναι κατάλληλα σχεδιασμένες και να ενθαρρύνουν την ελεύθερη εξερεύνηση. Ειδικότερα, οι «ανοιχτού τύπου» εφαρμογές επιτρέπουν φαντασία και πειραματισμό ενισχύουν τη δημιουργικότητα, ενώ οι πιο «κλειστού τύπου» καθώς προσφέρουν καθοδηγούμενη μάθηση. Παρόμοια η μελέτη των Kontovourki και Tafa (2019) υπογραμμίζει ότι η χρήση ψηφιακής αφήγησης (collaborative storytelling) ενθαρρύνει τα παιδιά να συμμετέχουν ενεργά στη δημιουργία ιστοριών, ενώ παράλληλα προάγει την επικοινωνία, τη συνεργασία και την αλληλοϋποστήριξη μεταξύ τους.

Η παρούσα εργασία επικεντρώνεται στην αξιοποίηση ψηφιακών εργαλείων στην προσχολική εκπαίδευση, με ιδιαίτερη έμφαση στον ρόλο τους στο πλαίσιο του αειφόρου σχολείου και συγκεκριμένα μέσα από την υλοποίηση του προγράμματος «Πράσινες Γειτονιές». Το πρόγραμμα αυτό, σε συνεργασία με την Υπεύθυνη Περιβαλλοντικής

Εκπαίδευσης Δυτικής Θεσσαλονίκης και το Ινστιτούτο Ψηφιακής Μάθησης και Επικοινωνίας NOUS, στοχεύει στην ανάπτυξη δεξιοτήτων που προάγουν τη βιωματική μάθηση, την κριτική σκέψη, τη συνεργασία και την περιβαλλοντική ευαισθησία των νηπίων. Μέσα από τη δημιουργία ψηφιακών χαρτών, τη χαρτογράφηση της γειτονιάς και τη χρήση εργαλείων επιστημονικής παρατήρησης, τα νήπια έχουν τη δυνατότητα να κατανοήσουν έννοιες όπως η συλλογική δράση, η υπευθυνότητα και η αειφορία.

Η προσέγγιση του Sterling (2010) για την αειφόρο εκπαίδευση δίνει έμφαση στη μετασχηματιστική μάθηση, όπου η αλλαγή του τρόπου σκέψης των μαθητώ/τριών οδηγεί σε ενεργούς και υπεύθυνους πολίτες. Αυτό συνδέεται με τη θεωρία της μάθησης μέσω εμπειρίας του Kolb (2014), η οποία υπογραμμίζει ότι η γνώση οικοδομείται μέσα από βιωματικές εμπειρίες, τον αναστοχασμό και την εφαρμογή. Παράλληλα, οι Voogt και Roblin (2012) αναδεικνύουν τις δεξιότητες του 21ου αιώνα (κριτική σκέψη, συνεργασία, δημιουργικότητα, ψηφιακός γραμματισμός), οι οποίες ευθυγραμμίζονται με τις αρχές της αειφορικής εκπαίδευσης και απαιτούν παιδαγωγικές πρακτικές που προωθούν συμμετοχή, συνεργασία και υπευθυνότητα. Η σύνθεση αυτών των προσεγγίσεων δείχνει ότι η αειφόρος εκπαίδευση δεν είναι απλώς γνωστική διαδικασία, αλλά βιωματική και κοινωνικά προσανατολισμένη μάθηση, απαραίτητη για την καλλιέργεια των δεξιοτήτων που απαιτεί η σύγχρονη εποχή.

Η εισαγωγή των νέων τεχνολογιών στο πλαίσιο του αειφόρου σχολείου δεν περιορίζεται μόνο στη γνωστική διάσταση. Η έννοια του αειφόρου σχολείου αναδεικνύει την ανάγκη για μια ολοκληρωμένη προσέγγιση που συνδυάζει παιδαγωγικές πρακτικές, περιβαλλοντική ευαισθησία, κοινωνική συμμετοχή και την καλλιέργεια αξιών υπευθυνότητας και συνεργασίας (Sterling, 2010; UNESCO, 2017) και όπως υποστηρίζουν οι Siraj-Blatchford, Smith, και Samuelsson, (2010) η εκπαίδευση για την αειφορία πρέπει να ξεκινά από την προσχολική ηλικία, μέσα από εμπειρίες που καλλιεργούν υπευθυνότητα, συνεργασία και φροντίδα για το περιβάλλον. Μέσα από τη χρήση ψηφιακών εργαλείων, τα νήπια έχουν την ευκαιρία να συνδεθούν με το περιβάλλον της γειτονιάς τους, να παρατηρήσουν, να καταγράψουν δεδομένα και να προτείνουν παρεμβάσεις για τη βελτίωση του φυσικού περιβάλλοντος, ενισχύοντας έτσι την ενεργό συμμετοχή τους στην κοινότητα. Άλλωστε, η Εκπαίδευση για την Αειφορία στην προσχολική ηλικία αποτελεί κρίσιμο πεδίο για τη διαμόρφωση οικολογικής συνείδησης και βιώσιμων στάσεων ζωής. Σύμφωνα μάλιστα με τη βιβλιογραφική επισκόπηση των Hedefalk, Almqvist και Östman (2015), η πρώιμη παιδική ηλικία είναι η καταλληλότερη περίοδος για την καλλιέργεια αξιών και συμπεριφορών που συνδέονται με την αειφόρο ανάπτυξη, ενώ η έρευνα παρέχει αποδείξεις για τα θετικά αποτελέσματα των κατάλληλα σχεδιασμένων εκπαιδευτικών προγραμμάτων. Ομοίως, η σύγχρονη μελέτη των Ärlemalm-Hagsér και Elliott (2017) παρουσιάζει πρακτικές εφαρμογές και καινοτόμες προσεγγίσεις, συνδέοντας τη θεωρία με την καθημερινή εκπαιδευτική πράξη σε διαφορετικά προσχολικά πλαίσια και αναδεικνύει τη σημασία της βιωματικής μάθησης για την ενίσχυση της περιβαλλοντικής συνείδησης.

Συνολικά, η εισαγωγή αυτή θέτει το θεωρητικό πλαίσιο για την αξιοποίηση των ΤΠΕ στην προσχολική εκπαίδευση, συνδέοντας τη γνωστική, κοινωνικο-συναισθηματική και δημιουργική διάσταση της μάθησης με τις αρχές της βιωματικής και διερευνητικής μάθησης, της μαθηματικής εκπαίδευσης και της αειφορίας. Στο επόμενο τμήμα της εργασίας θα αναλυθεί ο σκοπός του προγράμματος «Πράσινες Γειτονιές», τα επιδιωκόμενα μαθησιακά αποτελέσματα και οι δεξιότητες που προάγονται μέσω της ενσωμάτωσης ψηφιακών εργαλείων.

ΣΚΟΠΟΣ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ

Το πρόγραμμα «Πράσινες Γειτονιές» έχει ως βασικό στόχο την ενίσχυση της μαθησιακής εμπειρίας των νηπίων μέσα από τη βιωματική, διερευνητική και συνεργατική μάθηση, αξιοποιώντας ψηφιακά εργαλεία και προσεγγίσεις που συνδέονται με την Εκπαίδευση για την Αειφόρο Ανάπτυξη (ESD). Επίσης στοχεύει να ενσωματώσει τις αξίες της αειφορίας, της ενεργού συμμετοχής και της κοινωνικής υπευθυνότητας, όπως περιγράφεται στην Διευρυμένη Έκδοση του Προγράμματος Σπουδών (Ministry of Education, Research and Religious Affairs, 2024).

Συγκεκριμένα, το πρόγραμμα επιδιώκει:

1. Ενίσχυση δεξιοτήτων ψηφιακού γραμματισμού και κριτικής σκέψης: Τα νήπια χρησιμοποιούν ψηφιακά εργαλεία όπως Google Earth και Google Lens (εφαρμογές χαρτογράφησης, αναζήτησης, επεξεργασίας και παρουσίαση πληροφοριών). Μέσα από αυτές τις δραστηριότητες, τα παιδιά αναπτύσσουν ικανότητες ανάλυσης και επίλυσης προβλημάτων, συμβαδίζοντας με τις κατευθυντήριες γραμμές της UNESCO για την ESD, οι οποίες προάγουν την ανάπτυξη δεξιοτήτων όπως η κριτική σκέψη και η επίλυση προβλημάτων (UNESCO, 2017).

2. Καλλιέργεια οικολογικής συνείδησης και περιβαλλοντικής ευαισθησίας: Μέσα από δραστηριότητες παρατήρησης, χαρτογράφησης και σχεδιασμού παρεμβάσεων στο φυσικό περιβάλλον της γειτονιάς, τα παιδιά αναγνωρίζουν τις συνέπειες των ανθρώπινων δράσεων και μαθαίνουν να σέβονται τη φύση. Οι δραστηριότητες αυτές

συνδέονται άμεσα με τη βιωματική μάθηση (Dewey, 1986) και τονίζουν τη σημασία της ενεργού συμμετοχής των παιδιών σε δράσεις που προάγουν την αειφορία.

3. Ανάπτυξη συνεργατικών και κοινωνικών δεξιοτήτων: Οι ομαδικές δραστηριότητες ενισχύουν τη συνεργασία, την επικοινωνία και την υπευθυνότητα, προάγοντας την κοινωνική αλληλεπίδραση και την εμπλοκή σε συλλογικές αποφάσεις. Η προσέγγιση αυτή εναρμονίζεται με τις θεωρίες του Vygotsky (1978) για τη σημασία της κοινωνικής αλληλεπίδρασης στη μάθηση και της Ζώνης Επικείμενης Ανάπτυξης.

4. Εισαγωγή μαθηματικών και χωροταξικών εννοιών μέσω ψηφιακής χαρτογράφησης: Η δημιουργία ψηφιακών χαρτών και η χρήση εργαλείων όπως το Google Earth επιτρέπουν στα νήπια να αναπτύξουν δεξιότητες προσανατολισμού, να ακολουθήσουν διαδρομές, που θα τα βοηθήσουν στην κατανόηση του χάρτη (Tzekaki, 2010). Η μαθηματική αυτή δράση βελτιώνει την αναπαραστατική ικανότητα καθώς η ανάγνωση και η δημιουργία χάρτη αποτελούν μια σύνθετη και απαιτητική διαδικασία.

5. Σύνδεση με πραγματικά προβλήματα και την κοινότητα: Η ενεργός συμμετοχή σε τοπικά περιβαλλοντικά ζητήματα, όπως ο σχεδιασμός παρεμβάσεων για τη βελτίωση της γειτονιάς, επιτρέπει στα νήπια να συνδέσουν τη σχολική μάθηση με τον πραγματικό κόσμο. Οι δραστηριότητες αυτές ενισχύουν την αίσθηση συλλογικής δράσης και κοινωνικής υπευθυνότητας, όπως υποστηρίζεται και από διεθνείς έρευνες που δείχνουν ότι η εμπλοκή σε αυθεντικά προβλήματα βελτιώνει την ενεργή συμμετοχή και τη βιωματική μάθηση (Marsh et al., 2018; Papadakis & Kalogiannakis, 2019; Kontovourki & Tafa, 2019).

Στο πλαίσιο της θεωρίας του Kolb (2014), το πρόγραμμα «Πράσινες γειτονιές» επισημαίνει την σημασία της παρατήρηση, της εμπειρίας, της αναστοχαστικής σκέψης και της ενεργούς συμμετοχής των παιδιών στο περιβάλλον τους. Οι ψηφιακές εφαρμογές λειτουργούν ως εργαλεία υποστήριξης αυτής της διαδικασίας, δίνοντας τη δυνατότητα στα παιδιά να καταγράψουν, να αναπαραστήσουν και να αναλύσουν τα δεδομένα της εμπειρίας τους, ενισχύοντας την περιέργεια και την αυτενέργεια των παιδιών.

Ένα επιπλέον στοιχείο του σκοπού του προγράμματος είναι η διασύνδεση των ΤΠΕ με την αειφορία. Οι ΤΠΕ επιτρέπουν στα νήπια να παρακολουθούν και να αναλύουν περιβαλλοντικά δεδομένα, να κατανοούν τις επιπτώσεις των ανθρώπινων δραστηριοτήτων και να προτείνουν λύσεις για τη βελτίωση του φυσικού χώρου, προωθώντας την οικολογική συνείδηση και τη συμμετοχικότητα (UNESCO, 2017; Sterling, 2010). Με τον τρόπο αυτό, η χρήση ψηφιακών εργαλείων δεν περιορίζεται στην τεχνολογική διάσταση, αλλά ενσωματώνεται στην ολιστική παιδαγωγική προσέγγιση του αειφόρου σχολείου.

Συνοπτικά, ο σκοπός του προγράμματος «Πράσινες Γειτονιές» είναι να δημιουργήσει ένα μαθησιακό περιβάλλον όπου η γνώση, η τεχνολογία, η βιωματική μάθηση και η κοινωνική συμμετοχή συνδυάζονται για την ανάπτυξη ολοκληρωμένων δεξιοτήτων στα νήπια. Το πρόγραμμα ενσωματώνει τις θεωρητικές αρχές των Piaget, Vygotsky, Dewey και Kolb, ενώ παράλληλα αξιοποιεί διεθνείς ερευνητικές καταγραφές για την αποτελεσματικότητα των ΤΠΕ στην προσχολική εκπαίδευση, όπως αναφέρουν οι Papadakis & Kalogiannakis (2019), Marsh et al. (2018) και Kontovourki & Tafa (2019). Μέσα από αυτήν τη σύνθεση θεωρίας και πρακτικής, το πρόγραμμα στοχεύει στην ανάπτυξη ψηφιακών, μαθηματικών, κοινωνικών και περιβαλλοντικών δεξιοτήτων, προετοιμάζοντας τα νήπια για έναν συμμετοχικό και βιώσιμο κόσμο.

ΥΛΟΠΟΙΗΣΗ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ

Το πρόγραμμα «Πράσινες Γειτονιές» υλοποιήθηκε στο 33ο Νηπιαγωγείο Ευόσμου κατά τη διάρκεια του σχολικού έτους 2024-2025, ακολουθώντας μια δομημένη διαδικασία που ενσωμάτωσε βιωματική, διερευνητική και συνεργατική μάθηση. Οι δραστηριότητες σχεδιάστηκαν με γνώμονα τις θεωρητικές αρχές του Piaget (1972) για τη γνωστική ανάπτυξη, του Vygotsky (1978) για τη σημασία της κοινωνικής αλληλεπίδρασης και της Ζώνης Επικείμενης Ανάπτυξης, του Dewey (1986) για τη μάθηση μέσα από την εμπειρία, καθώς και του Kolb (2014) για τον κύκλο της εμπειρικής μάθησης.

Η διαδικασία υλοποίησης περιλάμβανε τα ακόλουθα στάδια:

1. Εισαγωγή στη θεματική του πράσινου: Η αρχική δραστηριότητα ξεκίνησε με έναν καταιγισμό ιδεών και τη δημιουργία εννοιολογικού χάρτη, όπου τα νήπια εκφράζουν τις γνώσεις και τις ιδέες τους για το πράσινο Η δραστηριότητα αυτή ενισχύει την ενεργό συμμετοχή και την κριτική σκέψη, καθώς τα παιδιά συγκρίνουν και οργανώνουν ιδέες (Marsh et al., 2018; Papadakis & Kalogiannakis, 2016).

2. Μελέτη πεδίου και παρατήρηση του φυσικού περιβάλλοντος: Τα νήπια συμμετείχαν σε επίσκεψη στη γειτονιά, παρατηρώντας δέντρα, φυτά, λουλούδια και αστικά στοιχεία. Η βιωματική αυτή εμπειρία συνδέεται με τον θεωρητικό προσανατολισμό του Dewey (1938), σύμφωνα με τον οποίο η μάθηση προκύπτει μέσα από τη δράση και την άμεση εμπειρία. Καταγράφηκαν στοιχεία όπως η θέση των δέντρων, οι περιοχές με περισσότερο ή λιγότερο πράσινο και οι δυνατότητες βελτίωσης του περιβάλλοντος.

3. Χρήση ψηφιακών εργαλείων: Το Google Lens χρησιμοποιήθηκε για την ταυτοποίηση των φυτών και των δέντρων, ενισχύοντας την επιστημονική παρατήρηση και τη γνώση της βιοποικιλότητας. Παράλληλα, η δημιουργία ψηφιακού χάρτη στο Google Earth επέτρεψε στα νήπια να απεικονίσουν συνεργατικά τις προτάσεις τους για τη βελτίωση της γειτονιάς, ενισχύοντας δεξιότητες προσανατολισμού, και μαθηματικής σκέψης (Tzekaki, 2010). Η ενσωμάτωση μαθηματικών και γεωγραφικών εννοιών σε αυτό το πλαίσιο επιτρέπει στα παιδιά να κατανοήσουν χωρικές σχέσεις και μετρήσεις με τρόπο βιωματικό.

4. Σχεδιασμός παρεμβάσεων και συλλογική δράση: Τα νήπια συζήτησαν πώς θα μπορούσε να εμπλουτιστεί η γειτονιά τους με περισσότερα στοιχεία πρασίνου όπως φύτευση δέντρων, δημιουργία παρτεριών με λουλούδια σε σημεία αναψυχής. Η δραστηριότητα αυτή προάγει την κοινωνική συμμετοχή και την ανάπτυξη συνεργατικών δεξιοτήτων, σε συμφωνία με τις θεωρίες του Vygotsky (1978) και τις διεθνείς πρακτικές για ενεργό πολίτη από μικρή ηλικία (UNESCO, 2017).

5. Ανταλλαγή εμπειριών με άλλα σχολεία: Μέσω διαδικτυακών συναντήσεων, τα νήπια μοιράστηκαν ιδέες και προτάσεις με παιδιά άλλων σχολείων, ενισχύοντας τη διασχολική συνεργασία, την επικοινωνία και την κοινωνική ενδυνάμωση. Αυτή η προσέγγιση υποστηρίζει την έννοια της συμμετοχικότητας και της συλλογικής δράσης, όπως περιγράφεται σε διεθνείς έρευνες (Marsh et al., 2018; Kontovourki & Tafa, 2021).

6. Σύνθεση και παρουσίαση αποτελεσμάτων: Τα νήπια παρουσίασαν τον ψηφιακό χάρτη και τις προτάσεις τους στη ***Βραδιά του Ερευνητή*** στη Θεσσαλονίκη (27-09-2024). Η διαδικασία αυτή ενίσχυσε, την αυτοπεποίθηση και τη δημιουργικότητα των παιδιών, την εξωστρέφεια του σχολείου ενώ ταυτόχρονα προώθησε την έννοια της διάχυσης γνώσης στην κοινωνία.

Η ενσωμάτωση των ψηφιακών εργαλείων υποστηρίξε τη διερευνητική μάθηση, επιτρέποντας στα νήπια να καταγράψουν, να επεξεργαστούν και να παρουσιάσουν πληροφορίες με δημιουργικό τρόπο (Papadakis & Kalogiannakis, 2019). Επιπλέον, η χρήση των ψηφιακών εργαλείων συνδέεται με τη μαθηματική ανάπτυξη, καθώς όπως τονίζει η Τζεκάκη (2010), μέσα από την δράση και τη συζήτηση, τα νήπια διαπραγματεύονται και επεξεργάζονται έννοιες και στρατηγικές για την δημιουργία του χάρτη και οδηγούνται σε μαθηματική μάθηση.

Η διαδικασία ολοκληρώνεται με αναστοχαστικές δραστηριότητες, όπου τα παιδιά συζητούν τι έμαθαν, πώς συνεργάστηκαν και ποιες αλλαγές προτείνουν για τη γειτονιά τους. Ο αναστοχασμός αυτός υποστηρίζει την ανάπτυξη μεταγνωστικών δεξιοτήτων, ενισχύει την ορθολογική σκέψη και εμβαθύνει στη μάθηση, σύμφωνα με τα τέσσερα στάδια του κύκλου μάθησης του Kolb (2014): της συγκεκριμένης εμπειρίας, της στοχαστικής παρατήρησης, την αφηρημένη νοητική πρόσληψη και του ενεργού πειραματισμού

Συνοψίζοντας μπορούμε να πούμε ότι η υλοποίηση του προγράμματος και η αξιοποίηση των νέων τεχνολογιών στην προσχολική εκπαίδευση μπορεί να δημιουργήσει ένα πλούσιο, διαδραστικό και πολυαισθητηριακό μαθησιακό περιβάλλον, όπου η γνώση, η δημιουργικότητα και η κοινωνική συμμετοχή συνδέονται με πρακτικές αειφορίας και μαθηματικής σκέψης (Siraj-Blatchford, Smith, & Samuelsson,2010); Marsh et al., 2018; Kontovourki & Tafa, 2019; Tzekaki, 2010).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η εφαρμογή του προγράμματος «Πράσινες Γειτονιές» ανέδειξε τη σημαντική συμβολή των ψηφιακών εργαλείων στην προσχολική εκπαίδευση, ενοποιώντας τις παιδαγωγικές αρχές της βιωματικής μάθησης, της διερευνητικής προσέγγισης και της κοινωνικής συμμετοχής. Η ενεργή συμμετοχή των νηπίων κατά τη διάρκεια του προγράμματος έδειξε ότι η ενσωμάτωση απλών ψηφιακών εφαρμογών όπως το Google Earth και το Google Lens αποτελούν παιδαγωγικά εργαλεία που προωθούν νέες προσεγγίσεις που ανταποκρίνονται στις σύγχρονες προκλήσεις της αειφορίας (Siraj-Blatchford, Smith, & Samuelsson, 2010; Ärlemalm-Hagsér & Elliott, 2017; Hedefalk, Almqvist & Östman, 2015)

Μέσα από την παρατήρηση και χαρτογράφηση του φυσικού περιβάλλοντος, τα νήπια εξοικειώθηκαν με τον χώρο που ζουν κι ανέπτυξαν δράση γνωρίζοντας τον καλύτερα. Μέσα από οικείες καταστάσεις (η γειτονιά του νηπιαγωγείο τους), διάβασαν τον χάρτη, εντοπίζοντας την θέση τους και σχεδιάζοντας την διαδρομή που ακολούθησαν (Tzekaki, 2010). Η δράση αυτή ενίσχυσε τη σύνδεση μαθηματικών εννοιών με την καθημερινή εμπειρία των παιδιών, υπογραμμίζοντας τη σημασία της βιωματικής μάθησης και της εφαρμογής των εννοιών του χώρου και της μέτρησης σε πραγματικά περιβαλλοντα πλαίσια.

Η συνεργασία μεταξύ των νηπίων, η ανταλλαγή απόψεων με άλλα σχολεία και η παρουσίαση των ψηφιακών χαρτών στη Βραδιά του Ερευνητή ενίσχυσαν τις κοινωνικές και επικοινωνιακές δεξιότητες, τη συλλογική λήψη αποφάσεων και την υπευθυνότητα. Οι πρακτικές αυτές βρίσκονται σε συμφωνία με τις θεωρίες του Vygotsky (1978) για τη σημασία της κοινωνικής αλληλεπίδρασης στη μάθηση και του Dewey (1986) για την ενεργή συμμετοχή στη μάθηση μέσω εμπειρίας.

Επιπλέον, η ενσωμάτωση της ψηφιακής τεχνολογίας προώθησε την ανάπτυξη δεξιοτήτων του 21ου αιώνα, όπως η κριτική σκέψη, η δημιουργικότητα και η επίλυση προβλημάτων (Voogt & Roblin, 2012). Τα νήπια είχαν την ευκαιρία να εφαρμόσουν αυτές τις δεξιότητες στην πραγματική ζωή, προτείνοντας πρακτικές παρεμβάσεις για τη βελτίωση της γειτονιάς τους και συνδέοντας τη σχολική μάθηση με την κοινωνική ευθύνη και την αειφορία (UNESCO, 2017)

Παράλληλα, η συνεργατική δημιουργία ψηφιακών χαρτών και η παρουσίαση προτάσεων για το περιβάλλον συνδύασαν την ατομική μάθηση με την ομαδική δράση, δημιουργώντας ένα πλούσιο μαθησιακό περιβάλλον που προάγει την κοινωνική ενδυνάμωση και την ενεργό συμμετοχή. Διαμορφώθηκε με άλλα λόγια ένα πλαίσιο που συνδύασε την εκπαίδευση με τις αξίες της βιωσιμότητας, ενθαρρύνοντας τη μάθηση μέσα από παιχνίδι, πειραματισμό και συνεργασία. (Sterling, 2010; Plowman & Stephen, 2007).

Η εφαρμογή του προγράμματος στην τάξη του νηπιαγωγείου επιβεβαίωσε ότι τέτοιες δράσεις μπορούν να ενσωματωθούν πρακτικά στην προσχολική εκπαίδευση για τη διαμόρφωση πολιτών με περιβαλλοντική συνείδηση, ψηφιακές δεξιότητες και ικανότητα συμμετοχής σε συλλογικές δράσεις (Markopoulou, 2024) . Η βιωματική εμπλοκή των παιδιών με το φυσικό περιβάλλον και η χρήση ψηφιακών εργαλείων επέτρεψε την καλλιέργεια στάσεων και αξιών που προάγουν την αειφορία, σύμφωνα με τις κατευθυντήριες γραμμές για την Εκπαίδευση για την Αειφόρο Ανάπτυξη (UNESCO, 2017;).

Τέλος, το πρόγραμμα «Πράσινες Γειτονιές» αποτελεί χαρακτηριστικό παράδειγμα του τρόπου με τον οποίο οι νέες τεχνολογίες μπορούν να υποστηρίξουν τη μετάβαση προς το αειφόρο σχολείο, ενισχύοντας τη μαθησιακή πρόοδο, την κοινωνική αλληλεπίδραση, την οικολογική συνείδηση και την ανάπτυξη δεξιοτήτων του 21ου αιώνα. Η εμπειρία δείχνει ότι η ενσωμάτωση ΤΠΕ δεν αποτελεί μόνο τεχνολογικό επίτευγμα, αλλά ουσιαστικό παιδαγωγικό εργαλείο για τη δημιουργία ολόπλευρα αναπτυγμένων παιδιών, ικανών να συμμετέχουν ενεργά στη βελτίωση του περιβάλλοντός τους και στην προώθηση αξιών βιώσιμης ανάπτυξης (Siraj-Blatchford, Smith, & Samuelsson,2010 ; Davis, 2010).

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ΘΠ10: Καλές πρακτικές αξιοποίησης ψηφιακών τεχνολογιών στη διδακτική πράξη

ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΣΧΕΔΙΑΣΗ ΚΑΙ ΑΝΑΠΤΥΞΗ ΛΟΓΙΣΜΙΚΟΥ ΜΕΤΑΓΡΑΦΗΣ ΚΑΙ ΕΚΜΑΘΗΣΗΣ ΤΟΥ ΚΩΔΙΚΑ BRAILLE

Αγγέλης Αλέξανδρος
Υποψήφιος Διδάκτωρ Πανεπιστημίου Ιωαννίνων
Τμήμα Πληροφορικής και Τηλεπικοινωνιών
Άρτα, Ελλάδα
email: a.angelis@uoi.gr

Αγγέλη Καλλιόπη
Μεταπτυχιακό Πρόγραμμα Σπουδών στην Επιστήμη Δεδομένων, τη Στατιστικής και τη Λήψη Αποφάσεων
Stockholm University
Stockholm, Sweden
email: kalligeli01@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία πραγματεύεται την αρχιτεκτονική σχεδίαση και ανάπτυξη ενός λογισμικού μεταγραφής και εκμάθησης του κώδικα Braille, με στόχο την ενίσχυση της προσβασιμότητας για άτομα με αναπηρία όρασης. Το λογισμικό υποστηρίζει τη μεταγραφή ελληνικών και αγγλικών κειμένων σε Braille και ταυτόχρονα προσφέρει ένα εύχρηστο περιβάλλον εκμάθησης του κώδικα. Η μεθοδολογία βασίζεται στην Επίπεδη Αρχιτεκτονική, η οποία περιλαμβάνει: (α) το Επίπεδο Χρήστη, όπου ο χρήστης εισάγει το κείμενο, (β) το Επίπεδο Λογικής Επιχειρήσεων, όπου υλοποιούνται οι αλγόριθμοι αναγνώρισης γλώσσας και μεταγραφής, (γ) το Επίπεδο Δεδομένων, με τη χρήση πινάκων αντιστοίχισης χαρακτήρων. Κύρια ευρήματα της εργασίας αποτελούν η ανάπτυξη ενός ακριβούς και αποδοτικού εργαλείου μεταγραφής, η φιλικότητα της διεπαφής προς τους χρήστες, καθώς και η δυνατότητα μελλοντικής επεκτασιμότητας. Το τελικό προϊόν συμβάλλει ουσιαστικά στην εκπαιδευτική και κοινωνική ένταξη ατόμων με προβλήματα όρασης, προσφέροντας ένα σύγχρονο εργαλείο καθημερινής χρήσης.

Οι αλγόριθμοι εκμάθησης και μεταγραφής περιλαμβάνουν έλεγχο εγκυρότητας χαρακτήρων, αναγνώριση γλώσσας, διαχείριση ειδικών συμβόλων, και ακριβή αντιστοίχιση σε Braille. Η διεπαφή είναι σχεδιασμένη με βάση τις αρχές προσβασιμότητας και καθολικής σχεδίασης για απρόσκοπτη χρήση από άτομα με οπτική αναπηρία.

Η αξιολόγηση του συστήματος κατέδειξε υψηλή ακρίβεια μεταγραφής, γρήγορη απόκριση και θετικά σχόλια από χρήστες και εκπαιδευτικούς, ενώ προτείνονται μελλοντικές επεκτάσεις όπως η υποστήριξη μαθηματικού Braille, η ενσωμάτωση φωνητικής εξόδου και διασύνδεση με συσκευές Braille display.

Η εργασία συμβάλλει σημαντικά στην προώθηση της εκπαιδευτικής ισότητας και της κοινωνικής ένταξης μέσω καινοτόμων τεχνολογιών προσβασιμότητας.

Λέξεις – κλειδιά: Αρχιτεκτονική Λογισμικού, Κώδικας Braille, Προσβασιμότητα, Μεταγραφή Κειμένου, Εκμάθηση Υποβοηθούμενη από Υπολογιστή, Επίπεδη Αρχιτεκτονική.

ΕΙΣΑΓΩΓΗ

Η πρόσβαση στην εκπαίδευση αποτελεί θεμελιώδες ανθρώπινο δικαίωμα, το οποίο πρέπει να διασφαλίζεται για όλους, ανεξαρτήτως σωματικών ή γνωστικών ιδιαιτεροτήτων. Ωστόσο, τα άτομα με **οπτική αναπηρία** εξακολουθούν να αντιμετωπίζουν σημαντικά εμπόδια στην ισότιμη συμμετοχή τους στη μαθησιακή διαδικασία. Η έλλειψη κατάλληλων εργαλείων, τεχνολογιών και εκπαιδευτικού υλικού σε μορφές προσιτές για άτομα με προβλήματα όρασης συχνά περιορίζει τις ευκαιρίες τους για εκπαίδευση και κοινωνική ένταξη (UNESCO, 2022).

Ο **κώδικας Braille**, που αναπτύχθηκε από τον Louis Braille τον 19ο αιώνα, αποτέλεσε μια επαναστατική τομή στην επικοινωνία και την εκπαίδευση των ατόμων με οπτική αναπηρία. Μέσω του Braille, οι μαθητές έχουν τη δυνατότητα να διαβάζουν, να γράφουν και να αλληλεπιδρούν με το γραπτό λόγο, διευρύνοντας τις δυνατότητες συμμετοχής τους στο εκπαιδευτικό περιβάλλον (Rex et al., 2020). Ωστόσο, η δημιουργία και η διάθεση εκπαιδευτικού υλικού σε Braille παραμένει συχνά μια **χρονοβόρα** και **κοστοβόρα διαδικασία** (Koutsogiannis & Papadopoulou, 2019).

Η παρούσα εργασία εστιάζει στην **ανάπτυξη λογισμικού αυτόματης μεταγραφής ελληνικού και αγγλικού κειμένου σε κώδικα Braille**, καθώς και στη δημιουργία **εκπαιδευτικού περιβάλλοντος εκμάθησης** του συστήματος Braille. Η υλοποίηση ενός τέτοιου εργαλείου συνεισφέρει ουσιαστικά στην **προσβασιμότητα** και στην **ισότιμη συμμετοχή** των ατόμων με προβλήματα όρασης στην εκπαίδευση, επιτρέποντας την ταχύτερη παραγωγή προσβάσιμου υλικού και τη διευκόλυνση της μαθησιακής διαδικασίας (World Health Organization [WHO], 2021).

Η αξιοποίηση των σύγχρονων τεχνολογιών πληροφορικής και επεξεργασίας φυσικής γλώσσας (**NLP**) καθιστά δυνατή τη **βελτίωση της ποιότητας της εκπαίδευσης** και τη δημιουργία **νέων δυνατοτήτων** για μαθητές, εκπαιδευτικούς και υποστηρικτές (Young & Temple, 2021). Μέσα από την ενσωμάτωση αυτοματοποιημένων διαδικασιών, η παρούσα εργασία στοχεύει να συμβάλει στη μείωση των ανισοτήτων στην εκπαίδευση και στην προώθηση μιας πιο **συμπεριληπτικής κοινωνίας** (European Disability Forum, 2023).

Μεθοδολογία / Παιδαγωγικό Πλαίσιο

Η ανάπτυξη του λογισμικού μεταγραφής και εκμάθησης του κώδικα Braille βασίζεται σε μια διεπιστημονική μεθοδολογία που συνδυάζει τεχνικά και παιδαγωγικά στοιχεία με σκοπό τη μεγιστοποίηση της διδακτικής αποτελεσματικότητας και της προσβασιμότητας. Το παιδαγωγικό πλαίσιο εδράζεται στην αρχή της ενεργητικής μάθησης (active learning), η οποία προωθεί την αλληλεπίδραση του χρήστη με το εκπαιδευτικό υλικό, ενισχύοντας την αυτονομία και την εποικοδομητική συμμετοχή (Bonwell & Eison, 1991). Η χρήση υπολογιστή ως μέσο υποβοηθούμενης μάθησης (Computer-Assisted Instruction, CAI) επιτρέπει τη προσωποποίηση της μαθησιακής διαδικασίας και την παροχή άμεσου ανατροφοδοτικού σχολίου, στοιχεία κλειδιά για την αποτελεσματική εκμάθηση δεξιοτήτων όπως ο κώδικας Braille (Wang & Reeves, 2007).

Σε επίπεδο λογισμικού, η μεθοδολογία υλοποιείται μέσω της επίπεδης αρχιτεκτονικής, η οποία διαχωρίζει τις λειτουργίες σε στρώματα: α) το Επίπεδο Χρήστη για την εισαγωγή και αλληλεπίδραση με το περιβάλλον, β) το Επίπεδο Λογικής Επιχειρήσεων όπου υλοποιούνται οι αλγόριθμοι γλωσσικής ανάλυσης και μεταγραφής, και γ) το Επίπεδο Δεδομένων με τους πίνακες αντιστοίχισης χαρακτήρων και κώδικα Braille. Αυτή η δομή διευκολύνει τη συντηρησιμότητα και την επεκτασιμότητα του συστήματος, ενώ παράλληλα ενισχύει την ευχρηστία και την προσαρμοστικότητα (Bass, Clements, & Kazman, 2012).

Επιπλέον, η μεθοδολογική προσέγγιση λαμβάνει υπόψη τις αρχές της καθολικής σχεδίασης για τη μάθηση (Universal Design for Learning – UDL), που στοχεύει στη δημιουργία εκπαιδευτικού υλικού προσβάσιμου από όλους, ανεξαρτήτως ικανοτήτων και αναγκών (Meyer, Rose, & Gordon, 2014). Η εφαρμογή των UDL αρχών εξασφαλίζει ότι οι χρήστες με οπτική αναπηρία μπορούν να αλληλεπιδρούν με το περιβάλλον μάθησης του λογισμικού με ευκολία, ενώ παράλληλα υποστηρίζεται η διαφοροποίηση στην εκμάθηση.

Συνολικά, η μεθοδολογία που υιοθετήθηκε επιτρέπει την ταυτόχρονη κάλυψη τεχνικών απαιτήσεων και διδακτικών στόχων, προσφέροντας ένα ολοκληρωμένο και αποτελεσματικό εργαλείο που συμβάλλει στη βελτίωση της εκπαιδευτικής εμπειρίας των ατόμων με προβλήματα όρασης (Brusilovsky, 2001; Kukulska-Hulme, 2012).

Στόχοι της Εργασίας

Η παρούσα εργασία έχει ως βασικούς στόχους:

Αυτοματοποιημένη μεταγραφή ελληνικού και αγγλικού κειμένου σε κώδικα Braille: Στόχος είναι η ανάπτυξη ενός ακριβούς και αποδοτικού λογισμικού που να μετατρέπει αυτόματα κείμενα στις δύο γλώσσες σε Braille, λαμβάνοντας υπόψη τις γλωσσικές ιδιαιτερότητες και την ορθότητα της απόδοσης. Η αυτοματοποίηση της μεταγραφής συμβάλλει στη μείωση του χρόνου και του κόστους παραγωγής προσβάσιμου εκπαιδευτικού υλικού για άτομα με προβλήματα όρασης (Kintsch & Rawson, 2005; UNESCO, 2022).

Δημιουργία εκπαιδευτικού περιβάλλοντος εκμάθησης του κώδικα Braille: Σχεδιάζεται ένα εύχρηστο υπολογιστικό περιβάλλον που υποστηρίζει τη διδασκαλία και την εκμάθηση του Braille, ενθαρρύνοντας την αλληλεπίδραση, την αυτονομία και την αυθεντική εμπειρία μάθησης (Meyer, Rose, & Gordon, 2014; Wang & Reeves, 2007). Με αυτόν τον τρόπο, ενισχύεται η εκπαιδευτική πρόσβαση και η κοινωνική ένταξη των ατόμων με οπτική αναπηρία (WHO, 2021).

Η συναρμογή αυτών των στόχων στοχεύει στην αξιοποίηση των σύγχρονων τεχνολογιών για τη μείωση εκπαιδευτικών ανισοτήτων, προωθώντας μια περισσότερο συγκοινωνιακή και προσβάσιμη μαθησιακή διαδικασία (European Disability Forum, 2023).

Περιγραφή του υλοποιημένου λογισμικού

Το αναπτυγμένο λογισμικό αποτελεί ένα ολοκληρωμένο εργαλείο μεταγραφής και εκμάθησης του κώδικα Braille, το οποίο διακρίνεται για την ακρίβεια, την ευχρηστία και την υποστήριξη διγλωσσικών κειμένων, ελληνικών και αγγλικών. Βασικά χαρακτηριστικά του λογισμικού περιλαμβάνουν:

Αυτοματοποιημένη μεταγραφή κειμένου σε Braille: Υλοποιούνται αλγόριθμοι αναγνώρισης και επεξεργασίας φυσικής γλώσσας (NLP), οι οποίοι επιτρέπουν την αυτόματη μετάφραση των ελληνικών και αγγλικών κειμένων στον αντίστοιχο κώδικα Braille, λαμβάνοντας υπόψη τις γλωσσικές ιδιαιτερότητες και τη σωστή διαχείριση τόνων, σημείων στίξης και ειδικών χαρακτήρων (Kukulska-Hulme, 2012).

Διπλή γλωσσική υποστήριξη: Το σύστημα υποστηρίζει πλήρως τόσο τα ελληνικά όσο και τα αγγλικά, επιτρέποντας την ευρεία χρήση του σε διαφορετικά εκπαιδευτικά και κοινωνικά περιβάλλοντα και καλύπτοντας τις ανάγκες διγλωσσικών χρηστών (Young & Temple, 2021).

Φιλικό περιβάλλον χρήστη: Ο σχεδιασμός της διεπαφής ακολουθεί αρχές καθολικής σχεδίασης (UDL), ώστε να διασφαλίζει την προσβασιμότητα για άτομα με οπτική αναπηρία, με ξεκάθαρη δομή, εύκολη πλοήγηση και υποστήριξη παραμέτρων προσαρμογής (Meyer, Rose, & Gordon, 2014).

Εκπαιδευτικό περιβάλλον: Παρέχονται διαδραστικά εργαλεία εκμάθησης που βοηθούν τους χρήστες να κατανοήσουν και να μάθουν τον κώδικα Braille μέσω ασκήσεων, οπτικοακουστικής υποστήριξης και άμεσης ανατροφοδότησης.

Η τριστρωματική (επίπεδη) αρχιτεκτονική του λογισμικού διευκολύνει τη μελλοντική συντήρηση και επεκτασιμότητα, επιτρέποντας την ανεξάρτητη ανάπτυξη των επιπέδων χρήστη, επιχειρησιακής λογικής και διαχείρισης δεδομένων (Bass, Clements, & Kazman, 2012).

Οργάνωση της εργασίας

Η παρούσα εργασία οργανώνεται ως εξής:

Στο Κεφάλαιο 1 (Εισαγωγή) παρουσιάζονται το πλαίσιο, η σημασία και οι στόχοι της έρευνας, καθώς και το θεωρητικό και κοινωνικό υπόβαθρο.

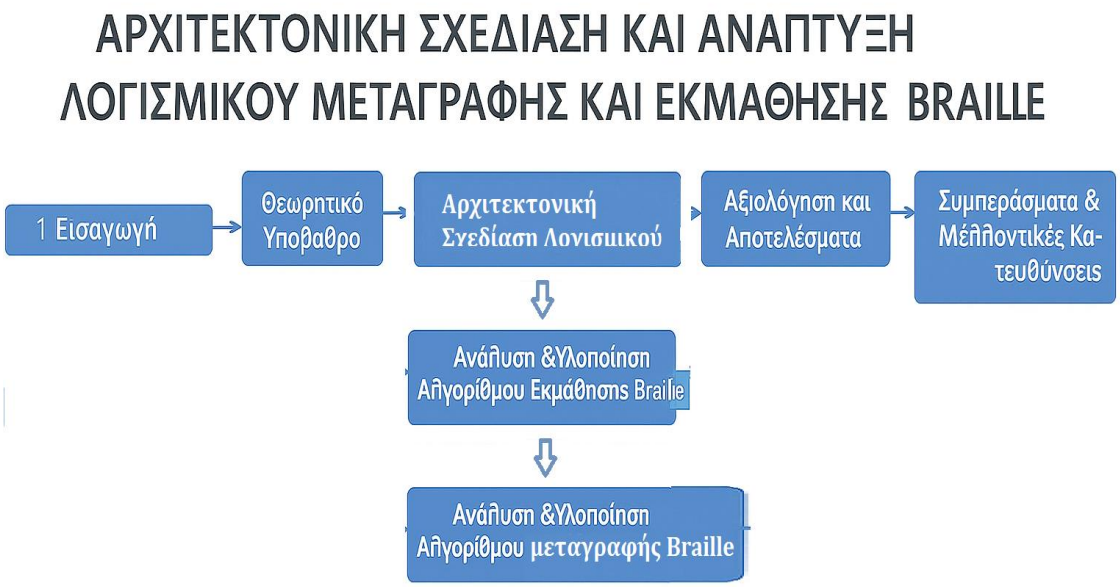
Το Κεφάλαιο 2 περιλαμβάνει τη Μεθοδολογία και το Παιδαγωγικό Πλαίσιο, όπου αναλύονται οι αρχές βάσει των οποίων σχεδιάστηκε και υλοποιήθηκε το λογισμικό, καθώς και η διδακτική προσέγγιση που υποστηρίζει.

Στο Κεφάλαιο 3 περιγράφεται λεπτομερώς η αρχιτεκτονική και τα τεχνικά χαρακτηριστικά του υλοποιημένου συστήματος, συμπεριλαμβανομένων των αλγορίθμων μεταγραφής, της υποστήριξης γλωσσών και της διεπαφής χρήστη.

Το Κεφάλαιο 4 παρουσιάζει τα αποτελέσματα των δοκιμών, την αξιολόγηση της απόδοσης και την αποδοχή του λογισμικού από τους χρήστες.

Τέλος, στο Κεφάλαιο 5 συνοψίζονται τα κύρια ευρήματα, προτείνονται κατευθύνσεις για μελλοντική έρευνα και ανάπτυξη, και αναδεικνύεται η συμβολή της εργασίας στην εκπαιδευτική προσβασιμότητα.

Εικόνα 1
Οργανόγραμμα δομής εργασίας



ΘΕΩΡΗΤΙΚΟ ΥΠΟΒΑΘΡΟ

Κώδικας Braille: Ιστορικό, Δομή, Γλωσσικά Συστήματα και Σημασία στην Εκπαιδευτική Προσβασιμότητα

Ο κώδικας Braille αναπτύχθηκε στις αρχές του 19ου αιώνα από τον Louis Braille, ο οποίος μετέτρεψε το προηγούμενο σύστημα "night writing" σε έναν κώδικα με έξι σημεία που επιτρέπει την ανάγνωση με το αφτί των δακτύλων (Braille cells) (Wikipedia, 2024). Το σύστημα Braille αποτελείται από κελία των έξι κουκκίδων οργανωμένες σε δύο στήλες και τρεις σειρές, δημιουργώντας 64 πιθανά μοτίβα που αντιστοιχούν σε γράμματα, αριθμούς και σημεία στίξης (Braille - Wikipedia, 2024). Παράλληλα, ο κώδικας Braille έχει προσαρμοστεί και για πάνω από 133 γλώσσες, μεταξύ των οποίων και τα ελληνικά (Greek Braille - Wikipedia, 2012).

Στα ελληνικά, ο κώδικας Braille υποστηρίζει τόσο το μονοτονικό όσο και το πολυτονικό σύστημα, καλύπτοντας τη χρήση τόνων και πνευμάτων, κάτι που είναι κρίσιμο για την πιστή αναπαράσταση του γραπτού λόγου (Greek Braille - Wikipedia, 2012). Η δυνατότητα αυτή καθιστά τον κώδικα Braille ένα απαραίτητο εργαλείο εκπαιδευτικής προσβασιμότητας για άτομα με οπτική αναπηρία, καθώς τους παρέχει τη δυνατότητα ανάγνωσης, γραφής και εκμάθησης γλωσσών που χρησιμοποιούν διαφορετικά ορθογραφικά και φωνητικά μοτίβα (WHO, 2021).

Προσβασιμότητα και Τεχνολογίες Υποστήριξης για Άτομα με Προβλήματα Όρασης

Η προσβασιμότητα στην εκπαίδευση και την κοινωνία για άτομα με προβλήματα όρασης εξαρτάται σε σημαντικό βαθμό από τη διάθεση τεχνολογικών εργαλείων που υποστηρίζουν τη διδασκαλία και την πληροφόρηση. Τέτοιες τεχνολογίες περιλαμβάνουν λογισμικά μεταγραφής κειμένου σε Braille, αναγνώστες οθόνης, και ψηφιακές συσκευές Braille που επιτρέπουν την ανάγνωση και την παραγωγή προσβάσιμου υλικού (European Disability Forum, 2023). Η ενσωμάτωση τεχνολογιών φυσικής γλώσσας και τεχνητής νοημοσύνης βελτιώνει την ακρίβεια και λειτουργικότητα τέτοιων εφαρμογών, συμβάλλοντας ουσιωδώς στην εκπαιδευτική ένταξη και την ενεργό συμμετοχή ατόμων με οπτική αναπηρία (Young & Temple, 2021).

Εισαγωγή στις Βασικές Θεωρίες Αρχιτεκτονικής Λογισμικού με Έμφαση στην Επίπεδη Αρχιτεκτονική

Η αρχιτεκτονική λογισμικού αναφέρεται στη δομή και οργάνωση ενός συστήματος λογισμικού, περιλαμβάνοντας τους βασικούς μηχανισμούς συνεργασίας των διαφόρων τμημάτων (Bass, Clements & Kazman, 2012). Η Επίπεδη Αρχιτεκτονική (Layered Architecture) αποτελεί μία από τις πιο διαδεδομένες προσεγγίσεις, όπου το σύστημα οργανώνεται σε ανεξάρτητα επίπεδα τα οποία αλληλεπιδρούν με συγκεκριμένους κανόνες.

Τα βασικά επίπεδα περιλαμβάνουν το Επίπεδο Χρήστη (User Layer), όπου ο χρήστης αλληλεπιδρά με το σύστημα, το Επίπεδο Λογικής Επιχειρήσεων (Business Logic Layer), όπου υλοποιούνται οι βασικές λειτουργίες και

κανόνες της εφαρμογής, και το Επίπεδο Δεδομένων (Data Layer), που διαχειρίζεται την αποθήκευση και ανάκτηση των δεδομένων (Bass, Clements & Kazman, 2012). Αυτή η αρχιτεκτονική προσφέρει πλεονεκτήματα όπως η ευκολία συντήρησης, η επεκτασιμότητα και η απομόνωση προβλημάτων, στοιχεία κρίσιμα για την ανάπτυξη πολύπλοκων συστημάτων, όπως το λογισμικό μεταγραφής και εκμάθησης Braille.

ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΣΧΕΔΙΑΣΗ ΤΟΥ ΛΟΓΙΣΜΙΚΟΥ

Επίπεδη Αρχιτεκτονική: Οργάνωση και Λειτουργία

Η αρχιτεκτονική του αναπτυγμένου λογισμικού βασίζεται στην Επίπεδη Αρχιτεκτονική (Layered Architecture), η οποία οργανώνει το σύστημα σε διακριτά επίπεδα με συγκεκριμένες ευθύνες, ενισχύοντας την ευελιξία, συντηρησιμότητα και επεκτασιμότητα του λογισμικού (Bass, Clements & Kazman, 2012).

Τα κύρια επίπεδα του συστήματος είναι:

Επίπεδο Διεπαφής Χρήστη (User Interface Layer): Το επίπεδο αυτό αναλαμβάνει την αλληλεπίδραση με τον χρήστη, παρέχοντας εργαλεία εισαγωγής κειμένου, επιλογής γλώσσας και απεικόνισης του αποτελέσματος σε Braille. Η διεπαφή είναι σχεδιασμένη ώστε να είναι προσβάσιμη και φιλική προς άτομα με οπτική αναπηρία, με καθαρή δομή και εύκολη πλοήγηση (Meyer, Rose, & Gordon, 2014).

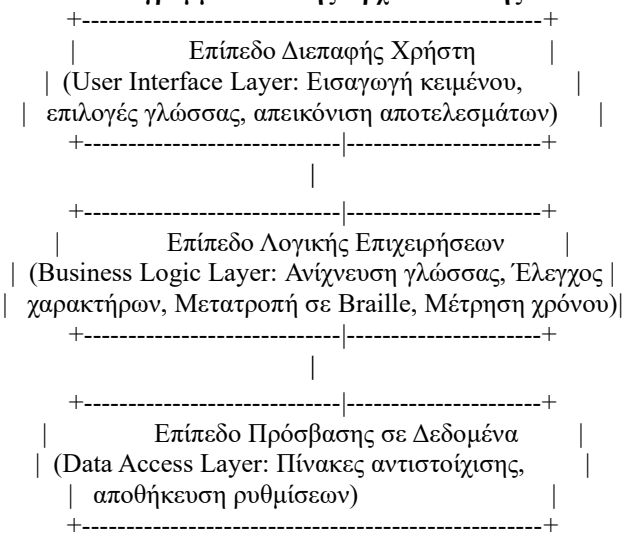
Επίπεδο Λογικής Επιχειρήσεων (Business Logic Layer): Σε αυτό το επίπεδο εκτελούνται οι βασικές λειτουργίες του λογισμικού, όπως η ανίχνευση της γλώσσας εισόδου με αλγορίθμους αναγνώρισης, ο έλεγχος εγκυρότητας και η τυποποίηση των χαρακτήρων κειμένου, καθώς και η μετατροπή τους στον αντίστοιχο κώδικα Braille μέσω πινάκων αντιστοίχισης και κανόνων μεταγραφής (Fly-LeNet model adaptation, 2024; Kukulska-Hulme, 2012). Επιπρόσθετα, το επίπεδο αυτό υποστηρίζει τη μέτρηση χρόνου εκτέλεσης για τη βελτιστοποίηση της απόδοσης.

Επίπεδο Πρόσβασης σε Δεδομένα (Data Access Layer): Διαχειρίζεται την αποθήκευση και ανάκτηση των πινάκων αντιστοίχισης χαρακτήρων Braille, των ρυθμίσεων γλωσσών και άλλων απαραίτητων δεδομένων, ενώ υποστηρίζει την εύκολη ενημέρωση και επέκταση του συστήματος (Bass, Clements & Kazman, 2012).

Διάγραμμα Επίπεδης Αρχιτεκτονικής

Το σύστημα μπορεί να απεικονιστεί με ένα τυπικό διάγραμμα τριών επιπέδων, όπου ο χρήστης αλληλεπιδρά αποκλειστικά με το Επίπεδο Διεπαφής. Τα αιτήματα επεξεργασίας αποστέλλονται στην Επιχειρησιακή Λογική, η οποία συνεργάζεται με το Επίπεδο Δεδομένων για την αντιστοίχιση και μεταγραφή χαρακτήρων. Η διαδικασία ολοκληρώνεται με την αποστολή των αποτελεσμάτων πίσω στη διεπαφή για απεικόνιση.

Διάγραμμα 1
Διάγραμμα επίπεδης Αρχιτεκτονικής



Περιγραφή Διαγράμματος

Στο Επίπεδο Διεπαφής Χρήστη πραγματοποιείται η αλληλεπίδραση με τον χρήστη, όπου εισάγεται το κείμενο, επιλέγεται η γλώσσα και εμφανίζονται τα αποτελέσματα σε μορφή Braille.

Το Επίπεδο Λογικής Επιχειρήσεων φροντίζει για την ανάλυση του κειμένου: ανιχνεύει τη γλώσσα, ελέγχει την εγκυρότητα των χαρακτήρων, και μετατρέπει το κείμενο στον κώδικα Braille. Επίσης, υπολογίζει το χρόνο εκτέλεσης των αλγορίθμων για βελτιστοποίηση.

Το Επίπεδο Πρόσβασης σε Δεδομένα διαχειρίζεται τα δεδομένα που απαιτούνται για τη μεταγραφή, όπως τους πίνακες αντιστοίχισης χαρακτήρων και άλλες παραμέτρους της εφαρμογής.

Σύγκριση με Άλλες Αρχιτεκτονικές Προσεγγίσεις

Σε σύγκριση με άλλες αρχιτεκτονικές, όπως η Μικροϋπηρεσιακή (Microservices) ή η Μονολιθική (Monolithic), η επίπεδη αρχιτεκτονική προσφέρει απλότητα και σαφή διαχωρισμό ευθυνών, που είναι κρίσιμα για εκπαιδευτικό λογισμικό με περιορισμένες απαιτήσεις υποδομής (Bass, Clements & Kazman, 2012). Μικροϋπηρεσιακές προσεγγίσεις, αν και πιο ευέλικτες σε μεγάλης κλίμακας συστήματα, απαιτούν πολύπλοκη διαχείριση δικτύου και συνεχή συντονισμό, που δεν είναι αναγκαία σε αυτή την περίπτωση. Αντίθετα, η επίπεδη αρχιτεκτονική διευκολύνει την άμεση ανάπτυξη και συντήρηση με χαμηλότερο κόστος.

Πλεονεκτήματα της Επιλογής Επίπεδης Αρχιτεκτονικής για το Παρόν Λογισμικό

Η επιλογή της επίπεδης αρχιτεκτονικής στο συγκεκριμένο λογισμικό μεταγραφής και εκμάθησης Braille προσφέρει σημαντικά πλεονεκτήματα:

Απλότητα και ευκολία συντήρησης: Τα επίπεδα επιτρέπουν την ανεξάρτητη ανάπτυξη, δοκιμή και ενημέρωση, μειώνοντας την πολυπλοκότητα (Bass, Clements & Kazman, 2012).

Ευελιξία και επεκτασιμότητα: Διευκολύνεται η μελλοντική προσθήκη υποστήριξης νέων γλωσσών ή λειτουργιών, όπως η υποστήριξη ήχου ή η ενσωμάτωση επιπλέον μεθόδων εκμάθησης (Kukulska-Hulme, 2012).

Βελτίωση απόδοσης: Η μέτρηση χρόνου εκτέλεσης και η βελτιστοποίηση αλγορίθμων πραγματοποιούνται κεντρικά στο επίπεδο λογικής, διασφαλίζοντας αποτελεσματική λειτουργία.

Προσβασιμότητα: Ο διαχωρισμός επιπέδων επιτρέπει την ανεξάρτητη βελτίωση της διεπαφής χρήστη με γνώμονα την προσβασιμότητα και την καθολική σχεδίαση (Meyer, Rose, & Gordon, 2014).

Συνολικά, η επίπεδη αρχιτεκτονική αποτέλεσε την ιδανική επιλογή για την υλοποίηση ενός αξιόπιστου, προσαρμόσιμου και φιλικού προς τον χρήστη συστήματος μεταγραφής Braille.

ΑΝΑΛΥΣΗ ΚΑΙ ΥΛΟΠΟΙΗΣΗ ΑΛΓΟΡΙΘΜΟΥ ΕΚΜΑΘΗΣΗΣ BRAILLE

Δομική Αρχιτεκτονική του Αλγορίθμου

Ο αλγόριθμος εκμάθησης Braille του λογισμικού σχεδιάστηκε βάσει της επιλογής της επίπεδης αρχιτεκτονικής, που εξασφαλίζει τη σαφή οργάνωση των λειτουργιών σε διακριτά επίπεδα και διευκολύνει την επεκτασιμότητα και συντήρηση (Bass, Clements & Kazman, 2012).

Βασικές μεταβλητές στο πλαίσιο υλοποίησης είναι:

strBuffer: Χρησιμοποιείται για την αποθήκευση του τρέχοντος χαρακτήρα ή σειράς χαρακτήρων που εισάγονται από το χρήστη, πριν την επεξεργασία τους.

booShift: Λογική μεταβλητή που ελέγχει αν βρίσκεται σε ισχύ κάποιο ειδικό καθεστώς μεταγραφής, όπως η ενεργοποίηση μετασχηματισμών ή τροποποιήσεων κατά τη μεταγραφή σε Braille.

VALUE_TIMER: Μεταβλητή που χρήζει για τη διαχείριση χρονισμού διεργασιών, ιδιαίτερα στη διαχείριση των χρονικών ορίων (timeouts) για την αυτόματη ενημέρωση διεπαφής και απόκρισης (Kintsch & Rawson, 2005).

Οι βασικές διαδικασίες και συναρτήσεις που υλοποιούνται είναι:

Form_KeyDown: Αντιλαμβάνεται και επεξεργάζεται την είσοδο χαρακτήρων από το πληκτρολόγιο, ενημερώνοντας το strBuffer.

Form_Timer: Διαχειρίζεται τα χρονόμετρα που ελέγχουν τον χρόνο εκτέλεσης και την περιοδική ενημέρωση της διεπαφής.

DLookup: Πραγματοποιεί αναζήτηση στους πίνακες αντιστοίχισης χαρακτήρων, εντοπίζοντας το κατάλληλο Braille σύμβολο που αντιστοιχεί στον εισαχθέντα χαρακτήρα.

Η οργάνωση του αλγορίθμου ακολουθεί ένα τριεπίπεδο λειτουργικό μοντέλο:

Επίπεδο Εισόδου: Λαμβάνει και αποθηκεύει τα δεδομένα εισόδου (κείμενο προς μεταγραφή).

Επίπεδο Επεξεργασίας: Υλοποιεί τη λογική μεταγραφής, ελέγχου εγκυρότητας χαρακτήρων και αναζήτησης στα Braille tables.

Επίπεδο Εξόδου: Παράγει το τελικό αποτέλεσμα σε μορφή Braille και ενημερώνει τη διεπαφή χρήστη με τα δεδομένα.

Λογική Αρχιτεκτονική

Η ροή των δεδομένων ξεκινά από την είσοδο χαρακτήρων μέσω της διεπαφής χρήστη, όπου προκαλείται ο έλεγχος εγκυρότητας (έλεγχος για αποδεκτούς χαρακτήρες). Στη συνέχεια, το σύστημα πραγματοποιεί αναζήτηση στους πίνακες Braille για την εύρεση του αντίστοιχου κώδικα (Young & Temple, 2021). Τα αποτελέσματα επιστρέφουν στην διεπαφή, όπου παρουσιάζονται στον χρήστη.

Η χρονική διαχείριση μέσω της μεταβλητής VALUE_TIMER εξασφαλίζει ομαλή ενημέρωση, ενώ ταυτόχρονα αποφυγή επιβράδυνσης ή καθυστερήσεων (Kukulska-Hulme, 2012). Η ενημέρωση της διεπαφής χρήστη πραγματοποιείται με βάση επεισόδια χρονισμού (timer events), ώστε να υπάρχει άμεση οπτικοακουστική ανατροφοδότηση.

Επίπεδη Αρχιτεκτονική στον Αλγόριθμο Εκμάθησης

Ο αλγόριθμος εκμάθησης ακολουθεί τη δομή τριών επιπέδων:

UI Layer: Λαμβάνει την είσοδο από τον χρήστη (πληκτρολόγιο) και εμφανίζει τα αποτελέσματα, ενώ επίσης διαχειρίζεται την επικοινωνία με τον χρήστη μέσω timers και πληκτρολογικών συμβάντων.

Business Logic Layer: Περιλαμβάνει τη λογική ανίχνευσης, τον έλεγχο χαρακτήρων και τη διαδικασία αναζήτησης στο Braille data layer. Εκτελεί τη μεταγραφική λογική και χειρίζεται τις λειτουργίες που καθορίζουν την ορθότητα και πλήρωση του αλγορίθμου.

Data Access Layer: Παρέχει τους πίνακες αναίρεσης και αντιστοίχισης χαρακτήρων που χρησιμοποιούνται για τη μεταγραφή, επιτρέποντας ευκολία στην προσθήκη νέων γλωσσών ή γραμματικών κανόνων.

Η ροή των εσωτερικών διαδικασιών ακολουθεί αυστηρά τη διαχωρισμένη διαδρομή μεταξύ επιπέδων, εξασφαλίζοντας την απομόνωση λειτουργιών και καλή διαχείριση των αλλαγών (Bass, Clements & Kazman, 2012).

Μετά από αναλυτική εξέταση της δομικής, λογικής και επίπεδης αρχιτεκτονικής του αλγορίθμου εκμάθησης Braille, η επιλογή της επίπεδης αρχιτεκτονικής κρίθηκε ως η πλέον κατάλληλη για το συγκεκριμένο λογισμικό. Η επίπεδη αρχιτεκτονική προσφέρει σαφή διαχωρισμό των λειτουργιών σε ανεξάρτητα επίπεδα (UI, Business Logic, Data Access), επιτρέποντας την απομόνωση των επιμέρους μονάδων και διευκολύνοντας σημαντικά τη συντήρηση, την επεκτασιμότητα και την αξιοπιστία του συστήματος. Επιπλέον, η δομή αυτή ανταποκρίνεται ιδανικά στις ανάγκες του λογισμικού για γρήγορη και ακριβή μεταγραφή, εύκολη διαχείριση χρονισμού και αποδοτική ενημέρωση της διεπαφής χρήστη, στοιχεία κρίσιμα για την υποστήριξη της διαδικασίας εκμάθησης Braille. Συνολικά, η επίπεδη αρχιτεκτονική εξασφαλίζει ένα ευέλικτο και λειτουργικό σύστημα που καλύπτει αποτελεσματικά τις ειδικές απαιτήσεις αυτής της εφαρμογής (Bass, Clements & Kazman, 2012; Kukulska-Hulme, 2012).

Αναλυτικό Διάγραμμα Ροής

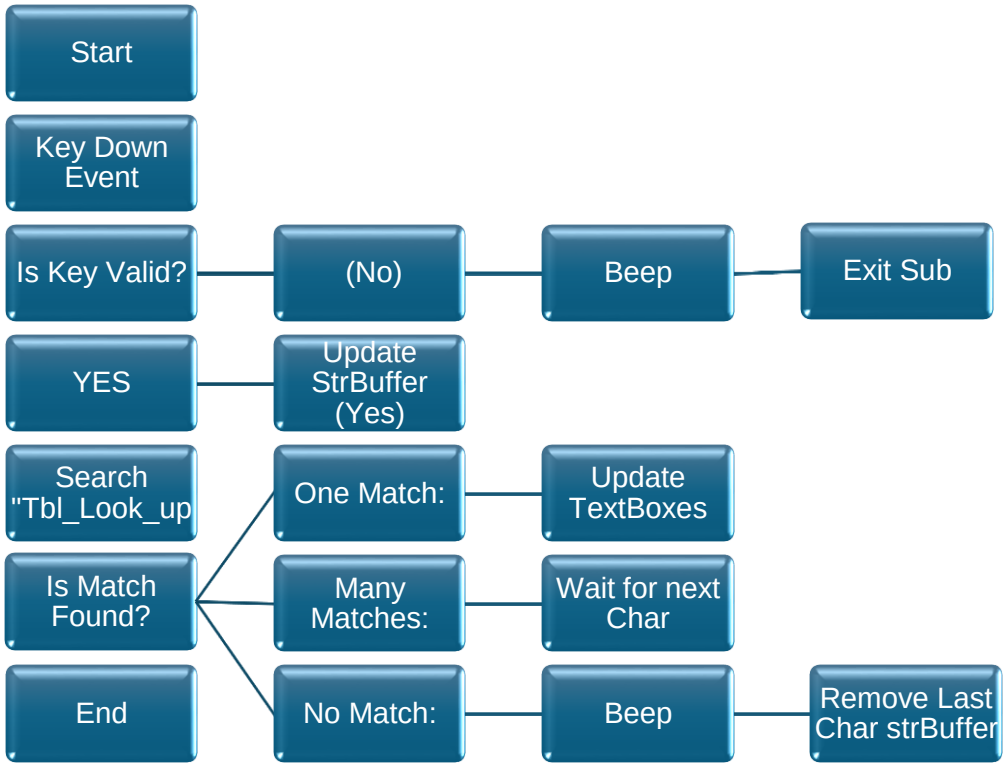
Το διάγραμμα ροής του αλγορίθμου εκμάθησης περιλαμβάνει τα ακόλουθα βασικά βήματα:

Η εικόνα παρουσιάζει ένα διάγραμμα ροής (flowchart) του αλγορίθμου εκμάθησης Braille, με εστίαση στον έλεγχο εγκυρότητας χαρακτήρων και στην αναζήτηση στον πίνακα αντιστοίχισης ("Tbl_Look_up"). Ακολουθεί μια ανάλυση κάθε βήματος με βάση το διάγραμμα:

- Start: Έναρξη της διαδικασίας.
- Key Down Event: Ανίχνευση γεγονότος πάτηματος πλήκτρου από το χρήστη.
- Is Key Valid?: Έλεγχος αν το πλήκτρο που πατήθηκε είναι έγκυρο, δηλαδή αν ο χαρακτήρας που εισάγεται μπορεί να υποστηριχθεί από το σύστημα.
- Αν ΟΧΙ (No):
- Εκπέμπεται ήχος προειδοποίησης (Beep).

- Έξοδος από τη υπορουτίνα (Exit Sub).
- Αν NAI (Yes):
- Ενημέρωση της μεταβλητής strBuffer με τον νέο χαρακτήρα.
- Search "Tbl_Look_up": Αναζήτηση στον πίνακα αντιστοίχισης χαρακτήρων Braille.
- Is Match Found?: Έλεγχος αν βρέθηκε αντιστοιχία για το χαρακτήρα.
- Αν βρεθεί Μία Αντιστοιχία (One Match):
- Ενημέρωση των πεδίων κειμένου (Update TextBoxes) για παρουσίαση.
- Αν βρεθούν Πολλές Αντιστοιχίες (Many Matches):
- Αναμονή για εισαγωγή του επόμενου χαρακτήρα (Wait for next Char), προκειμένου να οριστικοποιηθεί η αντιστοιχία.
- Αν δεν βρεθεί Καμία Αντιστοιχία (No Match):
- Εκπέμπεται ήχος προειδοποίησης (Beep).
- Αφαίρεση του τελευταίου χαρακτήρα από τη μεταβλητή strBuffer.
- End: Τέλος της διαδικασίας.

Εικόνα 2
Διάγραμμα ροής του αλγορίθμου εκμάθησης



Το διάγραμμα αποτυπώνει καθαρά τη λογική ροή του αλγορίθμου κατά την εισαγωγή χαρακτήρων και την αναγνώριση τους για μεταγραφή σε Braille, ενσωματώνοντας μηχανισμούς ελέγχου εγκυρότητας, αναζήτησης και ενημέρωσης της διεπαφής.Η απομόνωση των λειτουργιών σε ξεχωριστές μονάδες επιτρέπει την εύκολη συντήρηση, εντοπισμό σφαλμάτων και επεκτασιμότητα του λογισμικού (Brusilovsky, 2001).

Το παραπάνω διάγραμμα απεικονίζει τη ροή διαδικασιών κατά την εισαγωγή χαρακτήρων στο σύστημα και την αντιστοίχισή τους στον κώδικα Braille. Μετά την ενεργοποίηση του γεγονότος πάτησης πλήκτρου (Key Down Event), γίνεται άμεση επικύρωση του χαρακτήρα (Is Key Valid?). Εάν ο χαρακτήρας δεν είναι αποδεκτός, το σύστημα εκπέμπει ηχητική ειδοποίηση (Beep) και τερματίζει τη διαδικασία της υπορουτίνας (Exit Sub).

Σε περίπτωση που ο χαρακτήρας είναι έγκυρος, ενημερώνεται το buffer (Update StrBuffer) και ακολουθεί η αναζήτηση στον πίνακα αντιστοίχισης χαρακτήρων Braille ("Tbl_Look_up"). Εάν βρεθεί μία αντιστοιχία, το σύστημα ενημερώνει τα πεδία κειμένου (Update TextBoxes) που απεικονίζουν το αποτέλεσμα προς τον χρήστη. Στην περίπτωση πολλαπλών αντιστοιχιών, το πρόγραμμα περιμένει την εισαγωγή του επόμενου χαρακτήρα, ώστε να οριστικοποιήσει την επιλογή. Αν δεν βρεθεί καμία αντιστοιχία, το λογισμικό εκπέμπει «μπιπ» και αφαιρεί τον τελευταίο χαρακτήρα από το buffer για αποφυγή λαθών.

Αυτή η διακριτή και αυστηρή ροή ελέγχου διασφαλίζει την ακρίβεια της μεταγραφής και την άμεση ενημέρωση του χρήστη, καλύπτοντας βασικές λειτουργίες ελέγχου και διαχείρισης εισόδου (Bass, Clements & Kazman, 2012).

Το διάγραμμα ροής απεικονίζει τη διαδικασία διαχείρισης εισόδου χαρακτήρων από τον χρήστη. Μετά το γεγονός πάτησης πλήκτρου, γίνεται έλεγχος εγκυρότητας του χαρακτήρα. Αν είναι άκυρος, το σύστημα εκπέμπει ήχο ειδοποίησης και τερματίζει τη λειτουργία. Για έγκυρα πλήκτρα, ενημερώνεται ο buffer των χαρακτήρων και ακολουθεί αναζήτηση στον πίνακα αναζήτησης Braille. Αν βρεθεί μία αντιστοιχία, ενημερώνονται τα πεδία κειμένου, αν πολλές αντιστοιχίες, περιμένει νέο χαρακτήρα, ενώ αν δεν βρεθεί αντιστοιχία, εκπέμπεται προειδοποιητικό beep και αφαιρείται ο τελευταίος χαρακτήρας από τον buffer.

ΑΝΑΛΥΣΗ ΚΑΙ ΥΛΟΠΟΙΗΣΗ ΑΛΓΟΡΙΘΜΟΥ ΜΕΤΑΓΡΑΦΗΣ ΚΕΙΜΕΝΟΥ ΣΕ BRAILLE ΛΕΙΤΟΥΡΓΙΚΟΤΗΤΑ ΚΑΙ ΧΡΗΣΗ ΤΟΥ ΛΟΓΙΣΜΙΚΟΥ

Η διαδικασία μεταγραφής ελληνικού και αγγλικού κειμένου σε Braille υλοποιείται με ακριβείς αλγορίθμους που αναγνωρίζουν κάθε χαρακτήρα, λαμβάνουν υπόψη γλωσσικές ιδιαιτερότητες και αποδίδουν τον αντίστοιχο κώδικα Braille. Το λογισμικό εκμεταλλεύεται πίνακες αντιστοίχισης και κανόνες μεταγραφής που καλύπτουν το μονοτονικό και πολυτονικό σύστημα στα ελληνικά, καθώς και τις ιδιαιτερότητες της αγγλικής γλώσσας. Η αλυσίδα μεταγραφής ακολουθεί λειτουργίες ελέγχου εγκυρότητας χαρακτήρων, προσεκτικής μετάφρασης και άμεσης ενημέρωσης της διεπαφής (Kukulska-Hulme, 2012; Young & Temple, 2021).

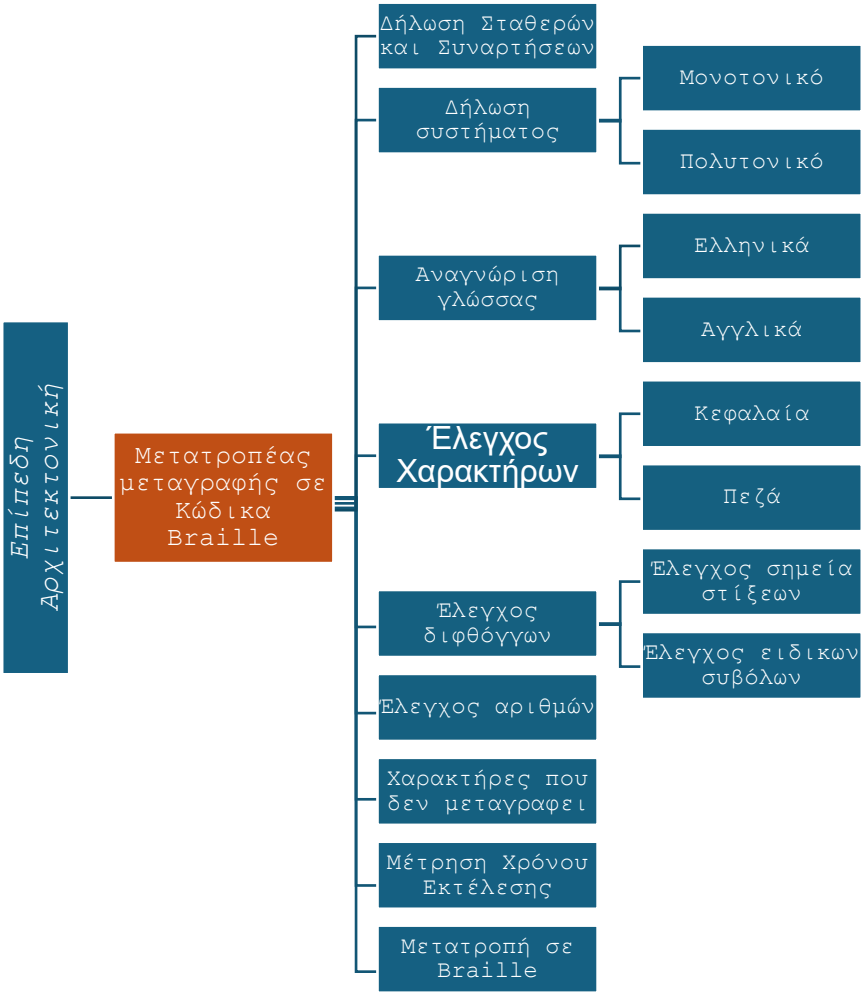
Παράλληλα, το λογισμικό παρέχει λειτουργίες εκμάθησης που διευκολύνουν τους χρήστες στην κατανόηση του συστήματος Braille μέσω αλληλεπίδρασης, οπτικοακουστικής ανατροφοδότησης και σταδιακής εκμάθησης. Μέσα από διαδραστικά περιβάλλοντα, οι μαθητές έχουν τη δυνατότητα να δουν σε πραγματικό χρόνο τη μετατροπή χαρακτήρων σε Braille, ενισχύοντας τη σύνδεση μεταξύ γραπτού και αγγίγματος (Meyer, Rose, & Gordon, 2014; Brusilovsky, 2001). Αυτή η άμεση απόδοση βελτιώνει σημαντικά την εκπαιδευτική αποτελεσματικότητα και ενθαρρύνει την ενεργή συμμετοχή.

Τα σενάρια χρήσης του λογισμικού καλύπτουν ένα ευρύ φάσμα: οι εκπαιδευτικοί το χρησιμοποιούν για την παραγωγή προσβάσιμου εκπαιδευτικού υλικού και την υποστήριξη της διδασκαλίας Braille, οι μαθητές το αξιοποιούν για αυτοκατευθυνόμενη εκμάθηση και εξάσκηση, ενώ οι υποστηρικτές προσφέρουν βοήθεια και παρακολουθούν την πρόοδο μέσα από τις αναλυτικές λειτουργίες του συστήματος (European Disability Forum, 2023; WHO, 2021).

Ιδιαίτερη σημασία δίνεται στη φιλικότητα της διεπαφής και την προσβασιμότητα, καθώς το λογισμικό σχεδιάστηκε εφαρμόζοντας τις αρχές της καθολικής σχεδίασης (Universal Design for Learning – UDL), ώστε να είναι απολύτως προσιτό σε χρήστες με οπτική αναπηρία. Απλή πλοήγηση, ευανάγνωστα στοιχεία, ηχητική υποστήριξη και δυνατότητα προσαρμογής παραμέτρων εγγυώνται μια καθηλωτική και αποτελεσματική μαθησιακή εμπειρία (Meyer, Rose, & Gordon, 2014; Kukulska-Hulme, 2012).

Η συνολική λειτουργικότητα και η διευρυμένη χρήση αυτής της εφαρμογής επιφέρουν σημαντικό κοινωνικό αντίκτυπο, συμβάλλοντας στην εκπαιδευτική ισότητα και την ενσωμάτωση ατόμων με προβλήματα όρασης στην εκπαιδευτική διαδικασία και την κοινωνία ευρύτερα (World Health Organization, 2021).

Εικόνα 3
Διάγραμμα επίπεδης *αρχιτεκτονικής* του λογισμικού μεταγραφής



Το διάγραμμα παρουσιάζει την ανάλυση των λειτουργιών του μετατροπέα σε επίπεδα αρχιτεκτονικής που περιλαμβάνει:

Δήλωση Σταθερών και Συναρτήσεων: Καλύπτει το μονοτονικό και πολυτονικό σύστημα, δηλαδή τη βασική υποδομή υποστήριξης της ελληνικής γλώσσας με όλους τους τόνους και πνεύματα.

Αναγνώριση Γλώσσας: Εντοπισμός αν το κείμενο είναι ελληνικό ή αγγλικό.

Έλεγχος Χαρακτήρων: Περιλαμβάνει έλεγχο για πεζά και κεφαλαία, σημεία στίξης, διφθόγγους και ειδικούς συμβόλους, καθώς και διαχείριση χαρακτήρων που δεν υποστηρίζονται.

Μέτρηση Χρόνου Εκτέλεσης: Καταγραφή χρόνου για την αξιολόγηση της αποδοτικότητας.

Μετατροπή σε Braille: Ο τελικός μετασχηματισμός των συμβόλων σε κώδικα Braille βάσει των πινάκων αντιστοίχισης.

Η διάταξη αυτή επιβεβαιώνει την επιλεγμένη επίπεδη αρχιτεκτονική, που ευνοεί τον σαφή διαχωρισμό λειτουργιών και διευκολύνει τη συντήρηση και μελλοντική επέκταση (Kukulska-Hulme, 2012; Bass, Clements & Kazman, 2012).

Η συνδυασμένη χρήση αυτών των διαγραμμάτων ενισχύει την κατανόηση της δομής και των διαδικασιών του λογισμικού, υποδεικνύοντας την ισορροπία μεταξύ ακρίβειας, ταχύτητας και φιλικής προς τον χρήστη εμπειρίας.

Το παραπάνω διάγραμμα αναλύει την επίπεδη αρχιτεκτονική του μετατροπέα σε Braille με διαχωρισμό λειτουργιών: δήλωση σταθερών και συστημάτων (μονοτονικό, πολυτονικό), αναγνώριση γλώσσας (ελληνικά, αγγλικά), έλεγχος χαρακτήρων (κεφαλαία, πεζά, σημεία στίξης, ειδικοί χαρακτήρες), μέτρηση χρόνου εκτέλεσης, και τελική μετατροπή σε Braille. Η δομή αυτή διευκολύνει τη συντήρηση, την ακρίβεια και την επεκτασιμότητα του λογισμικού σύμφωνα με την επίπεδη αρχιτεκτονική..

ΑΞΙΟΛΟΓΗΣΗ ΚΑΙ ΑΠΟΤΕΛΕΣΜΑΤΑ

Η αξιολόγηση του λογισμικού μεταγραφής και εκμάθησης του κώδικα Braille πραγματοποιήθηκε σε δύο βασικούς άξονες: ποσοτική μέτρηση της ακρίβειας της μεταγραφής και ποιοτική δοκιμή της χρηστικότητας με πραγματικούς χρήστες και ειδικούς στον τομέα της προσβασιμότητας.

Στην ποσοτική αξιολόγηση, εξετάστηκε η ακρίβεια της αυτόματης μεταγραφής ελληνικών και αγγλικών κειμένων σε Braille, όπου το λογισμικό έδειξε υψηλά ποσοστά ορθότητας, με ποσοστό επιτυχίας που ξεπέρασε το 95% σε δοκιμαστικά δείγματα εκπαιδευτικού υλικού (Young & Temple, 2021). Η χρήση λεπτομερών πινάκων αντιστοίχισης και αλγορίθμων ελέγχου χαρακτήρων συνέβαλε στη διόρθωση λάθους και εξασφάλισε την πιστότητα της μεταγραφής τόσο στο μονοτονικό όσο και στο πολυτονικό σύστημα.

Η ποιοτική αξιολόγηση περιελάμβανε δοκιμές χρηστικότητας με ομάδες χρηστών που περιλάμβαναν άτομα με οπτική αναπηρία, εκπαιδευτικούς και ειδικούς στην προσβασιμότητα. Οι συμμετέχοντες ανέφεραν θετική εμπειρία, επισημαίνοντας ως σημαντικά χαρακτηριστικά τη φιλικότητα της διεπαφής, την ευκολία πλοήγησης και την άμεση ανατροφοδότηση κατά τη διάρκεια της εκμάθησης (Meyer, Rose, & Gordon, 2014). Παράλληλα, προτάθηκαν βελτιώσεις όσον αφορά την ενίσχυση της ηχητικής υποστήριξης και την επέκταση στη χρήση επιπλέον γλωσσών.

Αναφορικά με την απόδοση, η ανάλυση των χρόνων επεξεργασίας κατέδειξε ότι ο αλγόριθμος λειτουργεί αποτελεσματικά σε πραγματικό χρόνο, με ικανοποιητικά χαμηλές καθυστερήσεις, καθιστώντας το λογισμικό κατάλληλο για καθημερινή χρήση και άμεση απόκριση στην εισαγωγή δεδομένων (Bass, Clements & Kazman, 2012). Η μέτρηση χρόνου εκτέλεσης και η περιοδική βελτιστοποίηση των διαδικασιών επιβεβαίωσαν τη σταθερότητα και αποδοτικότητα της εφαρμογής.

Συνολικά, τα σχόλια των χρηστών και ειδικών αναδεικνύουν το λογισμικό ως ένα αξιόπιστο, προσβάσιμο και λειτουργικό εργαλείο που προάγει την εκπαιδευτική ισότητα και την κοινωνική ένταξη των ατόμων με προβλήματα όρασης, παράλληλα με τη δυνατότητα περαιτέρω ανάπτυξης και βελτίωσης (European Disability Forum, 2023; WHO, 2021).

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΜΕΛΛΟΝΤΙΚΕΣ ΚΑΤΕΥΘΥΝΣΕΙΣ

Η παρούσα εργασία παρουσίασε την ανάπτυξη ενός λογισμικού μεταγραφής και εκμάθησης του κώδικα Braille, εστιάζοντας στην προσβασιμότητα και εκπαιδευτική υποστήριξη ατόμων με προβλήματα όρασης. Τα αποτελέσματα δείχνουν ότι το σύστημα είναι ικανό να παρέχει ακριβή, γρήγορη και φιλική προς το χρήστη μεταγραφή ελληνικών και αγγλικών κειμένων σε Braille, συμβάλλοντας ουσιαστικά στην εκπαιδευτική και κοινωνική ένταξη των ατόμων αυτών (Young & Temple, 2021).

Η επιλογή της επίπεδης αρχιτεκτονικής κατέστησε δυνατή μια ευέλικτη, συντηρήσιμη και επεκτάσιμη δομή, που διευκολύνει την προσθήκη νέων λειτουργιών και γλωσσικών υποστηρίξεων, καθώς και τη βελτίωση απόδοσης (Bass, Clements & Kazman, 2012). Το ενσωματωμένο εκπαιδευτικό περιβάλλον επιτρέπει την ενεργή αλληλεπίδραση των χρηστών με τον κώδικα Braille, ενισχύοντας την αυτονομία και την αποτελεσματικότητα της μάθησης (Meyer, Rose, & Gordon, 2014).

Για το μέλλον, προτείνεται η διεύρυνση των δυνατοτήτων του λογισμικού σε περισσότερα γλωσσικά συστήματα και η υποστήριξη του μαθηματικού Braille, που θα διευκόλυνε σημαντικά τους μαθητές με οπτική αναπηρία σε επιστημονικά και τεχνικά πεδία (European Disability Forum, 2023). Επιπλέον, η συμβατότητα με σύγχρονες συσκευές Braille display, η ενσωμάτωση φωνητικής εξόδου και η διασύνδεση με βάσεις δεδομένων εκπαιδευτικού υλικού θα αναβαθμίσουν περαιτέρω τη λειτουργικότητα και προσβασιμότητα του εργαλείου.

Επιστημονικά, η εργασία συμβάλλει στην εξέλιξη της εκπαιδευτικής τεχνολογίας για την προσβασιμότητα, προωθώντας την έρευνα στη διαδραστική μάθηση και τις τεχνολογίες επεξεργασίας φυσικής γλώσσας για ειδικές ανάγκες (Brusilovsky, 2001; Kukulska-Hulme, 2012). Κοινωνικά, το λογισμικό ενισχύει την ισότητα στην εκπαίδευση και την κοινωνική ενσωμάτωση, προσφέροντας ένα σύγχρονο εργαλείο άμεσης χρήσης και ευρείας αποδοχής (WHO, 2021).

Συνολικά, οι προτάσεις για μελλοντική έρευνα περιλαμβάνουν την ανάλυση εμπειριών χρηστών σε ευρύτερα δείγματα, την ανάπτυξη πιο εξατομικευμένων μαθησιακών διαδρομών και την επέκταση σε περιβάλλοντα φορητής μάθησης και διαδικτυακής εκπαίδευσης.

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"INTERNATIONAL JOINT CLASSES": ΈΝΑ ΠΑΡΑΔΕΙΓΜΑ ΑΞΙΟΠΟΙΗΣΗΣ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΕ ΔΙΕΘΝΕΣ ΠΡΟΓΡΑΜΜΑ ΣΧΟΛΕΙΩΝ

Αντωνίου Αικατερίνη
Εκπαιδευτικός Νοσηλευτικής και Γεωπονίας και Διευθύντρια Γυμνασίου Νεοχωρίου
Ημερήσιο Γυμνάσιο Νεοχωρίου, Δ.Δ.Ε. Άρτας, Ελλάδα
e-mail: katerinaaaaant@gmail.com

Γρίβα Ελευθερία
Φιλόλογος ΕΑΕ και Σύμβουλος Σχολικής Ζωής
Ημερήσιο Γυμνάσιο Νεοχωρίου, Δ.Δ.Ε. Άρτας, Ελλάδα
e-mail: elgriva@yahoo.gr

ΠΕΡΙΛΗΨΗ

Μια καλή πρακτική αξιοποίησης ψηφιακών τεχνολογιών θα παρουσιάσουμε μέσα από τη παρούσα εργασία, όπως αυτή υλοποιήθηκε στο πλαίσιο του προγράμματος με τίτλο "International Joint Classes" που διοργάνωσε το Μητροπολιτικό Γραφείο Εκπαίδευσης της Δημοκρατίας της Κορέας αξιοποιώντας τις τεχνολογίες επικοινωνίας και της εξ' αποστάσεως εκπαίδευσης με στόχο την καλύτερη κατανόηση της πολιτιστικής διαφορετικότητας και την ανάπτυξη δεξιοτήτων επικοινωνίας. Το διακρατικό, διασχολικό και συνεργατικό έργο μεταξύ τριών σχολείων (του Ημερήσιου Γυμνασίου και ΓΕΛ Νεοχωρίου Άρτας από Ελλάδα και του Yang Chung Middle School στη Σεούλ από Νότια Κορέα) ήταν μια πρωτοβουλία του πρώτου σχολείου και είχε διάρκεια από Μάιο έως Δεκέμβριο 2024. Το θέμα των εργασιών ορίστηκε «Ο Β΄ Παγκόσμιος Πόλεμος και οι επιπτώσεις του στους δύο λαούς». Υλοποιήθηκαν εξ αποστάσεως σύγχρονες διαδικτυακές συναντήσεις αλλά και ασύγχρονες εξ αποστάσεως διδακτικές ώρες αξιοποίησης του παραγόμενου υλικού.

Στο πρώτο μέρος της εργασίας παρουσιάζεται η σημασία των σύγχρονων ψηφιακών εργαλείων στην εκπαίδευση και στη διδασκαλία. Η ραγδαία ανάπτυξη των ψηφιακών και τεχνολογικών μέσων έχει επιφέρει σημαντικές αλλαγές στη μαθησιακή διαδικασία, δημιουργώντας νέες ευκαιρίες και προκλήσεις για την εκπαιδευτική κοινότητα. Ως εκ τούτου κρίνεται απαραίτητη η αξιοποίηση και η αξιολόγηση αυτών των μέσων στη σύγχρονη εκπαιδευτική πραγματικότητα, εξετάζοντας τη δυναμική και τη συμβολή των ψηφιακών εργαλείων στη βελτίωση της διδακτικής πρακτικής. Στο δεύτερο μέρος της εργασίας θα παρουσιάσουμε τις εργασίες του σχολείου μας και τα ψηφιακά εργαλεία που χρησιμοποιήθηκαν στο πλαίσιο του παραπάνω προγράμματος. Με τη βοήθεια των εργαλείων αυτών δημιουργήθηκε μια δυναμική διαδικτυακή κοινότητα μάθησης, συνεργασίας και αλληλεπίδρασης με ανταλλαγή πληροφοριών, ιστορικών πηγών και απόψεων για τα γεγονότα του Β' Παγκόσμιου Πολέμου. Να σημειωθεί ότι η γλώσσα όλων των εργασιών είναι τα αγγλικά. Τα βασικά ψηφιακά εργαλεία που αξιοποιήθηκαν ενισχύοντας έτσι τη διαδραστικότητα και την πολυτροπική προσέγγιση της μάθησης είναι:

- Padlet. Μια εύχρηστη διαδραστική πλατφόρμα συνεργατικής μάθησης. Πρόκειται για έναν διαδικτυακό εικονικό τοίχο, έναν πίνακα καρφιτσών στον οποίο μπορεί να αναρτηθεί το περιεχόμενο, τα πολυμέσα (έγγραφα, εικόνες, βίντεο, ηχητικά, κτλ) με πρόσβαση των μελών ανά πάσα στιγμή. Επιλέχθηκε ως κοινή πλατφόρμα ανάρτησης των ομαδικών εργασιών των μαθητών/μαθητριών από τα τρία σχολεία.
- Veed. Ένα απλό πρόγραμμα επεξεργασίας βίντεο. Επιλέχθηκε από την ομάδα εργασία για να μετατρέψουν ένα αρχείο ppt σε βίντεο με θέμα την παρουσίαση των μελών της ομάδας και του τόπου τους.
- Canva. Μια πλατφόρμα σχεδίασης που μας επιτρέπει να δημιουργήσουμε ένα ευρύ φάσμα διαδραστικών υλικών πολυμέσων, όπως γραφήματα, αφίσες, παρουσιάσεις, φύλλα εργασίας, κόμικς κ.ά. Αυτό το εργαλείο προτιμήθηκε από την ομάδα εργασίας για τη δημιουργία μιας αφίσας (poster) με θέμα τη σφαγή στο Κομμένο Άρτας το 1943.
- Prezi. Ένα λογισμικό πολυμέσων για ελκυστικές παρουσιάσεις. Είναι μια φιλική εφαρμογή που δεν απαιτεί προηγούμενη εμπειρία σχεδιασμού ή προγραμματισμού. Επιλέχθηκε από την ομάδα εργασίας για μια παρουσίαση με θέμα τις κύριες ημερομηνίες και σημαντικά γεγονότα του Β΄ Παγκόσμιου πολέμου στην Ελλάδα. Με το ίδιο θέμα ασχολήθηκε και μια δεύτερη ομάδα εργασίας, η οποία επέλεξε τη δημιουργία ιστοριογραμμής με το εργαλείο Preceden.
- Vocaroo. Μια πολύ εύκολη εφαρμογή εγγραφής ήχου με παραγόμενα mp3 αρχεία. Το εργαλείο επιλέχθηκε από την μαθητική ομάδα για την ηχογράφηση βασικών λέξεων σχετικών με τον Β΄ Παγκόσμιο πόλεμο.

Στο τρίτο μέρος παρουσιάζονται τα συμπεράσματα και η αξιολόγηση της εμπειρίας αυτής, η οποία ανέδειξε τη θετική συμβολή των ψηφιακών εργαλείων στη βελτίωση της κριτικής σκέψης, της συνεργασίας και της κατανόησης ιστορικών γεγονότων από διαφορετικές πολιτισμικές οπτικές γωνίες.

Λέξεις – κλειδιά: διεθνές πρόγραμμα, Β΄ Παγκόσμιος Πόλεμος, ψηφιακά εργαλεία.

ΕΙΣΑΓΩΓΗ

Η ραγδαία ανάπτυξη των ψηφιακών τεχνολογιών, ιδιαίτερα μετά την παγκόσμια εμπειρία της πανδημίας COVID-19, ανέδειξε τη σημασία τους ως αναπόσπαστο στοιχείο της σύγχρονης εκπαιδευτικής διαδικασίας. Η αναγκαστική μετάβαση από τη δια ζώσης διδασκαλία σε περιβάλλοντα εξ αποστάσεως εκπαίδευσης, είτε σύγχρονης είτε ασύγχρονης μορφής, επέφερε ουσιαστικές αλλαγές στον τρόπο σχεδιασμού και υλοποίησης της διδασκαλίας. Μέσω ποικίλων εκπαιδευτικών πλατφορμών, δόθηκε έμφαση στην ανάγκη ουσιαστικής ενσωμάτωσης των ψηφιακών εργαλείων στο εκπαιδευτικό έργο, γεγονός που μετέβαλε σημαντικά τις διδακτικές πρακτικές (Xesternou, 2020).

Η αξιοποίηση των Τεχνολογιών Πληροφορίας και Επικοινωνιών (ΤΠΕ) συνέβαλε αποφασιστικά στη συγκρότηση νέων μαθησιακών πλαισίων, που χαρακτηρίζονται από ευελιξία, διαδραστικότητα και αυξημένες δυνατότητες συμμετοχής (Tzimogiannis & Komis, 2007). Οι ψηφιακές πλατφόρμες σύγχρονης τηλεκπαίδευσης επέτρεψαν την άμεση επικοινωνία διδασκόντων/-ουσών και μαθητών/-τριών, προσφέροντας ένα λειτουργικό και προσιτό μαθησιακό περιβάλλον. Παράλληλα, η εξοικείωση με ανοικτά λογισμικά για την οργάνωση ασύγχρονων μαθημάτων και τη δημιουργία ψηφιακών τάξεων, ενίσχυσε την αυτονομία των εκπαιδευτικών και των μαθητών/τριών στην εκπαιδευτική διαδικασία. Οι εκπαιδευτικοί, ειδικότερα, κλήθηκαν να ανανεώσουν τις παραδοσιακές τους πρακτικές, αξιοποιώντας ψηφιακά εργαλεία για την ανασύνταξη του διδακτικού τους υλικού.

Σε αυτό το νέο παιδαγωγικό και τεχνολογικό πλαίσιο, αναδύεται η ανάγκη αναθεώρησης του νοήματος του «διδακτικού σχεδιασμού» και, ευρύτερα, της έννοιας της διδασκαλίας και της μάθησης. Ενδεικτική πρωτοβουλία αυτής της νέας πραγματικότητας αποτελεί το πρόγραμμα “International Joint Classes”, το οποίο συνιστά παράδειγμα παιδαγωγικής καινοτομίας με διαπολιτισμικό προσανατολισμό και ενεργή αξιοποίηση των ψηφιακών τεχνολογιών.

ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Η τεχνολογία στην εκπαίδευση έχει φέρει επανάσταση στον τρόπο με τον οποίο οι μαθητές/μαθήτριες μαθαίνουν και οι εκπαιδευτικοί διδάσκουν. Τα ψηφιακά εργαλεία και οι καινοτόμες μέθοδοι μάθησης έχουν μεταμορφώσει την εκπαιδευτική εμπειρία, καθιστώντας την πιο προσβάσιμη, ευέλικτη και αποδοτική. Η εισαγωγή των ψηφιακών εργαλείων στην εκπαίδευση ξεκίνησε με την χρήση υπολογιστών και εκπαιδευτικού λογισμικού στις τάξεις. Σήμερα, η χρήση της τεχνολογίας έχει επεκταθεί σε κάθε πτυχή της εκπαιδευτικής διαδικασίας, από την παραδοσιακή διδασκαλία έως την εξ αποστάσεως εκπαίδευση και την αυτόνομη μάθηση.

Στη σημερινή εκπαιδευτική πράξη, παρόλο που η παραδοσιακή προσέγγιση της γνώσης εξακολουθεί να κυριαρχεί στη σχολική τάξη, παρατηρείται και μια σημαντική τάση για ενσωμάτωση της ψηφιακής τεχνολογίας στις εκπαιδευτικές διαδικασίες (Moeller & Reitzes, 2011). Ως αποτέλεσμα αυτού, κατά την υλοποίηση του προγράμματος σπουδών, παράλληλα με τα διάφορα διδακτικά εργαλεία (εγχειρίδια, φύλλα εργασίας, διδακτικά βοηθήματα κτλ.), χρησιμοποιούνται και ψηφιακά εργαλεία βασισμένα στις ΤΠΕ. Ως ψηφιακά εργαλεία του προγράμματος σπουδών θεωρούνται τα ψηφιακά υλικά που αξιοποιούνται από εκπαιδευτικούς και μαθητές κατά την αλληλεπίδραση με ηλεκτρονικά μέσα διδασκαλίας και είναι διαθέσιμα και προσβάσιμα κάθε χρονική στιγμή και σε κάθε χωρικό πλαίσιο, μέσα και έξω από την τάξη, όπως ψηφιακά λογισμικά, ιστότοποι, ψηφιακές εκπαιδευτικές πλατφόρμες, ψηφιακές αξιολογήσεις, ηλεκτρονικά βιβλία κτλ. (Pepin & Gueudet,2018). Άρα θα μπορούσαμε να πούμε ότι τα ψηφιακά εργαλεία είναι εφαρμογές λογισμικού ή πλατφόρμες που διευκολύνουν τη διαδικασία των γνώσεων, των δεξιοτήτων και των επιδόσεων των μαθητών/τριών σε ένα διαδικτυακό ή ψηφιακό μαθησιακό περιβάλλον.

Το οφέλη της χρήσης ψηφιακών εργαλείων στην εκπαίδευση είναι εμφανή και οι σύγχρονοι εκπαιδευτικοί παρακινούνται όλο και περισσότερο να βασίζονται στα ψηφιακά εργαλεία κατά το σχεδιασμό του εκπαιδευτικού υλικού, μια και εισαγωγή των ψηφιακών εργαλείων στην εκπαιδευτική διαδικασία επιτρέπει τη βελτίωση των διαδικασιών διδασκαλίας και εκμάθησης. Τα ψηφιακά εργαλεία κάνουν τη μάθηση πιο ενδιαφέρουσα και διαδραστική, αυξάνοντας την εμπλοκή των μαθητών/μαθητριών. Οι διαδραστικές παρουσιάσεις, τα εκπαιδευτικά παιχνίδια και οι εικονική πραγματικότητα, μπορούν να κάνουν τα μαθήματα πιο ελκυστικά και διασκεδαστικά. Μάλιστα, κινητοποιούνται ακόμα και οι πιο “αδύναμοι/ες” και οι πιο “αδιάφοροι/ες” μαθητές/μαθήτριες. Εξίσου σημαντικό είναι ότι η τεχνολογία διευκολύνει την πρόσβαση στην εκπαίδευση για όλους τους μαθητές/μαθήτριες, ανεξάρτητα από την τοποθεσία τους. Οι διαδικτυακές πλατφόρμες τους /τις επιτρέπουν από απομακρυσμένες περιοχές να παρακολουθούν μαθήματα και να αποκτούν γνώσεις που διαφορετικά θα ήταν δύσκολο να αποκτήσουν. Τέλος, η χρήση της τεχνολογίας στην εκπαίδευση βοηθά τους μαθητές/μαθήτριες να αναπτύξουν και να καλλιεργήσουν σημαντικές δεξιότητες του 21ου αιώνα, όπως η κριτική σκέψη, η επίλυση προβλημάτων και η συνεργασία. Οι μαθητές/μαθήτριες μαθαίνουν επίσης να χρησιμοποιούν ψηφιακά εργαλεία και τεχνολογίες, κάτι που είναι απαραίτητο στην σύγχρονη αγορά εργασίας.

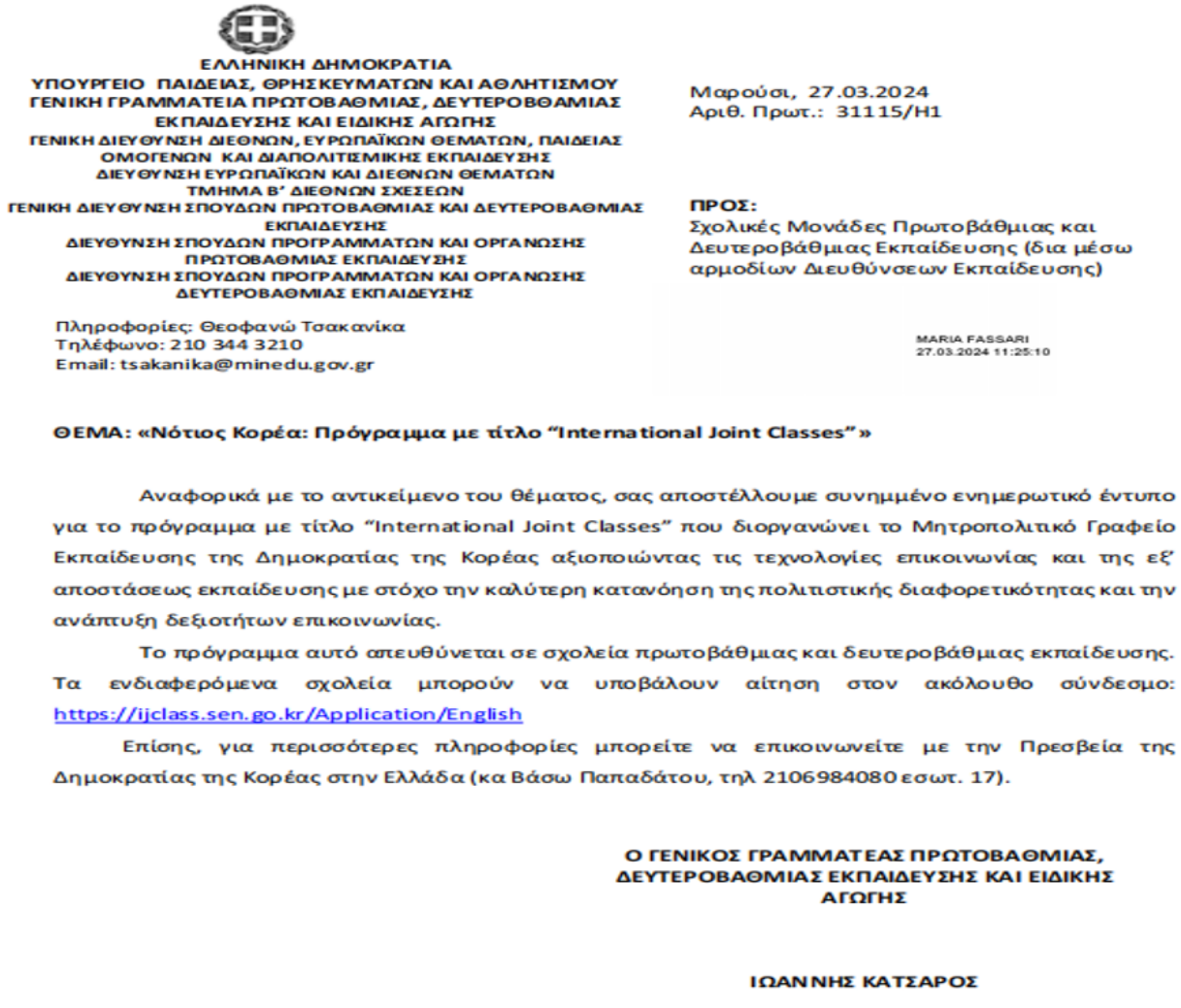
Σύμφωνα με τους Jimogiannis & Komis η αξιοποίηση των ψηφιακών εργαλείων στη διδακτική πράξη οδηγεί στη δημιουργία μαθητοκεντρικών μαθησιακών περιβαλλόντων και στην εφαρμογή στρατηγικών ενεργητικής μάθησης. Οι μαθητές/μαθήτριες μαθαίνουν να επικοινωνούν, βελτιώνονται οι αντιληπτικές τους ικανότητες καθώς και οι ικανότητες προσοχής, ενεργοποιούνται και συμμετέχουν περισσότερο στη διδασκαλία (Jimogiannis & Komis, 2007).

Πιο ειδικά οφέλη είναι:

1. Τα ψηφιακά εργαλεία συμβάλλουν στην κλιμάκωση τόσο των οπτικών όσο και των ακουστικών δεξιοτήτων των μαθητών/μαθητριών (Shyamlee & Phil 2012: 155).
2. Η χρήση ψηφιακών εργαλείων συμβάλλει στη βελτίωση της δημιουργικότητας των μαθητών/τριών (Tang et all 2022: 101032).
3. Η τεχνολογία με τη χρήση ψηφιακών εργαλείων είναι ιδιαίτερα χρήσιμη στη διδασκαλία και τη μάθηση στην τάξη καθώς βοηθάει στην επικοινωνία, το σχεδιασμό του διδακτικού υλικού και των ασκήσεων αλλά και στα μαθησιακά αποτελέσματα γενικότερα, δηλαδή στην επίδοση (Gilakjani 2017: 100).
4. Άλλα οφέλη περιλαμβάνουν τη συμμετοχή των μαθητών/μαθητριών σε διαδικτυακές συζητήσεις και εργασίες. Μπορούν επίσης, να συνδεθούν με άλλους/άλλες μαθητές/μαθήτριες ανά τον κόσμο μέσω συνεργατικών πλατφορμών και μέσων κοινωνικής δικτύωσης. Οι εκπαιδευτικοί, από τη μεριά τους, δημιουργούν ψηφιακές τάξεις, ψηφιακά ιστολόγια, όπως είναι το edublogs, όπου μαθητές και μαθήτριες μπορούν να δημοσιεύουν τις εργασίες τους.

Παρατηρούμε, λοιπόν, ότι τα υποβοηθούμενα από την τεχνολογία εργαλεία διδασκαλίας παρέχουν μια μοναδική πλατφόρμα τόσο στις/στους εκπαιδευτικούς όσο και στους/στις μαθητές/μαθήτριες για να αλληλεπιδρούν και έτσι να απλοποιούν τη διδασκαλία και τη διαδικασία εκμάθησης.

Εικόνα 1
Πρόσκληση - έγγραφο Υ.ΠΑΙ.Θ.Α



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ, ΘΡΗΣΚΕΥΜΑΤΩΝ ΚΑΙ ΑΘΛΗΤΙΣΜΟΥ
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ΓΕΝΙΚΗ ΔΙΕΥΘΥΝΣΗ ΔΙΕΘΝΩΝ, ΕΥΡΩΠΑΪΚΩΝ ΘΕΜΑΤΩΝ, ΠΑΙΔΕΙΑΣ ΟΜΟΓΕΝΩΝ ΚΑΙ ΔΙΑΠΟΛΙΤΙΣΜΙΚΗΣ ΕΚΠΑΙΔΕΥΣΗΣ
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ΔΙΕΥΘΥΝΣΗ ΣΠΟΥΔΩΝ ΠΡΟΓΡΑΜΜΑΤΩΝ ΚΑΙ ΟΡΓΑΝΩΣΗΣ ΠΡΩΤΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ
ΔΙΕΥΘΥΝΣΗ ΣΠΟΥΔΩΝ ΠΡΟΓΡΑΜΜΑΤΩΝ ΚΑΙ ΟΡΓΑΝΩΣΗΣ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ

Πληροφορίες: Θεοφανώ Τσακανίκα
Τηλέφωνο: 210 344 3210
Email: tsakanika@minedu.gov.gr

Μαρούσι, 27.03.2024
Αριθ. Πρωτ.: 31115/Η1

ΠΡΟΣ:
Σχολικές Μονάδες Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης (δια μέσω αρμοδίων Διευθύνσεων Εκπαίδευσης)

MARIA FASSARI
27.03.2024 11:25:10

ΘΕΜΑ: «Νότιος Κορέα: Πρόγραμμα με τίτλο "International Joint Classes"»

Αναφορικά με το αντικείμενο του θέματος, σας αποστέλλουμε συνημμένο ενημερωτικό έντυπο για το πρόγραμμα με τίτλο "International Joint Classes" που διοργανώνει το Μητροπολιτικό Γραφείο Εκπαίδευσης της Δημοκρατίας της Κορέας αξιοποιώντας τις τεχνολογίες επικοινωνίας και της εξ' αποστάσεως εκπαίδευσης με στόχο την καλύτερη κατανόηση της πολιτιστικής διαφορετικότητας και την ανάπτυξη δεξιοτήτων επικοινωνίας.

Το πρόγραμμα αυτό απευθύνεται σε σχολεία πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης. Τα ενδιαφερόμενα σχολεία μπορούν να υποβάλουν αίτηση στον ακόλουθο σύνδεσμο: https://ijclass.sen.go.kr/Application/English

Επίσης, για περισσότερες πληροφορίες μπορείτε να επικοινωνείτε με την Πρεσβεία της Δημοκρατίας της Κορέας στην Ελλάδα (κα Βάσω Παπαδάτου, τηλ 2106984080 εσωτ. 17).

Ο ΓΕΝΙΚΟΣ ΓΡΑΜΜΑΤΕΑΣ ΠΡΩΤΟΒΑΘΜΙΑΣ, ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΚΑΙ ΕΙΔΙΚΗΣ ΑΓΩΓΗΣ

ΙΩΑΝΝΗΣ ΚΑΤΣΑΡΟΣ

INTERNATIONAL JOINT CLASSES

Τον Μάρτιο του 2024 με πρωτοβουλία του σχολείου μας συμμετείχαμε στην πρόκληση του Υπουργείου Παιδείας, Θρησκευμάτων και Αθλητισμού (Εικόνα 1) στο Πρόγραμμα με τίτλο "International Joint Classes" που διοργάνωσε το Μητροπολιτικό Γραφείο Εκπαίδευσης της Δημοκρατίας της Κορέας σε συνεργασία με το Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού και με τη Γενική Γραμματεία Πρωτοβάθμιας, Δευτεροβάθμιας Εκπαίδευσης και Ειδικής Αγωγής, τη Γενική Διεύθυνση Διεθνών, Ευρωπαϊκών θεμάτων, Παιδείας Ομογενών και Διαπολιτισμικής εκπαίδευσης, τη Διεύθυνση Ευρωπαϊκών και Διεθνών θεμάτων, Τμήμα Β΄ Διεθνών Σχέσεων, τη Γενική Διεύθυνση Σπουδών Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης, τη Διεύθυνση Σπουδών Προγραμμάτων και Οργάνωσης Πρωτοβάθμιας και Δευτεροβάθμιας Εκπαίδευσης αξιοποιώντας τις τεχνολογίες επικοινωνίας και της εξ' αποστάσεως εκπαίδευσης με στόχο την καλύτερη κατανόηση της πολιτιστικής διαφορετικότητας και την ανάπτυξη δεξιοτήτων επικοινωνίας.

Πρόκειται για ένα διακρατικό, διασχολικό και συνεργατικό έργο μεταξύ τριών σχολείων (του Ημερήσιου Γυμνασίου και Γενικού Ενιαίου Λυκείου Νεοχωρίου Άρτας από Ελλάδα και του Yang Chung Middle School στη Σεούλ από Νότια Κορέα). Ο αριθμός των συμμετεχόντων/-ουσών μαθητών/μαθητριών του σχολείου μας ήταν 13 και 5 εκπαιδευτικών. Η διάρκεια του προγράμματος ήταν από τον Απρίλιο έως και Δεκέμβριο 2024. Να σημειωθεί εδώ ότι η συνεργασία μεταξύ των σχολείων ανανεώθηκε και θα συνεχιστεί και για τη περίοδο Απρίλιο 2025 έως και Δεκέμβριο 2025.

Το θέμα των εργασιών ορίστηκε «Ο Δεύτερος Παγκόσμιος Πόλεμος και οι επιπτώσεις του στους δύο λαούς». Το θέμα αυτό επιλέχθηκε καθώς και οι δύο λαοί έχουν υποστεί φρικαλεότητες κατά τον Δεύτερο Παγκόσμιο Πόλεμο, η μεν Ελλάδα από Γερμανούς, η δε Κορέα από Ιαπωνία. Οι μαθητές/μαθήτριες μέσα από μια θεματική ενότητα της Ιστορίας όχι μόνο θα γνώριζαν καλύτερα τα ιστορικά γεγονότα για τη χώρα τους αλλά και τι συνέβη την ίδια περίοδο στην Κορέα. Η γλώσσα του προγράμματος τόσο σε επίπεδο επικοινωνίας των ομάδων όσο και σε επίπεδο παραγόμενων εργασιών είναι τα αγγλικά. Να σημειωθεί ότι τα αγγλικά για κανέναν από τους μαθητές/μαθήτριες των τριών σχολείων δεν είναι μητρική γλώσσα αλλά πρώτη ξένη γλώσσα.

Βασικοί στόχοι του προγράμματος είναι οι μαθητές/μαθήτριες να αναπτύξουν δεξιότητες επικοινωνίας και συνεργασίας μεταξύ τους και μάλιστα σε γλώσσα που δεν είναι η μητρική τους. Επίσης, να έλθουν σε επαφή με τα πολιτιστικά χαρακτηριστικά του άλλου λαού, να εντοπίσουν ομοιότητες αλλά και να κατανοήσουν τη πολιτιστική διαφορετικότητα με στόχο τον σεβασμό στην διαφορετικότητα, την καταπολέμηση του ρατσισμού και της μισαλλοδοξίας. Τέλος, με την αξιοποίηση Τεχνολογιών Πληροφορίας και Επικοινωνίας (ΤΠΕ), με την χρήση ψηφιακών εργαλείων σε περιβάλλον εξ αποστάσεως μάθησης οι μαθητές/μαθήτριες να αναπτύξουν ψηφιακές δεξιότητες και γραμματισμό.

Οι μέθοδοι που χρησιμοποιήθηκαν είναι η μέθοδος project (Project-based teaching), η ομαδοσυνεργατική και η εξ αποστάσεως μάθηση (Σύγχρονη, Ασύγχρονη και Μικτή). Πιο συγκεκριμένα, η μέθοδος Project αφορά «Συνθετικές Δημιουργικές Εργασίες» ή «Ερευνητικές Εργασίες». Η μαθητοκεντρική αυτή μέθοδος καλύπτει ένα εύρος από συνεργατικές μεθόδους, με κύρια χαρακτηριστικά την αυθεντικότητα στις διαδικασίες, την αυτονομία των ομάδων των συνεργαζόμενων μαθητών και τον βιωματικό χαρακτήρα. Τρία είναι τα βασικά στάδια του Project, ο σχεδιασμός στην τάξη, η διεξαγωγή από τις ομάδες εργασίας και η παρουσίαση-αξιολόγηση. Όλα τα στάδια υλοποιούνται σε συνεργασία με τον/την εκπαιδευτικό που έχει ρόλο ενδυναμωτή και ενισχυτή. Για την ομαδοσυνεργατική μέθοδος οι μαθητές/μαθήτριες του σχολείου χωρίστηκαν σε ομάδες, καθόρισαν ρόλους, συνεργάστηκαν, αλληλεπίδρασαν, αναζήτησαν και οργάνωσαν το υλικό τους (ιστοεξερεύνηση), επέλεξαν τον τρόπο παρουσίασή του και ολοκλήρωσαν τις εργασίες τους. Οι ίδιες ομάδες ανέλαβαν να παρουσιάσουν τις εργασίες τους στις διαδικτυακές συναντήσεις των σχολείων. Ο ρόλος του εκπαιδευτικού ήταν καθοδηγητικός, ανατροφοδοτικός. Επρόκειτο για μια δυναμική διαδικασία η οποία παρακινούσε τους μαθητές /τις μαθήτριες να γίνουν πιο δραστήριοι/δραστήριες και να εμπλακούν ακόμη περισσότερο συμμετέχοντας στη μαθησιακή διαδικασία.

Όλο το πρόγραμμα τόσο σε επίπεδο σχεδιασμού και οργάνωσης όσο και σε επίπεδο υλοποίησης, πραγματοποίησης συναντήσεων και παρουσίασης εργασιών στηρίχθηκε σε εξ αποστάσεως πλατφόρμες μάθησης και επικοινωνίας. Η σύγχρονη εξ αποστάσεως επικοινωνία γινόταν μέσω της πλατφόρμας Skype ενώ η ασύγχρονη εξ αποστάσεως μάθηση πραγματοποιούνταν μέσα από ένα Padlet, έναν εικονικό τοίχο στον οποίο ανέβαιναν οι εργασίες των σχολείων, οι οποίες στη συνέχεια σχολιάζονταν και αξιοποιούνταν στην τάξη από το κάθε σχολείο. Για το 2024 πραγματοποιήθηκαν πέντε (05) σύγχρονες διαδικτυακές συναντήσεις (Εικόνες 2,3). Πιο συγκεκριμένα, τη Τετάρτη 15 Μαΐου 2024 πραγματοποιήθηκε η πρώτη τηλεδιάσκεψη των εκπαιδευτικών των σχολείων προκειμένου να καθοριστεί το θέμα και ο χρονοπρογραμματισμός των συναντήσεων. Τη Παρασκευή 17 Μαΐου 2024 πραγματοποιήθηκε η πρώτη τηλεδιάσκεψη μεταξύ των μαθητών/μαθητριών των σχολείων που συμμετέχουν στο πρόγραμμα με σκοπό να γνωριστούν

και να παρουσιάσουν τα σχολεία τους. Μια συνάντηση γνωριμίας με θέμα "Κουλτούρα και πολιτισμός της περιοχής μας". Τη Πέμπτη 31 Οκτωβρίου 2024 πραγματοποιήθηκε μια ακόμα διαδικτυακή συνάντηση των σχολείων και παρουσίαση εργασιών από τους/τις μαθητές/μαθήτριες. Τη Πέμπτη 5 Δεκεμβρίου 2024 πραγματοποιήθηκε η τελευταία για το 2024 διαδικτυακή συνάντηση των σχολείων ολοκληρώνοντας έτσι τις εργασίες του πρώτου έτους. Οι μαθητές/μαθήτριες αφού παρουσίασαν τις εργασίες τους, αποχαιρετήθηκαν ανανεώνοντας το ραντεβού τους για το 2025. Την Παρασκευή 6 Δεκεμβρίου 2024 πραγματοποιήθηκε διαδικτυακή συνάντηση των εκπαιδευτικών των τριών σχολείων με στόχο τον απολογισμό του προγράμματος.

Εικόνες 2, 3.
Φωτογραφίες από τις διαδικτυακές συναντήσεις



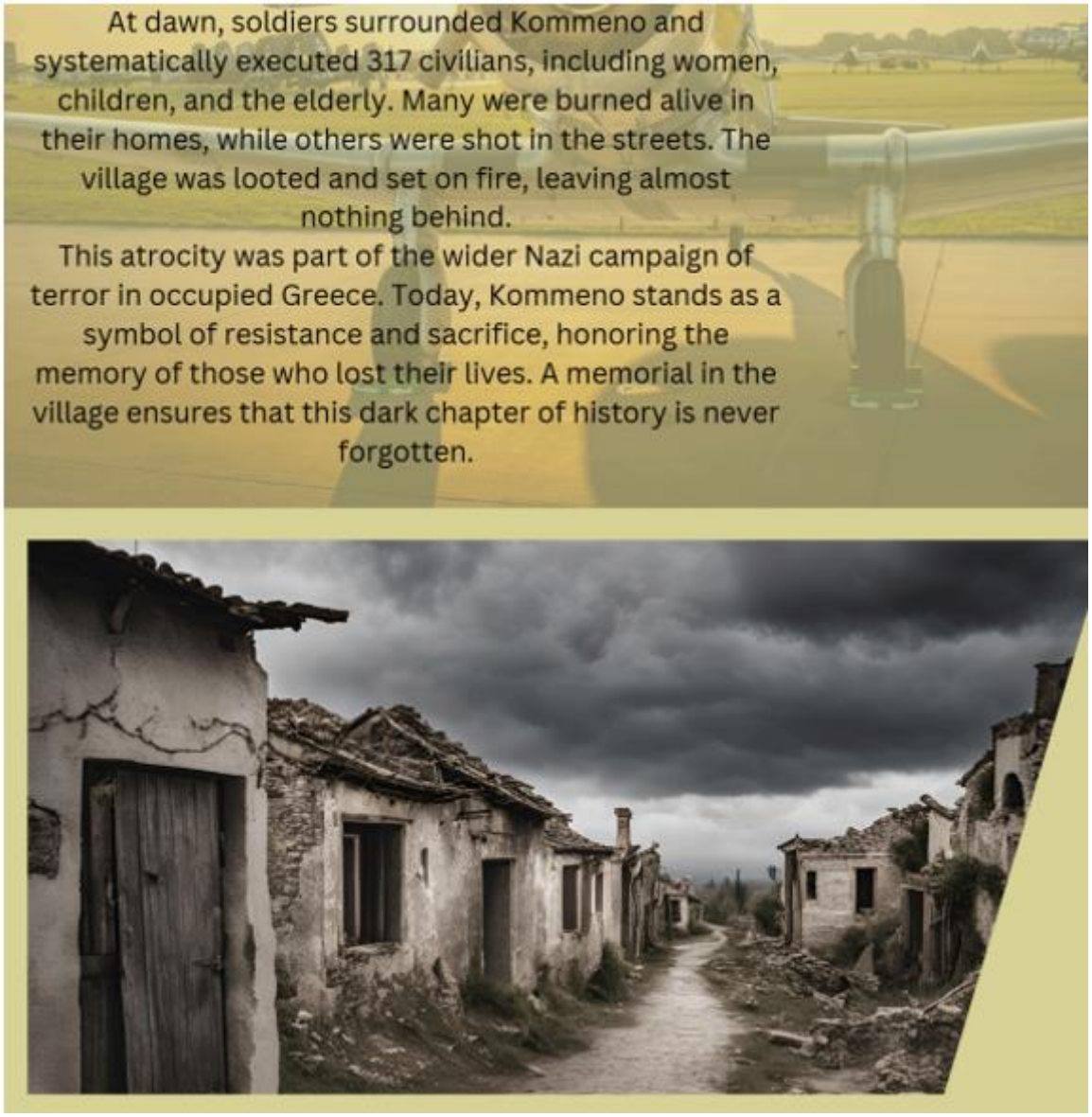


Στο πλαίσιο του συγκεκριμένου προγράμματος έγινε ευρεία χρήση πολλών και διαφορετικών ψηφιακών εργαλείων από πλευράς εκπαιδευτικών και μαθητών/μαθητριών. Όλο το παραγόμενο υλικό του προγράμματος αναρτήθηκε σε Padlet (https://padlet.com/), τον εικονικό τοίχο που δημιουργήθηκε για να καλύψει τις ανάγκες της εξ αποστάσεως συνεργασίας των σχολείων. Πρόκειται για ένα από τα πιο δημοφιλή και ευέλικτα ψηφιακά εργαλεία που χρησιμοποιούνται στην εκπαίδευση για συνεργατική μάθηση, οπτικοποίηση ιδεών και δημιουργία ψηφιακού περιεχομένου από μαθητές/μαθήτριες και εκπαιδευτικούς. Είναι μια διαδικτυακή εφαρμογή δημιουργίας ψηφιακού πίνακα όπου οι χρήστες μπορούν να αναρτούν κείμενα, εικόνες, βίντεο, ηχητικά, συνδέσμους, αρχεία και άλλα, να συνεργάζονται σε πραγματικό χρόνο, να οργανώνουν πληροφορίες με πολλούς τρόπους (χάρτες, στήλες, χρονογραμμές, πίνακες κ.λπ.) και να αλληλεπιδρούν μέσω σχολίων και αντιδράσεων. Στο πρόγραμμα "International Joint Class", το Padlet χρησιμοποιήθηκε ως εικονικός τοίχος για την ανάρτηση εργασιών των μαθητών/ μαθητριών, τη συλλογή πολυμεσικού περιεχομένου από όλες τις ομάδες, τη διαδραστική συνεργασία μεταξύ μαθητών/μαθητριών από Ελλάδα και Κορέα, την ασύγχρονη επικοινωνία και σχολιασμό εργασιών, το διαμοιρασμό του υλικού και την οργάνωση του περιεχομένου του. Το Padlet του προγράμματος βρίσκεται διαθέσιμο στον παρακάτω σύνδεσμο: https://padlet.com/suai3209/let-s-introduce-ourselves-ucqgse2zw3319nsr

Το δεύτερο ψηφιακό εργαλείο είναι το Veed (https://www.veed.io/), ένα πολύ χρήσιμο και φιλικό εργαλείο για τη δημιουργία, επεξεργασία και μετατροπή βίντεο online, χωρίς να απαιτείται εγκατάσταση λογισμικού. Είναι ιδανικό για χρήση στην εκπαίδευση, ιδιαίτερα για τη μετατροπή παρουσιάσεων σε βίντεο ή για τη δημιουργία εκπαιδευτικού πολυμεσικού περιεχόμενου γρήγορα και εύκολα. Οι μαθητές/μαθήτριες το χρησιμοποίησαν για να μετατρέψουν μια απλή παρουσίαση από Power Point σε βίντεο με τίτλο: " Lets introduce ourselves", η οποία είναι διαθέσιμη στον ακόλουθο σύνδεσμο:https://padlet.com/suai3209/let-s-introduce-ourselves-ucqgse2zw3319nsr/wish/kxodWGewxR0JQgP7

Επόμενο εργαλείο που χρησιμοποίησαν οι μαθητές/μαθήτριες στο πλαίσιο του προγράμματος είναι το Canva (https://www.canva.com/) με το οποίο δημιούργησαν μια ψηφιακή αφίσα με θέμα "Η σφαγή στο Κομμένο Άρτας, 1943" (Εικόνα 4) και διαθέσιμη στον παρακάτω σύνδεσμο: https://padlet.com/suai3209/let-s-introduce-ourselves-ucqgse2zw3319nsr/wish/O7A9QmzDbq4wZ6x3. Το Canva είναι μια online πλατφόρμα γραφιστικού σχεδιασμού, που επιτρέπει σε εκπαιδευτικούς και μαθητές/μαθήτριες να δημιουργούν εντυπωσιακό οπτικό υλικό εύκολα, χωρίς να απαιτούνται ειδικές γνώσεις σχεδίασης. Στην εκπαίδευση, το Canva μπορεί εξίσου να αξιοποιηθεί για τη δημιουργία αφίσας για μια σχολική εκδήλωση, ένα project ή ένα ιστορικό/πολιτισμικό θέμα, την οπτικοποίηση περιεχομένου μαθητών/μαθητριών (π.χ. έρευνες, παρουσιάσεις ομάδων), τις διαθεματικές εργασίες (Ιστορία, Γλώσσα, Αγωγή Υγείας κ.ά.) αλλά και να συμβάλλει στην ενίσχυση της δημιουργικότητας και του ψηφιακού γραμματισμού.

Εικόνα 4.
Ψηφιακή αφίσα "Η σφαγή στο Κομμένο Άρτας, 1943"



Για την εργασία με θέμα: "Σημαντικές ημερομηνίες και γεγονότα του Δεύτερου Παγκόσμιου Πολέμου στην Ελλάδα" οι μαθητές/μαθήτριες χωρίστηκαν σε δύο ομάδες και δημιούργησαν δύο ιστοριογραμμές (timeline) με δύο διαφορετικά εργαλεία. Η πρώτη ομάδα επέλεξε το Prezi (https://prezi.com/), ένα δημοφιλές εργαλείο παρουσίασης που διαφέρει από τα παραδοσιακά slides (όπως το PowerPoint), προσφέροντας μια μη γραμμική, δυναμική εμπειρία παρουσίασης. Παρόλο που δεν σχεδιάστηκε αποκλειστικά για ιστοριογραμμές, μπορεί να χρησιμοποιηθεί πολύ αποτελεσματικά για τη δημιουργία ιστοριογραμμών, κυρίως όταν ο στόχος είναι η οπτικά εντυπωσιακή και διαδραστική απεικόνιση γεγονότων. Η εργασία τους είναι στον παρακάτω σύνδεσμο:

- https://padlet.com/suai3209/let-s-introduce-ourselves-ucqgse2zw3319nsr/wish/pRxDZ4qYkw6XW183. Η δεύτερη ομάδα επέλεξε το Preceden (https://www.preceden.com/), ένα διαδικτυακό εργαλείο σχεδιασμένο για τη δημιουργία χρονοδιαγραμμάτων (ιστοριογραμμών) με έμφαση στην απλότητα, τη σαφήνεια και την επαγγελματική εμφάνιση. Χρησιμοποιείται ευρέως στην εκπαίδευση όπου απαιτείται παρουσίαση γεγονότων με χρονολογική σειρά. Επιτρέπει τη δημιουργία διαδραστικών ή στατικών ιστοριογραμμών και υποστηρίζει πολλαπλά επίπεδα (layers) για καλύτερη οργάνωση γεγονότων. Η εργασία είναι διαθέσιμη στον σύνδεσμο:
- https://www.preceden.com/timelines/1167188-greece-ww2/22aea42b85da60af.

Τέλος, οι ομάδες των μαθητών/μαθητριών επέλεξαν το Vocarroo (https://vocaroo.com/) με το οποίο δημιούργησαν μια εργασία με τις σημαντικές λέξεις και ορολογία του Δεύτερου Παγκοσμίου Πολέμου, στον εξής σύνδεσμο:

- https://padlet.com/suai3209/let-s-introduce-ourselves-ucqgse2zw3319nsr/wish/MbejW1XAyk43ZNkG. Το Vocarroo είναι ένα εξαιρετικά απλό και δημοφιλές διαδικτυακό εργαλείο για τη δημιουργία και διαμοίραση ηχητικών αρχείων. Χρησιμοποιείται ευρέως στην εκπαίδευση, κυρίως λόγω της ευχρηστίας του, τόσο από εκπαιδευτικούς όσο και από μαθητές/μαθήτριες. Εναλλακτικά μπορεί εξίσου να χρησιμοποιηθεί για καταγραφή αφηγήσεων, προφορικών παρουσιάσεων ή αναγνώσεων από τους/τις μαθητές/μαθήτριες, ασκήσεις παραγωγής προφορικού λόγου σε μαθήματα γλώσσας, δημιουργία podcast, ηχητικών σχολίων ή ανατροφοδότησης από τον/την εκπαιδευτικό και καταγραφή προφορικών εργασιών και σύνδεσή τους σε πλατφόρμες όπως Padlet ή Canva.

ΑΠΟΤΙΜΗΣΗ ΕΡΓΟΥ/ ΣΥΜΠΕΡΑΣΜΑΤΑ

Η υλοποίηση του προγράμματος ολοκληρώθηκε εντός των προβλεπόμενων χρονικών ορίων, με συνέπεια στην πραγματοποίηση των προγραμματισμένων συναντήσεων και δραστηριοτήτων. Όλες οι προβλεπόμενες εργασίες εκπονήθηκαν και παρουσιάστηκαν επιτυχώς από τις μαθητικές ομάδες, γεγονός που καταδεικνύει την αποτελεσματική οργάνωση και τον σαφή προγραμματισμό του έργου. Οι στόχοι που είχαν τεθεί εξ αρχής επετεύχθησαν σε ικανοποιητικό βαθμό, ενώ οι συμμετέχοντες – μαθητές/μαθήτριες και εκπαιδευτικοί – εξέφρασαν υψηλά επίπεδα ικανοποίησης από την εμπειρία συνεργασίας.

Επιπλέον, το σχολείο ανέπτυξε εξωστρεφή προσανατολισμό, ενισχύοντας τη συμμετοχή του σε διεθνή συνεργατικά εκπαιδευτικά προγράμματα. Οι μαθητικές εργασίες αναρτήθηκαν στην επίσημη ιστοσελίδα του σχολείου (**https://blogs.sch.gr/gymneoch/**), ενισχύοντας τη διάχυση των αποτελεσμάτων και την προβολή του εκπαιδευτικού έργου.

Ιδιαίτερη σημασία δόθηκε στην ανάπτυξη ομαδοσυνεργατικής κουλτούρας. Τα μέλη των ομάδων εργάστηκαν με κοινό σκοπό, ενισχύοντας την έννοια της συλλογικής ευθύνης. Η ενεργή εμπλοκή όλων των συμμετεχόντων/ουσών συνέβαλε στη σταδιακή καλλιέργεια σύνθετων δεξιοτήτων αλληλεπίδρασης, απαραίτητων για την οικοδόμηση αποτελεσματικών μορφών ομαδικής εργασίας.

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ΤΟ ΔΑΣΟΣ …Η ΖΩΗ ΜΟΥ: ΒΙΩΜΑΤΙΚΗ ΜΑΘΗΣΗ ΜΕ ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ

Γραμματικοπούλου Σοφία
Νηπιαγωγός, Προϊσταμένη
2ο Νηπιαγωγείο Τριαδίου
Θεσσαλονίκη, Ελλάδα
e-mail: sophiagram@hotmail.com

Μαλλίδου Μαλέσσα Ευαγγελία
Νηπιαγωγός
6ο Νηπιαγωγείο Θέρμης
Θεσσαλονίκη, Ελλάδα
e-mail: lia2ms@gmail.com

ΠΕΡΙΛΗΨΗ

Τη σχολική χρονιά 2024-25 υλοποιήθηκε ένα πρόγραμμα σχετικό με το δάσος στο οποίο συμπεριλήφθηκαν και τα ψηφιακά μέσα των νέων τεχνολογιών τόσο κατά τον διδακτικό σχεδιασμό όσο και κατά την υλοποίησή του. Σκοπός ήταν τα παιδιά με βιωματικές δραστηριότητες να ανακαλύψουν τη γνώση και να ενδιαφερθούν για το δάσος ως οικοσύστημα αλλά και ως αισθητηριακή απόλαυση της φύσης, να ενισχυθεί η περιβαλλοντική τους συνείδηση και η ιδιότητα του ενεργού πολίτη. Χρησιμοποιήθηκαν διαδραστικά και ψηφιακά μέσα, αναδεικνύοντας τη δυναμική σχέση των ψηφιακών τεχνολογιών παιδαγωγικής και εκπαίδευσης. Η μεθοδολογία που ακολουθήθηκε βασίστηκε σε μια παιδοκεντρική, διερευνητική προσέγγιση, συνδυάζοντας τη διερευνητική και συνεργατική μάθηση.

Λέξεις – κλειδιά: δάσος, ενεργός πολίτης, ψηφιακές τεχνολογίες

ΕΙΣΑΓΩΓΗ

Η περιβαλλοντική εκπαίδευση στο νηπιαγωγείο διαδραματίζει καθοριστικό ρόλο στην ανάπτυξη της οικολογικής συνείδησης και της υπευθυνότητας των παιδιών για το περιβάλλον. Αποτελεί μια θεμελιώδη διαδικασία, καθώς θέτει τις βάσεις για τη διαμόρφωση υπεύθυνων και ευαισθητοποιημένων πολιτών. Μέσα από στοχευμένες δραστηριότητες και παιχνίδια, τα παιδιά ανακαλύπτουν τη μαγεία της φύσης, μαθαίνουν για την αλληλεξάρτηση των έμβιων όντων και αποκτούν θετικές στάσεις απέναντι στο περιβάλλον.

Το νέο πρόγραμμα σπουδών δίνει ιδιαίτερη βαρύτητα στην ανάπτυξης του αισθήματος του ενεργού πολίτη και στην εισαγωγή των ψηφιακών εργαλείων. Έτσι διαμορφώνεται ένα νέο τοπίο σε σχέση, με τους τρόπους με τους οποίους παίζουν, μαθαίνουν και δημιουργούν τα παιδιά (ΦΕΚ). Η καλλιέργεια ενεργών πολιτών από την προσχολική ηλικία συμβάλλει στη δημιουργία μιας κοινωνίας που προάγει την αειφορία, την περιβαλλοντική συνείδηση και αποτελεί μια επένδυση για το μέλλον. Η ανάπτυξη της κριτικής σκέψης, της συνεργατικής μάθησης βοηθά τα παιδιά να γίνουν πολίτες που νοιάζονται για τη φύση και για τη δημιουργία μιας βιώσιμης κοινωνίας.

Σ' αυτό το πλαίσιο, αποφασίσαμε τη σχολική χρονιά 2023-24 να ασχοληθούμε με το δάσος και τα πολλαπλά οφέλη που προσφέρει τόσο στο περιβάλλον όσο και στην ανθρώπινη ζωή. Αφόρμηση για τη δημιουργία αυτού του project αποτέλεσαν οι πυρκαγιές που έπληξαν τα δυο τελευταία χρόνια τη χώρα μας και ιδιαίτερα η καταστροφική πυρκαγιά του δάσους της Δαδιάς. Το πρόγραμμα πλαισιώθηκε και με τη χρήση των νέων τεχνολογιών αφού σύμφωνα με πολλαπλές έρευνες η χρήση του ηλεκτρονικού υπολογιστή μπορεί να αποτελέσει εκπαιδευτικό και γνωστικό εργαλείο και να μετασχηματίσει το μαθησιακό περιβάλλον (Raptis & Rapti 2013).

Στο παρόν πρόγραμμα συμμετείχαν δεκατρείς μαθητές και μαθήτριες από το 2ο Νηπιαγωγείο Τριαδίου, Θεσσαλονίκης. Ένα Νηπιαγωγείο, του οποίου ο αύλειος χώρος αποτελεί προέκταση ενός μικρού δασυλλίου. Έτσι τα παιδιά είχαν την ευκαιρία να έρχονται καθημερινά σε επαφή με το δάσος να το παρατηρούν, να το επισκέπτονται και να το χαίρονται καθ' όλη τη διάρκεια του έτους.

Στον σχεδιασμό του προγράμματος αρχικά χρησιμοποιήθηκε και το εργαλείο Project Based Learning (PBL) Generator από την εργαλειοθήκη της MagicSchool AI, εισάγοντας έτσι τα ψηφιακά μέσα στον διδακτικό σχεδιασμό και αξιοποιώντας παιδαγωγικά την τεχνητή νοημοσύνη.

ΔΙΔΑΚΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Το παρόν εκπαιδευτικό πρόγραμμα υλοποιήθηκε τη σχολική χρονιά 2023-24 με τη συμμετοχή δεκατριών μαθητών και μαθητριών του 2ου 1/Θ Νηπιαγωγείου Τριαδίου, στη Θέρμη Θεσσαλονίκης και συγκεκριμένα από 8 αγόρια και 5 κορίτσια. Η δράση ξεκίνησε τον Οκτώβριο και ολοκληρώθηκε τον Μάιο, με συνολική διάρκεια οχτώ μήνες. Ο σκοπός του προγράμματος είναι να βοηθήσει τα παιδιά να κατανοήσουν τη σημασία του φυσικού περιβάλλοντος.

Ως προς τις γνώσεις να μάθουν για το οικοσύστημα του δάσους και την αλληλεπίδραση μεταξύ των οργανισμών, να κατανοήσουν τη σημασία του οξυγόνου που προσφέρει, την επίδρασή του στο κλίμα και στη ζωή στον πλανήτη και να μάθουν πώς μπορούν να το προστατεύσουν.

Ως προς τις δεξιότητες να παρατηρήσουν και να καταγράψουν στοιχεία του δάσους, να αναπτύξουν γλωσσικές δεξιότητες μέσα από περιγραφές, αφηγήσεις και παιχνίδια, να ενισχύσουν την κινητική ανάπτυξη μέσω δραστηριοτήτων στη φύση (περιπάτους, αισθητηριακά παιχνίδια).

Ως προς τις στάσεις να καλλιεργήσουν οικολογική συνείδηση και την ιδιότητα του ενεργού πολίτη που νοιάζεται για το περιβάλλον, να συνδεθούν συναισθηματική με τη φύση, να την αγαπήσουν και να ευαισθητοποιηθούν σχετικά με τις επιπτώσεις των ανθρώπινων δραστηριοτήτων στο περιβάλλον.

Οι δράσεις σχεδιάστηκαν με βάση το νέο αναλυτικό πρόγραμμα του νηπιαγωγείου και τα εμπλεκόμενα βασικά θεματικά πεδία και ενότητες είναι: Παιδί και Επικοινωνία, Τεχνολογίες της Επικοινωνίας και της Πληροφορικής, Ανακάλυψη, Προγραμματισμός και Ψηφιακό Παιχνίδι (Α.2.2), Παιδί εαυτός και Κοινωνία, Κοινωνικές Επιστήμες και Σχέση με φυσικό και Δομημένο Περιβάλλον (Β.2.2). Ωστόσο το πρόγραμμα συμπεριλαμβάνει και αναφέρεται και σε άλλα θεματικά πεδία όπως, Παιδί και Θετικές Επιστήμες, Μαθηματικά και Παιδί, Σώμα, Δημιουργία και Έκφραση.

Η εφαρμογή της διδασκαλίας στηρίχτηκε στο μοντέλο των 5Ε (Michail, 2024). Τη φάση της Εξοικείωσης, της Επισκόπησης, της Επεξήγησης, του Εμπλουτισμού και της Εκτίμησης. Η οργάνωση των δραστηριοτήτων στην τάξη βασίστηκε στη συνεργατική μάθηση γιατί συμβάλει στην ανάπτυξη των κοινωνικών δεξιοτήτων (Avgitidou, 2008), στην

καλλιέργεια της κριτικής σκέψης και την ανάπτυξη δεξιοτήτων επίλυσης προβλημάτων. Τα παιδιά χωρίστηκαν σε μικρές ομάδες και εργάστηκαν ομαδοσυνεργατικά, ώστε μέσα από τη δυναμική της ομάδας να επέλθει η ατομική μάθηση (Matsagouras, 2004). Στόχος ήταν να εμπλακούν δημιουργικά όλα τα παιδιά σε όλες τις φάσεις των δραστηριοτήτων.

ΠΟΡΕΙΑ ΔΡΑΣΕΩΝ

Το ενδιαφέρον των παιδιών για το δάσος εκδηλώθηκε αρχικά κατά την ώρα των διαλλειμάτων στην αυλή με την παρατήρηση του δασυλλίου που βρίσκεται δίπλα σε αυτήν. Η φυσική τους περιέργεια ήταν η αφορμή και το πρόγραμμα για το δάσος ξεκίνησε με καταγραφές αρχικών ιδεών αλλά και πρότερων γνώσεων. Έπειτα τέθηκε το ερευνητικό ερώτημα: «πώς μας βοηθούν τα δάση και τι μπορούμε να κάνουμε εμείς για να τα προστατεύσουμε» (φάση της Εξοικείωσης). Τα παιδιά αναζήτησαν πληροφορίες στο διαδίκτυο και είδαν βίντεο σχετικά με το θέμα. Χωρίστηκαν σε ομάδες και έγινε καταμερισμός των δράσεων (φάση επισκόπησης).

Η εξερεύνηση άρχισε με περιπάτους κατά τη διάρκεια των οποίων ήταν φανερή η απόλαυση της γαλήνης και της ελευθερίας που πρόσφερε το δασύλλιο. Τα παιδιά έκαναν ησυχία για να ακούνε και να ηχογραφούν μαζί με μας τους ήχους του. Εισπνέαμε όλοι μαζί τα αρώματα και τις μυρωδιές του και βγάζαμε φωτογραφίες (με τη βοήθεια του κινητού της εκπαιδευτικού). Βρήκαμε μυρμηγκοφωλιές, σαλιγκάρια και κάναμε καταγραφές, διαφορετικές ανάλογα με την κάθε εποχή. Τα παιδιά με ιδιαίτερο ενδιαφέρον παρατηρούσαν το καθετί και μάζευαν υλικά από τη φύση -όπως τα ονομάσαμε. Αυτά τα τοποθετήσαμε σε μια γωνιά στην τάξη που είχε δημιουργηθεί για αυτόν τον λόγο. Μαζέψαμε φύλλα και τα χρησιμοποιήσαμε ως *πετσέτες* για να βάλουμε επάνω τα φαγητά και να κάνουμε πικ-νικ. Μετά τα παιδιά ξεκίνησαν ένα αυθόρμητο παιχνίδι με τα φύλλα κι έτσι με έναν φυσικό και αβίαστο τρόπο έγινε αναφορά σε μαθηματικές έννοιες όπως μεγάλο, μικρό, σε έννοιες ταξινόμησης (από το μεγαλύτερο φύλλο προς το μικρότερο και το αντίθετο). Σχεδιάσαμε τα περιγράμματα των φύλλων και παρατηρήσαμε το σχήμα τους. Κάναμε συγκρίσεις με τα διαφορετικά είδη φύλλων.

Από τις πιο εντυπωσιακές δράσεις ήταν τα παιχνίδια στο δάσος. Παίζαμε ό,τι μπορούσαμε να παίξουμε όπως το «λύκε λύκε είσαι εδώ», το «ένα, δυο, τρία κόκκινο φως», το κρυφτό πίσω από τους κορμούς των δέντρων, το κυνηγητό και πολλά άλλα ψυχοκινητικά παιχνίδια. Τα παιδιά ενθουσιάστηκαν τόσο πολύ που το δασύλλιο έγινε σχεδόν η καθημερινή απασχόληση, όταν ο καιρός το επέτρεπε (Εικόνα 1).

Εικόνα 1
Περίπατοι και παιχνίδια στο δάσος



Ο καιρός περνούσε, η μια εποχή διαδεχόταν την άλλη και τα παιδιά παρατηρούσαν τα δέντρα, τα φύλλα, τα έντομα και συνέχισαν να κάνουν καταγραφές. Κάθε ομάδα παρουσίαζε τα ευρήματά της στην ολομέλεια της τάξης (φάση επεξήγησης). Οι επισκέψεις στο δάσος συνεχίζονταν. Ανάμεσα στα άλλα, τα παιδιά απολάμβαναν να αγκαλιάζουν τους κορμούς των δέντρων, να μαζεύουν λουλούδια, κουκουνάρες κ.α. (Εικόνα 2) και να κάνουν έργα τέχνης με τη χρήση αυτών των υλικών (land art).

Δυστυχώς στο δασύλλιο βρήκαμε και αρκετά σκουπίδια κάτι που μας στεναχωρησε και μας αποτέλεσε αφορμή για προβληματισμό. Μαζέψαμε όσα περισσότερα μπορούσαμε και μαζί με τα παιδιά αποφασίσαμε να αναλάβουμε περαιτέρω δράση. Έτσι δημιουργήσαμε μια αφίσα με πληροφορίες για την προστασία των δασών αλλά και των ζώων που ζουν σε αυτά, την αναρτήσαμε έξω από την πόρτα του νηπιαγωγείου μας, ώστε να τη βλέπουν οι γονείς και όποιος άλλος ερχόταν στο σχολείο μας.

Εικόνα 2
Υλικά από τη φύση



Έπειτα όμως τα νήπια προβληματίστηκαν ακόμη πιο πολύ και έθεσαν το ερώτημα τι θα μπορούσαμε να κάνουμε ώστε να επικοινωνήσουν αυτές τις πληροφορίες σε περισσότερους ανθρώπους. Πρότειναν να φωτογραφίσουμε την αφίσα και να την ανεβάσουμε στο διαδίκτυο, στην ιστοσελίδα του σχολείου γιατί σκέφτηκαν ότι έτσι θα την έβλεπαν περισσότεροι άνθρωποι (φάση εμπλουτισμού).

Οι δράσεις συνεχίστηκαν με τη συμμετοχή μας στην ευρωπαϊκή εβδομάδα προγραμματισμού Code Week και τη χρήση της ρομποτικής μελισσούλας BeeBot για να εισαγάγουμε τα παιδιά στην υπολογιστική σκέψη μέσα από παιγνιώδη μορφή. Έτσι τα παιδιά *προγραμμάτισαν* το ρομπότ να συλλέξει πληροφορίες χρήσιμες για την προστασία των δασών. (Εικόνα 3).

Εικόνα 3
Υπολογιστική σκέψη , BeeBot



Για να βοηθήσουμε τους μαθητές και τις μαθήτριές μας να οργανώσουν τις σκέψεις τους και να αφομοιώσουν τις πληροφορίες που έλαβαν δημιουργήσαμε ένα κουΐζ χρησιμοποιώντας την ψηφιακή πλατφόρμα Quizizz. (Εικόνα 4) και τη διαδραστική εκπαιδευτική εφαρμογή Nearpod. (Εικόνα 5). Τα παιδιά συμμετείχαν με ενθουσιασμό διασκεδάζοντας αλλά και εμπεδώνοντας τις γνώσεις τους.

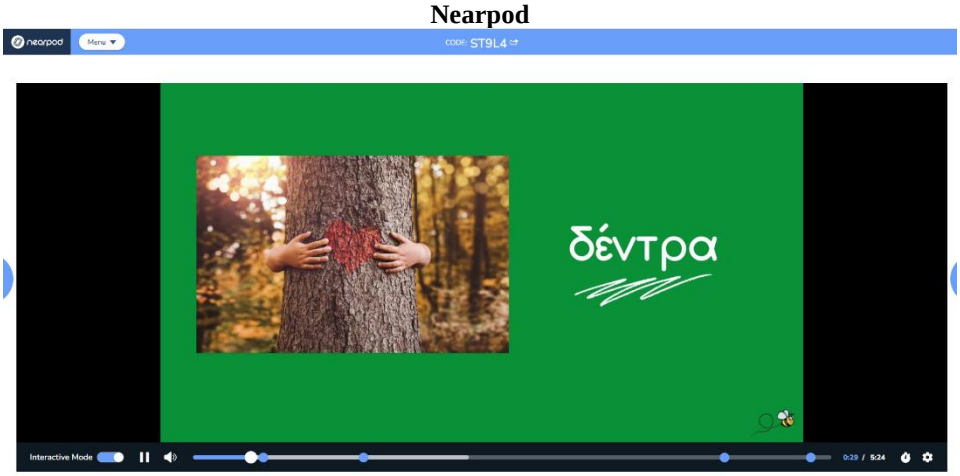
Ακολούθησαν ποικίλες δράσεις όπως φυτεύσεις δέντρων και λουλουδιών στον αύλειο χώρο του νηπιαγωγείου. Τα Χριστούγεννα μάλιστα στολίσαμε ένα δέντρο που επιλέξαμε από το δασάκι μας αλλά με αλλιώτικα στολίδια : τα στολίδια ήταν λεμονόκουπες γεμάτες σπόρους-τροφή για τα πουλιά για τις δύσκολες μέρες του χειμώνα. Ακόμη, πραγματοποιήθηκαν συναντήσεις και συζητήσεις με υλοτόμους και στη συνέχεια τα παιδιά δημιούργησαν ποικιλόμορφες εικαστικές κατασκευές με διάφορα υλικά και πολλά από εκείνα που είχαν συλλέξει από το δάσος. Συνεργαστήκαμε επίσης με το 1ο ΕΕΕΕΚ ειδικό σχολείο της περιοχής και δημιουργήσαμε μια συνεργατική αφίσα για το δάσος από ανακυκλώσιμα υλικά (Εικόνα 6). Όλα τα έργα εκτέθηκαν στη δημοτική βιβλιοθήκη του Δήμου μας.

Στο τέλος του προγράμματος, τα παιδιά δημιούργησαν το δικό τους παραμύθι χρησιμοποιώντας την ψηφιακή εφαρμογή Bookcreator και «ζωντανεύοντας» το μέσα από τις ιδέες και τις ζωγραφιές τους. Το ψηφιακό βιβλίο στάλθηκε με την ηλεκτρονική αλληλογραφία σε όλους τους γονείς των παιδιών.

Εικόνα 4
Quizizz



Εικόνα 5
Nearpod



Εικόνα 6
Το δάσος

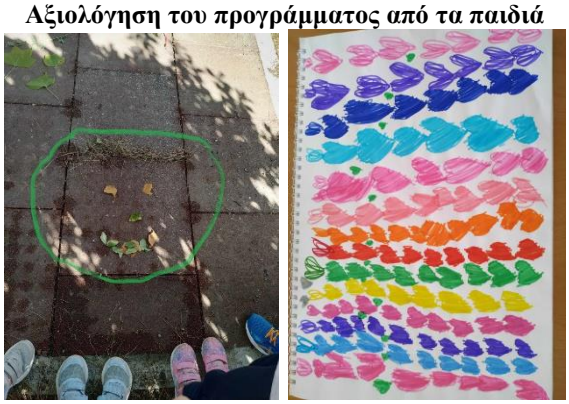


Αξίζει να σημειωθεί ότι το όλο πρόγραμμα βραβεύτηκε από την Ελληνική Εταιρία Προστασίας της Φύσης, Εθνικός Χειριστής του Διεθνούς Θεματικού Δικτύου Περιβαλλοντικής Εκπαίδευσης και τη Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Λάρισας, Συντονιστής του Δικτύου όπου συμμετείχε το σχολείο μας.

ΑΞΙΟΛΟΓΗΣΗ ΠΡΟΓΡΑΜΜΑΤΟΣ

Η αξιολόγηση του προγράμματος έγινε αρχικά με την παρατήρηση και την ενεργό συμμετοχή των παιδιών, με συζητήσεις στην ολομέλειά της τάξης και με αξιοποίηση του διαγράμματος K-W-L-H.E. Με ερωτήσεις ανοιχτού τύπου και αναστοχαστικές δραστηριότητες, αξιολογήθηκε η κατανόηση και η συναισθηματική εμπλοκή τους. Τα παιδιά αξιολόγησαν το πρόγραμμα με τον δικό τους μοναδικό τρόπο αποτυπώνοντας τις εμπειρίες τους με εικαστικούς τρόπους έκφρασης, όπως η ζωγραφική και οι κατασκευές (Εικόνα 7).

Εικόνα 7
Αξιολόγηση του προγράμματος από τα παιδιά



ΣΥΜΠΕΡΑΣΜΑΤΑ

Παρατηρήθηκε ότι η χρήση των ψηφιακών εργαλείων συντέλεσε σημαντικά στην αύξηση της αλληλεπίδρασης, στη συμμετοχή και το ενδιαφέρον των παιδιών. Επίσης, βοήθησε και διευκόλυνε την κατανόηση των βασικών εννοιών που σχετίζονται με το δάσος, αναπτύσσοντας παράλληλα τη συνεργασία και τη δημιουργική έκφραση των παιδιών. Τα παιδιά έδειχναν αμείωτο ενδιαφέρον σε όλη τη διάρκεια του project και μάλιστα σταδιακά εκδήλωναν μια ολοένα αυξανόμενη εμπλοκή τους τόσο κατά τις επισκέψεις στο δασύλλιο όσο και στην «ανατροφοδότηση». Οι απόψεις τους, οι κατασκευές τους, οι δραστηριότητές τους, η διάθεσή τους να αναλάβουν δράση για την προστασία του δάσους ήταν απόδειξη για την απήχηση που είχε το πρόγραμμα και τον βαθμό ευαισθητοποίησης που επιτεύχθηκε.

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ΕΝΣΩΜΑΤΩΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΔΙΔΑΣΚΟΝΤΑΣ ΣΤΗΝ Α' ΛΥΚΕΙΟΥ ΤΗΝ ΤΗΛΕΡΓΑΣΙΑ ΚΑΙ ΤΗΝ ΕΠΙΚΟΙΝΩΝΙΑ ΑΠΟ ΑΠΟΣΤΑΣΗ

Ευαγγελία Δημουλά
Καθηγήτρια Πληροφορικής, ΠΕ86
2ο Πρότυπο Γυμνάσιο Αθήνας
Αθήνα, Ελλάδα
e-mail: edimoula@gmail.com

Αικατερίνη Ρήγα
Διευθύντρια, Καθηγήτρια Πληροφορικής, ΠΕ86
26ο Πειραματικό ΓΕ.Λ. Αθηνών - Μαράσλειο
Αθήνα, Ελλάδα
e-mail: katsouf12@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη συστηματική ενσωμάτωση της Τεχνητής Νοημοσύνης (AI) στη διδασκαλία της Α΄ Λυκείου, εστιάζοντας στη διδακτική προσέγγιση θεμάτων σχετικών με την τηλεργασία και την επικοινωνία από απόσταση. Σκοπός της εργασίας είναι να αναδείξει πώς τα εργαλεία AI μπορούν να υποστηρίξουν την απόκτηση βασικών δεξιοτήτων εξ αποστάσεως συνεργασίας, ενισχύοντας παράλληλα την αυτονομία και τη δημιουργικότητα των μαθητών. Η ερευνητική παρέμβαση βασίστηκε σε ένα σύγχρονο εκπαιδευτικό σενάριο εκμάθησης μέσω εργασιών, ενσωματώνοντας εφαρμογές όπως το ChatGPT, συστήματα δημιουργίας αυτόματων παρουσιάσεων και πλατφόρμες συνεργατικής οργάνωσης του έργου. Παρουσιάζεται η μεθοδολογική προσέγγιση, το παιδαγωγικό πλαίσιο και τα εργαλεία τα οποία αξιοποιήθηκαν, με έμφαση στην πρακτική εφαρμογή της τηλεργασίας σε σχολικό περιβάλλον. Τα αποτελέσματα αναδεικνύουν τη σημασία της Τεχνητής Νοημοσύνης (AI) ως εργαλείου διαφοροποίησης της διδασκαλίας, υποστήριξης των μεταγνωστικών δεξιοτήτων και ενίσχυσης της συνεργασίας και της συμμετοχής των μαθητών. Η Τεχνητή Νοημοσύνη (AI) συνέβαλε στην εξατομίκευση της διδασκαλίας, στη βελτίωση της επικοινωνιακής ικανότητας και στην προώθηση της επαγγελματικής ετοιμότητας. Η εργασία προτείνει προοπτικές μελλοντικής αξιοποίησης της Τεχνητής Νοημοσύνης (AI) για τη διδασκαλία σύνθετων δεξιοτήτων, τονίζοντας τη σημασία της ανάπτυξης των παιδαγωγικών πλαισίων και των δεοντολογικών κατευθύνσεων για τη βιώσιμη ενσωμάτωσή της στην εκπαιδευτική πράξη.

Λέξεις-κλειδιά: Τεχνητή Νοημοσύνη, Τηλεργασία, Συνεργατική Μάθηση, Ψηφιακά Εργαλεία, Εκπαιδευτική Καινοτομία

ΕΙΣΑΓΩΓΗ

Η ραγδαία ανάπτυξη των τεχνολογιών της Τεχνητής Νοημοσύνης (AI) κατά τις τελευταίες δεκαετίες έχει ήδη προκαλέσει ριζικές αλλαγές σε διάφορους τομείς της ανθρώπινης δραστηριότητας, όπως η βιομηχανία, οι υπηρεσίες, η ιατρική και η εκπαίδευση (OECD, 2021). Στο πλαίσιο της εκπαίδευσης, η ενσωμάτωση των AI εργαλείων στην καθημερινή διδακτική πράξη αποτελεί πλέον μια πραγματικότητα η οποία προδιαγράφει το μέλλον της διδασκαλίας και της μάθησης (Holmes, Bialik and Fadel, 2019). Η Τεχνητή Νοημοσύνη (AI), ως τεχνολογία αιχμής, ενισχύει τη δυνατότητα της εξατομίκευσης της διδασκαλίας, της προσαρμογής της μαθησιακής διαδικασίας στις ανάγκες κάθε μαθητή, καθώς και της ανάπτυξης καινοτόμων μεθόδων για την προσέγγιση της γνώσης.

Ιδιαίτερο ενδιαφέρον παρουσιάζει η αξιοποίηση της AI για τη διδασκαλία των εννοιών και των δεξιοτήτων οι οποίες σχετίζονται με τη νέα, ψηφιακή μορφή εργασίας, όπως είναι η τηλεργασία. Στο σύγχρονο επαγγελματικό περιβάλλον, η τηλεργασία και η συνεργασία από απόσταση έχουν εξελιχθεί σε κρίσιμους μηχανισμούς λειτουργίας οργανισμών και επιχειρήσεων, φαινόμενο το οποίο ενισχύθηκε περαιτέρω από την πανδημία COVID-19 (Ciucci and Gouarderes, 2020). Είναι επιτακτική η ανάγκη της εξοικείωσης των μαθητών με τις σύγχρονες μορφές της επαγγελματικής συνεργασίας μέσω των ψηφιακών εργαλείων, καθώς συμβάλλει στην ανάπτυξη των βασικών δεξιοτήτων του 21ου αιώνα όπως είναι η συνεργασία, η επικοινωνία, η κριτική σκέψη, η ψηφιακή ικανότητα και ενισχύει την προετοιμασία τους για τις μελλοντικές απαιτήσεις της αγοράς εργασίας (Nguyen et al, 2022).

Η διδασκαλία της τηλεργασίας ως αντικείμενο της μάθησης δεν περιορίζεται στην παροχή θεωρητικών γνώσεων, αλλά ενσωματώνει τις πρακτικές εφαρμογές, όπως η χρήση των εργαλείων της σύγχρονης και της ασύγχρονης επικοινωνίας, των συνεργατικών πλατφορμών και των προγραμμάτων project management (Manousou et al, 2021). Η Τεχνητή Νοημοσύνη συνεισφέρει ουσιαστικά στην υποστήριξη αυτής της διδασκαλίας, μέσω της δημιουργίας του εκπαιδευτικού υλικού, της παροχής των εξατομικευμένων καθοδηγήσεων, αλλά και της προσομοίωσης των πραγματικών εργασιακών καταστάσεων (UNESCO, 2022).

Οι μαθητές καλούνται να αξιοποιήσουν τις τεχνολογίες τις οποίες χρησιμοποιούν στην καθημερινότητά τους, όπως το ChatGPT ή τις εφαρμογές της τεχνητής νοημοσύνης στα κοινωνικά δίκτυα, με παιδαγωγικά συγκροτημένο τρόπο, ώστε να προετοιμαστούν για τις απαιτήσεις της αγοράς εργασίας του 21ου αιώνα (Schmid and Petko, 2019). Η εκπαιδευτική παρέμβαση η οποία περιγράφεται στην παρούσα εργασία βασίζεται σε σενάριο το οποίο έχει εφαρμοστεί σε μαθητές της Α΄ Λυκείου στο πλαίσιο του μαθήματος της Πληροφορικής, με στόχο τη διδασκαλία της τηλεργασίας και της επικοινωνίας από απόσταση μέσω χρήσης των εργαλείων της Τεχνητής Νοημοσύνης (AI).

Η παρούσα μελέτη αποσκοπεί να καλύψει ένα σημαντικό κενό της ελληνικής και διεθνούς βιβλιογραφίας: την οργανωμένη αξιοποίηση της Τεχνητής Νοημοσύνης στη διδασκαλία της τηλεργασίας στην Α΄ Λυκείου. Αυτή η εργασία συνεισφέρει θεωρητικά και πρακτικά στη διαμόρφωση των νέων παιδαγωγικών μοντέλων, τα οποία υποστηρίζονται από τεχνολογίες AI, ενισχύοντας τη συνεργατική μάθηση, την ανάπτυξη ψηφιακών δεξιοτήτων, και την προετοιμασία των μαθητών για το επαγγελματικό μέλλον τους.

Συγκεκριμένα, οι επιμέρους στόχοι του παρόντος άρθρου είναι να αναδειχθεί το θεωρητικό υπόβαθρο της αξιοποίησης της Τεχνητής Νοημοσύνης στην εκπαιδευτική διαδικασία, εστιάζοντας στη δευτεροβάθμια εκπαίδευση, να περιγράψει τη μεθοδολογική προσέγγιση και το σενάριο της διδασκαλίας, η οποία εφαρμόστηκε, να παρουσιάσει τα αποτελέσματα της εκπαιδευτικής παρέμβασης ως προς την κατανόηση και την πρακτική εφαρμογή της τηλεργασίας από τους μαθητές και να προτείνει τις κατευθύνσεις για την περαιτέρω ενσωμάτωση των τεχνολογιών της Τεχνητής Νοημοσύνης (AI) στη διδασκαλία των θεμάτων του επαγγελματικού προσανατολισμού. Με αυτόν τον τρόπο, το άρθρο επιχειρεί να συμβάλει στην περαιτέρω ενίσχυση του επιστημονικού διαλόγου σχετικά με τις πρακτικές εφαρμογές της AI στην εκπαίδευση και ειδικότερα στη διδασκαλία των απαραίτητων δεξιοτήτων στο σύγχρονο επαγγελματικό τοπίο.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η Τεχνητή Νοημοσύνη (AI) στην Εκπαίδευση θεωρείται από τους σημαντικότερους μοχλούς του μετασχηματισμού της εκπαιδευτικής διαδικασίας, επηρεάζοντας τόσο τις μεθόδους διδασκαλίας όσο και την αξιολόγηση και την οργάνωση της γνώσης (Holmes, Bialik and Fadel, 2019). Οι εφαρμογές της AI στην εκπαίδευση περιλαμβάνουν προσαρμοστικά συστήματα μάθησης, συστήματα αξιολόγησης, εκπαιδευτικά chatbots, μηχανισμούς δημιουργίας αυτόματου περιεχομένου, καθώς και εργαλεία διαχείρισης της διδασκαλίας (OECD, 2021).

Σύμφωνα με τη UNESCO (2022), η Τεχνητή Νοημοσύνη (AI) συμβάλλει στη διαφοροποιημένη και στην εξατομικευμένη διδασκαλία, δίνοντας τη δυνατότητα σε κάθε μαθητή να ακολουθήσει μοναδική μαθησιακή διαδρομή, προσαρμοσμένη στις ατομικές ανάγκες του. Παράλληλα, διευκολύνει τη διαχείριση της μαθησιακής προόδου με ανάλυση

δεδομένων σε πραγματικό χρόνο (learning analytics), επιτρέποντας στους εκπαιδευτικούς να παρεμβαίνουν έγκαιρα και στοχευμένα (Papamitsiou and Economides, 2014). Επιπλέον ενισχύει τη δημιουργικότητα των μαθητών, προσφέροντας τη δυνατότητα της παραγωγής και της επεξεργασίας του περιεχομένου, όπως παρουσιάσεις, γραφικά, βίντεο και μουσικά κομμάτια. Πλατφόρμες όπως το ChatGPT χρησιμοποιούνται για την ανάπτυξη των δεξιοτήτων του γραμματισμού και της κριτικής σκέψης, παρέχοντας ανατροφοδότηση και διευκολύνοντας τη διαδικασία της συγγραφής (Schmid and Petko, 2019). Ωστόσο, η αποτελεσματική αξιοποίηση της Τεχνητής Νοημοσύνης (AI) στην εκπαίδευση προϋποθέτει παιδαγωγικό σχεδιασμό ο οποίος ενισχύει τη μάθηση και όχι μια τεχνοκρατική προσέγγιση. Η επιτυχής ενσωμάτωσή της εξαρτάται από τις παιδαγωγικές πεποιθήσεις των εκπαιδευτικών, την κατάλληλη επιμόρφωση και την εστίαση στη διδακτική αξιοποίηση των εργαλείων της (Velli and Zafiropoulos, 2024).

Η τηλεργασία ως αντικείμενο διδασκαλίας δεν αφορά μόνο την τεχνική χρήση των ψηφιακών εργαλείων της σύγχρονης και της ασύγχρονης επικοινωνίας, αλλά και την ανάπτυξη των συνεργατικών δεξιοτήτων, της διαχείρισης του χρόνου και της διαχείρισης του έργου έπειτα από συγκροτημένο παιδαγωγικό σχεδιασμό. Οι ψηφιακές πλατφόρμες και τα εργαλεία μπορούν να ενισχύσουν αυτές τις δεξιότητες όταν εντάσσονται στο αναλυτικό πρόγραμμα με σκοπό την ενίσχυση της συνεργασίας εξ αποστάσεως (Cherbonnier et al., 2024). Η εισαγωγή της ως διδακτικό αντικείμενο στο Λύκειο ενισχύει την επαγγελματική ετοιμότητα των μαθητών και αναπτύσσει τις δεξιότητες της ψηφιακής επικοινωνίας, της κοινωνικής δικτύωσης και της αυτοδιαχείρισης. Η χρήση των εργαλείων όπως το Zoom και το Microsoft Teams επιτρέπει στους μαθητές να συμμετέχουν σε διαδικτυακές επικοινωνίες με δυνατότητες για τα breakout rooms, κοινή χρήση της οθόνης και ομαδική συνεργασία σε πραγματικό χρόνο, ενώ εργαλεία όπως το Trello και το Padlet υποστηρίζουν την οργάνωση των έργων, τη διαχείριση των ευθυνών και την ασύγχρονη συνεργασία στα ψηφιακά περιβάλλοντα της μάθησης (Shchetynina et al., 2022). Παράλληλα, ενισχύεται η συνειδητοποίηση των ζητημάτων της ασφαλούς επικοινωνίας, της προστασίας των προσωπικών δεδομένων και της επαγγελματικής δεοντολογίας. Η τηλεργασία ως εκπαιδευτικό αντικείμενο συμβάλλει στη διαθεματική προσέγγιση της διδασκαλίας, ενσωματώνοντας στοιχεία από την Πληροφορική, τα Οικονομικά, τη Γλώσσα, και την Κοινωνιολογία.

Η Τεχνητή Νοημοσύνη υποστηρίζει ενεργά τη διδασκαλία της τηλεργασίας, ενισχύοντας τη μαθησιακή διαδικασία μέσω λειτουργιών όπως η εξατομικευμένη υποστήριξη κατά τη χρήση των εργαλείων της τηλεργασίας, η αυτόματη παραγωγή και η διανομή του διδακτικού υλικού, η δημιουργία προσομοιώσεων των επαγγελματικών περιβαλλόντων και η εποπτεία των ομαδικών εργασιών με την ταυτόχρονη παροχή της αυτοματοποιημένης ανατροφοδότησης. Επιπλέον, η αξιοποίηση των εργαλείων της δημιουργίας του περιεχομένου, όπως οι δημιουργοί βίντεο με τεχνητή νοημοσύνη και τα αυτόματα συστήματα της παραγωγής των παρουσιάσεων, δίνει τη δυνατότητα στους μαθητές να αναπτύσσουν τα ολοκληρωμένα έργα τα οποία προσομοιάζουν τις επαγγελματικές εργασίες, συμβάλλοντας στην εμβάθυνση της κατανόησης και στην απόκτηση της πρακτικής εμπειρίας (Papamitsiou and Economides, 2014). Η συνδυασμένη διδασκαλία της τηλεργασίας και της Τεχνητής Νοημοσύνης προωθεί την ανάπτυξη των σύνθετων δεξιοτήτων, όπως η συνεργατική επίλυση των προβλημάτων, η ψηφιακή επικοινωνία και η αποτελεσματική οργάνωση των έργων. Σημαντικό είναι ότι η Τεχνητή Νοημοσύνη δεν αντικαθιστά το διδάσκοντα, αλλά λειτουργεί υποστηρικτικά, ενισχύοντας το ρόλο του ως σχεδιαστή των εξατομικευμένων μαθησιακών εμπειριών (Holmes et al., 2019).

ΜΕΘΟΔΟΛΟΓΙΑ

Η ερευνητική μελέτη ακολούθησε τη μεθοδολογία της έρευνας δράσης (action research), η οποία θεωρείται ιδιαίτερα κατάλληλη για εκπαιδευτικά περιβάλλοντα στα οποία επιδιώκεται η άμεση παρέμβαση, η αναστοχαστική πρακτική και η ταυτόχρονη αξιολόγηση των αποτελεσμάτων (McNiff and Whitehead, 2011). Η έρευνα σχεδιάστηκε ως μελέτη περίπτωσης (case study), επικεντρωμένη στη συστηματική εφαρμογή και αξιολόγηση ενός σεναρίου διδασκαλίας με χρήση της AI και των εργαλείων της τηλεργασίας, στο φυσικό περιβάλλον της σχολικής τάξης. Στο σχεδιασμό του διδακτικού σεναρίου εντάχθηκε ως κεντρική μεθοδολογική πρακτική η αξιοποίηση του σεναρίου της αφήγησης (narrative-based learning). Η δομή του διδακτικού σεναρίου σχεδιάστηκε με βάση τις αρχές της σταδιακής οικοδόμησης της γνώσης και της εννοιολογικής προσέγγισης της μάθησης, ακολουθώντας διαδοχικά στάδια τα οποία στόχευαν στην ανάπτυξη γνωστικών, τεχνολογικών και κοινωνικών δεξιοτήτων σχετικών με την τηλεργασία και τη συνεργασία από απόσταση. Στο εισαγωγικό μέρος αξιοποιήθηκε ένα αφηγηματικό πλαίσιο βασισμένο σε μια αυθεντική, σύγχρονη επαγγελματική κατάσταση, στην οποία εφαρμόζεται η εξ αποστάσεως εργασία, (Εικόνα 1) και (Εικόνα 2), με σκοπό τη δημιουργία συνθηκών νοηματοδότησης και τη σύνδεση του γνωστικού αντικειμένου με τον πραγματικό κόσμο των μαθητών (constructivist anchoring). Αυτή η παρουσίαση συνέβαλε στην κινητοποίηση του ενδιαφέροντος και στο έναυσμα για τις επόμενες μαθησιακές φάσεις.

Εικόνα 1
Εργαζόμενος από Απόσταση

ΔΗΜΙΟΥΡΓΗΣΕ ΣΕΝΑΡΙΟ ΑΦΗΓΗΣΗΣ ΓΙΑ ΒΙΝΤΕΟ

- **Σενάριο Αφήγησης για το Μάθημα: Τηλεργασία και Συνεργασία από Απόσταση**

Έναρξη της Αφήγησης

Η ιστορία μας ξεκινά σε έναν ήσυχο γειτονικό δρόμο. Σε ένα μικρό, φωτεινό διαμέρισμα, ο Δημήτρης εργάζεται μπροστά στον υπολογιστή του. Κάποτε, έπρεπε να περνά δύο ώρες την ημέρα σε κίνηση για να φτάσει στο γραφείο του, αλλά τώρα το γραφείο του είναι το ίδιο του το σπίτι. **Ο Δημήτρης είναι προγραμματιστής και εργάζεται μέσω τηλεργασίας.**

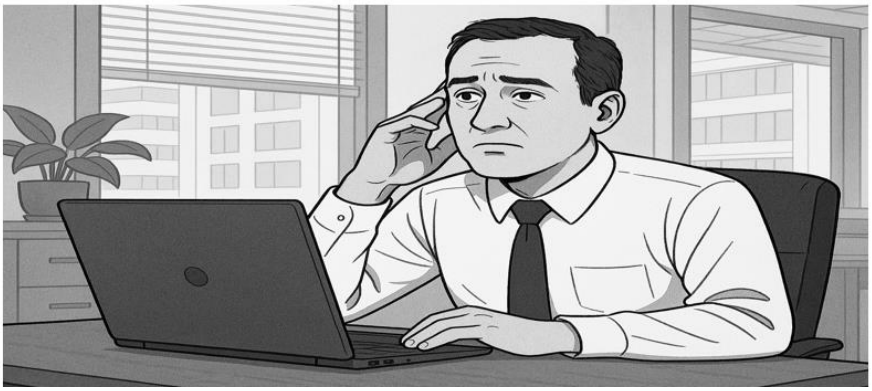
«Ποτέ δεν περίμενα ότι θα μπορούσα να εργάζομαι από το σπίτι μου», λέει στον φίλο του, Γιάννη, κατά τη διάρκεια ενός βιντεοκλήσης. «Έχω περισσότερο χρόνο για την οικογένειά μου και μπορώ να οργανώνω τη μέρα μου πιο ευέλικτα.»



Εικόνα 2
Εργαζόμενος με φυσική παρουσία στο χώρο εργασίας του

Η Εμπειρία του Γιάννη

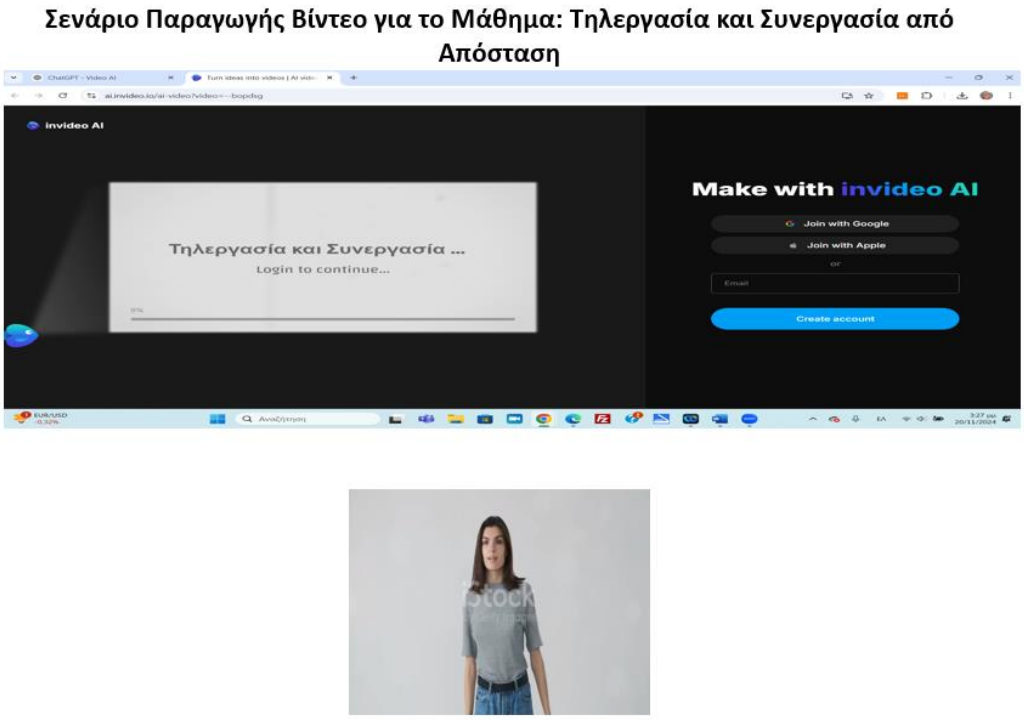
Ο Γιάννης, από την άλλη πλευρά, έχει μια διαφορετική εμπειρία. Εργάζεται σε μια παραδοσιακή εταιρεία όπου πρέπει να πηγαίνει στο γραφείο καθημερινά. **«Δεν μπορώ να φανταστώ πώς θα ήταν να δουλεύω από απόσταση»**, λέει. «Πώς διαχειρίζεσαι την απομόνωση, Δημήτρη;» Ο Δημήτρης του εξηγεί ότι χρειάζεται καλή οργάνωση και πειθαρχία. «Δεν είναι για όλους», λέει. «Αλλά υπάρχουν πλεονεκτήματα, όπως η ευελιξία και η εξοικονόμηση χρόνου μετακίνησης.»



Το σενάριο της αφήγησης αναπτύχθηκε με τη μορφή εκπαιδευτικού βίντεο, το οποίο αποτέλεσε το αφηγηματικό πλαίσιο της εισαγωγής των μαθητών στο θέμα της τηλεργασίας και της ψηφιακής επικοινωνίας. Το βίντεο χρησιμοποίησε τεχνικές αφήγησης με πρωτοπρόσωπη οπτική και πραγματικά παραδείγματα, ώστε να διευκολύνει τη σύνδεση των μαθητών με το αντικείμενο. Η δημιουργία του εκπαιδευτικού βίντεο με θέμα την «Τηλεργασία και Συνεργασία από Απόσταση» (Εικόνα 3) οργανώθηκε στη βάση ενός αφηγηματικού σεναρίου το οποίο καταρτίστηκε με τη βοήθεια του ChatGPT και μετέτρεψε την αρχική αφήγηση σε δομημένο σενάριο παραγωγής. Το σενάριο ακολουθούσε σαφή δομή με διαδοχικά μέρη: εισαγωγή στο φαινόμενο της τηλεργασίας, παρουσίαση εννοιών και μορφών (όπως εργασία από το σπίτι

ή σε τηλεκέντρα), ανάλυση εργαλείων συνεργασίας (Zoom, Padlet, email) και επίλογο με έμφαση στο μέλλον της εξ αποστάσεως συνεργασίας. Το ChatGPT διατύπωσε λεπτομερώς τις σκηνές, ενώ παρείχε και σαφείς οδηγίες παραγωγής. Οι μαθητές επέλεξαν την αφήγηση να γίνει στην ελληνική γλώσσα, με ανδρική φωνή, και ήπια μουσική υπόκρουση. Για τα γυρίσματα χρησιμοποιήθηκαν πραγματικά περιβάλλοντα (π.χ. σπίτια, καφετέριες), τα οποία συνδυάστηκαν με γραφικά και διαγράμματα. Το μοντάζ περιλάμβανε μεταβάσεις με χαλαρή μουσική και δυναμικούς τίτλους για κάθε σκηνή, ενώ η φιλική και ζεστή φωνή του αφηγητή διευκόλυνε την κατανόηση. Το τελικό αποτέλεσμα αξιοποιήθηκε στην τάξη ως αφορμή για τη βιωματική ενασχόληση με την έννοια της τηλεργασίας.

Εικόνα 3
Παραγωγή Video με AI



Ακολούθησε η ανάλυση των μορφών της τηλεργασίας, με έμφαση τόσο στη σύγχρονη (real-time) όσο και στην ασύγχρονη (time-independent) συνεργασία, μέσα από τη χρήση ψηφιακών εργαλείων όπως οι πλατφόρμες επικοινωνίας και διαχείρισης έργου. Η εισαγωγή των μαθητών στις λειτουργίες, στις απαιτήσεις και στα παραδείγματα εφαρμογής αυτών των μορφών υποστήριξε τη μεταγνώση και την εστίαση στις διαφοροποιημένες στρατηγικές συνεργασίας. Στη συνέχεια, οι μαθητές ενθαρρύνθηκαν να διερευνήσουν τα οφέλη και τις προκλήσεις της τηλεργασίας, ενισχύοντας τη δεξιότητα της κριτικής σκέψης και την ικανότητά τους να αξιολογούν διαφορετικές εργασιακές πρακτικές στο πλαίσιο της κοινωνίας της πληροφορίας. Η πρακτική φάση του σεναρίου περιλάμβανε προσομοιωμένη ομαδική εργασία, στην οποία οι μαθητές, οργανωμένοι σε μικρές ομάδες, αξιοποίησαν σύγχρονα εργαλεία Τεχνητής Νοημοσύνης και τηλεδιάσκεψης (π.χ. ChatGPT, Trello, Zoom, Padlet) για την από κοινού εκπόνηση ενός έργου, (Εικόνα 4). Μέσα από αυτή τη βιωματική δραστηριότητα, οι μαθητές ανέπτυξαν δεξιότητες συνεργασίας, διαχείρισης έργου, ψηφιακής επικοινωνίας και επίλυσης προβλημάτων σε ψηφιακά περιβάλλοντα.

Το σενάριο ολοκληρώθηκε με μια φάση αναστοχασμού και συζήτησης. Οι μαθητές κλήθηκαν να επεξεργαστούν τις εμπειρίες τους, να αξιολογήσουν τις στρατηγικές τις οποίες χρησιμοποίησαν και να συνδέσουν τα μαθησιακά αποτελέσματά τους με μελλοντικά επαγγελματικά ή ακαδημαϊκά συμφραζόμενα. Η ενσωμάτωση της αφήγησης καθ' όλη τη διάρκεια της διδακτικής πορείας ενίσχυσε όχι μόνο την ενσυναίσθηση και τη συναισθηματική εμπλοκή των μαθητών, αλλά και τη μεταγνωστική επίγνωσή τους, υποστηρίζοντας τη βαθύτερη επεξεργασία της πληροφορίας και την ενίσχυση της μαθησιακής αυτονομίας. Συνολικά, το σενάριο λειτούργησε ως πολυτροπικό παιδαγωγικό εργαλείο, συνδυάζοντας την τεχνολογική και τη συναισθηματική διάσταση, με στόχο τη δημιουργία μιας σύγχρονης, ενεργητικής και βιωματικής εμπειρίας μάθησης.

Εικόνα 4
Συνεργασία από Απόσταση-Αξιοποίηση Padlet



Η εκπαιδευτική παρέμβαση πραγματοποιήθηκε σε δύο (2) τμήματα. Ένα (1) τμήμα Πειραματικού Λυκείου και ένα (1) τμήμα Πρότυπου Γυμνασίου. Η εκπαιδευτική παρέμβαση υλοποιήθηκε σε τρεις (3) διακριτές φάσεις, με στόχο τη σταδιακή εισαγωγή, την εμπλοκή και την αξιολόγηση των μαθητών στη διδασκαλία της τηλεργασίας μέσω εργαλείων Τεχνητής Νοημοσύνης. Στην πρώτη (1η) φάση (1 διδακτική ώρα), προβλήθηκε και αναλύθηκε το σενάριο της αφήγησης μέσα από ένα εκπαιδευτικό βίντεο, το οποίο λειτούργησε ως εργαλείο κινητοποίησης και εισαγωγής των μαθητών στις βασικές έννοιες της τηλεργασίας και της εξ αποστάσεως συνεργασίας. Στη δεύτερη (2η) φάση (6 διδακτικές ώρες), ακολούθησε η πρακτική εφαρμογή, κατά την οποία οι μαθητές εργάστηκαν ομαδοσυνεργατικά σε προσομοιωτικά σενάρια τηλεργασίας, αξιοποιώντας σύγχρονα ψηφιακά εργαλεία όπως Zoom, Trello και Padlet, καθώς και δημιουργικές εφαρμογές της Τεχνητής Νοημοσύνης, όπως το ChatGPT και συστήματα αυτόματης παραγωγής παρουσιάσεων. Η τρίτη (3η) και τελευταία φάση (1 διδακτική ώρα) περιλάμβανε συζήτηση αναστοχασμού και αξιολόγηση της μαθησιακής εμπειρίας, μέσω ανατροφοδότησης, καταγραφής εμπειριών και δυσκολιών από τους μαθητές, καθώς και συστηματικής παρατήρησης από τους εκπαιδευτικούς.

Η συλλογή των ερευνητικών δεδομένων πραγματοποιήθηκε με τη χρήση ποιοτικών εργαλείων, τα οποία παρείχαν πολύπλευρη εικόνα της εκπαιδευτικής παρέμβασης. Συγκεκριμένα, αξιοποιήθηκε η συστηματική παρατήρηση της τάξης από τους εκπαιδευτικούς, οι οποίοι κατέγραφαν τις παρατηρήσεις τους σε ημερολόγια διδασκαλίας, ενώ αναλύθηκαν τα έργα τα οποία παρήγαγαν οι μαθητές, όπως παρουσιάσεις, ψηφιακές αναρτήσεις και σχέδια έργου. Επιπλέον, πραγματοποιήθηκαν ημιδομημένες συζητήσεις αναστοχασμού με τους μαθητές κατά τη φάση της αξιολόγησης, συζητήσεις καθώς και συνεντεύξεις με τους εμπλεκόμενους εκπαιδευτικούς. Η αξιολόγηση επικεντρώθηκε στην καταγραφή των εμπειριών, των δυσκολιών, των στρατηγικών και των στάσεων των μαθητών, όπως αυτές αποτυπώθηκαν κατά την εφαρμογή του σεναρίου και μέσω της παιδαγωγικής παρατήρησης. Ωστόσο, η ερμηνεία των δεδομένων επηρεάζεται από ορισμένους περιορισμούς, όπως το σχετικά μικρό δείγμα, η ετερογένεια ως προς τις ψηφιακές δεξιότητες των μαθητών και η περιορισμένη χρονική διάρκεια της παρέμβασης.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η ανάλυση των παρατηρήσεων των εκπαιδευτικών, των παραγόμενων έργων των μαθητών και των συζητήσεων αναστοχασμού ανέδειξε σημαντικά ευρήματα σχετικά με την επίδραση της εκπαιδευτικής παρέμβασης. Οι μαθητές φάνηκε να ενισχύουν ουσιαστικά την κατανόηση των βασικών εννοιών οι οποίες σχετίζονται με την τηλεργασία, αναγνωρίζοντας την πρακτική εφαρμογή της εξ αποστάσεως συνεργασίας. Η ενεργή εμπλοκή τους στη χρήση των εργαλείων της τηλεργασίας και της τεχνητής νοημοσύνης (AI) ενίσχυσε τη συνεργασία εντός των ομάδων και βελτίωσε τις ψηφιακές δεξιότητές τους. Εντυπωσιακή ήταν η αύξηση της συμμετοχής και του ενδιαφέροντος, ιδιαίτερα από μαθητές οι οποίοι παραδοσιακά παρουσιάζουν χαμηλή εμπλοκή. Παράλληλα, καταγράφηκαν αυξημένα επίπεδα πρωτοβουλίας και αυτονομίας κατά την εκτέλεση των ομαδικών εργασιών, όπως τεκμηριώθηκε στα ημερολόγια παρατήρησης και στα παραγόμενα έργα των μαθητών.

Από την ανάλυση των ποιοτικών δεδομένων προέκυψαν σημαντικές ενδείξεις για τη θετική επίδραση της διδακτικής παρέμβασης στους μαθητές. Καταγράφηκε βελτίωση στις επικοινωνιακές δεξιότητές τους, με έμφαση στην ικανότητά τους να συντονίζουν ομαδικές εργασίες σε ψηφιακά περιβάλλοντα και να διαχειρίζονται αποτελεσματικά την ανταλλαγή πληροφοριών μέσω εργαλείων όπως το Trello και οι πλατφόρμες τηλεδιάσκεψης. Οι μαθητές ανέπτυξαν βαθύτερη κατανόηση της τηλεργασίας, αποκτώντας επίγνωση των απαιτήσεών της, όπως η σαφής επικοινωνία, η διαχείριση του χρόνου και η επίλυση συγκρούσεων εξ αποστάσεως. Παράλληλα, η χρήση εργαλείων τεχνητής νοημοσύνης, όπως το ChatGPT, ενίσχυσε την αυτονομία τους, υποστηρίζοντας την αυτόνομη αναζήτηση και τη διαχείριση των πληροφοριών, καθώς και την ενεργή συμμετοχή τους στη δημιουργία περιεχομένου. Ορισμένοι μαθητές ανέφεραν ότι ανέπτυξαν μεταγνωστικές δεξιότητες, κυρίως μέσω της χρήσης ανατροφοδοτικών εργαλείων και αναστοχαστικών δραστηριοτήτων. Συνολικά, η εμπειρία τους από το σενάριο ήταν θετική, καθώς οι περισσότεροι δήλωσαν ενδιαφέρον και ικανοποίηση, διότι η αφηγηματική προσέγγιση λειτούργησε υποστηρίζοντας τη βιωματική κατανόηση του θέματος. Αυτά τα ευρήματα επιβεβαιώνουν την παιδαγωγική αξία της ενσωμάτωσης της τεχνητής νοημοσύνης και της τηλεργασίας στην εκπαιδευτική διαδικασία, ιδίως όταν συνδυάζονται με την ενεργοποίηση μέσω της αφήγησης και τις ομαδοσυνεργατικές πρακτικές.

Σύμφωνα με τις συστηματικές παρατηρήσεις των εκπαιδευτικών, όπως καταγράφηκαν στα ημερολόγια της τάξης και αποτυπώθηκαν στις συζητήσεις του αναστοχασμού, η εκπαιδευτική παρέμβαση οδήγησε σε πολλαπλά θετικά αποτελέσματα. Παρατηρήθηκε αυξημένο επίπεδο εμπλοκής και συμμετοχής των μαθητών, ιδιαίτερα κατά τη χρήση των εργαλείων της τηλεργασίας και της Τεχνητής Νοημοσύνης (AI). Το αφηγηματικό σενάριο λειτούργησε ενισχυτικά, ενισχύοντας το ενδιαφέρον και ενεργοποιώντας ακόμη και μαθητές οι οποίοι παραδοσιακά συμμετέχουν λιγότερο. Παρά τις αρχικές δυσκολίες της προσαρμογής στη χρήση των εργαλείων της διαχείρισης του έργου, όπως το Trello, οι μαθητές σταδιακά ανέπτυξαν λειτουργικές πρακτικές της οργάνωσης, του καταμερισμού των ρόλων και της συνεργατικής δράσης. Η διαδικασία υποστηρίχθηκε ενεργά από την καθοδήγηση του εκπαιδευτικού και από την ενίσχυση της συνεργασίας εντός των ομάδων.

Παράλληλα, οι εκπαιδευτικοί διαπίστωσαν σημαντική πρόοδο στην ενίσχυση των κοινωνικών και των συνεργατικών δεξιοτήτων των μαθητών. Μέσα από τη χρήση των ψηφιακών εργαλείων και τις ομαδοσυνεργατικές δραστηριότητες, προωθήθηκε η συλλογική δόμηση της γνώσης, η συναινετική λήψη των αποφάσεων, καθώς και η ανάπτυξη των δεξιοτήτων όπως η επικοινωνία, η ενσυναίσθηση και η επίλυση των προβλημάτων. Η Τεχνητή Νοημοσύνη αξιοποιήθηκε όχι μόνο ως εργαλείο παραγωγής υλικού, αλλά και ως μέσο παιδαγωγικής διαφοροποίησης, επιτρέποντας την προσαρμογή του μαθήματος στις ανάγκες και το ρυθμό κάθε ομάδας. Οι εκπαιδευτικοί εκτίμησαν συνολικά ως επιτυχημένη την εμπειρία, επισημαίνοντας τόσο τη γνωστική πρόοδο όσο και τη συναισθηματική ενδυνάμωση των μαθητών. Η ενσωμάτωση της AI και των εργαλείων τηλεργασίας, σε συνδυασμό με την αφήγηση, λειτούργησε υποστηρικτικά προς την καλλιέργεια των δεξιοτήτων του 21ου αιώνα, επιβεβαιώνοντας την ανάγκη του σχεδιασμού και της εφαρμογής καινοτόμων παιδαγωγικών πρακτικών οι οποίες συνδέουν τη μάθηση με το σύγχρονο ψηφιακό και επαγγελματικό περιβάλλον.

Η εφαρμογή του εκπαιδευτικού σεναρίου το οποίο βασίστηκε στη συνδυαστική χρήση των εργαλείων της Τεχνητής Νοημοσύνης και της τηλεργασίας ανέδειξε τη δυναμική μιας πολυτροπικής παιδαγωγικής προσέγγισης στην καλλιέργεια των σύνθετων ψηφιακών και κοινωνικών δεξιοτήτων. Η εισαγωγή του αφηγηματικού πλαισίου συνέβαλε καθοριστικά στη βιωματική εμπλοκή των μαθητών, ενισχύοντας τη σύνδεση με πραγματικές επαγγελματικές συνθήκες και διευκολύνοντας τη νοηματοδότηση βασικών εννοιών, όπως η εξ αποστάσεως συνεργασία και η ψηφιακή επαγγελματική επικοινωνία. Η αξιοποίηση της AI δεν περιορίστηκε σε υποστηρικτικό ρόλο, αλλά λειτούργησε ως βασικός μοχλός εξατομίκευσης και παιδαγωγικής διαφοροποίησης, επιτρέποντας την προσαρμογή των εργασιών στις ιδιαίτερες ανάγκες των μαθητών. Μέσω της αυτόνομης αναζήτησης πληροφοριών και της δημιουργικής παραγωγής περιεχομένου, ενισχύθηκαν η αυτονομία, η δημιουργικότητα και η κριτική σκέψη, όπως επιβεβαιώθηκε από τις εκπαιδευτικές παρατηρήσεις και την ανάλυση των παραγόμενων έργων. Παράλληλα, η χρήση συνεργατικών πλατφορμών προσέφερε τη δυνατότητα της προσομοίωσης ρεαλιστικών περιβαλλόντων τηλεργασίας, ενισχύοντας την κατανόηση των απαιτήσεων και των προκλήσεων τις οποίες συνεπάγεται η επαγγελματική συνεργασία από απόσταση (Holmes et al., 2019).

Η ενσωμάτωση τεχνολογιών AI στη διδακτική πρακτική συνέβαλε στην ενίσχυση των μεταγνωστικών δεξιοτήτων, καθώς προώθησε την αναστοχαστική σκέψη και την ικανότητα της αυτοαξιολόγησης (UNESCO, 2022). Τα ευρήματα της παρούσας μελέτης ευθυγραμμίζονται με σύγχρονες διεθνείς έρευνες οι οποίες αναδεικνύουν το ρόλο της Τεχνητής Νοημοσύνης στην εξατομίκευση της μάθησης, καθώς και στην ανάπτυξη των δεξιοτήτων όπως η επίλυση προβλημάτων, η συνεργασία και η δημιουργικότητα (Ciucci and Gouarderes, 2020). Ωστόσο, αναδείχθηκαν και προκλήσεις, όπως οι αρχικές δυσκολίες της προσαρμογής στη χρήση των εργαλείων της διαχείρισης του έργου, την ανάγκη της εντατικής υποστήριξης στη φάση της εξοικείωσης με τα ψηφιακά εργαλεία, καθώς και τα διαφοροποιημένα επίπεδα του ψηφιακού γραμματισμού μεταξύ των μαθητών. Η επιφανειακή χρήση των εργαλείων AI κατά τα πρώτα

στάδια της εφαρμογής ανέδειξε την αναγκαιότητα της συστηματικής παιδαγωγικής καθοδήγησης, ώστε αυτά να αξιοποιηθούν ουσιαστικά ως μέσα μάθησης και όχι ως απλές τεχνολογικές καινοτομίες. Συνολικά, η εφαρμογή επιβεβαίωσε ότι ο συνδυασμός των αφηγηματικών τεχνικών, των εργαλείων της AI και της τηλεργασίας, στο πλαίσιο ενός οργανωμένου σεναρίου, προωθεί τη βιωματική και την ενεργητική μάθηση και αποτελεί μια κατάλληλη προσέγγιση για την καλλιέργεια των δεξιοτήτων του 21ου αιώνα στο σύγχρονο σχολείο.

ΟΦΕΛΗ, ΠΕΡΙΟΡΙΣΜΟΙ ΚΑΙ ΗΘΙΚΑ ΖΗΤΗΜΑΤΑ ΑΠΟ ΤΗΝ ΕΝΣΩΜΑΤΩΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Η Τεχνητή Νοημοσύνη αναδεικνύεται ως ένα ισχυρό παιδαγωγικό εργαλείο το οποίο μπορεί να ενισχύσει την εξατομικευμένη διδασκαλία, να προσφέρει την προσαρμοσμένη ανατροφοδότηση και να υποστηρίξει τη δημιουργία συνεργατικών, ενεργών μαθησιακών περιβαλλόντων. Μέσω συστημάτων όπως τα εκπαιδευτικά chatbots, οι αλγόριθμοι προσαρμοστικής μάθησης και τα εργαλεία της δημιουργίας του ψηφιακού περιεχομένου, οι μαθητές έχουν τη δυνατότητα να καλλιεργήσουν δεξιότητες όπως η δημιουργικότητα, η κριτική σκέψη και η αυτορρυθμιζόμενη μάθηση (OECD, 2021, Papamitsiou and Economides, 2014). Παράλληλα, η AI μπορεί να υποστηρίξει τη διδασκαλία των μαθητών με ειδικές μαθησιακές ανάγκες και να προάγει τη διαθεματική συνεργασία μεταξύ των γνωστικών αντικειμένων. Ωστόσο, η παιδαγωγική αξιοποίηση αυτών των τεχνολογιών προϋποθέτει την κατάλληλη επιμόρφωση των εκπαιδευτικών, τις επαρκείς υποδομές και την ευαισθησία απέναντι στους κοινωνικούς και στους πολιτισμικούς παράγοντες οι οποίοι επηρεάζουν τη μαθησιακή διαδικασία (UNESCO, 2022).

Παρά τα εκπαιδευτικά οφέλη της, η ενσωμάτωση της AI συνοδεύεται από σοβαρούς ηθικούς, κοινωνικούς και παιδαγωγικούς προβληματισμούς. Η χρήση αλγοριθμικών συστημάτων αξιολόγησης και η συλλογή προσωπικών δεδομένων εγείρουν ζητήματα διαφάνειας, λογοδοσίας και προστασίας των δικαιωμάτων των μαθητών, καθιστώντας απαραίτητη τη συμμόρφωση με αυστηρά πρωτόκολλα ασφάλειας (Ciucci and Gouarderes, 2020). Παράλληλα, η αλγοριθμική μεροληψία μπορεί να οδηγήσει σε άνιση μεταχείριση ή αποκλεισμό των μαθητών (OECD, 2021), ενώ η υπερ-τεχνολογικοποίηση της τάξης ενδέχεται να μειώσει τη σημασία της ανθρώπινης διάδρασης, της ενσυναίσθησης και της αναλογικής παιδαγωγικής, οι οποίες είναι απαραίτητες για την καλλιέργεια κοινωνικοσυναισθηματικών δεξιοτήτων (Holmes et al., 2019). Η συνεχής αλληλεπίδραση με ψηφιακά συστήματα μπορεί να επηρεάσει αρνητικά την ψυχοκοινωνική ανάπτυξη των μαθητών, προκαλώντας άγχος ή αίσθηση παρακολούθησης. Συνεπώς, η Τεχνητή Νοημοσύνη πρέπει να αξιοποιείται με παιδαγωγική επίγνωση, ενσυνείδητα και με θεσμική υποστήριξη, ως εργαλείο ενίσχυσης της μάθησης και όχι ως υποκατάστατο της εκπαιδευτικής σχέσης.

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΤΑΣΕΙΣ

Η παρούσα ερευνητική παρέμβαση ανέδειξε τη δυναμική της ενσωμάτωσης της Τεχνητής Νοημοσύνης στην εκπαιδευτική διαδικασία, ειδικά όταν αυτή στοχεύει στην καλλιέργεια των δεξιοτήτων της τηλεργασίας. Μέσα από την εφαρμογή ενός οργανωμένου και πολυτροπικού διδακτικού σεναρίου, το οποίο συνδύασε την αφήγηση, τα εργαλεία της τηλεργασίας και τις ψηφιακές εφαρμογές της AI, οι μαθητές της Α΄ Λυκείου ανέπτυξαν ουσιαστικές γνώσεις και δεξιότητες σχετικές με τη συνεργασία από απόσταση, την επαγγελματική επικοινωνία και τη λειτουργική χρήση των τεχνολογικών εργαλείων. Υπήρξε ενεργή και στοχευμένη η εμπλοκή τους στη μαθησιακή διαδικασία, ενισχύοντας όχι μόνο τις τεχνικές, αλλά τις κοινωνικές και τις μεταγνωστικές ικανότητές τους.

Η Τεχνητή Νοημοσύνη δεν λειτούργησε απλώς ως υποστηρικτικό μέσο, αλλά αναδείχθηκε σε βασικό εργαλείο εξατομικευμένης μάθησης, παιδαγωγικής διαφοροποίησης και ανάπτυξης της αυτονομίας των μαθητών. Η χρήση των εργαλείων της AI διευκόλυνε την κατανόηση των σύνθετων εννοιών, ενεργοποίησε την κριτική και την αναστοχαστική σκέψη και ενίσχυσε τη δημιουργικότητα. Παράλληλα, η εμπειρία της τηλεργασίας μέσω των ψηφιακών πλατφορμών προσέφερε στους μαθητές τη δυνατότητα της προσομοίωσης των ρεαλιστικών επαγγελματικών καταστάσεων, ενισχύοντας την κατανόηση των απαιτήσεων της σύγχρονης εργασιακής πραγματικότητας. Ωστόσο, η εφαρμογή ανέδειξε την ανάγκη για τη σταδιακή εξοικείωση των μαθητών με αυτά τα νέα εργαλεία και τις νέες έννοιες. Ο καθοριστικός ρόλος του εκπαιδευτικού παραμένει ως εμψυχωτής, καθοδηγητής και διαμεσολαβητής της μάθησης.

Με βάση τα παραπάνω ευρήματα, προτείνονται συγκεκριμένες παιδαγωγικές κατευθύνσεις για τη μελλοντική αξιοποίηση της Τεχνητής Νοημοσύνης και της τηλεργασίας στην εκπαίδευση. Η συστηματική ένταξη των εργαλείων AI στη διδακτική πράξη όλων των γνωστικών αντικειμένων μπορεί να ενισχύσει τη μεταγνωστική και την κοινωνική ανάπτυξη των μαθητών. Παράλληλα, κρίνεται απαραίτητη η ενσωμάτωση των σχετικών θεματικών ενοτήτων με την τηλεργασία, στα προγράμματα των σπουδών της Δευτεροβάθμιας Εκπαίδευσης, ως η προετοιμασία για τις συνθήκες της αγοράς εργασίας του 21ου αιώνα. Η χρήση αφηγηματικών τεχνικών και σεναρίων προσομοίωσης μπορεί να ενισχύσει τη βιωματική προσέγγιση της μάθησης, ενώ η επιμόρφωση των εκπαιδευτικών στην παιδαγωγική αξιοποίηση της AI αποτελεί βασική προϋπόθεση για την αποτελεσματική εφαρμογή. Απαιτείται περαιτέρω ερευνητική διερεύνηση για τη

συστηματική αποτίμηση των μακροπρόθεσμων μαθησιακών και κοινωνικών αποτελεσμάτων της ενσωμάτωσης της AI και της τηλεργασίας στο σχολικό περιβάλλον. Η Τεχνητή Νοημοσύνη, εφόσον αξιοποιηθεί παιδαγωγικά και οργανωμένα, μπορεί να συμβάλει καθοριστικά στο μετασχηματισμό του σχολείου σε ένα σύγχρονο, ευέλικτο και μαθητοκεντρικό θεσμό, ικανό να ανταποκριθεί στις προκλήσεις της ψηφιακής εποχής και της κοινωνίας της γνώσης.

Η εφαρμογή της Τεχνητής Νοημοσύνης στη δευτεροβάθμια εκπαίδευση αναδεικνύει σημαντικές δυνατότητες για την εξατομίκευση της διδασκαλίας, την προσαρμοστική ανατροφοδότηση και τη δημιουργία συνεργατικών μαθησιακών περιβαλλόντων. Μέσω εργαλείων όπως τα εκπαιδευτικά chatbots, τα συστήματα προσαρμοστικής μάθησης και οι μηχανισμοί αυτόματης αξιολόγησης, οι εκπαιδευτικοί μπορούν να ενισχύσουν την ενεργή συμμετοχή, την αυτονομία και την αίσθηση του ελέγχου των μαθητών στη μαθησιακή διαδικασία (OECD, 2021). Ωστόσο, η ενσωμάτωση της AI στην καθημερινή εκπαιδευτική πρακτική συνοδεύεται από σημαντικές προκλήσεις, όπως η έλλειψη επιμόρφωσης των εκπαιδευτικών, η ανάγκη καλλιέργειας ψηφιακής παιδείας στους μαθητές, τα ηθικά ζητήματα τα οποία αφορούν την προστασία προσωπικών δεδομένων και την αλγοριθμική διαφάνεια (UNESCO, 2022), καθώς και οι τεχνικοί περιορισμοί οι οποίοι απορρέουν από την ανεπαρκή υλικοτεχνική υποδομή. Για να επιτευχθεί ο παιδαγωγικός μετασχηματισμός της σχολικής τάξης, η χρήση της Τεχνητής Νοημοσύνης οφείλει να είναι συνειδητή, παιδαγωγικά τεκμηριωμένη και να συνοδεύεται από στοχευμένη επιμόρφωση των εκπαιδευτικών, από ανάπτυξη δεξιοτήτων AI literacy στους μαθητές και θεσμική υποστήριξη η οποία θα ενισχύει την καλλιέργεια της κριτικής σκέψης, της δημιουργικότητας και των ασφαλών εκπαιδευτικών πρακτικών (Walter, 2024).

Με βάση τα ευρήματα της μελέτης, προτείνεται η θεσμική ενσωμάτωση της τηλεργασίας και της Τεχνητής Νοημοσύνης στα προγράμματα σπουδών, καθώς και η ενίσχυση της επιμόρφωσης των εκπαιδευτικών για την παιδαγωγική αξιοποίησή τους. Διδακτικά, προτείνεται η υιοθέτηση project-based μαθημάτων, η χρήση εργαλείων AI για εξατομικευμένη μάθηση και η καλλιέργεια του ψηφιακού γραμματισμού μέσω βιωματικών δραστηριοτήτων. Παράλληλα, κρίνεται αναγκαία η συνέχιση της έρευνας σχετικά με τις επιπτώσεις αυτών των τεχνολογιών στις μεταγνωστικές και στις κοινωνικές δεξιότητες των μαθητών, με στόχο τη διαμόρφωση ενός σύγχρονου και συμπεριληπτικού εκπαιδευτικού μοντέλου.

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Ο (ΑΝΤΙ ΠΙΝΑΚΑ) ΗΛΕΚΤΡΟΝΙΚΟΣ ΥΠΟΛΟΓΙΣΤΗΣ, ΚΛΕΙΔΙ, ΓΙΑ ΤΗΝ ΕΦΑΡΜΟΓΗ ΤΟΥ (ΕΝ ΚΥΛΚΛΩ) ΜΑΘΗΜΑΤΟΣ, ΑΠΟ ΤΟΥΣ ΙΔΙΟΥΣ ΤΟΥΣ ΜΑΘΗΤΕΣ

Καππέ Σταματία
συμβ. Εκπαιδευτικός ΠΕ08, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: stamatiakappe12@gmail.com

Δημουλάς Κωνσταντίνος
επί τιμή Α΄ Σχολικός Σύμβουλος
Φιλολόγων και επιστημονικοπαιδαγωγικής καθοδήγησης
κάθε ειδικότητας, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dimoulask@yahoo.gr

Δημουλάς Ευριπίδης
Ηλεκτρολόγος μηχανικός και μηχανικός Ηλεκτρονικών
Υπολογιστών ΠΕ18, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: euripides5@hotmail.com

Βέλλιου Έλλη
αδιόρ. Εκπαιδευτικός ΠΕ18, ΟΨΜ.ΕΤΥ*,
Λάρισα, Ελλάδα
e-mail: ellivelliou14@gmail.com

Παπαδημητρίου Θεοδώρα
συνταξ. Εκπαιδευτικός ΠΕ03, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dorapapadim@gmail.com

Κουτσαβλάκη Αγγελική
συνταξ. εκπαιδευτικός ΠΕ02, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: akoutsavlaki@yahoo.com

Βερβέρας Νικόλαος
αδιόρ. Εκπαιδευτικός ΠΕ02,ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: lyrikos@gmail.com

* **ΟΨΜ.ΕΤΥ:** Οργανισμός Ψυχοβιοαναλυτικής Μόρφωσης «ἐκ τῶν ὑστέρων»

ΠΕΡΙΛΗΨΗ

Η μετατροπή του μετωπικού συστήματος (στο οποίο τα θρανία είναι το ένα πίσω από το άλλο, απέναντι από την έδρα του δάσκαλου) σε μάθημα με τα παιδιά σε υποομάδες, δεν δίνει, στην τάξη, την (χωρίς ανταγωνισμούς, μεταξύ των παιδιών, λόγω σύσφιγξης των διατομικών σχέσεων, μέσα στην υποομάδα, για αντιμετώπιση των άλλων υποομάδων) μαθητοκεντρικότητα, που επιζητούμε, καθώς οι υποομάδες λειτουργούν, έτσι κι αλλιώς, ανταγωνιστικά, η μία προς την άλλη. Σκοπός της πρακτικής ήταν η μαθητοκεντρικότητα της τάξης ως ενός όλου, με τα θρανία σε κύκλο και (λόγω κατάργησης της έδρας) με τον δάσκαλο (από κυρίαρχος της τάξης, από την έδρα του, που ήταν), τώρα, απλά, συντονιστή του μαθήματος, που θα διεξάγεται (λόγω μετριασμού της σύσφιγξης των σχέσεων των παιδιών, που εντεινόταν, για αντιμετώπιση των παιδιών των άλλων υποομάδων, που δεν θα υπάρχουν, πια) μη ανταγωνιστικά, αλλά συναγωνιστικά, μεταξύ τους, από τα ίδια τα παιδιά. Η (εντελώς προσωπική του εμπνευστή της) πρακτική εφαρμοζόταν σε σχολικές μονάδες, δευτεροβάθμιας, κυρίως, τυπικής και άτυπης, εκπαίδευσης, από το 1979 (έτος διορισμού του ως εκπαιδευτικού) έως το 2013 (έτος αφυπηρέτησής του). Η (ως εντελώς, προσωπικής πρακτικής, προσωπική) μεθοδολογία της βασίζεται στην μετατροπή της μετωπικής, προς τον δάσκαλο, θρανιοτοποθέτησης σε κυκλική, καταργούμενης της έδρας του δασκάλου, κάνοντας τις παράλληλες, ατομικές, μονοδρομικές, από και προς τον δάσκαλο, δράσεις των μαθητών του μετωπικού συστήματος ομαδική δράση, στην οποία, τώρα, θα μπορούν, εκ των πραγμάτων, να έχουν, όλοι την ίδια ευκαιρία να είναι συνδημιουργοί του κοινού έργου της τάξης. Αρχικά, σχεδιάζεται, φανερό, κοινωνιόγραμμα, για τις σχέσεις των παιδιών, στο τμήμα, από τα παιδιά ή και τον δάσκαλο, προς όποια χρήση, από τα παιδιά και τον δάσκαλο, και ακολουθεί συζήτηση, για το καταστατικό λειτουργίας της τάξης, σύνταξη και υπογραφή του. Η συνεδρίαση διεξαγωγής του μαθήματος των παιδιών γίνεται ως εξής. Από την προηγουμένη, τα παιδιά ενημερώνονται, για το μάθημα της ημέρας, για να το επεξεργαστούν. Ύστερα από βραχύτατη αφορμησιακή εισήγηση του δασκάλου, η τάξη, δυνάμει, γίνεται, εν κύκλω, ένα απέραντο εργαστήριο. Το κάθε παιδί, έχοντας, πλήρη, εικόνα της δράσης των άλλων, μπορεί να είναι ρυθμιστής του αποτελέσματος. Το μάθημα είναι μια ενιαία (όχι ως μέρη εξέτασης και παράδοσης) πλατφόρμα συζήτησης. Ο δάσκαλος δεν έχει μόνιμη έδρα, αλλά περιφέρεται, όπου χρειάζεται, για τον καλύτερο συντονισμό του μαθήματος. Στην κυκλική τοποθέτηση των θρανίων, έχει καταργηθεί και ο πίνακας. Στην περίοδο εφαρμογής της πρακτικής, αυτός είχε αντικατασταθεί με χαρτόνια, προς επίδειξη, στους άλλους, του τι γραφόταν, σ' αυτό. Τώρα, όμως, υπερπηδάται το τελευταίο πρόβλημα, που αντιμετώπιζε η πρακτική, με την αντικατάστασή του από τόσες οθόνες υπολογιστών, για κάθε παιδί. Το κάθε παιδί θα μπορεί να γράψει ή να ζωγραφίσει ή να σχηματίσει ή ό,τι άλλο, στον υπολογιστή του, και αυτό να το βλέπουν όλα τα άλλα παιδιά, τα οποία, μάλιστα, θα μπορούν και να συμμετέχουν, σε ό,τι έκανε το παιδί αυτό, διαδραστικά, για το όποιο, κοινό, αποτέλεσμα. Το παραγόμενο προϊόν αποτυπώνεται σε (κοινόχρηστα, διαγωνισμικού τύπου, εξελισσόμενα) «βιβλία», από τα παιδιά, για κάθε μάθημα, για όλα τα ενδιαφέροντα, ως «Ελεύθερη Προαιρετική Εργασία, για το σπίτι». Καθότι τα παιδιά είναι, ως συνδημιουργοί, οι δημιουργοί του μαθήματος, αυτά είναι και που προβαίνουν στην αξιολόγησή του. Τα δελτία αξιολόγησης συλλέγονται, τέλος κάθε

εβδομάδας, μήνα, τριμήνου, τετραμήνου, εξαμήνου, έτους, για εξαγωγή του μέσου όρου βαθμολογίας, από το τμήμα, για κάθε παιδί, με τον δάσκαλο να έχει, με σύμβουλο το κοινωνιόγραμμα, την όποια (αν θα) του δίνεται δυνατότητα τροποποιητικής (στον μέσο όρο της αυτοδιασταυρωτικής, αυτής, αξιολόγησης) παρέμβασης. Τα θετικά αποτελέσματα αποτυπώνονται στην επιστημονική εξέλιξη των παιδιών, η οποία (θετικά σχόλια και τρίτων, κατατεθειμένα, στο «Αρχείο Μαθητικής Δημιουργίας» του Οργανισμού) οφειλόταν (και) στην πρακτική, αυτή. Όμως, λόγω της κόπωσης, που συνεπάγεται, για τον δάσκαλο, αν και θετικότατης αποδοχής, δεν είχε, δυστυχώς, απήχηση.

Λέξεις – κλειδιά: μάθημα χωρίς δάσκαλο, αυτορρύθμιση τάξης, αυτομάθημα, κυκλική θρανιοτοποθέτηση, συνεδριακό μάθημα, διασταυρωτική αυτοαξιολόγηση

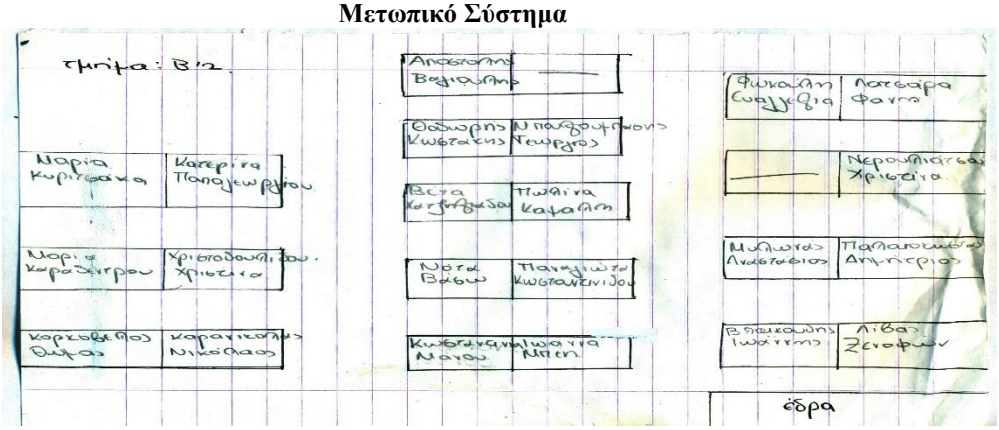
ΕΙΣΑΓΩΓΗ

Η εργασία παρουσιάζει τον (αντί πίνακα) ηλεκτρονικό υπολογιστή κλειδί, για την εφαρμογή του (εν κύκλω) μαθήματος, από τους ίδιους τους μαθητές, καταδεικνύοντας την ύπαρξη ηλεκτρονικού υπολογιστή, για κάθε παιδί, στον κύκλο των θρανίων τους, που θα έχουν κάνει οι μαθητές, για να διεξαγάγουν, από μόνοι τους, χωρίς τον δάσκαλο, που θα παραμένει, απλά, ο συντονιστής της συνεδρίασής των, εν κύκλω, το μάθημά τους, εκ των ων ουκ άνευ, για την (πλήρη) επιτυχία της εν ολομελεία εργασία τους (Chatzieuthymiou, 1994). Ο προβληματισμός να μαθαίνουν τα παιδιά πώς να μαθαίνουν (Makri - Botsari, 2006), έτσι, ώστε να μπορούν, από μόνα τους, να μαθαίνουν (Dimoulas et al, 2024d), όταν, πια, δεν θα έχουν τον δάσκαλο, δίπλα τους, όχι, πλέον, να τους μαθαίνει πράγματα, αλλά, έστω, να τους καθοδηγεί, πώς να τα μάθουν τα πράγματα, αυτά, που, άλλωστε, είναι και το σπουδαιότερο, στην εκπαίδευση (Dimoulas, 1996α; 1996β; 2010), οδήγησε τον δημιουργό της πρακτικής στον προβληματισμό για το πώς τα παιδιά θα είναι, τα ίδια, οι δημιουργοί του μαθήματος, από τώρα (Dimoulas et al, 2024g), με τον δάσκαλο να μην διδάσκει, αλλά, απλά, να συντονίζει το μάθημα (Δημουλάς, 2010), το οποίο, βεβαίως, μετά από μια μικρή εισαγωγή τους, σε αυτό, από τον δάσκαλο, θα γίνεται από τα ίδια τα παιδιά (Agrafioti, 2019). Η πρακτική εκδιπλώνεται, φυσικά, με προσωπική του μεθοδολογία (πρβλ., McCaslin and Good, 1996), βασισμένη στην έως τότε, που πρωτοεφαρμόσθηκε, σχετική, βιβλιογραφία, έως, το πολύ (καθώς η πρακτική εμπλουτιζόταν, συνεχώς, προς βελτίωσή της, για επίτευξη του καλύτερου), την χρονολογία αφυπηρέτησης του δημιουργού της (Ververas, 2018). Η εφαρμογή της πρακτικής, από τον ίδιο, κράτησε από το 1979 (έτος διορισμού του) έως το 1998 (έτος αποχώρησής του από την τάξη, καθώς, την χρονιά αυτή, επελέγη Σχολικός Σύμβουλος Φιλολόγων) (Agrafioti, 2019). Η πρακτική υπάρχει στους πλήρεις φακέλους μαθήματος, στα χέρια των μαθητών, σπουδαστών, φοιτητών, άλλων, όπου εφαρμόσθηκε (Vouvousi, 2018). Συνέχισε να παρουσιάζεται, κυρίως, στην Δευτεροβάθμια Εκπαίδευση, στο πλαίσιο των υποχρεώσεών του, ως δάσκαλου ή επιμορφωτή των εκπαιδευτικών του, ως Σχολικού Συμβούλου Φιλολόγων και επιστημονικοπαιδαγωγικής καθοδήγησης, στα σχολεία της αρμοδιότητάς του, αλλά και στην μεταδευτεροβάθμια και στην Τριτοβάθμια, τυπική και άτυπη Εκπαίδευση, αλλά και αλλού (Agrafioti, 2019; Ververas, 2018; Vouvousi, 2018; Chatzieuthymiou, 1994).

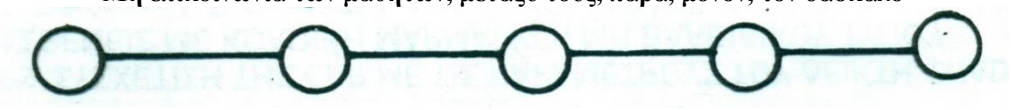
ΑΝΑΠΤΥΞΗ ΠΡΑΚΤΙΚΗΣ ΜΑΘΗΜΑΤΟΣ ΧΩΡΙΣ ΔΑΣΚΑΛΟ

Η μετατροπή του μετωπικού συστήματος (στο οποίο τα θρανία είναι το ένα πίσω από το άλλο, απέναντι από την έδρα του δάσκαλου) (Matsagouras, 2007) σε μάθημα με τα παιδιά σε υποομάδες, που είναι και η πιο δημοφιλής ενέργεια του δάσκαλου, σήμερα (Kapsalis, 1983; Matsagouras, 2007), δεν δίνει, στην τάξη, την (χωρίς ανταγωνισμούς, μεταξύ των παιδιών) μαθητοκεντρικότητα, που επιζητούμε (Matsagouras, 2007), καθώς οι υποομάδες (Forsyth, 1999; Haupt and Leary, 1997), λόγω σύσφιγξης των διατομικών σχέσεων, μέσα στην υποομάδα, για αντιμετώπιση των άλλων υποομάδων (Ververas et al, 2024), λειτουργούν, έτσι κι αλλιώς, ανταγωνιστικά, η μία προς την άλλη (Dimoulas et al, 2024e; 2024f).

Εικόνα 1
Μετωπικό Σύστημα

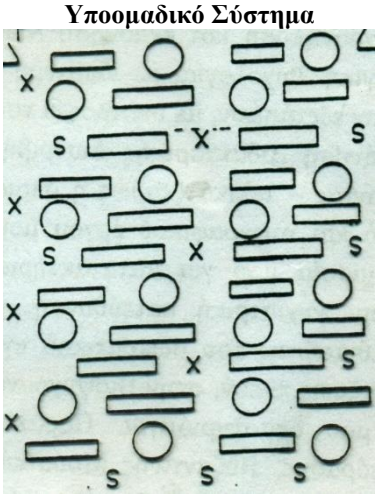


Εικόνα 2.
Μη επικοινωνία των μαθητών, μεταξύ τους, παρά, μόνον, τον δάσκαλο



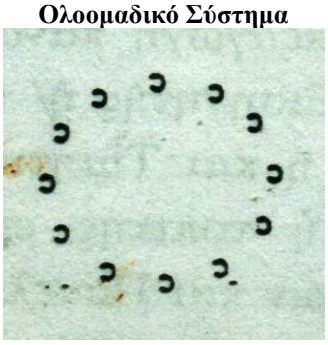
Σκοπός της πρακτικής ήταν η μαθητοκεντρικότητα της τάξης ως (μακράν υποομαδισμού) ενός όλου, με τα θρανία σε κύκλο και (λόγω κατάργησης της έδρας) με τον δάσκαλο (από κυρίαρχος της τάξης, από την έδρα του, που ήταν), τώρα, απλά, συντονιστή του μαθήματος, που θα διεξάγεται μη ανταγωνιστικά, λόγω μετριασμού της σύσφιγξης των σχέσεων των παιδιών, που εντεινόταν, για αντιμετώπιση των παιδιών των άλλων υποομάδων, που δεν θα υπάρχουν, πια, αλλά συναγωνιστικά, μεταξύ τους, από τα ίδια τα παιδιά.

Εικόνα 3
Υποομαδικό Σύστημα



Η (εντελώς, προσωπική, άρα μακράν όποιας, έως, εδώ, τηρούμενης μεθοδολογίας) του εμπνευστή της) πρακτική εφαρμοζόταν σε σχολικές μονάδες, δευτεροβάθμιας, κυρίως, τυπικής και άτυπης, εκπαίδευσης, από το 1979 (έτος διορισμού του ως εκπαιδευτικού) έως το 2013 (έτος αφυπηρέτησής του).

Εικόνα 4.
Ολοομαδικό Σύστημα



Η (ως εντελώς, προσωπικής πρακτικής, προσωπική) μεθοδολογία της βασίζεται στην μετατροπή της μετωπικής, προς τον δάσκαλο, θρανιοτοποθέτησης σε (με υποομαδοϋπερπήδηση) κυκλική, καταργούμενης της έδρας του δασκάλου, κάνοντας τις παράλληλες, ατομικές, μονοδρομικές, από και προς τον δάσκαλο, δράσεις των μαθητών του μετωπικού συστήματος ομαδική δράση, στην οποία, τώρα, θα μπορούν, εκ των πραγμάτων, να έχουν, όλοι την ίδια ευκαιρία να είναι συνδημιουργοί του κοινού έργου της τάξης.

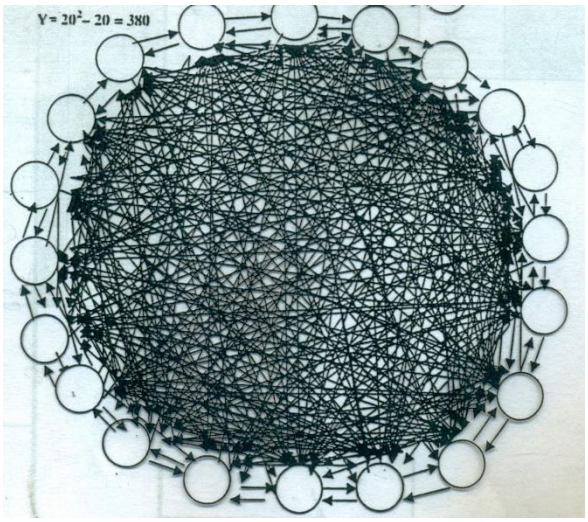
Αρχικά, όπως και, σε όποια πρακτική, θα έπρεπε, σχεδιάζεται, φανερό, κοινωνιόγραμμα, για τις σχέσεις των παιδιών, στο τμήμα, από τα παιδιά ή και τον δάσκαλο, προς όποια χρήση, από τα παιδιά και τον δάσκαλο, και ακολουθεί συζήτηση, για το καταστατικό λειτουργίας της τάξης, σύνταξη και υπογραφή του.

Η ολοομαδική συνεδρίαση της τάξης διεξαγωγής του μαθήματος των παιδιών γίνεται ως εξής.

Από την προηγουμένη, τα παιδιά ενημερώνονται, για το μάθημα της ημέρας, για να το επεξεργαστούν. Ύστερα από βραχύτατη αφορμησιακή εισήγηση του δασκάλου, η τάξη, δυνάμει, γίνεται, εν κύκλω, ένα απέραντο εργαστήριο. Το κάθε παιδί, έχοντας, πλήρη, εικόνα της δράσης των άλλων, μπορεί να είναι ρυθμιστής του αποτελέσματος. Το (από τα παιδιά, διεξαγόμενο) μάθημα είναι μια ενιαία (όχι ως μέρος εξέτασης και μέρος παράδοσης, αφού δεν υπάρχει, πλέον, τίποτε από αυτά) πλατφόρμα συζήτησης.

Ο δάσκαλος, μη έχοντας, άλλο, ρόλο, από το να συντονίζει το (αυτο)μάθημα των παιδιών, δεν έχει, πλέον, μόνιμη έδρα, αλλά περιφέρεται, όπου χρειάζεται, για τον καλύτερο συντονισμό του μαθήματος.

Εικόνα 5
Πλέγμα διαδραστικών σχέσεων μαθητών, σε ώρα αυτομαθήματός τους, στην τάξη



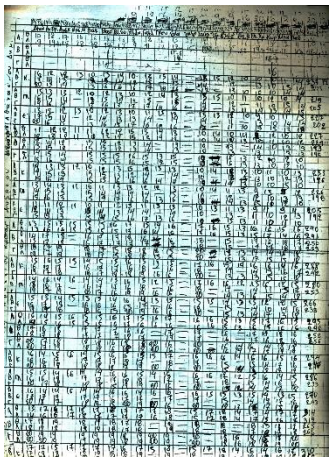
Το μεγαλύτερο, όμως, πρόβλημα, στην εφαρμογή του συστήματος, ήταν ο πίνακας, η παράκαμψη του πίνακα, έτσι, ώστε τα παιδιά να είναι τοποθετημένα, με τον πίνακα του παλαιού (του μετωπικού) συστήματος, ως άχρηστο, ’πίσω τους, σε εντελώς κλειστό κύκλο, αφού, ακριβώς, εδώ είναι η διαφορά με το υποομαδικό σύστημα, το οποίο με τίποτα δεν θεραπεύει την παθογένεια του μετωπικού συστήματος, αντίθετα, αυξάνοντας τον ανταγωνισμό των υποομάδων, μεταξύ τους, αυξάνει την αντιπαλότητα, μέσα στην τάξη, πράγμα, που είναι χειρότερο και από τον αυταρχισμό του ενός (του δασκάλου), επάνω στα παιδιά. Ο πίνακας, τώρα, μεταφέρεται, οιονεί, εμπρός στο κάθε παιδί, με κατεύθυνση στα άλλα παιδιά: τόσοι πίνακες, όσα και τα παιδιά. Χωρίς την κυκλικότητα στην θρανιοτοποθέτηση, το σύστημα, που σας παρουσιάζουμε, δεν υφίσταται, αλλά η κυκλικότητα των θρανίων υποδεικνύει κατάργηση του πίνακα, από την τάξη.

Στην κυκλική τοποθέτηση των θρανίων, λοιπόν, έχει καταργηθεί και ο πίνακας. Στην περίοδο εφαρμογής της πρακτικής, αυτός είχε αντικατασταθεί με χαρτόνια, προς επίδειξη, στους άλλους, του τι γραφόταν, σ’ αυτό. Τώρα, όμως, υπερπηδάται το τελευταίο πρόβλημα, που αντιμετώπιζε η πρακτική, με την αντικατάστασή του από τόσες οθόνες υπολογιστών (τάμπλετ, για την ακρίβεια, ελαφρώς, υπερυψωμένο, για την καλή και εύχερη χρήση τους, τόσο, όμως, έτσι, ώστε να υπάρχει ορατότητα, ανάμεσά τους, πράγμα που θα εμποδιζόταν, από την οθόνη του ηλεκτρονικού υπολογιστή, για το τι, ακριβώς, γίνεται, στην τάξη, από όλους), για κάθε παιδί. Το κάθε παιδί θα μπορεί να γράψει ή να ζωγραφίσει ή να σχηματίσει ή ό,τι άλλο, στον υπολογιστή του, και αυτό να το βλέπουν όλα τα άλλα παιδιά, τα οποία, μάλιστα, θα μπορούν και να συμμετέχουν, σε ό,τι έκανε το παιδί αυτό, διαδραστικά, για το όποιο, κοινό, αποτέλεσμα (Dimoulas et al, 2024b). Το κάθε παιδί βλέπει, στην, όλη, παρουσία του κάθε, άλλου, παιδιού, μέσω οθόνης υπολογιστή, την δράση του κάθε, άλλου, παιδιού, έτσι, ώστε να μπορεί να συνεργάζεται, μαζί του, μέσω αυτής, επίσης.

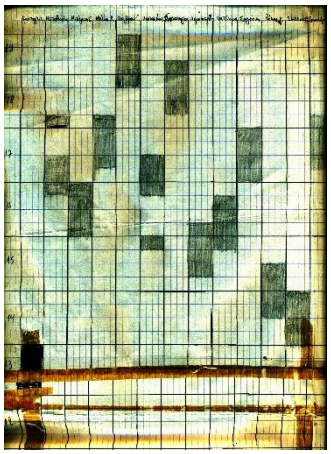
Το παραγόμενο προϊόν (Dimoulas et al, 2022b) αποτυπώνεται σε (κοινόχρηστα, διαγωνισμικού τύπου, εξελισσόμενα) «βιβλία», από τα παιδιά, για κάθε μάθημα, πολλαπλά, πολλαπλής χρήσης, για όλα τα παιδιά, για όλα τα ενδιαφέροντα, ως «Ελεύθερη Προαιρετική Εργασία, για το σπίτι» (Dimoulas et al, 2022c).

Καθότι τα παιδιά είναι, ως συνδημιουργοί, οι δημιουργοί του μαθήματος (Dimoulas et al, 2022c), αυτά είναι και που προβαίνουν στην αξιολόγησή του (Dimoulas et al, 2020; Dimoulas et al., 2021a). Τα δελτία αξιολόγησης συλλέγονται, τέλος κάθε εβδομάδας, μήνα, τριμήνου, τετραμήνου, εξαμήνου, έτους, για εξαγωγή του μέσου όρου βαθμολογίας, από το τμήμα, για κάθε παιδί, με τον δάσκαλο να έχει, με σύμβουλο το κοινωνιόγραμμα (Volioti, 1989; Spanou & Tsea, 2008), την όποια (αν, καταστατικά, θα) του δίνεται δυνατότητα τροποποιητικής (στον μέσο όρο της αυτοδιασταυρωτικής, αυτής, αξιολόγησης) παρέμβασης.

Εικόνα 6
Αυτοδιασταυρωτική αξιολόγηση



Εικόνα 7
Αυτοδιασταυρωτική αυτοκατάταξη



ΣΥΜΠΕΡΑΣΜΑΤΑ

Με την μετα-ανάλυση των σχετικών ερευνών, διαπιστώνεται, ότι, σε σύγκριση με τις κατευθυνόμενες μορφές διδασκαλίας (Matsagouras, 2007), οι μαθητοκεντρικές μορφές διδασκαλίας επιφέρουν επιδόσεις υψηλότερες, στον συναισθηματικό, και χαμηλότερες, στον ακαδημαϊκό τομέα του παιδιού (Adams and Engelman, 1996; Petersen, 1979), πράγμα, που οδήγησε στις (υπο)ομαδοσυνεργατικές μεθόδους (Matsagouras, 2007), οι οποίες, όμως, κατακερματίζοντας την ομάδα της τάξης σε υποομάδες (Dimoulas et al., 2024e; 2024f), διότι αυτό, ακριβώς, εννοούν (βλ., Battistich et al., 1993), με τον όρο "ομαδοσυνεργασία" (Matsagouras, 2007), όχι, απλά, δεν σημειώνουν πρόοδο, στον δεύτερο (βλ., Adams and Engelman, 1996; Petersen, 1979), αφού επιφέρουν μεν μεγαλύτερη παραγωγή, αλλά κατώτερης ποιότητας (Correll, 1976:136 κ.κ.; Sherif, 1956, στον Καψάλη, 1983), αλλά, και στον πρώτο, προκαλούν ζημιά (Anderson et al., 1997; Battistich et al., 1993, Cohen, 1986; McCaslin and Good, 1996; βλ., Tsiaras, 2007). Αυτό οδήγησε τον δημιουργό της πρακτικής (Dimoulas, 1996α; 1996β; 2010) στο πέρασμα, από τον κατακερματισμό σε υποομάδες (Kakana, 2008; Karagiozidis, 2008; Matsagouras, 2007; Meyer, 1977), που προσπερνάται (Chatzieuthymiou, 1996), στην λειτουργία της ομάδας ως ενός όλου (Δημουλάς, 2010). Σε μια τάξη, που ξεκινά, έτσι κι αλλιώς, συνήθως, μετωπικά (Matsagouras, 2007), η επιθυμία των παιδιών να έχουν λόγο (Dimoulas et al, 2024c), που, στο μετωπικό σύστημα, εκ των πραγμάτων, δεν έχουν, για όλα, όσα συμβαίνουν στην τάξη (Matsagouras, 2007), οδηγεί, κατ' ανάγκη, χωρίς την παρεμβολή της υποομαδοποίησης του συνόλου των παιδιών (Kakana, 2008; Karagiozidis, 2008; Matsagouras, 2007; Meyer, 1977), που, όχι, απλά, δεν λύνει το πρόβλημα της αμεσοσυνεργασίας, όλων με όλους, στην τάξη (Ververas et al, 2024), αλλά και την εμποδίζει (Dimoulas et al, 2024e), επιδεινώνοντας την αντιπαράθεση των παιδιών (βλ., Festinger, 1954), μεταξύ των υποομάδων τους (Δημουλάς κ.ά., 2024f), κατευθείαν, στην κυκλική τοποθέτηση των θρανίων (Polemi – Todoulou, n.d.). Όπου όλοι, ενώπιος ενωπίω, έχουν την ίδια ευκαιρία να συμβάλουν, εφόσον το θέλουν, με την αλληλοδιαπλοκή των δράσεών τους (βλ., Crocker et al., 1993), στο κοινό έργο της τάξης (βλ., Anderson et al., 1997; Cohen, 1986), ως συνεργάτες, επί το αυτό ((Ververas et al, 2024; Dimoulas, 2022), με την ίδια ευθύνη (Dimoulas et al., 2021b; 2022d; 2024h; βλ., Tsiaras, 2007), χωρίς τον δάσκαλο (Dimoulas et al, 2024a), που, απλά, μετά την εισαγωγή της, στο μάθημα, ύστερα από την αφόρμησή του, συντονίζει το έργο της σχολικής ομάδας, το οποίο πραγματοποιείται από, την ίδια, την σχολική ομάδα (Agrafioti, 2019; (Ververas, 2018; (Ververas et al, 2024; Vouvousi, 2018; Chatzieuthymiou, 1994), που, έτσι (Correl, 1976), μαθαίνει πώς να μαθαίνει (Makri - Botsari, 2006). Οι υπολογιστές (ένας για κάθε παιδί, σε αλληλοσύνδεσή των, για την πλήρη αλληλόδρασή των, λύνει το μεγάλο πρόβλημα της πλήρους εφαρμογής της πρακτικής μας, η οποία, με την, εκ των πραγμάτων, κατάργηση του πίνακα, λόγω της κυκλικής θρανιοτοποθέτησης, λειτούργησε, με τις ατομικές πινακίδες των παιδιών, αλλά όχι πλήρως.

Η σύνδεση των βαθμολογιών των παιδιών μας, αυτών, που συνέχισαν τις σπουδές των, σε μεταδευτεροβάθμια και τριτοβάθμια Ιδρύματα (βλ., Kapsalis & Chaniotakis, 2011; Solomon (ed.), 1999), δείχνει μια συνεπή, επί καλώ, εξελικτικότητα της σπουδαστικής πορείας των (Kapsalis, 1983). Αλλά, και επαγγελματικά, τα παιδιά αυτά φαίνεται, εξ όσων γνωρίζουμε, αλλά και με την ιδιότητά τους, που αναγράφεται στον τηλεφωνικό κατάλογο, να έχουν προοδεύσει (Dimoulas, 1996α). Πέραν, όμως, και τούτων, η όλη, συνεχώς, εξελισσόμενη, επί τα βελτίω, πρακτική έχει αποσπάσει ενθουσιώδη σχόλια, από πανεπιστημιακούς, παιδαγωγούς, Σχολικούς Συμβούλους, δημοσιογράφους, τρίτους, αλλά (πιο πολύ, ίσως και το κυριότερο) και από τα ίδια τα παιδιά, όχι, τόσον, τότε, όταν ήσαν, ακόμα, μαθητές, αλλά υστερότερα, όταν, πια, βγήκαν, στην κοινωνία και στην ζωή (Agrafioti, 2019). Τα αποδεικτικά στοιχεία όλων αυτών ευρίσκονται στο Αρχείο Μαθητικής Δημιουργίας του Οργανισμού μας Ψυχοβιοαναλυτικής Μόρφωσης «ἐκ τῶν ὑστέρων» (Dimoulas,

2010). Άξιζε (Δημουλάς, 2010). Πρώτα – πρώτα, τα παιδιά αγάπησαν την τάξη (Chatzieuthymiou, 1996). Ξεκινώντας μετωπικά (Matsagouras, 2007), οι όποιες παρεμβάσεις του όποιου παιδιού, στην δράση του όποιου, άλλου, παιδιού, ως συμβολή του, στην αξιολόγησή του, δεν ήταν δυνατόν να γίνουν δεκτές, ως, εκ των πραγμάτων (με την συνηθισμένη διάταξη των θρανίων), ελλιπείς και, άρα, μη ακριβείς, αφού κανένα τους δεν είχε, λόγω της θέσης του, στην γνωστή, αυτή, θρανιοδιάταξη, πλήρη εικόνα, για την δράση των άλλων (Dimoulas, 1996α). Η επιθυμία των ίδιων των παιδιών να έχουν λόγο, για όλα όσα συμβαίνουν, στην τάξη, οδήγησε, κατ' ανάγκην, στην κυκλική τοποθέτηση των θρανίων, για μετατροπή των παράλληλων, ατομικών, δράσεων σε ομαδική δράση, στην οποία, τώρα, θα μπορούσαν, εκ των πραγμάτων, να έχουν λόγο όλοι, όσοι το ήθελαν, για τα πάντα, στην τάξη (Dimoulas 1996β). Με τα θρανία σε κύκλο, όπου όλοι (καθήμενοι, όπου ο καθένας επιθυμεί) είναι ενώπιος ενωπίω, όλοι έχουν την ίδια ευκαιρία να συμβάλουν, εφόσον το θέλουν, στο κοινό έργο της τάξης, ως συνεργάτες, επί το αυτό, με την ίδια ευθύνη (Dimoulas, 2010). Τα αποτελέσματα ήταν θεαματικά (Agrafioti, 2019). Οι μαθητές, με το πέρασμα της διαχείρισης του μαθήματος, από τον δάσκαλο, στους ίδιους, πέραν της δημοκρατικότητας, που εμπνεύσθηκαν (Dimoulas et al, 2012), έμαθαν πώς να μαθαίνουν, για να μπορούν να αντεπεξέρχονται, στην ζωή, και όταν, πια, δεν θα έχουν τον δάσκαλο, μαζί τους, και το απέδειξαν με την μετέπειτα πρόοδό τους, γενικώς ((Ververas, 2018). Η αυτοδιαχείριση του μαθήματος και της τάξης έκανε τα παιδιά να σκέφτονται, υπεύθυνα, για το καλύτερο, μέσα στην τάξη, πρόπλασμα, για το μέλλον τους, αναλαμβάνοντας, με το θάρρος της ευθύνης του, πρωτοβουλίες, για το γενικό, κοινωνικό, καλό (Vouvousi, 2018). Τα θετικά αποτελέσματα αποτυπώνονται στην επιστημονική εξέλιξη των παιδιών, η οποία (θετικά σχόλια και τρίτων, κατατεθειμένα, στο «Αρχείο Μαθητικής Δημιουργίας» του Οργανισμού) οφειλόταν (και) στην πρακτική, αυτή (Χατζηγεωργίου, 1994). Όπως και στην άλλη μας εργασία, στην τακτοποίηση του απίστευτου, σε όγκο, υλικού της πρακτικής, βοήθησαν, με τον όποιο τρόπο τους, κατά καιρούς, οι επιστημονικοί συνεργάτες μας, που, συχνά, συνδράμουν, στο έργο μας, Κ. Ζαμπάκας, Ει.-Χ. Δροσινού, Ν.-Φ. Αγραφιώτη, Γ. Ζαμπέτογλου, Δ. Δημάκας, Θ. Κατσαρός, Φ. Καλύβα, Δ. Μπαρμπάκας, Α. Βαχτσεβάνου, Ι. Τρίγκας, Β. Ζησοπούλου, Γ. Τρακάλα, Μ. Γιαννούλα, Π. Ζησόπουλος, Δ. Λιόβας, Χ. Πολύζος, Ι. Κατσής, Μ. Πουρνάρας, Ό. Κούρτογλου, Χ.Χ. Βαμβούρη-Δημάκη, Ευ. Μιμηλίδου, Ζ. Ζήκος, Α. Αργύρη, Γ. Κυρίτσης κ.ά..

Όμως (Dimoulas, 2010), λόγω της κόπωσης, που συνεπάγεται, για τον δάσκαλο, αν και θετικότατης, και από τον εκπαιδευτικό κόσμο, αποδοχής, δεν είχε, δυστυχώς, απήχηση. Η πρακτική δεν ακολουθήθηκε, από κανέναν, απολύτως, συνάδελφο (Ververas, 2024), λόγω της τεράστιας, αυτής, κόπωσης, που συνεπάγεται, για τον δάσκαλο, και που ο ίδιος, ο δημιουργός της, πολύ, εβίωσε (Dimoulas, 1996β).

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ΛΑΝΘΑΣΜΕΝΗ ΕΡΜΗΝΕΙΑ ΜΗΝΥΜΑΤΟΣ, ΛΟΓΩ ΕΓΚΕΦΑΛΙΚΗΣ ΣΥΓΧΥΣΗΣ, ΑΠΟ ΚΑΤΑΙΓΙΣΤΙΚΗ ΠΡΟΒΟΛΗ ΕΙΚΟΝΩΝ, ΣΤΗΝ ΟΘΟΝΗ ΤΟΥ ΥΠΟΛΟΓΙΣΤΗ

Βερβέρας Νικόλαος
αδιόρ. Εκπαιδευτικός ΠΕ02,ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: lyrikos@gmail.com

Δημουλάς Κωνσταντίνος
επί τιμή Α΄ Σχολικός Σύμβουλος
Φιλολόγων και επιστημονικοπαιδαγωγικής
καθοδήγησης κάθε ειδικότητας, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dimoulask@yahoo.gr

Δημουλάς Ευριπίδης
Ηλεκτρολόγος μηχανικός και μηχανικός Ηλεκτρονικών
Υπολογιστών ΠΕ18, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: euripides5@hotmail.com

Βέλλιου Έλλη
αδιόρ. Εκπαιδευτικός ΠΕ18, ΟΨΜ.ΕΤΥ*,
Λάρισα, Ελλάδα
e-mail: ellivelliou14@gmail.com

Παπαδημητρίου Θεοδώρα
συνταξ. Εκπαιδευτικός ΠΕ03, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: dorapapadim@gmail.com

Κουτσαβλάκη Αγγελική
συνταξ. εκπαιδευτικός ΠΕ02, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: akoutsavlaki@yahoo.com

Καππέ Σταματία
συμβ. Εκπαιδευτικός ΠΕ08, ΟΨΜ.ΕΤΥ*
Λάρισα, Ελλάδα
e-mail: stamatiakappe12@gmail.com

* **ΟΨΜ.ΕΤΥ:** Οργανισμός Ψυχοβιοαναλυτικής Μόρφωσης «ἐκ τῶν ὑστέρων»

ΠΕΡΙΛΗΨΗ

Η εικόνα περιέχει πλήθος πληροφοριών, οι οποίες προσλαμβάνονται ως όλον, η συμπλοκότητα των σχέσεων των μερών του οποίου δυσκολεύει, με την πολυπλοκότητά του, τα μάλιστα, την ερμηνεία του. Η δυσκολία αυτή είναι μεγαλύτερη, στην περίπτωση ανάγκης να δοθεί, εσπευσμένα, μια απάντηση, σε αυτό. Η εργασία αυτή είχε σκοπό να μελετήσει την ικανότητα αναγνώρισης των συναισθηματικών εκφράσεων του προσώπου, σε καταιγιστική προβολή τους, στην οθόνη υπολογιστή, στο πλαίσιο μαθήματος, πράγμα που οφείλεται να το γνωρίζει ο δάσκαλος. Στην έρευνα την οποία παρουσιάζουμε στην εργασία αυτή συμμετείχαν (61 άντρες και 104 γυναίκες=) 165, υποκείμενα, οι οποίοι ζουν στην Ελλάδα, 25-55 χρονών, μέσου μορφωτικού επιπέδου. Χρησιμοποιήθηκε η σειρά των Ekman και Friesen 65 διαφανειών προσώπων με ένα (από ολόκληρο ή μέρος του προσώπου) ή περισσότερα συναισθήματα (F.A.S.T., 1971). Τα υποκείμενα έπρεπε, σε μια πρώτη προβολή τους, να αναγνωρίσουν ένα (οπωσδήποτε, και μόνο ένα) από τα επτά, παγκόσμια αναγνωρισμένα, συναισθήματα (ευτυχία, λύπη, φόβος, θυμός, έκπληξη, αηδία, περιφρόνηση) και, σε μια δεύτερη φάση, με την ίδια σειρά προβολής, να αποδώσουν ένα (οπωσδήποτε, και μόνο ένα) βαθμό, από το 0 (απουσία συναισθήματος) μέχρι το 8 (έντονη παρουσία συναισθήματος), στο καθένα, από τα συναισθήματα, αυτά, σε προκατασκευασμένα φύλλα απαντήσεων, και τις δύο φορές. Ο χρόνος προβολής κάθε διαφάνειας ήταν, προοδευτικά, 10΄΄-5΄΄ και 25΄΄-10΄΄ και ο ενδιάμεσος χρόνος, για την σημείωση των απαντήσεων, ήταν 5΄΄ και 10΄΄, αντίστοιχα, για τις φάσεις αυτές. Τα δεδομένα περάστηκαν σε επτά, όσα και τα συναισθήματα, συγκεντρωτικούς, πίνακες, για κάθε φύλο. Από αυτούς, βγήκαν, για κάθε διαφάνεια, η εκατοστιαία αναλογία των προτιμήσεων συναισθηματικής σημασιοδότησης και ο μέσος όρος της έντασης, που αποδόθηκε, σε αυτές, από το σύνολο των υποκειμένων. `Υστερα, με βάση τις διαφάνειες που συγκεντρώνουν το 20% και πλέον της αποδοχής των υποκειμένων των δύο ομάδων (άνδρες - γυναίκες), για την συγκεκριμένη τους, συναισθηματική, σημασιοδότηση, κατασκευάσθηκε λεξικό συναισθηματικής σημασιοδότησης, που αποδόθηκε, από κάθε ομάδα, για κάθε ομάδα. Σ' αυτό, φαίνονται οι συγκρίσιμες περιπτώσεις, ενδοομαδικά, και διαομαδικά. Η στατιστική ανάλυση (χ^2, για την ένταση, και t test, για την συχνότητα) αφορά στον έλεγχο: α) της έντασης, με βάση την βαθμολογία, που αποδόθηκε, από τα υποκείμενα, σε κάθε συναίσθημα, β) της συχνότητας της αναγνώρισης των συναισθημάτων, και, σε σύγκριση με τα διεθνή standards, γ) της έντασης των συναισθημάτων που αναγνωρίσθηκαν αληθώς, δ) της συχνότητας των συναισθημάτων που αναγνωρίσθηκαν αληθώς. Τα αποτελέσματα δείχνουν τα εξής: Η αναγνωριστική των συναισθημάτων ικανότητα είναι, γενικά, καλή, σε βαθμό συγκρίσιμο, ενδοομαδικά και διομαδικά, επιδεινούμενη, παρά την προοδευτική ευχέρεια αληθούς αναγνώρισης, που προέρχεται από την εξάσκηση, όσο μικραίνει ο χρόνος προβολής και λιγοστεύει ο διαθέσιμος χρόνος της αναγνώρισης αυτής. Οι άνθρωποι, γενικά, δεν βλέπουν πολύ διαφορετικά συναισθήματα, στο πρόσωπο, ακόμα και όταν πρόκειται για διαφορετικό φύλο. Χωρίς το άγχος της γρήγορης διαδικασίας, κάνουμε τις περισσότερες αναγνωρίσεις και αληθείς

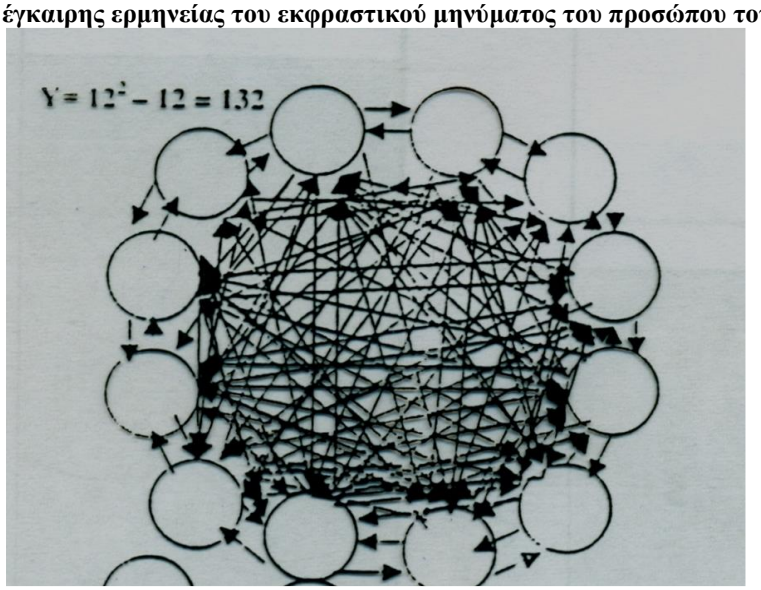
αναγνωρίσεις συναισθημάτων, ενώ, με αυτό, η βαθμολογία, που δίνουμε, στα συναισθήματα, που αναγνωρίζουμε, είναι, συνήθως, πιο υψηλή, από την βαθμολογία, που δίνουμε, χωρίς αυτό. Η διαφορά, με τις γυναίκες να υπερέχουν, στην αναγνώριση και στην αληθή αναγνώριση συναισθημάτων, από τους άνδρες, χωρίς αυτό το άγχος, με αυτό, φαίνεται να μην υπάρχει, ουσιωδώς. Στην περίπτωση της γρήγορης διαδικασίας, με το άγχος, που υφέρπει, σε αυτή, στις μονοσήμαντες εκφράσεις, τα καταφέρνουμε καλύτερα, απ' ό,τι στις πολυσήμαντες, όπως, βέβαια, και στην αργότερη διαδικασία, χωρίς το άγχος αυτό. Γενικά, η ικανότητα αναγνώρισης συναισθημάτων είναι καλύτερη, χωρίς το άγχος της γρήγορης διαδικασίας, και, ειδικά, στις γυναίκες. Με το άγχος σπουδής, να προσλάβουμε, να διευθετήσουμε και να ερμηνεύσουμε, μέσα σε ελάχιστο, διαθέσιμο, χρόνο, ένα μεγάλο όγκο πληροφοριών, ο εγκέφαλός μας πέφτει σε σύγχυση, πράγμα, που μας δυσκολεύει στην αναγνώριση του μηνύματος, που μας εκπέμπεται, συνεπαγόμενης, πόσο, μάλλον, αν πρόκειται, όχι για στατικές, αλλά εικόνες σε κίνηση, λάθος εκτιμήσεις.

Λέξεις – κλειδιά: πληροφοριακή κόπωση, εγκεφαλική σύγχυση, ακριβής αναγνώριση μηνύματος

ΕΙΣΑΓΩΓΗ

Η εργασία παρουσιάζει, νευροψυχολογικά (Brodal, 1965; Burke, 1979; Caucheteux et al., 2023; Chung et al., 2014; Do and Ng, 2005; Garner, 1974; Hinton and Salakhutdinov 2006; Krizhevsky et al., 2012; McCulloch and Pitts, 1943; Vaswami et al., 2017; Widrow and Hoff, 1985; βλ., και O' Reilly and Munakata, 2000; Rumelhart et al., 1986α; 1986β), την λανθασμένη ερμηνεία μηνύματος, που δίνεται, λόγω εγκεφαλικής σύγχυσης, από καταιγιστική προβολή εικόνων, στην οθόνη του υπολογιστή (βλ., Tsesmelis, D.S., & Florakis, 2018), δηλαδή σε καταιγιστική προβολή στατικών, έστω (το πρόβλημα θα είναι πολύ μεγαλύτερο, σε προβολή σε κίνηση), εικόνων, από την οθόνη του υπολογιστή. Σε μια τέτοια υποβολή μηνυμάτων, ο εγκέφαλος πέφτει σε σύγχυση, ερμηνεύοντας, εξ αυτού, λανθασμένα, φυσικά, τα όσα, δι' αυτών, του εκπέμπονται (Dimoulas et al, 2024a; 2024b; 2024c; 2024d). Αυτό φαίνεται φυσικό. Η ερμηνεία των μηνυμάτων, που δεχόμαστε, σε γρήγορη εκπομπή, προφανώς, όπως φαίνεται και από την βιβλιογραφία (De Kosky, 1980; Dimoulas et al, 2019; 2020; Diakogianni-Tarlatzi, 1981; Eckman and Friesen, 1973; Eckman and Oster, 1979; Hoffman, 1981), θα είναι περισσότερον επιτυχής, αν αυτή είναι αργή. Η εργασία μας αυτή έχει σκοπό να μελετήσει την ικανότητα αναγνώρισης των συναισθηματικών εκφράσεων του προσώπου, σε καταιγιστική προβολή τους, στην οθόνη του υπολογιστή μας. Η εικόνα περιέχει πλήθος πληροφοριών, οι οποίες προσλαμβάνονται ως όλον, η συμπλοκότητα των σχέσεων των μερών του οποίου δυσκολεύει, με την πολυπλοκότητά του, τα μάλιστα, την ερμηνεία του (Dimoulas, 1999). Η δυσκολία αυτή είναι μεγαλύτερη,

Εικόνα 1
Η ανάγκη έγκαιρης ερμηνείας του εκφραστικού μηνύματος του προσώπου του παιδιού



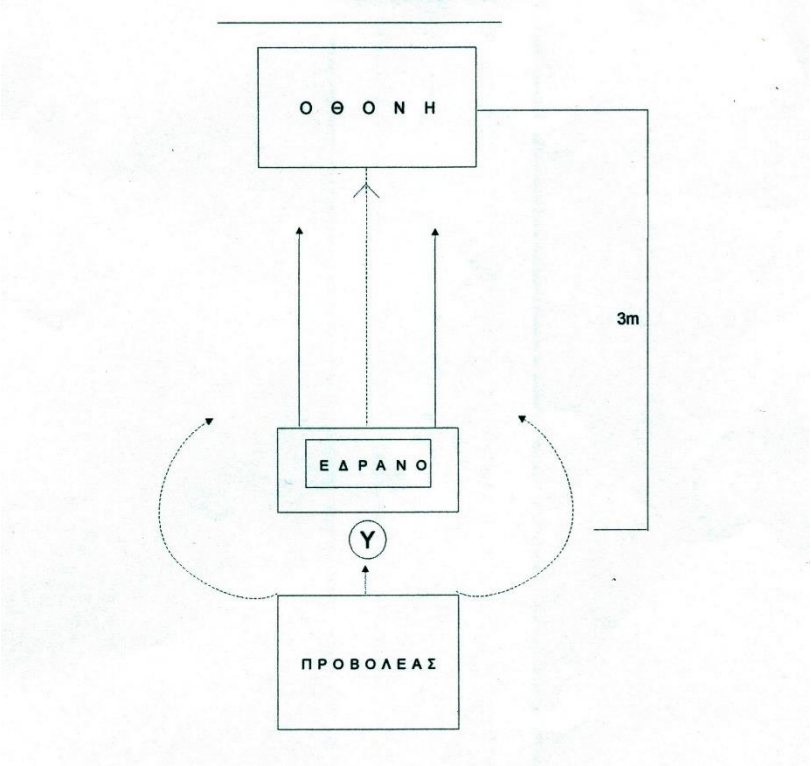
Στην περίπτωση ανάγκης να δοθεί, εσπευσμένα, μια απάντηση, σε αυτό (Dimoulas et al, 2021; 2023; 2024e; Lewis, 1996). Η εργασία αυτή είχε σκοπό να μελετήσει την ικανότητα αναγνώρισης των συναισθηματικών εκφράσεων του προσώπου, σε καταιγιστική προβολή τους, στην οθόνη υπολογιστή, προσομοιώνοντας την δυσκολία, που, στην διάρκεια της προβολής, αυτής, αντιμετωπίζει, στην αναγνώριση, αυτήν, ο χειριστής του υπολογιστή (βλ., και Anderson, 1995; Bose and Liang, 1996; Dimoulas et al, 2021; 2023; 2024a; 2024b; 2024c; 2024d, 2024e; Diamantaras, 2007; Garson, 1998; Haykin, 1999; Hecht and Nielsen, 1988; Kohonen, 1987; Lippman, 1987; Minsky and Papert, 1969; Shah, 2021; UNESCO, 2023; Folinas et al, 2007; Wayne et al., 2019; Zimmerman, 2018), με την δυσκολία, που αντιμετωπίζει ο δάσκαλος, στο πλαίσιο ενός ολοομαδικού μαθήματος, όπου, όλοι, εν κύκλω, αλληλεπιδρούν, με όλους (Garner, 1976; Heshka and Nelson, 1972; Peck and Peck, 1970), με συνεπαγόμενη απίστευτη την (άμεση) ανάγκη να πρέπει να είναι, πάντα, σε (πλήρη) ετοιμότητα να έχει ερμηνεύσει, ταχύτατα, έγκαιρα, σωστά, την συγκινησιακή / συναισθηματική έκφραση των παιδιών (Buck et al., 1972; Carey, 1982), που αυτά (με τον δάσκαλο, απλά, συντονιστή τους) είναι, που διεξάγουν το μάθημα, πριν προκύψει η (όποια) ανάγκη να παρέμβει, σ' αυτό. Η σημασία της έρευνας, για τον δάσκαλο και την εκπαίδευση, είναι, σίγουρα, προφανής.

ΑΝΑΠΤΥΞΗ ΕΡΕΥΝΑΣ

Έλαβαν μέρος (61 άντρες και 104 γυναίκες=) 165 άτομα, 25-55 χρονών, μέσου μορφωτικού επιπέδου. Χρησιμοποιήθηκε, απ' όλα τα διαθέσιμα μέσα (βλ., Bassili, 1979; Bayer and Bayley, 1959; Benton et al., 1975; Etcoff et al., 1984; Hansch and Pirozzolo, 1980; McCord and Illingworth, 2009; Wasserman, 1993; Zuckerman et al., 1975) η

σειρά των Ekman και Friesen, 65 διαφανειών προσώπων με ένα (από ολόκληρο ή μέρος του προσώπου) ή περισσότερα συναισθήματα (F.A.S.T., 1971). Τα υποκείμενα έπρεπε, σε μια πρώτη προβολή τους, να επισημάνουν ένα (οπωσδήποτε, και μόνον ένα), από τα επτά (παγκόσμια, αναγνωρισμένα) συναισθήματα (ευτυχία, λύπη, φόβος, θυμός, έκπληξη, αηδία, περιφρόνηση), και, σε μια δεύτερη φάση, με την ίδια σειρά προβολής, ένα (οπωσδήποτε, και μόνον ένα) βαθμό, από το 0 (απουσία συναισθήματος) μέχρι το 8 (έντονη παρουσία συναισθήματος), για το καθένα, από τα επτά, ό.π., συναισθήματα. Ο χρόνος προβολής, κάθε διαφάνειας, ήταν (βαθμιαία, μειούμενος) 10΄΄-5΄΄ και (σταδιακά) 25΄΄-20΄΄-15΄΄-10΄΄ και ο ενδιάμεσος χρόνος, για την σημείωση των απαντήσεων, 5΄΄ και 10΄΄, αντίστοιχα.

Εικόνα 2
Διεξαγωγή της έρευνας



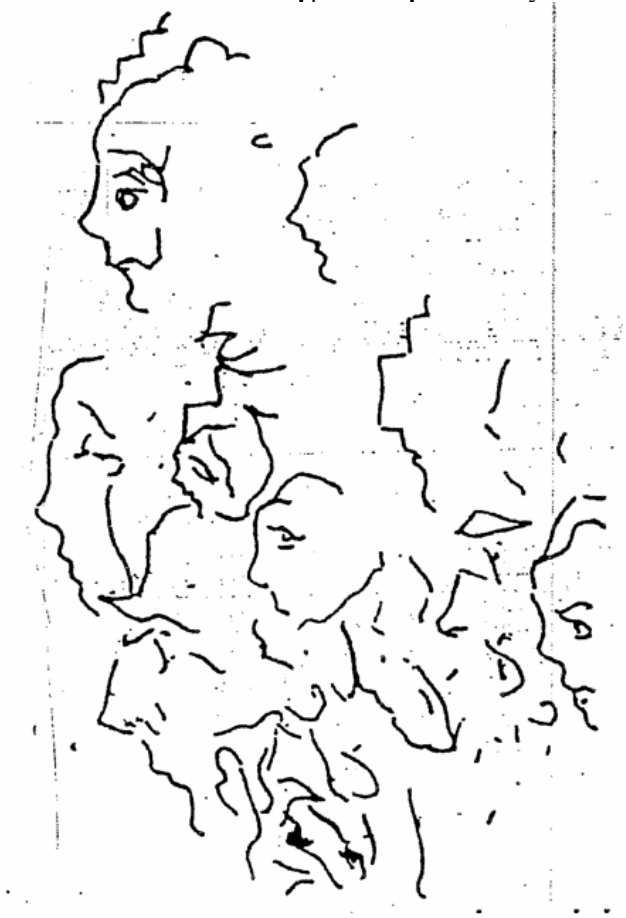
Βγήκαν, για κάθε διαφάνεια, η εκατοστιαία αναλογία των προτιμήσεων (συναισθηματικής) σημασιοδότησης και ο μέσος όρος της έντασης, που αποδόθηκε, σε αυτές. Με βάση τις διαφάνειες, που συγκέντρωναν το 20% και πλέον της αποδοχής των υποκειμένων (cut off point), για την συγκεκριμένη τους (συναισθηματική) σημασιοδότηση, κατασκευάσθηκε "λεξικό" (συναισθηματικής) σημασιοδότησης, που αποδόθηκε, στις διαφάνειες, από κάθε ομάδα. Σ' αυτό, φαίνονται οι (συγκρίσιμες και μη) περιπτώσεις, ενδοομαδικά και διαομαδικά, χωριστά, για τις μονοσήμαντες και για τις πολυσήμαντες διαφάνειες.

Η στατιστική ανάλυση αφορούσε στην εξέταση της έντασης (X^2) των συναισθημάτων, που αναγνωρίστηκαν (αληθώς, άρα, με βαθμό, τουλάχιστον, 1) και της συχνότητας (t test) της αναγνώρισης των συναισθημάτων. Επίπεδα σημαντικότητας ήσαν, για όλες τις περιπτώσεις μας, τα $P<0,05$, $P<0,01$, $P<0,001$.

Τα αποτελέσματα (όπως και στην άλλη μας εργασία, στην τακτοποίηση του μεγάλου, σε όγκο, υλικού της έρευνας, βοήθησαν, με τον όποιο τρόπο τους, κατά καιρούς, οι επιστημονικοί συνεργάτες μας, που, συχνά, συνδράμουν, στο έργο μας, Κ. Ζαμπάκας, Ει.-Χ. Δροσινού, Ν.-Φ. Αγραφιώτη, Γ. Ζαμπέτογλου, Δ. Δημάκας, Θ. Κατσαρός, Φ. Καλύβα, Δ. Μπαρμπάκας, Α. Βαχτσεβάνου, Ι. Τρίγκας, Β. Ζησοπούλου, Γ. Τρακάλα, Μ. Γιαννούλα, Π. Ζησόπουλος, Δ. Λιόβας, Χ. Πολύζος, Ι. Κατσής, Μ. Πουρνάρας, Ό. Κούρτογλου, Χ.Χ. Βαμβούρη-Δημάκη, Ευ. Μιμηλίδου, Ζ. Ζήκος, Α. Αργύρη, Γ. Κυρίτσης κ.ά.) δείχνουν τα εξής: Η αναγνωριστική των συναισθημάτων ικανότητα είναι, γενικά, καλή, σε βαθμό συγκρίσιμο, ενδοομαδικά και διομαδικά, επιδεινούμενη, παρά την (προοδευτική) ευχέρεια (αληθούς) αναγνώρισης, που προέρχεται από την εξάσκηση, όσο μικραίνει ο χρόνος προβολής και λιγοστεύει ο (διαθέσιμος) χρόνος της αναγνώρισης, αυτής. Η αναγνωριστική των συναισθημάτων ικανότητα, στην (γρήγορη) προβολή των εικόνων, είναι, γενικά, φτωχή, όχι, όμως, σε βαθμό μη συγκρίσιμο, με ό,τι στην αργή. Στην πρώτη περίπτωση, γενικά, δεν βλέπουμε (πολύ) διαφορετικά συναισθήματα, στο πρόσωπο, απ' ό,τι στην δεύτερη, στην οποία κάνουμε τις περισσότερες αναγνωρίσεις

συναισθημάτων, με βαθμολογία, συνήθως, πιο χαμηλή, από την βαθμολογία στην πρώτη. Η διαφορά, με τις γυναίκες να υπερέχουν, στην αναγνώριση συναισθημάτων, στην δεύτερη προβολή, στην πρώτη, φαίνεται να μην υφίσταται. Στις μονοσήμαντες εκφράσεις, τα καταφέρνουμε καλύτερα. Γενικά, η ικανότητα αναγνώρισης συναισθημάτων είναι καλύτερη στην δεύτερη περίπτωση, ειδικά στις γυναίκες. Στην πρώτη περίπτωση, ίσως, δυσκολευόμαστε, στην αναγνώριση, ’μπροστά σε πολυσήμαντες, κυρίως, εκφράσεις, που επιφέρουν σύγχυση, λόγω του όγκου των εκείθεν πληροφοριών. Οι άνθρωποι, γενικά, δεν βλέπουν (πολύ) διαφορετικά συναισθήματα, στο πρόσωπο, ακόμα και όταν πρόκειται για διαφορετικό φύλο. Χωρίς το άγχος της γρήγορης διαδικασίας, κάνουμε τις περισσότερες αναγνωρίσεις (που σημαίνει, αυτό, αληθείς αναγνωρίσεις) συναισθημάτων, ενώ, με αυτό, η βαθμολογία, που δίνουμε, στα συναισθήματα, που αναγνωρίζουμε, είναι, συνήθως, πιο υψηλή, από την βαθμολογία, που δίνουμε, χωρίς αυτό. Η διαφορά, με τις γυναίκες να υπερέχουν, στην αναγνώριση (που δεν γίνεται, παρά να είναι και αληθής) συναισθημάτων, από τους άνδρες, χωρίς αυτό, το άγχος, με αυτό, το άγχος, φαίνεται να μην υπάρχει, ουσιωδώς (βλ., και Frieze and Ramsey, 1976). Στην περίπτωση της γρήγορης διαδικασίας, με το άγχος, που υφέρπει, σε αυτή, στις μονοσήμαντες εκφράσεις, τα καταφέρνουμε καλύτερα, απ’ ό,τι στις πολυσήμαντες, όπως, βέβαια, και στην αργότερη διαδικασία, χωρίς το άγχος αυτό. Γενικά, η ικανότητα αναγνώρισης συναισθημάτων είναι καλύτερη, χωρίς το άγχος της γρήγορης διαδικασίας, ειδικά, στις γυναίκες. Με το άγχος σπουδής, να προσλάβουμε, να διευθετήσουμε και να ερμηνεύσουμε, μέσα σε ελάχιστο (διαθέσιμο) χρόνο, ένα (μεγάλο) όγκο πληροφοριών, ο εγκέφαλός μας πέφτει σε σύγχυση, πράγμα, που μας δυσκολεύει, στην αναγνώριση του μηνύματος, που μας εκπέμπεται, συνεπαγόμενης (πόσο, μάλλον, αν πρόκειται, όχι για στατικές, αλλά εικόνες σε κίνηση) λάθος εκτιμήσεις.

Εικόνα 1
Φυσιολογική διάσπαση εικόνας, στο μυαλό ενός ψυχωσικού, που δυσκολεύεται να αντιληφθεί το πρόσωπο ως ένα όλον



ΣΥΜΠΕΡΑΣΜΑΤΑ

Σήμερα, μπορούμε να καταλάβουμε, πιο εύκολα, τι επιπτώσεις μπορεί να έχει η υπερβολική δόση πληροφοριών, στον εγκέφαλο και στην υγεία, γενικότερα, η οποία, με την «εσωτερικοποίησή» τους, φαίνεται να βλάπτεται, κάποτε, σοβαρά (Lewis, 1996). Για τους ανθρώπους που εργάζονται σε ένα γραφείο, το θέαμα ενός γραφείου γεμάτου, από στοίβες χαρτιών και φακέλων, είναι συνηθισμένο φαινόμενο, ακόμα και όταν υπάρχει ο ηλεκτρονικός υπολογιστής και

η δυνατότητα πρόσβασης στις σελίδες Internet (Dimoulas, 1999). Ο σωρός αυτός των χαρτιών είναι, συνήθως, γεμάτος πληροφορίες (αριθμοί, διαγράμματα, άλλα στοιχεία, κείμενα, παραπομπές, κ.λπ.) (Lewis, 1996). Τις πιο πολλές φορές, ο όγκος των πληροφοριών είναι δυσανάλογος με τον χρόνο, που μπορεί να διαθέσει κάποιος, για να τις εκμεταλλευτεί, στην εργασία του (Dimoulas, 1999). Έτσι κι αλλιώς, πάντα θα υπάρχει πρόβλημα επιλογής μεταξύ τους (Matsatsinis, 2010). Κάποτε, απ' όλες, αυτές, τις πληροφορίες, λίγες είναι οι (πραγματικά) χρήσιμες, για την ώρα και την ανάγκη, που εμείς τις χρειαζόμαστε (Dimoulas, 1999). Προκύπτει θέμα προτεραιοτήτων, στη χρήση των πληροφοριών αυτών, κι αυτό θα πρέπει να λυθεί, τις πιο πολλές φορές σύντομα, αν όχι άμεσα (Matsatsinis, 2010). Η ένταση, πάνω σ' αυτή την ενέργεια, καθώς το άτομο είναι αδύνατο να θυμάται, όλες, αυτές, τις πληροφορίες και καθώς (πολύ) λιγότερες είναι αυτές που θα μπορούσε, μέσα σε (τόσο) λίγο χρόνο και κάτω από (τέτοια) πίεση, να αφομοιώσει, έχει, συχνά, αρνητικές επιπτώσεις, στην ψυχολογία του ατόμου (Obermeier and Barron, 1987). Βεβαίως, η γνώση είναι δύναμη (βλ., Vlachavas, 2013; Vlachakis, 2017; Georgoulis, 2015; Graham, 2004; Zacharakis, 2001; Iliadis & Papaleonidas, 2016; Howard and Ruder, 2018; Kissinger, 2002; Papakonstantinou, 2020; Pontikas, 2025), αλλά αυτό δεν ισχύει για την (τέτοια) χρησιμοποίηση των πληροφοριών, αφού το να λαμβάνεις, καθημερινά, τόσο (μεγάλο) όγκο πληροφοριών, όταν, μάλιστα, είσαι υποχρεωμένος να πάρεις, βασισμένος, σε αυτές, μια (σωστή) απόφαση, εμπεριέχει τους ίδιους κινδύνους με το να είσαι απληροφόρητος (Dimoulas, 1999; βλ., και Fanara, 2002).

Πράγματι, τα περισσότερα (διευθυντικά) στελέχη επιχειρήσεων (γιατροί, δικηγόροι, δάσκαλοι και άλλοι επαγγελματίες) δείχνουν να υποφέρουν, σήμερα, από «υπερκορεσμό πληροφοριών και δεδομένων» (Dimoulas et al, 2019; 2020). Οι ψυχολόγοι, ήδη, κάνουν λόγο, για την εμφάνιση μιας, νέας, «ασθένειας» των καιρών μας, με συμπτώματα την νευρικότητα και το αίσθημα της μοναξιάς και της ανασφάλειας, δείγματα, ότι το άτομο βρίσκεται σε (έντονη) κατάσταση άγχους (Lewis, 1996). Πολύ σύντομα, θα καθιερωθεί στην ιατρική διάλεκτο ο όρος «πληροφοριακή κόπωση» (Dimoulas, 1999; Dimoulas et al, 2004; 2010; 2019; 2020). Μεταξύ των άλλων προβλημάτων, ο συνδυασμός τόσων, πολλών, πληροφοριών και παραμέτρων οδηγεί σε αδιέξοδο την όποια ανάλυση (βλ., Albert and Kaplan, 1979; Fried et al., 1982) και δυσχεραίνει την επιλογή τών (σωστών) λύσεων και αποφάσεων (Matsatsinis, 2010). Οι πληροφορίες έχουν, σαφώς, ως (βασικό) στόχο τους, την επιτάχυνση της ροής της εργασίας μας, αλλά, όπως και όλα τα πράγματα που χορηγούνται χωρίς όριο, έχουν αρχίσει να προκαλούν, αρνητικές, συνέπειες, στην ψυχική υγεία στελεχών και εργαζομένων, κάθε (σχεδόν) επαγγέλματος, όλων (σχεδόν) των βαθμίδων (Δημουλάς, 1999; Dimoulas et al, 2019; 2020). Η καθημερινή λήψη και χρήση τόσον (μεγάλου) όγκου πληροφοριών έχει καταστρέψει τις (προσωπικές) σχέσεις, με την αύξηση των διενέξεων, με συναδέλφους, και διαβρώσει την όποια ικανοποίηση θα μπορούσαν να έχουν, από την εργασία τους, των δύο τρίτων δείγματος 1300 εργαζομένων, όλων των βαθμίδων, διάφορων κλάδων, στην Βρετανία, τις Η.Π.Α., την Αυστραλία, την Σιγκαπούρη και το Χονγκ-Κονγκ, με το ένα τρίτο του να δηλώνει, ότι υποφέρει από προβλήματα υγείας, που σχετίζονται, άμεσα, με την υπερπληθώρα των πληροφοριών, ενώ ποσοστό μεγαλύτερο του 40% συμφωνεί, ότι η κατάσταση, στην οποία έχει περιέλθει, ήταν η αιτία, για την καθυστέρηση, στην λήψη, σημαντικών και σωστών, αποφάσεων, λόγω του όγκου των πληροφοριών, στον οποίο, συχνά, οφειλόταν και η (λανθασμένη) εκτίμησή τους (Dimoulas, 1999; Dimoulas et al, 2019; 2020; 2024a; 2024b; Lewis, 1996).

Εικόνα 2
Η αντίληψη του προσώπου υπό την επήρρεια παραισθησιογόνων



Το «άγχος των πληροφοριών» επηρεάζει, κυρίως, τα άτομα που ασχολούνται με (μεγάλο) όγκο δεδομένων και πρέπει, μέσα σε λίγο χρόνο, να λάβουν, σημαντικές, αποφάσεις (Matsatsinis, 2010). Στην δικηγορία, αλλά και αλλού, αυτό συμβαίνει, συχνά: όταν η μια πλευρά ζητάει μια πληροφορία, η άλλη της δίνει σωρεία, μη ουσιαστικών, πληροφοριών ή, ακόμα και άχρηστων, στοιχείων, καλύπτοντας, έτσι, την μη παροχή πληροφοριών ακριβείας, που ζητάει εκείνη (Dimoulas, 1999). Στην περίπτωσή μας, την αναγνώριση των συναισθημάτων, στο πρόσωπο, το ανθρώπινο σώμα (πρωτίστως, ο εγκέφαλος) αρχίζει να αντιδρά, δείχνοντας σημεία έκτακτης λειτουργίας (ένστικτο αυτοσυντήρησης) (βλ.,

Obermeier et Barron, 1987). Η απόδοση, έτσι, του ατόμου, στις όποιες δραστηριότητές του, μειώνεται. Τα λανθασμένα συμπεράσματα οδηγούν σε λανθασμένες αποφάσεις. Με τον καταιγισμό των πληροφοριών, ιδίως στις πολυσήμαντες εκφράσεις, ο εγκέφαλος έρχεται σε κατάσταση σύγχυσης (Dimoulas et al, 2024a; 2024b; 2024c; 2024d), όπως στο μυαλό ενός ψυχωσικού ή υπό την επήρρεια παραισθησιογόνων (Dimoulas et al, 2004; 2010). Με τον εγκέφαλο σε μια τέτοια κατάσταση, το άτομο, ακόμα και χωρίς, άλλα, προβλήματα (βλ., Borod et al., 1986; Cicone et al., 1980; De Renzi and Spinnler, 1966; Dimoulas, 1999; 2009; Dimoulas et al, 2017; Gardner et al., 1975; Gessler et al., 1989), περιέρχεται σε δύσκολη θέση. Σε καταστάσεις ανάγκης, όπως αυτές που αντιμετωπίζουν πιλότοι ή χειρουργοί, αλλ' ακόμα και όταν η εργασία του ατόμου δεν έχει να κάνει άμεσα με ανθρώπινες ζωές, η επιρρέπεια στο λάθος αυξάνεται. Οι αναλυτές, που δέχονται, καθημερινά, τεράστιο όγκο πληροφοριών και αντιμετωπίζουν μια συνεχή ευμεταβλητότητα στη συνολική εικόνα, που διαμορφώνουν, πάνω σε ένα συγκεκριμένο θέμα, πάσχουν από αυξανόμενη ανασφάλεια για την ορθότητα της πρόβλεψης και τη λήψη αποφάσεων, με συνέπεια, συχνά, να αρνούνται, εν τέλει, να πάρουν μια, την όποια, απόφαση.

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ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΓΙΑ ΑΞΙΟΠΟΙΗΣΗ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ

Ειρήνη Καραβίτη
Εκπαιδευτικός ΠΕ79.01, Μουσικός, Διευθύντρια Γυμνασίου-Λυκειακών Τάξεων Χαλανδρίτσας Αχαΐας
Πάτρα Αχαΐας, Ελλάδα
email: renakaraviti@gmail.com

Νεκταρία Κουτσοπούλου
Εκπαιδευτικός ΠΕ06, Αγγλικής Γλώσσας, Διευθύντρια Γυμνασίου-Λυκειακών Τάξεων Φαρών Αχαΐας
Πάτρα Αχαΐας, Ελλάδα
email: riaki1981@yahoo.gr

ΠΕΡΙΛΗΨΗ

Θέμα της εργασίας αυτής είναι η παρουσίαση πέντε καινοτόμων web 2.0 εργαλείων που διαθέτουν τα εξής χαρακτηριστικά: είναι πανεύκολα στη χρήση και δεν απαιτούν ειδικές ψηφιακές δεξιότητες, παρέχονται εντελώς δωρεάν ή διαθέτουν δωρεάν έκδοση με μεγάλο εύρος δυνατοτήτων για το χρήστη και εξάπτουν το ενδιαφέρον, πράγμα που τα καθιστά κατάλληλα για ενσωμάτωση στη μαθησιακή διαδικασία. Ως εκπαιδευτικοί που αγαπούν το λειτούργημά τους και που διαρκώς στοχεύουν στη βελτίωση της ποιότητας της διδασκαλίας τους και στον εμπλουτισμό της με νέα μέσα και σύγχρονες διδακτικές μεθόδους, αναζητούμε εύχρηστα εργαλεία ώστε να δημιουργούμε κουίζ, ασκήσεις, παρουσιάσεις, νέα κειμενικά είδη και γενικά διδακτικό υλικό για τη σχολική μας τάξη. Ως εκ τούτου παρακολουθούμε διάφορα σεμινάρια και επιμορφώσεις που άπτονται των εκπαιδευτικών θεμάτων. Ανάμεσά τους ξεχωρίζουμε τα σεμινάρια etwinning, όπου παρουσιάζονται μεταξύ άλλων σύγχρονα εργαλεία για να αξιοποιηθούν ποικιλοτρόπως στη μαθησιακή διαδικασία.

Έχουμε χρησιμοποιήσει αρκετά από αυτά στα μαθήματά μας και κάποια από αυτά τα έχουμε ξεχωρίσει ιδιαίτερα για τα χαρακτηριστικά τους αλλά και για την πολύπλευρη παιδαγωγική τους αξιοποίηση στη μαθησιακή διαδικασία. Πρόκειται για το EDpuzzle, το Book Creator, το Quizziz, το Wordwall και το Artsteps. Στην εργασία μας ασχολούμαστε ξεχωριστά με καθένα από τα εργαλεία και επεξηγούμε με παραδείγματα και εικόνες πόσο εύκολη είναι η χρήση τους και πώς μπορούν να βρουν αποτελεσματική εφαρμογή στη μαθησιακή διαδικασία. Τονίζουμε τα βασικά τους χαρακτηριστικά και σχολιάζουμε πώς αξιοποιούνται παιδαγωγικά.

Λέξεις – κλειδιά: κουίζ, πολυμέσα, ψηφιακός εμπλουτισμός

ΕΙΣΑΓΩΓΗ

Η εξοικείωση της νεολαίας με τη σύγχρονη τεχνολογία κάνει επιτακτική την ανάγκη να συμπεριληφθούν οι ΤΠΕ (Τεχνολογίες Πληροφορίας και Επικοινωνίας) και στη μαθησιακή διαδικασία, ώστε να διευκολύνουν την επικοινωνία των εκπαιδευτικών με τους/τις μαθητές/τριες και ταυτόχρονα να αποβούν το έναυσμα για δραστηριοποίηση και συμμετοχή των τελευταίων στα διδακτικά αντικείμενα. Εντούτοις, υπάρχουν ακόμα πολλοί/ές εκπαιδευτικοί που είναι διστακτικοί/ές στο να συμπεριλάβουν τις ΤΠΕ στη διδασκαλία τους (Politis et al, 2000). Στη Διακήρυξη της Λισσαβόνας το 2000 διατυπώθηκε η ανάγκη ενσωμάτωσης της τεχνολογίας στην εκπαίδευση σε όλες τις χώρες της Ευρωπαϊκής Ένωσης. Έγκειται στον/στην κάθε εκπαιδευτικό ως σύγχρονος/η παιδαγωγός να προσαρμόσει τη διδασκαλία του/της στις εκπαιδευτικές προσκλήσεις του 21ου αιώνα, ώστε να καταστεί πιο αποδοτική και αποτελεσματική η διδασκαλία του/της. Η διδακτική διαδικασία και συγκεκριμένα η ποιότητα της διδασκαλίας επηρεάζει τη γνωστική και την ανάπτυξη των μαθητών/τριών σε μεγαλύτερο βαθμό από την εκπαιδευτική κουλτούρα της σχολικής μονάδας (Kyriakides, Creemers & Antoniou, 2009). Ο/Η σύγχρονος/η μαθητής/μαθήτρια είναι οπτικά μαθητευόμενος/μενη, χρησιμοποιεί τις τεχνολογίες της πληροφορίας και των επικοινωνιών, αναλύει τις πληροφορίες και παράγει περιεχόμενα (Hirsh-Pasek et al., 2015). Επίσης με τη χρήση ΤΠΕ ενθαρρύνεται η συνεργατική μάθηση με παιγνιώδη τρόπο, επιτυγχάνεται ο ψηφιακός γραμματισμός του μαθητικού δυναμικού, ενώ μετασχηματίζεται και ο ρόλος του εκπαιδευτικού, καθώς μέσω των ΤΠΕ καλείται να βοηθήσει τους/τις μαθητές/τριες στην απόκτηση, αξιοποίηση, αξιολόγηση και αποθήκευση πληροφοριών.

Είναι φανερό ότι ο/η εκπαιδευτικός οφείλει να προσαρμοστεί στα νέα δεδομένα και να αναπροσαρμόσει τις διδακτικές μεθόδους ενσωματώνοντας τις ΤΠΕ όπου κρίνει εφικτό. Η εν λόγω εργασία έχει στόχο να παρουσιάσει πέντε ψηφιακά εργαλεία με τα οποία οι εκπαιδευτικοί μπορούν να ετοιμάσουν δραστηριότητες με γρήγορο, έξυπνο, παιγνιώδη και πρακτικό τρόπο. Επιπροσθέτως, μπορούν να αναθέσουν στους μαθητές να ετοιμάσουν οι ίδιοι δραστηριότητες ακολουθώντας τα προσφερόμενα πρότυπα, εμπλέκοντάς τους δημιουργικά, βάσει της μεθοδολογίας Project Based Learning (Μάθηση μέσω Πρότζεκτ). Είναι κοινά παραδεκτή η σημασία που έχει το παιχνίδι στη μάθηση, αφού μπορεί να συζευχθεί αρμονικά, πολυδιάστατα και σε πολλά επίπεδα, η διδασκαλία και η μάθηση μέσα από το παιχνίδι (Πατσιομίτου, 2016). Η μάθηση μέσω πρότζεκτ θεωρείται ότι συνδέει το βιωματικό χαρακτήρα της μάθησης με την «παιδοκεντρικότητα, την αυτενέργεια, την εποπτεία, την εργασία κατά ομάδες, τη διαθεματικότητα, την καλλιέργεια διαπροσωπικών σχέσεων δασκάλου-μαθητών και μαθητών μεταξύ τους» (Κόπτσης, 2009).

Στην εργασία μας παρουσιάζονται πέντε ψηφιακά εργαλεία που ενστερνίζονται την Μάθηση μέσω Πρότζεκτ και αποτελούν χρήσιμο βοηθό στα χέρια ενός εκπαιδευτικού που επιθυμεί να εμπλέξει ενεργά και με παιγνιώδη τρόπο τους μαθητές του στη μαθησιακή διαδικασία. Πρόκειται για τα EDpuzzle, Book Creator, Quizziz, Wordwall και Artsteps.

EDpuzzle

Το EDpuzzle, είναι μια διαδικτυακή εφαρμογή επεξεργασίας βίντεο είτε δικών μας (από τον υπολογιστή μας) είτε από τις διάσημες διαδικτυακές πλατφόρμες (Youtube, Vimeo, κ.α.). Υπάρχει η απλή έκδοση (Basic) που διατίθεται δωρεάν, ενώ με χρέωση είναι η Pro Teacher και η Schools & Districts. Το Edpuzzle μας δίνει τη δυνατότητα να κόψουμε κάποιο κομμάτι του βίντεο, να προσθέσουμε το δικό μας ήχο, να σχολιάσουμε φωνητικά σε οποιοδήποτε σημείο του και να δημιουργήσουμε διαδραστικά quiz σε οποιοδήποτε σημείο. Ο εκπαιδευτικός μπορεί να διαλέξει ένα βίντεο από τη βιβλιοθήκη του Edpuzzle ή να ανεβάσει το δικό του. Μπορεί να ενσωματώσει:

- Ερωτήσεις (πολλαπλής επιλογής ή ανοιχτού τύπου)
- Σχόλια και επεξηγήσεις
- Ηχητικά ή γραπτά μηνύματα για καθοδήγηση

Οι μαθητές παρακολουθούν το βίντεο και απαντούν στις ερωτήσεις. Ο εκπαιδευτικός μπορεί να παρακολουθεί την πρόοδό τους και να βλέπει τις απαντήσεις τους. Παρέχεται επίσης στατιστική ανάλυση της προόδου των μαθητών, βοηθώντας τον εκπαιδευτικό να εντοπίσει δυσκολίες.

Παιδαγωγική Αξιοποίηση στην τάξη:

Το Edpuzzle μπορεί να αξιοποιηθεί σε διάφορες διδακτικές πρακτικές:

- **Ανεστραμμένη τάξη (Flipped Classroom)**: Οι μαθητές παρακολουθούν το εκπαιδευτικό υλικό στο σπίτι και έρχονται στην τάξη έτοιμοι για συζήτηση και δραστηριότητες.
- **Διαφοροποιημένη διδασκαλία**: Προσαρμογή του περιεχομένου στις ανάγκες κάθε μαθητή.
- **Αξιολόγηση της κατανόησης**: Οι ερωτήσεις στο βίντεο βοηθούν στον έλεγχο της κατανόησης σε πραγματικό χρόνο.
- **Ενεργή μάθηση**: Οι μαθητές δεν είναι παθητικοί θεατές αλλά αλληλεπιδρούν με το περιεχόμενο.
- **Εξατομικευμένη μάθηση**: Οι μαθητές μπορούν να βλέπουν το υλικό με τον δικό τους ρυθμό.

Το Edpuzzle προσφέρει μια μοναδική ευκαιρία στους εκπαιδευτικοί να μετατρέψουν μια παθητική παρακολούθηση βίντεο σε μια ενεργητική μαθησιακή εμπειρία ενσωματώνοντας ερωτήσεις και καταγράφοντας την πρόοδο των μαθητών. (Castro, S., & Silva, A. (2020), *Integrating Edpuzzle in higher education to support flipped classrooms: A case study*. *Educational Technology & Society*, 23(1), 98-109).

Book Creator

Το Book Creator είναι ένα ψηφιακό εργαλείο που επιτρέπει τη δημιουργία διαδραστικών ηλεκτρονικών βιβλίων (ebooks). Οι χρήστες μπορούν να προσθέσουν κείμενο, εικόνες, ήχο, βίντεο, ακόμα και σχέδια, δημιουργώντας πλούσιο και δυναμικό εκπαιδευτικό περιεχόμενο. Είναι εύκολο στη χρήση και λειτουργεί τόσο σε tablets όσο και σε υπολογιστές μέσω διαδικτυακής εφαρμογής. Υποστηρίζει τη διαφοροποιημένη διδασκαλία και ενισχύει τη δημιουργικότητα των μαθητών. Ο χρήστης δημιουργεί ένα βιβλίο επιλέγοντας έναν τύπο βιβλίου (π.χ., κόμικ, βιβλίο με εικόνες, παραμύθι). Στη συνέχεια, προσθέτει περιεχόμενο έχοντας να επιλέξει μεταξύ των: κείμενο, σχέδια και εικόνες (εισαγωγή ή δημιουργία), ήχο (ηχογράφηση φωνής) και βίντεο (ενσωμάτωση ή εγγραφή). Το βιβλίο μπορεί να αποθηκευτεί, να εξαχθεί σε μορφή PDF/ePub ή να μοιραστεί με άλλους ενώ οι μαθητές μπορούν να δουλέψουν ομαδικά πάνω στο ίδιο βιβλίο.

Παιδαγωγική Αξιοποίηση στην τάξη:

Το Book Creator μπορεί να χρησιμοποιηθεί σε όλες τις βαθμίδες εκπαίδευσης και σε διάφορα γνωστικά αντικείμενα:

- **Γλώσσα & Λογοτεχνία**: Δημιουργία ιστοριών, ποιημάτων, λογοτεχνικών αναλύσεων.
  Ιστορία: Εικονογραφημένα χρονικά, βιογραφίες, ιστορικά γεγονότα.
  Φυσικές Επιστήμες: Εξηγήσεις φαινομένων με εικόνες και διαγράμματα.
- **Ειδική Αγωγή**: Διαδραστικά βιβλία με αφήγηση και προσαρμοσμένο περιεχόμενο για μαθητές με μαθησιακές δυσκολίες.
- **STEM/STEAM**: Συνδυασμός κειμένου, εικόνας και βίντεο για επεξήγηση τεχνολογικών ή επιστημονικών εννοιών.
- **Ανεστραμμένη τάξη**: Οι εκπαιδευτικοί δημιουργούν ψηφιακά βιβλία ως εκπαιδευτικό υλικό για μελέτη στο σπίτι.

Το Book Creator μπορεί να χρησιμοποιηθεί σε όλες τις βαθμίδες εκπαίδευσης και σε διάφορα γνωστικά αντικείμενα. Ενισχύει τη δημιουργικότητα των μαθητών και προωθεί τη συνεργατική μάθηση, καθιστώντας το μια εξαιρετική επιλογή για την εκπαίδευση! «Τα εργαλεία ψηφιακής αφήγησης όπως το Book Creator επιτρέπουν στους μαθητές να εμπλακούν με το μαθησιακό περιεχόμενο με διαδραστικό και δημιουργικό τρόπο, καλλιεργώντας μια βαθύτερη κατανόηση μέσω της αυτοέκφρασης» **(**McVerry, J. G., & McVerry, M. (2017). *Exploring the use of Book Creator as an instructional tool*. *Journal of Educational Technology Systems*, 45(1), 24-36).

Quizziz

Το Quizizz είναι ένα ψηφιακό εργαλείο δημιουργίας κουίζ και διαδραστικών δραστηριοτήτων που υποστηρίζει τη μάθηση με παιγνιώδη τρόπο. Οι εκπαιδευτικοί μπορούν να δημιουργήσουν ή να επιλέξουν έτοιμα κουίζ, ενώ οι μαθητές συμμετέχουν είτε ατομικά είτε ομαδικά, αποκτώντας άμεση ανατροφοδότηση. Στο quizziz οι μαθητές απαντούν σε ερωτήσεις με **παιχνιδοποιημένα στοιχεία** (πόντοι, χρονόμετρο, leaderboard), γεγονός που ενισχύει το ενδιαφέρον και την ενεργή συμμετοχή τους. Το Quizizz διατίθεται μέσω ιστοσελίδας και εφαρμογής, επιτρέποντας τη χρήση του σε κάθε συσκευή. Το Quizizz ενσωματώνει τεχνητή νοημοσύνη (AI) για να βελτιώσει την εμπειρία μάθησης και τη διαδικασία αξιολόγησης παρέχοντας αυτόματη δημιουργία ερωτήσεων (με χρήση AI, το Quizizz μπορεί να δημιουργήσει ερωτήσεις με βάση ένα κείμενο ή θέμα, διευκολύνοντας τους εκπαιδευτικούς), προσαρμοσμένη μάθηση (αναλύει τις επιδόσεις των μαθητών και προτείνει στοχευμένες ερωτήσεις για ενίσχυση των αδύναμων σημείων), έξυπνη ανατροφοδότηση (παρέχει στους μαθητές εξατομικευμένες επεξηγήσεις και καθοδήγηση με βάση τις απαντήσεις τους) και αυτόματη αξιολόγηση και ανάλυση δεδομένων (οι εκπαιδευτικοί λαμβάνουν αναλυτικά στατιστικά για την πρόοδο των μαθητών και μπορούν να προσαρμόσουν τη διδασκαλία τους ανάλογα).

Το Quizizz μετατρέπει την αξιολόγηση σε ένα δυναμικό και διασκεδαστικό εργαλείο μάθησης, ενισχύοντας τη συμμετοχή των μαθητών. Το Quizizz επιτρέπει στους μαθητές να εμπλακούν σε πραγματικού χρόνου διαμορφωτική αξιολόγηση, ενθαρρύνοντας την ενεργή συμμετοχή και παρέχοντας άμεση ανατροφοδότηση, που υποστηρίζει τη βαθύτερη κατανόηση της ύλης» (Wills, G., & Foster, D. (2018). *The effectiveness of Quizizz in promoting active learning in secondary education*. *Journal of Educational Technology & Society*, 21(1), 116-128).

Παιδαγωγική Αξιοποίηση στην τάξη:

Το quizziz μπορεί να αξιοποιηθεί παιδαγωγικά στην τάξη με πολλούς τρόπους:

- **-Διαμορφωτική αξιολόγηση**

Οι εκπαιδευτικοί μπορούν να χρησιμοποιήσουν το Quizizz για:

- ◇ Έλεγχο κατανόησης μετά από ένα μάθημα.
- ◇ Αξιολόγηση πρότερων γνώσεων πριν από ένα νέο θέμα.
- ◇ Παροχή ανατροφοδότησης στους μαθητές σε πραγματικό χρόνο.

- **-Ενεργή και διαφοροποιημένη μάθηση**

- ◇ Οι μαθητές μπορούν να απαντούν με τον δικό τους ρυθμό, χωρίς πίεση.
- ◇ Δίνεται δυνατότητα επανάληψης του quiz για βελτίωση της επίδοσης.
- ◇ Οι εκπαιδευτικοί μπορούν να προσαρμόσουν τα ερωτηματολόγια στις ανάγκες των μαθητών.

- **-Ανεστραμμένη τάξη & εξ αποστάσεως εκπαίδευση**

- ◇ Οι εκπαιδευτικοί μπορούν να αναθέσουν quiz ως εργασία για το σπίτι.
- ◇ Οι μαθητές δουλεύουν ατομικά, ενώ ο εκπαιδευτικός βλέπει τα αποτελέσματα και προσαρμόζει τη διδασκαλία.

- **-Παιχνιδοποίηση & Κίνητρο**

- ◇ Το Quizizz ενσωματώνει πόντους, leaderboard, memes και ήχους, κάνοντας τη μάθηση πιο διασκεδαστική. Οι μαθητές είναι πιο ενεργοί και ανταποκρίνονται θετικά στη διαδικασία αξιολόγησης.

Wordwall

Πρόκειται για μία διαδικτυακή εφαρμογή που μπορεί να χρησιμοποιηθεί για τη δημιουργία διαδραστικών και εκτυπώσιμων δραστηριοτήτων. Τα περισσότερα πρότυπα είναι διαθέσιμα τόσο σε διαδραστική όσο και σε εκτυπώσιμη έκδοση.

Τα διαδραστικά παιχνίδια που ετοιμάζουμε στο wordwall αναπαράγονται σε οποιαδήποτε συσκευή με δυνατότητα Web, δηλαδή σε έναν υπολογιστή, tablet, τηλέφωνο ή διαδραστικό πίνακα. Μπορούν να αναπαραχθούν μεμονωμένα από τους μαθητές, ή να γίνουν ομαδικά μέσα στην τάξη με την καθοδήγηση του εκπαιδευτικού.Τα εκτυπώσιμα παιχνίδια μπορούν να εκτυπωθούν απευθείας ή να ληφθούν ως αρχείο PDF. Μπορούν να χρησιμοποιηθούν μαζί με τις διαδραστικές δραστηριότητες ή ως αυτόνομες δραστηριότητες. Οι δραστηριότητες δημιουργούνται με τη χρήση ενός συστήματος προτύπων.Αφού δημιουργήσουμε μια δραστηριότητα, μπορούμε να την αλλάξουμε σε διαφορετικό πρότυπο με ένα μόνο κλικ. Αυτό μας εξοικονομεί χρόνο και είναι εξαιρετικό για διαφοροποίηση και ενίσχυση. Οι διαδραστικές δραστηριότητες μπορούν να παρουσιαστούν σε διαφορετικά θέματα. Κάθε θέμα αλλάζει την εμφάνιση με διαφορετικά γραφικά, γραμματοσειρές και ήχους. Στη δωρεάν έκδοση μπορούμε να δημιουργήσουμε μέχρι 5 δραστηριότητες σε κάθε λογαριασμό. Καθώς δημιουργούνται πάρα πολύ εύκολα δεν είναι και τόσος κόπος να σβήνουμε κάποιες από αυτές προκειμένου να δημιουργήσουμε μία καινούρια. Ο άλλος τρόπος είναι να ανοίξουμε και δεύτερο λογαριασμό με άλλο mail, ώστε να έχουμε τη δυνατότητα δημιουργίας ακόμα 5 δραστηριοτήτων. Κάθε δραστηριότητα που δημιουργείται μπορεί να μετατραπεί σε δημόσια. Με αυτόν τον τρόπο μπορεί να διαμοιραστεί στα μέσα κοινωνικής δικτύωσης ή μέσω άλλων μέσων. Στο κάτω μέρος της δραστηριότητας, στη μέση, μπορούμε να δούμε πόσες φορές έχει η δραστηριότητα χρησιμοποιηθεί. Επίσης μπορεί να καταχωρήσει κάποιος το όνομά του και να εισαχθεί στην top5 κατάταξη της δραστηριότητας. Γι' αυτόν τον λόγο οι μαθητές παίζουν ξανά και ξανά ώστε να βελτιώσουν τις επιδόσεις τους. Οι δραστηριότητες του Wordwall μπορούν να τοποθετηθούν σε άλλους ιστότοπους χρησιμοποιώντας αποσπάσματα κώδικα HTML.

Παιδαγωγική Αξιοποίηση στην τάξη:

Το Wordwall μπορεί να αξιοποιηθεί ποικιλοτρόπως στη διδακτική πράξη.

- **-Διαμορφωτική αξιολόγηση & Επανάληψη γνώσεων**

- ◇ Οι εκπαιδευτικοί μπορούν να δημιουργούν κουίζ, παιχνίδια αντιστοίχισης και αναγραμματισμούς για να ελέγχουν την κατανόηση των μαθητών.
- ◇ Τα διαδραστικά στοιχεία ενισχύουν τη μνήμη και την επανάληψη με πιο διασκεδαστικό τρόπο.

- **-Διαφοροποιημένη διδασκαλία**
  - ◇ Οι δραστηριότητες του Wordwall μπορούν να προσαρμοστούν στις ανάγκες κάθε μαθητή.
  - ◇ Οι μαθητές επιλέγουν τον τρόπο που θα συμμετάσχουν (π.χ. παιχνίδι μνήμης, σταυρόλεξο, χρονόμετρο), ανάλογα με τον μαθησιακό τους ρυθμό.

- **-Ενίσχυση της ενεργής συμμετοχής**
  - ◇ Οι μαθητές δεν είναι απλοί παρατηρητές, αλλά συμμετέχουν **ενεργά** μέσω παιχνιδιών και προκλήσεων.
  - ◇ Δίνεται η δυνατότητα για **συνεργατική μάθηση**, καθώς μπορούν να παίξουν σε ομάδες ή να διαγωνιστούν μεταξύ τους.

- **-Χρήση σε διαφορετικά μαθήματα**

Το Wordwall μπορεί να αξιοποιηθεί σε διάφορα γνωστικά αντικείμενα, όπως:
Γλώσσα & Λογοτεχνία → Σχηματισμός προτάσεων, ορθογραφία, συνώνυμα-αντώνυμα.
Μαθηματικά → Αριθμητικά παιχνίδια, πράξεις, επίλυση προβλημάτων.
Ιστορία & Γεωγραφία → Χρονολογίες, τοποθεσίες, αντιστοίχιση γεγονότων.
Φυσικές Επιστήμες → Όροι και έννοιες, διαδικασίες, αναγραμματισμοί.

- **-Υποστήριξη της ανεστραμμένης τάξης & της εξ αποστάσεως εκπαίδευσης**
  - ◇ Οι μαθητές μπορούν να ολοκληρώσουν δραστηριότητες **από το σπίτι**, ενώ ο εκπαιδευτικός παρακολουθεί την πρόοδό τους. Μπορεί βέβαια να χρησιμοποιηθεί και **δια ζώσης** στην τάξη μέσω διαδραστικού πίνακα.

«Το Wordwall ενισχύει την κατάκτηση του λεξιλογίου και τη γλωσσική πρακτική μέσα από διαδραστικά παιχνίδια επιτρέποντας στους μαθητές να εμπλακούν ενεργά και ουσιαστικά στη μάθησή τους» **(**Cumming-Potvin, W., & Crozier, W. R. (2020). *Using Wordwall to create interactive learning activities in primary education: A case study*. *Educational Technology Research and Development*, 68(5), 2593-2610).

Artsteps

Το Artsteps είναι ένα ψηφιακό εργαλείο που επιτρέπει τη δημιουργία εικονικών εκθέσεων και μουσειακών χώρων σε τρισδιάστατο περιβάλλον (3D). Οι χρήστες μπορούν να σχεδιάσουν προσαρμοσμένες γκαλερί, να τοποθετήσουν έργα τέχνης, εικόνες, βίντεο και ήχο, δημιουργώντας μια διαδραστική εμπειρία. Η πλατφόρμα είναι διαθέσιμη διαδικτυακά και υποστηρίζει περιήγηση τόσο μέσω υπολογιστών όσο και μέσω VR τεχνολογιών για ακόμα πιο ρεαλιστική εμπειρία. Ο χρήστης δημιουργεί μια εικονική γκαλερί και σχεδιάζει έναν χώρο επιλέγοντας το μέγεθος και τη διαμόρφωση. Στη συνέχεια προσθέτει περιεχόμενο με την εισαγωγή εικόνας, κειμένου, βίντεο και ήχου για να εμπλουτίσει την έκθεση. Έχει τη δυνατότητα προσαρμογής του χώρου με την αλλαγή τοποθέτησης αντικειμένων, φωτισμού και σχεδίασης του χώρου. Τέλος, υπάρχει η επιλογή του διαμοιρασμού καθώς η έκθεση μπορεί να δημοσιευτεί και να κοινοποιηθεί σε άλλους, δίνοντας τη δυνατότητα περιήγησης σε VR ή μέσω υπολογιστή/κινητού.

Παιδαγωγική Αξιοποίηση στην τάξη:

Το Artsteps βρίσκει εφαρμογή σε πληθώρα διδακτικών αντικειμένων, όπου ο εκπαιδευτικός μπορεί να χρησιμοποιήσει το Artsteps για να δημιουργήσει εικονικά περιβάλλοντα μάθησης:

Ιστορία & Τέχνη
Δημιουργία εικονικών μουσείων και γκαλερί με έργα τέχνης, αρχαιολογικά εκθέματα ή ιστορικά γεγονότα.
Οι μαθητές μπορούν να δημιουργήσουν ένα εικονικό μουσείο με πίνακες ζωγραφικής ή γλυπτά και να το παρουσιάσουν στην τάξη.
Γλώσσα & Λογοτεχνία
Παρουσίαση λογοτεχνικών έργων και βιογραφιών συγγραφέων με διαδραστικό τρόπο.
Δημιουργία εικονικών αφηγήσεων, όπου οι μαθητές "περπατούν" σε έναν χώρο και διαβάζουν ή ακούν ιστορίες.
Φυσικές Επιστήμες & Γεωγραφία
Δημιουργία εκθέσεων για βιολογία, αστρονομία, γεωλογία με εικόνες και πληροφορίες.
Διαδραστικές παρουσιάσεις για οικοσυστήματα, φυσικά φαινόμενα ή πλανήτες.
Πολιτιστικά & Διαθεματικά Προγράμματα
Οι μαθητές μπορούν να συνεργαστούν για τη δημιουργία πολιτιστικών και διαπολιτισμικών εκθέσεων.
Παρουσίαση παραδόσεων, μουσικής, φορεσιών ή αρχιτεκτονικών δομών διαφορετικών χωρών.
Ανεστραμμένη τάξη & Εξ αποστάσεως εκπαίδευση

Οι μαθητές μπορούν να δημιουργήσουν ψηφιακές εκθέσεις στο σπίτι και να τις παρουσιάσουν στους συμμαθητές τους διαδικτυακά.

Με το να επιτρέπει στους χρήστες να δημιουργούν εικονικά μουσεία και εκθέσεις το Artsteps παρέχει ένα εμβυθιστικό περιβάλλον που ενισχύει την ιστορική και καλλιτεχνική κατανόηση, καλλιεργώντας κριτική σκέψη και δημιουργικότητα" (Harrison, S., & Wilkins, S. (2021). *Exploring virtual museum tools like Artsteps in enhancing historical learning experiences*. *Journal of Virtual Learning*, 17(1), 44-58.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η χρήση ψηφιακών εργαλείων στη διδακτική πράξη προσφέρει σημαντικά οφέλη, καθώς ενισχύει την αλληλεπίδραση των μαθητών με το περιεχόμενο, προάγει τη συνεργασία και την κριτική σκέψη, ενώ ταυτόχρονα εξασφαλίζει εξατομικευμένη μάθηση. Τα ψηφιακά εργαλεία διευκολύνουν την αναζήτηση και επεξεργασία πληροφοριών, ενώ προσφέρουν νέες δυνατότητες για δημιουργία και έκφραση. Επιπλέον, η αξιοποίηση τεχνολογικών εφαρμογών, όπως εκπαιδευτικά λογισμικά και πλατφόρμες, ενισχύει τη συμμετοχή των μαθητών, διατηρεί το ενδιαφέρον τους και επιτρέπει την παρακολούθηση της προόδου τους σε πραγματικό χρόνο. Κατά συνέπεια, τα ψηφιακά εργαλεία προσφέρουν προστιθέμενη αξία στη μαθησιακή διαδικασία, καθιστώντας την πιο αποτελεσματική, διαδραστική και προσαρμοσμένη στις ανάγκες του κάθε μαθητή. Τα εργαλεία που προτείνονται ανωτέρω είναι τα πλέον εύχρηστα για το λόγο αυτό προτείνεται η συχνή εφαρμογή τους και η ενσωμάτωσή τους στη διδακτική πράξη.

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Ηλεκτρονικές παραπομπές:

- https://seminars.etwinning.gr/
- https://edpuzzle.com/
- https://quizizz.com/
- https://wordwall.net/el
- https://bookcreator.com/

ΑΞΙΟΠΟΙΩΝΤΑΣ ΤΙΣ ΔΥΝΑΤΟΤΗΤΕΣ ΤΟΥ ΗΛΕΚΤΡΟΝΙΚΟΥ ΒΙΒΛΙΟΥ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΙΣΤΟΡΙΑΣ: ΜΙΑ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΓΙΑ ΤΗΝ Γ΄ ΓΥΜΝΑΣΙΟΥ

Λεύκα Βασιλική
Εκπαιδευτικός ΠΕ02
Γυμνάσιο Μπιζανίου
Ιωάννινα, Ελλάδα
email: vlefka@sch.gr

Τσιούρη Ευθυμία
Εκπαιδευτικός ΠΕ02
Γυμνάσιο Περάματος
Ιωάννινα, Ελλάδα
email: mtsiouri@sch.gr

ΠΕΡΙΛΗΨΗ

Στο σύγχρονο εκπαιδευτικό περιβάλλον, η ενσωμάτωση των ψηφιακών μέσων και εργαλείων στην διδακτική πράξη αναδεικνύεται ως κρίσιμος παράγοντας για την ενίσχυση της μαθησιακής εμπειρίας και την προώθηση της ενεργού μάθησης. Ιδιαίτερα για τη διδασκαλία του μαθήματος της ιστορίας, τα ηλεκτρονικά βιβλία (e-books) αποτελούν μια σύγχρονη και δυναμική μορφή ψηφιακού μέσου, η οποία μπορεί να αξιοποιηθεί αποτελεσματικά και να έχει πολλαπλά οφέλη μέσω του εμπλουτισμού του διδακτικού υλικού με πολυμεσικά στοιχεία, όπως η διαδραστικότητα, η ενίσχυση της μαθητοκεντρικής μάθησης, η προώθηση της διαφοροποιημένης διδασκαλίας και η ανάπτυξη ψηφιακών δεξιοτήτων στους μαθητές. Η παρούσα ανακοίνωση προτείνει ως καλή πρακτική αξιοποίησης των ψηφιακών μέσων στην εκπαιδευτική διαδικασία τη δημιουργία και χρήση ενός πρωτότυπου ηλεκτρονικού βιβλίου (e-book) για τη συνδυαστική διδασκαλία διαφόρων ενοτήτων της ιστορίας στην Γ΄ Γυμνασίου. Συγκεκριμένα, παρουσιάζεται η περίπτωση ενός ηλεκτρονικού βιβλίου που δημιουργήθηκε[1] με την πλατφόρμα Book Creator και έχει σχεδιαστεί ειδικά για να αποτελέσει εργαλείο για τη διδασκαλία των βασικότερων ιστορικών σταθμών της διαμόρφωσης των συνόρων του ελληνικού κράτους, στο μάθημα της ιστορίας για την Γ΄ Γυμνασίου. Το ηλεκτρονικό βιβλίο αξιοποιώντας ποικίλα πολυμεσικά στοιχεία, όπως χάρτες, εικόνες, βίντεο, φωνητική αφήγηση, διαδραστικές και ομαδοσυνεργατικές δραστηριότητες έχει ως στόχο να καταστήσει τη μάθηση της ιστορίας πιο ελκυστική και αποτελεσματική για τους μαθητές. Η ευκολία χρήσης, οι ποικίλες δυνατότητες διαμόρφωσης διαδραστικού περιεχομένου και η ευελιξία προσαρμογής στις ανάγκες του μαθήματος αλλά και του μαθητή συμβάλλουν στην καλύτερη κατανόηση της ιστορικής αφήγησης, στην ανάπτυξη της ιστορικής σκέψης και στην κριτική προσέγγιση των ιστορικών πηγών από τους μαθητές, καθώς και στην ενίσχυση της αυτενέργειας του μαθητή και τον ψηφιακό του γραμματισμό. Τα συμπεράσματα από την πιλοτική εφαρμογή του ηλεκτρονικού βιβλίου στην τάξη, οι εντυπώσεις των μαθητών, η ανταπόκριση και αλληλεπίδραση τους με το βιβλίο παρέχουν σημαντικές πληροφορίες για την συνολική συμβολή του στην μαθησιακή διαδικασία, την κατανόηση του παρελθόντος και την εμπέδωση της ιστορικής γνώσης.

Λέξεις – κλειδιά: ηλεκτρονικό βιβλίο (e-book), διδασκαλία ιστορίας, ψηφιακά μέσα, Book Creator, μαθητοκεντρική μάθηση, πολυμεσικά στοιχεία

[1]Το συγκεκριμένο ηλεκτρονικό βιβλίο δημιουργήθηκε στα πλαίσια εργασίας του μεταπτυχιακού προγράμματος «Ψηφιακές και Ήπιες Δεξιότητες στις Επιστήμες της Αγωγής», του Διεθνούς Πανεπιστημίου Ελλάδος (ΔΙΠΑΕ).

ΕΙΣΑΓΩΓΗ: Η ΣΥΜΒΟΛΗ ΤΟΥ ΗΛΕΚΤΡΟΝΙΚΟΥ ΒΙΒΛΙΟΥ ΣΤΗ ΜΑΘΗΣΙΑΚΗ ΔΙΑΔΙΚΑΣΙΑ

Τα ηλεκτρονικά βιβλία (e-books), γνωστά επίσης ως ηλεκτρονικά ή ψηφιακά εγχειρίδια, ενσωματώνουν την κλασική δομή των συμβατικών έντυπων βιβλίων και της προσδίδουν ηλεκτρονικά χαρακτηριστικά, προσφέροντας οπτικά ή ηχητικά εφέ και διαδραστικούς συνδέσμους (Vorothykova, 2019; Waller, 2013; Maynard & Cheyne, 2005). Υποστηρίζουν έτσι ένα πιο δυναμικό, σύγχρονο περιεχόμενο, προσφέρουν άμεση πρόσβαση και έξυπνη εύρεση και είναι προσπελάσιμα μέσω οποιασδήποτε ηλεκτρονικής συσκευής (Kouis & Konstantinou, 2014).

Η συμβολή τους στη μαθησιακή διαδικασία είναι πολύπλευρη, ενισχύοντας τα αποτελέσματα σε διάφορα εκπαιδευτικά περιβάλλοντα. Χρησιμεύουν ως δυναμικοί πόροι μάθησης που μπορούν να βελτιώσουν σημαντικά τα κίνητρα των μαθητών, ειδικά όταν ενσωματώνουν παιγνιοποιημένα στοιχεία. Σχετικές ερευνητικές μελέτες επισημαίνουν πως τα ηλεκτρονικά εγχειρίδια προσφέρουν ένα ευρύ φάσμα εργαλείων μάθησης στην εκπαίδευση ενισχύοντας την διαδραστικότητα, παρακινώντας τους μαθητές και προωθώντας τη συνεργασία σε σύγκριση με τα παραδοσιακά εγχειρίδια (Maynard & Cheyne, 2005; Lee et al., 2013; Kouis & Konstantinou, 2014). Η χρήση ηλεκτρονικών βιβλίων μπορεί να οδηγήσει σε σημαντικές βελτιώσεις στην ακαδημαϊκή απόδοση και να προωθήσει την κριτική σκέψη, την επίλυση προβλημάτων και τη δημιουργικότητα (Waller, 2013; Vorotnykova, 2019) ενώ παράλληλα η δυνατότητα προσπέλασης τους σε διάφορες συσκευές διευκολύνει την εύκολη πλοήγηση και οργάνωση πληροφοριών (Lee et al., 2012; Kouis & Konstantinou, 2014; Babushko et al., 2024), προωθεί την ανάγνωση, ειδικά μεταξύ των νέων που περνούν σημαντικό χρόνο μπροστά από οθόνες και βελτιώνει την προσβασιμότητα για άτομα με αναπηρίες, μέσω ρυθμιζόμενου μεγέθους κειμένου και επιλογών φωνητικής αφήγησης (Gasouka et al., 2013; Maynard & Cheyne, 2005; Lim et al., 2020).

Ειδικά για τη διδασκαλία της ιστορίας, οι σχετικές έρευνες για τη χρήση των ηλεκτρονικών βιβλίων αναδεικνύουν βελτίωση της προσβασιμότητας σε ένα ευρύ φάσμα ιστορικών πόρων, αυξημένη συμμετοχή και ενδιαφέρον των μαθητών, μεγαλύτερη ευκολία, εξατομικευμένες μαθησιακές εμπειρίες, προσαρμοσμένες στις ανάγκες του κάθε μαθητή και ευκολία στον εμπλουτισμό των ιστορικών ηλεκτρονικών βιβλίων με νέες ιστορικές έρευνες και ερμηνείες (Maniotis et al., 2024; Martin & Quan-Haase, 2013).

Στον αντίποδα και παρά τα πλεονεκτήματά τους, η χρήση των ηλεκτρονικών βιβλίων στην εκπαίδευση δεν είναι χωρίς προκλήσεις. Αυτές περιλαμβάνουν το ψηφιακό χάσμα και τις ανισότητες πρόσβασης, ανησυχίες για την ιστορική ακρίβεια και την αξιοπιστία των πηγών από το διαδίκτυο (Martin & Quan-Haase, 2013; Kelly, 2013), την οπτική κόπωση (Lee et al., 2012) και τον ψηφιακό περισπασμό (Evurulobi et al., 2024; Doering et al., 2012), τον περιορισμό αυτού του είδους της αυθόρμητης ανακάλυψης σε απροσδόκητες πληροφορίες που «κρύβει» συχνά το φυλλογύρισμα των παραδοσιακών έντυπων βιβλίων (Martin & Quan-Haase, 2013).

ΔΗΜΙΟΥΡΓΙΑ ΚΑΙ ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ ΤΟΥ ΗΛΕΚΤΡΟΝΙΚΟΥ ΒΙΒΛΙΟΥ ΕΡΓΑΛΕΙΑ ΚΑΙ ΤΕΧΝΟΛΟΓΙΕΣ

Για τη δημιουργία του συγκεκριμένου ηλεκτρονικού βιβλίου επιλέχτηκε η πλατφόρμα Book Creator, ένα ελκυστικό εργαλείο για τους χρήστες, καθώς προσφέρει καινοτόμα χαρακτηριστικά, επιτρέπει την ενσωμάτωση διαφόρων μέσων, όπως φωτογραφιών, βίντεο, σχεδίων, ηχογραφήσεων, χρονογραμμών, έχει διαδραστικές λειτουργίες που ενισχύουν την αφοσίωση και εμπλουτίζουν τη μαθησιακή εμπειρία (Tuminah et al., 2022; Zain, 2023). Η συγκεκριμένη διαδικτυακή πλατφόρμα, στη δωρεάν έκδοσή της, προσφέρει στον εκπαιδευτικό τη δυνατότητα δημιουργίας και δημοσίευσης έως 40 βιβλίων και δεν απαιτεί μεγάλο βαθμό εξοικείωσης με τεχνολογικά μέσα, καθώς είναι αρκετά εύκολη στη χρήση.

Χρησιμοποιήθηκαν, επίσης, διαδικτυακές πλατφόρμες για τη δημιουργία online διαδραστικών κουίζ και συγκεκριμένα το Wayground (πρώην Quizizz), ομαδοσυνεργατικά έγγραφα (Google docs), διαδικτυακή πλατφόρμα αναπαραγωγής οπτικοακουστικού υλικού (youtube), ψηφιακά εργαλεία δημιουργίας παρουσιάσεων (Microsoft powerpoint, Canvas) και εργαλεία επεξεργασίας εικόνων.

ΤΟ ΠΕΡΙΕΧΟΜΕΝΟ

Το βιβλίο, με τίτλο «Η διαμόρφωση των συνόρων του ελληνικού κράτους», αποτελείται από 32 σελίδες και είναι χωρισμένο σε 8 κεφάλαια, τα οποία αντιστοιχούν στους 8 βασικούς χρονικούς σταθμούς αλλαγής συνόρων του ελληνικού κράτους από την ίδρυσή του (1830) έως την τελευταία ενσωμάτωση εδαφών σε αυτό (1947 - 1948). Το υλικό για τη δημιουργία του αντλήθηκε από έγκυρες βιβλιογραφικές και διαδικτυακές πηγές και σχολικά εγχειρίδια, τα οποία απαριθμώνται στην ενότητα της βιβλιογραφίας και των διαδικτυακών πηγών. Είναι δημοσιευμένο και διαθέσιμο online, μέσω του συνδέσμου BookCreator | Η διαμόρφωση των συνόρων του ελληνικού κράτους.

Η ΕΠΙΛΟΓΗ ΤΗΣ ΘΕΜΑΤΙΚΗΣ

Μέσα από την πολύχρονη ενασχόληση των δημιουργών του βιβλίου με την διδασκαλία του αντικείμενου της Νεότερης Ελληνικής Ιστορίας, διαπιστώθηκε η αποσπασματικότητα με την οποία προσεγγίζεται η διδασκαλία της διαμόρφωσης των ελληνικών συνόρων και η συνακόλουθη δυστοκία των μαθητών της Γ΄ Γυμνασίου να συγκροτήσουν μια ολοκληρωμένη εικόνα για ένα τόσο σύνθετο θέμα, όπως η διαμόρφωση του σύγχρονου ελληνικού κράτους. Οι σταθμοί των συνοριακών αλλαγών διδάσκονται σε ξεχωριστά κεφάλαια, διάσπαρτα στο συμβατικό έντυπο βιβλίο, καθιστώντας δύσκολη την αντίληψη του ιστορικού γίγνεσθαι και των αλληλεπιδράσεων μεταξύ των διαφορετικών φάσεων. Το γνωστικό αντικείμενο της ιστορίας μπορεί και πρέπει να γίνει πιο προσιτό και ενδιαφέρον, επιτρέποντας στους μαθητές να εξερευνήσουν τα ιστορικά γεγονότα με πιο καθηλωτικό τρόπο και η διδασκαλία της διαμόρφωσης των συνόρων, με την ανάγκη οπτικοποίησης και κατανόησης μιας πολυεπίπεδης και χρονικά εκτεταμένης διαδικασίας, είναι ένα πεδίο που προσφέρεται ιδανικά για μια πιο διαδραστική και ψηφιακή προσέγγιση μέσω ενός ηλεκτρονικού βιβλίου.

ΚΟΙΝΟ ΣΤΟ ΟΠΟΙΟ ΑΠΕΥΘΥΝΕΤΑΙ

Το συγκεκριμένο βιβλίο απευθύνεται κυρίως σε μαθητές της Γ΄ Γυμνασίου, οι οποίοι διδάσκονται Νεότερη Ελληνική Ιστορία, ενώ θα μπορούσε να αξιοποιηθεί και από μαθητές της Γ΄ Λυκείου, στην αντίστοιχη θεματική ενότητα. Απευθύνεται επίσης, σε εκπαιδευτικούς δευτεροβάθμιας εκπαίδευσης, κυρίως του κλάδου ΠΕ02, αλλά και σε γενικό κοινό, το οποίο ενδιαφέρεται για το συγκεκριμένο θέμα. Μπορεί να αποτελέσει συμπληρωματικό ως προς το σχολικό εγχειρίδιο υλικό διδασκαλίας και πηγή μάθησης.

ΔΟΜΗ – ΠΑΡΟΥΣΙΑΣΗ ΤΟΥ ΒΙΒΛΙΟΥ

Η εμπεριστατωμένη κατανόηση από τους μαθητές της ιστορικής διαμόρφωσης των συνόρων του ελληνικού κράτους αποτελεί κεντρικό στόχο του e-book. Το συγκεκριμένο εκπαιδευτικό υλικό στοχεύει στην ανάδειξη της διαδικασίας αυτής ως μιας δυναμικής ιστορικής εξέλιξης, υπερβαίνοντας την απλή παράθεση στατικών γεγονότων. Παράλληλα, επιδιώκεται η ευαισθητοποίηση των μαθητών ως προς την κομβική σημασία των συνόρων στην εθνική ταυτότητα και την κρατική οντότητα.

ΜΕΘΟΔΟΛΟΓΙΚΗ ΠΡΟΣΕΓΓΙΣΗ ΚΑΙ ΟΡΓΑΝΩΣΗ ΤΗΣ ΥΛΗΣ

Για την επίτευξη των προαναφερθέντων παιδαγωγικών στόχων, υιοθετήθηκε μια χρονολογική οργάνωση της ύλης. Το βιβλίο διαρθρώνεται σε οκτώ (8) κεφάλαια-ενότητες, καθεμιά από τις οποίες αντιστοιχεί στη χρονολογία και την αντίστοιχη διεθνή συνθήκη που καθόρισε τις μεταβολές στα σύνορα του ελληνικού κράτους: 1830, 1832, 1864, 1881, 1912-13, 1920, 1923 και 1947-48. Η συστηματική αυτή χρονολογική προσέγγιση επιτρέπει στους μαθητές την παρακολούθηση της σταδιακής επέκτασης των ελληνικών συνόρων, αναγνωρίζοντας τους βασικούς ιστορικούς σταθμούς και τις κομβικές χρονικές περιόδους που διαμόρφωσαν την εδαφική συγκρότηση της χώρας.

ΔΥΝΑΤΟΤΗΤΕΣ ΠΛΟΗΓΗΣΗΣ ΚΑΙ ΠΡΟΣΒΑΣΙΜΟΤΗΤΑΣ

Η αρχιτεκτονική του ηλεκτρονικού βιβλίου περιλαμβάνει έναν ενεργό πίνακα περιεχομένων, ο οποίος βρίσκεται μετά το εξώφυλλο, εξασφαλίζοντας άμεση και εύκολη πλοήγηση. Οι ενεργοί υπερσύνδεσμοι επιτρέπουν στους χρήστες εύκολη πρόσβαση στο επιθυμητό κεφάλαιο, βελτιστοποιώντας τον χρόνο μελέτης και ενισχύοντας την ευελιξία της μαθησιακής διαδικασίας.

Ιδιαίτερη έμφαση δόθηκε στην προσβασιμότητα, ενσωματώνοντας φωνητική αφήγηση για το σύνολο των κειμένων. Η επιλογή αυτή, όπως γίνεται σαφές και σε σχετικές μελέτες (Gasouka et al., 2013; Xu et al., 2021), αποτελεί κρίσιμο εργαλείο υποστήριξης διαφορετικών μαθησιακών τύπων και διασφαλίζει την πρόσβαση στην πληροφορία, ανεξαρτήτως αναγνωστικών ικανοτήτων. Επίσης, είναι ιδιαίτερα χρήσιμη για μαθητές με μαθησιακές δυσκολίες ή προβλήματα όρασης**.** Η λύση της ηχογράφησης προτιμήθηκε έναντι της αυτόματης ανάγνωσης κειμένου (Read to me) που παρέχει η πλατφόρμα Book Creator, λόγω της υποδεέστερης ποιότητας στην ελληνική γλώσσα.

ΕΜΠΛΟΥΤΙΣΜΟΣ ΤΟΥ ΜΑΘΗΣΙΑΚΟΥ ΠΕΡΙΕΧΟΜΕΝΟΥ

Το εκπαιδευτικό υλικό εμπλουτίζεται με μια πληθώρα πολυμεσικών στοιχείων και διαδραστικών εργαλείων, που περιλαμβάνουν ιστορικούς χάρτες, οπτικό και οπτικοακουστικό υλικό, εξωτερικούς υπερσυνδέσμους και πρωτογενείς ιστορικές πηγές.

Σε κάθε φάση της διαμόρφωσης των συνόρων, ενσωματώνονται ιστορικοί χάρτες που επιτρέπουν την γεωγραφική εντόπιση των ενσωματωμένων περιοχών, την οπτικοποίηση της εδαφικής επέκτασης και την κατανόηση της κλίμακας των μεταβολών, καθώς και την σύνδεση ιστορικών γεγονότων με γεωγραφικές αλλαγές. Έχει ενσωματωθεί εκτενές αρχειακό οπτικό υλικό (εικόνες προσώπων, γεγονότων, τοποθεσιών της εποχής), με σκοπό την αναβίωση της ιστορικής αφήγησης και την ενίσχυση της κατανόησης μέσω της οπτικοποίησης (Berendsen et al., 2018). Για κάθε εικόνα και χάρτη, αναφέρεται η διαδικτυακή πηγή για λόγους διασφάλισης πνευματικών δικαιωμάτων. Παρά το γεγονός ότι η πλατφόρμα Book Creator παρέχει τη δυνατότητα χρήσης δικών της εικόνων, ο ιστορικός χαρακτήρας του θέματος δεν επέτρεψε την εύρεση αντίστοιχων εικόνων διαθέσιμων στην πλατφόρμα. Παράλληλα, περιλαμβάνονται αρχεία βίντεο με ιστορικά ντοκιμαντέρ, εστιάζοντας σε πρόσφατα ιστορικά γεγονότα όπως οι Βαλκανικοί Πόλεμοι, οι Συνθήκες των Σεβρών και της Λωζάνης και η ενσωμάτωση της Δωδεκανήσου. Η συμπερίληψη οπτικοακουστικού υλικού προσφέρει μια πολυδιάστατη μαθησιακή εμπειρία και διευκολύνει την εμβάθυνση στο ιστορικό πλαίσιο (Μανιώτης et al., 2024; Waller, 2013; Vorotnykova, 2019).

Σε πολλές ενότητες παρέχονται ενεργοί υπερσύνδεσμοι προς εξωτερικούς διαδικτυακούς πόρους (π.χ., Φωτόδεντρο, ιστοσελίδες Υπουργείου Εξωτερικών, ιστοσελίδες εκπαιδευτικού περιεχομένου), με στόχο την επέκταση της μαθησιακής εμπειρίας, την ενθάρρυνση της αυτόνομης μάθησης και την ανάπτυξη ερευνητικών δεξιοτήτων από τους μαθητές. Επίσης, έχουν ενσωματωθεί, σε μορφή αρχείων pdf, τα κείμενα των συνθηκών που καθόρισαν τα σύνορα του ελληνικού κράτους. Η άμεση επαφή με αυτές τις πρωτογενείς ιστορικές πηγές, με τα αυθεντικά έγγραφα κάθε εποχής, επιτρέπει στους μαθητές να αναπτύξουν κριτική σκέψη και να αποκτήσουν μια βαθύτερη κατανόηση των γεγονότων και των αντιλήψεων της εποχής (Martin & Quan-Haase, 2013).

ΔΙΑΔΡΑΣΤΙΚΑ ΕΡΓΑΛΕΙΑ ΚΑΙ ΑΞΙΟΛΟΓΗΣΗ

Για την ενίσχυση της ενεργητικής συμμετοχής και της εμπέδωσης της γνώσης, έχουν ενσωματωθεί δύο διαδραστικά κουίζ. Αυτά επιτρέπουν την αυτοαξιολόγηση των μαθητών και τον εντοπισμό πιθανών κενών στην κατανόησή τους, με έναν τρόπο διασκεδαστικό και ελκυστικό, ενισχύοντας ταυτόχρονα τα κίνητρα και τη διατήρηση της εμπλοκής σε διαδικτυακά περιβάλλοντα μάθησης (Nuci et al., 2021; Mulyati & Iskandar, 2023). Μία άσκηση δημιουργικής γραφής, υλοποιημένη σε συνεργατικό έγγραφο (Google Doc), ενθαρρύνει τους μαθητές να επεξεργαστούν σε βάθος τις ιστορικές πληροφορίες, να τις κατανοήσουν σε ένα πιο προσωπικό επίπεδο, να ταυτιστούν με ιστορικά πρόσωπα ή καταστάσεις, και να αναπτύξουν ενσυναίσθηση και κατανόηση των προκλήσεων και των εμπειριών του παρελθόντος (Dehghanzadeh et al., 2024; Erdoğdu & Kesim, 2021). Η χρήση του συνεργατικού εγγράφου προάγει την επικοινωνία και την ομαδική εργασία.

ΣΥΜΠΛΗΡΩΜΑΤΙΚΑ ΕΡΓΑΛΕΙΑ ΑΝΑΦΟΡΑΣ

Η δομή του βιβλίου ολοκληρώνεται με δύο σημαντικά συμπληρωματικά εργαλεία. Το πρώτο είναι μια χρονογραμμή, η οποία ακολουθεί μετά την ολοκλήρωση των κεφαλαίων και οπτικοποιεί τη σειρά των γεγονότων. Λειτουργεί ως εύχρηστο εργαλείο αναφοράς για την επανάληψη των βασικών ιστορικών σταθμών, την οργάνωση των πληροφοριών και την κατανόηση της διαδοχής των ιστορικών φάσεων (Denial, 2013;· Tavares et al., 2019). Το δεύτερο είναι ένα γλωσσάρι, που περιλαμβάνει τους βασικότερους όρους που χρησιμοποιούνται στο βιβλίο, ενισχύοντας την αυτονομία των μαθητών στην κατανόηση άγνωστων όρων και τον εμπλουτισμό του λεξιλογίου τους (Karamanoli, 2022). Τέλος, προς διασφάλιση της επιστημονικής εγκυρότητας και δεοντολογίας, παρατίθεται πλήρης βιβλιογραφία και οι διαδικτυακές πηγές που χρησιμοποιήθηκαν για την ανάπτυξη του εκπαιδευτικού υλικού.

ΠΙΛΟΤΙΚΗ ΕΦΑΡΜΟΓΗ ΚΑΙ ΑΞΙΟΛΟΓΗΣΗ ΗΛΕΚΤΡΟΝΙΚΟΥ ΒΙΒΛΙΟΥ: ΑΠΟΤΕΛΕΣΜΑΤΑ ΚΑΙ ΠΡΟΟΠΤΙΚΕΣ

Η παρούσα ενότητα παρουσιάζει τα ευρήματα από την πιλοτική εφαρμογή και αξιολόγηση του ψηφιακού εκπαιδευτικού βιβλίου σε πραγματικές συνθήκες τάξης. Στόχος ήταν η συλλογή ποιοτικών δεδομένων σχετικά με την εμπειρία των μαθητών και η καταγραφή των αρχικών τους αντιδράσεων, προσφέροντας πολύτιμες πληροφορίες για τη μελλοντική βελτίωση και προσαρμογή του υλικού.

ΠΛΑΙΣΙΟ ΕΦΑΡΜΟΓΗΣ

Η πιλοτική εφαρμογή πραγματοποιήθηκε σε δύο τμήματα μαθητών της Γ' Γυμνασίου από διαφορετικά σχολικά περιβάλλοντα, εντός της διάρκειας μίας διδακτικής ώρας. Αν και ο πρωταρχικός σχεδιασμός του βιβλίου προβλέπει ατομική χρήση μέσω προσωπικού υπολογιστή ή tablet, η παρουσίαση διενεργήθηκε από τις εκπαιδευτικούς μέσω διαδραστικού πίνακα, προκειμένου να διευκολυνθεί η συλλογική αλληλεπίδραση στην τάξη. Μετά την ολοκλήρωση της

παρουσίασης και της αλληλεπίδρασης με το ψηφιακό βιβλίο, οι συμμετέχοντες μαθητές κλήθηκαν να συμπληρώσουν ένα ανώνυμο ερωτηματολόγιο γενικών εντυπώσεων, το οποίο διατέθηκε μέσω της πλατφόρμας Google Forms (διαθέσιμο στο https://docs.google.com/forms/d/1-vkitb4pOd58PuE9VJcmLdD11Mm7l23NhrfNcSQMgf8/edit), με σκοπό την ποσοτικοποίηση και ποιοτική ανάλυση των αρχικών τους αντιδράσεων. Το ερωτηματολόγιο αποτελείται από 10 ερωτήσεις κλειστού και 4 ερωτήσεις ανοιχτού τύπου.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η ανάλυση των απαντήσεων στην ερώτηση που αφορούσε τη γενική εντύπωση από το ηλεκτρονικό βιβλίο, αποκάλυψε μια σαφώς θετική τάση. Συγκεκριμένα, η συντριπτική πλειοψηφία (90%) των μαθητών εξέφρασε εντυπώσεις που κατηγοριοποιήθηκαν ως «θετικές» ή «πολύ θετικές».

Η συγκριτική ερώτηση ως προς το παραδοσιακό σχολικό βιβλίο ανέδειξε ενδιαφέροντα ποιοτικά ευρήματα. Οι μαθητές που εκδήλωσαν προτίμηση προς το ψηφιακό βιβλίο ανέφεραν ως κύριους λόγους την πολυμορφία του περιεχομένου (π.χ., εικόνες, βίντεο, κουίζ), την καλύτερη οργάνωση της ύλης και την αίσθηση της διαδραστικότητας. Ενδεικτικά σχόλια περιλαμβάνουν: «Ήταν πιο διασκεδαστικό από το κανονικό βιβλίο», «Μου άρεσαν τα κουίζ και τα βίντεο», «Είναι μέσα στην τεχνολογία». Στην περίπτωση της μοναδικής αρνητικής απάντησης, ο μαθητής ανέφερε ότι το ψηφιακό βιβλίο φάνηκε λιγότερο αναλυτικό σε σύγκριση με το παραδοσιακό.

Ως προς την ευκολία χρήσης και πλοήγησης, το σύνολο σχεδόν των ερωτηθέντων μαθητών (97,5%) χαρακτήρισε το ηλεκτρονικό βιβλίο ως «εύκολο» ή «πολύ εύκολο». Αντίστοιχα, στο ερώτημα σχετικά με τις επιλογές της αισθητικής εμφάνισης (γραφικά, εικόνες, διάταξη), οι θετικές απαντήσεις κυριάρχησαν, με ελάχιστες αρνητικές παρατηρήσεις. Σημειώθηκαν, ωστόσο, κάποιες αναφορές στο μικρό μέγεθος της γραμματοσειράς, ένα ζήτημα που πιθανώς οφείλεται στην προβολή του βιβλίου μέσω διαδραστικού πίνακα και όχι σε ατομική συσκευή.

Η ανταπόκριση ως προς το ενδιαφέρον του περιεχομένου ήταν σε μεγάλο βαθμό θετική (95%). Επιπλέον, η χρήση κατανοητής γλώσσας στο ηλεκτρονικό βιβλίο, όπως προέκυψε από τις απαντήσεις, διευκόλυνε σημαντικά την πρόσβαση των μαθητών στην παρεχόμενη πληροφορία.

Η λειτουργικότητα των διαδραστικών στοιχείων επιβεβαιώθηκε από τη συντριπτική πλειοψηφία των μαθητών που αλληλεπίδρασαν με αυτά. Η επιθυμία για περισσότερα διαδραστικά στοιχεία (όπως κουίζ, παιχνίδια, αλληλεπιδραστικοί χάρτες κ.ά.), η οποία εκφράστηκε, υπογραμμίζει τη σημασία που αποδίδουν οι μαθητές στην ενεργητική μάθηση και την αλληλεπίδραση με το ψηφιακό υλικό.

Ένα ιδιαίτερα σημαντικό εύρημα ήταν ότι ένα μεγάλο ποσοστό μαθητών (68%) δήλωσε ότι το ψηφιακό βιβλίο αύξησε το ενδιαφέρον τους για την ιστορία. Το αποτέλεσμα αυτό αναδεικνύει την δυναμική των ψηφιακών μέσων να αναζωογονήσουν το ενδιαφέρον των μαθητών για το συγκεκριμένο γνωστικό αντικείμενο (Hangen, 2015).

Οι απαντήσεις στις ανοιχτές ερωτήσεις, που αφορούσαν τα σημεία που άρεσαν περισσότερο στους μαθητές, ανέδειξαν κυρίως την αξία των πολυμεσικών στοιχείων (εικόνες, βίντεο), τη διαδραστικότητα (κουίζ) και τη φωνητική αφήγηση. Οι προτάσεις για βελτίωση επικεντρώθηκαν στην προσθήκη περισσότερων διαδραστικών στοιχείων (όπως κουίζ, παιχνίδια, αλληλεπιδραστικοί χάρτες) και στην ενσωμάτωση επιπλέον οπτικοακουστικού υλικού.

ΠΡΟΟΠΤΙΚΕΣ

Τα αποτελέσματα της πιλοτικής εφαρμογής του ηλεκτρονικού βιβλίου στην τάξη είναι ενθαρρυντικά. Οι αρχικές εντυπώσεις των μαθητών ήταν σε μεγάλο βαθμό θετικές, με το ηλεκτρονικό βιβλίο να θεωρείται ενδιαφέρον, εύχρηστο και ικανό να κάνει την ιστορία πιο ελκυστική. Η αξιοποίηση πολυμεσικών στοιχείων και η επιθυμία για περισσότερη διαδραστικότητα αναδεικνύονται ως σημαντικά πλεονεκτήματα του. Παρά την ομαδική παρουσίαση, οι μαθητές εξέφρασαν θετικές απόψεις για την εμφάνιση, την πλοήγηση και την επιλογή του υλικού. Οι προτάσεις τους για βελτίωση θα ληφθούν υπόψη για την περαιτέρω ανάπτυξη και βελτίωση του ηλεκτρονικού βιβλίου, ειδικά όσον αφορά την ενίσχυση της διαδραστικότητας και την προετοιμασία για την ατομική χρήση από τους μαθητές.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Συμπερασματικά, η δημιουργία και η πιλοτική εφαρμογή του συγκεκριμένου ηλεκτρονικού βιβλίου στην τάξη, σε συνδυασμό με τη μελέτη της σχετικής βιβλιογραφίας, αναδεικνύουν με σαφήνεια τη δυναμική και τα οφέλη της ενσωμάτωσης ηλεκτρονικών βιβλίων στη διδασκαλία της ιστορίας. Η χρήση του e-book μπορεί να λειτουργήσει ως μια

καινοτόμος προσέγγιση στην ιστορική διδασκαλία αλλά και ως εργαλείο που ενισχύει την ενεργό συμμετοχή, την ενσυναίσθηση και την ερευνητική σκέψη των μαθητών.

Η θετική αποδοχή του ψηφιακού υλικού από τους μαθητές επιβεβαιώνει ότι η αξιοποίηση σύγχρονων τεχνολογικών εργαλείων μπορεί να αναζωογονήσει το ενδιαφέρον για την ιστορία και να μετατρέψει ένα απαιτητικό περιεχόμενο σε μια βιωματική μαθησιακή εμπειρία. Η δυνατότητα οπτικοποίησης ιστορικών φαινομένων, η διασύνδεση των γεγονότων με γεωγραφικές και πολιτισμικές συντεταγμένες, η φωνητική αφήγηση και η διαδραστικότητα διαμορφώνουν ένα ελκυστικό και περιεκτικό περιβάλλον μάθησης, προσβάσιμο σε μαθητές με διαφορετικά μαθησιακά προφίλ.

Επιπλέον, η μεθοδολογική προσέγγιση του ηλεκτρονικού βιβλίου - με χρονολογική και θεματική διάρθρωση, συμπληρωματικά εργαλεία (χρονογραμμή, γλωσσάρι), αξιολόγηση μέσω κουίζ και δημιουργική γραφή - επιτρέπει την ενεργοποίηση πολλαπλών μορφών νοημοσύνης και ενισχύει τη διαφοροποίηση της διδασκαλίας. Ιδιαίτερη αξία αποκτά η δυνατότητα αυτενέργειας και πλοήγησης του μαθητή στο περιεχόμενο, στοιχείο που ευνοεί την αυτορρυθμιζόμενη μάθηση. Αυτή η δυνατότητα προσαρμογής στις ανάγκες του μαθήματος και του μαθητή, καθώς και η ενίσχυση του ψηφιακού γραμματισμού, αναδεικνύουν τα ηλεκτρονικά βιβλία ως ένα πολύτιμο εργαλείο για το σύγχρονο εκπαιδευτικό περιβάλλον.

Η παρούσα πρόταση μπορεί να αποτελέσει αφετηρία για την ευρύτερη αξιοποίηση αντίστοιχων ψηφιακών εγχειριδίων, με στόχο τη δημιουργία ενός πλουραλιστικού, πολυτροπικού και παιδαγωγικά ευαισθητοποιημένου εκπαιδευτικού περιβάλλοντος. Η περαιτέρω διερεύνηση της αποτελεσματικότητας των ηλεκτρονικών βιβλίων σε διαφορετικά σχολικά συμφραζόμενα και η αξιολόγηση της μακροπρόθεσμης επίδρασής τους στη μαθησιακή πορεία των μαθητών αποτελούν σημαντικά πεδία μελλοντικής έρευνας.

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ΕΞΕΡΕΥΝΩΝΤΑΣ ΤΟΝ ΚΟΣΜΟ ΜΕ ΓΕΩΓΡΑΦΙΚΑ ΠΛΗΡΟΦΟΡΙΑΚΑ ΣΥΣΤΗΜΑΤΑ (GIS): Η ΓΕΩΓΡΑΦΙΑ ΣΤΗΝ ΠΡΑΞΗ

Μπάγκου Ευαγγελία
Εκπαιδευτικός ΠΕ86, Μηχανικός Γεωπληροφορικής & Τοπογραφίας - MSc Περιβαλλοντολόγος ΑΠΘ,
3ο Πειραματικό Δημοτικό Σχολείο Ευόσμου
Θεσσαλονίκη, Ελλάδα
e-mail: li.mpagkou@gmail.com

Βασιλούδη Αγγελική
Εκπαιδευτικός ΠΕ70, Μεταπτυχιακή Φοιτήτρια
3ο Πειραματικό Δημοτικό Σχολείο Ευόσμου, Α.Π.Θ
Θεσσαλονίκη, Ελλάδα
e-mail: vasiloudia@gmail.com

ΠΕΡΙΛΗΨΗ

Η εκπαίδευση και ειδικότερα το μάθημα της Γεωγραφίας, χρειάζεται καινοτόμα προγράμματα και πρωτότυπες ιδέες. Το Νέο Πρόγραμμα Σπουδών για την Γεωγραφία στο Δημοτικό Σχολείο (2021) αναφέρει την εισαγωγή των Γεωγραφικών Πληροφοριακών Συστημάτων – ΓΣΠ (Geographic Information System –GIS) στην διδακτική πράξη, χωρίς, ωστόσο, να δίνονται στους εκπαιδευτικούς συγκεκριμένες οδηγίες για την επίτευξη αυτού του στόχου. Θέλοντας να γίνει πιο διαδραστικό το μάθημα της Γεωγραφίας, εντάξαμε τα ΓΣΠ στο μάθημα, δίνοντας στους μαθητές τη δυνατότητα να εξερευνήσουν τον κόσμο με αυτά.

Η καινοτόμος δράση αυτή, θα πραγματοποιηθεί σε 22 μαθητές/τριες της Στ΄ τάξης του 3ου Πειραματικού Δημοτικού σχολείου Ευόσμου, από τον Φεβρουάριο ως τον Ιούνιο του 2025. Ο χρόνος υλοποίησης της δράσης πραγματοποιείται εντός του σχολικού ωραρίου και συμπεριλαμβάνεται στις δράσεις των Β΄ και Γ΄ σχολικών τριμήνων. Πραγματοποιείται σε συνεργασία μεταξύ της δασκάλας του τμήματος και της εκπαιδευτικού πληροφορικής με ειδίκευση στα ΓΣΠ.

Τα G.I.S. (Geographic Information Systems) συνδυάζουν τις βάσεις δεδομένων και τα σχεδιαστικά προγράμματα, με σκοπό να επιτρέπουν την επεξεργασία της χωρικής και περιγραφικής πληροφορίας, με τελικό αποτέλεσμα τη δημιουργία δυναμικών χαρτών. Είναι σκόπιμο να αναφερθεί ότι τα GIS αποτελούν δυναμικά συστήματα πληροφοριών, τα οποία με την τεχνολογία της Πληροφορικής και τις ειδικές μαθηματικές μεθόδους διαχειρίζονται και αξιοποιούν δεδομένα από τις Γεωεπιστήμες για την παραγωγή μεταπληροφορίας (μεταδεδομένα - metadata), δηλαδή πληροφορίας υψηλότερου επιπέδου (Bagkou, 2013). Γενικά μπορούμε να πούμε ότι είναι ένα ολοκληρωμένο, σύγχρονο αλλά και πολυδιάστατο «εργαλείο» που προέρχεται και συσχετίζεται άμεσα με το χώρο της πληροφορικής (Konstantinidis, 2002). Παρέχουν την δυνατότητα συλλογής, διαχείρισης, αποθήκευσης, επεξεργασίας, ανάλυσης και οπτικοποίησης, σε ψηφιακό περιβάλλον, των δεδομένων που σχετίζονται με τον χώρο.

Σκοπός της παρούσας εργασίας είναι η παρουσίαση παραδειγμάτων δραστηριοτήτων της συγκεκριμένης καινοτόμας πρακτικής στη διδασκαλία της Γεωγραφίας. Συγκεκριμένα, οι στόχοι του καινοτόμου προγράμματος είναι α) η ενίσχυση της χωρικής αντίληψης των μαθητών/τριών μέσω της εφαρμογής των Γεωγραφικών Πληροφοριακών Συστημάτων (GIS), β) η καλλιέργεια δεξιοτήτων ανάλυσης δεδομένων και επίλυσης προβλημάτων, γ) η ανάπτυξη της συνεργασίας και της ομαδικής εργασίας μέσα από τη διερεύνηση γεωγραφικών θεμάτων και δ) η σύνδεση της γεωγραφίας με την καθημερινή ζωή και τις σύγχρονες ανάγκες.

Οι μαθητές μέσω των δραστηριοτήτων που πραγματοποιούνται (συλλογή δεδομένων, δημιουργία γραμμικών – σημειακών – πολυγωνικών αρχείων, εξαγωγή τελικών χαρτών), έρχονται σε επαφή με βασικές λειτουργίες χαρτογράφησης, εξετάζουν γεωγραφικά δεδομένα και δημιουργούν διαδραστικούς χάρτες στους οποίους απεικονίζουν τις πληροφορίες που συλλέγουν.

Τα προσδοκώμενα μαθησιακά αποτελέσματα είναι:
1. Ανάπτυξη δεξιοτήτων στη χρήση τεχνολογιών και γεωγραφικών δεδομένων.
2. Καλλιέργεια κριτικής σκέψης μέσα από την ανάλυση και τη σύνθεση πληροφοριών.
3. Ενίσχυση της χωρικής αντίληψης και της κατανόησης του φυσικού και ανθρωπογενούς περιβάλλοντος.
4. Ανάπτυξη βασικών δεξιοτήτων στα ψηφιακά σχεδιαστικά προγράμματα.

Τα θέματα που αναπτύσσονται στο πλαίσιο της συγκεκριμένης παρέμβασης περιλαμβάνουν α) τα φυσικά χαρακτηριστικά της Ελλάδας (βουνά, ποτάμια, θάλασσες), β) τις ανθρώπινες δραστηριότητες και πληθυσμιακές κατανομές και γ) τα περιβαλλοντικά ζητήματα (π.χ., πράσινοι χώροι, ρύπανση).Τέλος, οι μαθητές θα δουλεύουν σε ομάδες με καθορισμένους ρόλους.

Για την επίτευξη των στόχων του προγράμματος οι μαθητές χρησιμοποιούν το λογισμικό ArcGIS Online, σχολικά εγχειρίδια γεωγραφίας., διαδικτυακούς χάρτες και γεωγραφικές βάσεις δεδομένων καθώς και φωτογραφικό υλικό που έχουν συλλέξει οι ίδιοι οι μαθητές. Το λογισμικό ArcGIS Online επιλέχθηκε γιατί θεωρήθηκε από τους εκπαιδευτικούς ότι είναι το πιο αξιόπιστο σχεδιαστικό πρόγραμμα και μπορεί να χρησιμοποιηθεί δωρεάν για ένα συγκεκριμένο χρονικό διάστημα.

Η συγκεκριμένη δράση δεν έχει εφαρμοστεί στο παρελθόν στη σχολική μονάδα μας. Ωστόσο, βασίζεται σε διεθνώς αναγνωρισμένες πρακτικές για τη διδασκαλία της γεωγραφίας μέσω σύγχρονων τεχνολογικών εργαλείων, όπως τα Γεωγραφικά Πληροφοριακά Συστήματα (GIS). Η δράση αποτελεί πρωτοβουλία που εισάγει τους μαθητές στη χρήση καινοτόμων μεθόδων, προσαρμοσμένων στις ανάγκες της εκπαιδευτικής κοινότητας για την ανάπτυξη δεξιοτήτων.

Λέξεις – κλειδιά: Γεωγραφικά Πληροφοριακά Συστήματα (GIS), Διαδραστικοί χάρτες, καινοτόμες δράσεις, ArcGIS, Διδασκαλία Γεωγραφίας, Δημοτικό Σχολείο

ΕΙΣΑΓΩΓΗ

Η γεωγραφία αποτελεί έναν δυναμικό επιστημονικό κλάδο που μελετά τον χώρο, το περιβάλλον και τις αλληλεπιδράσεις τους με τις ανθρώπινες δραστηριότητες. Στη σύγχρονη εποχή, η αξιοποίηση τεχνολογικών εργαλείων, όπως τα Γεωγραφικά Πληροφοριακά Συστήματα (Geographic Information Systems - GIS), έχει αλλάξει ριζικά τον τρόπο διδασκαλίας και κατανόησης της γεωγραφίας. Τα GIS επιτρέπουν την ανάλυση, οπτικοποίηση και διαχείριση γεωχωρικών δεδομένων, προσφέροντας μια πιο διαδραστική και εμπεριστατωμένη προσέγγιση στη μάθηση.

Η ενσωμάτωση των GIS στην εκπαιδευτική διαδικασία συμβάλλει στην ανάπτυξη κριτικής σκέψης, χωρικής επίγνωσης και αναλυτικών δεξιοτήτων στους μαθητές. Μέσω της χρήσης χαρτογραφικών εργαλείων και βάσεων δεδομένων, οι μαθητές μπορούν να διερευνήσουν πραγματικά προβλήματα, να αναπτύξουν δεξιότητες επίλυσης προβλημάτων και να κατανοήσουν καλύτερα τη σχέση μεταξύ φυσικού και ανθρωπογενούς περιβάλλοντος.

Το παρόν άρθρο εξετάζει τη σημασία των GIS στην εκπαιδευτική διαδικασία συζητά τις παιδαγωγικές προεκτάσεις που προκύπτουν από την ενσωμάτωσή τους στη σχολική τάξη.

ΓΕΩΓΡΑΦΙΚΑ ΠΛΗΡΟΦΟΡΙΑΚΑ ΣΥΣΤΗΜΑΤΑ (GIS)

Τα Γεωγραφικά Πληροφοριακά Συστήματα (Geographic Information Systems - GIS) αποτελούν τεχνολογικές πλατφόρμες που επιτρέπουν τη συλλογή, αποθήκευση, ανάλυση και οπτικοποίηση γεωγραφικών δεδομένων. Συνδυάζουν τη γεωγραφία με την επιστήμη της πληροφορικής, επιτρέποντας στους χρήστες να κατανοούν τη χωρική διάσταση φαινομένων και να αναλύουν γεωγραφικά μοτίβα και σχέσεις (DeMers 2008). Τα GIS χρησιμοποιούνται σε διάφορους τομείς, όπως η περιβαλλοντική διαχείριση, η πολεοδομία, η γεωλογία και η εκπαίδευση. Η δυνατότητα οπτικοποίησης και αλληλεπίδρασης με δεδομένα σε χάρτες καθιστά τα GIS ένα πολύτιμο εργαλείο για την κατανόηση και τη λήψη αποφάσεων σε πραγματικό χρόνο (Konstantinidi, 2002).

Η βασική δομή των GIS περιλαμβάνει πέντε κύρια στοιχεία: (1) Δεδομένα, που περιλαμβάνουν χωρικές και περιγραφικές πληροφορίες αποθηκευμένες σε βάσεις δεδομένων, (2) Λογισμικό, όπως το ArcGIS και το QGIS, που επιτρέπει την επεξεργασία και ανάλυση των δεδομένων, (3) Χαρτογραφικές αναπαραστάσεις, που προσφέρουν οπτικοποίηση των δεδομένων σε ψηφιακούς χάρτες, (4) Ανάλυση δεδομένων, μέσω μαθηματικών και στατιστικών εργαλείων για τη μελέτη γεωγραφικών φαινομένων, και (5) Χρήστες, δηλαδή επιστήμονες, ερευνητές και φορείς που αξιοποιούν τα GIS για διάφορες εφαρμογές. Η δομή αυτή επιτρέπει την προσαρμογή των GIS σε διαφορετικά γνωστικά αντικείμενα και ανάγκες (Bagkou & Stavrakidou, 2010).

Η ενσωμάτωση των GIS στην εκπαίδευση έχει σημαντικά οφέλη, καθώς ενισχύει την ενεργή μάθηση και την ανάπτυξη κριτικής σκέψης. Οι μαθητές έχουν τη δυνατότητα να αναλύουν πραγματικά δεδομένα, να αναπτύσσουν δεξιότητες επίλυσης προβλημάτων και να εξοικειώνονται με τη χωρική σκέψη. Επιπλέον, η διαδραστική φύση των GIS ενισχύει τη συμμετοχή των μαθητών, καθιστώντας τη μαθησιακή διαδικασία πιο ενδιαφέρουσα και αποτελεσματική. Η εφαρμογή των GIS στη διδασκαλία της γεωγραφίας επιτρέπει την κατανόηση πολύπλοκων γεωγραφικών θεμάτων και τη σύνδεσή τους με την καθημερινή ζωή, προετοιμάζοντας τους μαθητές για έναν κόσμο όπου η ανάλυση δεδομένων και η γεωχωρική πληροφορία αποκτούν ολοένα και μεγαλύτερη σημασία.

ΓΕΩΓΡΑΦΙΚΑ ΠΛΗΡΟΦΟΡΙΑΚΑ ΣΥΣΤΗΜΑΤΑ (GIS): ΟΡΙΣΜΟΣ ΚΑΙ ΑΝΑΛΥΣΗ

Τα Γεωγραφικά Συστήματα Πληροφοριών (GIS - Geographic Information Systems) είναι ολοκληρωμένα πληροφοριακά συστήματα σχεδιασμένα για τη συλλογή, αποθήκευση, διαχείριση, ανάλυση και παρουσίαση γεωχωρικών δεδομένων (Longley 2015). Τα GIS επιτρέπουν τη διασύνδεση χωρικών και περιγραφικών πληροφοριών, διευκολύνοντας την οπτικοποίηση δεδομένων σε χαρτογραφικές αναπαραστάσεις και την εξαγωγή συμπερασμάτων για γεωγραφικά φαινόμενα (Konstantinidis, 2002; Bagkou, 2013).

ΔΟΜΗ ΚΑΙ ΣΤΟΙΧΕΙΑ ΤΩΝ GIS

Ένα σύστημα GIS αποτελείται από τέσσερα βασικά συστατικά (Bagkou, 2013):

1. **Δεδομένα GIS**: Τα GIS λειτουργούν με δύο βασικούς τύπους δεδομένων:
    - **Διανυσματικά δεδομένα (Vector data)**: Αντιπροσωπεύονται μέσω σημείων, γραμμών και πολυγώνων και χρησιμοποιούνται για την αποτύπωση χωρικών στοιχείων όπως δρόμοι, κτίρια και όρια περιοχών.
    - **Δεδομένα πλέγματος (Raster data)**: Χρησιμοποιούνται για τη χαρτογράφηση συνεχών φαινομένων, όπως η θερμοκρασία, η βλάστηση και η τοπογραφία.

2. **Λογισμικό GIS**: Τα πιο διαδεδομένα λογισμικά GIS περιλαμβάνουν το **ArcGIS**, το **QGIS**, το **GRASS GIS** και το **Google Earth Engine**, τα οποία επιτρέπουν την ανάλυση και χαρτογράφηση δεδομένων.
3. **Υλικό GIS**: Περιλαμβάνει υπολογιστές υψηλών προδιαγραφών, αποθηκευτικά μέσα, δέκτες GPS και σαρωτές χαρτών που επιτρέπουν την επεξεργασία και ανάλυση γεωχωρικών δεδομένων.
4. **Χρήστες και Μέθοδοι**: Οι χρήστες GIS περιλαμβάνουν επιστήμονες, αναλυτές δεδομένων, πολεοδόμους, περιβαλλοντολόγους και κυβερνητικούς φορείς. Οι μέθοδοι που εφαρμόζονται περιλαμβάνουν γεωστατιστική ανάλυση, χωρικά μοντέλα πρόβλεψης και εξόρυξη δεδομένων.

ΕΦΑΡΜΟΓΕΣ ΤΩΝ GIS

Τα GIS έχουν ευρεία εφαρμογή σε πολλούς τομείς (Bagkou, 2013):

- ✓ **Περιβαλλοντική διαχείριση:** Χρησιμοποιούνται για τη χαρτογράφηση προστατευόμενων περιοχών και τη μελέτη της κλιματικής αλλαγής.
- ✓ **Πολεοδομία και Χωροταξία:** Εφαρμόζονται στη σχεδίαση υποδομών και στην αστική ανάπτυξη.
- ✓ **Γεωργία και Δασοκομία:** Επιτρέπουν την ανάλυση χρήσης γης και την παρακολούθηση καλλιεργειών.
- ✓ **Μεταφορές και Δίκτυα:** Χρησιμοποιούνται για τη βελτιστοποίηση διαδρομών και τη διαχείριση κυκλοφορίας.
- ✓ **Διαχείριση Καταστροφών:** Βοηθούν στην πρόβλεψη και ανταπόκριση σε φυσικές καταστροφές, όπως πυρκαγιές και πλημμύρες.
- ✓ **Δημόσιας υγείας:** Παίζουν κρίσιμο ρόλο στη χαρτογράφηση της εξάπλωσης ασθενειών και στη διαχείριση υγειονομικών κρίσεων. Κατά την πανδημία COVID-19, χρησιμοποιήθηκαν ευρέως για την παρακολούθηση της διασποράς του ιού, τη διαχείριση των εμβολιασμών και τη λήψη στρατηγικών αποφάσεων από τις υγειονομικές αρχές. Η ικανότητα των GIS να συνδυάζουν και να αναλύουν δεδομένα από πολλαπλές πηγές τα καθιστά πολύτιμα εργαλεία για την προστασία της δημόσιας υγείας και την προώθηση της βιώσιμης ανάπτυξης.

ΕΦΑΡΜΟΓΕΣ ΤΩΝ GIS ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΓΕΩΓΡΑΦΙΑΣ

Η είσοδος των Γεωγραφικών Συστημάτων Πληροφοριών (Geographic Information Systems- GIS) στη χαρτογραφία οδήγησε ήδη από τα πρώτα χρόνια εφαρμογής (δεκαετία του 60) σε ραγδαία ανάπτυξη του κλάδου της γεωγραφίας, λόγω της εύκολης και άμεσης δημιουργίας νέων χαρτών ή και την αναθεώρηση των υπαρχόντων (Lamprinos N. , 2009).

Η ενσωμάτωση των Γεωγραφικών Πληροφοριακών Συστημάτων (GIS) στη διδασκαλία της γεωγραφίας ενισχύει τη χωρική αντίληψη των μαθητών και τους βοηθά να αναπτύξουν δεξιότητες ανάλυσης δεδομένων και επίλυσης προβλημάτων. Τα GIS επιτρέπουν τη χαρτογράφηση και την οπτικοποίηση γεωγραφικών φαινομένων σε πραγματικό χρόνο, προσφέροντας μια διαδραστική εμπειρία μάθησης. Μέσω αυτών των τεχνολογιών, οι μαθητές έχουν τη δυνατότητα να ερευνούν γεωγραφικές σχέσεις, να αναλύουν χωρικά μοτίβα και να εξάγουν συμπεράσματα από δεδομένα του πραγματικού κόσμου. Αυτή η προσέγγιση είναι ιδιαίτερα χρήσιμη για τη μελέτη σύνθετων γεωγραφικών θεμάτων, όπως η κλιματική αλλαγή, η κατανομή του πληθυσμού και η αστικοποίηση, επιτρέποντας στους μαθητές να δουν την εφαρμογή της γεωγραφίας πέρα από τα θεωρητικά πλαίσια.

Μια από τις βασικές εφαρμογές των GIS στην εκπαίδευση αφορά τη χρήση διαδραστικών χαρτών, οι οποίοι επιτρέπουν στους μαθητές να εξερευνούν και να αναλύουν γεωγραφικά φαινόμενα με έναν τρόπο που ξεπερνά τις παραδοσιακές διδακτικές μεθόδους. Για παράδειγμα, οι μαθητές μπορούν να δημιουργήσουν θεματικούς χάρτες που απεικονίζουν κοινωνικοοικονομικά δεδομένα, να συγκρίνουν πληθυσμιακές κατανομές ή να αναλύσουν την επίδραση περιβαλλοντικών παραγόντων σε διάφορες περιοχές. Επίσης, τα GIS χρησιμοποιούνται στην παρακολούθηση φυσικών καταστροφών, επιτρέποντας στους μαθητές να μελετήσουν τις επιπτώσεις σεισμών, πλημμυρών και πυρκαγιών, καθώς και να εξετάσουν πιθανές λύσεις για τη διαχείριση των κινδύνων. Μέσα από αυτή τη διαδικασία, η μάθηση γίνεται πιο βιωματική, καθώς οι μαθητές συμμετέχουν ενεργά στην ανάλυση πραγματικών δεδομένων.

Επιπλέον, η χρήση των GIS στην εκπαίδευση προωθεί τη συνεργατική μάθηση και την ανάπτυξη κριτικής σκέψης. Οι μαθητές μπορούν να εργαστούν σε ομάδες για να συλλέξουν, να επεξεργαστούν και να αναλύσουν δεδομένα, δημιουργώντας γεωγραφικές αναπαραστάσεις και παρουσιάζοντας τα ευρήματά τους. Αυτή η προσέγγιση καλλιεργεί δεξιότητες που είναι απαραίτητες στον σύγχρονο κόσμο, όπως η διαχείριση δεδομένων, η ερμηνεία χαρτών και η λήψη αποφάσεων με βάση αντικειμενικά κριτήρια. Καθώς η τεχνολογία GIS εξελίσσεται και ενσωματώνεται όλο και περισσότερο στην εκπαίδευση, οι μαθητές αποκτούν γνώσεις και δεξιότητες που μπορούν να αξιοποιήσουν τόσο στην ακαδημαϊκή τους πορεία όσο και σε επαγγελματικούς τομείς που σχετίζονται με τη γεωπληροφορική, την περιβαλλοντική επιστήμη και τον αστικό σχεδιασμό.

Αν και η βιβλιογραφική έρευνα αποδεικνύει πως τα GIS είναι ένα εκπαιδευτικό τεχνολογικό εργαλείο που έχει πολλαπλά οφέλη για τους εκπαιδευόμενους, η αξιοποίησή του στην σχολική εκπαίδευση υστερεί (Sofias, 2020). Σε μια προσπάθεια αναμόρφωσης του Προγράμματος Σπουδών για την Γεωγραφία, δημοσιεύτηκε στο ΦΕΚ με Αρ. Φύλλου 2259, στο οποίο γίνεται αναφορά στην εισαγωγή των Διαδικτυακών Υπηρεσιών Χαρτογράφησης στην εκπαίδευση.

ΚΑΙΝΟΤΟΜΑ ΕΚΠΑΙΔΕΥΤΙΚΑ ΠΡΟΓΡΑΜΜΑΤΑ ΚΑΙ ΠΑΡΑΔΕΙΓΜΑΤΑ ΧΡΗΣΗΣ ΤΩΝ GIS

Η ενσωμάτωση των Γεωγραφικών Πληροφοριακών Συστημάτων (GIS) στην εκπαίδευση έχει ανοίξει νέους δρόμους στη διδασκαλία της γεωγραφίας, επιτρέποντας στους μαθητές να αλληλεπιδρούν με γεωχωρικά δεδομένα και να αναπτύσσουν δεξιότητες ανάλυσης και κριτικής σκέψης. Ένα καινοτόμο εκπαιδευτικό πρόγραμμα που εφαρμόστηκε στο 3ο Πειραματικό Δημοτικό Σχολείο Ευόσμου περιλαμβάνει τη χρήση του ArcGISOnline για τη δημιουργία χαρτών και την ανάλυση γεωγραφικών δεδομένων από μαθητές της Στ’ τάξης. Οι μαθητές εργάζονται σε ομάδες με καθορισμένους ρόλους, συλλέγουν δεδομένα από τοπικές και διαδικτυακές πηγές και δημιουργούν θεματικούς χάρτες σχετικούς με τη σχολική ύλη, ενισχύοντας έτσι τη χωρική αντίληψη και την ομαδοσυνεργατική μάθηση.

Το πρόγραμμα αυτό βασίζεται στη βιωματική μάθηση, όπου οι μαθητές δεν είναι απλοί αποδέκτες γνώσεων, αλλά ενεργοί ερευνητές που διερευνούν πραγματικά προβλήματα. Για παράδειγμα, ένα από τα έργα τους αφορούσε την ανάλυση της ατμοσφαιρικής ρύπανσης στην περιοχή τους, χρησιμοποιώντας δεδομένα από αισθητήρες αέρα και χαρτογραφώντας τις διακυμάνσεις στη ρύπανση κατά τη διάρκεια της ημέρας. Άλλο παράδειγμα εφαρμογής αφορά τη μελέτη της αλλαγής της αστικής ανάπτυξης, όπου οι μαθητές συνέκριναν δορυφορικές εικόνες διαφορετικών ετών για να κατανοήσουν την επέκταση της πόλης και τις επιπτώσεις στο φυσικό περιβάλλον. Μέσω αυτών των δραστηριοτήτων, το GIS βοηθά τους μαθητές να αποκτήσουν μια βαθύτερη κατανόηση των γεωγραφικών και περιβαλλοντικών ζητημάτων.

Αντίστοιχα εκπαιδευτικά προγράμματα έχουν υλοποιηθεί και σε άλλες χώρες, όπου τα GIS χρησιμοποιούνται για την ανάλυση πληθυσμιακών δεδομένων, την προσομοίωση φυσικών καταστροφών και τη διερεύνηση ιστορικών γεγονότων μέσω χαρτογραφικών αναπαραστάσεων. Η χρήση των GIS στην εκπαίδευση δεν περιορίζεται μόνο στη γεωγραφία αλλά μπορεί να επεκταθεί και σε άλλα γνωστικά αντικείμενα, όπως οι φυσικές επιστήμες, η κοινωνιολογία και η οικονομία. Καθώς η τεχνολογία εξελίσσεται, τα GIS αναμένεται να διαδραματίσουν ολοένα και σημαντικότερο ρόλο στην εκπαίδευση, προσφέροντας νέα εργαλεία και προσεγγίσεις για τη μάθηση και την έρευνα.

ΒΑΣΙΚΕΣ ΔΡΑΣΤΗΡΙΟΤΗΤΕΣ ΚΑΙ ΣΤΟΧΟΙ

Στο πλαίσιο σχεδιασμού και υλοποίησης της δράσης μας σχεδιάστηκε και υλοποιήθηκε πλήθος δραστηριοτήτων με σκοπό την επίτευξη των στόχων που είχαμε θέσει. Αρχικά, έγινε εισαγωγή των μαθητών/τριών στις βασικές λειτουργίες του προγράμματος μέσα από απλές, ανεξάφρτητες δραστηριότητες που εξοικείωσαν τους μαθητές/τριες στα διάφορα εργαλεία του ArcGIS Online. Οι δραστηριότητες αυτές πήραν περισσότερο χρόνο από όσο αρχικά αναμενόταν, όμως αποδείχθηκαν εξαιρετικά σημαντικές για την μετέπειτα πορεία του προγράμματος.

Οι δραστηριότητες περιλαμβάνουν:
- ✓ **Συλλογή δεδομένων**
- ✓ **Δημιουργία σημειακών, γραμμικών και πολυγωνικών αρχείων**
- ✓ **Χαρτογράφηση φυσικών χαρακτηριστικών (βουνά, ποτάμια, θάλασσες)**
- ✓ **Ανάλυση πληθυσμιακών κατανομών και ανθρώπινων δραστηριοτήτων**
- ✓ **Ανάπτυξη χαρτών** περιβαλλοντικών ζητημάτων (ρύπανση, πράσινοι χώροι)

Οι κύριοι στόχοι του προγράμματος είναι:
1. Η ενίσχυση της χωρικής αντίληψης μέσω GIS.
2. Η καλλιέργεια δεξιοτήτων ανάλυσης δεδομένων και επίλυσης προβλημάτων.
3. Η σύνδεση της Γεωγραφίας με την καθημερινή ζωή.
4. Η ανάπτυξη 21ου αιώνα δεξιοτήτων μέσω της χρήσης καινοτόμων τεχνολογικών εργαλείων.

ΜΕΘΟΔΟΛΟΓΙΑ

ΧΡΟΝΟΔΙΑΓΡΑΜΜΑ

Η δράση του προγράμματος GIS στο σχολείο θα υλοποιηθεί κατά την περίοδο από τον Φεβρουάριο έως τον Ιούνιο του 2025, εντός του σχολικού ωραρίου. Η δράση περιλαμβάνει ομαδοσυνεργατική προσέγγιση, όπου οι μαθητές εργάζονται σε ομάδες πάνω σε πραγματικά δεδομένα και καλούνται να αναπτύξουν διαδραστικούς χάρτες. Σκοπός της

διαδικασίας είναι να ενισχυθεί η κριτική σκέψη των μαθητών και να αναπτύξουν ικανότητες επίλυσης προβλημάτων μέσω της ανάλυσης γεωγραφικών δεδομένων.

ΜΕΘΟΔΟΛΟΓΙΑ ΥΛΟΠΟΙΗΣΗΣ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ GIS ΣΤΟ ΣΧΟΛΕΙΟ

Η υλοποίηση του προγράμματος γίνεται σε συνεργασία μεταξύ των εκπαιδευτικών πληροφορικής και γεωγραφίας. Οι μαθητές θα εισαχθούν στις βασικές λειτουργίες των Συστημάτων Γεωγραφικών Πληροφοριών (GIS), μαθαίνοντας πώς να δημιουργούν και να αναλύουν γεωχωρικά δεδομένα. Κατά τη διάρκεια της δράσης, οι μαθητές θα συμμετέχουν σε διάφορες δραστηριότητες που ενισχύουν τη βιωματική μάθηση και προάγουν την κριτική σκέψη. Με αυτόν τον τρόπο, οι μαθητές θα αποκτήσουν πρακτικές γνώσεις για τη χρήση GIS και θα αναπτύξουν δεξιότητες που συνδέονται άμεσα με την επίλυση πραγματικών προβλημάτων μέσω της γεωγραφικής ανάλυσης.

ΑΞΙΟΛΟΓΗΣΗ ΚΑΙ ΑΠΟΤΙΜΗΣΗ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ

Η καινοτόμος δράση υλοποιήθηκε με επιτυχία στο Στ2 τμήμα του σχολείου μας, με στόχο την εξοικείωση των μαθητών με τα Γεωγραφικά Πληροφοριακά Συστήματα (GIS) και την καλλιέργεια δεξιοτήτων, όπως η ανάλυση δεδομένων, η επίλυση προβλημάτων, η συνεργασία και η ενεργητική μάθηση.

Οι μαθητές εργάστηκαν ομαδοσυνεργατικά, χρησιμοποίησαν το λογισμικό ArcGIS, δημιούργησαν διαδραστικούς χάρτες και συνδύασαν την επιστήμη της γεωγραφίας με την τεχνολογία, την περιβαλλοντική εκπαίδευση και τα μαθηματικά. Το πρόγραμμα εστίασε στην εξερεύνηση φυσικών χαρακτηριστικών, ανθρωπογενών δραστηριοτήτων και περιβαλλοντικών ζητημάτων, με εφαρμογή σε πραγματικά δεδομένα.

Κατά το Β΄ Τρίμηνο πραγματοποιήθηκε η παρουσίαση της δράσης στους μαθητές, η εκπαίδευσή τους στο GIS, η ομαδική διερεύνηση θεμάτων και η συλλογή δεδομένων, καθώς και η δημιουργία χαρτών με τη βοήθεια του ArcGIS. Κατά το Γ΄ Τρίμηνο, οι μαθητές παρουσίασαν τις εργασίες τους, συνέθεσαν τον τελικό διαδραστικό χάρτη και συμμετείχαν σε συζήτηση, αξιολόγηση και αποτίμηση του προγράμματος.

Η δράση κρίνεται άκρως επιτυχημένη. Οι μαθητές απέκτησαν βασικές δεξιότητες GIS και χωρικής ανάλυσης, ανέπτυξαν κριτική σκέψη και ικανότητα επίλυσης προβλημάτων, συνεργάστηκαν αποτελεσματικά και παρουσίασαν αξιόλογες εργασίες. Σύνδεσαν τη γεωγραφία με σύγχρονα και καθημερινά θέματα, ενώ ενίσχυσαν σημαντικά την ψηφιακή τους επάρκεια και την περιβαλλοντική τους ευαισθησία.

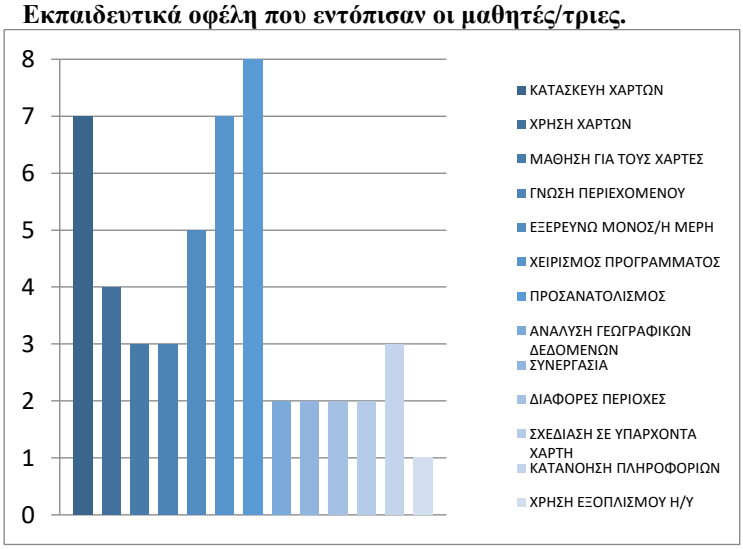
Η αξιολόγηση της δράσης πραγματοποιήθηκε μέσω αρχικού και τελικού ερωτηματολογίου, συστηματικής παρατήρησης της συνεργασίας και συμμετοχής των μαθητών, της ποιότητας των παραδοτέων (ομαδικοί τελικοί χάρτες, παρουσιάσεις) και συζητήσεων-ανατροφοδότησης, μέσα από τις οποίες οι μαθητές εξέφρασαν ενθουσιασμό και ενδιαφέρον για την επανάληψη ή τη συνέχιση παρόμοιων δράσεων.

Η δράση συνέβαλε ουσιαστικά στην αυτοαξιολόγηση της σχολικής μονάδας, ενισχύοντας την καινοτομία στη διδασκαλία και την εισαγωγή ψηφιακών εργαλείων στην καθημερινή πρακτική. Παράλληλα, αναβάθμισε τη διδασκαλία της γεωγραφίας μέσα από βιωματικές και διαθεματικές προσεγγίσεις και συνέβαλε στην ανάπτυξη δεξιοτήτων τόσο των μαθητών όσο και των εκπαιδευτικών.

Η υλοποίηση της καινοτόμου δράσης υπήρξε ιδιαίτερα ωφέλιμη και ουσιαστική για τη μαθητική κοινότητα, καθώς προήγαγε την ενεργητική και διαθεματική μάθηση, ενίσχυσε την κατανόηση της γεωγραφίας και συνέδεσε τη γνώση με την καθημερινή ζωή των μαθητών. Η ενεργός συμμετοχή, η συνέπεια και η ποιότητα των εργασιών των μαθητών επιβεβαιώνουν την επιτυχία της δράσης και ενισχύουν την ανάγκη για συνέχιση ή διεύρυνση παρόμοιων προγραμμάτων στο μέλλον.

Στο παρακάτω γράφημα απεικονίζονται οι απόψεις των μαθητών αναφορικά με τα εκπαιδευτικά οφέλη που εντόπισαν στο συγκεκριμένο λογισμικό. Οι μαθητές απάντησαν σε ανοιχτή ερώτηση που τους δόθηκε, αν και οι απαντήσεις τους συμπλέουν με αντίστοιχες εκπαιδευτικές έρευνες. Αυτό μάς βοηθά να αντιληφθούμε πως οι μαθητές μπορούν να εντοπίσουν οι ίδιοι τι κερδισαν από την εμπλοκή τους στο πρόγραμμά μας.

Γράφημα 1
Εκπαιδευτικά οφέλη που εντόπισαν οι μαθητές/τριες.



ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΜΕΛΛΟΝΤΙΚΕΣ ΤΑΣΕΙΣ

Παρόλο που τα GIS προσφέρουν σημαντικά πλεονεκτήματα, εξακολουθούν να υπάρχουν προκλήσεις, όπως η διαχείριση μεγάλων όγκων δεδομένων και η προστασία της ιδιωτικότητας. Ωστόσο, οι εξελίξεις στην τεχνητή νοημοσύνη και το cloud computing αναμένεται να ενισχύσουν περαιτέρω τις δυνατότητες των GIS.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Οι προσδοκώμενες μαθησιακές ωφέλειες από τη διδασκαλία της γεωγραφίας περιλαμβάνουν μια σειρά θετικών αποτελεσμάτων που ενισχύουν την εκπαιδευτική διαδικασία.

Πρώτον, οι μαθητές αναμένεται να αναπτύξουν δεξιότητες στη χρήση τεχνολογιών και γεωγραφικών δεδομένων, επιτρέποντάς τους να αποκτήσουν γνώση και κατανόηση σε προγράμματα και εργαλεία που είναι κρίσιμα για τη σύγχρονη γεωγραφική ανάλυση.

Δεύτερον, καλλιεργείται η κριτική σκέψη και η ικανότητα ανάλυσης δεδομένων, καθώς οι μαθητές καλούνται να ερμηνεύσουν διάφορες πληροφορίες, να διατυπώσουν ερωτήσεις και να εκφράσουν απόψεις βασισμένες σε στοιχειοθετημένα επιχειρήματα. Η βελτίωση της χωρικής αντίληψης αποτελεί επίσης βασικό μαθησιακό όφελος, καθώς οι μαθητές αποκτούν μια πιο ολοκληρωμένη εικόνα του φυσικού και ανθρωπογενούς περιβάλλοντος.

Επιπλέον, τη σύνδεση της γεωγραφίας με σύγχρονα προβλήματα και προκλήσεις, όπως η κλιματική αλλαγή και η αστική ανάπτυξη, αναδεικνύει τη σημασία της γεωγραφίας στη σύγχρονη κοινωνία.

Τέλος, μέσω της ομαδικής εργασίας, οι μαθητές ενθαρρύνονται να αναπτύξουν δεξιότητες συνεργασίας, επικοινωνίας και επίλυσης προβλημάτων, στοιχεία που είναι ουσιαστικά για την προσωπική και επαγγελματική τους ανάπτυξη.

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ΑΞΙΟΠΟΙΗΣΗ ΑΙΣΘΗΤΗΡΩΝ ΥΓΡΑΣΙΑΣ ΕΔΑΦΟΥΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΠΡΑΞΗ ΜΕ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ

Καραχρήστος Χριστόφορος
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ86)
2ο ΓΕΛ Αιτωλικού
email: karachristos.x@gmail.com

Διαμαντόπουλος Μάριος
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ82)
ΕΝ.Ε.Ε.ΓΥ.-Λ. Κορωπίου
email: diamantmarios@gmail.com

Παντερμαλή Μαρία
Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ88.01)
ΕΝ.Ε.Ε.ΓΥ.-Λ. Μεσολογγίου
email: mpantermali@gmail.com

Πατρόπουλος Αθανάσιος
Διευθυντής, Εκπαιδευτικός Δευτεροβάθμιας Εκπαίδευσης (ΠΕ86)
ΕΝ.Ε.Ε.ΓΥ.-Λ. Μεσολογγίου
email: apatrop@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση ψηφιακών μέσων στη σύγχρονη εκπαιδευτική πραγματικότητα αποτελεί καθοριστικό παράγοντα για την αναβάθμιση της διδασκαλίας και την ανάπτυξη δεξιοτήτων STEM στους μαθητές. Παρόλο που στην Ευρωπαϊκή Ένωση δεν υπάρχει ένας συγκεκριμένος ορισμός, το STEM αναφέρεται γενικά στους τομείς της επιστήμης, της τεχνολογίας, της μηχανικής και των μαθηματικών, οι οποίοι θεωρούνται κρίσιμοι για την καινοτομία, την οικονομική ανάπτυξη και την ευημερία. Η εκπαίδευση STEM δίνει έμφαση στην κριτική σκέψη, την επίλυση προβλημάτων και τη δημιουργικότητα, συνδυάζοντας τη θεωρία με την πρακτική εφαρμογή.

Στο πλαίσιο αυτό, η παρούσα εργασία παρουσιάζει τη χρήση αισθητήρων υγρασίας εδάφους σε συνδυασμό με τεχνολογικά εργαλεία για την ενίσχυση της μαθησιακής διαδικασίας στο μάθημα "Φυτική Παραγωγή" της Β’ τάξης του Ενιαίου Ειδικού Επαγγελματικού Γυμνασίου-Λυκείου (ΕΝ.Ε.Ε.ΓΥ.-Λ.) Μεσολογγίου. Το πρόγραμμα υλοποιήθηκε από μαθητές με την καθοδήγηση των εκπαιδευτικών τους, στο πλαίσιο της εργαστηριακής διδασκαλίας του μαθήματος.

Η προσέγγιση αυτή επιτρέπει τη συλλογή, ανάλυση και οπτικοποίηση δεδομένων που αφορούν την υγρασία του εδάφους σε πραγματικό χρόνο. Οι μαθητές εμπλέκονται ενεργά στην τοποθέτηση αισθητήρων στο σχολικό κήπο, καταγράφουν δεδομένα υγρασίας μέσω ψηφιακών πλατφορμών και λογισμικού, όπως το Arduino και το Raspberry Pi, και συγκρίνουν τις μετρήσεις με παραδοσιακές αρδευτικές πρακτικές. Με τον τρόπο αυτό, αναπτύσσουν βασικές γνώσεις στη γεωπονία, την πληροφορική και τα μαθηματικά, ενισχύοντας παράλληλα την κριτική σκέψη και τις δεξιότητες επίλυσης προβλημάτων.

Επιπλέον, η διαθεματική προσέγγιση αυτής της δράσης καθιστά εφικτή τη σύνδεση της θεωρητικής γνώσης με την πρακτική εφαρμογή, καθιστώντας τη μάθηση πιο βιωματική και προσαρμοσμένη στις ανάγκες των μαθητών. Παράλληλα, η αξιοποίηση των δεδομένων επιτρέπει την ανάπτυξη περιβαλλοντικής συνείδησης και την κατανόηση της σημασίας της ορθολογικής διαχείρισης των φυσικών πόρων, όπως το νερό στην άρδευση.

Η εργασία παρουσιάζει τα στάδια σχεδιασμού και υλοποίησης του προγράμματος, καθώς και τα παιδαγωγικά οφέλη που προκύπτουν από τη χρήση των αισθητήρων υγρασίας στην εκπαιδευτική πρακτική. Επιπλέον, αναλύονται τα τεχνικά και διδακτικά εργαλεία που χρησιμοποιήθηκαν, οι προκλήσεις που αντιμετωπίστηκαν και οι προοπτικές εξέλιξης της μεθόδου στο πλαίσιο της ειδικής αγωγής και εκπαίδευσης.

Τα αποτελέσματα της εφαρμογής καταδεικνύουν ότι η ενσωμάτωση των αισθητήρων υγρασίας εδάφους και των ψηφιακών μέσων στη διδακτική διαδικασία ενισχύει τη βιωματική μάθηση, αναπτύσσει δεξιότητες STEM και ψηφιακού προγραμματισμού και βελτιώνει τη συνεργασία μεταξύ μαθητών και εκπαιδευτικών. Συνεπώς, προτείνεται η επέκταση της μεθοδολογίας και σε άλλες εκπαιδευτικές βαθμίδες, με σκοπό τη δημιουργία καινοτόμων μαθησιακών περιβαλλόντων που αξιοποιούν την τεχνολογία προς όφελος της εκπαίδευσης και της βιώσιμης ανάπτυξης.

Λέξεις – κλειδιά: Αισθητήρες υγρασίας εδάφους, ψηφιακά μέσα στην εκπαίδευση, διαθεματική μάθηση, στρατηγικές STEM

ΤΙ ΕΙΝΑΙ Η ΜΕΘΟΔΟΛΟΓΙΑ STEM;

Το ακρωνύμιο STEM, που περιλαμβάνει τους όρους Επιστήμη, Τεχνολογία, Μηχανική και Μαθηματικά, αποτελεί μια διεπιστημονική εκπαιδευτική προσέγγιση που ενσωματώνει αυτούς τους τομείς για να προάγει την κριτική σκέψη και την καινοτομία (Bybee, 2013). Στόχος του είναι η καλλιέργεια δεξιοτήτων επίλυσης προβλημάτων μέσω βιωματικής μάθησης, η οποία, σύμφωνα με τη θεωρία του Kolb (1984), συνδέει τη θεωρητική γνώση με την πρακτική εφαρμογή, ενισχύοντας τη μαθησιακή εμπειρία. Οι δραστηριότητες STEM, όπως η κατασκευή μοντέλων, ο προγραμματισμός ή τα επιστημονικά πειράματα, ενθαρρύνουν τη δημιουργικότητα και τη συνεργασία, προετοιμάζοντας τους μαθητές για τις τεχνολογικές και επαγγελματικές απαιτήσεις του 21ου αιώνα (Honey et al., 2014; Sanders, 2009). Η διαθεματική φύση του STEM επιτρέπει τη σύνδεση επιστημονικών εννοιών με πραγματικές εφαρμογές, όπως η ανάπτυξη τεχνολογικών λύσεων ή η προώθηση της περιβαλλοντικής ευαισθητοποίησης, ενισχύοντας την κατανόηση μέσω αυθεντικών πλαισίων (Moore et al., 2014). Σε έναν κόσμο που εξελίσσεται ραγδαία τεχνολογικά, το STEM καλλιεργεί δεξιότητες όπως η αναλυτική σκέψη, η προσαρμοστικότητα και η ψηφιακή ικανότητα, οι οποίες είναι κρίσιμες για τη σύγχρονη αγορά εργασίας (Ertmer & Ottenbreit-Leftwich, 2010). Επιπρόσθετα, η STEM προσέγγιση υποστηρίζει την ανάπτυξη κοινωνικών δεξιοτήτων μέσω συνεργατικών έργων, ενισχύοντας την ομαδικότητα και την επικοινωνία, όπως υπογραμμίζει η θεωρία της κοινωνικής μάθησης (Vygotsky, 1978). Έτσι, το STEM καθίσταται βασικός πυλώνας της σύγχρονης εκπαίδευσης, προσφέροντας ένα ολιστικό πλαίσιο μάθησης που προετοιμάζει τους μαθητές για τις προκλήσεις του μέλλοντος.

Η ΔΥΝΑΜΙΚΗ ΕΝΣΩΜΑΤΩΣΗ ΤΗΣ STEM ΕΚΠΑΙΔΕΥΣΗΣ ΚΑΙ ΤΗΣ ΒΙΩΜΑΤΙΚΗΣ ΜΑΘΗΣΗΣ ΣΤΗΝ ΕΙΔΙΚΗ ΑΓΩΓΗ

Η σύγχρονη παιδαγωγική προσέγγιση μετασχηματίζει τη μάθηση από παθητική αποστήθιση σε ενεργή, συμμετοχική εμπειρία, συνδέοντας θεωρία και πράξη. Στο πλαίσιο αυτό, η μεθοδολογία STEM (Επιστήμη, Τεχνολογία, Μηχανική, Μαθηματικά) στην ειδική αγωγή αποτελεί καινοτόμο επιλογή που ανταποκρίνεται στις μαθησιακές ανάγκες μαθητών με δυσκολίες ή αναπηρίες (Tomlinson, 2017).

Η εκπαίδευση STEM προάγει δεξιότητες κριτικής σκέψης, επίλυσης προβλημάτων και δημιουργικότητας, κρίσιμες για τη γνωστική ανάπτυξη (Bargerhuff, 2013; Vygotsky, 1978; Bybee, 2013). Πρακτικές δραστηριότητες, όπως η κατασκευή μοντέλων, η ρομποτική ή ο προγραμματισμός, διευκολύνουν την κατανόηση αφηρημένων εννοιών μέσω χειροπιαστών εμπειριών. Για παράδειγμα, η δημιουργία ενός ηλιακού συστήματος ή η παρακολούθηση υγρασίας φυτών με αισθητήρες ενεργοποιούν τη μάθηση και ενισχύουν την αυτοπεποίθηση.

Η βιωματική και διαθεματική προσέγγιση ενισχύει την εμπλοκή και προσαρμόζεται στις ιδιαίτερες ανάγκες των μαθητών (Honey et al., 2014; Kolb, 1984; McLeskey et al., 2017). Η σύνδεση γνωστικών αντικειμένων, όπως βιολογία, τεχνολογία και μαθηματικά, προσδίδει νόημα στη μάθηση και επιτρέπει την εξατομίκευση, κρίσιμη στην ειδική αγωγή (Basham & Marino, 2013). Δραστηριότητες όπως η φροντίδα σχολικού κήπου με τεχνολογικά εργαλεία ή συνεργατικά έργα ενισχύουν δεξιότητες ζωής, υπευθυνότητας και αυτονομίας.

Η συνεργατική μάθηση, βασικό στοιχείο της βιωματικής εκπαίδευσης, αναπτύσσει κοινωνικές δεξιότητες και το αίσθημα του ανήκειν (Koliadis, 2011; Johnson & Johnson, 2014). Η ομαδική εργασία και η συλλογική επίλυση προβλημάτων προάγουν αξίες όπως ο σεβασμός και η κοινωνική ένταξη, ιδιαίτερα για μαθητές με ειδικές ανάγκες.

Συμπερασματικά, η ενσωμάτωση του STEM σε μια βιωματική, διαθεματική προσέγγιση αποτελεί αναγκαιότητα για ολιστική εκπαίδευση. Υποστηρίζει τη γνωστική, κοινωνική και συναισθηματική ανάπτυξη, καλλιεργώντας δεξιότητες ζωής και προετοιμάζοντας μαθητές για τις προκλήσεις του κόσμου (Moore et al., 2014). Είναι μια μετασχηματιστική πρακτική, ιδιαίτερα αποτελεσματική στην ειδική αγωγή, προάγοντας διαφοροποίηση, ενδυνάμωση και ένταξη.

ΠΕΡΙΓΡΑΦΗ ΤΗΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΔΡΑΣΗΣ

Οι γενικοί στόχοι της δράσης επικεντρώνονται στην κατανόηση επιστημονικών εννοιών, όπως η υγρασία εδάφους στη γεωπονία, και στην εξοικείωση με τεχνολογικά εργαλεία, όπως Arduino, αισθητήρες και λογισμικά Node.js και Node-RED. Επιπλέον, περιλαμβάνουν την κατασκευή και τον προγραμματισμό κυκλωμάτων, καθώς και τη μέτρηση και ανάλυση δεδομένων μέσω διαγραμμάτων. Οι ειδικοί παιδαγωγικοί στόχοι προάγουν την περιβαλλοντική συνείδηση και τη βιώσιμη διαχείριση πόρων, καλλιεργούν κοινωνικές και συνεργατικές δεξιότητες, ενισχύουν τον ψηφιακό γραμματισμό και την αυτονομία, ενώ υποστηρίζουν τη μαθησιακή κατανόηση μέσω πρακτικών εφαρμογών. Η STEM προσέγγιση, μέσα από αυτούς τους στόχους, προετοιμάζει τους μαθητές για τις σύγχρονες προκλήσεις, συνδέοντας τη θεωρία με την πράξη (Bybee, 2013).

Η δράση εντάχθηκε στο μάθημα «Φυτική παραγωγή» της Β' τάξης ΕΝ.Ε.Ε.ΓΥ.-Λ. Μεσολογγίου, διήρκεσε 5 εβδομάδες και συμμετείχαν 6 μαθητές. Η διδασκαλία ήταν διαθεματική και συνεργατική, με εμπλοκή καθηγητών γεωπονίας και πληροφορικής. Οι μαθητές ανέλαβαν ρόλους (τεχνική, τεκμηρίωση, παρουσίαση), εργάστηκαν σε ομάδες και τοποθέτησαν αισθητήρες υγρασίας εδάφους και θερμοκρασίας, δημιουργώντας ένα αυτοματοποιημένο σύστημα παρακολούθησης.

Για την πραγματοποίηση της Δράσης αξιοποιήθηκαν σύγχρονα τεχνολογικά μέσα και πλατφόρμες για την ενίσχυση της μάθησης και την ανάπτυξη δεξιοτήτων. Το Arduino UNO χρησιμοποιείται για τη συλλογή και μετάδοση δεδομένων, επιτρέποντας στους μαθητές να εξοικειωθούν με τη λειτουργία μικροελεγκτών. Το Node-RED διευκολύνει την επεξεργασία ροών δεδομένων και την ανάπτυξη διαδραστικών dashboards, προσφέροντας οπτικοποιημένες λύσεις για την ανάλυση πληροφοριών. Οι αισθητήρες DHT11 και YL-69 εφαρμόζονται για τη μέτρηση θερμοκρασίας και υγρασίας, συνδέοντας την τεχνολογία με περιβαλλοντικές εφαρμογές. Το Excel χρησιμοποιείται για την ανάλυση δεδομένων και τη στατιστική επεξεργασία, βοηθώντας τους μαθητές να ερμηνεύουν δεδομένα μέσω διαγραμμάτων. Αυτά τα εργαλεία προάγουν τον ψηφιακό γραμματισμό και την πρακτική κατανόηση, ενισχύοντας τη διαθεματική μάθηση και την καινοτομία στην εκπαίδευση (Honey et al., 2014).

ΜΕΘΟΔΟΛΟΓΙΑ ΥΛΟΠΟΙΗΣΗΣ

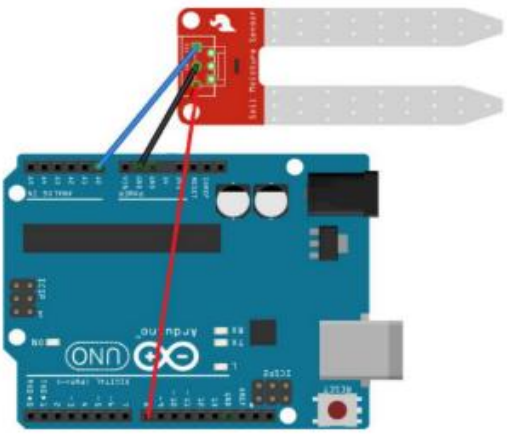
Η υλοποίηση ενός STEM έργου, όπως η ανάπτυξη ενός συστήματος παρακολούθησης υγρασίας για τον σχολικό κήπο, περιλαμβάνει πέντε διαδοχικές φάσεις που συνδυάζουν επιστημονική έρευνα, τεχνολογική εφαρμογή και συνεργατική μάθηση. Κάθε φάση έχει σχεδιαστεί για να προάγει τη δημιουργικότητα, την κριτική σκέψη και τις δεξιότητες επίλυσης προβλημάτων των μαθητών, ενώ παράλληλα ενισχύει την περιβαλλοντική συνείδηση.

Στην πρώτη φάση, οι μαθητές κλήθηκαν να εντοπίσουν το πρόβλημα μέσω μιας καθοδηγητικής ερώτησης: «Πώς μπορούμε να γνωρίζουμε πότε χρειάζεται πότισμα ο σχολικός μας κήπος χωρίς να σπαταλάμε νερό;» Μέσα από ομαδική συζήτηση, κατέγραψαν τις ιδέες τους στον πίνακα, θέτοντας τις βάσεις για την έρευνά τους. Αυτή η διαδικασία όχι μόνο ενεργοποίησε τη σκέψη τους αλλά και τους βοήθησε να συνειδητοποιήσουν τη σημασία της βιώσιμης διαχείρισης πόρων.

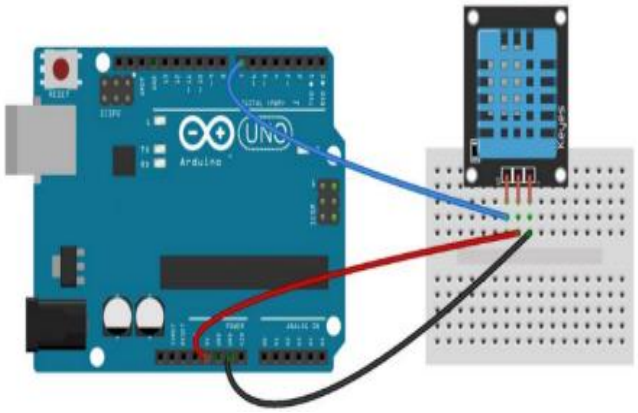
Στη δεύτερη φάση, επικεντρώθηκαν στον σχεδιασμό και τον προγραμματισμό. Οι μαθητές εξοικειώθηκαν με τεχνολογικά εργαλεία όπως το Arduino, οι αισθητήρες υγρασίας και το Node-RED, ενώ σχεδίασαν το κύκλωμα και το πρωτότυπο του συστήματος. Χρησιμοποιήθηκαν διδακτικά εργαλεία, όπως PDF με οδηγίες βήμα-βήμα, το Arduino IDE και το Node.js, για την υποστήριξη της διαδικασίας. Για την αποτελεσματική οργάνωση, δημιουργήθηκαν τρεις ομάδες: η τεχνική ομάδα, η ομάδα τεκμηρίωσης και η ομάδα παρουσίασης. Αυτή η κατανομή ρόλων προώθησε τη συνεργασία και την ανάπτυξη δεξιοτήτων οργάνωσης.

Η τρίτη φάση περιλάμβανε την κατασκευή και τον πειραματισμό. Οι μαθητές συνέδεσαν τους αισθητήρες (Εικόνα 1, Εικόνα 2), προγραμμάτισαν το σύστημα (Εικόνα 3) και κατέγραψαν δεδομένα υγρασίας (Εικόνα 4). Παράλληλα, ρύθμισαν ένα διαδραστικό dashboard στο Node-RED για την οπτικοποίηση των δεδομένων. Η διαδικασία εμπλουτίστηκε με την ανάλυση των δεδομένων στο Excel στο εργαστήριο πληροφορικής, ενισχύοντας τις δεξιότητες μαθηματικής επεξεργασίας και ερμηνείας.

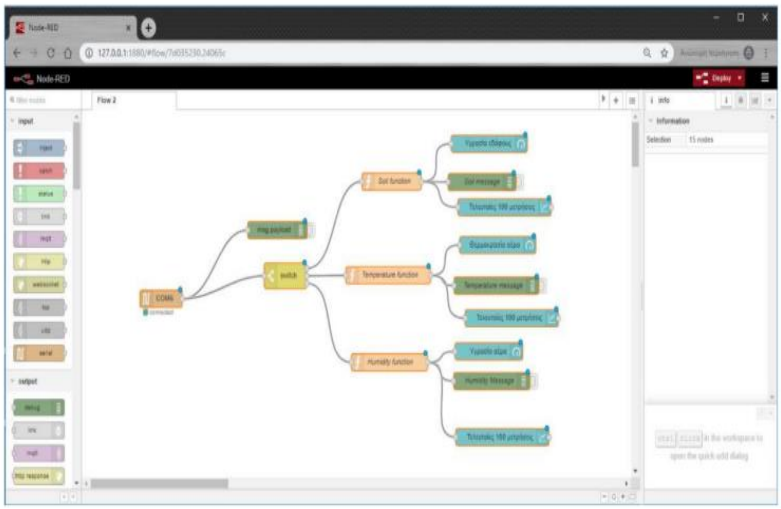
Εικόνα 1
Σύνδεση Soil Moisture Sparkfun με Arduino UNO



Εικόνα 2
Σύνδεση DHT-11 3 ακίδων με Arduino UNO



Εικόνα 3
Node-Red ανάπτυξη



Εικόνα 4
Dashboards με γραφήματα και real-time δεδομένα



Στην τέταρτη φάση, οι μαθητές συμμετείχαν σε αναστοχασμό και ανάλυση. Συζήτησαν τη χρησιμότητα του συστήματος για τη διαχείριση του σχολικού κήπου και πρότειναν βελτιώσεις, όπως την προσθήκη αυτοματισμών ή

triggers για πιο αποδοτική λειτουργία. Αυτή η φάση καλλιέργησε την κριτική σκέψη και την ικανότητα αξιολόγησης της δουλειάς τους, ενισχύοντας την αυτοπεποίθησή τους.

Τέλος, στην πέμπτη φάση, οι μαθητές παρουσίασαν τα αποτελέσματα του έργου σε καθηγητές και συμμαθητές, διαχέοντας τη γνώση και τα επιτεύγματά τους (Εικόνα 5). Η παρουσίαση όχι μόνο ανέδειξε το έργο τους αλλά και ενίσχυσε τις δεξιότητες επικοινωνίας και δημόσιας ομιλίας.

Εικόνα 5
Τελικό αποτέλεσμα σε μικρή κλίμακα



Η διαδικασία υλοποίησης του έργου αποδεικνύει τη δυναμική της STEM προσέγγισης να συνδυάζει θεωρητική γνώση, πρακτική εφαρμογή και συνεργασία. Μέσα από αυτά τα στάδια, οι μαθητές ανέπτυξαν όχι μόνο τεχνικές δεξιότητες αλλά και περιβαλλοντική ευαισθητοποίηση, ψηφιακό γραμματισμό και κοινωνικές ικανότητες, καθιστώντας το έργο πρότυπο για τη σύγχρονη εκπαίδευση.

ΑΠΟΤΕΛΕΣΜΑΤΑ ΚΑΙ ΠΑΡΑΤΗΡΗΣΕΙΣ

Η ανάλυση των δεδομένων που συλλέχθηκαν από την εκπαιδευτική παρέμβαση κατέδειξε θετικό παιδαγωγικό αντίκτυπο, τόσο σε ποσοτικό όσο και σε ποιοτικό επίπεδο. Συγκεκριμένα, το 75% των μαθητών κατανόησε την έννοια της υγρασίας εδάφους, γεγονός που υποδηλώνει αποτελεσματική κατανόηση επιστημονικών εννοιών μέσα από βιωματική προσέγγιση. Παράλληλα, το 65% των συμμετεχόντων ήταν σε θέση να περιγράψει με σαφήνεια τη λειτουργία του αισθητήρα, καταδεικνύοντας την επιτυχή σύνδεση θεωρίας και πράξης.

Στο επίπεδο της συνεργατικότητας και της κοινωνικής αλληλεπίδρασης, το 80% των μαθητών συμμετείχε ενεργά στις ομαδικές δραστηριότητες, γεγονός που ενισχύει τη θέση πως η ομαδοσυνεργατική μάθηση μέσα από STEM εφαρμογές μπορεί να προάγει δεξιότητες συνεργασίας και ενδυνάμωσης.

Πέραν των ποσοτικών δεδομένων, η ποιοτική ανάλυση των μαθητικών σχολίων ανέδειξε τη συναισθηματική εμπλοκή και τον αυξημένο ενθουσιασμό για τη μαθησιακή διαδικασία. Μαθητές δήλωσαν πως *«μου άρεσε που κάναμε κάτι αληθινό, όχι μόνο θεωρία»*, επιβεβαιώνοντας την αξία της βιωματικής μάθησης. Ένα άλλο χαρακτηριστικό σχόλιο, *«νιώθω σαν επιστήμονας!»*, υπογραμμίζει την ενίσχυση της αυτοεκτίμησης και της προσωπικής εμπλοκής στη μάθηση.

Τα παραπάνω αποτελέσματα επιβεβαιώνουν ότι η εκπαιδευτική προσέγγιση που βασίζεται στη μεθοδολογία STEM όχι μόνο ενισχύει τη γνωστική κατανόηση αλλά και προάγει την αυτενέργεια, τη συνεργασία και τη θετική στάση απέναντι στη μάθηση. Ιδιαίτερα για μαθητές με μαθησιακές δυσκολίες, η σύνδεση της θεωρίας με την πράξη και η συμμετοχή σε ουσιαστικές δραστηριότητες συνιστούν κρίσιμους παράγοντες για την ενίσχυση της εκπαιδευτικής τους εμπειρίας.

ΣΥΖΗΤΗΣΗ – ΣΥΜΠΕΡΑΣΜΑΤΑ

Η εκπαιδευτική παρέμβαση που βασίστηκε στην προσέγγιση STEM και υλοποιήθηκε μέσω της εγκατάστασης και παρακολούθησης αισθητήρων υγρασίας σε σχολικό κήπο, ανέδειξε την καταλληλότητα της μεθοδολογίας ως

αποτελεσματικού εργαλείου στην ειδική αγωγή. Η δράση συνδύασε την επιστήμη, την τεχνολογία, τη μηχανική και τα μαθηματικά με βιωματικό και λειτουργικό τρόπο, ενισχύοντας τη μαθησιακή εμπειρία, τον ψηφιακό προγραμματισμό και την κοινωνική ενσωμάτωση των μαθητών με ειδικές εκπαιδευτικές ανάγκες.

Οι μαθητές τοποθέτησαν αισθητήρες στον σχολικό κήπο, παρακολούθησαν πραγματικές μετρήσεις υγρασίας και ανέλυσαν δεδομένα μέσω διαδραστικών εργαλείων όπως το Arduino και το Node-RED. Η δραστηριότητα αυτή ενίσχυσε την κατανόηση αφηρημένων εννοιών, όπως η υγρασία του εδάφους, μέσω οπτικής και πρακτικής υποστήριξης, σύμφωνα με τις αρχές της καθολικής σχεδίασης για τη μάθηση (Rose & Meyer, 2002). Παράλληλα, καλλιεργήθηκαν αναλυτικές και μεταγνωστικές δεξιότητες, καθώς οι μαθητές συνέκριναν τα δεδομένα των αισθητήρων με παραδοσιακές μεθόδους ποτίσματος και πρότειναν βελτιώσεις, αναπτύσσοντας κριτική σκέψη και ικανότητες επίλυσης προβλημάτων (Honey et al., 2014).

Η διεπιστημονικότητα της δράσης αποδείχθηκε καθοριστική. Η γεωπονική παρατήρηση συνδυάστηκε με την τεχνολογική διαχείριση, τη μαθηματική ανάλυση δεδομένων και την περιβαλλοντική ευαισθητοποίηση. Μέσα από αυτή τη διαθεματική σύνθεση, η μάθηση απέκτησε ουσιαστικό νόημα και λειτουργικό χαρακτήρα (Bybee, 2013· Moore et al., 2014), προσφέροντας ευκαιρίες ενεργού συμμετοχής, ανεξαρτήτως του γνωστικού επιπέδου ή των δυσκολιών των μαθητών.

Σημαντική ήταν και η συμβολή της ομαδοσυνεργατικής μάθησης: οι μαθητές ανέλαβαν ρόλους (τοποθέτηση αισθητήρων, λήψη και καταγραφή μετρήσεων, παρακολούθηση μεταβολών), γεγονός που ενίσχυσε τις κοινωνικές και οργανωτικές τους δεξιότητες, όπως η υπευθυνότητα, η επικοινωνία και η συνεργασία (Bargerhuff, 2013). Ταυτόχρονα, η δυνατότητα να βλέπουν άμεσα και απτά τα αποτελέσματα της εργασίας τους συνέβαλε στην ενίσχυση της αυτοεκτίμησης και του αισθήματος προσωπικής επίτευξης, στοιχεία που σχετίζονται με την αυτοαποτελεσματικότητα (Bandura, 1997).

Η βιωματική φύση της δράσης υποστήριξε και την ανάπτυξη οικολογικής συνείδησης. Οι μαθητές, μέσω της παρακολούθησης της υγρασίας και της ορθολογικής διαχείρισης του νερού, συνειδητοποίησαν την αξία της τεχνολογίας στην αειφόρο ανάπτυξη, καλλιεργώντας στάσεις υπευθυνότητας και περιβαλλοντικής ευαισθησίας.

Τέλος, αξίζει να σημειωθεί ότι η εστίαση στην πράξη και η χρήση σύγχρονων τεχνολογιών ενίσχυσαν τον ψηφιακό προγραμματισμό, προσφέροντας πρόσβαση στην τεχνολογία ακόμη και σε μαθητές χωρίς προηγούμενη εμπειρία. Η επιτυχής ενσωμάτωση μιας τέτοιας STEM δράσης αποδεικνύει ότι η τεχνολογική και βιωματική εκπαίδευση μπορεί να συμβάλει στην παιδαγωγική διαφοροποίηση και την ισότιμη συμμετοχή των μαθητών με ειδικές ανάγκες, προάγοντας μια ανθρώπινη, δυναμική και ουσιαστική ειδική αγωγή.

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ΠΑΡΟΥΣΙΑΣΗ ΚΑΛΩΝ ΠΡΑΚΤΙΚΩΝ ΑΞΙΟΠΟΙΗΣΗΣ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΚΤΙΚΗ ΠΡΑΞΗ ΚΑΙ ΕΦΑΡΜΟΓΗ ΔΡΑΣΤΗΡΙΟΤΗΤΩΝ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΚΑΙ ΑΞΙΟΛΟΓΗΣΗΣ ΜΕ ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ, ΣΥΜΦΩΝΑ ΜΕ ΤΟ ΝΕΟ ΠΡΟΓΡΑΜΜΑ ΣΠΟΥΔΩΝ ΤΟΥ 2023 ΓΙΑ ΤΟ ΜΑΘΗΜΑ ΤΩΝ ΓΑΛΛΙΚΩΝ

Σίτα Ντούντα Ευαγγελία
Εκπαιδευτικός ΠΕ05 Γαλλικής ΔΙ.Δ.Ε. Ιωαννίνων, Μ.Δ.Ε. ΕΑΠ
Αρτα, Ελλάδα
e-mail: evangelia.sita@gmail.com

Αγγέλη Δήμητρα
Μεταπτυχιακή Φοιτήτρια «Πολιτική, Διοίκηση και Αξιολόγηση στην Εκπαίδευση» Παι.Τ.Δ.Ε. του Ε.Κ.Π.Α, ΠΕ05 Γαλλικής ΔΙ.Π.Ε. Ιονίων Νήσων, Μ.Δ.Ε. ΕΑΠ
Αρτα, Ελλάδα
e-mail: dimoulaaggeli71@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση και αξιοποίηση των ψηφιακών τεχνολογιών στην ξενόγλωσση εκπαίδευση διαδραματίζει πρωταγωνιστικό ρόλο στην υλοποίηση των στόχων του Νέου Προγράμματος Σπουδών σε έναν συνεχώς εξελισσόμενο ψηφιακό κόσμο που βαδίζει ταχύτατα πλέον στην εποχή της τεράστιας επίδρασης των εργαλείων τεχνητής νοημοσύνης. Η παιδαγωγικά προσανατολισμένη αξιοποίηση τους στη διδασκαλία με βάση τον σχεδιασμό του μαθήματος και τα προσδοκώμενα μαθησιακά αποτελέσματα εμπλουτίζει το περιεχόμενο της με πλούσιο αυθεντικό και επίκαιρο υλικό.

Η μαθησιακή διαδικασία γίνεται πιο ελκυστική και παιγνιώδης για τους/τις μαθητές/τριες, συμμετέχοντας πλέον οι ίδιοι ενεργά με δραστηριότητες βιωματικού χαρακτήρα μέσα σε ψηφιακά περιβάλλοντα, αναπτύσσοντας με τον τρόπο αυτό δεξιότητες ψηφιακού γραμματισμού καθώς και πλήθος άλλων ήπιων και κοινωνικών δεξιοτήτων μετατρέποντας με αυτό τον τρόπο σταδιακά την τάξη σε κοινότητα δημιουργικής μάθησης.

Σκοπός της παρούσας εισήγησης είναι να αναδείξει τις δυνατότητες που προσφέρουν τα ψηφιακά εργαλεία για τη διαφοροποίηση της διδασκαλίας και της αξιολόγησης, καθώς και να παρουσιάσει συγκεκριμένες πρακτικές και παραδείγματα εφαρμογής τους στην εκπαιδευτική πράξη. Επιπλέον, επιδιώκει να εξετάσει τις προκλήσεις και τις προοπτικές που συνδέονται με την ενσωμάτωση των νέων τεχνολογιών στον διδακτικό σχεδιασμό σύμφωνα με τα Νέα Αναλυτικά Προγράμματα Σπουδών.

Πιο συγκεκριμένα, η παρουσίαση μας θα αναδείξει ότι τα ψηφιακά εργαλεία υποστηρίζουν την παροχή εξατομικευμένων μαθησιακών εμπειριών, οι οποίες ανταποκρίνονται στις ανάγκες και τα ενδιαφέροντα κάθε μαθητή, δημιουργούν ευέλικτα μαθησιακά περιβάλλοντα, τα οποία επιτρέπουν στους μαθητές να μαθαίνουν με τον δικό τους τρόπο και ρυθμό, αναπτύσσουν ψηφιακές δεξιότητες σε μαθητές/τριες και εκπαιδευτικούς.

Επιπλέον, θα αναδείξει ότι το e-portfolio, ως ένα δυναμικό αποθετήριο μαθησιακών τεκμηρίων, αναδύεται ως σημαντικό εργαλείο στη μαθησιακή αξιολόγηση. Ενσωματώνοντας αρχές της αυθεντικής αξιολόγησης, το e-portfolio επιτρέπει την ολιστική αποτύπωση της μαθησιακής πορείας, εστιάζοντας στην ανάπτυξη μεταγνωστικών δεξιοτήτων και στην ενίσχυση της αυτορρύθμισης. Μέσω της συγκέντρωσης ποικίλων artifacts, το e-portfolio προάγει την ενδοσκόπηση και την κριτική ανάλυση, διευκολύνοντας τη διαμορφωτική αξιολόγηση και παρέχοντας μια συνεχή ανατροφοδότηση για τη βελτίωση της μάθησης.

Τέλος, οι προτάσεις μας απευθύνονται σε εκπαιδευτικούς, ερευνητές, υπεύθυνους χάραξης εκπαιδευτικής πολιτικής και σε άλλους ενδιαφερόμενους, προτείνοντας δράσεις για την προώθηση της διαφοροποιημένης διδασκαλίας και αξιολόγησης με χρήση ψηφιακών εργαλείων συμβάλλοντας στην ανάπτυξη και εφαρμογή καινοτόμων διδακτικών πρακτικών, οι οποίες ανταποκρίνονται στις ανάγκες των μαθητών/τριών του 21ου αιώνα.

Λέξεις-κλειδιά: ψηφιακά εργαλεία, διαφοροποιημένη διδασκαλία, e-portfolio, νέα αναλυτικά προγράμματα σπουδών

ΕΙΣΑΓΩΓΗ

Η διαφοροποιημένη διδασκαλία στην ξενόγλωσση εκπαίδευση αποτελεί παιδαγωγική επιταγή, καθώς ανταποκρίνεται στην ετερογένεια των μαθητών, ενισχύοντας την ενσωμάτωση και την ισότιμη πρόσβαση στη γνώση, σύμφωνα με τις αρχές της συμπεριληπτικής εκπαίδευσης (Tomlinson, 2014). Η χρήση ψηφιακών εργαλείων εμπλουτίζει τη μαθησιακή διαδικασία, προσφέροντας εξατομικευμένες εμπειρίες και προάγοντας την ενεργητική συμμετοχή των μαθητών, όπως υποστηρίζεται από την UNESCO (2019) και το Ευρωπαϊκό Πλαίσιο Ψηφιακών Ικανοτήτων για τους Εκπαιδευτικούς (DigCompEdu).

Το ηλεκτρονικό portfolio (ePortfolio) αναδεικνύεται σε δυναμικό εργαλείο αυθεντικής αξιολόγησης, επιτρέποντας την ολιστική αποτύπωση της μαθησιακής πορείας και την ανάπτυξη μεταγνωστικών δεξιοτήτων, σύμφωνα με τις αρχές της διαμορφωτικής αξιολόγησης (Barrett, 2007). Η ενσωμάτωση αυτών των πρακτικών στην ξενόγλωσση εκπαίδευση συμβάλλει στην ανάπτυξη κρίσιμων δεξιοτήτων του 21ου αιώνα, όπως ο ψηφιακός εγγραμματισμός, η αυτορρύθμιση και η συνεργασία. Στην Ελλάδα, η νομοθεσία και οι οδηγίες του ΙΕΠ προωθούν την αξιοποίηση ψηφιακών εργαλείων και την εφαρμογή καινοτόμων παιδαγωγικών πρακτικών για τη βελτίωση της ποιότητας της εκπαίδευσης. Τα ερωτήματα, λοιπόν, τα οποία θέσαμε και εμείς, είναι τα εξής: Γιατί Διαφοροποιημένη Διδασκαλία; Γιατί Ψηφιακά Εργαλεία; Γιατί Ηλεκτρονικός Φάκελος;

ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗ ΔΙΔΑΣΚΑΛΙΑ ΣΤΗΝ ΞΕΝΟΓΛΩΣΣΗ ΕΚΠΑΙΔΕΥΣΗ

Το σημερινό εκπαιδευτικό περιβάλλον είναι πιο ετερογενές από ποτέ, προσφέροντας προκλήσεις αλλά και ευκαιρίες για τους εκπαιδευτικούς. Αντιμέτωπος με τις διαφορετικές μαθησιακές ανάγκες και τη γλωσσική επάρκεια των μαθητών, ειδικά στην ξένη γλώσσα, ο εκπαιδευτικός καλείται να διασφαλίσει ισότιμη πρόσβαση στην εκπαίδευση για όλους.

Η Διαφοροποιημένη Διδασκαλία είναι μια απαραίτητη φιλοσοφία για ένα συμπεριληπτικό σχολείο. Προσαρμόζει τη διδασκαλία στα διαφορετικά προφίλ των μαθητών – λαμβάνοντας υπόψη την ετοιμότητα, τα ενδιαφέροντα, το μαθησιακό στυλ, τις εμπειρίες και τις συνθήκες ζωής τους – αντί να ακολουθεί αυστηρά ένα ενιαίο πρόγραμμα σπουδών.

Η υιοθέτησή της δικαιολογείται από παιδαγωγικούς (δυνατότητα επιλογής εργασιών, εξατομίκευση), ψυχολογικούς (οι μαθητές αναδομούν τη γνώση και βρίσκουν το σχολείο ελκυστικό) και κοινωνικούς λόγους (ισότητα ευκαιριών, αποφυγή διακρίσεων). Η Διαφοροποιημένη Διδασκαλία είναι το κλειδί για ένα δίκαιο και αποτελεσματικό εκπαιδευτικό περιβάλλον που ανταποκρίνεται στις ανάγκες κάθε μαθητή.

ΤΑ ΨΗΦΙΑΚΑ ΜΕΣΑ ΚΑΙ Ο ΓΡΑΜΜΑΤΙΣΜΟΣ ΤΟΥ 21ΟΥ ΑΙΩΝΑ

Στη σημερινή κοινωνία του 21ου αιώνα, με την εξέλιξη των ψηφιακών τεχνολογιών αναδύονται νέες μορφές γραμματισμού που ξεπερνούν την ικανότητα για κατανόηση και παραγωγή προφορικού και γραπτού λόγου. Αυτές περιλαμβάνουν, μεταξύ άλλων, την ανάπτυξη ικανοτήτων σε: οπτικό γραμματισμό (ικανότητα κατανόησης και παραγωγής εικόνας), ψηφιακό γραμματισμό (ικανότητα χρήσης της ψηφιακής τεχνολογίας και εργαλείων εντοπισμού και χρήση της πληροφορίας), πληροφοριακό γραμματισμό (ικανότητα ανεύρεσης, αξιολόγησης και σύνθεσης της πληροφορίας) και τέλος, κριτικό γραμματισμό (ικανότητα του να θέτει κανείς ερωτήματα, να αμφισβητεί και να αξιολογεί τις έννοιες που πραγματεύεται ένα κείμενο).

Κρίνεται πλέον αναγκαίο οι μελλοντικοί πολίτες να αναπτύξουν νέους γραμματισμούς λόγω της «νέας επικοινωνιακής τάξης πραγμάτων» και της ευρείας χρήσης των ψηφιακών μέσων. Η ξένη γλώσσα παίζει σημαντικό ρόλο σε αυτή την προσαρμογή, καθώς τα ψηφιακά μέσα μετατρέπονται σε μέσα πρακτικού γραμματισμού, επηρεάζοντας δυναμικά τις διδακτικές πρακτικές και το περιεχόμενο του μαθήματος της ξένης γλώσσας.

Η νέα κειμενικότητα μεταβάλλει ριζικά την αντίληψη της γλώσσας, της γνώσης, του κειμένου, της επικοινωνίας και των ανθρώπινων ταυτοτήτων. Οι εκπαιδευτικοί θα πρέπει να είναι ικανοί να κινούνται δυναμικά μεταξύ της παλιάς και της νέας πραγματικότητας, προκειμένου να προωθηθεί ένας κριτικός γραμματισμός στον 21ο αιώνα.

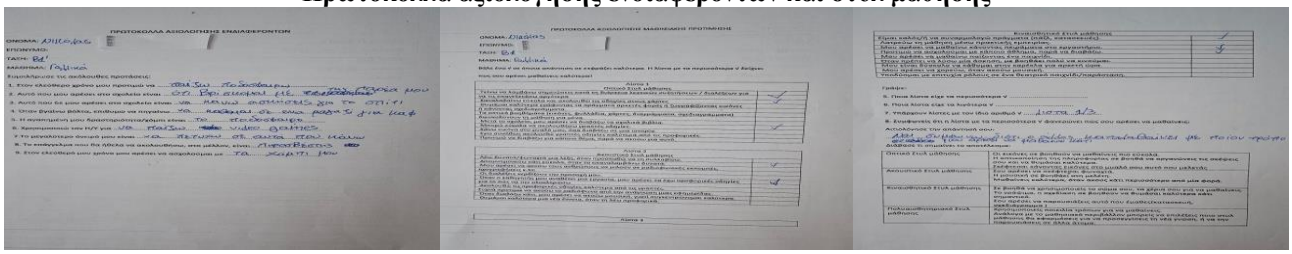
ΑΡΧΕΣ ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗΣ ΔΙΔΑΣΚΑΛΙΑΣ ΚΑΙ ΟΡΓΑΝΩΣΗ ΤΑΞΗΣ

Πριν την εφαρμογή της ΔΔ στην ξενόγλωσση τάξη ο εκπαιδευτικός μοιράζει τα πρωτόκολλα αξιολόγησης ενδιαφερόντων και μαθησιακής προτίμησης στους μαθητές/τριες του με σκοπό να τους γνωρίσει καλύτερα, να ανακαλύψει σε ποιο στυλ μάθησης ανήκουν ετσι ώστε να είναι σε θέση να οργανώσει το μαθημα του με πιο κατάλληλο

τρόπο. Το βήμα αυτό είναι ιδιαίτερα σημαντικό και βοηθητικό γιατί τις περισσότερες φορές το μαθητικό δυναμικό της ξενόγλωσσης τάξης χαρακτηρίζεται από ιδιαίτερη ανομοιογένεια εξαιτίας των διαφορετικών επιπέδων γλωσσομάθειας, ενδιαφερόντων και προφίλ μάθησης.

Αυτοί οι μαθητές έχουν ανάγκη από εμπνευσμένα διαφοροποιημένα μαθήματα που θα τους επιτρέψουν να επιδείξουν τις μαθησιακές τους ικανότητες (Heacox, 2002). Στη συνέχεια ο εκπαιδευτικός συγκεντρώνει τα πρωτόκολλα με τις απαντήσεις των μαθητών/τριών του και τους χωρίζει σε ομάδες ανάλογα με το στυλ μάθησης και τα ενδιαφέροντα που έχουν καταγραφεί στο πρωτόκολλο. Ο χωρισμός αυτός δεν είναι εφικτός σε κάθε διδακτική ώρα, αποτελεί όμως το βασικό κριτήριο για να συνεργάζονται και να δουλεύουν καλύτερα οι ομάδες.

Εικόνα 1
Πρωτόκολλα αξιολόγησης ενδιαφερόντων και στυλ μάθησης



Διδακτικό παράδειγμα διαφοροποιημένης διδασκαλίας και μάθησης με χρήση ψηφιακών εργαλείων

Η διδασκαλία μπορεί να διαφοροποιηθεί ως προς το περιεχόμενο (πολλαπλές πηγές άντλησης των πληροφοριών και διαφορετικά επίπεδα δυσκολίας), τη διαδικασία (πολλαπλές διαδικασίες δημιουργίας νοήματος) και το τελικό προϊόν (πολλαπλές μορφές έκφρασης της γνώσης).

ΣΤΡΑΤΗΓΙΚΕΣ ΔΙΑΦΟΡΟΠΟΙΗΣΗΣ ΤΗΣ ΔΙΔΑΣΚΑΛΙΑΣ

Think – Tac – Toe (Τρίλιζα)

Εικόνα 2
Tic-Tac-Toe/Τρίλιζα

Think-Tac-Toe με θέμα το γαλλικό έθιμο La Chandeleur

Vive la Chandeleur!

Διαλέξτε τρεις από τις παρακάτω προτεινόμενες δραστηριότητες σχηματίζοντας τρίλιζα. Προσοχή η δραστηριότητα που βρίσκεται στο κέντρο είναι υποχρεωτική!

Δημιουργήστε μια αφίσα σε έντυπη ή ηλεκτρονική μορφή για να ενημερώσετε τους συμμαθητές σας για την γιορτή της κρέπας στην τάξη σας!	Ετοιμαστείτε για να παραγγείλετε νόστιμες κρέπες!	Αφήστε την φαντασία σας ελεύθερη και δημιουργήστε ευφάνταστα μενού με τις κρέπες τις επιλογής σας!
Στην κουζίνα! Φορέστε τον σκούφο και τις ποδιές σας και μαγειρέψτε γευστικές κρέπες!	Αφού ψάξετε στο διαδίκτυο την συνταγή που σας φαίνεται πιο ενδιαφέρουσα, παρουσιάστε την στην ολομέλεια της τάξης!	Γράψτε ένα μήνυμα στον φίλο/η σας για να τον καλέσετε στην γιορτή της κρέπας!
Γράψτε μια μικρή παράγραφο στην ιστοσελίδα του σχολείου σας για το γαλλικό έθιμο Chandeleur!	Ετοιμαστείτε για σερβίρισμα! Αναλαμβάνετε τις παραγγελίες στην γιορτή της κρέπας!	Καταγράψτε με φωτογραφικό υλικό τα κυριότερα στιγμιότυπα από την γιορτή της κρέπας και πλαισιώστε την λεζάντα με ένα μικρό σχόλιο!

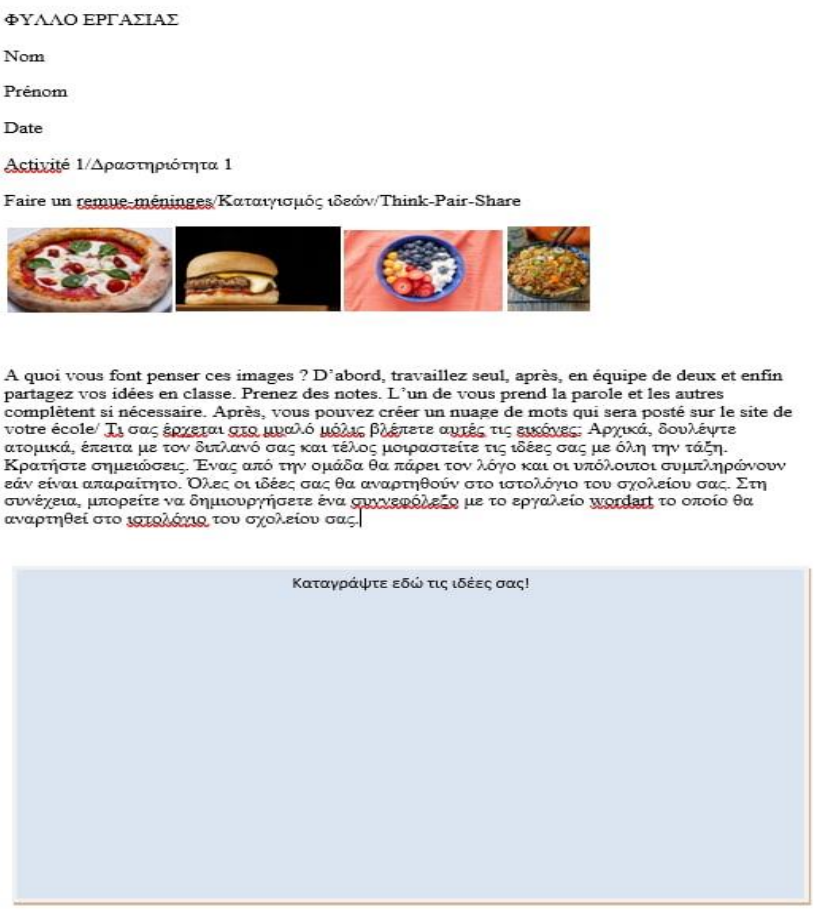
Η στρατηγική Think-Tac-Toe ή αλλιώς Tic-Tac-Toe στηρίζεται στη θεωρία της Πολλαπλής Νοημοσύνης του Howard Gardner προκειμένου οι μαθητές να επιλέξουν οι ίδιοι, μέσα από μια ποικιλία δραστηριοτήτων, τον τρόπο με το οποίο θα είναι σε θέση να κάνουν αυτό που γνώρισαν, κατανόησαν και μπορούν να υλοποιήσουν.

Προσδιορίζονται αρχικά οι μαθησιακοί στόχοι και τα αποτελέσματα συνδέονται με το Πρόγραμμα Σπουδών και τότε δημιουργείται το Think-Tac-Toe με τη μορφή πίνακα εννέα τετραγώνων – με τη μορφή τρίλιζας – όπου κάθε τετράγωνο προσδιορίζει μία εργασία ή ένα μαθητικό προϊόν το οποίο συνδέεται με μία από τις νοημοσύνες του Gardner. Όλες οι δραστηριότητες αναφέρονται στο ίδιο θέμα από διαφορετική οπτική προκειμένου να έχουν οι μαθητές τη δυνατότητα επιλογής ανάλογα με τις νοημοσύνες στις οποίες μπορούν να αποδώσουν καλύτερα. Το ζητούμενο είναι κάθε μαθητής να επιλέξει τρία τετράγωνα και να δεσμευτεί για την υλοποίηση του έργου που αναφέρουν σε ένα ορισμένο χρονικό διάστημα. Στην ολοκλήρωση των δραστηριοτήτων ο μαθητής έχει κάνει «τρίλιζα».

Think - Pair – Share

Η στρατηγική Think-Pair-Share (Σκέψου-Συνεργάσου-Μοιράσου) (Lyman, 1981) παρέχει στους μαθητές το χρόνο και το πλαίσιο για να κατανοήσουν, να συνδεθούν, να σκεφτούν πάνω στις έννοιες που τους παρουσιάζει κάθε φορά ο εκπαιδευτικός, να αναπτύξουν τις προηγούμενες γνώσεις τους, να διαμορφώσουν τις προσωπικές τους ιδέες, να τις συζητήσουν με ένα συμμαθητή τους και, ως εκ τούτου, να τις διευρύνουν και στη συνέχεια να τις μοιραστούν με την ολομέλεια της τάξης. Το Think-Pair-Share μπορεί να χρησιμοποιηθεί ως εργαλείο αξιολόγησης καθώς ο εκπαιδευτικός μπορεί να παρακολουθεί τις συζητήσεις της δυάδας και να παρεμβαίνει ανάλογα.

Εικόνα 3
Φύλλο Εργασίας/Think-Pair-Share


ΦΥΛΛΟ ΕΡΓΑΣΙΑΣ

Nom

Prénom

Date

Activité 1/Δραστηριότητα 1

Faire un remue-méninges/Καταιγισμός ιδεών/Think-Pair-Share

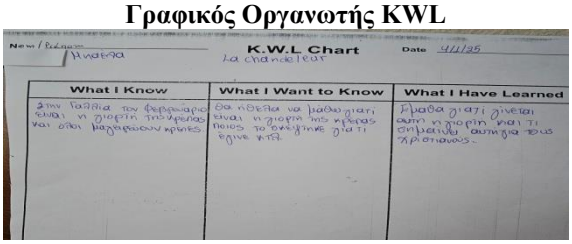
A quoi vous font penser ces images ? D'abord, travaillez seul, après, en équipe de deux et enfin partagez vos idées en classe. Prenez des notes. L'un de vous prend la parole et les autres complètent si nécessaire. Après, vous pouvez créer un nuage de mots qui sera posté sur le site de votre école/ Τι σας έρχεται στο μυαλό μόλις βλέπετε αυτές τις εικόνες: Αρχικά, δουλέψτε ατομικά, έπειτα με τον διπλανό σας και τέλος μοιραστείτε τις ιδέες σας με όλη την τάξη. Κρατήστε σημειώσεις. Ένας από την ομάδα θα πάρει τον λόγο και οι υπόλοιποι συμπληρώνουν εάν είναι απαραίτητο. Όλες οι ιδέες σας θα αναρτηθούν στο ιστολόγιο του σχολείου σας. Στη συνέχεια, μπορείτε να δημιουργήσετε ένα συννεφόλεξο με το εργαλείο wordart το οποίο θα αναρτηθεί στο ιστολόγιο του σχολείου σας.

Καταγράψτε εδώ τις ιδέες σας!

KWL (Know– Want to know- Learned)

Η στρατηγική KWL (Know– Want to know- Learned)/Γνωρίζω-Θέλω να μάθω-Έχω μάθει χρησιμοποιείται για να καθοδηγεί τους μαθητές/τριες μέσω ενός γραφικού οργανωτή.Οι πληροφορίες που καταγράφονται στη στήλη K είναι εκείνες που ήδη γνωρίζουν. Στη συνέχεια οι μαθητές δημιουργούν μία λίστα ερωτήσεων σχετικά με αυτό που θέλουν να μάθουν για το θέμα. Αυτές οι ερωτήσεις καταγράφονται στη στήλη W . Μελετούν ένα κείμενο ή άλλο πληροφοριακό υλικό και τέλος καταγράφουν στη στήλη L αυτό που τελικά έμαθαν.

Εικόνα 4.
Γραφικός Οργανωτής KWL



ΔΙΑΦΟΡΟΠΟΙΗΜΕΝΗ ΔΙΔΑΣΚΑΛΙΑ ΚΑΙ ΜΑΘΗΣΗ ΚΑΙ ΨΗΦΙΑΚΑ ΜΕΣΑ

Με τη βοήθεια της εκπαιδευτικής τεχνολογίας και τη «δημοκρατικοποίηση» της χρήσης των ψηφιακών μέσων και περιβαλλόντων από τους εκπαιδευτικούς αλλά και από τον μαθητικό πληθυσμό, ευνοούνται οι πολυαισθητηριακές προσεγγίσεις, διευκολύνεται η επαφή με πολυμεσικό και πολυτροπικό υλικό αυθεντικών κειμένων στην ξένη γλώσσα, επιτρέπονται προσωπικές επιλογές και ατομικοί ρυθμοί μάθησης. Με άλλα λόγια, η ψηφιακή τεχνολογία, με τα χαρακτηριστικά και τις επιλογές που προσφέρει, αποτελεί το κατεξοχήν κατάλληλο εργαλείο για τη διαφοροποίηση της διδασκαλίας και της μάθησης.

Κάποια από τα χαρακτηριστικά της ένταξης των ψηφιακών μέσων στη διαφοροποιημένη διδασκαλία (Benjamin, 2005) είναι οι συνεργατικές και επικοινωνιακές δεξιότητες που καλλιεργούνται μέσα από τη χρήση διαδικτυακών τεχνολογιών, η υποστήριξη μαθησιακών στυλ και πολυαισθητηριακής μάθησης, η αυθεντική μάθηση, η ιδιωτικότητα και εξατομίκευση της μαθησιακής διαδικασίας, η παροχή επιλογών μέσω των ποικίλων ψηφιακών πολυμεσικών εφαρμογών και η οργάνωση της μάθησης, χωρο-χρονικά αλλά και σε σχέση με τη σταδιακή ανάπτυξη επικοινωνιακών δεξιοτήτων και πολυγραμματισμών που μπορεί να γίνει από τους ίδιους τους μαθητές.

ΨΗΦΙΑΚΑ ΠΟΛΥΤΡΟΠΙΚΑ ΚΕΙΜΕΝΑ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΞΕΝΗΣ ΓΛΩΣΣΑΣ ΠΟΥ ΧΡΗΣΙΜΟΠΟΙΗΘΗΚΑΝ ΓΙΑ ΤΗΝ ΑΝΑΠΤΥΞΗ ΔΕΞΙΟΤΗΤΩΝ

ΚΑΤΑΙΓΙΣΜΟΣ ΙΔΕΩΝ ΜΕ ΧΡΗΣΗ ΣΥΝΝΕΦΟΛΕΞΟΥ

Εικόνα 5
Συννεφόλεξο με χρήση word art



Η δημιουργία ενός συννεφόλεξου προσφέρει μια δημιουργική και διασκεδαστική διάθεση στο μάθημα της ξένης γλώσσας. Εάν ο στόχος στο μάθημα της ξένης γλώσσας είναι η διερεύνηση των ιδεών των παιδιών πάνω σε συγκεκριμένο θέμα (για παράδειγμα την διατροφή), οι μαθητές επιχειρούν ομαδικά να καταγράψουν όσες έννοιες γνωρίζουν σχετικά με το θέμα. Το τελικό αποτέλεσμα ενός συννεφόλεξου μπορεί να αναδείξει τις ιδέες τους και εναλλακτικά μπορεί να χρησιμοποιηθεί ως έναυσμα για συζήτηση, ως διαγνωστικό εργαλείο ή να χρησιμοποιηθεί ως

καταιγισμός ιδεών. Μετά την ολοκλήρωση της διερεύνησης μπορούν, με ένα νέο συννεφόλεξο, να συγκρίνουν τι γνώριζαν και τι έμαθαν.

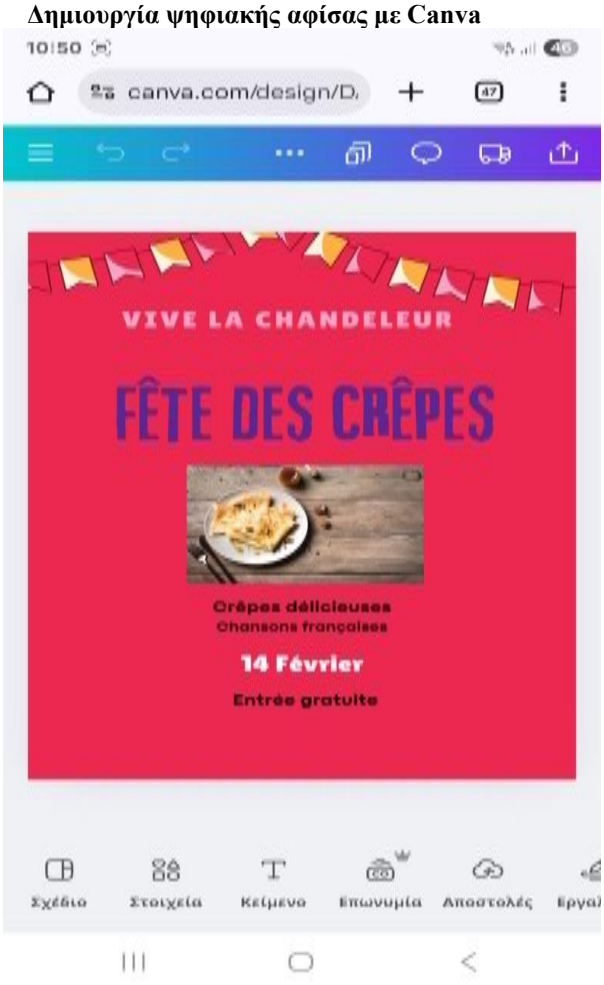
ΠΑΡΑΓΩΓΗ ΓΡΑΠΤΟΥ ΛΟΓΟΥ ΜΕ ΔΗΜΙΟΥΡΓΙΑ ΔΙΑΔΡΑΣΤΙΚΗΣ ΑΦΙΣΑΣ, ΧΡΗΣΗ PADLET, GAMMAAI, BOOKCREATOR

Η δημιουργία και χρήση διαδραστικών αφισών (Εικόνα 6) στο μάθημα ξένης γλώσσας προσφέρει πολλαπλά οφέλη στους μαθητές, μετατρέποντάς τους από παθητικούς δέκτες πληροφοριών σε ενεργούς συμμετέχοντες στη μαθησιακή διαδικασία. Έχουν τη δυνατότητα να διαμοιράζονται τις γνώσεις τους ενσωματώνοντας έγγραφα, βίντεο, ήχο και συνδέσμους, κάτι που καθιστά το περιεχόμενο πιο ελκυστικό και περιεκτικό. Αυτή η προσέγγιση ενισχύει την κατανόηση και διατηρεί την προσοχή της μαθητικής κοινότητας.

Η διαδικασία κατασκευής αφίσας φέρνει τα παιδιά σε επαφή με τον επιστημονικό τρόπο εργασίας, ακολουθώντας τις αρχές της διερευνητικής και βιωματικής μάθησης. Παράλληλα, αποτελεί ένα αποτελεσματικό εργαλείο αξιολόγησης για τους εκπαιδευτικούς, καθώς μπορούν να αξιολογήσουν την ορθότητα του περιεχομένου, τη διαδικασία κατάκτησης της γνώσης, καθώς και την οπτική οργάνωση και προφορική παρουσίαση (Κακαβά κ.ά., 2017).

Ένα σημαντικό όφελος είναι η ανάπτυξη του οπτικού λόγου και η ανταλλαγή ιδεών μεταξύ των μαθητών (Hofmann, 2010), ενώ η αυθεντικότητα του έργου αυξάνει το κίνητρο για παραγωγή εργασιών υψηλής ποιότητας (Buck Institute of Education, 2013).

Εικόνα 6
Δημιουργία ψηφιακής αφίσας με Canva



Τέλος, η εμπλοκή των μαθητών στον πολυμεσικό γραμματισμό ενισχύει τη μάθησή τους σε ένα ψηφιακό πλαίσιο. Αυτό απαιτεί όχι μόνο ψηφιακές και τεχνικές δεξιότητες, αλλά και ικανότητες όπως η σύνθεση, αξιολόγηση, κριτική και παρουσίαση πληροφοριών. Η παρουσίαση αφίσας αποτελεί μια βιωματική δραστηριότητα που διεγείρει την

περιέργεια, ενθαρρύνει την εξερεύνηση και παρέχει ένα νέο τρόπο μάθησης της ξένης γλώσσας, οδηγώντας σε θετική στάση απέναντι στη γνώση και τη δημιουργία.

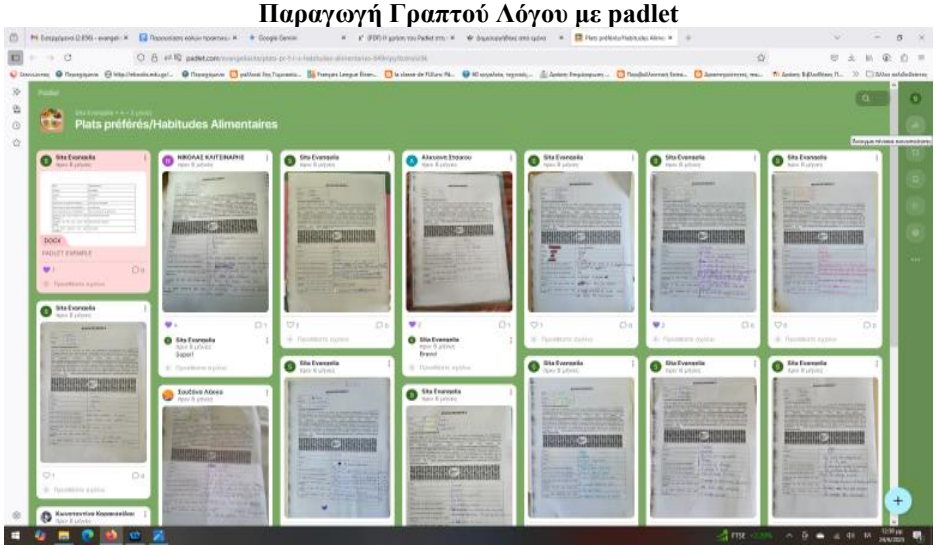
Η χρήση του padlet (Εικόνα 7) αυξάνει τη συμμετοχή των μαθητών στο μάθημα, μειώνει το άγχος τους, ενθαρρύνει τη συνεργασία μεταξύ μαθητών αλλά και των μαθητών με τον εκπαιδευτικό και βελτιώνει την ακρίβεια των μαθητών μέσω της συνεργασίας με συνομηλίκους (Rashid, Yunus, and Wahi 2019). Οι μαθητές μπορούν να εκφράσουν τις απόψεις τους γραπτώς και να συνεργαστούν είτε μέσα στην τάξη είτε εκτός τάξης μέσω της χρήσης του padlet.

Το ψηφιακό εργαλείο δημιουργίας διαδραστικού βιβλίου Bookcreator (Εικόνα 8) επιτρέπει στους μαθητές να εκφράσουν τη δημιουργικότητά τους με διάφορους τρόπους, δημιουργώντας διαδραστικά βιβλία με εικόνες, βίντεο, ήχο και κείμενο.Οι μαθητές συμμετέχουν ενεργά στη διαδικασία μάθησης, καθώς δημιουργούν το δικό τους ψηφιακό βιβλίο, αντί να είναι απλοί δέκτες πληροφοριών.Οι μαθητές μπορούν να προσαρμόσουν το περιεχόμενο του βιβλίου τους στις ανάγκες και τα ενδιαφέροντά τους, κάνοντας τη μάθηση πιο ενδιαφέρουσα και ελκυστική.

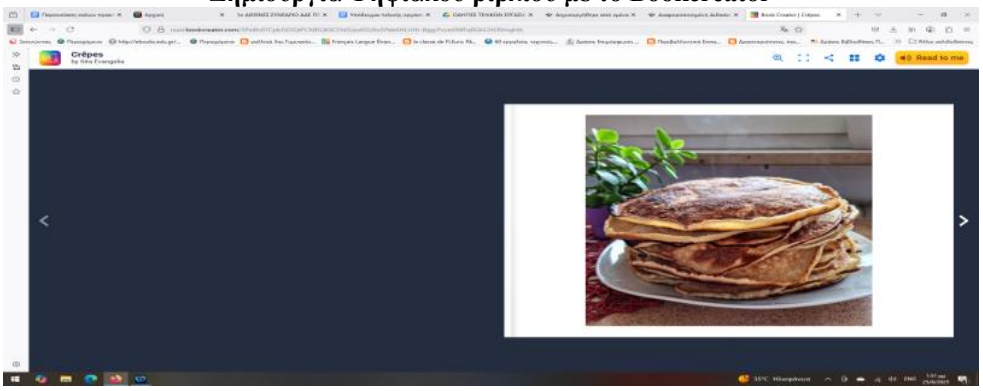
Το ψηφιακό εργαλείο TN GammaAI (Εικόνα 9) ενισχύει την εξατομικευμένη μάθηση και επιτρέπει στους μαθητές να δημιουργούν όμορφο, ελκυστικό περιεχόμενο χωρίς την ταλαιπωρία της μορφοποίησης και της σχεδίασης. Η εφαρμογή Gamma ενθαρρύνει επίσης τη συνεργασία μεταξύ των μαθητών και ευνοεί τη δημιουργία εξαιρετικών έργων ακομα και για εκείνους που δυσκολεύονται με τη μορφοποίηση των παρουσιάσεων.

Η δημιουργία ψηφιακών κουίζ με το εργαλείο Kahoot (Εικόνα 10) μετατρέπει την εκπαιδευτική διαδικασία σε παιχνίδι, κάνοντας τους μαθητές να συμμετέχουν με πιο ενεργό τρόπο δημιουργώντας ένα θετικό και διασκεδαστικό περιβάλλον μάθησης. Οι μαθητές λαμβάνουν άμεση ανατροφοδότηση για τις απαντήσεις τους, βοηθώντας τους να κατανοήσουν καλύτερα τις έννοιες και να διορθώσουν τυχόν λάθη.Το Kahoot μπορεί να χρησιμοποιηθεί για ομαδικές δραστηριότητες, ενθαρρύνοντας την συνεργασία και την επικοινωνία μεταξύ των μαθητών.

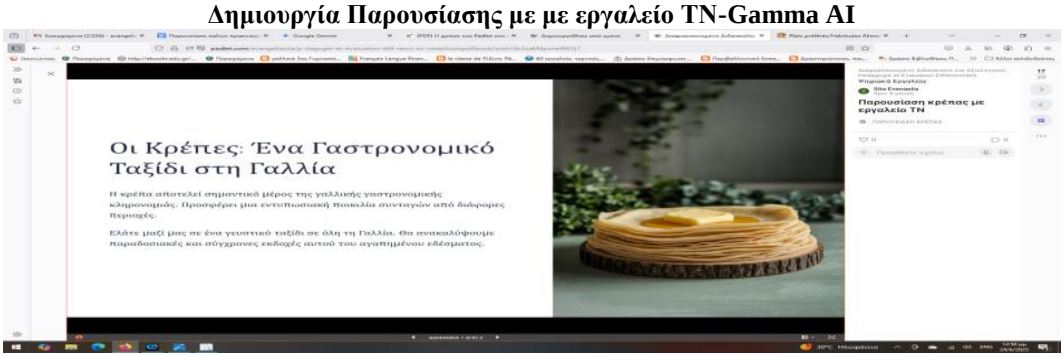
Εικόνα 7.
Παραγωγή Γραπτού Λόγου με padlet



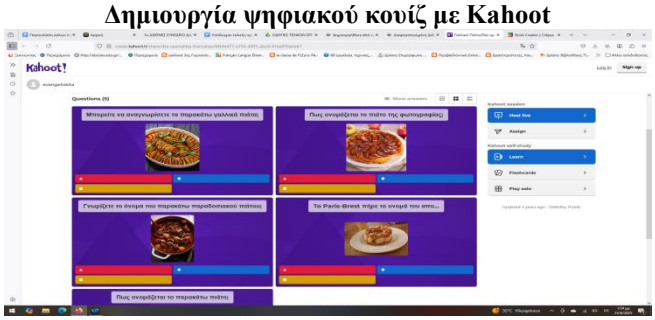
Εικόνα 8.
Δημιουργία Ψηφιακού βιβλίου με το Bookcreator



Εικόνα 9.
Δημιουργία Παρουσίασης με με εργαλείο TN-Gamma AI



Εικόνα 10
Δημιουργία ψηφιακού κουίζ με Kahoot



Ο ΗΛΕΚΤΡΟΝΙΚΟΣ ΦΑΚΕΛΟΣ ΑΞΙΟΛΟΓΗΣΗΣ ΣΤΟ ΜΑΘΗΜΑ ΤΩΝ ΓΑΛΛΙΚΩΝ: ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΕΚΤΑΣΕΙΣ ΚΑΙ ΠΡΑΚΤΙΚΗ ΕΦΑΡΜΟΓΗ

Ο ηλεκτρονικός φάκελος αξιολόγησης, ή αλλιώς e-portfolio, αποτελεί μια σύγχρονη ψηφιακή πλατφόρμα σχεδιασμένη για τη συλλογή, οργάνωση και προβολή εργασιών, αναστοχασμών και επιτευγμάτων ενός ατόμου με δομημένο και προσβάσιμο τρόπο. Δεν πρόκειται για μια απλή συλλογή ψηφιακών αντικειμένων, όπως ένα ψηφιακό λεύκωμα ή μια πολυμεσική παρουσίαση, αλλά για ένα εργαλείο αναστοχασμού που καταδεικνύει τη μαθησιακή ανάπτυξη με την πάροδο του χρόνου. Η παιδαγωγική φιλοσοφία που διέπει το e-portfolio βασίζεται στον κοινωνικό κονστρουκτιβισμό, μια θεωρία μάθησης που υποστηρίζει ότι η γνώση δομείται πιο αποτελεσματικά όταν οι μαθητές την οικοδομούν οι ίδιοι, μέσα από διάλογο και αλληλεπίδραση με άλλους (Meirieu, 2010).

Η υιοθέτηση του e-portfolio αναδεικνύει την αναγκαιότητα της αυθεντικής αξιολόγησης στο σύγχρονο γλωσσικό μάθημα. Σε αντίθεση με τις παραδοσιακές μεθόδους αξιολόγησης, όπως οι χρονομετρημένες γραπτές εξετάσεις που εστιάζουν στο τελικό αποτέλεσμα, τα e-portfolios είναι προσανατολισμένα στη διαδικασία μάθησης (Huy Phung, 2016). Αυτή η προσέγγιση ενθαρρύνει τους μαθητές να επιδεικνύουν τα μαθησιακά τους επιτεύγματα, να αναστοχάζονται κριτικά στη μαθησιακή τους πορεία και να αναθεωρούν και να βελτιώνουν διαρκώς την εργασία τους. Πρόκειται για ένα αυθεντικό εργαλείο αξιολόγησης που αντικατοπτρίζει πραγματικές καταστάσεις και λαμβάνει υπόψη τις ικανότητες, τις κλίσεις και τα ενδιαφέροντα κάθε μαθητή (Panteliadou & Filippatou, 2013). Αυτή η διαφοροποίηση υποδηλώνει μια θεμελιώδη μεταβολή από την αθροιστική αξιολόγηση, η οποία επικεντρώνεται στο τι γνωρίζει ο μαθητής σε μια συγκεκριμένη χρονική στιγμή, προς μια διαμορφωτική προσέγγιση που παρακολουθεί την ανάπτυξη του μαθητή διαχρονικά. Η σημασία αυτής της μεταβολής έγκειται στην παροχή μιας πιο ολιστικής και δίκαιης αξιολόγησης της γλωσσικής ανάπτυξης, αναγνωρίζοντας τη μάθηση ως μια συνεχή και εξελικτική διαδικασία, και όχι ως ένα στατικό στιγμιότυπο (Tagliante,2025). Αυτή η προσέγγιση έχει τη δυνατότητα να μεταμορφώσει την εκπαιδευτική πρακτική, καθιστώντας την αξιολόγηση αναπόσπαστο και υποστηρικτικό μέρος της ίδιας της μάθησης.

ΓΙΑΤΙ ΝΑ ΕΠΙΛΕΞΟΥΜΕ ΤΟ E-PORTFOLIO ΣΤΑ ΓΑΛΛΙΚΑ;

Η ενσωμάτωση του e-portfolio στο μάθημα των Γαλλικών προσφέρει πολλαπλά οφέλη. Πρωτίστως, ενισχύεται η αυτονομία και ο κριτικός αναστοχασμός των μαθητών βελτιώνοντας την απόδοσή τους, η οποία δεν θα ήταν εφικτή με συμβατικές μεθόδους. Δεύτερον, προωθείται η ενεργητική μάθηση και η εξατομίκευση καθώς τους δίνεται η αυτονομία να επιλέγουν και να επιμελούνται τις δικές τους εργασίες, δημιουργώντας ένα προσωπικό αποθετήριο της μάθησής τους

(Przesmycki, 2004). Επιπλέον, τα e-portfolios συμβάλλουν στην ανάπτυξη ψηφιακών δεξιοτήτων και πολυμεσικής έκφρασης καθώς λειτουργούν ως "σχεδιαστές" των ψηφιακών τους χώρων. Αυτή η διπλή ανάπτυξη, γλωσσικής επάρκειας και ψηφιακής παιδείας, είναι ζωτικής σημασίας για τον 21ο αιώνα, καθώς οι μαθητές εφοδιάζονται με δεξιότητες που είναι απαραίτητες τόσο στην ακαδημαϊκή όσο και στην επαγγελματική τους ζωή (Weber, Cai & Elliston, 2023).

ΒΗΜΑΤΑ ΕΦΑΡΜΟΓΗΣ ΤΟΥ E-PORTFOLIO ΣΤΗΝ ΤΑΞΗ ΤΩΝ ΓΑΛΛΙΚΩΝ

Το πρώτο και πιο κρίσιμο βήμα είναι ο καθορισμός του σκοπού και των στόχων του e-portfolio. Θα χρησιμοποιηθεί για διαμορφωτική αξιολόγηση, εστιάζοντας στη συνεχή διαδικασία μάθησης και την παροχή ανατροφοδότησης, ή για αθροιστική αξιολόγηση, επικεντρώνοντας στα τελικά μαθησιακά αποτελέσματα;. Η επιλογή του σκοπού θα καθορίσει άμεσα το περιεχόμενο, την οργάνωση και τα κριτήρια αξιολόγησης του φακέλου (Kouloubaritsi & Matsagouras, 2004). Ακολουθεί η επιλογή της πλατφόρμας και η παροχή τεχνολογικής υποστήριξης. Είναι απαραίτητο να ληφθεί υπόψη η διαθεσιμότητα και ο βαθμός εξοικείωσης των μαθητών με την τεχνολογία. Ένα θεμελιώδες βήμα είναι η συλλογή και οργάνωση των τεκμηρίων μάθησης. Οι μαθητές καλούνται να συλλέγουν εργασίες που καταδεικνύουν την επίτευξη των μαθησιακών στόχων και την πρόοδό τους. Η οργάνωση των τεκμηρίων σε λογικές ενότητες είναι κρίσιμη για την ευκολία πλοήγησης και την αποτελεσματική αξιολόγηση (Feresidi, 2016).

Η διαδικασία αναστοχασμού και αυτοαξιολόγησης αποτελεί τον πυρήνα της παιδαγωγικής αξίας του e-portfolio. Απαραίτητη είναι η ενσωμάτωση αναστοχαστικών σημειώσεων, στις οποίες οι μαθητές εκφράζουν τις σκέψεις τους για τη μαθησιακή διαδικασία, τις προκλήσεις που αντιμετώπισαν και τα διδάγματα που αποκόμισαν. Ο αναστοχασμός βοηθά τους μαθητές να αξιολογήσουν κριτικά την εργασία τους, να κάνουν συνδέσεις μεταξύ διαφορετικών μαθημάτων ή δραστηριοτήτων και να αναπτύξουν μεταγνωστικές δεξιότητες, δηλαδή την ικανότητα να κατανοούν πώς μαθαίνουν και πώς μπορούν να βελτιωθούν.

Τέλος, η παροχή ανατροφοδότησης και η αξιολόγηση είναι αναπόσπαστο μέρος της διαδικασίας. Πρέπει να ενσωματωθούν μηχανισμοί ανατροφοδότησης, τόσο από τους εκπαιδευτικούς όσο και από τους συμμαθητές, καθ' όλη τη διάρκεια της ανάπτυξης του e-portfolio. Η ανατροφοδότηση αυτή πρέπει να είναι διαμορφωτική, δηλαδή να επικεντρώνεται στην καθοδήγηση των μαθητών για συνεχή βελτίωση. Η αξιολόγηση του e-portfolio πρέπει να βασίζεται σε προκαθορισμένα, σαφή κριτήρια τα οποία πρέπει να είναι γνωστά στους μαθητές από την αρχή της διαδικασίας (Feresidi, 2016).

ΠΕΡΙΕΧΟΜΕΝΑ ΤΟΥ ΗΛΕΚΤΡΟΝΙΚΟΥ ΦΑΚΕΛΟΥ ΑΞΙΟΛΟΓΗΣΗΣ ΓΑΛΛΙΚΩΝ

Ο ηλεκτρονικός φάκελος αξιολόγησης για το μάθημα των Γαλλικών μπορεί να περιλαμβάνει μια ποικιλία τεκμηρίων, τα οποία αντικατοπτρίζουν τις διαφορετικές πτυχές της γλωσσικής επάρκειας και της μαθησιακής διαδικασίας σύμφωνα με το ΕΠΣ-ΞΓ (Υ.Α. 141417/Δ2/02-09-2016, ΦΕΚ 2871/τ.Β΄/09-09-2016). Ενδεικτικά, αναφέρουμε τις γραπτές εργασίες, τις ηχογραφήσεις προφορικού λόγου, τα βίντεο παρουσιάσεων, τα ατομικά ή ομαδικά προϊόντα, τις ψηφιακές δημιουργίες, τις αυτοαξιολογήσεις και τα αναστοχαστικά κείμενα, φωτογραφίες από εκπαιδευτικές δραστηριότητες κτλ.

ΟΦΕΛΗ ΤΟΥ E-PORTFOLIO ΓΙΑ ΤΟΥΣ ΜΑΘΗΤΕΣ

Πρώτον, οδηγεί σε αυξημένο κίνητρο και εμπλοκή, καθώς οι μαθητές αποκτούν ιδιοκτησία της μάθησής τους, επιλέγοντας το περιεχόμενο του φακέλου τους και αναστοχαζόμενοι στην πρόοδό τους ενισχύοντας την εσωτερική τους παρακίνηση για μάθηση. Δεύτερον, επιτρέπει στους μαθητές να παρακολουθούν την εξέλιξή τους και να βλέπουν απτά τις βελτιώσεις στην απόδοσή τους. Τρίτον, συμβάλλει στην ανάπτυξη μεταγνωστικών δεξιοτήτων. Μέσω του αναστοχασμού, οι μαθητές κατανοούν πώς μαθαίνουν, τι γνωρίζουν και τι χρειάζονται να βελτιώσουν, ενισχύοντας την αυτοεκτίμηση και την ικανότητα επίλυσης προβλημάτων. Τέλος, το e-portfolio λειτουργεί ως μέσο προετοιμασίας για το μέλλον, καθώς οι μαθητές δημιουργούν μια επαγγελματική διαδικτυακή παρουσία και επιδεικνύουν τις δεξιότητές τους για μελλοντικές σπουδές ή την αγορά εργασίας (Ciesielkiewicz & Coca,2013)

ΟΦΕΛΗ ΓΙΑ ΤΟΥΣ ΕΚΠΑΙΔΕΥΤΙΚΟΥΣ

Αποκτούν μια ολιστική εικόνα της μάθησης, καθώς ο φάκελος παρέχει μια ολοκληρωμένη και διαχρονική καταγραφή της προόδου των μαθητών. Αυτό τους επιτρέπει να εντοπίζουν τις ατομικές ανάγκες και να προσαρμόζουν τη διδασκαλία τους αποτελεσματικότερα. Η βαθύτερη κατανόηση των μαθητών οδηγεί σε εξατομικευμένη διδασκαλία και σχεδιασμό διαφοροποιημένων δραστηριοτήτων. Τέλος, συμβάλλει στην αξιολόγηση του προγράμματος σπουδών και του διδακτικού έργου, παρέχοντας δεδομένα για τη βελτίωση της εκπαιδευτικής διαδικασίας (Feresidi &Tsitas,2023).

ΟΦΕΛΗ ΓΙΑ ΤΟΥΣ ΓΟΝΕΙΣ

Παρέχει άμεση και συγκεκριμένη ενημέρωση για την πρόοδο του παιδιού τους, με απτά παραδείγματα των εργασιών και των επιτευγμάτων του. Αυτό ενθαρρύνει την συμμετοχή τους στην εκπαιδευτική διαδικασία και τους κάνει να αισθάνονται πιο ενεργό μέρος της αξιολόγησης. Επιπλέον, λειτουργεί ως εξαιρετική βάση για συζήτηση κατά τη διάρκεια συναντήσεων γονέων-εκπαιδευτικών, καθώς παρέχονται συγκεκριμένα τεκμήρια που μπορούν να συζητηθούν(Upbility, 2025).

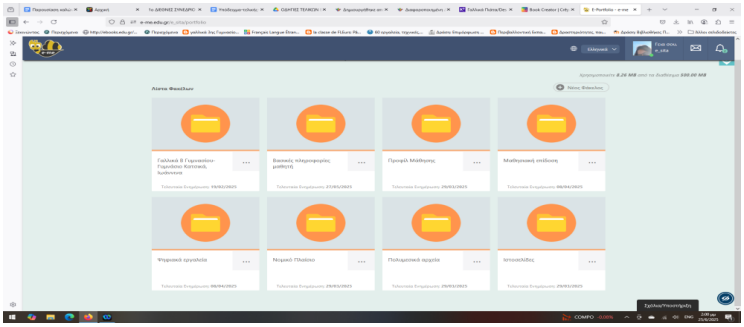
ΟΦΕΛΗ ΓΙΑ ΤΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΣΤΗΜΑ

Οι μαθητές αναστοχάζονται , οι εκπαιδευτικοί αποκτούν βαθύτερη κατανόηση , οι γονείς ενημερώνονται , και το εκπαιδευτικό σύστημα συλλέγει δεδομένα για βελτίωση προγραμμάτων. Αυτή η αλληλεπίδραση ενισχύει τη διαφάνεια και τη λογοδοσία. Η υιοθέτηση των e-portfolios μπορεί να οδηγήσει σε ένα πιο συνεκτικό και αποτελεσματικό εκπαιδευτικό οικοσύστημα, όπου η αξιολόγηση δεν είναι απλώς μια τελική κρίση, αλλά ένας συνεχής κύκλος μάθησης, ανατροφοδότησης και βελτίωσης για όλους τους εμπλεκόμενους.

ΑΞΙΟΠΟΙΗΣΗ ΤΗΣ ΠΛΑΤΦΟΡΜΑΣ E-ME ΓΙΑ ΤΟ E-PORTFOLIO ΣΤΑ ΓΑΛΛΙΚΑ

Η πλατφόρμα e-me, ως η Ενιαία Ψηφιακή Εκπαιδευτική Πλατφόρμα του Υπουργείου Παιδείας, Θρησκευμάτων και Αθλητισμού, προσφέρει ένα ενσωματωμένο περιβάλλον για την ανάπτυξη και διαχείριση e-portfolios, καθιστώντας την μια ιδιαίτερα προσβάσιμη επιλογή για το μάθημα των Γαλλικών στην Ελλάδα. Η e-me διαθέτει μια ειδική εφαρμογή "e-portfolio" (Εικόνα 11). Αυτή η εφαρμογή λειτουργεί ως ένας προσωπικός ηλεκτρονικός φάκελος δεξιοτήτων, αποτελώντας μια ευέλικτη και εύχρηστη εκδοχή του παραδοσιακού έντυπου portfolio. Οι βασικές λειτουργικότητές της περιλαμβάνουν: δημιουργία και οργάνωση φακέλων, ανάρτηση και αποθήκευση αρχείων, διαμοιρασμός και προβολή, υποστήριξη αναστοχασμού.

Εικόνα 11.
Πλατφόρμα e-me-Δημιουργία e-portfolio



ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΟΠΤΙΚΕΣ

Ο ηλεκτρονικός φάκελος αξιολόγησης (eportfolio) αναδεικνύεται ως ένα σύγχρονο, δυναμικό και πολυδιάστατο εργαλείο που υπερβαίνει τα όρια της παραδοσιακής αξιολόγησης. Για την κλιμάκωση της χρήσης των e-portfolios στο μάθημα των Γαλλικών και πέρα από αυτό, απαιτείται μια συστηματική, ολιστική προσέγγιση που να περιλαμβάνει την ανάπτυξη ικανοτήτων, την προσαρμογή του προγράμματος σπουδών και την παροχή συνεχούς υποστήριξης, διασφαλίζοντας ότι το εργαλείο χρησιμοποιείται για τη μεγιστοποίηση των μαθησιακών αποτελεσμάτων και όχι απλώς ως ένα ψηφιακό αποθετήριο. Το e-portfolio ωφελεί περισσότερο όταν εντάσσεται σε μια "συνεκτική προσέγγιση διδασκαλίας και μάθησης"(Eric, 2025). Αυτό σημαίνει ότι η επιτυχία δεν εξαρτάται μόνο από την τεχνολογία, αλλά από την παιδαγωγική ενσωμάτωση σε ολόκληρο το πρόγραμμα σπουδών και την υποστήριξη από το εκπαιδευτικό σύστημα.

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Η ΑΞΙΟΠΟΙΗΣΗ ΔΙΕΠΑΦΩΝ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ (AI) ΩΣ ΕΡΓΑΛΕΙΟΥ ΕΝΙΣΧΥΣΗΣ ΤΗΣ ΒΙΩΜΑΤΙΚΗΣ ΜΑΘΗΣΗΣ ΣΤΟ ΝΗΠΙΑΓΩΓΕΙΟ

Τάλλου Κωνσταντίνα
Σύμβουλος Εκπαίδευσης ΠΕ60
ΔΠΕ Ιωαννίνων
Ιωάννινα, Ελλάδα
email: ktallou@sch.gr

Κασιούμη Δανάη
Βρεφονηπιοκόμος
ΔΠΕ Δωδεκανήσων
Ρόδος, Ελλάδα
email: Danai.kass@gmail.com

Kasioumi Myrto
Οικονομολόγος
QSMSRC, Budapest University of Technology and Economics,
Budapest, Hungary
email: kasioumi.myrto@gtk.bme.hu

ΠΕΡΙΛΗΨΗ

Το διδακτικό σενάριο που παρουσιάζεται σχεδιάστηκε σύμφωνα με τις Θεματικές Περιοχές και τα Προσδοκώμενα Μαθησιακά Αποτελέσματα του νέου Προγράμματος Σπουδών για την Προσχολική Εκπαίδευση, εστιάζοντας στα στάδια της ανάπτυξης των φυτών (Φυσικές Επιστήμες), ενώ παράλληλα εμπλέκει τα Θεματικά Πεδία των Κοινωνικών Επιστημών και των Τεχνολογιών Πληροφορίας και Επικοινωνίας (ΤΠΕ). Στόχος του σεναρίου είναι η αξιοποίηση διεπαφών Τεχνητής Νοημοσύνης (AI) ως εργαλείου ενίσχυσης της βιωματικής μάθησης μέσω διαδραστικών και συνεργατικών δραστηριοτήτων.

Ακολουθεί το διδακτικό μοντέλο μάθησης 5e (Engage, Explore, Explain, Elaborate, Evaluate) που προτείνει το νέο Πρόγραμμα Σπουδών για την Προσχολική Εκπαίδευση και δομείται ως εξής: η μάθηση και η διαδικασία εκκινείται με την εισαγωγή μιας διαδραστικής φωνητικής AI μέσω της οποίας μια εικονική μέλισσα εμφανίζεται στην τάξη και ζητά βοήθεια από τους μαθητές/τριες για να μάθει πώς αναπτύσσεται το φυτό. Με τον τρόπο αυτό ενεργοποιείται το ενδιαφέρον και η περιέργεια των παιδιών για το θέμα (Engage). Στη συνέχεια τα νήπια χωρίζονται σε ομάδες, αναζητούν πληροφορίες σχετικά με την ανάπτυξη των φυτών χρησιμοποιώντας εκπαιδευτικό ψηφιακό υλικό, ενώ ο ρόλος του εκπαιδευτικού είναι συντονιστικός και καθοδηγητικός, καθώς μέσα από στοχευμένες ερωτήσεις ενθαρρύνει τα παιδιά να διατυπώσουν τις αρχικές τους γνώσεις και να τις κατανοήσουν καλύτερα εμπλουτίζοντάς τες (Explore). Ακολουθεί η φάση της Ερμηνείας όπου η μέλισσα ζητά επιπλέον διευκρινήσεις και τα παιδιά αξιοποιώντας εργαλεία AI συνεργάζονται και πάλι σε μικρές ομάδες και παρουσιάζουν στην ολομέλεια το αποτέλεσμα της εργασίας τους και όσα έχουν μάθει, ενισχύοντας με αυτό τον τρόπο τη γλωσσική τους ανάπτυξη και προάγοντας την κριτική τους σκέψη (Explain). Για τη δραστηριότητα Εμπέδωσης (Elaborate) γίνεται χρήση ψηφιακών παιχνιδιών αξιολόγησης (π.χ. Wordwall, Quizizz, LearningApps) τόσο για αξιολόγηση όσο και για την επανάληψη των εννοιών με παιγνιώδη τρόπο ώστε να αποτυπωθεί η γνώση των παιδιών με φυσικό και ευχάριστο τρόπο. Έτσι τα νήπια αναπτύσσουν δεξιότητες δημιουργικής σκέψης και ψηφιακής έκφρασης. Το τελευταίο στάδιο, αυτό της Αξιολόγησης, ολοκληρώνεται με δραστηριότητες αυτοαξιολόγησης και ετεροαξιολόγησης, ώστε να καλλιεργηθούν μεταγνωστικές δεξιότητες στους μαθητές/τριες και η ικανότητά τους να αναστοχάζονται πάνω στη μαθησιακή τους πορεία.

Συμπερασματικά, το συγκεκριμένο διδακτικό σενάριο αναδεικνύει τη δυναμική της Τεχνητής Νοημοσύνης στην προσχολική εκπαίδευση, προτείνοντας μια πολυδιάστατη, διαδραστική και συνεργατική προσέγγιση στη μάθηση. Η αξιοποίηση καινοτόμων τεχνολογιών όχι μόνο ενισχύει τη μαθησιακή διαδικασία αλλά και διαμορφώνει το σχολείο του μέλλοντος, στο οποίο η ψηφιακή καινοτομία συνυπάρχει με την παιδαγωγική δημιουργικότητα.

Λέξεις – κλειδιά: Διεπαφές Τεχνητής Νοημοσύνης, διδακτικό μοντέλο 5e, ψηφιακή μάθηση, προσχολική εκπαίδευση και AI

ΕΙΣΑΓΩΓΗ

Η εισαγωγή της τεχνητής νοημοσύνης (ΤΝ) στην προσχολική εκπαίδευση αποτελεί ένα ταχέως αναπτυσσόμενο πεδίο που ανοίγει νέους ορίζοντες στη μαθησιακή εμπειρία των μαθητών/τριών. Μεγαλώνοντας σε έναν κόσμο όπου η ΤΝ είναι παρούσα σε πάμπολλες πτυχές της καθημερινότητάς τους. η ενσωμάτωσή της στο νηπιαγωγείο είναι απαραίτητη συμβάλλοντας στην καλλιέργεια δεξιοτήτων όπως η κριτική σκέψη, η επίλυση προβλημάτων και η δημιουργικότητα (Kandlhofer et al., 2016).

Μία από τις σημαντικότερες εφαρμογές της στην εκπαίδευση είναι οι λεγόμενες Πλατφόρμες Προσαρμοστικής Μάθησης, οι οποίες χρησιμοποιούν αλγόριθμους ΤΝ για να αναλύουν τα δεδομένα των μαθητών/τριών και να υποστηρίζουν τους εκπαιδευτικούς στην αξιολόγηση του γνωστικού επιπέδου των παιδιών προσφέροντας εξατομικευμένη υποστήριξη και προσαρμόζοντας τη διδασκαλία με βάση τις προσωπικές μαθησιακές ανάγκες και τα ενδιαφέροντα της μαθητικής τους ομάδας (Blackwell et al., 2014). Με τη χρήση ειδικά σχεδιασμένων εφαρμογών σε συνδυασμό με διαδραστικά εργαλεία, μπορούν να εντοπίσουν τα δυνατά και αδύναμα σημεία των μαθητών τους προσφέροντας εξατομικευμένα μαθησιακά πλαίσια και διασφαλίζοντας ότι κάθε μαθητής θα μπορεί να αξιοποιήσει πλήρως τις δυνατότητές του (Holmes et al., 2019). Προσαρμόζοντας και διαφοροποιώντας τόσο το αναλυτικό πρόγραμμα όσο και τις διδακτικές τους πρακτικές σύμφωνα με τις εξατομικευμένες ανάγκες κάθε παιδιού, καθιστούν την ΤΝ ιδιαίτερα πολύτιμη στην προσχολική εκπαίδευση, όπου η διαφοροποίηση της διδασκαλίας είναι απαραίτητη λόγω των διαφορετικών ρυθμών ανάπτυξης των παιδιών (Bers, 2020).

Επιπλέον, έχει αποδειχθεί επιστημονικά ότι δραστηριότητες ΤΝ στην προσχολική ηλικία ενισχύουν την κριτική σκέψη και τις δεξιότητες λήψης αποφάσεων (Papadakis & Kalogiannakis, 2020), ενώ μπορούν να προσαρμοστούν στο ρυθμό μάθησης των μικρών παιδιών και να βοηθήσουν σημαντικά την ανάπτυξη γλωσσικών, αριθμητικών, συναισθηματικών δεξιοτήτων προσφέροντας ένα ελκυστικό και διαδραστικό τρόπο διαπαιδαγώγησης (Chen, L. et al., 2020).

Παράλληλα, μέσα από αυτές οι μαθητές της προσχολικής ηλικίας μαθαίνουν να αξιολογούν τις πράξεις τους και να κατανοούν τις συνέπειες των επιλογών τους καλλιεργώντας έτσι την ανεξαρτησία τους (Mubin et al., 2013). Επίσης, οι δραστηριότητες που αξιοποιούν εργαλεία τεχνητής νοημοσύνης με δυνατότητα δημιουργίας σεναρίων και περιβαλλόντων στα οποία τα παιδιά πειραματίζονται με ιδέες και αναπτύσσουν εναλλακτικές λύσεις, συμβάλλουν στην ενίσχυση της δημιουργικότητας και της φαντασίας τους (Duffy, 2006).

Εξάλλου, η τεχνητή νοημοσύνη μπορεί να διαδραματίσει καθοριστικό ρόλο στην ενίσχυση της πολυπολιτισμικότητας στο νηπιαγωγείο, μέσω εργαλείων που βοηθούν τους μαθητές να γνωρίσουν και να κατανοήσουν την πολιτισμική ποικιλομορφία. Εκπαιδευτικά προγράμματα με προσαρμοστικό χαρακτήρα, βασισμένα στην ΤΝ, μπορούν να αξιοποιηθούν από τους παιδαγωγούς για την ενθάρρυνση διαπολιτισμικού διαλόγου, προσφέροντας περιεχόμενο και δραστηριότητες που λαμβάνουν υπόψη τις γλωσσικές και πολιτισμικές ιδιαιτερότητες των παιδιών. Τέτοιες εφαρμογές παρέχουν βιωματικές εμπειρίες που ενισχύουν την κατανόηση και τον σεβασμό της διαφορετικότητας, καλλιεργώντας από νωρίς αξίες όπως η αποδοχή και η συνεργασία (Holmes et al., 2019).

Τέλος, η ένταξη της τεχνητής νοημοσύνης στην προσχολική εκπαίδευση μπορεί να συμβάλει στην ανάπτυξη θετικής στάσης των παιδιών απέναντι στην τεχνολογία, ενισχύοντας την εξοικείωσή τους με τα ψηφιακά εργαλεία και την ικανότητά τους να τα χρησιμοποιούν με αυτονομία. Μέσα από αυτή τη διαδικασία, διαμορφώνονται τα θεμέλια για μια υπεύθυνη και ενεργή σχέση με την τεχνολογία στην ενήλικη ζωή (Bers, 2020).

Ωστόσο, λόγω της ιδιαίτερης φύσης των προσωπικών δεδομένων των παιδιών που αφορούν τις μαθησιακές τους ανάγκες, το γνωστικό κομμάτι και τις προτιμήσεις τους, είναι απαραίτητο να τηρούνται οι νομικές διατάξεις όπως ο Γενικός Κανονισμός για την Προστασία Δεδομένων (GDPR), ώστε να διασφαλίζεται η υπεύθυνη συλλογή και επεξεργασία των πληροφοριών μέσω των εφαρμογών τεχνητής νοημοσύνης (Holmes et al., 2019).

Ένα αρνητικό σημείο της χρήσης ΤΝ στην εκπαίδευση θεωρείται η άνιση πρόσβαση στην εκπαιδευτική τεχνολογία μεταξύ των κοινωνικών ομάδων κάτι που εντείνει τις εκπαιδευτικές ανισότητες. Πιο συγκεκριμένα, κοινότητες με περιορισμένους οικονομικούς πόρους συναντούν δυσκολίες στην υιοθέτηση και εφαρμογή τέτοιων καινοτομιών, γεγονός που τις φέρνει σε μειονεκτική θέση (UNICEF, 2021).

Επιπροσθέτως, εκπαιδευτικοί εκφράζουν προβληματισμούς σχετικά με την πιθανή μείωση της διαπροσωπικής επαφής μέσα στη μαθησιακή διαδικασία. Αν και η ΤΝ μπορεί να λειτουργήσει ενισχυτικά στη διδασκαλία, δεν είναι σε θέση να αντικαταστήσει τη συναισθηματική σύνδεση, την ενσυναίσθηση και τη στήριξη που προσφέρει ο εκπαιδευτικός.

Για τον λόγο αυτό, είναι αναγκαίο να διατηρείται μια ισορροπία μεταξύ της παρουσίας του εκπαιδευτικού και της χρήσης της τεχνολογίας στην εκπαιδευτική διαδικασία (Williams et al., 2019).

Συνοψίζοντας, η αξιοποίηση διεπαφών ΤΝ στο νηπιαγωγείο παρουσιάζει σημαντικές ευκαιρίες για την ενίσχυση της μαθησιακής εμπειρίας, την ανάπτυξη δεξιοτήτων και την προετοιμασία των παιδιών για έναν κόσμο όπου η ΤΝ θα είναι αναπόσπαστο μέρος της καθημερινότητας. Ωστόσο, απαιτείται προσεκτικός σχεδιασμός, κατάλληλη επιμόρφωση των εκπαιδευτικών και συνεκτίμηση των ηθικών και κοινωνικών παραμέτρων για την επιτυχή ενσωμάτωσή της στην προσχολική εκπαίδευση.

ΔΙΔΑΚΤΙΚΗ ΜΕΘΟΔΟΛΟΓΙΑ

Διδακτικό Μοντέλο 5e

Το διδακτικό μοντέλο που χρησιμοποιείται για την ανάπτυξη των δραστηριοτήτων του παρόντος διδακτικού σεναρίου είναι το 5E (Bybee R. W. et al., 2006; Penderi et al, 2021), σύμφωνα με το οποίο η μαθησιακή διαδικασία βασίζεται στη διερευνητική μάθηση και εξελίσσεται σε πέντε διαδοχικές φάσεις οι οποίες ουσιαστικά αλληλοδιαπλέκονται. Η ονομασία 5e οφείλεται στο αρχικό γράμμα Ε που επαναλαμβάνεται σε όλες οι φάσεις: α. Εξοικείωση, β. Επισκόπηση, γ. Επεξήγηση, δ. Εμπλουτισμός, ε. Εκτίμηση.

Πιο συγκεκριμένα, στην 1η Φάση (ΕΞΟΙΚΕΙΩΣΗ) υλοποιούνται δραστηριότητες εισαγωγής και ευαισθητοποίησης των μαθητών/τριών με το θέμα και η ανάπτυξη προβληματισμού σε σχέση με το προς διερεύνηση ζήτημα. Αυτό μπορεί να επιτευχθεί είτε με τον εμπλουτισμό των κέντρων μάθησης με σχετικά υλικά, είτε με την ανάγνωση σχετικών βιβλίων, είτε με αξιοποίηση υλικών από το διαδίκτυο, μια παράσταση θεατρική ή κουκλοθέατρου που θα παρακολουθήσουν τα παιδιά, μια επίσκεψη εντός ή εκτός σχολείου κλπ, έτσι ώστε να κινητοποιηθεί το ενδιαφέρον τους και να οργανωθεί μια συζήτηση που θα υποστηρίξει την ανάκληση πρότερων γνώσεων και εναλλακτικών ιδεών. Σε αυτό το σημείο καταγράφεται η πρώτη και δεύτερη στήλη του διαγράμματος K-W-L-H, δημιουργούνται εννοιολογικοί χάρτες και ιδεοθύελλες, αξιοποιώντας διδακτικές τεχνικές όπως είναι ο καταιγισμός των ιδεών. Μια πολύ καλή ιδέα υποστήριξης των παιδιών σε αυτή τη φάση είναι η αξιοποίηση της κούκλας (γαντόκουκλα κούκλα της τάξης, κούκλα Persona κλπ) η οποία ως επιστημονικός συνεργάτης των παιδιών μπορεί να βοηθήσει στη συζήτηση, στην ανάδυση προ υπαρχουσών γνώσεων και στην τελική διατύπωση του προς διερεύνηση ζητήματος.

Στη 2η Φάση (ΕΠΙΣΚΟΠΗΣΗ) υλοποιούνται δραστηριότητες με τις οποίες τα παιδιά αναζητούν και επεξεργάζονται τις πληροφορίες και με χρήση κατάλληλων εργαλείων καλλιεργούν δεξιότητες που θα χρησιμοποιήσουν στις επόμενες δραστηριότητες. Στη φάση αυτή τα παιδιά με βιωματικό τρόπο και εργαζόμενα ατομικά ή σε ομάδες έρχονται σε γνωστική ασυμφωνία με τις προϋπάρχουσες γνώσεις (γνωστική σύγκρουση, κοινωνιογνωστική σύγκρουση), ανασκευάζουν λανθασμένες αντιλήψεις και ιδέες και οικοδομούν νέα γνώση. Συνεχίζεται η αναδιατύπωση ή η καταγραφή νέων ερωτήσεων (2η στήλη K-W-L-H).

Στην 3η Φάση (ΕΠΕΞΗΓΗΣΗ) υλοποιούνται δραστηριότητες στις οποίες δίνονται ευκαιρίες στα παιδιά να παρουσιάσουν στην υπόλοιπη τάξη ή στα μέλη της ομάδας τους τον τρόπο με τον οποίο εργάστηκαν, πώς έλυσαν ένα πρόβλημα που είχαν, πώς υλοποίησαν ένα πείραμα επιχειρηματολογώντας και εντοπίζοντας τα λάθη τους και τις δυσκολίες που αντιμετώπισαν. Με αυτό τον τρόπο καλλιεργούν μεταγνωστικές δεξιότητες και μαθαίνουν πώς να μαθαίνουν καλύτερα.

Στην 4η Φάση (ΕΜΠΛΟΥΤΙΣΜΟΣ) υλοποιούνται δραστηριότητες εμπέδωσης, εφαρμογής και εξάσκησης των γνώσεων και δεξιοτήτων που έχουν κατακτήσει στις προηγούμενες φάσεις και καταγράφονται η 3η & 4η στήλη του διαγράμματος K-W-L-H.

Τέλος, κατά την 5η Φάση (ΕΚΤΙΜΗΣΗ) υλοποιούνται δραστηριότητες ατοαξιολόγησης και ετεροαξιολόγησης, αλλά και δραστηριότητες αξιολόγησης της πορείας και της συνολικής εργασίας των παιδιών. Αποτιμάται συνολικά το διάγραμμα K-W-L-H και γίνεται συνολική αξιολόγηση του σεναρίου, ώστε να υπάρξει η κατάλληλη ανατροφοδότηση. Η αξιολόγηση αφορά τόσο στα γνωστικά επιτεύγματα των παιδιών όσο και στις δεξιότητες που καλλιέργησαν αλλά και την επιτυχή ολοκλήρωση των δραστηριοτήτων που συμμετείχαν.

Ο Τροχός της Παιδαγωγικής

Ο Τροχός της Παιδαγωγικής (Pedagogy Wheel) είναι ένα μοντέλο που μπορούν να χρησιμοποιήσουν και εκπαιδευτικοί που δεν έχουν ιδιαίτερη εξοικείωση με τεχνολογικά εργαλεία, καθώς τους βοηθά να επιλέξουν εφαρμογές που εξυπηρετούν συγκεκριμένους μαθησιακούς στόχους. Χρησιμοποιεί τεχνολογικά εργαλεία που υποστηρίζουν τα

επίπεδα της Ταξινομίας του Bloom και το μοντέλο SAMR (Substitution, Augmentation, Modification, Redefinition). Οι στόχοι μπορούν να αφορούν είτε Ενσωμάτωση τεχνολογίας: Βοηθά στην επιλογή εργαλείων που ενισχύουν την κριτική σκέψη, τη συνεργασία και τη δημιουργικότητα, αλλά και την ανάπτυξη ψηφιακών δεξιοτήτων προσαρμόζοντας τη διδασκαλία στις σύγχρονες απαιτήσεις της εκπαίδευσης με έμφαση στις δεξιότητες του 21ου αιώνα (Carrington A., https://mentep.pi.ac.cy/resource-details/The-pedagogy-Wheel).

ΑΝΑΛΥΤΙΚΗ ΔΙΔΑΚΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Γενικός σκοπός του σεναρίου είναι να γνωρίσουν τα παιδιά τα στάδια εξέλιξης του φυτού χρησιμοποιώντας ταυτόχρονα διεπαφές Τεχνητής Νοημοσύνης

Σύνδεση με Στόχους Ταξινομίας του BLOOM

- Γνώση (Remembering). Ανάκληση πληροφοριών και βασικών εννοιών: Να μάθουν για την ανάπτυξη των φυτών.
- Κατανόηση (Understanding). Ερμηνεία, εξήγηση και σύγκριση πληροφοριών: Να κατανοούν τη σημασία της γύρης και του νέκταρ στην ανάπτυξη των φυτών.
- Εφαρμογή (Applying). Χρήση των γνώσεων σε νέες καταστάσεις: Να φυτεύουν σπόρους και να φροντίζουν τα φυτά τους, παρατηρώντας πώς μεγαλώνουν.
- Ανάλυση (Analyzing). Διάσπαση πληροφοριών σε μέρη, κατανόηση σχέσεων: Να αναλύουν το ταξίδι μιας μέλισσας και πώς αυτό βοηθά την ανάπτυξη των φυτών.
- Αξιολόγηση (Evaluating) - Ανάπτυξη Κριτικής σκέψης και δεξιοτήτων λήψης αποφάσεων: Να αξιολογούν το ρόλο της μέλισσας στη φύση.
- Δημιουργία (Creating) - Σύνθεση νέων ιδεών και δημιουργία πρωτότυπου έργου

Αναλυτική Πορεία Διδασκαλίας

1η Φάση: Κινητοποίηση του ενδιαφέροντος μαθητών/τριών και εισαγωγή στο θέμα.

Μια κούκλα-μέλισσα εμφανίζεται στην τάξη με τη χρήση της εφαρμογής Voice AI Avatars (π.χ. με χρήση της Synthesia), η οποία, μέσω τεχνητής φωνής και οπτικής αφήγησης, ζητά τη βοήθεια των παιδιών ώστε να ανακαλύψει τι χρειάζεται ένα σποράκι για να εξελιχθεί σε μεγάλο και υγιές φυτό. Με την τεχνική της ιδεοθύελλας καταγράφονται οι πρότερες γνώσεις και οι εναλλακτικές ιδέες των παιδιών σε ψηφιακό πίνακα συνεργασίας (πχ Padlet) από τον/την εκπαιδευτικό, σχηματίζοντας με αυτόν τον τρόπο έναν εννοιολογικό χάρτη. Το 1ο βήμα ολοκληρώνεται με τη ακριβή διατύπωση του προς διερεύνηση ερωτήματος από τα παιδιά και την καταγραφή των πρώτων δύο στηλών του διαγράμματος KWLH.

2η Φάση: Αναζήτηση πληροφοριών από τα ίδια τα παιδιά σε ομάδες και σε πολλαπλές πηγές πληροφόρησης (βιβλιοθήκη της τάξης εμπλουτισμένη με σχετικό υλικό, στο διαδίκτυο σε ασφαλείς μηχανές αναζήτησης ή σε ολιγόλεπτα βίντεο, στη γωνιά της παρατήρησης ή στο chat gpt). Ακολουθεί παρουσίαση των ευρημάτων στην ολομέλεια, με συντονισμένη συζήτηση και στοχευμένες ερωτήσεις από τον/την εκπαιδευτικό. Συνεχίζεται η καταγραφή της 3ης στήλη του KWLH.

3η Φάση: Εφαρμογή της αποκτηθείσας γνώσης. Τα παιδιά, αφού έχουν εμπεδώσει τη βασική γνώση, καλούνται να την εφαρμόσουν δημιουργικά με τη χρήση σύγχρονων ψηφιακών εργαλείων και διεπαφών τεχνητής νοημοσύνης. Χωρίζονται ξανά σε ομάδες ως εξής: Η 1η Ομάδα δημιουργεί τρεις εικόνες με τα στάδια της ανάπτυξης του φυτού (σπόρος – φύτρωση – άνθιση) χρησιμοποιώντας το εργαλείο Canva AI Image Generator. Η 2η Ομάδα επιλέγει ένα συγκεκριμένο φυτό και δημιουργεί την εξέλιξή του σε εικόνα μέσω του εργαλείου Adobe Firefly. Η 3η Ομάδα ζωγραφίζει τα στάδια του φυτού με tablets σε εφαρμογές όπως Sketchbook ή Tayasui Sketches και εισάγει τις ζωγραφιές στο Pixton για να φτιάξει ένα μικρό κόμικ. Η 4η Ομάδα δημιουργεί ένα σύντομο ψηφιακό βίντεο με Animaker ή Renderforest, δίνοντας φωνητικές εντολές ή κείμενο περιγραφής. Στο τέλος κάθε ομάδα παρουσιάζει τα αποτελέσματα της δουλειάς της, γίνεται η αυτό- και ετερο- αξιολόγηση και μέσω του avatar –μέλισσα με χρήση και πάλι της φωνητικής AI τίθενται ερωτήματα στα παιδιά, αποτιμώντας με αυτόν τον τρόπο το βαθμό κατανόησης του θέματος και ειδικά της έννοιας της επικονίασης.

4η Φάση: Γίνεται χρήση ψηφιακών παιχνιδιών αξιολόγησης (π.χ. Wordwall, Quizizz, LearningApps) τόσο για αξιολόγηση όσο και για την επανάληψη των εννοιών με παιγνιώδη τρόπο ώστε να αποτυπωθεί η γνώση των παιδιών με φυσικό και ευχάριστο τρόπο.

5η Φάση: Αξιολόγηση των μαθητών/τριών. Για την τελική αξιολόγηση των παιδιών αξιοποιούνται τόσο η τεχνική της συνεχούς παρατήρησης για τον μετασχηματισμό της διδασκαλίας, όσο και η τεχνική της Αυτοαξιολόγησης (μέσω emojis στο Mentimeter ή Kahoot! Form Poll), της Ετεροαξιολόγηση, (αξιολόγηση των ομάδων μεταξύ τους, ενισχύοντας με αυτόν τον τρόπο τη συνεργατικότητα και τον σεβασμό και τέλος με τη συμπλήρωση της 4ης στήλης του διαγράμματος KWLH και τη συνολική αποτίμηση του πίνακα και του σεναρίου από τον/την εκπαιδευτικό.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η εργασία ανέδειξε τη σημαντικότητα της αξιοποίησης διεπαφών Τεχνητής Νοημοσύνης (AI) στην προσχολική εκπαίδευση σαν εργαλείο ενίσχυσης της βιωματικής μάθησης. Μέσα από τη σχεδίαση και την εφαρμογή ενός διδακτικού σεναρίου βασισμένου στο μοντέλο 5e επιβεβαιώθηκε ότι οι τεχνολογίες AI μπορούν να ενεργοποιήσουν το ενδιαφέρον των νηπίων, να ενισχύσουν την αυτενέργεια και τη συνεργασία, και να συμβάλουν ουσιαστικά στην καλλιέργεια δεξιοτήτων του 21ου αιώνα, όπως η δημιουργικότητα, η κριτική σκέψη και η συνεργασία.

Η χρήση διαδραστικών εργαλείων και ποικίλων εφαρμογών έδωσε τη δυνατότητα στα παιδιά να πειραματιστούν, να εκφραστούν πολυτροπικά και να εμπεδώσουν έννοιες των φυσικών επιστημών με τρόπο ευχάριστο και προσαρμοσμένο στα ενδιαφέροντά τους. Η παιδαγωγική αξιοποίηση της ΤΝ οδήγησε σε αυθεντικές μαθησιακές εμπειρίες, συνδέοντας τη γνώση με τη δημιουργική παραγωγή.

Παράλληλα, η ενσωμάτωση της ΤΝ στη διδακτική πράξη ανέδειξε την ανάγκη για ισορροπία μεταξύ τεχνολογίας και διαπροσωπικής σχέσης. Αν και η ΤΝ μπορεί να προσφέρει εξατομικευμένη υποστήριξη και προσβάσιμα μαθησιακά περιβάλλοντα, ωστόσο δεν μπορεί να υποκαταστήσει τον παιδαγωγικό ρόλο του/της εκπαιδευτικού. Επιπλέον, επισημάνθηκε η σημασία τήρησης των ηθικών και νομικών πλαισίων (όπως ο Γενικός Κανονισμός Προστασίας Δεδομένων – GDPR), καθώς και η ανάγκη για επιμόρφωση των εκπαιδευτικών ώστε να χρησιμοποιούν τα εργαλεία αυτά με ασφάλεια και αποτελεσματικότητα.

Συμπερασματικά, η ερευνητική εργασία τεκμηριώνει ότι η τεχνητή νοημοσύνη, όταν αξιοποιείται με παιδαγωγικό σχεδιασμό, αποτελεί καταλυτικό παράγοντα εκσυγχρονισμού της προσχολικής εκπαίδευσης, διαμορφώνοντας ένα σχολείο που απαντά στις σύγχρονες προκλήσεις, ενσωματώνει την ψηφιακή καινοτομία και προωθεί τη μάθηση ως μία βιωματική, χαρούμενη και ουσιαστική διαδικασία.

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Η ΑΞΙΟΠΟΙΗΣΗ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΧΗΜΕΙΑΣ: ΜΕΛΕΤΗ ΤΗΣ ΗΛΕΚΤΡΙΚΗΣ ΑΓΩΓΙΜΟΤΗΤΑΣ ΔΙΑΛΥΜΑΤΩΝ ΜΕΣΩ ΔΙΑΔΡΑΣΤΙΚΗΣ ΠΡΟΣΟΜΟΙΩΣΗΣ ΤΟΥ PHET COLORADO

Τζανάκη Νικολέττα
Εκπαιδευτικός Μέσης Εκπαίδευσης, Χημικός MSc
3ο Γυμνάσιο Πρέβεζας, Διεύθυνση Δευτεροβάθμιας Εκπαίδευσης Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: letzan@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση ψηφιακών τεχνολογιών στη διδασκαλία της Χημείας προάγει την ενεργό συμμετοχή των μαθητών και τη βαθύτερη κατανόηση επιστημονικών εννοιών. Η παρούσα εργασία παρουσιάζει μια διδακτική πρόταση για τη μελέτη της ηλεκτρικής αγωγιμότητας υδατικών διαλυμάτων, συνδυάζοντας το πραγματικό πείραμα με τη διαδραστική προσομοίωση "Διάλυμα Ζάχαρης και Αλατιού" του PhET Colorado. Η διδακτική προσέγγιση βασίζεται στη διερευνητική μάθηση (Inquiry-Based Learning - IBL) και εφαρμόστηκε σε μαθητές της Β' Γυμνασίου σε δύο διδακτικές ώρες. Στην πρώτη φάση, οι μαθητές, δουλεύοντας σε ομάδες, διατύπωσαν υποθέσεις και πραγματοποίησαν πειράματα με υδατικά διαλύματα αλατιού (NaCl) και ζάχαρης ($C_{12}H_{22}O_{11}$), καταγράφοντας και αναλύοντας τα αποτελέσματα. Στη δεύτερη φάση, χρησιμοποίησαν την προσομοίωση για να παρατηρήσουν τη διάσταση του NaCl σε ιόντα, κατανοώντας τη σχέση μεταξύ χημικής δομής και αγωγιμότητας.

Η διδακτική παρέμβαση που παρουσιάζεται διαφοροποιείται ουσιαστικά από την παραδοσιακή προσέγγιση διδασκαλίας, προωθώντας τη διερευνητική μάθηση που ενεργοποιεί τους μαθητές ως συμμετοχικά υποκείμενα της εκπαιδευτικής διαδικασίας. Σε ένα τέτοιο πλαίσιο, οι μαθητές εργάστηκαν σε ένα μαθησιακό-διαλογικό περιβάλλον, όπου ανέπτυξαν την κριτική σκέψη και την κατανόηση θεμελιωδών εννοιών της Χημείας, όπως η αγωγιμότητα και η φύση των χημικών ενώσεων. Η πορεία της παρέμβασης, που ακολουθεί το μοντέλο 5E (Engage, Explore, Explain, Elaborate, Evaluate), αποτυπώθηκε σε Φύλλα Εργασίας, με υψηλά ποσοστά σωστών απαντήσεων και ικανοποιητική χρήση επιστημονικής ορολογίας, υποδεικνύοντας εννοιολογική κατανόηση και ικανότητα εφαρμογής γνώσεων σε νέα πλαίσια.

Παράλληλα, η αξιοποίηση τόσο πραγματικών όσο και εικονικών πειραμάτων συνέβαλε στην πολυτροπική προσέγγιση της διδασκαλίας, καθιστώντας τις αφηρημένες έννοιες πιο προσιτές. Η συνδυαστική χρήση των μεθόδων αυτών ενίσχυσε τη συμμετοχή και την αυτενέργεια των μαθητών, ιδιαίτερα όσων συνήθως δυσκολεύονται. Οι μαθητές ενεπλάκησαν ενεργά στη διαδικασία, ανέπτυξαν δεξιότητες ερμηνείας, πρόβλεψης και συνεργασίας, και ανέδειξαν την ικανότητά τους να μεταφέρουν και να επεκτείνουν τη γνώση. Η παρέμβαση αναδεικνύει ότι η χρήση της διερευνητικής μάθησης και των ψηφιακών εργαλείων, όπως οι προσομοιώσεις PhET, μπορεί να μετασχηματίσει τη διδασκαλία της Χημείας σε μια δυναμική, βιωματική και ουσιαστική μαθησιακή εμπειρία.

Λέξεις – κλειδιά: ηλεκτρική αγωγιμότητα, προσομοίωση PhET Colorado, διερευνητική μάθηση (IBL), μοντέλο 5E, πολυτροπική μάθηση

ΕΙΣΑΓΩΓΗ

Διερευνητική (ή ανακαλυπτική) μάθηση

Η μάθηση μέσω διερεύνησης εμφανίστηκε στην εκπαίδευση στις φυσικές επιστήμες τον τελευταίο αιώνα. Πριν από το 1900, επικρατούσε η άποψη ότι οι μαθητές θα έπρεπε να κατακτήσουν το σύνολο της γνώσης μέσω ης παραδοσιακής διδασκαλίας. Η κριτική του Dewey έθεσε τα θεμέλια για το μοντέλο διερευνητικής μάθησης, όπου οι μαθητές μαθαίνουν μέσα από την παρατήρηση και από υποθέσεις που δοκιμάζουν καθώς δρουν και όχι μέσα από τελικές αλήθειες (Dewey, 1916, σελ. 153–154). Σύμφωνα με την άποψή του, οι εκπαιδευτικοί θα πρέπει να παρουσιάσουν την επιστήμη ως διερεύνηση και οι μαθητές είναι αναγκαίο να χρησιμοποιούν τη διερεύνηση ως ένα σύνολο εννοιολογικών δομών που αναπροσαρμόζονται υπό το φως νέων δεδομένων (Skordoulis & Stefanidou, 2021, σελ. 107–108). Η εκμάθηση των φυσικών επιστημών μέσω της διερεύνησης μπορεί να θέσει στο επίκεντρο τα προσωπικά ενδιαφέροντα και την εμπειρία των μαθητών, βοηθώντας τους να αναπτύξουν μηχανισμούς για τη κατανόηση του κόσμου γύρω τους, καθώς και την τόνωση και ικανοποίηση της περιέργειάς τους, επηρεάζοντας τις προσωπικές τους αποφάσεις στη ζωή σε ότι αφορά την ευημερία τους και την επιλογή της σταδιοδρομίας τους (Harlen, 2013, σελ. 11).

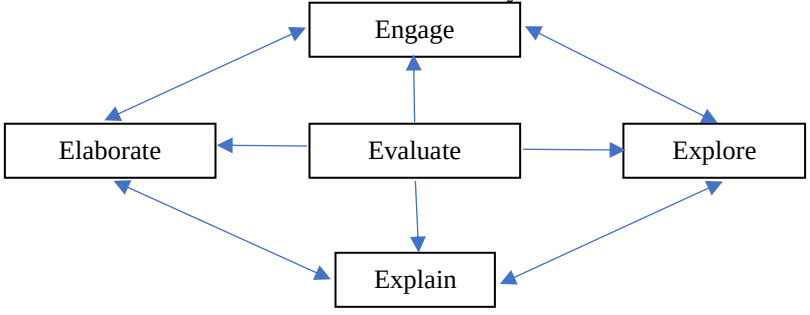
Η μάθηση μέσω διερεύνησης είναι μια μαθησιακή προσέγγιση που επιτρέπει στους μαθητές να είναι ενεργοί καθ' όλη τη διάρκεια της μαθησιακής διαδικασίας, ενθαρρύνοντάς τους να κάνουν ερωτήσεις, να αναλύουν τις πληροφορίες και να ερευνούν. Αναπτύσσεται, έτσι, η ικανότητα χρήσης επιστημονικών διαδικασιών (διατύπωση προβλημάτων, σχεδιασμός πειραματικών διαδικασιών, διατύπωση υποθέσεων, συλλογή και ανάλυση δεδομένων και ερμηνεία των αποτελεσμάτων) και προάγεται η δημιουργικότητα των μαθητών (Bass, J. E. κ.ά., 2009, σελ. xii). Χάρη στη μάθηση μέσω διερεύνησης, το επίκεντρο της εκπαίδευσης στις φυσικές επιστήμες έχει μετατοπιστεί από την αποστήθιση εννοιών και φαινομένων στη χρήση επιστημονικών διαδικασιών και δεξιοτήτων κριτικής σκέψης (Z. Zacharia, 2003, σελ. 795). Στα μαθήματα φυσικών επιστημών όπου η διερεύνηση είναι το κύριο εργαλείο μάθησης, οι μαθητές δεν μαθαίνουν απλώς επιστημονικά θέματα, αλλά αποκτούν και δεξιότητες όπως λογική σκέψη, διατύπωση ερωτήσεων, διεξαγωγή έρευνας και επίλυση καθημερινών προβλημάτων (Germann, 1994, σελ. 749).

Το Μοντέλο Διδασκαλίας 5E

Το Μοντέλο Διδασκαλίας των φυσικών επιστημών 5E παρέχει τη δομή που χρειάζονται οι εκπαιδευτικοί για να ανταποκριθούν στις απαιτήσεις των σύγχρονων προτύπων επιστημονικής εκπαίδευσης (τόσο ποσοτικών όσο και ποιοτικών). Ενθαρρύνει τη σκέψη των μαθητών, επιτρέποντάς τους στη συνέχεια να ανακαλύψουν και να μάθουν μέσα από την εξερεύνηση, εμβαθύνοντας, έτσι, στην κατανόηση του περιεχομένου. Οι μαθητές έχουν την ευκαιρία να αναπτύξουν την κριτική σκέψη και να συνεχίσουν τη μάθηση σε θέματα που τους ενδιαφέρουν και βρίσκονται στην καθημερινότητά τους, καθώς περνά ο χρόνος (Chitman-Booker & Kopp, 2013, σελ. 9–10).

Το μοντέλο 5E είναι ένα διδακτικό μοντέλο για τη διδασκαλία των φυσικών επιστημών με στόχο την καλλιέργεια επιστημονικά εγγράμματων μαθητών, δηλαδή συνειδητοποίησης του ρόλου της επιστήμης στη σύγχρονη κοινωνία, εξοικείωσης με θεμελιώδεις έννοιες και, τέλος, ευχέρειας στην εφαρμογή (Skordoulis & Stefanidou, 2021, σελ. 281). Καθώς αποτελεί μια παιδαγωγική προσέγγιση στη διδασκαλία των επιστημών, παρέχει ένα πλαίσιο στους εκπαιδευτικούς για την ανάπτυξη της κατανόησης των μαθητών σχετικά με επιστημονικές έννοιες και ιδέες (περιεχόμενο). Αυτή η μέθοδος είναι ευέλικτη και μπορεί να χρησιμοποιηθεί με πολλούς διαφορετικούς τύπους διδακτικών πόρων, προγραμμάτων και υλικών. Τα βήματα του μοντέλου 5E φαίνονται στο **Σχήμα 1** (Duran & Duran, 2004, σελ. 52) και αποτελείται από γνωστικά στάδια μάθησης που περιλαμβάνουν τα: Engage (Ενεργοποίηση), Explore (Εξερεύνηση), Explain (Εξήγηση), Elaborate (Εμβάθυνση) και Evaluate (Αξιολόγηση).

Σχήμα 1
Μοντέλο Διδασκαλίας 5E



Η περιγραφή κάθε φάσης έχει ως εξής:

1. Engage (Ενεργοποίηση): Σε αυτό το στάδιο, καταβάλλονται προσπάθειες για να τραβηχτεί η προσοχή των μαθητών και να ενισχυθεί ο ενθουσιασμός τους για τη μάθηση.

2. Explore (Εξερεύνηση): Στόχος είναι να αποκτήσουν οι μαθητές μια γενική εμπειρία. Οι μαθητές, ως «ενεργά υποκείμενα της μάθησης», κάνουν παρατηρήσεις σχετικά με τη λύση ενός προβλήματος, διατυπώνουν υποθέσεις, συλλέγουν και αναλύουν δεδομένα, ελέγχουν την εγκυρότητα των υποθέσεών τους, συνεργάζονται με άλλους, διευρύνουν την οπτική τους και αναπτύσσουν δημιουργική σκέψη.

3. Explain (Εξήγηση): Σε αυτό το στάδιο, ο δάσκαλος θέτει ερωτήσεις και δίνει «επιστημονικές εξηγήσεις» για να διασφαλίσει ότι οι μαθητές έχουν κατανοήσει πλήρως τη μελέτη, τις ερμηνείες και τις λύσεις που έχουν συζητηθεί.

4. Elaborate (Εμβάθυνση): Εδώ, οι μαθητές εφαρμόζουν τις γνώσεις που έχουν αποκτήσει σε νέες καταστάσεις. Οι δραστηριότητες αυτού του σταδίου στοχεύουν στην «εμβάθυνση της μάθησης», την ανάπτυξη δεξιοτήτων και την ουσιαστική κατανόηση του αντικειμένου.

5. Evaluate (Αξιολόγηση): Στο τελευταίο στάδιο, αξιολογούνται «οι γνώσεις, οι δεξιότητες και τα έργα» των μαθητών. Η έμφαση δίνεται στην ικανότητα «εφαρμογής της μάθησης σε διαφορετικά περιβάλλοντα», αντί της απλής απομνημόνευσης.

Συνεργατική μάθηση

Έχοντας ως βάση τον Dewey, η συνεργατική μάθηση δημιουργεί το πλαίσιο όπου οι μαθητές μπορούν να αλληλεπιδράσουν, να συνεργαστούν, να ενθαρρύνουν ο ένας τον άλλον, να αλληλοβοηθηθούν σε ένα συγκεκριμένο θέμα, να διερευνήσουν και να αναλύσουν συλλογικά τα δεδομένα και, έτσι, μπορούν να ολοκληρώσουν μία εργασία καλύτερα από ότι όταν εργάζεται ο καθένας μόνος του και το αποτέλεσμα της συλλογικής εργασίας να είναι συνολικά ανώτερο σε σχέση με το ατομικό (Kakana, 2015, σελ. 31–32). Στη συνεργατική μάθηση, οι πόροι της ομάδας ωφελούν το κάθε άτομο και γενικότερα το ομαδικό πνεύμα και η συνεργασία αποφέρουν πολλά πλεονεκτήματα στο άτομο όπως αυτοπεποίθηση και λήψη αποφάσεων από κοινού.

Η χρήση του συνδυασμού των Φυσικών Πειραμάτων και των Ψηφιακών Τεχνολογιών στη Διδασκαλία των Φυσικών Επιστημών

Έρευνες υποστηρίζουν την αποδοτικότητα του βιωματικού πειράματος στη διδασκαλία των ΦΕ, μιας και οι μαθητές αποκτούν κινητικές και διανοητικές ικανότητες, κατασκευάζουν μόνοι τους τις γνώσεις τους, αναπτύσσουν ερευνητικού τύπου δεξιότητες και ικανότητες επίλυσης προβλήματος. Παρά τους περιορισμούς και το κόστος τους, τα πραγματικά εργαστήρια παρέχουν μοναδικές εμπειρίες στους μαθητές όσον αφορά στην αίσθηση της εργαστηριακής πρακτικής, αισθητηριακές και απτικές εμπειρίες, στην εκτίμηση των δυσκολιών διεξαγωγής της εργασίας, λήψης, μετρήσεων, χειρισμού σφαλμάτων καθώς και στη συγκρότηση αξιόπιστων δεδομένων (Z. C. Zacharia & Michael, 2016, σελ. 127).

Κάποιες άλλες αμφισβητούν την παραπάνω θέση και υποστηρίζουν τη χρήση προσομοιώσεων διαπιστώνοντας ότι η δυνατότητα οπτικοποίησης των φυσικών φαινομένων, η άμεση ανατροφοδότηση για τα σφάλματα των μετρήσεων, η δυνατότητα άμεσης αναδιάταξης της πειραματικής συσκευής και η εύκολη κα γρήγορη διερεύνηση νέων πειραματικών διατάξεων οδηγεί στην κατανόηση και την άσκηση στην επιστημονική μεθοδολογία (Psyllos, 2021, σελ. 193). Η ενσωμάτωση των ψηφιακών τεχνολογιών έχει πρόσθετη παιδαγωγική αξία και δυνατότητα μετασχηματισμού των παραδοσιακών μοντέλων μεταφοράς της γνώσης, παρέχοντας στους μαθητές τη δυνατότητα αλληλεπίδρασης με πληθώρα γνωστικών αντικειμένων (Moore κ.ά., 2014, σελ. 1191). Εφαρμογές όπως, τα εκπαιδευτικά παιχνίδια, η χρήση εικονικών οργάνων μέτρησης των φυσικών μεγεθών, ο χειρισμός οπτικοποιημένων εννοιολογικών οντοτήτων, διεγείρουν το ενδιαφέρον και συντελούν στη δημιουργική δραστηριοποίηση των μαθητών. Πολλές έρευνες δείχνουν ότι οι ψηφιακές τεχνολογίες έχουν την δυνατότητα να υποστηρίξουν αποτελεσματικά τη μάθηση με νέους τρόπους συγκριτικά με το παρελθόν, π.χ. μέσα από τη χρήση ενός μαθησιακού περιβάλλοντος με ενσωματωμένες δυναμικές διασυνδέσεις πολλαπλών αναπαραστάσεων μακροσκοπικών φυσικών μεγεθών με μικροσκοπικές οντότητες (Psyllos & Taramopoulos, 2022, σελ. 369). Οι προσομοιώσεις και οι απεικονίσεις έχουν αναγνωριστεί εδώ και καιρό ως σημαντικές για τη διδασκαλία και τη μάθηση της χημείας (Stieff & Wilensky, 2003, σελ. 287).

Σχετικά πρόσφατες μελέτες ερευνούν τα αποτελέσματα της χρήσης συνδυασμού πραγματικού και βιωματικού πειράματος και διαπιστώνουν ισχυρότερη εννοιολογική κατανόηση (De Jong κ.ά., 2013, σελ. 307). Σύγχρονες επισκοπήσεις τεκμηριώνουν ότι ο συνδυασμός εικονικών και πραγματικών εργαστηρίων σε κατάλληλα πλαίσια έχει προστιθέμενη παιδαγωγικά αξία για τους μαθητές και εκπαιδευτικούς διότι οι παροχές των εικονικών εργαστηρίων υποστηρίζουν τη γνωστική εστίαση και την αλληλεπίδραση θεωρίας και πρακτικής ενώ τα πραγματικά εργαστήρια προωθούν την εξοικείωση με τα φαινόμενα, τα όργανα και τις επιστημονικές πρακτικές (Wörner κ.ά., 2022, σελ. 911). Επιπλέον, η ταυτόχρονη αξιοποίηση εργαστηριακού περιβάλλοντος και τεχνολογικών μέσων, από τους εκπαιδευτικούς

φυσικών επιστημών, φαίνεται να συμβάλλει ουσιαστικά στην καλλιέργεια αναπαραστατικής ικανότητας σε πολλαπλά επίπεδα στη διδασκαλία χημεία (μακροσκοπικό, μικροσκοπικό, συμβολικό και αλγεβρικό). Οι εκπαιδευτικοί μπορούν να χρησιμοποιούν την τεχνολογία ως ένα υποστηρικτικό εργαλείο για την κατανόηση φαινομένων σε μικροσκοπικό επίπεδο. Μέσα από τη σύνδεση των εργαστηριακών δραστηριοτήτων με τα τεχνολογικά μέσα, οι εκπαιδευόμενοι μπορούν να διατυπώνουν τεκμηριωμένες απόψεις, αξιοποιώντας διαφορετικά επίπεδα αναπαράστασης, απαραίτητα για την εις βάθος κατανόηση της χημείας. (Yaman & Hand, 2024, σελ. 2231).

Η περίπτωση του PhET Colorado

Από το 2002, το έργο PhET, του πανεπιστημίου του Colorado, έχει αναπτύξει 116 διαδραστικές προσομοιώσεις (sims) για την εκπαίδευση στις επιστήμες και τα μαθηματικά, με περισσότερες από 50 προσομοιώσεις για τη διδασκαλία της χημείας, οι οποίες είναι όλες διαθέσιμες δωρεάν στο διαδίκτυο (The PhET Interactive Simulations Project, 2025). Χρησιμοποιώντας αρχές σχεδιασμού που υποστηρίζουν τους μαθητές στην επίτευξη των διάφορων μαθησιακών στόχων, οι προσομοιώσεις PhET έχουν έναν ξεχωριστό σχεδιασμό και αίσθηση. Αυτές οι αρχές σχεδιασμού, που βασίζονται στην έρευνα και την εμπειρία του έργου PhET, καθώς και στις μελέτες από τις κοινότητες επιστημονικής εκπαίδευσης και εκπαιδευτικού σχεδιασμού (Moore κ.ά., 2014, σελ. 1191). (Kozma & Russell, 2005, σελ. 122), (Plass κ.ά., 2012, σελ. 394), (Rodrigues, 2012, σελ. 209), περιλαμβάνουν:

- Διαδραστικότητα: Οι μαθητές πειραματίζονται με βασικές παραμέτρους (π.χ. προσθήκη διαλυτής ουσίας).
- Άμεση Ανατροφοδότηση: Οι αλλαγές εμφανίζονται αμέσως (π.χ. αλλαγή χρώματος διαλύματος).
- Πολλαπλές Αναπαραστάσεις: Σύνδεση διαφορετικών προσεγγίσεων (π.χ. εικονιστικές και συμβολικές).
- Προσομοίωση Δύσκολων Πειραμάτων: Επιτρέπει πειράματα αδύνατα στον πραγματικό κόσμο (π.χ. αλλαγή ηλεκτραρνητικότητας ατόμων).
- Διαισθητική Διεπαφή: Εύκολη χρήση και εξερεύνηση χωρίς περιττά εμπόδια.
- Σύνδεση με την Πραγματική Ζωή: Οι έννοιες γίνονται πιο σχετικές για τους μαθητές.
- Προκλήσεις & Παιχνίδια: Διασκέδαση που ενισχύει την περιέργεια και τη μάθηση.
- Έμμεση Καθοδήγηση: Οι μαθητές καθοδηγούνται χωρίς να νιώθουν περιορισμένοι.

Αυτές οι αρχές μεταμορφώνουν τη διδασκαλία, βοηθώντας τους μαθητές να κατανοήσουν τη χημεία μέσα από εξερεύνηση και πειραματισμό (Lancaster κ.ά., 2013, σελ. 98).

ΜΕΘΟΔΟΛΟΓΙΑ

Διδακτικό πλαίσιο:

Η παρούσα διδακτική πρόταση αφορά στη διδασκαλία της ενότητας 2.9 «Υποατομικά σωματίδια – Ιόντα» του σχολικού εγχειριδίου της Χημείας της Β' Γυμνασίου κατά την οποία προτείνεται να γίνει το «Παράθυρο στο εργαστήριο: Αγωγιμότητα διαλύματος μαγειρικού αλατιού» καθώς και η 7η εργαστηριακή άσκηση του εργαστηριακού οδηγού με τίτλο: «Διαπίστωση της ηλεκτρικής αγωγιμότητας διαλύματος χλωριούχου νατρίου». Στην διδακτική πρόταση, πραγματοποιήθηκε διερεύνηση της αγωγιμότητας υδατικών διαλυμάτων ιοντικών (αλάτι - NaCl) και μοριακών ενώσεων (ζάχαρη - $C_{12}H_{22}O_{11}$), χρησιμοποιώντας τόσο την πραγματική πειραματική διαδικασία όσο και τη διαδραστική προσομοίωση «Διάλυμα ζάχαρης και αλατιού» του PhET Colorado.

Διδακτική βάση της παρέμβασης αποτέλεσε το ισχύον ΔΕΠΠΣ-ΑΠΣ της Χημείας της Β' Γυμνασίου (DEPPS-APS, *Φυσικής Χημείας*, 2003, σελ. 546), όπου στόχοι της είναι το να είναι σε θέση οι μαθητές να:

- αναγνωρίζουν τη σχέση της χημικής δομής μιας ένωσης με την αγωγιμότητα του διαλύματός της,
- κατανοούν τη διαφορά στην αγωγιμότητα μεταξύ ιοντικών και μοριακών ενώσεων,
- διερευνούν με εργαστηριακό και ψηφιακό τρόπο φαινόμενα ιοντισμού,
- χρησιμοποιούν την προσομοίωση «Διάλυμα ζάχαρης και αλατιού» του PhET Colorado για την πειραματική επιβεβαίωση των θεωρητικών γνώσεων, και
- αναπτύξουν δεξιότητες διερευνητικής μάθησης (Inquiry-Based Learning - IBL), θέτοντας ερωτήματα, διατυπώνοντας υποθέσεις, σχεδιάζοντας και ερμηνεύοντας πειραματικά δεδομένα.

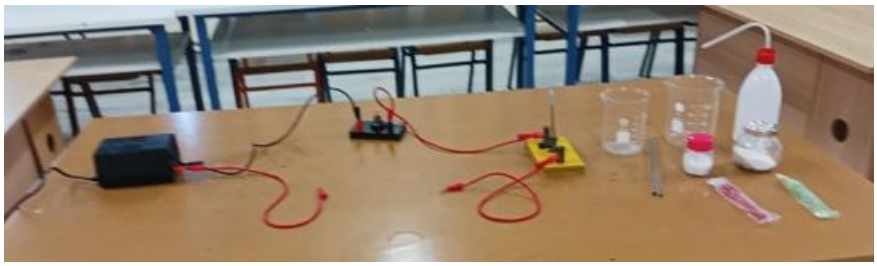
Πριν την υλοποίηση της παρέμβασης σχεδιάστηκαν οι πειραματικές δραστηριότητες (πραγματικά και εικονικά πειράματα) που θα εκτελούσαν οι μαθητές και δύο Φύλλα Εργασίας (ΦΕ) που θα τους δίνονταν προς επεξεργασία. Η διδακτική παρέμβαση πραγματοποιήθηκε σε δύο τμήματα - 35 μαθητές (21 αγόρια - 14 κορίτσια) της Β' Γυμνασίου του 3ου Γυμνασίου Πρέβεζας σε δύο διαδοχικές διδακτικές ώρες (90 λεπτά). Η 1η διδακτική ώρα πραγματοποιήθηκε στο Εργαστήριο Φυσικών Επιστημών και η 2η διδακτική ώρα στη σχολική αίθουσα, καθώς εκεί μόνο υπάρχει η δυνατότητα χρήσης διαδραστικού πίνακα. Επίσης, πρέπει να σημειωθεί ότι πριν την υλοποίηση της παρέμβασης οι μαθητές είχαν

έρθει σε επαφή κατά τη διάρκεια της τρέχουσας σχολικής χρονιάς με τις έννοιες του ατόμου, μορίου και ιόντος αλλά όχι με τις έννοιες των ιοντικών και μοριακών ενώσεων και τις ιδιότητες των υδατικών τους διαλυμάτων.

Διδακτικά Μέσα:

Για το φυσικό πείραμα τα υλικά που χρησιμοποιήθηκαν ήταν: ποτήρια ζέσεως, απιονισμένο νερό, ζάχαρη, αλάτι, πλαστικά κουταλάκια, ράβδοι ανάδευσης, τροφοδοτικό χαμηλής τάσης, καλώδια με καρφιά, καλώδια με κροκοδειλάκια, ένα λαμπάκι 4,5V (βιδωτό) με λυχνιολαβή και ένας διακόπτης (**Εικόνα 1**).

Εικόνα 1
Τα υλικά που χρησιμοποιήθηκαν στο φυσικό πείραμα



Για το εικονικό πείραμα χρησιμοποιήθηκε: Διαδραστικός πίνακας με πρόσβαση στο διαδίκτυο. Το λογισμικό προσομοίωσης που χρησιμοποιήθηκε για τα εικονικά πειράματα ήταν το «Διάλυμα ζάχαρης και αλατιού» του PhET Colorado: http://phet.colorado.edu/el/simulation/legacy/sugar-and-salt-solutions.

Το συγκεκριμένο λογισμικό επιλέχθηκε γιατί οι μαθητές, ύστερα από σύντομη επίδειξη της χρήσης του προγράμματος, είναι σε θέση να το χρησιμοποιούν με ευκολία. Επιπλέον, το λογισμικό χαρακτηρίζεται από ιδιαίτερα φιλικό περιβάλλον επικοινωνίας και ο μαθητής μπορεί, με απλούς χειρισμούς, να εκτελέσει πειράματα και να δει άμεσα τα αποτελέσματα τους στην οθόνη του υπολογιστή, αλλά και έχει τη δυνατότητα να επαναλάβει το πείραμά του όσες φορές επιθυμεί. Επίσης, είναι λογισμικό ελεύθερης διανομής, με αποτέλεσμα να είναι εύκολα διαθέσιμο σε οποιοδήποτε σχολείο για να το χρησιμοποιήσουν ανά πάσα στιγμή ο εκπαιδευτικός και οι μαθητές για την εκτέλεση πειραμάτων στην αγωγιμότητα διαλυμάτων ζάχαρης και αλατιού. Τέλος, η αναλογία του πραγματικού με το εικονικό πείραμα, τόσο στο ηλεκτρικό κύκλωμα που χρησιμοποιείται, όσο και στα διαλύματα που διαθέτει, είναι πανομοιότυπη οπότε υπάρχει η άμεση συσχέτιση-εξήγηση με το πραγματικό πείραμα.

Υλοποίηση των διδασκαλιών:

1η Διδακτική Ώρα: Πειραματική Μελέτη της Αγωγιμότητας Διαλυμάτων Αλατιού και Ζάχαρης (1ο ΦΕ)

1. Engage (Προσέλκυση ενδιαφέροντος) - 10'

Κατά τη διάρκεια της πρώτης διδακτικής ώρας, η οποία πραγματοποιήθηκε στο σχολικό εργαστήριο, οι μαθητές χωρίστηκαν σε ομάδες των 5 ατόμων και τους διανεμήθηκε το 1ο ΦΕ. Αρχικά, ο εκπαιδευτικός ξεκίνησε με διερευνητικά ερωτήματα: «*Τι συμβαίνει όταν διαλύσουμε αλάτι ή ζάχαρη στο νερό;*», και «*Ποιο από τα δύο διαλύματα μπορεί να άγει το ηλεκτρικό ρεύμα και γιατί;*»

Ακολούθησε διαλογική συζήτηση με τον εκπαιδευτικό καθώς και των μαθητών μεταξύ τους και οι μαθητές έθεσαν το ερευνητικό ερώτημα: «*Πώς επηρεάζει η χημική σύσταση μιας ουσίας την αγωγιμότητα του υδατικού της διαλύματος;*» Στη συνέχεια οι μαθητές κλήθηκαν να διατυπώσουν τις υποθέσεις τους, οι οποίες, αφού πρώτα συζητήθηκαν στις ομάδες, ανακοινώθηκαν στην τάξη. Ο εκπαιδευτικός, έχοντας καθοδηγητικό και κατευθυντήριο ρόλο, συμμετείχε στη διαδικασία διατύπωσης επί μέρους υποθέσεων, των οποίων οι απαντήσεις καταγράφηκαν στο ΦΕ.

2. Explore (Διερεύνηση) - 25'

Οι μαθητές, εργαζόμενοι σε ομάδες, εκτέλεσαν το φυσικό πείραμα. Συγκεκριμένα, ετοίμασαν τα διαλύματα αλατιού και ζάχαρης, συναρμολόγησαν το ηλεκτρικό κύκλωμα, συνδέοντας σε σειρά το τροφοδοτικό, τα καλώδια, το διακόπτη και τη λάμπα και τοποθέτησαν τα καλώδια εκ περιτροπής στα δύο διαλύματα προκειμένου να παρατηρήσουν αν ανάβει το λαμπάκι σε κάθε κλειστό κύκλωμα που πραγματοποιείται. Στη συνέχεια, κατέγραψαν τις παρατηρήσεις τους, οι οποίες ήταν οι εξής: το λαμπάκι ανάβει στο διάλυμα στο αλατιού ενώ δεν ανάβει στο διάλυμα της ζάχαρης.

3. Explain (Επεξήγηση) - 10'

Οι μαθητές ανέλυσαν τα δεδομένα και συζήτησαν την έννοια των ιόντων και τη σχέση τους με την αγωγιμότητα των υδατικών τους διαλυμάτων. Στη συνέχεια, εξήγησαν τα αποτελέσματά τους και συμπλήρωσαν το ΦΕ, απαντώντας σε καθοδηγούμενες ερωτήσεις: «*Ποια διαφορά παρατηρήσατε μεταξύ των δύο διαλυμάτων;*», «*Ποιο είναι το κοινό χαρακτηριστικό των ουσιών που άγουν το ηλεκτρικό ρεύμα;*», «*Πώς εξηγείτε τα αποτελέσματά σας με βάση τη δομή των ουσιών που χρησιμοποιήσατε;*», «*Πώς εξηγείται η αγωγιμότητα του διαλύματος αλατιού με βάση τη δομή των ιόντων;*», «*Αν προσθέτατε περισσότερη ποσότητα αλατιού στο διάλυμα, πώς πιστεύετε ότι θα επηρεαζόταν η αγωγιμότητα;*»

Τέλος, ο εκπαιδευτικός διευκόλυνε τη συζήτηση εξηγώντας γιατί οι ιοντικές ενώσεις άγουν το ηλεκτρικό ρεύμα, ενώ οι μοριακές όχι, καταλήγοντας στα παρακάτω συμπεράσματα:

α) Η παρουσία ιόντων σε ένα διάλυμα επηρεάζει την αγωγιμότητά του, β) το αλάτι (NaCl) διαλύεται στο νερό και δημιουργεί ιόντα Na^+ και Cl^-, τα οποία επιτρέπουν τη μεταφορά ηλεκτρικού φορτίου (ηλεκτρικό ρεύμα), και γ) η ζάχαρη, ως μοριακή ένωση, δεν παράγει ιόντα στο νερό, επομένως το διάλυμά της δεν άγει το ηλεκτρικό ρεύμα.

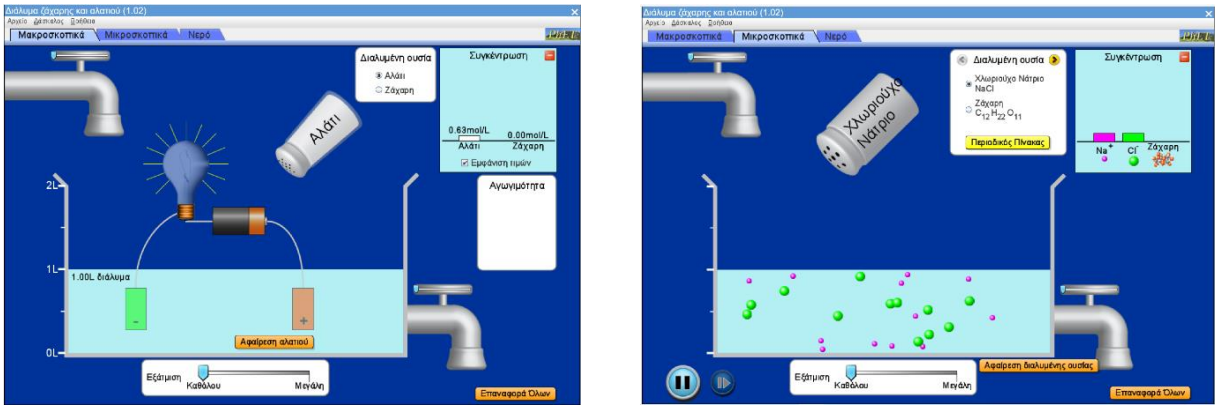
2η Διδακτική Ώρα: Μελέτη της Ηλεκτρικής Αγωγιμότητας Διαλύματος Ζάχαρης και Αλατιού με Χρήση Προσομοίωσης του PhET Colorado (2ο ΦΕ)

Σύνδεση με την προηγούμενη διδακτική ώρα - 5'

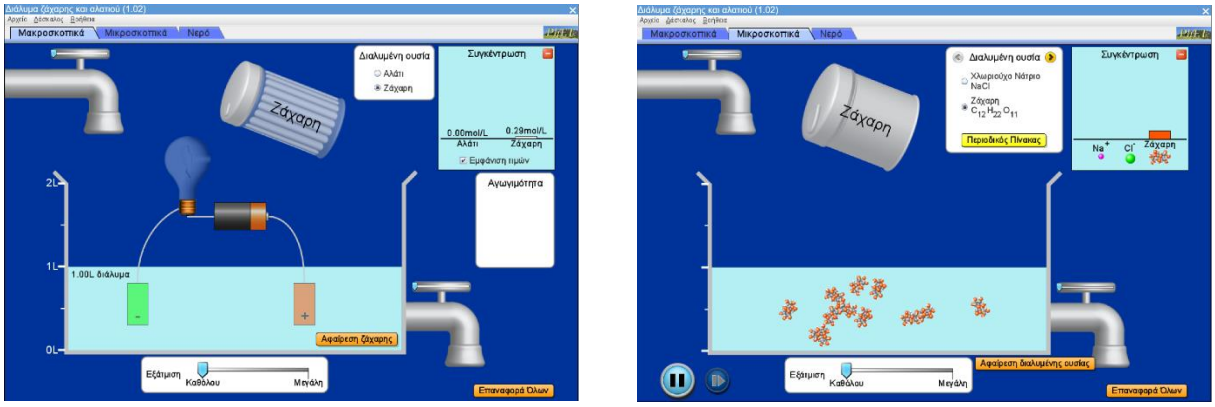
Κατά τη διάρκεια της δεύτερης διδακτικής ώρας, η οποία πραγματοποιήθηκε στη σχολική αίθουσα, έγινε αρχικά μια συζήτηση-σύνδεση σχετική με την προηγούμενη διδακτική ώρα και ζητήθηκε από τους μαθητές να προβλέψουν τη διαφορά της αγωγιμότητας των διαλυμάτων αλατιού και ζάχαρης.

4. Elaborate (Επέκταση) - 25'

Εικόνα 2
Το διάλυμα αλατιού στο λογισμικό του PhET Colorado



Εικόνα 3
Το διάλυμα ζάχαρης στο λογισμικό του PhET Colorado



Αρχικά, έγινε σύντομη επίδειξη του περιβάλλοντος της διαδικτυακής προσομοίωσης του PhET Colorado «Διάλυμα ζάχαρης και αλατιού», με τη χρήση του διαδραστικού πίνακα, από τον εκπαιδευτικό. Στη συνέχεια, πραγματοποιήθηκε το εικονικό πείραμα από εκπροσώπους των ομάδων, ενώ οι υπόλοιποι μαθητές τους καθοδηγούσαν σύμφωνα με το ΦΕ.

Κατά τη διάρκεια, αλλά και στο τέλος του εικονικού πειράματος, οι μαθητές οδηγήθηκαν, με τη βοήθεια του εκπαιδευτικού, σε παρατηρήσεις, οι οποίες και καταγράφηκαν στα ΦΕ: «*Το αλάτι (NaCl), όταν διαλύεται στο νερό, διίσταται σε ιόντα* Na^+ *και* Cl^-» (**Εικόνα 2**), «*Η ζάχαρη* ($C_{12}H_{22}O_{11}$)*, όταν διαλύεται στο νερό, δε σχηματίζει ιόντα*» (**Εικόνα 3**), «*Η φωτεινότητα της λάμπας αποτελεί ένδειξη αγωγιμότητας ενός διαλύματος*» (**Εικόνα 2** και **Εικόνα 3**), «*Υπάρχει σχέση μεταξύ της ποσότητας (συγκέντρωση) του αλατιού με την αγωγιμότητα του υδατικού του διαλύματος*».

Οι μαθητές συμπλήρωσαν τις παρατηρήσεις τους, αναλύοντας τα αποτελέσματά τους, και απάντησαν στις ερωτήσεις του ΦΕ, αφού πρώτα υπήρξε διαλογική-αναστοχαστική συζήτηση στις ομάδες: «*Γιατί το NaCl εμφανίζει υψηλή αγωγιμότητα όταν διαλύεται στο νερό;*», «*Γιατί η ζάχαρη δεν επιτρέπει τη διέλευση ηλεκτρικού ρεύματος στο διάλυμα;*», «*Πώς σχετίζεται η ηλεκτρική αγωγιμότητα με τη χημική δομή των ουσιών;*», «*Αν προσθέσουμε περισσότερη ποσότητα NaCl στο νερό, πώς θα επηρεαστεί η αγωγιμότητα; Δικαιολογήστε την απάντησή σας.*»

5. Evaluate (Αξιολόγηση) - 10'

Οι μαθητές, περνώντας στο στάδιο της αξιολόγησης των γνώσεων που αποκόμισαν από την παρέμβαση, ολοκλήρωσαν το ΦΕ απαντώντας στις παρακάτω ερωτήσεις, κλειστού τύπου, συγκρίνοντας τα αποτελέσματα της προσομοίωσης με το φυσικό πείραμα αναστοχαζόμενοι για τα εξής:

α) «Ποιο από τα παρακάτω διαλύματα είναι καλός αγωγός του ηλεκτρικού ρεύματος;»,

β) «Τι συμβαίνει όταν το αλάτι (NaCl) διαλύεται στο νερό;»

γ) «Ποια είναι η βασική αιτία της αγωγιμότητας του διαλύματος αλατιού (NaCl);»

δ) «Γιατί το διάλυμα ζάχαρης ($C_{12}H_{22}O_{11}$) δεν άγει το ηλεκτρικό ρεύμα;»

ε) «Τι συμβαίνει στην αγωγιμότητα αν αυξήσουμε την ποσότητα (συγκέντρωση) του αλατιού στο νερό;»

Τέλος, σε μια ερώτηση ανοιχτού τύπου, τους ζητήθηκε: «Να συνοψίσετε τα ευρήματά σας και να εξηγήσετε πώς αυτά επιβεβαιώνουν ή αντικρούουν τις αρχικές σας προβλέψεις».

Γενίκευση-προέκταση - 5'

Κατά τη συζήτηση που προέκυψε, τέθηκαν ερωτήματα από τους ίδιους τους μαθητές σχετικά με την ικανότητα πρόβλεψης της αγωγιμότητας άγνωστων υδατικών διαλυμάτων, με την προϋπόθεση ότι γνωρίζουμε για το αν πρόκειται για ιοντικές ή μοριακές ενώσεις. Ενδεικτικά συζητήθηκε και προβλέφθηκε η αγωγιμότητα διαλύματος υδατικού διαλύματος ανθρακικής σόδας (Na_2CO_3 - ιοντική ένωση) καθώς και υδατικού διαλύματος φρουκτόζης ($C_6H_{12}O_6$ - μοριακή ένωση).

ΑΠΟΤΕΛΕΣΜΑΤΑ - ΣΥΖΗΤΗΣΗ

Στη διδακτική παρέμβαση που υλοποιήθηκε γίνεται φανερό ότι υπάρχει διαφοροποίηση από το παραδοσιακό πλαίσιο διδασκαλίας όπου ο εκπαιδευτικός έχει ρόλο διεκπεραιωτή και ο μαθητής παθητικού δέκτη. Πρέπει να αναφερθεί ότι το στοχοθετικό πλαίσιο των ΔΕΠΠΣ-ΑΠΣ ακολουθήθηκε σε όλες τις φάσεις της διδακτικής παρέμβασης, μετασχηματίζοντας το αντικείμενο στη διδάξιμη μορφή του. Αφετηρία ήταν η διαμόρφωση κατάλληλου περιεχομένου και μετασχηματισμού του διδακτικού υλικού της Χημείας της Β' Γυμνασίου στην κατεύθυνση υποστήριξης της κριτικής ικανότητας των μαθητών που συγκρότησαν τη συγκεκριμένη τάξη-«κοινότητα». Αυτό έγινε με τη συμμετοχή των μαθητών σε ένα μαθησιακό-διαλογικό πλαίσιο, το οποίο υποστηρίχθηκε από τον εκπαιδευτικό, αφού πρώτα αναγνωρίστηκε η αναγκαιότητα του. Ειδικότερα, τα αποτελέσματα συνοψίζονται στους παρακάτω άξονες.

Μαθησιακά αποτελέσματα

Αποτιμώντας τα Φύλλα Εργασίας (ΦΕ) καταδείχθηκε ότι η πλειοψηφία των μαθητών κατανόησε σε βάθος τους βασικούς στόχους του μαθήματος, όπως αυτοί ορίζονται από το ΔΕΠΠΣ-ΑΠΣ. Πιο συγκεκριμένα, οι μαθητές ήταν σε θέση να αναγνωρίσουν τη σχέση ανάμεσα στη χημική δομή μιας ένωσης και την αγωγιμότητα των διαλυμάτων της, καθώς και να κατανοήσουν τον ρόλο των ιόντων στην αγωγή του ηλεκτρικού ρεύματος. Οι απαντήσεις των μαθητών στις ερωτήσεις αξιολόγησης είχε αρκετά θετικά αποτελέσματα και οι επιδιωκόμενες έννοιες φάνηκε ότι εμπεδώθηκαν σε μεγάλο βαθμό από το σύνολο της τάξης.

Ενδεικτικά, τα ποσοστά σωστών απαντήσεων στις ερωτήσεις του ΦΕ ήταν τα εξής: το 89% των μαθητών αναγνώρισαν ποιο διάλυμα είναι καλός αγωγός του ηλεκτρικού ρεύματος, ενώ το ίδιο ποσοστό απάντησε σωστά στην

ερώτηση που αφορούσε τη διάλυση του NaCl στο νερό. Το 71% κατανόησε τη βασική αιτία της αγωγιμότητας του διαλύματος αλατιού, ενώ το 83% μπόρεσε να εξηγήσει γιατί το διάλυμα ζάχαρης δεν άγει το ηλεκτρικό ρεύμα. Τέλος, το 97% των μαθητών απάντησε σωστά στην ερώτηση σχετικά με την επίδραση της συγκέντρωσης του αλατιού στην αγωγιμότητα.

Επίσης, η χρήση επιστημονικού λεξιλογίου στις διαλογικές συζητήσεις των ομάδων, επιχειρηματολογώντας και υποστηρίζοντας τις απόψεις τους, κυρίως στα στάδια αποτίμησης τόσο του φυσικού όσο και του εικονικού πειράματος, ανέδειξε την ικανότητα των μαθητών να περιγράφουν και να ερμηνεύουν φαινόμενα που παρατηρήθηκαν με λογική συνέπεια και τεκμηριωμένη επιστημονική γνώση. Πιο συγκεκριμένα, χρησιμοποίησαν όρους όπως: «αγωγιμότητα», «ιόντα», «ιοντικές και μοριακές ενώσεις» και «ηλεκτρικό ρεύμα». Κάτι τέτοιο εκτιμάται ότι αποτέλεσε, ως ένα βαθμό, ένα εργαλείο με το οποίο οι μαθητές είχαν τη δυνατότητα να αποδώσουν μια πληρέστερη περιγραφή των αποτελεσμάτων και της διαδικασίας των πειραμάτων. Η κατανόηση των εννοιών αυτών συνέβαλε στην ορθή ερμηνεία των διαφορών μεταξύ ιοντικών και μοριακών ενώσεων, καθώς και στη σύνδεση της χημικής τους δομής με την αγωγιμότητα που παρουσίασαν. Μέσα από τη χρήση αυτών των όρων, οι μαθητές μπόρεσαν να κατανοήσουν βαθύτερα τη φύση των ουσιών και τη συμπεριφορά τους σε διαφορετικά πειραματικά περιβάλλοντα. Παράλληλα, η επιστημονική ορολογία δεν λειτούργησε απλά ως μέσο έκφρασης, αλλά ως εργαλείο ενίσχυσης της αναλυτικής σκέψης και της επιστημονικής μεθοδολογίας.

Διδακτική και μαθησιακή πρακτική

Η εφαρμογή της συγκεκριμένης διδακτικής παρέμβασης συνέβαλε ουσιαστικά στην προώθηση της διερευνητικής μάθησης, ενισχύοντας την ενεργό συμμετοχή των μαθητών στη μαθησιακή διαδικασία. Οι μαθητές ενθαρρύνθηκαν να διατυπώνουν ερωτήματα, να κάνουν υποθέσεις και να τις ελέγχουν με βάση τα πειραματικά δεδομένα, καλλιεργώντας δεξιότητες που ευθυγραμμίζονται με τη μεθοδολογία των φυσικών επιστημών. Μέσα από την παρατήρηση φαινομένων, την εξαγωγή συμπερασμάτων και τη σύνδεση θεωρίας με πράξη, αναπτύχθηκε η κριτική και αναλυτική τους σκέψη, η οποία αποτελεί θεμέλιο της επιστημονικής προσέγγισης. Οι μαθητές, σε ένα υποστηρικτικό μαθησιακό περιβάλλον, ανέλαβαν ενεργό ρόλο στη γνώση που οικοδομούσαν.

Σημαντικό επίσης εύρημα, ήταν η δυνατότητα των μαθητών να προβλέψουν την αγωγιμότητα άγνωστων διαλυμάτων, βασιζόμενοι στη φύση της χημικής ένωσης (ιοντική ή μοριακή). Η πρόβλεψη αυτή δεν βασίζεται απλώς στη μηχανική απομνημόνευση, αλλά στην εφαρμογή της γνώσης σε νέα, άγνωστα παραδείγματα. Μέσα από αυτή τη διαδικασία, οι μαθητές αναπτύσσουν επιστημονική σκέψη και ενισχύουν την ικανότητά τους να διακρίνουν μοτίβα και σχέσεις μεταξύ θεωρητικών εννοιών και πειραματικών δεδομένων. Παράλληλα, αυτή η ικανότητα προβλεπτικής σκέψης ενισχύει τη μεταφορά της γνώσης σε ευρύτερα και πιο σύνθετα πλαίσια, κάτι που αποτελεί βασικό στόχο της εκπαίδευσης στις φυσικές επιστήμες. Έτσι, το διερευνητικό πλαίσιο αποκτά χαρακτηριστικά «ανοικτού» τύπου, καθώς δίνεται «χώρος» στους μαθητές στο να θέσουν και να προτείνουν προς μελέτη ερωτήματα, τα οποία για να προκύψουν απαιτείται διαμόρφωση επιστημονικής γνώσης. Η σύνδεση θεωρίας και πράξης, όπως εκφράζεται μέσα από την ικανότητα πρόβλεψης και ερμηνείας φαινομένων, βοηθά τους μαθητές να αντιλαμβάνονται τη χρησιμότητα της επιστημονικής γνώσης στην κατανόηση του πραγματικού κόσμου. Έτσι, το μάθημα μετατρέπεται από μια στατική διαδικασία μετάδοσης πληροφοριών σε μια δυναμική διαδικασία διερεύνησης, ερμηνείας και ενεργής μάθησης στην κατεύθυνση διαμόρφωσης των μαθητών ως ενεργοί πολίτες.

Παράλληλα, από την ανάλυση των απαντήσεων στα Φύλλα Εργασίας και τις ελεύθερες μαθητικές τοποθετήσεις, διαπιστώθηκε πως ο συνδυασμός πραγματικού και εικονικού πειράματος λειτούργησε συμπληρωματικά, ενισχύοντας την κατανόηση και την εμπλοκή των μαθητών. Οι απόψεις τους ανέδειξαν ποικιλία θετικών στάσεων, όπως: *«το ένα συμπληρώνει το άλλο»*, *«μου αρέσουν και τα φυσικά και τα ηλεκτρονικά πειράματα»*, *«είναι καλύτερο να κάνουμε το πείραμα και με τους δύο τρόπους»*, υποδηλώνοντας ότι η πολυτροπική προσέγγιση στη διδασκαλία είναι αποτελεσματικότερη από την προσκόλληση σε ένα μόνο μοντέλο. Οι μαθητές βρήκαν το εικονικό πείραμα ιδιαίτερα υποστηρικτικό για την κατανόηση αφηρημένων εννοιών, με χαρακτηριστικά σχόλια όπως: *«με βοήθησε να δω πιο αναλυτικά τη διαδικασία διάσπασης»*, *«μου εξήγησε τι γίνεται μέσα στο νερό»*, *«με βοήθησε γιατί πίστευα άλλα και άλλα είδα»*. Από την άλλη, αρκετοί αναγνώρισαν την αξία του πραγματικού πειράματος, θεωρώντας το *«πιο ρεαλιστικό»* ή *«πιο αυθεντικό»*. Ακόμα και κάποιες υπερβολικές θετικές κρίσεις υπέρ του εικονικού πειράματος (π.χ. *«είναι άκρως καλύτερο»*, *«αν το έκανα από το βιβλίο δε θα το καταλάβαινα τόσο»*) επιβεβαιώνουν την εντύπωση ισχυρής ενίσχυσης της κατανόησης μέσα από την οπτικοποίηση και την αλληλεπίδραση. Συνολικά, η ολοκληρωμένη αυτή προσέγγιση, που αξιοποιεί τις δυνατότητες των νέων τεχνολογιών σε συνδυασμό με τη βιωματική φύση των φυσικών πειραμάτων, φαίνεται να υποστηρίζει αποτελεσματικά τη μάθηση και την ουσιαστική κατανόηση των χημικών εννοιών. Ο παραδοσιακός χαρακτήρας της διδασκαλίας δίνει τη θέση του στη διερευνητική μάθηση με κυρίαρχο ρόλο τον εμπλουτισμό της με τις νέες τεχνολογίες.

Ενεργός συμμετοχή των μαθητών

Η δραστηριότητα ανέδειξε την αυξημένη συμμετοχή των μαθητών και στις δύο διδακτικές ώρες, φαινόμενο που παρατηρήθηκε ιδιαίτερα έντονα ακόμη και στους μαθητές που συνήθως εμφανίζουν μικρότερη εμπλοκή ή δυσκολεύονται στο γνωστικό αντικείμενο. Η διαρκής αλληλεπίδραση κατά τη διάρκεια της συζήτησης και της διεξαγωγής των δραστηριοτήτων υποδηλώνει την ενίσχυση της ενεργού μάθησης, όπου οι μαθητές δεν περιορίζονται σε παθητικό ρόλο, αλλά συμμετέχουν ουσιαστικά και με ενδιαφέρον. Το ομαδοσυνεργατικό πλαίσιο ενίσχυσε τη συνεργασία και την αλληλοστήριξη, αναπτύσσοντας δεξιότητες επικοινωνίας, διαπραγμάτευσης και συλλογικής επίλυσης προβλημάτων, που είναι απαραίτητες τόσο στη σχολική ζωή όσο και στη μετέπειτα κοινωνική τους ένταξη.

Μέσα από την ερμηνεία των πειραματικών δεδομένων και την ανάγκη εξαγωγής συμπερασμάτων, οι μαθητές ενεργοποιήθηκαν ως μικροί «ερευνητές» και όχι απλοί αποδέκτες ή απομνημονευτές θεωρίας. Η μετάβαση αυτή από την παθητική μάθηση στη διερεύνηση και την κατανόηση μέσω πειραματισμού ενίσχυσε τη σύνδεση θεωρητικών γνώσεων με τις παρατηρούμενες πειραματικές διαδικασίες. Παράλληλα, δόθηκε η δυνατότητα στους μαθητές να εκφράσουν τις ιδέες, τις απορίες και τα συναισθήματά τους, καθιστώντας ορατή τη «φωνή τους» στη μαθησιακή διαδικασία. Χαρακτηριστικές μαθητικές αναφορές, όπως: «*με βοήθησε γιατί πίστευα άλλα και άλλα είδα*», ή «*με βοήθησε να αναθεωρήσω κάποια πράγματα που είχα αλλιώς στο μυαλό μου*», επιβεβαιώνουν την ουσιαστική κατανόηση, την αυτενέργεια και την εσωτερική αναδόμηση της γνώσης. Μέσα από την εμπειρική διερεύνηση και τον αναστοχασμό, διαφαίνεται μια ολοκληρωμένη μαθησιακή προσέγγιση, στην οποία ο μαθητής μετατρέπεται σε ενεργό υποκείμενο της γνώσης, ενισχύοντας την κριτική σκέψη και τη δια βίου μάθηση.

Συνολικά, η ενσωμάτωση της διερευνητικής μάθησης, σε συνδυασμό με τη χρήση ψηφιακών προσομοιώσεων όπως το PhET, αναδεικνύεται ως μια ιδιαίτερα αποτελεσματική προσέγγιση στη διδασκαλία της Χημείας. Η ενεργή συμμετοχή των μαθητών στις διαδικασίες διερεύνησης και πειραματισμού οδηγεί σε ουσιαστικότερη κατανόηση των επιστημονικών φαινομένων και μπορεί να διευκολύνει την κατανόηση αφηρημένων εννοιών, μετατρέποντας τη Χημεία από μια θεωρητική επιστήμη σε μια βιωματική μαθησιακή εμπειρία. Οι ψηφιακές τεχνολογίες λειτουργούν ως ισχυρά υποστηρικτικά εργαλεία της ενεργού μάθησης και της ανάπτυξης κριτικής σκέψης, ενισχύοντας την αυτενέργεια των μαθητών και τη συμμετοχή τους στη μαθησιακή διαδικασία. Επιπλέον, η εφαρμογή του μοντέλου 5E και της διερευνητικής μάθησης αποδείχθηκε καθοριστική, καθώς διατήρησε τον μαθητή στον κεντρικό ρόλο της μαθησιακής διαδικασίας, ενίσχυσε τη σύνδεση μεταξύ θεωρίας, πειράματος και προσομοίωσης, και προώθησε την ανάπτυξη επιστημονικής σκέψης, συνεργασίας και κριτικής ανάλυσης.

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ΔΙΑΘΕΜΑΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ ΣΤΗΝ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΜΗΧΑΝΙΚΗ, ΔΗΜΙΟΥΡΓΙΚΗ ΓΡΑΦΗ, ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΨΗΦΙΑΚΑ ΜΕΣΑ

Χριστίνα Τόκη
Μόνιμη εκπαιδευτικός, μηχανολόγος ΠΕ82, BEng, MSc, PhD στη μηχανική περιβάλλοντος,
1ο Επαγγελματικό Λύκειο Άρτας

Πεκλάρη Βασιλική
Μόνιμη εκπαιδευτικός, φιλόλογος ΠΕ02, MSc,
1ο Επαγγελματικό Λύκειο Άρτας

Μπαρδάκας Σταύρος
Μόνιμος εκπαιδευτικός, ηλεκτρολόγος ΠΕ83, MSc,
1ο Επαγγελματικό Λύκειο Άρτας

ΠΕΡΙΛΗΨΗ

Η διαθεματική προσέγγιση αποτελεί βασικό πυλώνα της σύγχρονης εκπαιδευτικής πρακτικής, καθώς μέσω αυτής αξιοποιούνται γνώσεις και δεξιότητες από διαφορετικούς τομείς, δημιουργώντας μια ολιστική εμπειρία μάθησης. Η παρούσα εισήγηση αποτελεί χαρακτηριστικό παράδειγμα αυτής της προσέγγισης, καθώς συνδυάζει την περιβαλλοντική μηχανική, τη δημιουργική γραφή, την τεχνητή νοημοσύνη και τα ψηφιακά μέσα σε μια ενιαία περιβαλλοντική εκπαιδευτική δράση.

Η διαθεματική προσέγγιση στην Περιβαλλοντική Εκπαίδευση συνδέει γνώσεις από διάφορα γνωστικά πεδία για την κατανόηση σύνθετων περιβαλλοντικών ζητημάτων. Σύμφωνα με πανελλαδική μελέτη (2006-2014), μόνο το 7% των εκπαιδευτικών πρωτοβάθμιας εκπαίδευσης συμμετείχε σε προγράμματα ΠΕ, ενώ η συμμετοχή μαθητών έφτανε το 16%. Παρά τα αρχικά χαμηλά ποσοστά, παρατηρήθηκε αυξητική τάση τα τελευταία χρόνια της μελέτης, ωστόσο, η έλλειψη αναλυτικών δεδομένων καθιστά δύσκολη την πλήρη αξιολόγηση της εφαρμογής και αποτελεσματικότητάς της.

Η δράση πραγματοποιήθηκε σε ΕΠΑΛ και επικεντρώθηκε στη θαλάσσια ρύπανση, ένα σημαντικό περιβαλλοντικό ζήτημα, και είχε ως στόχο την ευαισθητοποίηση των μαθητών μέσα από μια διαδικασία επιστημονικής κατανόησης και δημιουργικής έκφρασης. Ειδικότερα στο πρώτο στάδιο οι μαθητές ενημερώθηκαν για τις αιτίες και τις επιπτώσεις της θαλάσσιας ρύπανσης, αποκτώντας επιστημονικές γνώσεις που αποτέλεσαν τη βάση για τη δημιουργία των ποιημάτων τους. Στη συνέχεια αξιοποίησαν τεχνικές δημιουργικής γραφής, όπως η επιλογή λέξεων σχετικών με το θέμα, οι εικόνες ως ερέθισμα για συγγραφή και η συνειρμική γραφή, για να μετουσιώσουν τις επιστημονικές πληροφορίες σε ποιήματα. Στο τρίτο στάδιο, η τεχνητή νοημοσύνη χρησιμοποιήθηκε για τη δημιουργία εικόνων που αντικατόπτριζαν το περιεχόμενο των ποιημάτων. Τέλος, τα ποιήματα και οι εικόνες συγκεντρώθηκαν σε ένα διαδραστικό ψηφιακό βιβλίο, που ήταν αποτέλεσμα συλλογικής προσπάθειας. Αυτή η συνεργασία ανέδειξε τη σημασία της διαθεματικότητας, καθώς κάθε τομέας συμπληρώθηκε και εμπλουτίστηκε από τον άλλο, δημιουργώντας μια ολοκληρωμένη εκπαιδευτική εμπειρία.

Η δράση ανέδειξε τη δυναμική των ψηφιακών εργαλείων στη σύγχρονη εκπαίδευση, προσφέροντας στους μαθητές τη δυνατότητα να εκφραστούν δημιουργικά, να καλλιεργήσουν ψηφιακές δεξιότητες, να κατανοήσουν το θέμα μέσω της οπτικοποίησης του προβλήματος και να ενισχύσουν την περιβαλλοντική τους ευαισθησία. Παράλληλα, υπογράμμισε τη σημασία της διαθεματικής συνεργασίας, η οποία επιτρέπει στους μαθητές να αντιμετωπίσουν πολύπλοκα ζητήματα από πολλές πλευρές, ενισχύοντας την κριτική τους σκέψη. Η εισήγηση αναδεικνύει τα παιδαγωγικά οφέλη αυτής της προσέγγισης, τις προκλήσεις που προέκυψαν κατά την εφαρμογή της και τις μελλοντικές προοπτικές για περαιτέρω αξιοποίηση της τεχνολογίας στην εκπαιδευτική διαδικασία.

Λέξεις – κλειδιά: διαθεματική προσέγγιση, περιβαλλοντική εκπαίδευση, δημιουργική γραφή, ψηφιακά εργαλεία.

ΕΙΣΑΓΩΓΗ

Η Περιβαλλοντική Εκπαίδευση (Π.Ε.) αναδύθηκε ως απάντηση στα σοβαρά περιβαλλοντικά προβλήματα των τελευταίων δεκαετιών, με βασικό στόχο τόσο την κατανόηση της φύσης και των αιτίων τους, όσο και την πρόληψη και την αποτελεσματική τους αντιμετώπιση. Αντιμετωπίζει το περιβάλλον όχι μόνο ως αντικείμενο μελέτης, αλλά και ως δυναμικό πεδίο εξερεύνησης, βιωματικής εμπλοκής και δράσης. Βασίζεται στο παιδαγωγικό πρότυπο της μαθητοκεντρικής εκπαίδευσης, αξιοποιώντας την προϋπάρχουσα γνώση των μαθητών, ενισχύοντας την ανάληψη πρωτοβουλιών και καλλιεργώντας την κριτική σκέψη.

Η Π.Ε. συνδέεται άρρηκτα με τις σύγχρονες διδακτικές προσεγγίσεις, υιοθετώντας εκπαιδευτικές πρακτικές που ανταποκρίνονται στις ανάγκες της εποχής. Η εποικοδομητική μάθηση, για παράδειγμα, αξιοποιεί τις εμπειρίες και τις γνώσεις των μαθητών για το περιβάλλον, προωθώντας την ενεργό συμμετοχή τους στη μαθησιακή διαδικασία (Vygotsky, 1978). Άλλωστε η ολιστική προσέγγιση επιτρέπει τη σφαιρική κατανόηση των προβλημάτων, ενώ η συστημική ενσωματώνει τις σχέσεις και τις αλληλεπιδράσεις μεταξύ των εμπλεκόμενων παραγόντων, δημιουργώντας ένα ενιαίο και λειτουργικό πλαίσιο. Σε αυτό το πλαίσιο, η ανάπτυξη της κριτικής σκέψης είναι θεμελιώδης, καθώς συμβάλλει στην εξαγωγή τεκμηριωμένων συμπερασμάτων και στην ενίσχυση της περιβαλλοντικής συνείδησης.

Ταυτόχρονα, η συνεργατική μάθηση καθίσταται απαραίτητη για την αντιμετώπιση των πολυδιάστατων προκλήσεων, ενώ η βιωματική προσέγγιση ενεργοποιεί τους μαθητές, εμπλέκοντάς τους ουσιαστικά στην επεξεργασία και επίλυση αυθεντικών προβλημάτων. Για την εφαρμογή αυτών των προσεγγίσεων, αξιοποιούνται σύγχρονες παιδαγωγικές μέθοδοι, με κυρίαρχες τη μέθοδο Project και τη Μέθοδο Επίλυσης Προβλήματος, οι οποίες προάγουν την ενεργητική μάθηση και την αυτενέργεια.

Chrysomalidou, Takos, Spiliotis και Xofis (2022) εξέτασαν τη συμμετοχή εκπαιδευτικών σε δράσεις Εκπαίδευσης Εκτός Τάξης σε 350 ελληνικά σχολεία και διαπίστωσαν ότι σε ποσοστό 50 % των σχολείων λιγότερο από το 40 % των εκπαιδευτικών συμμετείχε σε τέτοιες δραστηριότητες, ενώ σε 17,6 % των σχολείων δεν υλοποιήθηκε καμία δράση· παράλληλα, σε 52,5 % των σχολείων έως το 40 % των μαθητών συμμετείχε ενεργά σε τουλάχιστον μία εκτός τάξης εκδήλωση. Οι ερευνητές προτείνουν ενδυνάμωση της επιμόρφωσης των εκπαιδευτικών, ενίσχυση διαθεματικών συμπράξεων και στήριξη από τους σχολικούς φορείς για την αύξηση της εμπλοκής σε αυτά τα προγράμματα (Chrysomalidou et al., 2022, p. 804).

Η σημερινή εκπαιδευτική πραγματικότητα όμως χαρακτηρίζεται από ταχύτατες κοινωνικές, τεχνολογικές και περιβαλλοντικές αλλαγές, που καθιστούν επιτακτική την ανάγκη αναθεώρησης των παραδοσιακών μοντέλων διδασκαλίας. Απαιτούνται πλέον πολυδιάστατες και ομαδοσυνεργατικές μέθοδοι, οι οποίες όχι μόνο κινητοποιούν ενεργά τους μαθητές, αλλά και καλλιεργούν ένα ευρύ φάσμα δεξιοτήτων — γνωστικών, κοινωνικών, ψηφιακών και δημιουργικών — ενισχύοντας τη σύνδεση της μάθησης με την καθημερινή ζωή και την κοινωνική πραγματικότητα.

Μία από τις πιο αποτελεσματικές στρατηγικές σε αυτό το πλαίσιο είναι η διαθεματική προσέγγιση. Μέσω αυτής επιτυγχάνεται η διασύνδεση γνώσεων και δεξιοτήτων από διαφορετικά γνωστικά πεδία, οδηγώντας στη δημιουργία ενός ολιστικού και συνεκτικού μαθησιακού πλαισίου. Η διαθεματικότητα προσδίδει νόημα στη μάθηση, καθώς επιτρέπει την πολυπρισματική προσέγγιση σύνθετων θεμάτων και προσφέρει στους μαθητές τη δυνατότητα να αναπτύξουν κριτική σκέψη, δημιουργικότητα και επικοινωνιακές δεξιότητες. Επομένως, η σοβαρότητα και η πολυπλοκότητα των σύγχρονων περιβαλλοντικών ζητημάτων καθιστούν τη διεπιστημονική και διαθεματική προσέγγιση όχι μόνο χρήσιμη, αλλά απολύτως αναγκαία για την οικοδόμηση ουσιαστικής γνώσης και ενεργού περιβαλλοντικής στάσης (Zachariou, 2006:17).

Η παρούσα εκπαιδευτική δράση, που υλοποιήθηκε στο 1ο Επαγγελματικό Λύκειο (ΕΠΑ.Λ.) Άρτας, εντάσσεται πλήρως σε αυτή τη λογική και λειτουργεί ως χαρακτηριστικό παράδειγμα εφαρμογής της διαθεματικής μεθοδολογίας σε συνδυασμό με τη χρήση ψηφιακών τεχνολογιών και εργαλείων τεχνητής νοημοσύνης. Ειδικότερα, η δράση οργανώθηκε γύρω από τους άξονες της περιβαλλοντικής μηχανικής, της δημιουργικής γραφής, του ψηφιακού γραμματισμού και της τεχνητής νοημοσύνης με κοινή θεματική τη θαλάσσια ρύπανση, που αποτελεί καίριο περιβαλλοντικό πρόβλημα της εποχής.

Οι μαθητές, με την καθοδήγηση εκπαιδευτικών από διαφορετικά γνωστικά πεδία, ακολούθησαν μια πολυεπίπεδη μαθησιακή διαδρομή, η οποία ξεκίνησε με την απόκτηση επιστημονικών γνώσεων για το φαινόμενο της ρύπανσης των θαλασσών και κορυφώθηκε με τη συγγραφή ποιημάτων, την εικαστική οπτικοποίησή τους με εργαλεία τεχνητής νοημοσύνης και τη δημιουργία ενός ψηφιακού βιβλίου.

Η καινοτομία της παρέμβασης δεν έγκειται μόνο στο θεματικό περιεχόμενο ή στα τεχνολογικά μέσα που αξιοποιήθηκαν, αλλά κυρίως στον τρόπο με τον οποίο η επιστημονική γνώση μετουσιώθηκε σε καλλιτεχνική δημιουργία και η προσωπική έκφραση συνδυάστηκε με τη συλλογική δράση. Πρόκειται για μια εμπειρία που ενίσχυσε τόσο τις γλωσσικές και ψηφιακές δεξιότητες των μαθητών όσο και την περιβαλλοντική τους ευαισθητοποίηση.

Μέσω της συγκεκριμένης δράσης, τέλος, υπογραμμίζεται η σημασία της ενσωμάτωσης των ψηφιακών μέσων στην εκπαίδευση και προτείνεται ένας δημιουργικός τρόπος αξιοποίησης της τεχνητής νοημοσύνης στην τάξη, όχι ως υποκατάστατο της ανθρώπινης δημιουργίας, αλλά ως εργαλείο ενίσχυσής της, ενθαρρύνοντας τους μαθητές να εκφραστούν, να επικοινωνήσουν και να δράσουν με επίκεντρο το περιβάλλον και την κοινωνία.

ΜΕΘΟΔΟΛΟΓΙΑ

Η θεωρητική αυτή θεμελίωση βρήκε πρακτική εφαρμογή μέσα από μια εκπαιδευτική δράση που σχεδιάστηκε με βάση τις αρχές της διεπιστημονικής και βιωματικής μάθησης, υιοθετώντας την παιδαγωγική φιλοσοφία του «μαθαίνω μέσα από τη δημιουργία». Η κεντρική ιδέα ήταν να δημιουργηθεί ένα πλούσιο μαθησιακό περιβάλλον, όπου οι μαθητές, με την καθοδήγηση των εκπαιδευτικών, θα καλλιεργούσαν διαφορετικές δεξιότητες (γλωσσικές, ψηφιακές, αισθητικές, επιστημονικές) μέσα από σταδιακά οικοδομημένες δραστηριότητες.

Η υλοποίηση βασίστηκε στη συνεργασία εκπαιδευτικών από διαφορετικές ειδικότητες, της Περιβαλλοντικής Μηχανικής, της Φιλολογίας και της Πληροφορικής, οι οποίοι συνέβαλαν με την επιστημονική τους κατάρτιση στον σχεδιασμό και την υποστήριξη των επιμέρους φάσεων. Κάθε στάδιο αυτής της προσέγγισης αποτελούσε θεμέλιο για το επόμενο, διαμορφώνοντας μια μαθησιακή αλυσίδα εμπλοκής, κατανόησης, δημιουργίας και παρουσίασης. Άλλωστε η διαθεματική και συνεργατική προσέγγιση διδασκαλίας, σύμφωνα με την UNESCO (2017: 9-10), συμβάλλει στην καλλιέργεια δεξιοτήτων του 21ου αιώνα και στην εκπαίδευση για την αειφορία.

Από παιδαγωγική άποψη η διαθεματικότητα είναι σημαντική διότι αποσκοπεί στην ολόπλευρη ανάπτυξη των μαθητών, αφού καλλιεργεί δεξιότητες και ικανότητες και στηρίζεται στην ομαδοσυνεργατική μορφή διδασκαλίας με την ενεργητική συμμετοχή των μαθητών (Theodoropoulos, 2009). Επιπλέον, ενσωματώνει αρχές της προοδευτικής παιδαγωγικής (progressive education), όπως αυτές διατυπώθηκαν από τον Dewey (1938), δίνοντας έμφαση στη μάθηση ως κοινωνική εμπειρία και στην αλληλεπίδραση των μαθητών με πραγματικά προβλήματα.

Στάδιο 1: Επιστημονική Ενημέρωση – Περιβαλλοντική Μηχανική

Η Περιβαλλοντική Μηχανική αποτελεί έναν δυναμικό επιστημονικό κλάδο που εστιάζει στη μελέτη, την πρόληψη και την αντιμετώπιση περιβαλλοντικών προβλημάτων, αξιοποιώντας γνώσεις από τη μηχανική, τη χημεία, τη βιολογία και τη φυσική (Morrison & Murphy, 2021: 1). Στο πλαίσιο της δράσης, η προσέγγιση του θέματος της θαλάσσιας ρύπανσης έγινε μέσω μιας δομημένης διαδικασίας, η οποία συνέβαλε ώστε να κατανοήσουν οι μαθητές τόσο τους σχετικούς επιστημονικούς όρους όσο και τις πολυδιάστατες επιπτώσεις του φαινομένου στο φυσικό και κοινωνικό περιβάλλον (UNEP, 2021: 4).

Η πρώτη φάση επικεντρώθηκε στη θεωρητική προσέγγιση της θαλάσσιας ρύπανσης, με στόχο την απόκτηση γνώσεων για την περαιτέρω διερεύνηση και ανάλυση του θέματος. Οι μαθητές:

1. Παρακολούθησαν επιστημονική παρουσίαση που κάλυπτε τις αιτίες, τις μορφές και τις συνέπειες της θαλάσσιας ρύπανσης.
2. Μελέτησαν πραγματικές περιπτώσεις (case studies), εξετάζοντας μεγάλα περιβαλλοντικά περιστατικά, όπως οι πετρελαιοκηλίδες και η διασπορά μικροπλαστικών στις θάλασσες.
3. Ανέλυσαν εκπαιδευτικά βίντεο, τα οποία παρείχαν οπτικοποιημένα δεδομένα για την αλληλεπίδραση των ρυπογόνων ουσιών με το θαλάσσιο οικοσύστημα.

Μέσα από αυτή τη διαδικασία, οι μαθητές:

- Έμαθαν να αναγνωρίζουν αιτιακές σχέσεις μεταξύ περιβαλλοντικών προβλημάτων και των επιπτώσεών τους στο οικοσύστημα.
- Εξοικειώθηκαν με βασικούς επιστημονικούς όρους, όπως τα μικροπλαστικά—μικροσκοπικά σωματίδια πλαστικού που εισέρχονται στην τροφική αλυσίδα μέσω θαλάσσιων οργανισμών, τις πετρελαιοκηλίδες—μεγάλες συγκεντρώσεις πετρελαίου στην επιφάνεια της θάλασσας που προκαλούν σοβαρές περιβαλλοντικές και οικονομικές επιπτώσεις—την τροφική αλυσίδα, δηλαδή τη διαδικασία μεταφοράς ενέργειας και θρεπτικών ουσιών μεταξύ των οργανισμών ενός οικοσυστήματος, και το ίδιο το οικοσύστημα, ένα σύνολο βιοτικών και αβιοτικών στοιχείων που αλληλεπιδρούν μεταξύ τους σε ένα συγκεκριμένο περιβάλλον.

- Ανέπτυξαν κριτική σκέψη μέσω της ομαδικής συζήτησης για τοπικά περιβαλλοντικά ζητήματα, φέρνοντας στο προσκήνιο προσωπικές εμπειρίες και παρατηρήσεις.

Η ενασχόληση με την Περιβαλλοντική Μηχανική επέτρεψε στους μαθητές να κατανοήσουν ότι η επίλυση των περιβαλλοντικών προβλημάτων απαιτεί επιστημονική μελέτη, καινοτόμες τεχνολογίες και συλλογική δράση. Μέσα από τη συστηματική ανάλυση των δεδομένων, τη χρήση επιστημονικών όρων και τη σύνδεση της θεωρίας με την πράξη διαμόρφωσαν περιβαλλοντική συνείδηση και ερευνητική διάθεση.

Αυτό το στάδιο αποτέλεσε τη βάση πάνω στην οποία δομήθηκε η δράση, προκειμένου οι μαθητές να προετοιμαστούν για να προσεγγίσουν το ζήτημα της θαλάσσιας ρύπανσης και από άλλες – πιο δημιουργικές και καινοτόμες – οπτικές γωνίες.

Στάδιο 2: Δημιουργική Γραφή – Μετουσίωση της γνώσης σε ποίηση για τη ρύπανση του νερού

Η Δημιουργική Γραφή αποτελεί μια εκπαιδευτική μέθοδο που μπορεί να αξιοποιηθεί σε όλες τις βαθμίδες της εκπαίδευσης (Moula, 2012). Εδράζεται στη δημοκρατική θεώρηση της δημιουργικότητας, σύμφωνα με την οποία όλα τα παιδιά διαθέτουν, σε διαφορετικό βαθμό, τη δυνατότητα καλλιτεχνικής έκφρασης, αρκεί να τους προσφέρονται κατάλληλα παιδαγωγικά ερεθίσματα και υποστηρικτικό μαθησιακό περιβάλλον (Skourtis, 2015: 23-24). Ο στόχος της είναι η ενεργοποίηση της φαντασίας και της δημιουργικής σκέψης μέσω της «παιχνιδοκεντρικής μάθησης», περιορίζοντας τη μηχανική μάθηση και την τυπική σχολική ρουτίνα (Moula, 2012).

Στη συγκεκριμένη δράση με θέμα την περιβαλλοντική εκπαίδευση, η Δημιουργική Γραφή αξιοποιήθηκε για τη μετουσίωση της γνώσης σε ποίηση. Οι μαθητές, αφού ενημερώθηκαν για τη ρύπανση του νερού (Στάδιο 1), προέβησαν στη συγγραφή ποιημάτων στα οποία αποτύπωσαν τις σκέψεις και τα συναισθήματά τους. Ειδικότερα επέλεξαν λέξεις-κλειδιά σχετικές με το θέμα και τις χρησιμοποίησαν ως αφόρμηση για την παραγωγή λόγου, ενσωματώνοντας εκφραστικά μέσα για την επίτευξη συναισθηματικής διέγερσης. Ο στόχος αυτής της φάσης ήταν να κατανοήσουν το θέμα προσεγγίζοντάς το όχι μόνο γνωστικά, αλλά και βιωματικά, αναπτύσσοντας δεξιότητες γραμματισμού και δημιουργικής έκφρασης. Η επιτυχία αυτής της δράσης εξαρτήθηκε σε μεγάλο βαθμό και από τον ρόλο των εκπαιδευτικών, οι οποίοι ήταν υποστηρικτικοί και διαμόρφωσαν ένα περιβάλλον χωρίς αξιολογικούς περιορισμούς. Άλλωστε όπως επισημαίνει ο Akkaya (2014), για να είναι αποτελεσματική η Δημιουργική Γραφή, απαιτείται από τον εκπαιδευτικό να διαθέτει κριτική σκέψη, δημιουργικότητα και την προθυμία να ενθαρρύνει την αυτονομία των μαθητών, απομακρυνόμενος από αυστηρά προγράμματα σπουδών και φορμαλιστικές πρακτικές.

Η συγγραφή ποιημάτων με θέμα τη ρύπανση του νερού αποτέλεσε, επομένως, μια ολοκληρωμένη παιδαγωγική εμπειρία που συνδύασε τη γνωστική κατανόηση με τη συναισθηματική και καλλιτεχνική έκφραση, καθιστώντας τη Δημιουργική Γραφή ισχυρό εργαλείο περιβαλλοντικής ευαισθητοποίησης και προσωπικής ενδυνάμωσης.

Στάδιο 3: Οπτικοποίηση μέσω Τεχνητής Νοημοσύνης

Η τρίτη φάση επικεντρώθηκε στη μετατροπή του υλικού (ποιήματα) σε οπτικό περιεχόμενο, με τη βοήθεια εργαλείων τεχνητής νοημοσύνης. Εξάλλου η ενσωμάτωση της τεχνητής νοημοσύνης στην εκπαιδευτική πράξη προσφέρει νέους ορίζοντες, όταν αξιοποιείται με κριτικό και δημιουργικό τρόπο (Pérez & Delgado, 2022).

Οι μαθητές εργάστηκαν σε ομάδες και εισήγαγαν τους στίχους από τα ποιήματά τους σε εφαρμογές όπως το DALL·E, για να παραγάγουν εικόνες εμπνευσμένες από το περιεχόμενό τους. Σε αυτό το στάδιο αξιοποιήθηκαν οι δυνατότητες της πολυτροπικής μάθησης, καθώς το κείμενο, η εικόνα και το συναίσθημα συνεργάζονται (Cope & Kalantzis, 2009,· Walsh, 2010).

Μέσα από αυτή τη διαδικασία:

- ενισχύθηκε ο οπτικός γραμματισμός (visual literacy) των μαθητών (Buckingham, 2007, σ. 45),
- αναπτύχθηκε η κριτική σκέψη ως προς τη χρήση της τεχνητής νοημοσύνης στην καλλιτεχνική δημιουργία (Pérez & Delgado, 2022),
- δόθηκε η δυνατότητα πολυτροπικής έκφρασης, καθώς τα παιδιά είδαν τα λόγια τους να αποκτούν μορφή και εικόνα (Walsh, 2010).

Παράλληλα, πραγματοποιήθηκαν συζητήσεις για την ηθική διάσταση της AI (πνευματικά δικαιώματα, ψευδείς εικόνες, αξιοπιστία), ενισχύοντας την ψηφιακή υπευθυνότητα των μαθητών (Rosen, Wolf, & Shonfeld, 2020).

Στάδιο 4: Δημιουργία Ψηφιακού Διαδραστικού Βιβλίου

Η τελική φάση περιλάμβανε τη σύνθεση όλων των παραγόμενων υλικών σε μια ενιαία, καλαίσθητη και λειτουργική μορφή: ένα διαδραστικό ψηφιακό βιβλίο, το οποίο δημιουργήθηκε από τους ίδιους τους μαθητές με εργαλεία όπως το Book Creator. Η χρήση τέτοιων ψηφιακών εργαλείων υποστηρίζεται από ευρωπαϊκά πλαίσια δεξιοτήτων, όπως το DigCompEdu, τα οποία προωθούν την παιδαγωγική αξιοποίηση της τεχνολογίας (Redecker & Punie, 2017:22).

Το ψηφιακό βιβλίο περιλάμβανε τα ποιήματα των μαθητών σε ψηφιακή μορφή, τις εικόνες που δημιούργησαν με τεχνητή νοημοσύνη, υπερσυνδέσμους με επιπλέον πληροφορίες για το περιβάλλον και τη ρύπανση. Η δημιουργία του ψηφιακού βιβλίου λειτούργησε όχι μόνο ως αποθετήριο του συλλογικού έργου, αλλά και ως μέσο επικοινωνίας και διάδοσης του μηνύματος της περιβαλλοντικής ευαισθητοποίησης στην τοπική κοινωνία και πέρα από αυτήν (Cope & Kalantzis, 2009).

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η εκπαιδευτική παρέμβαση απέφερε πολύπλευρα αποτελέσματα, τόσο σε γνωστικό όσο και σε μεταγνωστικό και συναισθηματικό επίπεδο. Οι μαθητές είχαν την ευκαιρία να ενεργοποιηθούν σε πολλαπλά πεδία, να εκφραστούν, να συνεργαστούν και να αποκτήσουν βαθύτερη επίγνωση για το περιβάλλον και την κοινωνική τους ευθύνη. Τα αποτελέσματα αποτυπώθηκαν τόσο μέσα από τις εργασίες τους όσο και μέσα από την αλλαγή στάσης και συμπεριφοράς κατά τη διάρκεια της δράσης.

Ενίσχυση της Περιβαλλοντικής Συνείδησης

Οι μαθητές:
- ανέπτυξαν περιβαλλοντική συνείδηση, αντιλαμβανόμενοι το φυσικό περιβάλλον όχι ως αφηρημένη έννοια, αλλά ως οντότητα που επηρεάζεται από τις ανθρώπινες πράξεις,
- κατανόησαν βαθύτερα τις συνέπειες της θαλάσσιας ρύπανσης σε παγκόσμιο και τοπικό επίπεδο,
- εκδήλωσαν ενδιαφέρον να αναλάβουν πρωτοβουλίες για την ευαισθητοποίηση της σχολικής κοινότητας,
- υιοθέτησαν μια πιο κριτική στάση απέναντι στην κατανάλωση και τη ρύπανση.

Οφέλη Δημιουργικής Γραφής

Οι μαθητές:
- ανέπτυξαν τη γλωσσική τους ικανότητα σε επίπεδο γραμματικής, λεξιλογίου και βελτίωσαν τις δεξιότητες της ανάγνωσης και της γραφής
- ενίσχυσαν την αυτοπεποίθηση και τα εσωτερικά τους κίνητρα
- **επεξεργάστηκαν** συναισθήματα και ασυνείδητες εμπειρίες, ενισχύοντας την αυτογνωσία τους (Peach, 2023)
- καλλιέργησαν τη δημιουργική σκέψη και τη φαντασία τους
- συμμετείχαν σε βιωματικές δράσεις, συνεργάστηκαν και εκφράστηκαν ελεύθερα χωρίς να περιορίζονται από αξιολογικά κριτήρια (Papavasileiou, 2018)
- όξυναν και εμπλούτισαν τη φαντασία τους
- διερεύνησαν και ανέδειξαν τις προσωπικές τους απόψεις (Stewart, 2010)
- διαμόρφωσαν έναν ελεύθερο χώρο νοητικής και συναισθηματικής αποφόρτισης
- εισέπραξαν αναγνώριση και αποδοχή για τη δημιουργία τους με αποτέλεσμα να ενισχυθεί η επιθυμία τους για πρόοδο (Tompkins, 1982)

Καλλιέργεια Ψηφιακών και Πολυτροπικών Δεξιοτήτων

Η ενασχόληση με τα ψηφιακά μέσα είχε ως αποτέλεσμα:
- την εξοικείωση των μαθητών με σύγχρονα εργαλεία παραγωγής περιεχομένου (Book Creator, Canva, DALL·E),
- την ενίσχυση της κριτικής σκέψης ως προς τη χρήση της τεχνητής νοημοσύνης, με έμφαση στα ζητήματα αυθεντικότητας, δεοντολογίας και δημιουργικότητας,
- την καλλιέργεια της ικανότητας σχεδιασμού πολυτροπικών προϊόντων, όπου ο λόγος, η εικόνα και ο ήχος συνδυάζονται λειτουργικά.

Συνεργατική Μάθηση και Κοινωνικοποίηση

Η ομαδική διάσταση της δράσης συνέβαλε στην:
- ενίσχυση των διαπροσωπικών σχέσεων των μαθητών,
- καλλιέργεια του συναισθήματος του «ανήκειν» σε μια ομάδα με κοινό στόχο,
- προσφορά ευκαιριών δημιουργικής έκφρασης μέσα στην ομάδα,
- ενίσχυση της αλληλεγγύης, της ενσυναίσθησης και της αποδοχής της διαφορετικότητας.

ΣΥΖΗΤΗΣΗ

Με την δράση αυτή μεταδόθηκαν στους μαθητές νέοι τρόποι κατανόησης του κόσμου μέσω της διασύνδεσης της επιστήμης και τέχνης και ενεργοποιήθηκε η φαντασία και το συναίσθημά τους με τη μετατροπή της γνώσης σε προσωπική εμπειρία. Παράλληλα επιτεύχθηκε η πολυτροπική έκφραση, που ικανοποιεί διαφορετικά μαθησιακά προφίλ και ενισχύθηκε η μαθητική αυτενέργεια και αυτεπίγνωση, που συμβάλλουν στην ανάπτυξη της αυτοεκτίμησης και της αυτορρύθμισης. Το ενδιαφέρον των μαθητών ήταν εμφανές από τον ενθουσιασμό τους να συμμετάσχουν ενεργά σε όλα τα στάδια, την ποιότητα και πρωτοτυπία των παραγόμενων προϊόντων, τη θετική ανατροφοδότηση που έδωσαν οι ίδιοι για την εμπειρία τους. Επιπλέον, η εμπειρία αυτή ενίσχυσε τον ρόλο του σχολείου ως φορέα καινοτομίας και δημιουργίας, ανοίγοντας διαύλους συνεργασίας με φορείς και άλλες σχολικές μονάδες.

Ωστόσο παρατηρήθηκαν σημαντικές διαφοροποιήσεις σε επίπεδο εξοικείωσης των μαθητών με τα ψηφιακά εργαλεία και απαιτήθηκε διαφοροποιημένη υποστήριξη και δημιουργία μικτών ομάδων με στόχο την αλληλοβοήθεια. Παράλληλα κάποιοι μαθητές δυσκολεύτηκαν να μετατρέψουν τις πληροφορίες σε καλλιτεχνική έκφραση, για αυτόν τον λόγο εφαρμόστηκαν τεχνικές απλοποίησης, οπτικοποίησης και βιωματικής προσέγγισης.

Ο ρόλος της περιβαλλοντικής μηχανικής υπήρξε καθοριστικός, καθώς παρείχε το επιστημονικό πλαίσιο για την κατανόηση περιβαλλοντικών ζητημάτων και πρότεινε λύσεις με βάση τεχνολογικά εργαλεία και μεθόδους μέτρησης. Η επαφή των μαθητών με αυτή την επιστήμη συνέβαλε στην ανάπτυξη της περιβαλλοντικής τους συνείδησης και στην εξοικείωση με έννοιες βιωσιμότητας και καινοτομίας. Τέλος τα τεχνικά προβλήματα, όπως ζητήματα σύνδεσης στο διαδίκτυο, περιορισμένη πρόσβαση σε εξοπλισμό και μικρή εξοικείωση με τις πλατφόρμες, αντιμετωπίστηκαν με προγραμματισμό, ευελιξία και αξιοποίηση δωρεάν και φιλικών προς τον χρήστη εργαλείων.

Η θετική εμπειρία και τα παιδαγωγικά αποτελέσματα αυτής της δράσης ανοίγουν τον δρόμο για εμπλουτισμό και επέκταση του εγχειρήματος σε νέες θεματικές ενότητες που αφορούν την αειφορία, όπως η κλιματική αλλαγή, η κυκλική οικονομία, τα απειλούμενα είδη ή η βιώσιμη γεωργία, αξιοποιώντας την ίδια μεθοδολογική δομή. Παράλληλα θα ήταν ωφέλιμη η διασύνδεση και με άλλα μαθήματα, όπως η Φυσική, η Ιστορία, τα Μαθηματικά ή η Πολιτική Παιδεία, με σκοπό την ενίσχυση τη διαθεματικότητας. Θα ήταν ακόμα χρήσιμη η δημιουργία πλατφόρμας ανταλλαγής ψηφιακών βιβλίων μεταξύ σχολείων από διαφορετικές περιοχές, εντός ή και εκτός Ελλάδας, στο πλαίσιο δράσεων eTwinning ή Erasmus+ και η συνεργασία με εξωσχολικούς φορείς, όπως ΜΚΟ, πανεπιστημιακά τμήματα, βιβλιοθήκες και πολιτιστικά ιδρύματα, για υποστήριξη, εμπλουτισμό και διάχυση του έργου. Τέλος σημαντική θα ήταν και η συστηματική αξιολόγηση των επιδράσεων της παρέμβασης, με εργαλεία παρατήρησης, ερωτηματολόγια και συνεντεύξεις, για την τεκμηρίωση των αποτελεσμάτων και την επιστημονική ανάλυση της διαδικασίας.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η δράση ανέδειξε την αξία της διεπιστημονικής, βιωματικής μάθησης, καθώς η ενσωμάτωση επιστημονικών, καλλιτεχνικών και ψηφιακών στοιχείων κέρδισε το ενδιαφέρον των μαθητών και μετέτρεψε πολύπλοκα ζητήματα, όπως η ρύπανση των υδάτων, σε προσωπικές εμπειρίες. Μέσα από συνεργατικές, πολυτροπικές δραστηριότητες καλλιεργήθηκαν δεξιότητες αυτονομίας, ομαδικής εργασίας και αυτορρύθμισης, ενώ η ευέλικτη σχεδίαση επέτρεψε την ενεργή συμμετοχή όλων, παρά τις ψηφιακές προκλήσεις και τις ατομικές διαφοροποιήσεις. Το μοντέλο αυτό, συνδυάζοντας καινοτομία, περιβαλλοντική συνείδηση, αισθητική έκφραση και ψηφιακή παιδεία, προσφέρει ένα βιώσιμο πλαίσιο για την εκπαίδευση του 21ου αιώνα, ενισχύοντας ταυτόχρονα το προφίλ του σχολείου ως κόμβου δημιουργίας και καινοτομίας.

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ΠΑΙΔΑΓΩΓΙΚΗ ΑΞΙΟΠΟΙΗΣΗ ΨΗΦΙΑΚΩΝ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΩΝ ΜΕΣΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΓΓΛΙΚΗΣ ΓΛΩΣΣΑΣ: ΘΕΩΡΗΤΙΚΗ ΚΑΙ ΠΡΑΚΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Τσιπλακίδης Ιάκωβος
Ειδικό Εκπαιδευτικό Προσωπικό, Τμήμα Εικαστικών Τεχνών και Επιστημών της Τέχνης, Σχολή Καλών Τεχνών, Πανεπιστήμιο Ιωαννίνων, Συνεργαζόμενο Εκπαιδευτικό Προσωπικού (Σ.Ε.Π.) στο Ε.Α.Π.
e-mail: itsiplak [at] uoi.gr

ΠΕΡΙΛΗΨΗ

Η εργασία αυτή έχει ως αντικείμενό της την ανάδειξη καινοτόμου εκπαιδευτικού σχεδιασμού με την αξιοποίηση ψηφιακών και τεχνολογικών μέσων στη διδασκαλία της Αγγλικής ως ξένης γλώσσας τα οποία παρέχουν τη δυνατότητα αναβάθμισης της διδασκαλίας και εκμάθησής της. Ειδικότερα, στο πλαίσιο αυτό, προτείνει την παιδαγωγική αξιοποίηση ψηφιακών μέσων, αυθεντικών πηγών και βίντεο από το διαδίκτυο και Web 2.0 συνεργατικών εργαλείων για την υλοποίηση ιστοεξερευνήσεων (WebQuests). Ο σχεδιασμός αυτό προτείνεται με βάση την προσωπική εμπειρία μας και τα πορίσματα ερευνών που δείχνουν ότι η ενσωμάτωσή ψηφιακών και τεχνολογικών μέσων στη διδασκαλία αφενός παρέχει πολλαπλά οφέλη και αφετέρου ότι η αποτελεσματική αξιοποίησή τους είναι εφικτή και ρεαλιστική κι όχι απλά θεωρητική.

Η παιδαγωγική αξιοποίηση ψηφιακών μέσων, συνεργατικών εργαλείων και του διαδικτύου για την υλοποίηση ιστοεξερευνήσεων αυξάνει τα κίνητρα των μαθητών, -τριών και την ενεργητική τους συμμετοχή στη μαθησιακή διαδικασία, καθώς βασίζονται σε θέματα και πεδία έρευνας που ανταποκρίνονται στα ενδιαφέροντα των μαθητών και αξιοποιούν με παιδαγωγικά ορθούς τρόπους τις εμπειρίες τους. Επίσης, η συμμετοχή σε ιστοεξερευνήσεις αυξάνει την μαθητική πρωτοβουλία, ενισχύει την αυτόνομη μάθηση και τη διαθεματική προσέγγιση στη μάθηση καταπολεμώντας την παθητικότητα και την αδιαφορία, επειδή οι ιστοεξερευνήσεις τοποθετούν τους μαθητές στο επίκεντρο της μαθησιακής διαδικασίας. Επιπλέον οφέλη αποτελούν η δυνατότητα συνεργασίας, η ανάπτυξη της κριτικής και της δημιουργικής σκέψης αλλά και της διερευνητικής μάθησης, καθώς ενθαρρύνεται η κριτική συλλογή, ανάλυση και επεξεργασία των δεδομένων, κι όχι η αποστήθιση και η απλή παράθεση πληροφοριών. Ένα περαιτέρω ευεργετικό αποτέλεσμα αφορά το γεγονός ότι προάγεται η φυσική διδασκαλία όλων των γλωσσικών δεξιοτήτων στην Αγγλική γλώσσα, κατανόησης και παραγωγής γραπτού και προφορικού λόγου, σε ένα αυθεντικό επικοινωνιακό πλαίσιο.

Ο στόχος της εργασίας αυτής είναι η πρακτική εφαρμογή των βασικών αρχών της εκπαιδευτικής θεωρίας. Στην αρχή της εργασίας επιχειρείται μια σύντομη ανασκόπηση της βιβλιογραφίας και των ερευνών που έχουν πραγματοποιηθεί σχετικά με την παιδαγωγική αξιοποίηση των ιστοεξερευνήσεων, την χρησιμοποίηση πηγών και βίντεο από το διαδίκτυο στη διδασκαλία της Αγγλικής ως ξένης γλώσσας. Στη συνέχεια, με βάση τη σχετική βιβλιογραφία, προτείνουμε μια ιστοεξερεύνηση που μπορεί να υλοποιηθεί στο πλαίσιο της διδασκαλίας της Αγγλικής για μαθητές επιπέδου γλωσσομάθειας Β1. Παρουσιάζουμε τον βασικό της σχεδιασμό, τα στάδια υλοποίησής της, και τα αναμενόμενα θετικά αποτελέσματα από την υλοποίησή της, ιδιαίτερα αυτά που σχετίζονται με την ενίσχυση της ομαδοσυνεργατικής μάθησης, της κριτικής και δημιουργικής σκέψης, της αξιοποίησης αυθεντικού υλικού, και της ανάπτυξης όλων των γλωσσικών δεξιοτήτων. Παρέχουμε, επίσης, οδηγίες για την επιτυχημένη εφαρμογή της ιστοεξερεύνησης, έτσι ώστε τα ψηφιακά και τεχνολογικά μέσα να αξιοποιηθούν αποτελεσματικά, να αποτελέσουν μια καινοτόμο προσέγγιση και να συμβάλουν θετικά στην αύξηση των κινήτρων των μαθητών και στην εκμάθηση της Αγγλικής γλώσσας. Οι εκπαιδευτικοί της Αγγλικής γλώσσας μπορούν να προσαρμόσουν τις δραστηριότητες που προτείνονται και να διευρύνουν το εύρος της προτεινόμενης ιστοεξερεύνησης, την αξιοποίηση των ψηφιακών και τεχνολογικών μέσων και των συνεργατικών εργαλείων για να ανταποκριθούν στις ανάγκες και τα χαρακτηριστικά των δικών τους μαθητών-τριών και το γενικότερο πλαίσιο της διδασκαλίας τους.

Λέξεις – κλειδιά: ψηφιακά και τεχνολογικά μέσα, ιστοεξερευνήσεις, διαδίκτυο, Αγγλική γλώσσα

ΕΙΣΑΓΩΓΗ

Το σύγχρονο σχολείο πρέπει να συνομιλεί με την κοινωνία και να ανταποκρίνεται στις τρέχουσες τεχνολογικές και κοινωνικές συνθήκες. Με τον τρόπο αυτό είναι σε θέση να παρέχει στους μαθητές-τριες εκπαίδευση η οποία θα τους βοηθήσει στις ακαδημαϊκές, προσωπικές, κοινωνικές και επαγγελματικές τους διαδρομές μετά την αποφοίτησή τους από το σχολείο. Αυτή η απαίτηση κρίνεται ιδιαίτερα σημαντική στην εποχή μας, στην οποία οι ραγδαίες εξελίξεις στην τεχνολογία (διαδίκτυο, Web 2.0 εργαλεία, τεχνητή νοημοσύνη) δημιουργούν νέους τρόπους επικοινωνίας και αναπαράστασης, και, συνακόλουθα, νέους γραμματισμούς που είναι απαραίτητοι για την συμμετοχή των μαθητών/μελλοντικών πολιτών στο κοινωνικό γίγνεσθαι (Karava & Zouganeli, 2013).

Ένα τέτοιο σχολείο δεν μπορεί να είναι αποκομμένο από την κοινωνία, τους μαθητές και τις οικογένειές τους. Αντίθετα, χρειάζεται να αλληλοεπιδρά με αυτούς και να δέχεται ερεθίσματα από τον κοντινό και ευρύτερο περίγυρο. Με τον τρόπο αυτό, θα είναι σε θέση να παρέχει μια υψηλού επιπέδου συμπεριληπτική εκπαίδευση που θα επιτρέψει στους μαθητές να κατακτήσουν τη γνώση και να αξιοποιήσουν στο έπακρο τις δυνατότητές τους, με βάση την θεώρηση ότι η γνώση δεν προσφέρεται έτοιμη, αλλά δομείται από τους μαθητές μέσα από διαδικασίες διερεύνησης και μεταμορφωτικής προσωπικής ανάπτυξης (Dendrinou, 2013).

Το σχολείο που στηρίζεται στο δασκαλοκεντρικό μοντέλο λειτουργίας δεν είναι αποτελεσματικό. Δεν ανταποκρίνεται στην ανάγκη των μαθητών για μια μαθησιακή διαδικασία η οποία διεξάγεται με τρόπο που αξιοποιεί τα ενδιαφέρονται και τις ανάγκες τους. Κατά συνέπεια, όπως γνωρίζουν καλά οι εκπαιδευτικοί που διδάσκουν σε όλες τις βαθμίδες της εκπαίδευσης, μια από τις σημαντικότερες προκλήσεις του σύγχρονου σχολείου αποτελεί ο τρόπος με τον οποίο μπορεί να σχεδιαστεί μια μαθησιακή διαδικασία η οποία να είναι ελκυστική για τους μαθητές και να προάγει τη μάθηση. Η ανάγκη αυτή είναι περισσότερο εμφανής στο ελληνικό εκπαιδευτικό σύστημα, επειδή το εκτεταμένο δίκτυο εξωσχολικής υποστήριξης (φροντιστήρια, ιδιαίτερα μαθήματα) απαξιώνει το σχολείο. Οι μαθητές και οι γονείς τους συχνά εκφράζουν την άποψη ότι οι γνώσεις που αποκομίζουν οι μαθητές από το σχολείο δεν επαρκούν, και συνεπώς, χρειάζεται η προσφυγή στην εξωσχολική υποστήριξη.

Εκτός από τα παραπάνω, το δημόσιο σχολείο καλείται να ενσωματώσει με αποτελεσματικό τρόπο τα ψηφιακά μέσα και τις νέες τεχνολογίες. Με τον τρόπο αυτό θα αξιοποιήσει εργαλεία και τρόπους παρουσίασης της πληροφορίας με τους οποίους είναι ήδη εξοικειωμένοι οι μαθητές και αφετέρου θα τους εφοδιάσει με τους «νέους γραμματισμούς». Θα τους βοηθήσει, δηλαδή, να αποκτήσουν δεξιότητες, στρατηγικές και πρακτικές που είναι απαραίτητες στην διαδικτυακή κοινωνία (Castells, 1996), οι οποίες αφορούν την πλοήγηση, ερμηνεία και παραγωγή πληροφοριών σε έναν κόσμο ο οποίος καθίσταται ψηφιακός και όλο και πιο πολυμεσικός. Για να παρέχει το σχολείο στους μαθητές και μελλοντικούς πολίτες τη δυνατότητα να το συμμετέχουν ενεργά και δημιουργικά σε αυτή την κοινωνία, χρειάζεται να είναι δυναμικό, κι όχι στατικό ή συντηρητικό. Να προσαρμόζεται για να εφοδιάζει τους μαθητές με «νέους γραμματισμούς», δηλαδή με γνώσεις και δεξιότητες που υπερβαίνουν τον παραδοσιακό γραμματισμό (ανάγνωση και συγγραφή). Οι νέοι αυτοί γραμματισμοί περιλαμβάνουν την ικανότητα κριτικής και δημιουργικής χρήσης των νέων τεχνολογιών, μέσων και ψηφιακών πλατφορμών για επικοινωνία, μάθηση και αλληλεπίδραση, την αξιολόγηση του περιεχομένου που απαντάται στο διαδίκτυο και την συμμετοχή σε διαδικτυακές κοινότητες.

Οι «νέοι» αυτοί γραμματισμοί δύναται να περιλαμβάνουν τον «ψηφιακό γραμματισμό» (digital literacy), που αναφέρεται σε «γνωστικές δεξιότητες» (Bellou & Mikropoulos, 2023:30) με περιεχόμενο ευρύτερο από αυτό του «πληροφορικού αλφαβητισμού». Ο ψηφιακός γραμματισμός περιλαμβάνει γνώσεις και δεξιότητες κριτικής και αναστοχαστικής χρησιμοποίησης των ψηφιακών τεχνολογιών αναφορικά με την πρόσβαση στην πληροφορία (π.χ. αξιόπιστες πηγές του διαδικτύου), την διαχείριση της πληροφορίας, την κριτική της αξιολόγηση και τη δημιουργία και κατασκευή νέας γνώσης.

Με βάση την παραπάνω συζήτηση, στην εργασία αυτή εστιαζόμαστε στους τρόπους με τους οποίους οι παραπάνω παραδοχές μπορούν να «μεταφραστούν» σε συγκεκριμένες διδακτικές πρακτικές. Ειδικότερα, η εργασία αυτή έχει ως αντικείμενό της την ανάδειξη καινοτόμου εκπαιδευτικού σχεδιασμού με την αξιοποίηση ψηφιακών και τεχνολογικών μέσων στη διδασκαλία της Αγγλικής ως ξένης γλώσσας τα οποία παρέχουν τη δυνατότητα αναβάθμισης της διδασκαλίας και εκμάθησής της. Στο πλαίσιο αυτό, προτείνει την παιδαγωγική αξιοποίηση ψηφιακών μέσων, αυθεντικών πηγών και βίντεο από το διαδίκτυο και Web 2.0 συνεργατικών εργαλείων για την υλοποίηση ιστοεξερευνήσεων (WebQuests). Ο σχεδιασμός αυτός προτείνεται με βάση την προσωπική εμπειρία και τα πορίσματα ερευνών που δείχνουν ότι αφενός η ενσωμάτωσή ψηφιακών και τεχνολογικών μέσων στη διδασκαλία παρέχει πολλαπλά οφέλη και αφετέρου ότι η αποτελεσματική αξιοποίησή τους είναι εφικτή και ρεαλιστική, δηλαδή όχι απλά θεωρητική.

ΨΗΦΙΑΚΑ ΜΕΣΑ ΚΑΙ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΓΓΛΙΚΗΣ ΓΛΩΣΣΑΣ

Η παιδαγωγική αξιοποίηση ψηφιακών μέσων, συνεργατικών εργαλείων και του διαδικτύου για την υλοποίηση ιστοεξερευνήσεων στη διδασκαλία της Αγγλικής ως ξένης γλώσσας σε ένα πλαίσιο διερευνητικής μάθησης αυξάνει τα κίνητρα των μαθητών και την ενεργητική τους συμμετοχή στη μαθησιακή διαδικασία, καθώς βασίζονται σε θέματα και πεδία έρευνας που ανταποκρίνονται στα ενδιαφέροντα των μαθητών και αξιοποιούν με παιδαγωγικά ορθούς τρόπους τις εμπειρίες τους.

Οι ιστοεξερευνήσεις εντάσσονται στο ευρύτερο πλαίσιο της διερευνητικής μάθησης (Maddux and Cummings, 2007), η οποία βασίζεται στον εποικοδομισμό (constructivism) (Tsiatsos, 2015). Πρόκειται για μια μαθησιακή διαδικασία που εκκινεί από το γεγονός ότι οι μαθητές διερευνούν ένα ζήτημα/πρόβλημα (Aditomo et al., 2013; Kurt, 2012), το οποίο λειτουργεί ως «καταλύτης» για τη συμμετοχή των μαθητών στις μαθησιακές δραστηριότητες. Οι δραστηριότητες στις οποίες εμπλέκονται οι μαθητές εμπεριέχουν την επεξεργασία και ανάλυση πληροφοριών, τη δημιουργική σκέψη, τη διαθεματικότητα, τη συνεργασία και τη χρήση τεχνολογικών εργαλείων (Oliver, 2008). Η διερευνητική μάθηση σχεδιάζεται και υλοποιείται με στόχο την ενεργή συμμετοχή των μαθητών, οι οποίοι αναλαμβάνουν την ευθύνη για την ανακάλυψη και την οικοδόμηση της νέας γνώσης, μέσα από αυθεντικές διερευνητικές και συνεργατικές διαδικασίες (Pedaste et al., 2015).

Οι ιστοεξερευνήσεις περιλαμβάνουν μια σειρά από δομημένες δραστηριότητες, οργανώνοντας τις μαθησιακές εμπειρίες των μαθητών, οι οποίοι χρησιμοποιούν πόρους του διαδικτύου και ψηφιακά μέσα με τρόπους που απαιτούν κριτική σκέψη και βαθιά κατανόηση των ζητημάτων (Unal et al., 2012). Αποτελούν μια μαθητοκεντρική προσέγγιση που σχεδιάζεται με βάση ένα σενάριο που ενδιαφέρει τους μαθητές οι οποίοι εργάζονται σε μικρές ομάδες ακολουθώντας προδιαγεγραμμένα βήματα για να εξετάσουν προβλήματα, να προτείνουν λύσεις (χρησιμοποιώντας τη διαδικασία συλλογής, ανάλυσης και σύνθεσης των δεδομένων και των πληροφοριών που συλλέγουν από ψηφιακές πηγές), αξιοποιώντας πηγές του διαδικτύου που προτείνονται από τους εκπαιδευτικούς, ενώ οι μαθητές «συνήθως αναλαμβάνουν συγκεκριμένους ρόλους μέσα στην ομάδα» (Zheng et al., 2008:296). Προωθούν την κατασκευή της γνώσης μέσα από μια διαδικασία κριτικής σκέψης (Dodge, 2001) και βασίζονται σε τέσσερις βασικές αρχές (Zheng et al., 2008): την κριτική σκέψη, την πρακτική εφαρμογή αυτών που έχουν μελετήσει και μάθει οι μαθητές, τη συνεργατικότητα και την αξιοποίηση κοινωνικών δεξιοτήτων, καθώς επίσης, την υποστήριξη/σκαλωσιά (scaffolding), επειδή η οργάνωση της όλης διαδικασίας σε μικρά και ξεκάθαρα επιμέρους στάδια δίνει στους εκπαιδευτικούς τη δυνατότητα να υποστηρίζουν συνέχεια και συστηματικά τους μαθητές ανάλογα με την πρόοδό και τις ανάγκες τους.

Μια σύντομη βιβλιογραφικά ανασκόπηση δείχνει ότι η συμμετοχή σε ιστοεξερευνήσεις αποφέρει οφέλη για τους μαθητές σε πολλαπλά επίπεδα. Ειδικότερα, η συμμετοχή σε ιστοεξερευνήσεις στη διδασκαλία της αγγλικής ως ξένης γλώσσας αυξάνει την μαθητική πρωτοβουλία και τα κίνητρα, ενώ ενισχύει την αυτοκατευθυνόμενη μάθηση (Koutsogianni, 2014). Επιπλέον οφέλη αποτελούν η δυνατότητα συνεργασίας ανάμεσα στους μαθητές, η ανάπτυξη της κριτικής και της δημιουργικής σκέψης αλλά και της διερευνητικής μάθησης, καθώς ενθαρρύνεται η κριτική συλλογή, ανάλυση και επεξεργασία των δεδομένων, κι όχι η αποστήθιση και η απλή παράθεση πληροφοριών. Παρέχουν στους εκπαιδευτικούς ένα χρήσιμο εκπαιδευτικό εργαλείο για να βοηθήσουν τους μαθητές τους να αποκτήσουν δεξιότητες σκέψης υψηλού επιπέδου (higher-level thinking skills) (Dodge, 2001; Popota, 2014). Οι δεξιότητες αυτές περιλαμβάνουν την ικανότητα ανάλυσης, αξιολόγησης και εφαρμογής της γνώσης με τρόπο που είναι πολύπλοκος και απαιτεί αφηρημένη σκέψη, σε αντίθεση με την απλή ανάκληση και παρουσίαση πληροφοριών. Συνεπώς, οι δεξιότητες αυτές δεν αφορούν απλά την απομνημόνευση, αλλά την κριτική σκέψη, την επίλυση προβλήματος και την ικανότητα εύρεσης συνδέσεων και σχέσεων ανάμεσα σε φαινομενικά ασύνδετες έννοιες και ζητήματα (Mislia et al., 2019).

Ένα περαιτέρω ευεργετικό αποτέλεσμα αφορά το γεγονός ότι προάγεται η φυσική διδασκαλία όλων των γλωσσικών δεξιοτήτων στην Αγγλική γλώσσα, κατανόησης και παραγωγής γραπτού και προφορικού λόγου, σε ένα αυθεντικό επικοινωνιακό πλαίσιο. Αυτό που είναι σημαντικό είναι το γεγονός ότι οι ιστοεξερευνήσεις παρέχουν τη δυνατότητα να ενσωματωθούν με επιτυχή και φυσικό τρόπο οι νέες τεχνολογίες και τα ψηφιακά μέσα στη μαθησιακή διαδικασία (Abbit and Ophus, 2008).

Ο σχεδιασμός και η υλοποίηση των ιστοεξερευνήσεων ακολουθεί μια σειρά από διαδοχικά στάδια (Ebadi and Rahimi, 2018). Το πρώτο στάδιο αφορά την εισαγωγή (introduction). Στο στάδιο αυτό οι εκπαιδευτικοί παρουσιάζουν και εξηγούν στους μαθητές τη θεματική και τα ευρύτερα ζητήματα τα οποία θα διερευνήσουν στο πλαίσιο της ιστοεξερεύνησης. Το δεύτερο στάδιο της ιστοεξερεύνησης είναι οι δραστηριότητες (tasks), που περιλαμβάνει τα ερωτήματα που θα απαντηθούν και τα προβλήματα που θα αναλάβουν να επιλύσουν οι μαθητές, το τελικό προϊόν, το αποτέλεσμα της διερευνητικής δραστηριότητας των μαθητών. Το τρίτο στάδιο, η διαδικασία (process), αφορά τον προσδιορισμό των διαδοχικών σταδίων που θα ακολουθήσουν οι μαθητές για να πραγματοποιήσουν τις δραστηριότητες. Το τέταρτο στάδιο, οι πόροι/πηγές (resources) αφορά τις διαδικτυακές πηγές, ιστοσελίδες, ψηφιακά άρθρα, online

εγκυκλοπαίδειες, κλπ. που θα χρησιμοποιήσουν οι μαθητές. Το πέμπτο στάδιο, η αξιολόγηση, σχετίζεται με τις διαδικασίες (π.χ. χρήση ρουμπρίκας) για την αξιολόγηση των μαθητών και των ομάδων εργασίας. Το τελευταίο στάδιο, το συμπέρασμα, συνήθως είναι μια συζήτηση σχετικά με τα οφέλη που αποκόμισαν οι μαθητές και τους τρόπους με τους οποίους τα αποτελέσματα της ιστοεξερεύνησης μπορούν να αξιοποιηθούν.

Στο επίπεδο της μαθησιακής διαδικασίας, τα Web 2.0 συνεργατικά εργαλεία και εφαρμογές, σε αντίθεση με τις αντίστοιχες εφαρμογές Web 1.0 που αφορούσαν κατά κύριο λόγο την αναζήτηση της πληροφορίας και την πρόσβαση σε ιστοσελίδες (Anastasiades and Kotsidis, 2013), βοηθούν τους μαθητές να δημιουργούν και να διαμορφώνουν το περιεχόμενο και χαρακτηρίζονται από τις δυνατότητες που παρέχουν για διαδραστικότητα, συνεργασία, αλληλεπίδραση και τη δημιουργία ψηφιακών κοινοτήτων (Hwang, et al., 2008). Για παράδειγμα, τα ιστολόγια (blogs) μπορούν να χρησιμοποιηθούν στην υλοποίηση ιστοεξερευνήσεων (WebQuests), αλλά και ερευνητικών εργασιών (projects), και για να δημοσιεύσουν οι μαθητές τις απόψεις τους και να αλληλοεπιδρούν, ενώ οι εκπαιδευτικοί έχουν τη δυνατότητα να παρέχουν ανατροφοδότηση. Εφαρμογές Web 2.0 που αποσκοπούν στην συνεργασία και την ανταλλαγή ιδεών (π.χ. Google Docs) και οι οποίες ενισχύουν τις κοινωνικές δεξιότητες μπορούν να χρησιμοποιηθούν για ομαδοσυνεργατικές δραστηριότητες (Sa'diyah and Nabhan, 2021). Επίσης, εφαρμογές Web 2.0 που διευκολύνουν τη δημιουργία περιεχομένου, την ανάρτηση υλικού και την επεξεργασία του (π.χ. Padlet, wikis) παρέχουν τη δυνατότητα για την επιλογή του υλικού που είναι κατάλληλο για την υλοποίηση της ιστοεξερεύνησης, την online εργασία, την αλληλεπίδραση, την ανταλλαγή απόψεων, τη συζήτηση και την εξαγωγή συμπερασμάτων σε έναν ψηφιακό συνεργατικό χώρο (Pedaste et al., 2015; Scrhum & Levin, 2009).

Στη συνέχεια, με βάση τη σχετική βιβλιογραφία, προτείνουμε μια ιστοεξερεύνηση που μπορεί να υλοποιηθεί στο πλαίσιο της διδασκαλίας της Αγγλικής για μαθητές επιπέδου γλωσσομάθειας Β1. Παρουσιάζουμε τον βασικό της σχεδιασμό, τα στάδια υλοποίησής της, και τα αναμενόμενα θετικά αποτελέσματα από την υλοποίησή της, ιδιαίτερα αυτά που σχετίζονται με την ενίσχυση της ομαδοσυνεργατικής μάθησης, της κριτικής και δημιουργικής σκέψης, της αξιοποίησης αυθεντικού υλικού, και της ανάπτυξης όλων των γλωσσικών δεξιοτήτων σε ένα φυσικό και αυθεντικό επικοινωνιακό πλαίσιο. Παρέχουμε, επίσης, πρακτικές οδηγίες για την επιτυχημένη εφαρμογή της ιστοεξερεύνησης, έτσι ώστε τα ψηφιακά και τεχνολογικά μέσα να αξιοποιηθούν αποτελεσματικά, να αποτελέσουν στην πράξη μια καινοτόμο προσέγγιση και να συμβάλουν θετικά στην αύξηση των κινήτρων των μαθητών και στην εκμάθηση της Αγγλικής γλώσσας. Οι εκπαιδευτικοί της Αγγλικής γλώσσας μπορούν να προσαρμόσουν τις δραστηριότητες που προτείνονται και να διευρύνουν το εύρος της προτεινόμενης ιστοεξερεύνησης, την αξιοποίηση των ψηφιακών και τεχνολογικών μέσων και των συνεργατικών εργαλείων για να ανταποκριθούν στις ανάγκες και τα χαρακτηριστικά των δικών τους μαθητών-τριών και το γενικότερο πλαίσιο της διδασκαλίας τους.

ΠΡΟΤΑΣΗ ΙΣΤΟΕΞΕΡΕΥΝΗΣΗΣ

Η ιστοεξερεύνηση που παρουσιάζεται στη συνέχεια αφορά σε μαθητές της τρίτης τάξης του γυμνασίου, με επίπεδο γλωσσομάθειας Β1 στο «Κοινό Ευρωπαϊκό Πλαίσιο Αναφορά για τις Γλώσσες» (Common European Framework of Reference for Languages) (Council of Europe, 2020). Έχει σχεδιαστεί για να πραγματοποιηθεί σε διάστημα δύο μηνών.

ΣΤΟΧΟΙ ΤΗΣ ΙΣΤΟΕΞΕΡΕΥΝΗΣΗΣ

Οι σημαντικότεροι στόχοι της ιστοεξερεύνησης, δηλαδή αυτά τα οποία αναμένεται να μάθουν και να πετύχουν οι μαθητές στο τέλος της ιστοεξερεύνησης και οι οποίοι κατευθύνουν την διδασκαλία, το περιεχόμενο, τις δραστηριότητες, τις στρατηγικές διδασκαλίας και την αξιολόγηση, είναι οι ακόλουθοι.

Πρώτον, η ανάπτυξη όλων των δεξιοτήτων στην Αγγλική γλώσσα, παραγωγής και κατανόησης γραπτού και προφορικού λόγου (reading, writing, listening and speaking skills) σε ένα αυθεντικό επικοινωνιακό πλαίσιο. Η ιστοεξερεύνηση είναι σχεδιασμένη με τέτοιο τρόπο ώστε οι μαθητές να χρησιμοποιούν την αγγλική γλώσσα σε ένα φυσικό πλαίσιο για συνεργασία, αλληλεπίδραση και ανταλλαγή απόψεων. Αυτό σημαίνει ότι δεν χρησιμοποιούν της Αγγλική γλώσσα απλά για να συμμετέχουν σε δραστηριότητες κατανόησης προφορικού λόγου, ή δραστηριότητες παραγωγής προφορικού λόγου σε ένα προδιαγεγραμμένο πλαίσιο, αλλά για να συμμετέχουν σε δραστηριότητες που προσομοιάζουν την χρήση της Αγγλικής γλώσσας από τους φυσικούς της χρήστες. Για παράδειγμα, στο πρώτο στάδιο της ιστοεξερεύνησης, την εισαγωγή, οι μαθητές συζητούν για τα περιβαλλοντικά προβλήματα της περιοχής τους και παρακολουθούν ένα σχετικό βίντεο που θέτει το πλαίσιο της αναζήτησής τους. Επιπλέον, η χρησιμοποίηση ψηφιακών εργαλείων για συνεργασία ενσωματώνει την ανάπτυξη δεξιοτήτων κατανόησης και παραγωγής γραπτού λόγου σε ένα φυσικό επικοινωνιακό πλαίσιο. Οι εκπαιδευτικοί δεν χρειάζεται να σχεδιάσουν δραστηριότητες για να βοηθήσουν τους μαθητές τους να αναπτύξουν τις δεξιότητες αυτές, επειδή η ανάπτυξη των δεξιοτήτων αυτών αποτελεί αναπόσπαστο τμήμα τους σχεδιασμού και υλοποίησης της ιστοεξερεύνησης, η οποία αποτελεί ένα σύνολο δραστηριοτήτων που προσομοιάζει σε αυτές στις οποίες συμμετέχουν οι μαθητές έξω από το περιορισμένο πλαίσιο της σχολικής τάξης.

Πρόκειται για έναν κρίσιμο στόχο, καθώς η διδασκαλία της Αγγλικής γλώσσας στο ελληνικό σχολείο δεν παρέχει πάντοτε τη δυνατότητα για δυνατότητα χρήσης της γλώσσας σε ένα αυθεντικό επικοινωνιακό πλαίσιο (Tsiplakidis, 2021).

Ένας επιπλέον στόχος αποτελεί η παιδαγωγικά ορθή και αποτελεσματική αξιοποίηση των νέων τεχνολογιών στη διδασκαλία της Αγγλικής γλώσσας. Ο στόχος αυτός απορρέει από τα πορίσματα ερευνών που δείχνουν ότι οι ιστοεξερευνήσεις αποτελούν ιδανικό εργαλείο για την ενσωμάτωση των νέων τεχνολογιών στην ξενόγλωσση τάξη (Oilousidou, 2018), ενισχύοντας την κριτική και αναστοχαστική τους χρήση. Μια τέτοια χρήση περιλαμβάνει τα ακόλουθα χαρακτηριστικά: (α) οι μαθητές εφοδιάζονται με ψηφιακές πηγές, αλλά χρειάζεται να αξιολογήσουν την αξιοπιστία και την εγκυρότητά τους ή/και τυχόν προκαταλήψεις (bias), (β) οι μαθητές χρειάζεται να επιλέξουν μόνο τις πληροφορίες που είναι σχετικές με το υπό διερεύνηση ζήτημα, (γ) οι μαθητές δεν χρησιμοποιούν τα ψηφιακά εργαλεία απλά επειδή είναι διαθέσιμα. Αντίθετα, επιλέγουν σκόπιμα τα κατάλληλα ψηφιακά εργαλεία σε σχέση με τους στόχους της ιστοεξερεύνησης, αξιολογώντας τα κριτικά, εξετάζοντας σε βάθος τους τρόπους με τους οποίους μπορούν να τα αξιοποιήσουν. Για παράδειγμα, μια ομάδα μαθητών μπορεί να επιλέξει μια εφαρμογή του διαδικτύου (π.χ. Padlet, Google Docs) για να συνεργαστεί. Αναστοχαστικά, κατά τη διάρκεια, αλλά και μετά το πέρας της ιστοεξερεύνησης, αξιολογούν την αποτελεσματικότητα της εφαρμογής αυτής αναφορικά με τη δυνατότητά της για συνεργασία και διαμοιρασμό πληροφοριών και ιδεών.

Ένας περαιτέρω στόχος αποτελεί η ανάπτυξη δεξιοτήτων σκέψης υψηλού επιπέδου (higher-level thinking skills), που απορρέει από το γεγονός ότι οι μαθητές δεν καταγράφουν απλά τη νέα πληροφορία, αλλά την μελετούν. Μετά από την αρχική καταγραφή της πληροφορίας, στη συνέχεια οι μαθητές την κατανοούν, συνοψίζουν, αξιολογούν, επεξηγούν, αντιπαραβάλλουν, συγκρίνουν, επεξεργάζονται και την χρησιμοποιούν δημιουργικά για να συζητήσουν τα ζητήματα που έχουν τεθεί και να απαντήσουν στα ερωτήματα της ιστοεξερεύνησης.

ΣΤΑΔΙΑ ΥΛΟΠΟΙΗΣΗΣ ΤΗΣ ΙΣΤΟΕΞΕΡΕΥΝΗΣΗΣ

Ο τίτλος της ιστοεξερεύνησης είναι: “How climate change and pollution affect our lives in Epirus and Ioannina”. Το θέμα το οποίο θα εξερευνήσουν οι μαθητές επιλέχτηκε επειδή είναι ενδιαφέρον και βρίσκεται σε συμφωνία με τους μαθησιακούς στόχους. Η θεματική του περιβάλλοντος περιλαμβάνεται στα σχολικά εγχειρίδια, ωστόσο στο πλαίσιο της ιστοεξερεύνησης επιχειρείται η σύνδεσή του με τις εμπειρίες και τις ζωές τους (real world relevance)· δηλαδή δεν προσεγγίζεται «ακαδημαϊκά», αλλά με μια βιωματική διάσταση. Στο εν λόγω πλαίσιο, η βιωματική διάσταση βρίσκεται στο γεγονός ότι το ζήτημα αυτό προσεγγίζεται από την σκοπιά που το βιώνουν οι μαθητές και οι οικογένειές τους. Επιπλέον, το ζήτημα αυτό καθαυτό (με την διαδικασία έρευνας που αποσκοπεί στην ανάλυσή του και την παροχή κάποιων προτάσεων για την αντιμετώπισή του), διευκολύνει την έρευνα, καθώς ενσωματώνει μια διερευνητική πτυχή, χωρίς να ευνοεί την στείρα παράθεση πληροφοριών και στοιχείων. Ταυτόχρονα, αυτό που ζητείται από τους μαθητές είναι εφικτό, επειδή το εύρος της διερεύνησης δεν είναι ούτε τεράστιο, αλλά ούτε και εξαιρετικά περιορισμένο. Οι λύσεις (μέσα από το ψηφιακό υλικό) που δίνεται στους μαθητές δεν είναι προφανείς, αλλά απαιτούν συνεργασία και κριτική ανάλυσή του υλικού για να αντληθούν συμπεράσματα. Ο χαρακτήρας του υπό διερεύνηση ζητήματος σημαίνει ότι οι μαθητές δεν οδηγούνται σε κάποιες προκαθορισμένες απαντήσεις, αλλά οι λύσεις και οι προτάσεις είναι «ανοικτές», με σεβασμό στις απόψεις και προοπτικές των μαθητών.

Η ιστοεξερεύνηση σχεδιάζεται με βάση τα στάδια που αναφέρονται στη σχετική βιβλιογραφία (Godwin-Jones, 2004), και περιλαμβάνει τα ακόλουθα στάδια: την εισαγωγή (introduction), τις δραστηριότητες (tasks), την διαδικασία (process), τους πόρους/πηγές (resources), την αξιολόγηση (evaluation) και το συμπέρασμα (conclusion). Το περιεχόμενο των σταδίων αυτών παρουσιάζονται στη συνέχεια. Κρίνεται απαραίτητο να τονιστεί ότι η πρόταση ιστοεξερεύνησης και τα στάδια που παρουσιάζονται στο τμήμα αυτό της εργασίας θα ήταν χρήσιμο και πιο ωφέλιμο να θεωρηθούν ως αφετηρίες για αναστοχασμό από τους εκπαιδευτικούς που επιθυμούν να ενσωματώσουν τις ιστοεξερευνήσεις στη διδασκαλία τους, κι όχι προτάσεις «κλειστές» που δεν επιδέχονται αλλαγές. Άλλωστε, η διδασκαλία αποτελεί μια δυναμική διαδικασία που βρίσκεται σε άμεση συνάφεια με το περιβάλλον (φυσικό και ψυχολογικό) στο οποίο διεξάγεται (π.χ. επίπεδο γλωσσομάθειας των μαθητών, μαθησιακά κίνητρα, εξοπλισμός τάξης, κουλτούρα του σχολείου ή/και της τάξης, κλπ.). Είναι προφανές ότι στην μαθησιακή διαδικασία, προκαθορισμένες «λύσεις» και «συνταγές επιτυχίας» αντίκεινται στις αρχές της μαθητοκεντρικότητας. Μια διδακτική προσέγγιση που είναι αποτελεσματική σε μια σχολική τάξη δεν είναι απαραίτητα κατάλληλη σε κάποια άλλη, καθώς κάθε τάξη έχει τα δικά της χαρακτηριστικά. Συμπερασματικά, οι παρακάτω προτάσεις χρειάζεται να αναγνωστούν υπό το πρίσμα των προαναφερθέντων επισημάνσεων.

Στο πρώτο στάδιο, την εισαγωγή, ο στόχος των εκπαιδευτικών είναι να παρέχουν μια σύνοψη σχετικά με το θέμα της ρύπανσης και της κλιματικής αλλαγής και την επίδρασής της σε παγκόσμιο και τοπικό επίπεδο. Οι εκπαιδευτικοί εκκινούν μια συζήτηση στην τάξη σχετικά με τα προβλήματα που αντιμετωπίζουν οι κάτοικοι της περιοχής, αξιοποιώντας και την τεχνική του καταιγισμού ιδεών (brainstorming) και παρουσιάζει το θέμα στους μαθητές. Οι μαθητές, εργαζόμενοι

σε ζευγάρια, εμπλέκονται σε ανταλλαγή πληροφοριών/απόψεων και καταγράφουν αυτά που γνωρίζουν σχετικά με το θέμα αυτό. Στη συνέχεια, παρακολουθούν ένα εκπαιδευτικό βίντεο σχετικά με τις αιτίες της ρύπανσης και της κλιματικής αλλαγής και τον τρόπο με τον οποίο οι ανθρώπινες δραστηριότητες συμβάλλουν σε αυτή (π.χ. παράγοντες που συμβάλουν στην αιθαλομίχλη στην πόλη των Ιωαννίνων). Σημειώνουν τα σημαντικά σημεία του βίντεο και ερωτήσεις που τυχόν έχουν, οι οποίες θα λειτουργήσουν ως σημείο εκκίνησης για την περαιτέρω έρευνά τους. Στο δεύτερο στάδιο, τις δραστηριότητες, οι μαθητές χωρίζονται σε ομάδες και διερευνούν μια διαφορετική πτυχή της κλιματικής αλλαγής, με έμφαση στην τοπικότητα (π.χ. μια ομάδα διερευνά τον τρόπο με τον οποίο έχει αλλάξει το κλίμα των Ιωαννίνων και της Ηπείρου τα τελευταία χρόνια, μια άλλη ομάδα τον τρόπο με τον οποίο η κλιματική αλλαγή επηρεάζει την λίμνη Παμβώτιδα, ενώ αντικείμενο έρευνας μιας άλλης ομάδας μπορεί να αποτελέσουν τα προβλήματα υγείας που προκαλεί, ιδιαίτερα κατά τους χειμερινούς μήνες, η ρύπανση την ατμόσφαιρα των Ιωαννίνων). Εντός των ομάδων, οι μαθητές αναλαμβάνουν ρόλους και είναι υπεύθυνοι για ένα υποερώτημα ή μια επιμέρους πτυχή του ζητήματος για το οποίο παρουσιάζουν τα ευρήματά τους με έναν δημιουργικό τρόπο (π.χ. ένα inforgraphic, δηλαδή, μια οπτική αναπαράσταση πληροφοριών ή δεδομένων, βίντεο, ανάρτηση σε blog) . Σε σχέση με το τελικό προϊόν της διερεύνησης, οι ομάδες έχουν τη δυνατότητα να παρουσιάζουν μια συνοπτική παρουσίαση με την αξιοποίηση ψηφιακών μέσων για να παρουσιάσουν τα ευρήματά τους και να προτείνουν λύσεις, να δημιουργήσουν ένα βίντεο ή/και ένα podcast, ένα ποίημα ή ένα σύντομο θεατρικό κείμενο, λαμβάνοντας υπόψη μαθητές με κιναισθητικό μαθησιακό στυλ.

Στο τρίτο στάδιο και στο τέταρτο στάδιο, δηλαδή, τη διαδικασία και τους πόρους/πηγές, οι εκπαιδευτικοί παρουσιάζουν στους μαθητές μια λίστα από ιστοσελίδες, πολυτροπικά κείμενα (multimodal texts), podcasts, βίντεο, κλπ. σχετικά με το υπό διερεύνηση ζήτημα. Επίσης, επιστημονικές μελέτες σχετικά με τα κλιματικά στοιχεία της Ηπείρου τα τελευταία χρόνια για να μελετήσουν, αλλά και λύσεις που έχουν προταθεί σε άλλα μέρη του κόσμου, έτσι ώστε οι μαθητές να κάνουν συγκρίσεις και να εξετάσουν εάν αυτές οι λύσεις και οι προτάσεις είναι κατάλληλες για την δική τους πόλη. Οι πηγές αυτές καλύπτουν διάφορες πτυχές του ζητήματος που διερευνάται. Οι μαθητές συνεργάζονται με ψηφιακά συνεργατικά εργαλεία, ανταλλάσσουν τεκμηριωμένες απόψεις, προβληματισμούς και προτάσεις. Ένα σημαντικό τμήμα του σταδίου αυτού αφορά την κριτική εξέταση του ζητήματος με βάση τις πληροφορίες που έχουν συλλέξει οι μαθητές, έτσι ώστε να προτείνουν αιτιολογημένες προσεγγίσεις και παρεμβάσεις για το πρόβλημα της ρύπανσης στην περιοχή τους.

Το επόμενο στάδιο, η αξιολόγηση, έπεται της παρουσίασης των παρουσιάσεων των ομάδων. Για την υλοποίηση του σταδίου αυτού, θα χρησιμοποιηθεί μια ρουμπρίκα για την αξιολόγηση της εργασίας των ομάδων με βάση συγκεκριμένα κριτήρια, όπως η ακρίβεια των πληροφοριών, η σαφήνεια, η πληρότητα, η επάρκεια και η πρωτοτυπία της παρουσίασης. Στο πλαίσιο της αυτοαξιολόγησης, οι μαθητές αξιολογούν την δική τους συνεισφορά και αναστοχάζονται αναφορικά με την εργασία τους και τρόπους βελτίωσης. Στο τελευταίο στάδιο, το συμπέρασμα, οι μαθητές αναστοχάζονται για τις μαθησιακές εμπειρίες που απόκτησαν από τη συμμετοχή τους στην ιστοεξερεύνηση, απαντώντας σε ερωτήσεις σχετικά με το εάν η κατανόησή τους για τα ζητήματα με τα οποία ασχολήθηκαν αυξήθηκε και έγινε βαθύτερη, ποιες από τις λύσεις που προτάθηκαν αξιολογούν ως πιο αποτελεσματικές και εφικτές, δράσεις που χρειάζεται να αναλάβει η τοπική κοινωνία, κλπ. Τα παραπάνω αποτελούν, επίσης, το αντικείμενο ομαδικής συζήτησης μέσα στην τάξη, στην οποία όλοι οι μαθητές,-τριες θα έχουν τη δυνατότητα να εκφράσουν τις απόψεις τους, αλλά και να συζητήσουν τα ζητήματα που θα αναδείξουν και θα θέσουν προς συζήτηση οι συμμαθητές τους.

Ο ρόλος των εκπαιδευτικών και οι ενέργειές τους κατά τη διάρκεια καθορίζονται με φυσικό τρόπο από τον σχεδιασμό και τους στόχους της ιστοεξερεύνησης. Συνοπτικά, οι εκπαιδευτικοί ενορχηστρώνουν τις μαθησιακές εμπειρίες, απαντούν σε ερωτήσεις παρέχοντας νύξεις στους μαθητές έτσι ώστε να χρησιμοποιήσουν την κριτική και δημιουργική τους σκέψη, παρέχουν θετική και εποικοδομητική ανατροφοδότηση, παρατηρούν τον πρόοδο των μαθητών, επεμβαίνουν σε τυχόν τεχνικές δυσκολίες, βεβαιώνονται ότι όλοι οι μαθητές συμμετέχουν ενεργά και τους βοηθούν να αναστοχαστούν αναφορικά με την εμπειρία συμμετοχής στην ιστοεξερεύνηση. Επίσης, αξιοποιούν διαμορφωτική, τελική και εναλλακτική αξιολόγηση και, εξηγώντας στους μαθητές τα κριτήρια αξιολόγησης, ενθαρρύνουν την αυτοαξιολόγηση των μαθητών (self-assessment) και την αξιολόγηση των συμμαθητών τους (peer-assessment).

ΣΥΜΠΕΡΑΣΜΑ

Στην εργασία αυτή επιχειρήσαμε μια ρεαλιστική σύνδεση της θεωρητικής γνώσης με τη διδακτική πράξη και πρακτική εφαρμογή των βασικών αρχών της εκπαιδευτικής θεωρίας, λαμβάνοντας υπόψη: (α) τις ιδιαιτερότητες και τις ανάγκες της διδασκαλίας στο ελληνικό εκπαιδευτικό σύστημα και ειδικότερα αναφορικά με τη διδασκαλία της Αγγλικής γλώσσας, (β) τις τεχνολογικές εξελίξεις που αναπόφευκτα επηρεάζουν την εκπαίδευση, (γ) τους αναδυόμενους «νέους γραμματισμούς» και (δ) τον κόσμο στον οποίο ζουν και λειτουργούν οι μαθητές.

Στην αρχή της εργασίας περιγράψαμε και αναλύσαμε συνοπτικά την ανάγκη του σχολείου και της κοινωνίας για παροχή στους μαθητές γνώσεων και δεξιοτήτων που θα τους επιτρέψουν να λειτουργήσουν αποτελεσματικά ως πολίτες

σε μια εποχή με ραγδαίες τεχνολογικές και κοινωνικές εξελίξεις, την οποία οι «νέοι γραμματισμοί» είναι απαραίτητοι. Στη συνέχεια παρουσιάσαμε μια σύντομη ανασκόπηση της βιβλιογραφίας και των ερευνών που έχουν πραγματοποιηθεί σχετικά με την παιδαγωγική αξιοποίηση των ιστοεξερευνήσεων, την αξιοποίηση ψηφιακών μέσων, συνεργατικών εργαλείων, βίντεο και πόρων από το διαδίκτυο στη διδασκαλία της Αγγλικής ως ξένης γλώσσας.

Ακολούθως, με βάση τη σχετική βιβλιογραφία, προτείναμε μια ιστοεξερεύνηση που μπορεί να υλοποιηθεί στο πλαίσιο της διδασκαλίας της Αγγλικής για μαθητές επιπέδου γλωσσομάθειας Β1. Ο σχεδιασμός της ιστοεξερεύνησης που παρουσιάζεται στην εργασία αυτή μπορεί να τροποποιηθεί και το εύρος της διερεύνησης να τροποποιηθεί, έτσι ώστε οι εκπαιδευτικοί που επιθυμούν να εφαρμόσουν καινοτόμες εκπαιδευτικές μεθόδους να ανταποκριθούν στις ανάγκες και τα χαρακτηριστικά των μαθητών τους και το ευρύτερο πλαίσιο στο οποίο διεξάγεται η διδασκαλία τους.

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«ΠΑΜΕ ΠΑΙΔΙΑ ΣΤΗΝ ΕΚΚΛΗΣΙΑ!». ΜΙΑ ΚΑΛΗ ΠΡΑΚΤΙΚΗ ΣΤΟ ΜΑΘΗΜΑ ΤΩΝ ΘΡΗΣΚΕΥΤΙΚΩΝ ΜΕ ΑΞΙΟΠΟΙΗΣΗ ΠΟΛΥΜΕΣΙΚΟΥ ΥΛΙΚΟΥ

Φακάζης Ιωάννης
Εκπαιδευτικός Θεολόγος
5ο ΓΕΛ Κέρκυρας,
Κέρκυρα, Ελλάδα
e-mail: ifakazis@sch.gr

ΠΕΡΙΛΗΨΗ

Το άρθρο αυτό αναφέρεται σε μάθημα Θρησκευτικών που έλαβε χώρα σε μαθητές Γ΄ τάξης Γυμνασίου, και πιο συγκεκριμένα στο Δέσκειο Γυμνάσιο Πάργας κατά το σχολικό έτος 2022-2023. Πιο συγκεκριμένα η θεματική ενότητα με την οποία ασχοληθήκαμε εμείς αφορούσε το κεφάλαιο «Λατρεία και τέχνη σε Ανατολή και Δύση», και ιδιαιτέρως το κομμάτι της αρχιτεκτονικής και της ζωγραφικής του ορθόδοξου χριστιανικού ναού, οπότε θεωρήσαμε πρόσφορο να αξιοποιήσουμε σχετικό λογισμικό. Κάποιοι από τους στόχους που θέσαμε ήταν: να αναγνωρίζουν σε ποιο ρυθμό ανήκει ένας χριστιανικός ναός, να γνωρίζουν βασικές πληροφορίες σχετικά με την αγιογράφηση του ναού και τους συμβολισμούς αυτής, να πληροφορηθούν σχετικά με τη λατρευτική ζωή που λαμβάνει χώρα στον ορθόδοξο ναό κ.ά. Όσον αφορά το υλικό που χρησιμοποιήσαμε ήταν το βιβλίο της Φλώρας Τζανακάκη (Tzanakaki, 2008) «Πάμε στην Εκκλησία!», το οποίο περιέχει CD με λογισμικό και δραστηριότητες.

Το λογισμικό περιλαμβάνει στο αρχικό μενού ως κύριες ενότητες: τα «Περιεχόμενα», όπου περιλαμβάνονται 18 υποενότητες με τα κύρια σημεία της παρουσίασης, για να επιλέξει κάποιος μεμονωμένα το συγκεκριμένο κομμάτι που θέλει να παρακολουθήσει· την «Έναρξη παρουσίασης», όπου ο χρήστης μπορεί να παρακολουθήσει όλες τις ενότητες ως ενιαία παρουσίαση από το avatar του λογισμικού· τις «360 μοίρες», όπου δίνεται η δυνατότητα εικονικής περιήγησης 360 μοιρών στο κέντρο του ναού· τις «Δραστηριότητες», όπου περιέχονται ψηφιακές δραστηριότητες, οι οποίες αντιστοιχούν σε κάποιες από τις ενότητες που παρουσιάζονται από το avatar στο λογισμικό.

Το μάθημα στην τάξη έλαβε χώρα σε τρεις φάσεις. Αρχικά έγινε ενημέρωση των μαθητών δίνοντας βασικές πληροφορίες σχετικά με τη θεματική και το λογισμικό που θα γινόταν χρήση. Εν συνεχεία έγινε προβολή με βιντεοπροβολέα του λογισμικού, με εικονική ξενάγηση από avatar σε εκκλησιαστικό ναό των Αθηνών, δίνοντας βασικές πληροφορίες σχετικά με την αρχιτεκτονική και τη λατρευτική ζωή στο χριστιανικό ναό. Ακολούθως προχωρήσαμε σε επίλυση ψηφιακών δραστηριοτήτων που υπάρχουν στο εν λόγω λογισμικό, σχετικές με την προβολή που έλαβε χώρα πιο πριν. Κάποιες από τις δραστηριότητες που ασχοληθήκαμε είχαν να κάνουν με: τους ρυθμούς των ναών, τον προσανατολισμό του ναού, τα μέρη του ναού, τις εικόνες του τέμπλου και την εικονογράφηση του ναού. Στις ασκήσεις αυτές συνήθως δίνονται τέσσερις εικόνες, π.χ. με τους βασικούς ρυθμούς ναών (βασιλική, βασιλική με τρούλο, σταυροειδής με τρούλο, κατακόμβη), και τέσσερα πλαίσια με τα ονόματα του κάθε ρυθμού. Ο χρήστης θα πρέπει να σύρει με τον κέρσορα κάθε εικόνα στο σωστό πλαίσιο.

Σε επόμενη φάση έγινε επίσκεψη σε τοπικό ορθόδοξο εκκλησιαστικό ναό και εκκλησιαστικό μουσείο με ξενάγηση από τον ιερέα του ναού. Οι μαθητές παρατήρησαν διά ζώσης τα εκκλησιαστικά εκθέματα, τα μέρη του ναού και τις αγιογραφίες, με δυνατότητα για ερωτήσεις και διευκρινίσεις από τον ιερέα και τον Θεολόγο τους. Σε τρίτη φάση δόθηκε φύλλο εργασίας όπου οι μαθητές συνεργαζόμενοι σε ομάδες απάντησαν σε ερωτήσεις σχετικά με το μάθημα και τη διδακτική επίσκεψη που πραγματοποιήθηκαν τις προηγούμενες ημέρες.

Όσον αφορά τους στόχους που θέσαμε θεωρούμε ότι αυτοί επιτεύχθηκαν σε ικανοποιητικό βαθμό, ενώ αυξήθηκαν και τα μαθησιακά κίνητρα των μαθητών. Τις νέες τεχνολογίες γενικά τις αξιοποιήσαμε και τις αξιοποιούμε και πριν και μετά τη σχολική χρονιά που αναφέρουμε στο άρθρο μας (π.χ. χρήση διαδραστικού πίνακα, αξιοποίηση powerpoint, βίντεο από youtube κ.ά.). Συμπερασματικά, θεωρήσαμε ότι η χρήση πολυμεσικού υλικού αποτελεί μια εναλλακτική διδακτική προσέγγιση του μαθήματος των Θρησκευτικών στο Γυμνάσιο, η οποία συμπορεύεται με τη γενικότερη ανάπτυξη των ψηφιακών μέσων στην κοινωνία αλλά και στην εκπαίδευση, και η οποία μπορεί να συμβάλλει τα μέγιστα στην καλύτερη αφομοίωση της διδακτικής ύλης από τους μαθητές.

Λέξεις κλειδιά: ορθόδοξος χριστιανικός ναός, λογισμικό, εικονική ξενάγηση, προβολή, δραστηριότητες, επίσκεψη.

ΕΙΣΑΓΩΓΗ

Το μάθημα των Θρησκευτικών της Γ΄ γυμνασίου έχει να κάνει με τη μαρτυρία της ορθόδοξης εκκλησίας στο σύγχρονο κόσμο. Το βιβλίο καταπιάνεται με εφτά θεματικές που αναφέρονται: στην ορθόδοξη εκκλησία σήμερα, σε προτάσεις ζωής της ορθόδοξης εκκλησίας, στην ιεραποστολή και τη διακονία, στο σεβασμό του άλλου στην ορθόδοξη εκκλησία, στο διάλογο με το δυτικό χριστιανισμό, στις μονοθεϊστικές θρησκείες και τις θρησκείες της Ανατολής. Πιο συγκεκριμένα εμείς ασχοληθήκαμε με την Ε΄ θεματική ενότητα («Η Ορθόδοξη Εκκλησία σε διάλογο με τον δυτικό Χριστιανισμό»), και δη με το 5ο κεφάλαιο («Λατρεία και τέχνη σε Ανατολή και Δύση»), και ιδιαιτέρως με το κομμάτι της αρχιτεκτονικής και της ζωγραφικής του ορθόδοξου χριστιανικού ναού (Θρησκευτικά Γ΄ Γυμνασίου).

Στο Αναλυτικό Πρόγραμμα του συγκεκριμένου κεφαλαίου αναφέρεται στα προσδοκώμενα μαθησιακά αποτελέσματα οι μαθητές να διακρίνουν διαφορές και ομοιότητες της χριστιανικής τέχνης και λατρείας στην Ανατολή και στη Δύση (Curriculum for the subject of Religious Education in Primary and Junior High School, 2020). Ωστόσο, από τη διδασκαλία μας διαπιστώσαμε πως οι μαθητές δεν είχαν βασικές γνώσεις της τέχνης και της λατρείας ως προς τον ορθόδοξο ναό. Γι' αυτό θεωρήσαμε κατάλληλο να αφιερώσουμε χρόνο πρώτα στην αρχιτεκτονική και τη ζωγραφική του ορθόδοξου χριστιανικού ναού. Στη συνέχεια να διδάξουμε τα αντίστοιχα για την εκκλησία της Δύσης, και ακολούθως να περάσουμε σε σύγκριση των δύο, όπως αναφέρεται στο Αναλυτικό Πρόγραμμα.

Σύμφωνα με το Πρόγραμμα Σπουδών των Θρησκευτικών του Υπουργείου Παιδείας «το μάθημα των Θρησκευτικών οικοδομείται με βάση τη θρησκευτική παράδοση του τόπου, δηλαδή την παράδοση της ορθόδοξης εκκλησίας, όπως αυτή θεμελιώθηκε στη Βίβλο, σαρκώθηκε στη ζωή των αγίων Πατέρων της και αποτυπώθηκε στα μνημεία του πολιτισμού» (ό.π., σελ. 7659). Επίσης σκοπός του μαθήματος είναι «να συνεισφέρει δημιουργικά στην ανάπτυξη και καλλιέργεια της θρησκευτικής συνείδησης των Ορθόδοξων Χριστιανών μαθητών και μαθητριών» (ό.π., σελ. 7660).

Λαμβάνοντας, λοιπόν, υπόψη τα παραπάνω, και για να γίνει πιο βιωματική η προσέγγιση του κεφαλαίου σχετικά με την αρχιτεκτονική και τη ζωγραφική του ορθόδοξου χριστιανικού ναού, αποφασίσαμε να έρθουμε σε επικοινωνία με τον ιερέα της περιοχής (Πάργα), και να προγραμματίσουμε επίσκεψη στον τοπικό ναό και το γειτνιάζον εκκλησιαστικό μουσείο. Στο μουσείο έγινε ξενάγηση από τον ιερέα σχετικά με τα πολύτιμα εκκλησιαστικά εκθέματα της περιοχής, ενώ στο ναό κάναμε εμείς αναφορά στην αρχιτεκτονική και απαντήσαμε σε ερωτήσεις των μαθητών. Σε επόμενο μάθημα δώσαμε φύλλο εργασίας, στο οποίο οι μαθητές απάντησαν σε ερωτήσεις σχετικά με την επίσκεψη στο μουσείο και το ναό.

Πριν γίνει η επίσκεψη στο ναό και στο μουσείο αποφασίσαμε να αξιοποιήσουμε για τη διδασκαλία μας μέσα στην τάξη το βιβλίο: «Πάμε στην Εκκλησία!» της Φλώρας Τζανακάκη (Tzanakaki, 2008), το οποίο περιέχει CD με λογισμικό και ψηφιακές δραστηριότητες. Το βιβλίο περιέχει δύο μέρη· στο πρώτο μέρος δίνονται πληροφορίες με έγχρωμες εικόνες και κείμενα σχετικά με τον ορθόδοξο χριστιανικό ναό και στο δεύτερο μέρος γίνεται ανάλυση σχετικά με τη λατρευτική ζωή στο ναό. Στο τέλος του βιβλίου περιέχονται οι λύσεις των δραστηριοτήτων. Το CD περιλαμβάνει λογισμικό με παρουσίαση από avatar (εικονικός ξεναγός) χριστιανικού ναού, περιεχόμενα της παρουσίασης (ενιαία ή κατά ενότητες), δραστηριότητες, απεικόνιση του εσωτερικού του ναού 360 μοιρών και πληροφορίες σχετικά με τη δημιουργία του CD πολυμέσων. Εμείς στην τάξη κάναμε χρήση του CD που περιέχεται στο βιβλίο.

ΧΡΗΣΗ ΤΠΕ ΚΑΙ ΔΙΔΑΚΤΙΚΟΙ ΣΤΟΧΟΙ

Είναι γεγονός ότι η χρήση των ΤΠΕ (Τεχνολογιών Πληροφορίας και Επικοινωνίας) στην εκπαίδευση συμβάλει τα μέγιστα στην κινητοποίηση των μαθητών σε ενεργή και συμμετοχική μάθηση, τους προσφέρει πρόσβαση σε πληροφορίες και τους βοηθά να σκέφτονται και να επικοινωνούν με δημιουργικότητα (Jimoyiannis & Komis, 2017). Γι' αυτό κι εμείς αποφασίσαμε να αξιοποιήσουμε πολυμεσικό υλικό σχετικό με την ενότητα του μαθήματος των Θρησκευτικών το οποίο επρόκειτο να διδάξουμε, αφού οι ΤΠΕ αποτελούν σημαντικό κομμάτι της εκπαίδευσης και χρησιμοποιούνται ως εργαλεία μάθησης και διδασκαλίας των σχολικών εγχειριδίων (Kyridis et al, 2003) με πολλαπλά οφέλη μέσω της χρήσης τους.

Όσον αφορά τη χρήση λογισμικού πιστεύουμε πως η ενασχόληση με περιβάλλοντα εικονικής πραγματικότητας συντελεί ώστε η μάθηση να γίνεται πιο ενεργητική και επικοινωνιακή και να συνδέεται με τις εμπειρίες των μαθητών, μέσα από αυθεντικές καταστάσεις. Οι μαθητές με αυτόν τον τρόπο μπορούν να αλληλεπιδράσουν μ' ένα περιβάλλον αποθηκευμένων πληροφοριών και να κινηθούν μέσα στις πληροφορίες που αναπαρίστανται γραφικά (Dimitrakopoulou, 2001). Μέσα από τέτοιες δυνατότητες εφαρμόζεται δημιουργικά και ευέλικτα η γνώση. Επίσης, πιστεύουμε πως μέσα

από την χρήση της τεχνολογίας και συγκεκριμένα του λογισμικού, δίνουμε τη δυνατότητα να κατανοήσουν καλύτερα και να αφομοιώσουν την ύλη και μαθητές που αντιμετωπίζουν μαθησιακές δυσκολίες.

Το μάθημά μας έγινε σε δύο τμήματα της Γ΄ τάξης του Γυμνασίου Πάργας. Πιο συγκεκριμένα το μάθημα αφορούσε το βιβλίο των Θρησκευτικών, στο κεφάλαιο «Λατρεία και τέχνη σε Ανατολή και Δύση», και ιδιαιτέρως στο κομμάτι της αρχιτεκτονικής και της ζωγραφικής του ορθόδοξου χριστιανικού ναού. Στόχοι που θέσαμε κατά τη διδασκαλία μας ήταν οι μαθητές να:

- Συνειδητοποιήσουν για ποιο λόγο υπάρχει ο ναός και τι συμβαίνει εκεί.
- Αναγνωρίζουν σε ποιο ρυθμό ανήκει γενικότερα ένας χριστιανικός ναός που επισκέπτονται, και ειδικότερα ο ναός της περιοχής τους.
- Γνωρίζουν βασικές πληροφορίες σχετικά με την αγιογράφηση του ναού και τους συμβολισμούς αυτής.
- Πληροφορηθούν σχετικά με τη λατρευτική ζωή που λαμβάνει χώρα στον ορθόδοξο ναό.
- Εκτιμήσουν τη σημασία ύπαρξης εκκλησιαστικού μουσείου στην περιοχή τους· την ιστορία και την αξία των κειμηλίων που βρίσκονται εκεί.
- Κατανοήσουν ότι η τεχνολογία, και συγκεκριμένα η χρήση σχετικού λογισμικού, μπορεί να συμβάλει στη διευκόλυνση του μαθήματος των Θρησκευτικών.

ΒΙΒΛΙΟ «ΠΆΜΕ ΣΤΗΝ ΕΚΚΛΗΣΙΑ!» - ΛΟΓΙΣΜΙΚΟ

Χρησιμοποιήσαμε, λοιπόν, εκτός από την ύλη του σχολικού βιβλίου, και το βιβλίο «Πάμε στην Εκκλησία!» της Φλώρας Τζανακάκη (Tzanakaki, 2008), το οποίο περιέχει CD με λογισμικό και δραστηριότητες. Στην ενότητα αυτή θα δώσουμε μεγαλύτερη έμφαση και θα αναλύσουμε διεξοδικά το λογισμικό. Το λογισμικό αυτό περιλαμβάνει ειδικότερα αρχικό μενού με: «Περιεχόμενα», «Έναρξη παρουσίασης», «360 μοίρες», «Δραστηριότητες», «Πληροφορίες» και «Έξοδος».

Εικόνα 1
Αρχικό μενού λογισμικού - avatar

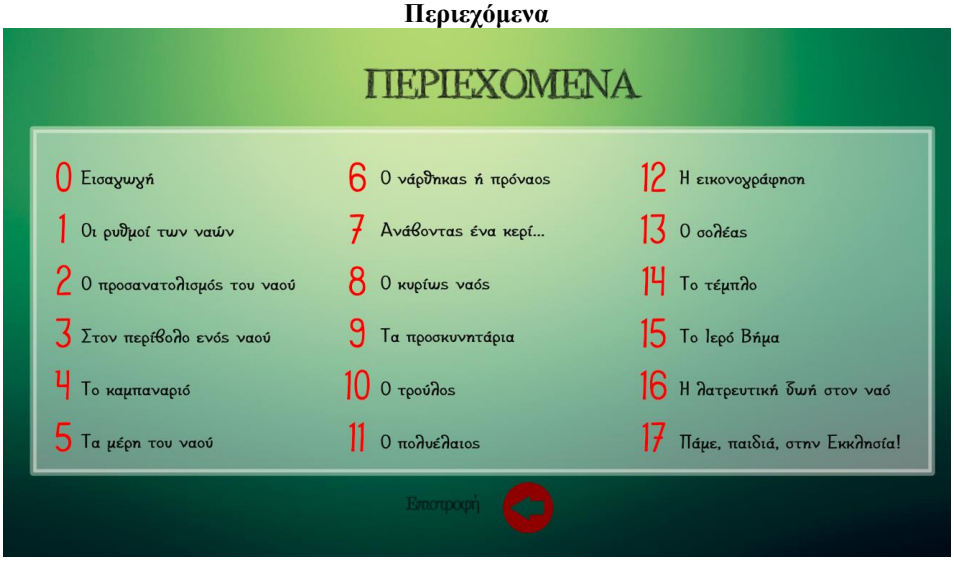


Προχωρώντας θα αναλύσουμε διεξοδικότερα την κάθε ενότητα. Όταν πατήσει κανείς με τον κέρσορα στην ενότητα «Περιεχόμενα» μπαίνει σε άλλη υποενότητα, θα λέγαμε, όπου δίνονται σε μορφή τίτλου οι παρακάτω 18 ενότητες:

- ✓ *Εισαγωγή*: Πρόκειται ουσιαστικά για ένα ολιγόλεπτο βίντεο το οποίο ξεκινάει αυτόματα μόλις εισαγάγουμε το CD, και λειτουργεί ως «πρόλογος» της παρουσίασης· αναφέρεται, επίσης, στο γιατί είναι σημαντικό να πηγαίνουν τα νέα παιδιά στην εκκλησία. Υπάρχει δυνατότητα παράλειψης αυτής της εισαγωγής πατώντας το σχετικό σύνδεσμο. Υπάρχει όμως και στο αρχικό μενού, στα «Περιεχόμενα»· οπότε μπορούμε να την ξαναβάλουμε αν θέλουμε.
- ✓ *Οι ρυθμοί των ναών*: Εδώ γίνεται ολιγόλεπτη παρουσίαση τεσσάρων βασικών ρυθμών ναών με φωτογραφίες. Για περισσότερες λεπτομέρειες ο εικονικός ξεναγός παραπέμπει στο συνοδευτικό βιβλίο.
- ✓ *Ο προσανατολισμός του ναού*: Με χρήση φωτογραφιών γίνεται αναφορά στο ότι οι χριστιανικοί ναοί κατασκευάζονται με κατεύθυνση προς την ανατολή. Ωστόσο παραπέμπει για τους λόγους στο εγχειρίδιο.

- ✓ *Στον περίβολο ενός ναού*: Αναφέρονται οι χριστιανικές τελετές που λαμβάνουν χώρα στον περίβολο ενός ορθόδοξου χριστιανικού ναού (Μέγας αγιασμός Θεοφανίων, περιφορά εικόνων την Κυριακή της Ορθοδοξίας κ.λπ.).
- ✓ *Το καμπαναριό*: Παράθεση κωδωνοκρουσίας καμπαναριού ιερού ναού και για ποιο λόγο χτυπάει.
- ✓ *Τα μέρη του ναού*: Επεξηγεί εν συντομία σε πόσα και ποια μέρη χωρίζεται ο ορθόδοξος ναός.
- ✓ *Ο νάρθηκας ή πρόναος*: Πολύ σύντομη εικονική περιήγηση στο νάρθηκα, ενώ παραπέμπει στο βιβλίο για την προέλευση της ονομασίας.
- ✓ *Ανάβοντας ένα κερί*: Εικονική περιήγηση στο πώς και γιατί ανάβουμε κερί όταν μπαίνουμε στο ναό.
- ✓ *Ο κυρίως ναός*: Αναφορά στον κυρίως ναό, τι γίνεται εκεί και πώς είναι χωρισμένος αρχιτεκτονικά.
- ✓ *Τα προσκυνητάρια*: Τι κάνουμε όταν βλέπουμε προσκυνητάρια και τι εικόνες περιέχονται εκεί. Επίσης τι κάνουμε αφού προσκυνήσουμε.
- ✓ *Ο τρούλος*: Πού βρίσκεται μέσα στο ναό. Τι αγιογραφίες βρίσκονται εκεί και πού παραπέμπουν.
- ✓ *Ο πολυέλαιος*: Τι είναι και τι συμβολίζει.
- ✓ *Η εικονογράφηση*: Περιήγηση και αναλυτική περιγραφή σχετικά με την αγιογράφηση του ναού. Σε ποια μέρη του ναού βλέπουμε συγκεκριμένες παραστάσεις.
- ✓ *Ο σολέας*: Πού βρίσκεται μέσα στο ναό, ποια μυστήρια και τελετές λαμβάνουν χώρα εκεί, καθώς και τι άλλο βρίσκεται εκεί (δεσποτικό, άμβωνας, αναλόγια).
- ✓ *Το τέμπλο*: Τι είναι, τι χωρίζει. Επίσης γίνεται αναλυτική παρουσίαση και επεξήγηση των εικόνων που βρίσκονται εκεί.
- ✓ *Το ιερό βήμα*: Γίνεται εκτεταμένη αναφορά στην αγιογράφηση, στην αγία Τράπεζα, στα αντικείμενα που υπάρχουν εκεί, καθώς και στα μέρη τα οποία χωρίζεται το ιερό βήμα.
- ✓ *Η λατρευτική ζωή στο ναό*: Σύντομη αναφορά στις ακολουθίες και τα ιερά μυστήρια που τελούνται στο ναό. Επιπλέον αναφέρεται στο συμβολισμό του ναού.
- ✓ *Πάμε, παιδιά, στην Εκκλησία*!: Ολιγόλεπτο βίντεο, το οποίο λειτουργεί ως επίλογος της παρουσίασης. Η αφήγηση εμπλουτίζεται με σύντομο βυζαντινό ύμνο που αναφέρεται στον ορθόδοξο ναό και το σκοπό του εκκλησιασμού των πιστών.

Εικόνα 2
Περιεχόμενα



Σε κάθε ενότητα που επιλέγουμε, κατά τη διάρκεια του βίντεο υπάρχει η δυνατότητα: επιστροφής στο αρχικό μενού, παύσης, επιστροφής σε προηγούμενη ενότητα βίντεο, μετάβασης σε επόμενη ενότητα βίντεο.

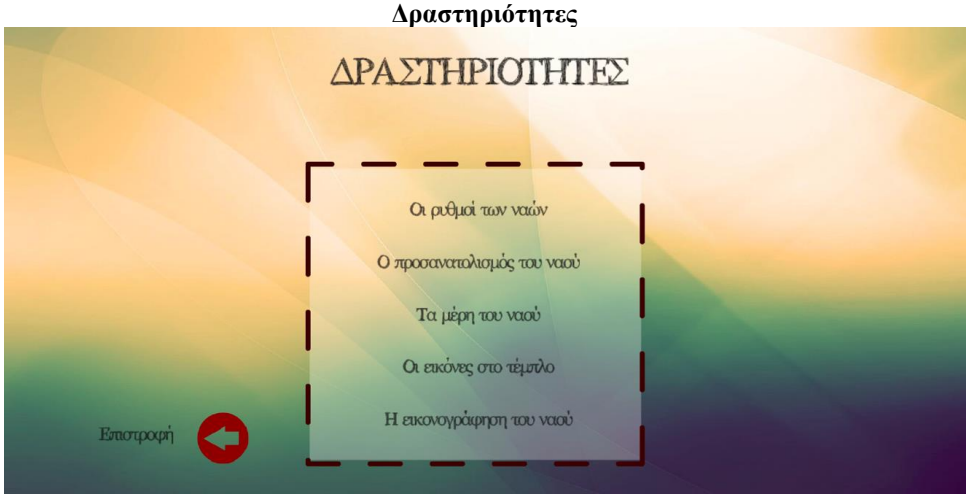
Άλλη μία ενότητα που υπάρχει στο αρχικό μενού είναι η «Έναρξη παρουσίασης». Πατώντας την ο χρήστης μπορεί να παρακολουθήσει όλες τις ενότητες ως ενιαία παρουσίαση από το avatar, έχοντας απλώς έναν τίτλο στην κορυφή της παρουσίασης, ώστε να διακρίνει ποιο είναι το θέμα το οποίο παρακολουθεί.

Άλλη ενότητα του αρχικού μενού είναι αυτή που τιτλοφορείται ως «360 μοίρες». Πατώντας την βρισκόμαστε σε εικονική περιήγηση 360 μοιρών μέσα στο ναό της αγίας Σοφίας Ψυχικού, και συγκεκριμένα στο κέντρο του κυρίως ναού, όπου μπορούμε να περιηγηθούμε γυρνώντας τον κέρσορα.

Επίσης υπάρχει ενότητα στο λογισμικό με δραστηριότητες. Ειδικότερα περιλαμβάνονται δραστηριότητες που αντιστοιχούν σε πέντε ενότητες από αυτές που υπάρχουν στα περιεχόμενα της παρουσίασης. Αναλυτικότερα έχουμε δραστηριότητες που αφορούν:

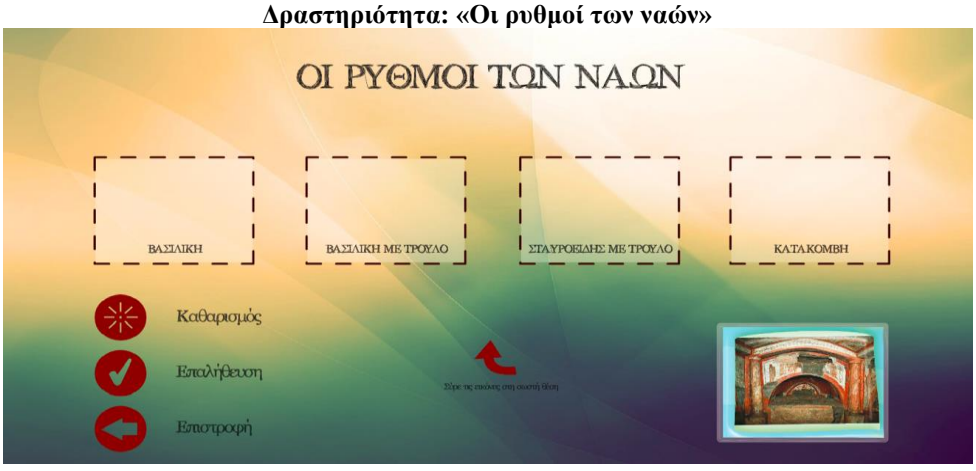
- *Τους ρυθμούς των ναών*: υπάρχουν τέσσερις εικόνες με τους βασικούς ρυθμούς ναών (βασιλική, βασιλική με τρούλο, σταυροειδής με τρούλο, κατακόμβη)· και τέσσερα πλαίσια με τα ονόματα του κάθε ρυθμού. Ο χρήστης θα πρέπει να σύρει με τον κέρσορα κάθε εικόνα στο σωστό πλαίσιο.
- *Τον προσανατολισμό του ναού*: υπάρχουν τέσσερις εικόνες με σχέδιο του ναού, ο οποίος κάθε φορά είναι διαφορετικά προσανατολισμένος. Υπάρχουν αντίστοιχα τέσσερα πλαίσια με τα σημεία του ορίζοντα (Α, Δ, Ν, Βορράς) ανακατεμένα. Θα πρέπει ο χρήστης να αντιστοιχίσει το κάθε σχέδιο στο σωστό πλαίσιο.
- *Τα μέρη του ναού*: υπάρχουν τέσσερις εικόνες με τα μέρη του ναού (ιερό βήμα, κυρίως ναός, σολέας, πρόναος)· και τέσσερα πλαίσια με τα ονόματα των μερών του ναού. Ο χρήστης καλείται να αντιστοιχίσει το κάθε σχέδιο με το σωστό πλαίσιο.
- *Οι εικόνες του τέμπλου*: υπάρχει το τέμπλο με έξι κενά και ισάριθμες εικόνες (του Χριστού, της Παναγίας δύο διαφορετικές, του Ιωάννου του Προδρόμου, του αρχαγγέλου Γαβριήλ και του αγίου Βασιλείου). Ο χρήστης θα πρέπει να σύρει με τον κέρσορα την κάθε εικόνα στο κενό του τέμπλου που πιστεύει ότι αντιστοιχεί.
- *Η εικονογράφηση του ναού*: υπάρχουν έξι πλαίσια με μέρη του ναού (τρούλος, αψίδα, ιερό βήμα, δεξιό κλίτος, νάρθηκας, αριστερό κλίτος), στα οποία οφείλει ο χρήστης να αντιστοιχίσει έξι αγιογραφίες, τις οποίες πιστεύει ότι βρίσκονται στα αντίστοιχα μέρη που αναγράφονται στα πλαίσια.

Εικόνα 3
Δραστηριότητες



Να αναφέρουμε εδώ πως σε όλες τις παραπάνω δραστηριότητες υπάρχει μέσα σε κάθε μία κοινό μενού: «καθαρισμός», όταν θέλεις να διορθώσεις τις επιλογές πριν ολοκληρώσεις την άσκηση· «επαλήθευση», όταν θέλεις να δεις ποιες είναι οι σωστές απαντήσεις ή τι έχεις κάνει λάθος· «επιστροφή», όταν επιθυμείς να επιστρέψεις στο κυρίως μενού.

Εικόνα 4
Δραστηριότητα: «Οι ρυθμοί των ναών»



Τέλος, υπάρχει ενότητα με πληροφορίες και έξοδος από το λογισμικό. Στις πληροφορίες ενημερωνόμαστε για την συγγραφέα, την κεντρική διάθεση του λογισμικού, την πηγή των φωτογραφιών και των αγιογραφιών, ευχαριστίες σε όσους έδωσαν άδεια και διέθεσαν το ναό, καθώς και στον δημιουργό και εμπνευστή του δίσκου πολυμέσων.

Όσον αφορά τώρα καθαυτό το βιβλίο αποτελείται από 90 σελίδες, είναι έγχρωμο και χωρίζεται βασικά σε δύο μέρη. Στο πρώτο μέρος δίνονται πληροφορίες για τον ορθόδοξο ναό (κυρίως τα μέρη του ναού, αντικείμενα και εικονογράφηση) όπως περιγράψαμε και στο CD, απλώς πιο αναλυτικά. Επίσης δίνονται ασκήσεις (κρυπτόλεξο, αναγραμματισμός, αντιστοίχιση, συμπλήρωσης κενού) και κατασκευές. Στο δεύτερο μέρος γίνεται αναλυτική αναφορά στη λατρευτική ζωή που λαμβάνει χώρα στο ναό. Πιο συγκεκριμένα σημειώνονται βασικές πληροφορίες για τα μυστήρια και τις ακολουθίες που τελούνται, με μεγαλύτερη έμφαση στην ανάλυση της Θείας Λειτουργίας. Καταγράφονται επιπλέον το Σύμβολο της Πίστεως («Πιστεύω») και η Κυριακή Προσευχή («Πάτερ ἡμῶν»), ενώ ιδιαίτερη μνεία γίνεται σχετικά με το πρόσφορο και τους συμβολισμούς του. Κι εδώ παρατίθενται κάποιες ασκήσεις, και στο τέλος δίνονται οι λύσεις των ασκήσεων όλου του βιβλίου.

ΔΙΔΑΣΚΑΛΙΑ ΚΑΙ ΕΠΙΣΚΕΨΗ

Το μάθημά μας, λοιπόν, αναπτύχθηκε σε τρεις φάσεις. Κατά την πρώτη φάση έγινε η διδασκαλία μέσα στην τάξη με τη χρήση του λογισμικού που αναλύσαμε σε προηγούμενο κεφάλαιο. Σε δεύτερη φάση έγινε επίσκεψη στον τοπικό ναό του αγίου Νικολάου της Πάργας και στο παρακείμενο εκκλησιαστικό μουσείο. Και σε τρίτη φάση πάλι μέσα στην τάξη συζητήσαμε με τους μαθητές συμπληρώνοντας φύλλο εργασίας αναφορικά με τα δύο προηγούμενα μαθήματα. Είναι σημαντικό εδώ να σημειώσουμε πως και οι κατευθυντήριες οδηγίες του Υπουργείου προς τους εκπαιδευτικούς του μαθήματος των Θρησκευτικών στρέφονται προς: τις επισκέψεις σε ναούς, μουσεία κ.λπ.· την επιτόπια μελέτη ζητήματος προς διδασκαλία· όπως και την ομαδοσυνεργατική διδασκαλία (Οδηγός εκπαιδευτικού στα Θρησκευτικά Δημοτικού και Γυμνασίου, σελ. 110, 158, 171).

Κατά τη διάρκεια του μαθήματος χρησιμοποιήσαμε το εν λόγω λογισμικό, παρουσιάζοντας όλες τις ενότητες που αναφέραμε στα «Περιεχόμενα», ώστε να έχουν οι μαθητές ολοκληρωμένη εικόνα για τα μέρη του ναού και τι τελείται εκεί. Στη συνέχεια κάναμε αντιπροσωπευτικά από όλες τις ψηφιακές δραστηριότητες που εμπεριέχονται στην ομώνυμη ενότητα, ζητώντας από τους μαθητές μας να λένε τη σωστή απάντηση, κι εμείς «σύραμε» την κάθε εικόνα στο σωστό πλαίσιο, όπως αναλύσαμε και πιο πάνω. Σε περίπτωση λάθους, τους δίναμε δεύτερη ευκαιρία.

Σε δεύτερη φάση κατά την ώρα του μαθήματος των Θρησκευτικών οργανώσαμε επίσκεψη στον τοπικό ναό της Πάργας και το εκκλησιαστικό μουσείο και για τα δύο τμήματα της Γ΄ Γυμνασίου, με συνοδεία και εκπαιδευτικού συναδέλφου. Εκεί δόθηκε η δυνατότητα στους μαθητές να παρατηρήσουν από κοντά τα εκκλησιαστικά εκθέματα και τα πολύτιμα κειμήλια του τόπου τους, και να συνειδητοποιήσουν την ιστορική και θρησκευτική αξία αυτών (π.χ. υπήρχε λάβαρο 300 ετών, το οποίο έφερε σημάδια από σφαίρες Τούρκων). Όλο αυτό το κάναμε με το σκεπτικό ότι ο εκπαιδευτικός κατανοώντας την απαιτητική καθημερινότητα των μαθητών/τριών, είναι καλό να εμπλουτίζει τη διδασκαλία του με ευχάριστες παρεμβάσεις, προκειμένου να διεγείρει τη φαντασία τους και να τους κινητοποιήσει να ασχοληθούν με το θέμα εκτός των περιοριστικών χωροχρονικών σχολικών ορίων (Chatzidimou & Anagnostopoulou, 2015).

Εικόνα 5
Ο τοπικός ναός και το μουσείο



Σε τρίτη φάση μέσα στην τάξη συζητήσαμε με τους μαθητές σχετικά με την επίσκεψή μας στο ναό και στο μουσείο, και ακολούθως μοιράσαμε φύλλο εργασίας. Χωρίσαμε τους μαθητές σε ομάδες, και σε κάθε ομάδα διανείμαμε φύλλο εργασίας, δίνοντάς τους 15 λεπτά να το ολοκληρώσουν. Αυτό το φύλλο περιελάμβανε πέντε ερωτήματα, τα οποία θα έπρεπε να απαντήσουν ομαδικά. Τα ερωτήματα ήταν:

1. Τι σας έκανε εντύπωση στο μουσείο που επισκεφτήκαμε; Κάντε μερικές προτάσεις για καλύτερη αξιοποίησή του.
2. Τι σας έκανε εντύπωση στην επίσκεψη στην εκκλησία του αγίου Νικολάου;
3. Σας βοήθησε το μάθημα που κάναμε τις προηγούμενες ημέρες σχετικά με την επεξήγηση του ναού; Αιτιολογήστε.
4. Πιστεύετε ότι αυτές τις πληροφορίες θα τις ανακαλείτε κατά την επίσκεψή σας σε ανάλογους ναούς και εκκλησιαστικά μουσεία; Γιατί;
5. Σχεδιάστε/ζωγραφίστε κάτι σχετικό με την επίσκεψη στο μουσείο και στην εκκλησία.

Τα ερωτήματα αυτά τα θέσαμε στους μαθητές, ώστε να ανακαλέσουν τα βασικά σημεία του μαθήματος και της διδακτικής επίσκεψης. Επιπλέον, να σκεφτούν σημεία βελτίωσης για την τοπική τους κοινωνία (π.χ. να συντηρηθεί καλύτερα το μουσείο, να ανοίγει περισσότερες μέρες και ώρες, να προβληθεί περισσότερο κ.λπ.). Τους δώσαμε τη δυνατότητα να εκφρασθούν μέσω της ζωγραφικής και να αποτυπώσουν εντυπώσεις και συναισθήματα, και ιδιαιτέρως μαθητές που μπορεί να μην τα πηγαίνουν τόσο καλά με τη γραφή, αλλά με το σχέδιο/ζωγραφική (Οδηγός εκπαιδευτικού στα Θρησκευτικά Δημοτικού και Γυμνασίου, σελ. 163). Γενικά οι μαθητές εκφράσθηκαν ικανοποιητικά και διατύπωσαν σκέψεις και προβληματισμούς για το ναό και το μουσείο. Όμως αυτό δεν έγινε με πληρότητα, καθώς διανύαμε τις τελευταίες ημέρες του σχολικού έτους και υπήρχε γενικότερη βαρυθυμία.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Ολοκληρώνοντας την εργασία μας οφείλουμε να ομολογήσουμε πως το μάθημα αυτό ήταν μια όμορφη εμπειρία και για εμάς, αλλά και για τους μαθητές μας. Μερικοί από τους στόχους του μαθήματος ήταν: να κατανοήσουν οι μαθητές την αρχιτεκτονική δομή και τα μέρη του ορθόδοξου χριστιανικού ναού και πιο συγκεκριμένα του τοπικού τους ναού· να γνωρίσουν τα εκκλησιαστικά κειμήλια του τόπου τους μέσα και από την επίσκεψη στο εκκλησιαστικό μουσείο· να συνειδητοποιήσουν ότι είναι και οι ίδιοι μέτοχοι και συνεχιστές αυτής της τοπικής παράδοσης, και ότι μπορούν να συμβάλουν στη βελτίωση της προβολής τους. Θεωρούμε ότι καταφέραμε σε γενικές γραμμές να επιτευχθούν οι παραπάνω στόχοι σε ικανοποιητικό βαθμό, καθώς και να καλλιεργήσουν τη θρησκευτική τους συνείδηση.

Κύρια δυσκολία που αντιμετωπίσαμε είχε να κάνει με το ότι οι μαθητές δεν ήταν ιδιαίτερα πρόθυμοι να συμπληρώσουν το φύλλο εργασίας με πληρότητα, καθώς βαίναμε προς τη λήξη του σχολικού έτους, διανύαμε τις τελευταίες ημέρες του Μαΐου και ήταν πεσμένη η προθυμία τους για μάθημα (ιδιαίτερα σε ένα τουριστικό μέρος όπως η Πάργα). Οπότε, σε μελλοντική εφαρμογή του μαθήματος θα προσπαθούσαμε να το υλοποιήσουμε νωρίτερα, ίσως πριν τις γιορτές του Πάσχα ή αμέσως μετά το Πάσχα.

Συνειδητοποιήσαμε μέσα από την εμπειρία μας ότι η τεχνολογία μπορεί να ωφελήσει τα μέγιστα το μάθημα των Θρησκευτικών και όχι μόνο. Άλλωστε οι ψηφιακές τεχνολογίες επηρεάζουν κάθε πτυχή της ανθρώπινης δραστηριότητας, ενώ η ενσωμάτωσή τους στην εκπαίδευση προσδίδει νέες δυναμικές ευκαιρίες στη διδακτική διαδικασία για διαρκή ανανέωση, ώστε να διεγείρει το ενδιαφέρον και να ελκύει την προσοχή των μαθητών (Mitropoulou, 2015).

Εδώ πρέπει να αναφέρουμε πως δεν είναι η πρώτη φορά που αξιοποιούμε τα ψηφιακά μέσα στη διδασκαλία μας. Από την αρχή κιόλας της εκπαιδευτικής μας σταδιοδρομίας έχουμε κάνει χρήση της τεχνολογίας και την αξιοποιούμε με κάθε ευκαιρία. Ενδεικτικά παραδείγματα χρήσης της είναι: η δημιουργία ταινίας με χρήση προγραμμάτων όπως: openshot video editor, audacity. Επιπρόσθετα, χρήση του Webex κατά τη διάρκεια της πανδημίας δημιουργώντας quiz από την εφαρμογή. Χρήση παρουσιάσεων powerpoint και βίντεο από το youtube, αλλά και από άλλες ιστοσελίδες που κρίναμε ότι βοηθούν (π.χ. slideshare, ψηφιακά διδακτικά σενάρια της πλατφόρμας «Αίσωπος» του Ι.Ε.Π). Κατασκευή τεστ-σταυρόλεξου με την εφαρμογή crossword labs. Χρήση των υπολογιστών για ομαδοσυνεργατικές αναζητήσεις από τους μαθητές σχετικά με πληροφορίες για τις θρησκείες. Παρουσίαση «τηλεπαιχνιδιού» σε σχολική εορτή 28ης Οκτωβρίου με ερωτήσεις σχετικά με όσα παρουσιάστηκαν στη γιορτή. Φυσικά, η ύπαρξη εργαλείων και μόνο, δεν είναι εχέγγυο αυτόματης γνώσης των μαθητών, αλλά αποτελεί ένα εξαιρετικά σημαντικό κίνητρο που τους υποκινεί να ερευνήσουν καινούριες πήγες γνώσης και να εμπλουτίσουν τις υπάρχουσες (Kampourakis & Loukis, 2006).

Επιπροσθέτως αντιληφθήκαμε, μετά από συζήτηση που είχαμε με άλλους συναδέλφους της ειδικής αγωγής, ότι η τεχνολογία και δη η χρήση λογισμικού στο μάθημα των Θρησκευτικών, μπορεί να βοηθήσει κατά πολύ και μαθητές με μαθησιακές δυσκολίες και ειδικές εκπαιδευτικές ανάγκες, αξιοποιώντας την π.χ. σε διαφοροποιημένη διδασκαλία.

Βέβαια η θετική συνεισφορά της πληροφορικής και των νέων τεχνολογιών γενικότερα στη μαθησιακή διαδικασία για μαθητές με ειδικές εκπαιδευτικές ανάγκες έχει επιβεβαιωθεί εδώ και αρκετές δεκαετίες (Wilkinson - Tilbrook, 1995). Ωστόσο, θα άξιζε να γίνει και περαιτέρω έρευνα προς αυτήν την κατεύθυνση και ειδικότερα στο μάθημα των Θρησκευτικών. Άρα είναι ένα στοιχείο το οποίο θα έχουμε υπόψη μας σε επόμενη σχετική διδασκαλία μας.

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ΘΠ11: Δυναμικά περιβάλλοντα μάθησης και Ψηφιακά Εκπαιδευτικά Εργαλεία

ΤΟ ΣΥΡΣΙΜΟ, ΩΣ ΜΙΑ ΔΥΝΑΜΙΚΗ ΜΟΝΤΕΛΟΠΟΙΗΣΗ ΤΟΥ ΠΑΡΑΔΟΣΙΑΚΟΥ, ΣΤΑΤΙΚΟΥ ΕΥΚΛΕΙΔΕΙΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ, ΣΕ ΔΥΝΑΜΙΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ ΓΕΩΜΕΤΡΙΑΣ

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
e-mail: alexmastr@yahoo.gr

Φραγκόπουλος Γεώργιος
Δ/ντής Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
e-mail: gfraggy@sch.gr

ΠΕΡΙΛΗΨΗ

Οι παραδοσιακές, στατικές προσεγγίσεις προσφέρουν τεχνικές κατάκτησης γεωμετρικών εννοιών, που μπορεί, σαφώς, να λειτουργούν ως «σκαλωσιές» και εργαλεία για την κατάκτηση της γνώσης. Στην ψηφιοχώρα των σημερινών, γηγενών μαθητών, όμως, καθίστανται μάλλον απαραίτητη η εισαγωγή και ενσωμάτωση, ως διδακτικών μέσων, και των τεχνολογικών, διαμεσολαβητικών εργαλείων. Οι δραστηριότητες μάθησης εφαρμόζονται και υλοποιούνται ευκολότερα με την επιστράτευση της τεχνολογίας. Πράγματι, η μάθηση της Γεωμετρίας έχει «πλεονεκτική μεταχείριση» από την Τεχνολογία, αφού με τη βοήθεια ψηφιακών εργαλείων οι μαθητές μοντελοποιούν γεωμετρικά θέματα και μέσα σε μαθησιακά περιβάλλοντα ζωτικής διάδρασης μελετούν μια πληθώρα γεωμετρικών μορφών.

Η δυναμική μοντελοποίηση του παραδοσιακού, στατικού ευκλείδειου περιβάλλοντος, μέσω του συρσίματος (drag-mode), αποτελεί το σημαντικότερο χαρακτηριστικό γνώρισμα των Δυναμικών Περιβαλλόντων Γεωμετρίας. Το σύρσιμο εισάγει τη μετακίνηση, την τροποποίηση και τον μετασχηματισμό στη στατική Ευκλείδεια Γεωμετρία, με διατήρηση, όμως, των βασικών σχέσεων και ιδιοτήτων των σχημάτων, ενώ φαίνεται ότι είναι και ένας ισχυρός πυρήνας πλούσιων διδακτικών και μαθησιακών δυνατοτήτων. Οι διερευνητικές δυνατότητες του συρσίματος αποτελούν σημαντικές, γνωστικές παροχές αλλά και ένα ισχυρό παιδαγωγικό εργαλείο υποστήριξης γεωμετρικών συλλογισμών, ιδιαίτερα κατά τον σχηματισμό υποθέσεων και εικασιών. Η κατασκευή ενός σχήματος στην οθόνη αντιπροσωπεύει μια ολόκληρη κλάση γεωμετρικών αντικειμένων, αφού για παράδειγμα, κατά τη δημιουργία ενός κύκλου, το σύρσιμο χαρίζει μιαν απειρία κύκλων, απλώς και μόνο με μιαν απλή κίνηση του ποντικιού.

Η παρούσα εργασία θα παρουσιάσει, αναλυτικά και με παραδείγματα, επτά διαφορετικούς τύπους συρσίματος, τους οποίους μετέρχονται οι μαθητές, κατά τη διάρκεια της διαδικασίας επίλυσης ανοιχτών προβλημάτων και σε σχέση με τη χρήση του ποντικιού: Το σύρσιμο περιπλάνησης, το σύρσιμο ελέγχου, το σύρσιμο λανθάνοντα γεωμετρικού τόπου, το σύρσιμο γραμμής αλλά και το δεσμευμένο, το καθοδηγούμενο και το εξαρτημένο σύρσιμο είναι οι κρίσιμες μορφές του συρσίματος, μέσω των οποίων παρουσιάζονται με «κινηματογραφική» απεικόνιση, διάφορες αναπαραστάσεις σχημάτων.

Λέξεις – κλειδιά: Σύρσιμο, Γεωμετρία, Δυναμικά Περιβάλλοντα, Συστήματα

ΕΙΣΑΓΩΓΗ

Τα Δυναμικά Περιβάλλοντα (Συστήματα) Γεωμετρίας ή αλλιώς Περιβάλλοντα Δυναμικής Γεωμετρίας επαναστατικοποίησαν τη διδασκαλία του μαθήματος της Ευκλείδειας Γεωμετρίας, από τα τέλη της δεκαετίας του 1980, όταν άρχισαν να συστήνονται ως ισχυρά διαμεσολαβητικά και γνωστικά εργαλεία στις τάξεις των Μαθηματικών. Η Γεωμετρία είναι το γνωστικό αντικείμενο στο οποίο η τεχνολογία έχει υπεισέλθει «δυναμικά», καθώς οι δραστηριότητες μάθησης εφαρμόζονται και υλοποιούνται ευκολότερα με την επιστράτευση των ψηφιακών περιβαλλόντων. Τα Δυναμικά Περιβάλλοντα Γεωμετρίας αξιοποιούνται συχνά κατά τη δυναμική δημιουργία σχημάτων αλλά και κατά την επίλυση στοιχειωδών προβλημάτων στο μάθημα της Γεωμετρίας. Πιο συγκεκριμένα, τα λογισμικά αυτά είναι κρίσιμα νοητικά εργαλεία για την εμπειρική μελέτη γεωμετρικών αντικειμένων και κατασκευών, παρέχοντας αποτελεσματικά εργαλεία, για διερευνήσεις και ανακαλύψεις σχέσεων και ιδιοτήτων, για διατυπώσεις και επαληθεύσεις εικασιών, για εισαγωγή «σε κουλτούρα και περικείμενο αποδείξεων», για εκτέλεση ευκλείδειων γεωμετρικών μετασχηματισμών καθώς και για παρουσιάσεις και επιδείξεις. Ως κυρίαρχα πλεονεκτικά χαρακτηριστικά των Δυναμικών Περιβαλλόντων Γεωμετρίας καταγράφονται η υψηλή αλληλεπιδραστικότητα, η φιλικότητα προς τον χρήστη και η ευχρηστία, το δυναμικό μαθησιακό περιβάλλον που επιτρέπει δυναμικούς μετασχηματισμούς των γεωμετρικών αντικειμένων, η άμεση ανατροφοδότηση, η αυτοδιόρθωση, η δυνατότητα δημιουργίας μακροεντολών και πολλαπλών αριθμητικών και οπτικών αναπαραστάσεων, η απουσία ανάγκης για γνώσεις προγραμματισμού και γενικά η ποιοτική και ποσοτική προσέγγιση των γεωμετρικών εννοιών. Είναι λογισμικά ανοιχτού τύπου και κονστρουκτιβιστικής κατατομής, τα πλέον επιτυχημένα από τα εκπαιδευτικά λογισμικά που αξιοποιούνται στις σχολικές αίθουσες. Το σημαντικότερο πλεονέκτημά τους είναι η αλληλεπίδραση με τον μαθητή-χρήστη, με έναν συνεχή και δυναμικό τρόπο, μέσω του άμεσου ελέγχου του ποντικιού. Το λεγόμενο σύρσιμο μπορεί να ελέγξει δυναμικά τις προδιαγραφές και τις επιθυμητές ιδιότητες μιας κατασκευής και ενός γεωμετρικού αντικειμένου, αλλά και να παρέχει ευκαιρίες για διερεύνηση και αναζήτηση, όπου αναγνωρίζονται και εντοπίζονται νέες ιδιότητες σταθερές και αναλλοίωτες ενός γεωμετρικού σχήματος. Η παρούσα εργασία, αφού, αρχικά, προβεί σε μια ιστορική αναδρομή και μια σταχυολόγηση των σπουδαιότερων «μαθησιακών αρετών και προσφορών» των Δυναμικών Περιβαλλόντων Γεωμετρίας, ακολούθως θα εστιάσει σε επτά διαφορετικές μορφές συρσίματος, τις οποίες θα διευκρινίσει και θα αποσαφηνίσει, με σχετικές παραδειγματικές περιπτώσεις. Όλες αυτές οι μορφές συρσίματος, μέσω της κινηματογραφικότητας που αναδεικνύουν, μπορεί να προσδώσουν μια αίσθηση μαγείας στο καθημερινό μάθημα της Γεωμετρίας, κεφαλαιοποιώντας, έτσι, τη μαθητική προσοχή και προσήλωση, τον μαθησιακό ενθουσιασμό και τη γεωμετρική κατανόηση.

ΤΑ ΔΥΝΑΜΙΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ ΓΕΩΜΕΤΡΙΑΣ

Η Γεωμετρία είναι επίλεκτο κομμάτι των Μαθηματικών και ανήκει ακριβώς στο κέντρο του πυρήνα τους (Garba, 2024; Nazarovich & Kurudirek, 2024). Η σπουδαιότητά της χρονολογείται από την εποχή που οι άνθρωποι άρχισαν να αλληλοεπιδρούν με τη φύση και τα φαινόμενά της (Jablonski & Ludwig, 2023). Οι ρίζες της, σύμφωνα με τον Ηρόδοτο, τον Ήρωνα τον Αλεξανδρέα και άλλους αρχαίους συγγραφείς, πρέπει να αναζητηθούν στην αρχαία Αίγυπτο (Τσαμάτος, 2004) και στον πολιτισμό της, ο οποίος αναπτύχθηκε στην εύφορη κοιλάδα του Νείλου. Οι πολλές πλημμύρες απαιτούσαν κάθε φορά σωστούς επαναπροσδιορισμούς των αγροτεμαχίων και απόδοσή τους, και πάλι, στους ιδιοκτήτες τους. Η ανάγκη για διδασκαλία και μάθηση της Γεωμετρίας, ως μιας ωφελιμιστικής, εξυπηρετικής, σχεδόν καθημερινής διαδικασία, ήρθε στο προσκήνιο των αναγκών των αρχαίων Αιγυπτίων. Δυο χιλιετίες σχεδόν μετά, το διανοητικό μεγαλείο του Ευκλείδη έδωσε την απαραίτητη επιστημονική θεωρητικοποίηση και τεκμηρίωση στη Γεωμετρία, αφού, μέχρι τότε, η αιγυπτιακή και η βαβυλωνιακή - αργότερα - Γεωμετρία ήταν πειραματική και εμπειρική, βασισμένη στο «βλέποντας και κάνοντας», ήταν, δηλαδή, ένα πρακτικό φύρδην μίγδην (Mastrogiannis 2009a; Kline, 2001).

Σήμερα αναφέρονται πολλοί κύριοι λόγοι αναγκαιότητας (Wu et al., 2024; Jones & Tzekaki, 2016; Abdullah & Mohamed, 2008; NCTM, 2000; Sherard, 1981), οι οποίοι συνηγορούν σθεναρά, υπέρ της διδασκαλίας της Γεωμετρίας στο Σχολείο. Αναλυτικότερα, ως σχολικό μάθημα, η Γεωμετρία ενισχύει την επικοινωνία και τη συνεργασία, προσφέρει λύσεις σε πολλά προβλήματα της καθημερινής ζωής (real life problems), έχει σημαντικές εφαρμογές σε βασικές μαθηματικές έννοιες, όπως για παράδειγμα της Αριθμητικής, της Άλγεβρας και της Στατιστικής, λειτουργεί προπαρασκευαστικά για ανεπιτήδευτη εισαγωγή στα ανώτερα Μαθηματικά και σε άλλες επιστήμες (π.χ. Μηχανική, Αρχιτεκτονική), αναπτύσσει τη χωρική αντίληψη, τις δεξιότητες σκέψης και επίλυσης προβλημάτων, ενώ μέσω της μελέτης της δημιουργεί γόνιμο και πλούσιο πλαίσιο καλλιέργειας υψηλών πολιτισμικών και αισθητικών αξιών.

Η Γεωμετρία, σε καμία περίπτωση, δεν είναι μόνο, μια ξερή και στεγνή παράθεση ορισμών, καθόσον επικεντρώνεται περισσότερο στην περιγραφή, ανάδειξη και αξιοποίηση σχέσεων και συλλογισμών (NCTM, 2000). Σε όλα τα εκπαιδευτικά συστήματα του κόσμου οι γενικοί στόχοι του μαθήματος της Γεωμετρίας περιστρέφονται γύρω από την αξιοποίηση της γεωμετρικής γνώσης και την οργάνωση και χρήση χωρικών σχέσεων, κατά τη διαδικασία επίλυσης προβλημάτων, αλλά και την κατανόηση άλλων εννοιών και την επεξήγηση του περιβάλλοντα φυσικού κόσμου (Hamidah et al., 2025; Shi et al., 2023; Armah & Kissi, 2019; Güven & Kosa, 2008).

Στη σημερινή πληθωρική απολαβή των ψηφιακών ευεργετημάτων, από σχεδόν κάθε ανθρώπινη δραστηριότητα, ενέργεια ή ενασχόληση, η Γεωμετρία είναι το γνωστικό αντικείμενο εκείνο, στο οποίο η τεχνολογία έχει αφήσει, σε μεγαλύτερο βαθμό σε σχέση με αλλά μαθήματα, το πρωτοποριακό και βαρύ αποτύπωμά της, μέσω των ριζοσπαστικών Δυναμικών Περιβαλλόντων μάθησης, τα οποία αξιοποιούνται, ιδιαιτέρως, για τη δυναμική κατασκευή γεωμετρικών αντικειμένων και μορφών και την ανάλυση στόχων και προβλημάτων στη Γεωμετρία, τουλάχιστον της Υποχρεωτικής Εκπαίδευσης (Mastrogiannis, 2020). Αυτά τα δυναμικά λογισμικά μπορεί να παρακινήσουν και να εμπλέξουν ενεργητικά τους μαθητές, κατά την εξερεύνηση γεωμετρικών θεωρημάτων και την ανάλυση προβλημάτων, μελετώντας πολλά παρόμοια παραδείγματα.

Τα Δυναμικά Περιβάλλοντα Γεωμετρίας είναι γνωστικά εργαλεία γεωμετρικής οπτικοποίησης (Freixas, Joan-Arinyo & Soto-Riera, 2010; Quaresma & Janičić, 2006) και συνεργατικά, μαθητοκεντρικά περιβάλλοντα μάθησης, ένα είδος διερευνητικού, διαδραστικού μικρόκοσμου, σχεδιασμένου για συγκεκριμένους μαθησιακούς σκοπούς, που προάγουν την κατανόηση της Γεωμετρίας (Denbel, 2015). Ο Seymour Papert, ο οποίος ανέπτυξε τη γλώσσα προγραμματισμού LOGO για να ενθαρρύνει την αυστηρή σκέψη που απαιτείται στα Μαθηματικά, επινόησε τον όρο «μικρόκοσμος» (δηλαδή «μικρά κομμάτια πραγματικότητας») στο MIT Media Lab (Carvalho et al., 2019; Jonassen & Howland, 2003), με σκοπό να ορίσει ένα διερευνητικό περιβάλλον μάθησης που προσομοιώνει φαινόμενα του πραγματικού κόσμου. Οι μαθητές, στο περιβάλλον ενός μικρόκοσμου, πειραματιζόμενοι με πολλούς και διάφορους τρόπους, μέσω άμεσης ανατροφοδότησης, ενθαρρύνονται να αναπτύξουν τη δημιουργικότητά τους, τροποποιώντας, επινοώντας και ανακαλύπτοντας στρατηγικές επίλυσης προβλημάτων και νέα γνώση, με παροτρύνσεις, όπως «χειριστείτε» «διερευνήστε», «υποθέστε» και «ελέγξτε» (Mees, 2023; Rieber, 2004; Jonassen & Howland, 2003).

Ο αριθμός των Δυναμικών Περιβαλλόντων, παγκοσμίως, από την αρχή του τρέχοντος αιώνα ξεπερνούσε τα 70, αν και τα περισσότερα από αυτά είναι κλώνοι αρχικών συστημάτων, τα οποία είναι λιγότερα από δέκα (Laborde et al., 2006). Τα πρώτα πακέτα λογισμικού Δυναμικής Γεωμετρίας, του καλύτερου τύπου, μάλλον, διερευνητικού λογισμικού, παρουσιάστηκαν στα τέλη της δεκαετίας του '80 και έκτοτε βαίνουν συνεχώς βελτιούμενα (Molnár & Lukáč, 2015; Johnston-Wilder & Pimm, 2005; Hohenwarter & Fuchs, 2004; Kortenkamp, 1999), επηρεάζοντας εξαιρετικά θετικά την εκπαίδευση στα Μαθηματικά (υπάρχουν και 3D-Δυναμικά Περιβάλλοντα). Από τα πλέον δημοφιλή (Hattermann, 2010) τέτοια διαδραστικά λογισμικά, αναδεικνύονται το Geometer Sketchpad, το Cabri Geometry, το GEOLOG, το Thales και τελευταία το (καλύτερο όλων) GeoGebra. Έχει, δε, διαπιστωθεί ότι το GeoGebra και το Cabri Geometry είναι τα πιο χρησιμοποιούμενα πακέτα από τους εκπαιδευτικούς Δημοτικών Σχολείων (İbili, 2019). Η σπουδαιότητά τους δομείται στον εύκολο τρόπο με τον οποίο οι χρήστες μπορούν και αλληλοεπιδρούν, με έναν διαρκή και δυναμικό τρόπο, έχοντας τον άμεσο έλεγχο του ποντικιού, με τα γεωμετρικά σχήματα, που έχουν κατασκευάσει, αξιοποιώντας τα εργαλεία που διαθέτουν τα λογισμικά αυτά (Johnston-Wilder & Pimm, 2005). Επιπλέον, παρέχονται τρόποι αναπαράστασης και χειρισμού γεωμετρικών αντικειμένων που είναι αδύνατο να παραχθούν με τα στατικά σχήματα που δημιουργούνται με χαρτί, μολύβι, χάρακα και διαβήτη (Adelabu, Makgato & Ramaligela, 2019). Οι μαθητές μπορούν να μετακινούν τη θέση των ελεύθερων σημείων και να μελετούν τις ιδιότητες των σχημάτων και μέσω της παραγομένης δυναμικότητας να προκύπτουν νέες ή ειδικές περιπτώσεις σχημάτων, όπως π.χ. ένα τρίγωνο που τελικά μέσω δυναμικού μετασχηματισμού καθίσταται ισοσκελές ή ισόπλευρο (Wilson & Fleuriot, 2005). Ακόμη, οι μαθητές μπορούν να μυηθούν σε αποδεικτικούς μηχανισμούς, εισαγόμενοι σταδιακά σε ένα δυναμικό πλαίσιο μαθηματικής αυστηρότητας και επαγωγικών και παραγωγικών συμπερασμών, παρέχοντας όλα τα στοιχεία που απαιτούνται σε μιαν απόδειξη (Janicic & Quaresma, 2006; Mogetta, Olivero & Jones, 1999), αν και μερικά από αυτά τα λογισμικά Δυναμικής Γεωμετρίας αποδεικνύουν αυτόματα θεωρήματα ή παρέχουν βοήθεια, κατά την εύρεση αποδείξεων (Quaresma, Santos & Teles, 2024; Pham & Bertot, 2012; Bantchev, 2010; Quaresma & Janičić, 2006). Η δυναμική τροποποίηση των σχημάτων, γενικά, παρέχει πολλά οφέλη, κατά την επίλυση προβλημάτων, καθότι μια λύση είναι έγκυρη, αν και μόνο αν το σχήμα στην οθόνη παραμένει σταθερό και αμετάβλητο, υπό την εξονυχιστική και εξαντλητική, επαγωγική μελέτη περιπτώσεων, που προσφέρει ο δυναμικός μετασχηματισμός του (Arzarello et al., 2012).

Στα κονστρουκτιβιστικά περιβάλλοντα μάθησης, όπως τα λογισμικά Δυναμικής Γεωμετρίας, ο ρόλος των δραστηριοτήτων είναι καίριος και καταλυτικός, Γενικά, έξι τύποι μαθησιακών, διερευνητικών δραστηριοτήτων, με σκοπό την ενεργητική συμμετοχή και την οικοδόμηση γνώσης μπορούν να σχεδιαστούν στην οθόνη ενός Δυναμικού Περιβάλλοντος Γεωμετρίας (Kordaki & Mastrogiannis 2006; Mastrogiannis & Kordaki, 2006; Kordaki & Mastrogiannis, 2007):

1. Διατυπώσεις/επαληθεύσεις εικασιών με βάση τη μεταβολή μιας γεωμετρικής κατασκευής.
2. Διατυπώσεις/επαληθεύσεις εικασιών, με βάση τα μεταβαλλόμενα αριθμητικά δεδομένα, που προκύπτουν, αυτόματα από τον δυναμικό μετασχηματισμό μιας γεωμετρικής κατασκευής.
3. Επαληθεύσεις σχέσεων, με βάση μεταβαλλόμενα αριθμητικά δεδομένα, που προκύπτουν αυτόματα, κατά τη διάρκεια μεταβολής μιας γεωμετρικής κατασκευής.

4. Δραστηριότητες τύπου «μαύρου κουτιού» - Black-box (π.χ. τετράπλευρα από τα οποία μερικά είναι εγγεγραμμένα σε κρυμμένο κύκλο, τον οποίο οι μαθητές πρέπει να εντοπίσουν από το γεγονός ότι το άθροισμα των απέναντι γωνιών αυτών των εγγεγραμμένων τετραγώνων ισούται με 180°).
5. Δραστηριότητες πολλαπλών επιλύσεων (π.χ. τρόποι κατασκευής ίσων γωνιών ή όμοιων τριγώνων).
6. Κατασκευές, που αντιγράφουν πραγματικά προβλήματα ζωής (real life problems).

Για την υλοποίηση των παραπάνω δραστηριοτήτων αξιοποιούνται τρεις χαρακτηριστικές-κεντρικές ιδιότητες των Δυναμικών Συστημάτων Γεωμετρίας (Hattermann, 2010; Kokol-Voljc, 2007; Sträßer, 2002), οι οποίες προσδίδουν και πινελιές παιχνιδίσματος στη διδακτική διαδικασία (Abdullah & Zakaria, 2011; Mastrogiannis, 2009b):

1. Η δυναμική μοντελοποίηση του παραδοσιακού, στατικού ευκλείδειου περιβάλλοντος, μέσω του συρσίματος (drag-mode), δηλαδή της δυναμικής μεταβολής ενός σχήματος με το σύρσιμο ενός σημείου του.
2. Η λειτουργία-εντολή για την οπτικοποίηση των ιχνών κινούμενων σημείων (κατασκευές μέσω γεωμετρικών τόπων).
3. Η ομαδοποίηση μιας ακολουθίας εντολών σε μια νέα εντολή («μακροεντολή»).

Ακόμη, εδώ και μια εικοσαετία (Canogullari & Erbas, 2024; Lu & Xie, 2024; Villa-Ochoa & Suárez-Téllez, 2021; Ruiz-López, 2018; Christou et al., 2004), μέσω ερευνών, αποδείχθηκε ότι τα λογισμικά Δυναμικής Γεωμετρίας μπορούν να παίξουν σημαίνοντα και καθοριστικό ρόλο στην επίλυση προβλημάτων. Υπάρχουν τρεις κύριες επιπτώσεις στη μαθησιακή διαδικασία:

1. Το σύρσιμο και η αυτόματη αριθμητική μέτρηση είναι σημαντικά εργαλεία για την επίλυση προβλημάτων και, κατά συνέπεια, για την επαλήθευση και την εγκυρότητα των εικασιών και των υποθέσεων.
2. Ως γνωστικά εργαλεία διαμεσολάβησης και διευκόλυνσης, ενθαρρύνουν τις υποθέσεις, τον πειραματισμό, τον επαγωγικό συλλογισμό (αλλά και τον παραγωγικό), τις ανακαλύψεις ιδιοτήτων και σχέσεων, καθώς και τις γενικεύσεις.
3. Οι μαθητές μπορεί να εντοπίσουν ειδικές περιπτώσεις σχημάτων και να τις μελετήσουν. Εύκολα διαπιστώνουν ποια κομμάτια της κατασκευής αλλάζουν και ποια παραμένουν σταθερά (αναλλοίωτα).

Από τις παραπάνω παραγράφους διαφαίνεται και τεκμαίρεται η μεγάλη μαθησιακή αξία της λειτουργίας του συρσίματος στα Δυναμικά Περιβάλλοντα Γεωμετρίας. Το σύρσιμο που αποτελεί το σημαντικότερο πλεονέκτημα αυτών των δυναμικών λογισμικών, εισάγει τη μετακίνηση, την τροποποίηση και τον μετασχηματισμό στη στατική Ευκλείδεια Γεωμετρία, με διατήρηση, όμως, των βασικών σχέσεων και ιδιοτήτων των σχημάτων, γεγονός που έχει επιφέρει σημαντικά και πλούσια μαθησιακά οφέλη σε θέματα διδασκαλίας και μάθησης της Γεωμετρίας.

ΤΟ ΣΥΡΣΙΜΟ ΣΤΑ ΔΥΝΑΜΙΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ ΓΕΩΜΕΤΡΙΑΣ

Το σύρσιμο είναι ένα εργαλείο για να παρουσιάζονται με «κινηματογραφική» απεικόνιση, διαφορετικές αναπαραστάσεις ενός και του αυτού σχήματος (Hölzl, 2001). Οι στατικές εικόνες μετατρέπονται σε δυναμικές και «ζωντανεύουν», προσφέροντας αυτήν την αίσθηση της μαγείας γύρω τους (Johnston-Wilder & Pimm, 2005), όπως προελέχθη. Κατά τη διάρκεια του συρσίματος, ένα γεωμετρικό αντικείμενο στην οθόνη διαφοροποιείται δυναμικά και ταυτόχρονα ο μετασχηματισμός αυτός είναι άμεσα παρατηρήσιμος. Το σχέδιο ενημερώνεται αυτόματα, σύμφωνα με τις εντολές της κατασκευής του. Στον χρήστη, το σχέδιο φαντάζει ότι σέβεται τους νόμους της Γεωμετρίας, καθώς η διαδικασία του συρσίματος εξελίσσεται. Το σύρσιμο διαδραματίζει, επίσης, και βασικό ρόλο στην επίλυση προβλημάτων, ως μια παρατηρήσιμη δράση, με μια σαφή επίσημη ερμηνεία. Είναι ένας τρόπος μελέτης, όχι μόνο μέσω διατύπωσης ερωτήσεων και εικασιών περί γενικεύσεων αλλά και της παροχής δυνατοτήτων για επαλήθευσή τους (Mastrogiannis, 2013). Στην πραγματικότητα, η λειτουργία του συρσίματος υποστηρίζει τη διατύπωση υποθέσεων σε ανοιχτού τύπου δραστηριότητες (Baccaglini-Frank & Mariotti, 2011), προσφέρει καίρια ανατροφοδότηση κατά τη φάση της διερεύνησης και προσδίδει στις αποδείξεις τον σημαντικό ρόλο των πραγματικών «εξηγήσεων», όσον αφορά στις υποθέσεις ή στις ιδιότητες (Arzarello et al., 2002). Η μετακίνηση και η συνεχής μεταβολή, μαζί με την προσφερόμενη οπτική και αισθητικοκινητική ανάδραση, μπορούν να καθοδηγήσουν στη διάκριση των ιδιοτήτων των γεωμετρικών σχημάτων (Leung, 2023). Η κατασκευή ενός σχήματος στην οθόνη αντιπροσωπεύει μια ολόκληρη κλάση γεωμετρικών αντικειμένων, αφού για παράδειγμα, κατά τη δημιουργία ενός κύκλου, το σύρσιμο χαρίζει μιαν απειρία κύκλων, απλώς και μόνο με μιαν απλή κίνηση του ποντικιού (κάνοντας κλικ και κρατώντας το πατημένο, σε ένα σημείο της περιμέτρου και σέρνοντας το ποντίκι προς οποιαδήποτε κατεύθυνση, ο κύκλος αυξομειώνεται, κατά το δοκούν).

Η διαμεσολαβητική, γνωστική παρακαταθήκη του συρσίματος μπορεί να αναδυθεί μέσω 2 αξιοσημείωτων λειτουργιών (Chen, Toh & Zhu, 2023; Hölzl, 2001):

- Το σύρσιμο ως λειτουργία ελέγχου των προδιαγραφών και των επιθυμητών ιδιοτήτων μιας κατασκευής.
- Το σύρσιμο ως λειτουργία διερεύνησης και αναζήτησης, όπου αναγνωρίζονται και εντοπίζονται νέες ιδιότητες και αναλλοίωτες μιας γεωμετρικής μορφής. Μάλιστα, οι επιστημονικές δυνατότητες του drag-mode εδράζονται

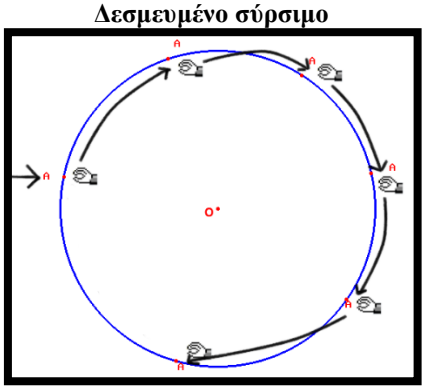
σε αυτή τη σημαντική συμβολή του, κατά τον εντοπισμό και τη διάκριση των σταθερών και των αναλλοίωτων, μέσω συγκρίσεων, διαχωρισμών, γενικεύσεων και συγχωνεύσεων (Leung, 2023). Για παράδειγμα το τμήμα που συνδέει τα μέσα δυο πλευρών του τριγώνου παραμένει πάντα και «σταθερά» παράλληλο στην τρίτη πλευρά, ανεξάρτητα από το σύρσιμο της κάθε πλευράς και τον επαγόμενο μετασχηματισμό και την τροποποίηση του τριγώνου.

Τα Περιβάλλοντα Δυναμικής Γεωμετρίας παρέχουν νέες διεξόδους για την εμφάνιση τόσο πειραματικών όσο και θεωρητικών Μαθηματικών εξερευνήσεων, μέσω του συρσίματος. Έρευνες έδειξαν ότι οι μαθητές χρησιμοποιούν διαφορετικές μεθόδους συρσίματος για να εξερευνούν, να ανακαλύπτουν και να γενικεύουν (Canogullari & Erbas, 2024). Περισσότερο αναλυτικά, κατά τη διάρκεια της διαδικασίας επίλυσης ανοιχτών προβλημάτων και σε σχέση με τη χρήση του ποντικιού, έχουν ανιχνευτεί επτά διαφορετικοί τύποι συρσίματος, τους οποίους μετέρχονται οι μαθητές, κατά την παιδαγωγική αξιοποίηση των Δυναμικών Περιβαλλόντων Γεωμετρίας (Højsted, 2020; Baccaglini-Frank, 2019; Μιχαλοπούλου, 2012; Leung, 2008; Arzarello et al., 2002). Συγκριμένα:

Σύρσιμο περιπλάνησης: Μετά την κατασκευή μιας γεωμετρικής μορφής, οι μαθητές τη διερευνούν, σύροντας τα βασικά της σημεία τυχαία στην οθόνη, χωρίς συγκεκριμένο στόχο. Έτσι, πιθανόν να ανακαλύψουν αναλλοίωτες, κανονικότητες και μοτίβα. Για παράδειγμα, οι μαθητές σχεδιάζουν, στην οθόνη, ένα τρίγωνο ΑΒΓ. Στη συνέχεια φέρνουν με τη βοήθεια του λογισμικού τα 3 ύψη του. Σύροντας το τρίγωνο από οποιαδήποτε κορυφή του και παράγοντας έτσι, απειρία τριγώνων, μπορεί να διαπιστώσουν ότι κάθε φορά τα τρία ύψη διέρχονται από το ίδιο σημείο Ο.

Δεσμευμένο σύρσιμο: Είναι εκείνες οι περιπτώσεις όπου κάποια σημεία, ως τμήματα μιας αρχικής κατασκευής, δεν μπορούν να συρθούν οπουδήποτε, παρά μόνο εντός των περιχαρακωμένων, δεσμευμένων πλαισίων του αρχικού αντικειμένου. Για παράδειγμα, ένα σημείο μιας ευθείας, σύρεται μόνο κατά μήκος της, ενώ ένα σημείο ενός τριγώνου ή ενός κύκλου διαγράφει μόνο την περίμετρό τους. Στην εικόνα 1 το σημείο Α, με σύρσιμο, κινείται μεν, αλλά δεν εγκαταλείπει την περιφέρεια του κύκλου (με κέντρο Ο), αφού παραμένει πάντοτε σημείο της.

Εικόνα 1
Δεσμευμένο σύρσιμο



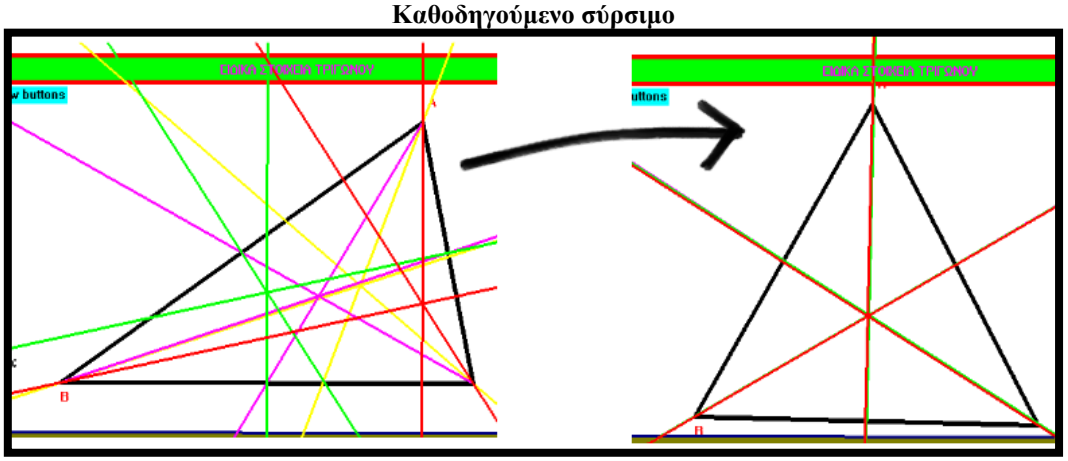
Καθοδηγούμενο σύρσιμο: Οι μαθητές σέρνουν ένα γεωμετρικό αντικείμενο με επιμέλεια και ηθελημένα, ώστε να του προσδώσουν μια συγκεκριμένη και ιδιαίτερη μορφή. Παραδείγματος χάριν, σε ένα τυχαίο τρίγωνο (εικόνα 2), έχουν χαραχτεί όλα τα στοιχεία του, δηλαδή οι 3 διάμεσοι (μωβ), οι 3 διχοτόμοι (κίτρινες), οι 3 μεσοκάθετες (πράσινες) και τα 3 ύψη (κόκκινα). Ο δυναμικός, σκόπιμος μετασχηματισμός του αρχικού τριγώνου σε ισόπλευρο (π.χ. με τη συνεχή μετακίνηση του σημείου Α), προσφέρει το μαγικό αποτέλεσμα της απόλυτης ταύτισης και των 4 αυτών στοιχείων μεταξύ τους. Τα 12 «ατάκτως ερριμμένα» τμήματα, ταυτίζονται ανά 4, και συγχωνεύονται στα τελικά 3.

Εξαρτημένο σύρσιμο: Είναι η περίπτωση κατά την οποία ένα σημείο μιας κατασκευής σύρεται κατά μήκος ενός άλλου αντικειμένου, όντας συνδεδεμένο και εξαρτημένο από αυτό. Για παράδειγμα, στο τρίγωνο ΑΒΓ, το σημείο Α σύρεται κατά μήκος της ευθείας e, η οποία είναι εκ κατασκευής παράλληλη προς την πλευρά ΒΓ. Το σύρσιμο του Α παράγει κάθε στιγμή, μιαν απειρία ισεμβαδικών τριγώνων (εικόνα 3).

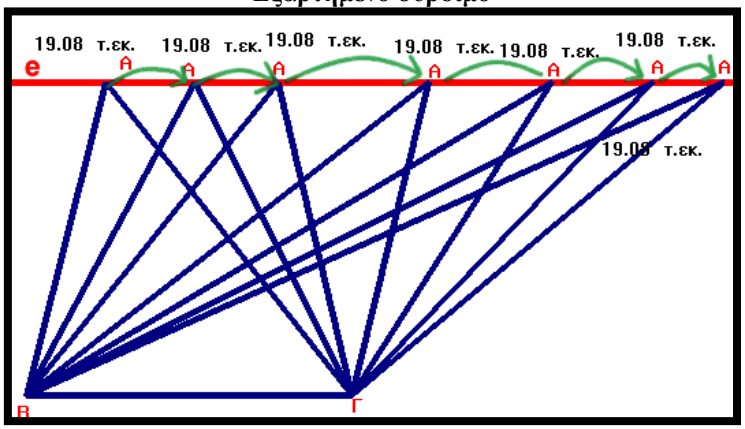
Σύρσιμο ελέγχου: Οι μαθητές σέρνουν μια γεωμετρική μορφή για να διαπιστώσουν, αν διατηρούνται οι αρχικές ιδιότητες, αν πληρούνται οι τιθέμενες «γεωμετρικές προδιαγραφές» και αν το σχήμα «συμπεριφέρεται» με τον ίδιο τρόπο, σε σχέση με το προγενέστερο. Για παράδειγμα, στην εικόνα 4, το αρχικό τραπέζιο ΑΒΓΔ με σύρσιμο του σημείου Γ σε κάποια δεδομένη στιγμή αυτό θα μετασχηματιστεί σε πλάγιο παραλληλόγραμμο (με «απαλοιφή» του μπλε χωρίου),

μετέπειτα πάλι σε τραπέζιο (με «σβήσιμο» του πράσινου τριγώνου) και τέλος στην οριακή περίπτωση, με τη σταδιακή εξάλειψη του πορτοκαλί τμήματος, το σημείο Γ θα συμπέσει με το Δ και το αρχικό σχήμα θα μετατραπεί σε τρίγωνο.

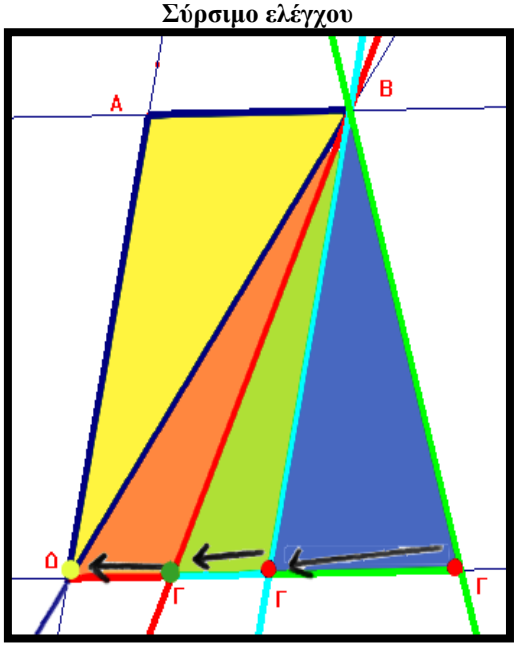
Εικόνα 2
Καθοδηγούμενο σύρσιμο



Εικόνα 3
Εξαρτημένο σύρσιμο

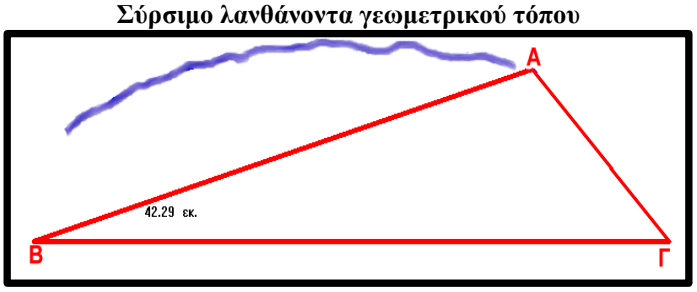


Εικόνα 4
Σύρσιμο ελέγχου



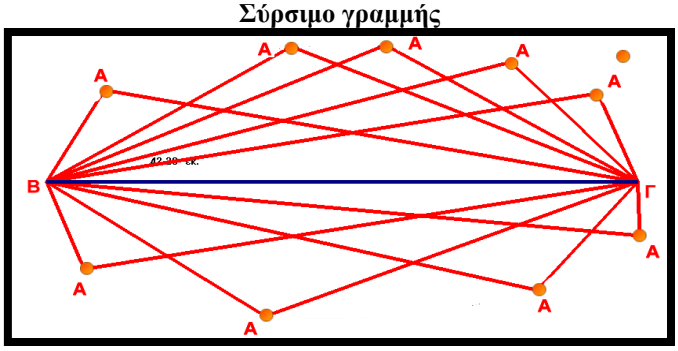
Σύρσιμο λανθάνοντα γεωμετρικού τόπου: Οι μαθητές, χωρίς να το συνειδητοποιούν, σέρνουν ένα σημείο μιας κατασκευής κατά μήκος ενός γεωμετρικού τόπου, ο οποίος δεν είναι ορατός. Θεωρείται κατά έναν τρόπο, ως σύρσιμο περιπλάνησης που έχει βρει την πορεία του. Ως παράδειγμα, θα αναφερθεί η προσπάθεια των μαθητών να βρουν ισοπεριμετρικά τρίγωνα ΑΒΓ, με την προϋπόθεση ότι η πλευρά ΒΓ παραμένει σταθερή και σύρεται μόνο το σημείο Α (εικόνα 5). Το σύρσιμο δεν είναι τυχαίο και οι μαθητές με τη βοήθεια του λογισμικού εντοπίζουν πολλές θέσεις του Α (μπλε ίχνος), οι οποίες πληρούν την ισότητα ΑΒ+ΑΓ+ΒΓ = a και ανήκουν φυσικά στον γνωστό γεωμετρικό τόπο της έλλειψης, με εστίες τα σημεία Β και Γ. Ο γεωμετρικός τόπος της έλλειψης δεν γίνεται αντιληπτός.

Εικόνα 5
Σύρσιμο λανθάνοντα γεωμετρικού τόπου



Σύρσιμο γραμμής: Οι μαθητές σχεδιάζουν νέα σημεία τα οποία ανήκουν με μια γραμμή ενός σχήματος, το οποίο διατηρεί μια ορισμένη ιδιότητα. Το σύρσιμο της γραμμής έπεται του συρσίματος του λανθάνοντα γεωμετρικού τόπου, δεδομένου ότι καθιστά τον γεωμετρικό τόπο φανερό και τον αποκαλύπτει στην οθόνη. Στο προηγούμενο παράδειγμα, το μονοπάτι που διαγράφει το σημείο Α δε σχεδιάζεται. Οι μαθητές εντοπίζουν και μαρκάρουν πολλά σημεία από το ίχνος του Α, τα οποία πληρούν τη δεδομένη ιδιότητα (εικόνα 6). Ακολούθως, μπορούν να παρατηρήσουν το τελικό σχήμα της έλλειψης, που τα παραπάνω σχεδιασμένα σημεία διαγράφουν. Ο γνωστός γεωμετρικός τόπος της κωνικής τομής της έλλειψης παύει να είναι λανθάνων και αποκαλύπτεται.

Εικόνα 6
Σύρσιμο γραμμής



Γενικά, έχουν αναγνωριστεί και σκιαγραφηθεί 3 είδη γνωστικών ταξινομήσεων, με διδακτική δυναμική, συνδεδεμένων με τη διαμεσολαβητική αξιοποίηση του συρσίματος και τον γεφυροποιό ρόλο του, κατά τη συναρμογή θεωρίας και πράξης-σχήματος αλλά και των γνωστικών μεταβάσεων από το αντιληπτικό επίπεδο στο θεωρητικό και τανάπαλιν στη δραστηριότητα των μαθητών. Έχει αναπτυχτεί ένα θεωρητικό μοντέλο διαδικασιών, το οποίο αποκωδικοποιεί και αποσαφηνίζει όλη τη συνθετική διαδικασία με αφετηρία τη δυναμική διερεύνηση μιας γεωμετρικής κατασκευής, υστερότερα τη διατύπωση της υπόθεσης και τέλος την επικύρωσή της (Μιχαλοπούλου, 2012; Baccaglini-Frank, 2010; Arzarello et al., 2002).

Αναλυτικότερα:

1. Οι ανερχόμενες, ανιούσες διαδικασίες, με αφετηρία τα σχήματα και σταθμούς-καταφυγές τη θεωρία, τις οποίες οι μαθητές μετέρχονται κατά τη διερεύνηση των σχημάτων, με σκοπό να διατυπώσουν υποθέσεις και να εντοπίσουν κανονικότητες, σταθερές και αναλλοίωτες.
2. Οι κατερχόμενες, κατιούσες διαδικασίες, με αντίστροφη των προηγούμενων πορεία, από τη θεωρία δηλαδή στα σχήματα, με σκοπό τον έλεγχο ιδιοτήτων, την εξέταση και μελέτη χαρακτηριστικών αλλά και την επαλήθευση ή διάψευση εικασιών και υποθέσεων.

3. Οι απαγωγικές διαδικασίες, οι οποίες «εμφανίζονται», ως ένας διευκολυντικός, καθοδηγητικός, γνωστικο-λογικός οπλισμός, κατά τη μετάβαση από τις ανιούσες στις κατιούσες διαδικασίες. Οι μαθητές επιλέγουν τον «κανόνα», ο οποίος ταιριάζει στη δεδομένη περίπτωση που μελετούν, ενεργοποιώντας τις πρόσφορες, σχετικές, γεωμετρικές γνώσεις τους, ώστε να μετατρέψουν τις διερευνήσεις τους σε εικασία (του τύπου «εάν… τότε») και κατόπιν να καταπιαστούν με την απόδειξη.

Σε σχέση με την τελευταία περίπτωση, ως μια απαγωγική διαδικασία γενίκευσης υποθέσεων, αναφέρεται επίσης και το σύρσιμο διατήρησης (Baccaglini-Frank, 2019; Baccaglini-Frank & Antonini, 2016; Baccaglini-Frank, 2010), όπου ένα βασικό σημείο μιας μορφής σύρεται, διατηρώντας, ωστόσο, αναλλοίωτη μια ιδιότητά της. Για παράδειγμα, αν ένα ορθογώνιο τρίγωνο ΑΒΓ είναι σχεδιασμένο πάνω σε δυο κάθετες ευθείες, οι οποίες στη συνέχεια αποκρύπτονται, τότε οποιοσδήποτε μετασχηματισμός του τριγώνου, με σύρσιμο, δεν αλλοιώνει την ορθογωνικότητά του.

ΣΥΖΗΤΗΣΗ, ΣΥΜΠΕΡΑΣΜΑΤΑ, ΠΡΟΤΑΣΕΙΣ

Η θεωρητικοποίηση των Μαθηματικών και η απόδειξη ως μηχανισμός ολικής τεκμηρίωσης των νόμων και των αρχών της φύσης και του σύμπαντος θεμελιώθηκε από τους μεγάλους Έλληνες μαθηματικούς, τον Θαλή, τον Ευκλείδη, τον Πυθαγόρα και τον Αρχιμήδη, οι οποίοι αποδέσμευσαν την εμπειρία από την αλήθεια, εισάγοντας τη λογική θεμελίωση θεωρημάτων. Οι Πυθαγόρειοι θεωρούσαν ότι «παν εστί αριθμός» ασπαζόμενοι την άποψη ότι οι αριθμοί περιέκλειαν δύναμη και, κατά συνέπεια, δομούσαν και την ουσία των πάντων, ως οι μόνοι γεννήτορες, ως η αρχή και η ύλη για την παραγωγή των όντων. Επίσης, οι Πυθαγόρειοι πίστευαν (Finn, 2021) ότι το Σύμπαν μπορεί να αποκωδικοποιηθεί και να κατανοηθεί με την αξιοποίηση όρων Γεωμετρίας. Η Γεωμετρία, άλλωστε, θεωρούνταν ένας από τους τέσσερις υποκλάδους των Μαθηματικών (μαζί με την Αριθμητική, τη Μουσική και την Αστρονομία), τα οποία (Μαθηματικά) οι Πυθαγόρειοι τα ανήγαγαν σε ολοκληρωμένο κλάδο επιστημονικής δραστηριότητας. Βέβαια και η φράση του Πλάτωνα «Αεί ο Θεός ο Μέγας γεωμετρεί» καταδεικνύει την θεϊκότητα με την οποία οι αρχαίοι Έλληνες περιέβαλλαν τη Γεωμετρία.

Ακόμη και σήμερα, σύγχρονοι θεωρητικοί φυσικοί αποδέχονται και προσυπογράφουν την επιστημονική μεγαλοσύνη της Γεωμετρίας, ως ενός υπέρτατου επιστημονικού εργαλείου. Ο Antony Garrett Lisi (1968 -), Αμερικανός θεωρητικός φυσικός, δεν άφησε περιθώρια για υπονόμευση και αποδόμηση της αξίας της Γεωμετρίας, αφού δήλωσε ξεκάθαρα (Koizumi, 2017): «Νομίζω ότι το σύμπαν είναι καθαρή Γεωμετρία - βασικά, ένα όμορφο σχήμα που στριφογυρίζει και χορεύει πάνω στον χωροχρόνο». Ως μέρος του σύμπαντος, άρα και της Γεωμετρίας, η ανθρώπινη υπόσταση έχει γεωμετρική κατατομή και περιστοιχίζεται από γεωμετρική ομορφιά και αριστουργηματικότητα. Κατανοώντας τη Γεωμετρία, ο άνθρωπος κατανοεί και την ίδια του την ύπαρξη αλλά και τη φύση που τον περιτρέχει.

Για πολλούς λόγους, λοιπόν, το μάθημα της Γεωμετρίας στο σχολείο είναι «καταδικασμένο» να περιέχεται στα Προγράμματα Σπουδών σε όλα τα εκπαιδευτικά συστήματα του κόσμου. Τελευταία, ωστόσο, η Γεωμετρία έχει παραγκωνιστεί, ως σχολικό μάθημα, χάνοντας την πρωταγωνιστικότητα και τον παιδευτικό ρόλο που της αξίζει. Μάλιστα, ειδικά στο Δημοτικό Σχολείο, η Γεωμετρία ως μάθημα διδάσκεται μάλλον αποσπασματικά. Προς αυτήν την κατεύθυνση, τη συνηγορική υπέρ της Γεωμετρίας, μια δελεαστική πρόταση οπωσδήποτε θα συμπεριλάμβανε και τα λογισμικά Δυναμικής Γεωμετρίας, επειδή αυτά είναι παροτρυντικά και ενθουσιαστικά, αιχμαλωτίζουν την προσοχή και το ενδιαφέρον των μαθητών και προσδίδουν μια «αίσθηση ταχυδακτυλουργίας» στο καθημερινό μάθημα, με τη δημιουργία και τον συνεχή μετασχηματισμό διαγραμμάτων και άλλων μαθηματικών μορφών.

Σύμφωνα με τα Νέα Αναλυτικά Προγράμματα Σπουδών των Μαθηματικών, ειδικά για το Δημοτικό Σχολείο, μέρος της μαθηματικής ύλης θα αποτελούν και οι τρεις ευκλείδειοι μετασχηματισμοί, δηλαδή η συμμετρία η μεταφορά και η περιστροφή. Αυτή η λεγόμενη «Γεωμετρία της κίνησης» (οι ευκλείδειοι μετασχηματισμοί στηρίζονται στην κίνηση των σχημάτων) δε θα μπορούσε να βρει καλύτερο σύμμαχο παρά μόνο στις οθόνες των Δυναμικών Περιβαλλόντων Γεωμετρίας, των οποίων το κυρίαρχο πλεονέκτημα είναι η μετακίνηση και ο δυναμικός μετασχηματισμός. Για πολλούς λόγους, όπως αναφέρθηκαν στη τρέχουσα εργασία (η προστιθέμη αξία τους κατά τη μελέτη των μετασχηματισμών είναι ένας παραπανίσιος λόγος), τα Δυναμικά Περιβάλλοντα Γεωμετρίας πρέπει να αποτελούν, οπωσδήποτε, κρίσιμο διδακτικό μέσο, ως λαμπρό γνωστικό εργαλείο, στα μαθήματα της Γεωμετρίας, η οποία είναι παιδαγωγικά επιβεβλημένο να αποκτήσει και ένα πυρηνικό, συμπαγές, ολιστικό και γραμμικό πλαίσιο, ως σχολικό μάθημα, δίχως σαλαμοειδείς και τμηματικές προσεγγίσεις. Και ως μια απάντηση στον μεγάλο δάσκαλο Ευκλείδη, όντως μπορεί να υπάρξει βασιλική οδός για τη Γεωμετρία. Είναι, πιθανόν, και οι δρόμοι (ευθείς, τεθλασμένοι, καμπύλοι κ.λπ.) που χαράσσονται από τα ίχνη του ποντικιού, κατά τη λειτουργία του συρσίματος, στα εικονοστοιχεία των μαγευτικών Δυναμικών Περιβαλλόντων Γεωμετρίας.

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ΕΠΑΝΕΡΜΗΝΕΙΑ ΤΩΝ ΕΠΙΠΕΔΩΝ ΓΕΩΜΕΤΡΙΚΗΣ ΣΚΕΨΗΣ ΤΩΝ VAN HIELE ΥΠΟ ΤΗ ΣΥΝΗΓΟΡΙΑ ΤΩΝ ΠΛΕΟΝΕΚΤΗΜΑΤΩΝ ΤΩΝ ΔΥΝΑΜΙΚΩΝ ΠΕΡΙΒΑΛΛΟΝΤΩΝ ΓΕΩΜΕΤΡΙΑΣ

Φραγκόπουλος Γεώργιος
Δ/ντής Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
e-mail: gfraggy@sch.gr

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
e-mail: alexmastr@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η σχολική Γεωμετρία, που παρουσιάζεται αξιωματικά, υποθέτει ότι οι μαθητές σκέφτονται, μάλλον, με ένα τυπικά συμπερασματικό τρόπο. Μια άλλη θεωρία, όμως, σχετικά με την εκμάθηση της Γεωμετρίας είναι η θεωρία των van Hiele, που αποτελεί, σήμερα, παράγοντα με μεγάλη επίδραση στη σχολική Γεωμετρία, αφού παρά την τεράστια έρευνα για τη γεωμετρική σκέψη, καμία πρόταση δεν έχει προσελκύσει τόσο πολύ την προσοχή όσο η θεωρία των επιπέδων γεωμετρικής σκέψης των van Hiele. Μάλιστα, έχει αναγνωρισθεί η προστιθέμενη αξία του μοντέλου των van Hiele, κατά την περιγραφή, τη μελέτη και την ανάδειξη της γεωμετρικής σκέψης. Το μοντέλο των van Hiele απαρτίζεται από δύο κύριες πτυχές. Η πρώτη αποτελείται από μια ιεραρχική ακολουθία πέντε επιπέδων, συλλογιστικών διεργασιών και γεωμετρικής σκέψης. Το δεύτερο μέρος ενδιαφέρεται για την ανάπτυξη της διαίσθησης των μαθητών και επικεντρώνεται στις φάσεις εκμάθησης, στα μέσα, δηλαδή, τα οποία μετέρχεται ένας δάσκαλος, προκειμένου να αυξήσει την απόδοση των μαθητών του, μέσω αυτών των διάφορων επιπέδων σκέψης.

Έρευνες έχουν δείξει ότι τα Λογισμικά Δυναμικής Γεωμετρίας ενισχύουν τους μαθητές στη μελέτη των γεωμετρικών εννοιών στα παρωθητικά πλαίσια ενεργοποίησης και αξιοποίησης της θεωρίας των van Hiele. Οι δραστηριότητες που βασίζονται στα επίπεδα σκέψης των van Hiele καθίστανται ευκολότερες και αποτελεσματικότερες με την παρουσία διάφορων τεχνολογικών εργαλείων και ειδικά μέσω Δυναμικών Λογισμικών Γεωμετρίας. Η παρούσα εργασία αφού περιγράψει τη θεωρία των van Hiele επιχειρηματολογεί, ακολούθως, υπέρ των Δυναμικών Λογισμικών Γεωμετρίας ως πλεονεκτικών εργαλείων μη στατικής οπτικοποίησης, που δύνανται να προαγάγουν τη σκέψη των μαθητών και προτείνει, και μέσω παραδειγμάτων, μια επαναδιατύπωση και επανερμηνεία των πέντε επιπέδων σκέψης των van Hiele, υπό το φως των Δυναμικών Περιβαλλόντων Γεωμετρίας.

Λέξεις – κλειδιά: Γεωμετρία, Δυναμικά Περιβάλλοντα, Συστήματα, van Hiele

Η ΓΕΩΜΕΤΡΙΑ ΩΣ ΣΧΟΛΙΚΟ ΜΑΘΗΜΑ

Είναι διαχρονική και μάλλον αυταπόδεικτη η αξία των χωρικών και γεωμετρικών ιδιοτήτων του φυσικού περιβάλλοντος, καθώς διαμέσου των πολιτισμών η Γεωμετρία αποτελούσε, τόσο θεσμικά όσο και μεθοδολογικά, πεδίο δόξας για την πρόοδο των Μαθηματικών αλλά και για τη διανοητική ανάπτυξη των ανθρώπων (Jablonski & Ludwig, 2023; Pantsar, 2022; Scriba & Schreiber, 2015; NCTM, 2000). Η Γεωμετρία βοηθά κατά την περιγραφή, ανάλυση και κατανόηση του φυσικού κόσμου και δικαιωματικά αποτελεί μια βασική συνιστώσα της ομορφιάς και της σπουδαιότητας των Μαθηματικών. Το Εθνικό Συμβούλιο των Δασκάλων των Μαθηματικών των ΗΠΑ (NCTM) αναγνωρίζει και υπογραμμίζει την εκπαιδευτική αξία και σημασία του μαθήματος της Γεωμετρίας σε όλη τη μαθητική διαδρομή, από το Νηπιαγωγείο μέχρι το Λύκειο. Συγκεκριμένα, με τη σπουδή του μαθήματος της Γεωμετρίας, οι μαθητές (Mageed, 2025; Schoenherr, Strohmaier & Schukajlow, 2024; Ghorbani et al., 2023; Rohendi & Wihardi, 2020; Rau & Matthews, 2017; NCTM, 2000):

- Εξετάζουν και αναλύουν χαρακτηριστικά και ιδιότητες δισδιάστατων και τρισδιάστατων γεωμετρικών σχημάτων και εντοπίζουν γεωμετρικές σχέσεις.
- Καθορίζουν και εντοπίζουν θέσεις στο επίπεδο και στον χώρο και περιγράφουν χωρικές σχέσεις μέσω καρτεσιανών συντεταγμένων, γραφημάτων αλλά και άλλων συστημάτων αναπαράστασης (π.χ. σε μια υδρόγειο σφαίρα).
- Εφαρμόζουν τους ευκλείδειους μετασχηματισμούς της μεταφοράς-μετατόπισης, της περιστροφής και ιδιαίτερα της συμμετρίας στην ανάλυση μαθηματικών καταστάσεων.
- Κατά την επίλυση προβλημάτων επιστρατεύουν την οπτικοποίηση, τη γεωμετρική μοντελοποίηση και τη χωρική συλλογιστική (χρησιμοποιώντας χάρτες, προγραμματίζοντας διαδρομές και δημιουργώντας έργα τέχνης).
- Αντιλαμβάνονται τα στερεά και τα επίπεδα αντικείμενα από διαφορετικές οπτικές γωνίες, και μέσω της κατασκευής και χειρισμού νοητικών αναπαραστάσεων, αναπτύσσουν τη χωρική τους οπτικοποίηση, μια σημαντική πτυχή της γεωμετρικής τους σκέψης.
- Μπορούν να κατανοήσουν τα εμβαδά και τα κλάσματα, αφού μέσω σχετικών, γεωμετρικών αναπαραστάσεων δημιουργούνται ευνοϊκότερες συνθήκες μάθησης.
- Χρησιμοποιούν ιστογράμματα και διαγράμματα κατά την ανάλυση δεδομένων

Έχει υποστηριχτεί από τον Hoffer (1981) ότι, πέραν της σπουδαιότητας της απόδειξης γεωμετρικών θεωρημάτων, θα πρέπει να αποτελεί σημαντικό στόχο και να χρήζει ιδιαίτερης εκπαιδευτικής προσοχής, στο μάθημα της Γεωμετρίας, και η ανάπτυξη πέντε βασικών, μαθητικών ικανοτήτων (Astuti, Sutopo & Nurhasanah, 2020; Misnasanti & Mahmudi, 2018; Patsiomitou, et al; Patsiomitou & Emvalotis, 2010a; b; Dindyal, 2007; Tzifas, 2005; Zaranis, 2000). Συγκεκριμένα:

- Οπτικές ικανότητες. Οι μαθητές βελτιώνουν αυτές τις ικανότητές τους μέσω της αναγνώρισης σχημάτων σε διαφορετικές μορφές αναπαράστασης (και από διαφορετικές προοπτικές και γωνίες), της παρατήρησης ιδιοτήτων και της απεικόνισης.
- Λεκτικές, ικανότητες. Οι μαθητές αποκτούν εκφραστικές δεξιότητες, μέσω δραστηριοτήτων, οι οποίες διευκολύνουν τη σωστή, ακριβή και τυπική χρήση της ορολογίας και της επικοινωνίας κατά την περιγραφή χωρικών εννοιών, σχέσεων και γεωμετρικών ιδιοτήτων ενός σχήματος.
- Ικανότητες Σχεδίασης. Οι μαθητές έχουν την ικανότητα να αποτυπώνουν σχεδιαστικά τις πληροφορίες και τις ιδέες τους, αλλά και να επικοινωνούν μέσω των σχεδίων τους. Τα γεωμετρικά σχήματα αναπαρίστανται σε δισδιάστατη και τρισδιάστατη μορφή. Επιπλέον μέσω της ανάπτυξης των σχεδιαστικών ικανοτήτων, οι μαθητές κατανοούν καλύτερα τις γεωμετρικές σχέσεις και είναι ικανοί να εντοπίζουν ισομετρίες στο επίπεδο, δηλαδή μετασχηματισμούς όπου διατηρούνται τα μήκη και οι αποστάσεις μεταξύ των σημείων (συμμετρίες, περιστροφές και μετατοπίσεις).
- Ικανότητες Λογικής. Οι μαθητές χρησιμοποιώντας ως κριτήρια τις ουσιαστικές ιδιότητες των σχημάτων, τις διαφορές και τις ομοιότητές τους, τα ταξινομούν, τα κατηγοριοποιούν ή τα ομαδοποιούν, μέσω της ενεργοποίησης βασικών αρχών της θεωρίας συνόλων. Επιπλέον, διακρίνουν μοτίβα, διατυπώνουν και δοκιμάζουν υποθέσεις χαρακτηρίζοντάς τες «αληθείς» ή «ψευδείς», εξάγουν συμπεράσματα και διατυπώνουν αντιπαραδείγματα. Τέλος, οι μαθητές οριοθετούν και κατανοούν τα πλαίσια και τις λογικές συντεταγμένες των αξιωμάτων, των θεωρημάτων και των αποδείξεων.
- Ικανότητες Εφαρμογής. Οι μαθητές εφαρμόζουν σε θέματα και καταστάσεις της καθημερινής ζωής τις γνώσεις που αποκτούν στο μάθημα της Γεωμετρίας. Μέσω αυτής της μεταφοράς της σχολικής γνώσης μπορούν να αντιληφθούν ότι η γνώση είναι χρήσιμη στην καθημερινή ζωή. Ακόμη, οι μαθητές με διευρυμένες «ικανότητες εφαρμογής» επιλύουν μαθηματικά μοντέλα ή αναπαριστούν με ευχέρεια, αφηρημένα σχήματα και καταστάσεις. Εντοπίζουν τη «γεωμετρικότητα» καθημερινών, φυσικών αντικειμένων και μπορούν να συμπεραίνουν τις ιδιότητές τους από μια πληροφορία.

Σήμερα, η εστίαση στη διατύπωση και στη μάθηση ορισμών και ιδιοτήτων σχημάτων αλλά και στη στείρα αποστήθισή τους είναι παρωχημένοι και μυωπικοί εκπαιδευτικοί στόχοι μιας παραδοσιακής διδασκαλίας της Γεωμετρίας, που αντιμάχονται σαφώς τη μάθηση και την κατανόηση. Εδώ και μια εξηκονταετία, μια άλλη θεωρία που υποστηρίζει τη γεωμετρική σκέψη και μάθηση, η θεωρία των van Hiele, έχει γίνει ένας παράγοντας βαθιάς επιρροής στη σχολική Γεωμετρία (Alex & Mammen, 2016; Vojkuvkova, 2012). Η ιεραρχική θεωρία των πέντε επιπέδων γεωμετρικής σκέψης των van Hiele, από τη στιγμή της διατύπωσής της, έχει τραβήξει τα επιστημονικά βλέμματα και το ενδιαφέρον για τη μελέτη των αρχών και των ιδεών της. Έχει αναγνωριστεί η κρίσιμη συμβολή της, κατά την περιγραφή, την ανάλυση, την προώθηση και την ανάπτυξη της γεωμετρικής σκέψης αλλά και ο κυρίαρχος ρόλος της στη διαμόρφωση των διδακτικών προσεγγίσεων στο μάθημα της Γεωμετρίας. Μάλιστα, η θεωρία των van Hiele συνεισφέρει καθοριστικά και στην ανάπτυξη και καλλιέργεια των πέντε βασικών, μαθητικών ικανοτήτων στη Γεωμετρία, όπως αναφέρθηκαν αμέσως παραπάνω. Πολλοί ερευνητές σημειώνουν ότι οι σκέψεις των μαθητών, στη Γεωμετρία των δυο διαστάσεων, επεξηγούνται καλύτερα και αναλυτικότερα με τη χρήση του μοντέλου των πέντε επιπέδων των van Hiele για τη γεωμετρική σκέψη, ειδικά σε μαθητές με διάφορες μαθησιακές ανάγκες (Salud et al., 2022; Moru et al., 2021; Abdullah & Zakaria, 2012). Οι μαθητές οικοδομούν προσωπικά νοήματα ως προς τις γεωμετρικές έννοιες και αναπτύσσουν τρόπους επιχειρηματολογίας και συμπερασμού, που τους επιτρέπουν να αναλύουν προσεκτικά προβλήματα του χώρου και να επινοούν λύσεις (Tursynkulova et al., 2023; Ismail & Kasmin, 2007).

Η ΘΕΩΡΙΑ ΤΩΝ VAN HIELE

Το μοντέλο γεωμετρικής σκέψης των Van Hiele αναπτύχθηκε, από το 1957 και εντεύθεν, στις διδακτορικές διατριβές του Pierre van Hiele και της συζύγου του Dina van Hiele-Geldof, οι οποίες εκπονηθήκαν ταυτόχρονα στο Πανεπιστήμιο της Ουτρέχτης στην Ολλανδία. Μετά τον πρόωρο χαμό της Dina, αμέσως μετά από την ολοκλήρωση της διατριβής της, ο Pierre, μόνος πια, αποσαφήνισε, τροποποίησε και εξέλιξε τη θεωρία (Akosah et al., 2024; Ma et al., 2015; Crowley, 1987). Το μοντέλο των Van Hiele άργησε να κερδίσει τη διεθνή, επιστημονική προσοχή, πλην μιας αποδοχής που έλαβε στην Σοβιετική Ένωση τη δεκαετία του 60, μέσω της αναθεώρησης του αναλυτικού προγράμματος της Γεωμετρίας. Τελικά το 1984, οι μεταφράσεις στα αγγλικά των εργασιών των Van Hiele ήταν παγκοσμίως, σχεδόν καθοριστικές για την υιοθέτηση του μοντέλου, ως κύριου ρυθμιστικού παράγοντα κατά τη σύνταξη των Αναλυτικών Προγραμμάτων των Μαθηματικών (Mensah, Barton Odro & Williams, 2023; Crowley, 1987).

Η θεωρία των Van Hiele αντλεί σπουδαιότητα από τη διττή εκπαιδευτική και επιστημονική συνεισφορά της, αφού αξιοποιείται συγχρόνως, ως μια θεωρία μάθησης και ως μια θεωρία διδασκαλίας (Van Hiele, 2011). Το μοντέλο απαρτίζεται από δύο κύριες πτυχές. Η πρώτη αποτελείται από μια ιεραρχική ακολουθία πέντε επιπέδων, συλλογιστικών διεργασιών και γεωμετρικής σκέψης. Το δεύτερο μέρος ενδιαφέρεται για την ανάπτυξη της διαίσθησης των μαθητών και επικεντρώνεται στις φάσεις εκμάθησης, στα μέσα, δηλαδή, τα οποία μετέρχεται ένας δάσκαλος, προκειμένου να αυξήσει την απόδοση των μαθητών του, μέσω αυτών των διάφορων επιπέδων σκέψης. Τα επίπεδα έχουν μια συγκεκριμένη και αυστηρή αλληλουχία και καθώς το παιδί προχωράει γραμμικά, από ένα προηγούμενο επίπεδο στο επόμενο, το αντικείμενο των γεωμετρικών του συλλογισμών αλλάζει (Armah & Kissi, 2019; Tan et al., 2015; Olkun & Sinoplu & Deryakulu, 2009; Van de Walle, 2005). Συγκεκριμένα, η θεωρία των van Hiele εστιάζει σε δύο κύριους εκπαιδευτικούς πυλώνες και μαθησιακούς μηχανισμούς:

- Στα 5 επίπεδα της γεωμετρικής σκέψης
- Στα στάδια της μάθησης

Επιπλέον, μιαν άλλη βασική συνιστώσα της θεωρίας των van Hiele αποτελεί η ενόραση/διορατικότητα (insight), με ιδέες δανεισμένες από τη θεωρία της Μορφολογικής Ψυχολογίας (Gestalt). Οι van Hiele, διατυπώνοντας διαφορετικά, κάποιες από τις αρχές της θεωρίας Gestalt, υποστηρίζουν ότι η ενόραση εντοπίζεται, ως μια ικανότητα, όταν ένα πρόσωπο ενεργεί σε μια νέα κατάσταση επαρκώς και με πρόθεση (Umar, Alhaji & Shehu, 2023; Idris, 2007). Οι μαθητές είναι σε θέση, προσεκτικά και συνειδητά, να επινοούν λύσεις, να χρησιμοποιήσουν τη γνώση τους κατά την επίλυση προβλημάτων, αλλά και να γνωρίζουν και να κατανοούν ό,τι κάνουν, γιατί το κάνουν και πότε πρέπει να το κάνουν (Lee & Kim, 2012).

ΤΑ ΠΕΝΤΕ ΕΠΙΠΕΔΑ ΓΕΩΜΕΤΡΙΚΗΣ ΣΚΕΨΗΣ ΤΩΝ ΟΛΛΑΝΔΩΝ VAN HIELE

Όσον αφορά στα πέντε επίπεδα γεωμετρικής σκέψης, οι μαθητές μαθαίνουν και εμπεδώνουν τη Γεωμετρία, προχωρώντας διαδοχικά μέσω πέντε επιπέδων γεωμετρικής σκέψης. Η διερεύνηση, η αιτιολόγηση και η χρήση μαθηματικών υποθέσεων, με διαφορετικό βαθμό, βέβαια, αυστηρότητας κάθε φορά, είναι κοινός τόπος σε όλα αυτά τα πέντε επίπεδα (Gawlick, 2005). Αμερικανοί ερευνητές αριθμούν τα επίπεδα από 1 έως 5, ενώ άλλοι ξεκινούν με αφετηρία το «επίπεδο 0», όπως και οι van Hiele (Vojkuvkova, 2012; Usiskin, 1982). Σε κάθε περίπτωση, ασφαλώς, τυπική είναι

και μόνο, αυτή η διαφοροποίηση αρίθμησης. Δεδομένου ότι αυτά τα συστήματα χρησιμοποιούνται χωρίς ανταγωνισμό, στην παρούσα κατηγοριοποίηση υιοθετείται ο δεύτερος τρόπος.

Τα πέντε επίπεδα γεωμετρικής σκέψεις των van Hiele είναι, κατά βάση, ιεραρχικά και ακολουθιακά και, φυσικά, δεν είναι ηλικιακά συναρτημένα (Mastrogiannis & Anastopoulos,, 2012), αφού η μετάβαση στο ανώτερο επίπεδο συνδέεται με την εμπειρία, ανεξαρτήτως ηλικίας. Μια τέτοια προσέγγιση έρχεται, ωστόσο, αντιμέτωπη με την πιαζετιανή θεωρία της ηλικιακής ωρίμασης της σκέψης, είναι όμως περισσότερο διδακτικοκεντρική και αισιόδοξη, δεδομένου ότι προσδίδει πρωτεύοντα και επιταχυντικό ρόλο στον δάσκαλο και τη διδασκαλία του (Usiskin, 1982). Η πρόοδος από ένα στάδιο στο επόμενο, δεν είναι μια φυσική διαδικασία, αφού εξαρτάται και επηρεάζεται από τις μεθόδους διδασκαλίας, τις δραστηριότητες μάθησης και από ένα καλά προετοιμασμένο και επιλεγμένο περιεχόμενο μαθήματος, παρά από τη χρονολογική ή και βιολογική ωριμότητα του μαθητή (Idris, 2005).

Τα πέντε επίπεδα γεωμετρικής σκέψης των Ολλανδών van Hiele (εικόνα 1), συνοδευόμενα από τα κυριότερα χαρακτηριστικά τους, είναι τα εξής (Okeke, Egara & Mosia, 2025; Arnal-Bailera & Manero, 2024; Naufal et al., 2021; Mastrogiannis & Anastopoulos, 2012; Patsiomitou & Emvalotis, 2010a; b; Abdullah & Mohamed, 2008; Ismail & Kasmin, 2007; Gawlick, 2005; Crowley, 1987; Usiskin, 1982):

Επίπεδο 0: Νοερή Απεικόνιση (Visualisation). Οι μαθητές έχουν επίγνωση του χώρου μόνο ως κάτι που υπάρχει γύρω τους. Αναγνωρίζουν οπτικά τα σχήματα, από την εμφάνιση, ως συνολικές οντότητες, σύμφωνα με τη Μορφολογική Ψυχολογία (Gestalt). Ακόμη, γνωρίζουν τα γεωμετρικά ονόματά τους, αλλά παραβλέπουν τις ιδιότητες και τα ιδιαίτερα χαρακτηριστικά τους, τα οποία δε γίνονται αντιληπτά. Συχνά, καταφεύγουν στη σύγκριση των σχημάτων με ένα γνωστό πρότυπο. Για παράδειγμα στα τετράγωνα και τα ορθογώνια εντοπίζεται γενικά, η διαφορετικότητά τους, αφού «φαίνονται» διαφορετικά, ωστόσο όμως, οι μαθητές σε αυτό το αρχικό στάδιο δεν μπορούν να διακρίνουν, αν τα σχήματα αυτά έχουν ορθές γωνίες ή ότι οι απέναντι πλευρές είναι παράλληλες. Οι μαθητές μπορούν, επίσης, να αναγνωρίζουν ένα εξάγωνο, αλλά αδυνατούν να διακρίνουν τις ίσες πλευρές του. Επιπλέον, σε ένα χαρτί, οι μαθητές θα μπορούσαν να αντιγράψουν δοσμένα σχήματα. Τέλος, ένα περιεστρεμμένο ορθογώνιο τρίγωνο, για παράδειγμα, που η βάση του δεν είναι παράλληλη στις γραμμές ή στο περίγραμμα τού τετραδίου, πιθανόν, να μην αναγνωρίζεται ως τέτοιο.

Επίπεδο 1: Ανάλυση (Analysis). Στο δεύτερο αυτό στάδιο, μια πρώιμη ανάλυση των γεωμετρικών εννοιών είναι ορατή, ενώ αναδεικνύεται και η σημαντικότητα της γλώσσας κατά την περιγραφή των σχημάτων. Οι μαθητές εξοικειώνονται σταδιακά με την ορολογία, μέσω παρατήρησης και πειραματισμού εντοπίζουν τις ιδιότητες κάποιων σχημάτων και μέσω αυτών προβαίνουν σε χαλαρές γενικεύσεις και ομαδοποιήσεις. Αδυνατούν, όμως, να εξηγήσουν τις ιδιότητες και τις σχέσεις μεταξύ τους, οι αλληλεπιδράσεις μεταξύ των σχημάτων δεν εντοπίζονται και οι ορισμοί δεν είναι, ακόμη, πλήρως κατανοητοί. Όταν περιγράφεται ένα αντικείμενο, μάλλον απαριθμούνται όλες οι ιδιότητες, που ήδη είναι γνωστές, δίχως όμως να μπορεί να διακρίνεται, ποιες ιδιότητες είναι απαραίτητες και ποιες αρκετές για να περιγραφεί το γεωμετρικό σχήμα. Για παράδειγμα, οι μαθητές μπορούν να αναγνωρίσουν και να παραθέσουν κάποιες ιδιότητες του τραπεζίου ότι έχει, δηλαδή, τέσσερις γωνίες και τέσσερις πλευρές, με τις δυο απέναντι πλευρές παράλληλες.

Επίπεδο 2: Μη Τυπική Παραγωγή (Informal Deduction). Οι μαθητές μπορούν να δημιουργήσουν ορισμούς και να προβάλουν λογικά επιχειρήματα σχετικά με τα χαρακτηριστικά ή τις σχέσεις μεταξύ των ιδιοτήτων των σχημάτων, μέσω μιας ενορατικής κατανόησης των ιδιοτήτων των σχημάτων αλλά και κάποιων συσχετισμών μεταξύ των ιδιοτήτων διαφορετικών σχημάτων. Οι μαθητές συσχετίζουν τους κανόνες που διέπουν τις ιδιοτήτων σχημάτων, δίδοντας ή ακολουθώντας άτυπα επιχειρήματα, για να δικαιολογήσουν τον τρόπο σκέψης τους. Διατάσσουν λογικά αυτές τις ιδιότητες αξιοποιώντας και την αντίληψη τους ως προς τις αλληλεξαρτήσεις μεταξύ των σχημάτων, δίχως ωστόσο να λειτουργούν στα πλαίσια ενός μαθηματικού συστήματος, δεδομένου ότι μια θεωρητική απόδειξη είναι αδύνατο να κατανοηθεί, όπως και η σημασία της παραγωγής ή ο ρόλος των αξιωμάτων. Οι μαθητές μπορούν να συμπεράνουν τις ιδιότητες ενός σχήματος και να προσδιορίσουν τις κατηγορίες σχημάτων. Λογικές συνέπειες και κατηγοριοποιήσεις αλλά και τάξεις εγκλεισμού, όπως το τετράγωνο είναι ένας τύπος ορθογωνίου είναι κατανοητές. «Ένα τετράπλευρο είναι τετράγωνο, επειδή έχει τις τέσσερις πλευρές του ίσες και τις τέσσερις γωνίες του μεταξύ τους ίσες» είναι μια δήλωση μαθητή που η σκέψη του κινείται, τουλάχιστο, στο τρίτο επίπεδο της Μη Τυπικής Παραγωγής.

Επίπεδο 3: Παραγωγή (Deduction). Οι μαθητές, στηριζόμενοι σε ορισμούς και αξιώματα, μέσω αφαιρετικών διαδικασιών, αποδεικνύουν θεωρήματα. Ακόμη, μπορούν να κατασκευάζουν με περισσότερους από έναν τρόπους ή να κατανοούν (και όχι μόνο να απομνημονεύουν) αποδείξεις, για όλα τα γεωμετρικά θέματα, αλλά και να γνωρίζουν την έννοια των ικανών και αναγκαίων συνθηκών. Επιπλέον, οι μαθητές σε αυτό το τέταρτο στη σειρά επίπεδο, είναι σε θέση να διακρίνουν τη διαφορά, ανάμεσα σε μια δήλωση και την αντίστροφή της.

Εικόνα 1
Εικονιστική αποτύπωση των πέντε επίπεδων γεωμετρικής σκέψης των van Hiele



Επίπεδο 4: Αυστηρότητα (Rigor). Είναι το υψηλότερο επίπεδο σκέψης στην ιεραρχία των van Hiele. Οι μαθητές, ως φοιτητές πια, με υψηλή μαθηματική σκέψη, με τη δέουσα και την επιβεβλημένη αυστηρότητα, κατανοούν τις τυπικές πτυχές των αφηρημένων παραγωγικών συλλογισμών, τη μέθοδο της ατόπου απαγωγής, και της αντιθετοαντιστροφής. Μελετούν διάφορα, μη ευκλείδεια αξιωματικά συστήματα, όπως τη Γεωμετρία του Riemman ή την Υπερβολική Γεωμετρία του Lobachevsky, και αναλύουν και συγκρίνουν αυτά τα συστήματα. Ερευνητικά, στο επίπεδο αυτό δεν δόθηκε ιδιαίτερη προσοχή, καθότι μόνο τα τέσσερα πρώτα ε-πίπεδα του μοντέλου των van Hiele υπηρετούν τη γεωμετρική ύλη, η οποία διδάσκεται και μελετάται στα σχολεία της Δευτεροβάθμιας Εκπαίδευσης. Τέλος, μια μεστή, γραφική απεικόνιση των πέντε επιπέδων παρουσιάζεται στην παραπάνω εικόνα 1.

ΟΙ ΠΕΝΤΕ ΦΑΣΕΙΣ ΜΑΘΗΣΗΣ

Μιαν άλλη, σημαντική παράμετρο στη θεωρία των van Hiele αποτελούν οι πέντε φάσεις μάθησης, οι οποίες προσδιορίζουν τη μετάβαση από ένα επίπεδο γεωμετρικής σκέψης στο επόμενο. Οι φάσεις αυτές της μαθησιακής διαδικασίας περιγράφονται λεπτομερώς στο τελευταίο άρθρο, που γράφτηκε από την Dina van Hiele-Geldof, και συνθέτουν ένα προκαταβολικό-προοργανωτικό περίγραμμα για την οργάνωση της διδασκαλίας. Όπως αναφέρθηκε παραπάνω, οι van Hiele υποστηρίζουν ότι η εξέλιξη της γεωμετρικής σκέψης, μέσω των επιπέδων, εξαρτάται κυρίως από την εκπαίδευση. Ισχυρίζονται ότι η διδασκαλία η οποία θα αναπτυχτεί, μέσω σχετικών δραστηριοτήτων, και θα εγκολπωθεί αυτήν τη διδακτική, ακολουθιακή γραμμικότητα θα παράσχει σημαντικά ερείσματα για την κατάκτηση των υπερκείμενων επιπέδων. Συγκεκριμένα, οι πέντε φάσεις μάθησης, οι οποίες βοηθούν τους μαθητές κατά την πρόοδό τους μέσω των επιπέδων είναι (Ndungo Balimuttajjo & Akugizibwe, 2025; Rezky & Wijaya, 2018; Mastrogiannis & Anastopoulos, 2012; Abdullah & Zakaria, 2011; Meng, 2009; Patsiomitou, 2008; Idris, 2007; Tzifas, 2005; Choi-Koh, 2000; Crowley, 1987; Usiskin, 1982):

Διερεύνηση (inquiry-information). Οι μαθητές με τη βοήθεια διαμεσολαβητικών υλικών (χειραπτικών και ψηφιακών) αρχίζουν, μέσω διερευνητικών και ανακαλυπτικών μεθόδων, να προσεγγίζουν βασικές γεωμετρικές δομές. Οι μαθητές εξοικειώνονται με τη δομή των σχημάτων, μέσω παρατήρησης και παραδειγμάτων. Κάποιες ενδεικτικές κατευθύνσεις θα περιλάμβαναν, οπωσδήποτε, ερωτήσεις όπως «τι είναι τετράγωνο», «τι ορθογώνιο», «ποιες οι ομοιότητες και ποιες οι διαφορές τους», ποιο από αυτά τα σχήματα είναι ρόμβος». Στη φάση αυτή, αποσαφηνίζεται η πρότερη και προϋπάρχουσα γνώση, ενώ και η επίσημη ορολογία και το σχετικό λεξιλόγιο της ειδικής, επιστημονικής γλώσσας διευκρινίζονται. Ακόμη, εγείρονται τα σχετικά ερωτήματα, αξιολογούνται οι απαντήσεις των μαθητών, καθορίζονται και γίνονται εμφανή, μέσω συζήτησης, τα αντικείμενα της μελέτης, αλλά και οι επόμενες παράμετροι της διδακτικής παρέμβασης.

Καθοδηγούμενος προσανατολισμός (guided-directed orientation). Οι μαθητές, συμμετέχοντας ενεργά και με ομαδικές πρακτικές, διπλώνουν, μετρούν, αντιπαραβάλλουν, χρησιμοποιούν γνώμονα και διαβήτη. Γενικά, διερευνούν χαρακτηριστικές γεωμετρικές δομές που αποτελούν αντικείμενο της μελέτης τους, ολοκληρώνοντας σταδιακά σύντομες, σχολαστικά προγραμματισμένες δραστηριότητες, οι οποίες απαιτούν συγκεκριμένες απαντήσεις (π.χ. εύρεση αξόνων συμμετρίας στο τετράγωνο ή η σχεδίαση ενός παραλληλογράμμου). Τα αντικείμενα μελέτης αποκαλύπτονται βαθμιαία, μέσω ενισχύσεων νοητικής σκαλωσιάς, που παρέχονται από τον δάσκαλο.

Επεξήγηση/διευκρίνιση (explanation/explication/explicitation). Εισάγεται η κατάλληλη γεωμετρική ορολογία, όπως και οι «τεχνικοί όροι» και ενθαρρύνονται οι μαθητές να τους χρησιμοποιούν σε γεωμετρικές δραστηριότητες, όπου εξετάζονται γεωμετρικές σχέσεις. Η νέα γνώση διαμορφώνεται μέσω εμπειρίας και πρότερης γνώσης. Οι μαθητές ανταλλάσσουν ιδέες για τις ανακαλύψεις τους και τις παρατηρήσεις τους, εκφράζουν τις απόψεις τους σχετικά με τις δομές που παρατηρήθηκαν, εξηγούν στους συμμαθητές τους τα αποτελέσματα της δουλειάς τους, διορθώνουν εσφαλμένα συμπεράσματα και αναγνωρίζουν σχέσεις. Για παράδειγμα, οι μαθητές καταθέτουν και ανταλλάσσουν ιδέες και απόψεις για τις ιδιότητες ενός ρόμβου.

Ελεύθερος προσανατολισμός (free orientation). Στη συνέχεια, οι μαθητές αναλαμβάνουν και συμμετέχουν σε συνθετότερες εργασίες, με πολλά επιμέρους βήματα αλλά και σε ανοιχτά προβλήματα, με περισσότερες από μία εναλλακτικές λύσεις. Με την ενεργοποίηση ερευνητικών προσανατολισμών, πολλές σχέσεις, που διέπουν και καθορίζουν τα αντικείμενα της μελέτης, γίνονται σαφείς και ξεκάθαρες. Οι μαθητές αρχίζουν να εργάζονται δημιουργικά και ανεξάρτητα, χρησιμοποιώντας τις πρόσφατα ανακαλυμμένες σχέσεις και αποκτούν εμπειρία στην εύρεση του δικού τους προσωπικού τρόπου και ρυθμού, κατά την επίλυση προβλημάτων. Η νέα γνώση εμπεδώνεται. Ο δάσκαλος παροτρύνει τους μαθητές να αναλύουν και να επεξεργάζονται τα προβλήματα καθώς και τις στρατηγικές λύσεις τους. Για παράδειγμα, μια δραστηριότητα ελεύθερου προσανατολισμού θα αποτελούσε και η προσπάθεια απόδειξης ότι το εμβαδόν ρόμβου ισούται με το ημιγινόμενο των διαγωνίων του.

Ολοκλήρωση (integration). Στην τελευταία φάση οι μαθητές επανεξετάζουν, συνοψίζουν και οργανώσουν τις νέες γνώσεις, οι οποίες είναι άμεσα διαθέσιμες για άμεση ανάκληση. Οι μαθητές αποκτούν μια γενική εικόνα για το πλέγμα των μελετώμενων αντικειμένων και των σχέσεων μεταξύ τους. Οι ιδιότητες ενός ρόμβου, για παράδειγμα, συνοψίζονται και απομνημονεύονται. Ο δάσκαλος καθοδηγεί τους μαθητές με τη χρήση τυποποιημένου, φορμαλιστικού λεξιλογίου, χωρίς ωστόσο να παρουσιάζει γνωστικά, καμιά νέα έννοια και ιδέα. Με την ολοκλήρωση αυτής της πέμπτης φάσης, οι μαθητές θα πρέπει να έχουν μεταβεί σε ένα νέο, επόμενο επίπεδο σκέψης. Τέλος, ετοιμάζονται τα περιγράμματα και ερευνώνται οι μαθησιακές και διδακτικές προοπτικές, για την ενεργοποίηση και εφαρμογή της πρώτης φάση της «διερεύνησης», αλλά και των υπόλοιπων τεσσάρων φάσεων, του επόμενου επιπέδου.

Η ΘΕΩΡΙΑ VAN HIELE ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΕΥΡΗΜΑΤΑ

Η θεωρία των van Hiele διαθέτει τρία σημαντικά ελκυστικά χαρακτηριστικά, τα οποία της προσδίδουν μαθησιακό, διδακτικό και επιστημονικό κύρος και εγκυρότητα (Usiskin, 1982): Κομψότητα, περιεκτικότητα και ευρεία εφαρμοσιμότητα. Η απλή δομή της την κομψύνει, οι σαφείς επεξηγήσεις και οι οδηγίες της ως προς την άρση μαθησιακών εμποδίων την κάνει περιεκτική, ενώ και η διείσδυσή της σε Αναλυτικά Προγράμματα σε πολλές και διαφορετικές χώρες (Ολλανδία, Σοβιετική Ένωση, ΗΠΑ) την πριμοδοτεί και της χαρίζει εύκολη και ευρεία εφαρμοσιμότητα. Κατά τη διάρκεια κάθε περιόδου μάθησης, που χαρακτηρίζει κάθε μετάβαση σε υψηλότερο επίπεδο, οι μαθητές ερευνούν και καθορίζουν κατάλληλους στόχους και συμμετέχουν σε αλληλεπιδραστικές δραστηριότητες, που αποτελούν γέφυρες και γνωστικά οχήματα ταυτόχρονα, για τη μετακίνηση στο παραπάνω επίπεδο γεωμετρικής σκέψης (Choi-Koh, 2000). Υιοθετώντας εποικοδομητικές και κοινωνικο-πολιτισμικές πρακτικές, οι van Hiele προτρέπουν οι μεταβάσεις και οι μαθησιακές αναβαθμίσεις σε παραπάνω επίπεδα να είναι διαδικασίες μάθησης, που πρέπει να υλοποιούνται από τους μαθητές τους ίδιους, υπό τη φθίνουσα καθοδήγηση των δασκάλων (van Hiele, 2011).

Με τη δημιουργία κατάλληλων ακολουθιακών δραστηριοτήτων, που αφορούν σε κάθε ιεραρχικό επίπεδο, ενθαρρύνονται διαδικασίες διερεύνησης που ξεκινούν από την οπτικοποίηση (νοερή απεικόνιση), κατόπιν, «αναλύονται» και, τέλος, μέσω εικασιών και συσχετισμών (3ο επίπεδο) μπορούν να καταλήξουν σε μαθηματικά αυστηρές αποδείξεις (4ο επίπεδο). Τα παιδιά της υποχρεωτικής εκπαίδευσης είναι ικανά και αναμένεται να κινηθούν μέχρι το τρίτο επίπεδο του μοντέλου van Hiele. Αυτονοήτως, το τέταρτο επίπεδο συνάδει και προσιδιάζει περισσότερο στα αναλυτικά προγράμματα του Λυκείου. Οι ίδιοι οι επινοητές της θεωρίας παραδέχονται ότι τα τρία πρώτα επίπεδα είναι τα πλέον σημαντικά για τα Μαθηματικά της Υποχρεωτικής Εκπαίδευσης (Choi-Koh, 2000), ονομάζοντάς τα, σε μια μεταγενέστερη, κατοπινή εργασία τους και ως οπτικό, περιγραφικό και θεωρητικό επίπεδο, με αυτό το τελευταίο να είναι εμφανώς εκτεταμένο, έτσι ώστε να περιλαμβάνει δυο επίπεδα της αρχικής διαβάθμισης.

Μάλιστα, ένας ιδανικός, χρονικός προγραμματισμός, για δωδεκάχρονους μαθητές, σύμφωνα με τους van Hiele (Tzifas, 2005), θα απαιτούσε 20 μαθήματα για τη μετάβαση από το επίπεδο 0 στο επίπεδο 1 και 50 μαθήματα για τη μετάβαση από το επίπεδο 1 στο επίπεδο 2, δηλαδή μισό διδακτικό έτος, αν και προϋποτίθεται ότι κάθε μάθημα δεν ταυτίζεται με τους συμβατικούς σχολικούς χρόνους και υπερτερεί της μιας διδακτικής ώρας. Βέβαια, κάθε μαθητής έχει το δικό του ρυθμό μάθησης και κατά συνέπεια οι μεταβάσεις στα επόμενα επίπεδα διαφέρουν, από μαθητή σε μαθητή, ως προς την ταχύτητα κατάκτησης. Φυσικά, ο χρόνος που διατίθεται και αφιερώνεται σε κάθε επίπεδο μπορεί να

συντομευτεί, μέσω μιας πεφωτισμένης διδασκαλίας ή αντιθέτως να πολλαπλασιαστεί, εξαιτίας λανθασμένων και πλημμελών, διδακτικών παρεμβάσεων (Lee & Kim, 2012). Σε κάθε περίπτωση βέβαια και σύμφωνα και με τον Bernstein, η πετυχημένη κατάκτηση της σχολικής γνώσης βασίζεται, σε μεγάλο βαθμό, στην αδύνατη (ασθενή) περιχάραξη βηματισμού, δηλαδή από την προώθηση διαφοροποιημένων και εξατομικευμένων μαθησιακών περιβαλλόντων, που δίνουν στους μαθητές τον χρόνο που χρειάζονται για να προσεγγίσουν, να επεξεργαστούν και τελικά να κατακτήσουν τη νέα γνώση (Mastrogiannis, 2014).

Πάντως, οι μαθητές ενός χαμηλότερου επίπεδου σκέψης δεν αναμένεται να κατανοήσουν δραστηριότητες και διαδικασίες που ταιριάζουν σε ένα υψηλότερο επίπεδο σκέψης. Σύμφωνα με τους van Hiele, αυτή η μαθησιακή επιβάρυνση είναι πηγή κακοδαιμονιών στην εκπαίδευση των Μαθηματικών και αποτελεί την πλέον ανασχετική αιτία στην επίτευξη των προσδοκώμενων αποτελεσμάτων. Για παράδειγμα, ένα αρνητικό παρελκόμενο της έλλειψης ισορροπίας μεταξύ διδασκαλίας και επιπέδου σκέψης, στο οποίο απευθύνεται αυτή, το οποίο εύκολα μπορεί να προκύψει ως σκόπελος κατανόησης, είναι η καταφυγή στην πνευματοκτόνο, στείρα αποστήθιση. Ως εκ τούτου, προβάλλει ως καθοριστική η παράμετρος της γνώσης των επιπέδων της γεωμετρικής σκέψης από τους εκπαιδευτικούς, ώστε να αναπτυχθούν δραστηριότητες και παρεμβάσεις, με βάση το μοντέλο των van Hiele (Choi-Koh, 2000). Πάντως, ευρήματα ερευνών δείχνουν ότι και δόκιμοι εκπαιδευτικοί έχουν ελλιπή γεωμετρική σκέψη στα τρία πρώτα επίπεδα (Bonyah & Larbi, 2021).

Τα τελευταία σαράντα χρόνια σωρεία σχετικών ερευνών, σε παγκόσμιο επίπεδο αλλά και στον ελλαδικό χώρο, έχουν επαληθεύσει την «ύπαρξη», τη διαδοχικότητα και τη συμβολή των επιπέδων γεωμετρικής σκέψης των van Hiele στη διδασκαλία και μάθηση της Γεωμετρίας. Μερικά από τα σημαντικότερα συμπεράσματα αυτών των ερευνών σκιαγραφούνται και περιγράφονται παρακάτω (Muti & Kusuma, 2025; Ruslau & Dadi, 2025; Naufal et al., 2021; Abdullah & Zakaria, 2013; Idris, 2007; Tzifas, 2005; Burger & Shaughnessy, 1986; Usiskin, 1982):

- Η θεωρία van Hiele προσφέρει και προκρίνει εποικοδομιστικές προσεγγίσεις στη μάθηση.
- Οι εκπαιδευτικοί για να παράσχουν πληρέστερη βοήθεια και να προαγάγουν αποτελεσματικότερη μαθησιακή επικοινωνία πρέπει να εντοπίσουν το επίπεδο στο οποίο καθένας μαθητής λειτουργεί.
- Είναι σχετικά εύκολη η αντιστοίχιση των μαθητών με κάποιο από τα πέντε επίπεδα.
- Όλα τα επίπεδα είναι ελέγξιμα πλην του τελευταίου.
- Πολλοί μαθητές δεν είναι εξοικειωμένοι με τη βασική ορολογία και τις απλούστερες γεωμετρικές ιδέες της Γεωμετρίας και αγνοούν έννοιες των βασικών γεωμετρικών σχημάτων και των ιδιοτήτων τους.
- Γενικά, η διδασκαλία πρέπει να επικεντρώνεται στα τρία πρώτα επίπεδα γεωμετρικής σκέψης της θεωρίας των Van Hiele
- Επιτραπέζια παιχνίδια βελτιώνουν τις γεωμετρικές δεξιότητες με βάση τα επίπεδα σκέψης του Van Hiele σε μαθητές Δημοτικού.
- Οι περισσότεροι μαθητές λειτουργούν στο πρώτο ή δεύτερο επίπεδο van Hiele.
- Τα χαμηλότερα επίπεδα (1ο και 2ο) απαιτούν γενικά περισσότερο χρόνο κατάκτησης, σε σχέση με τα υψηλότερα.
- Δεν υπάρχει κανένα προνομιούχο επίπεδο Van Hiele το οποίο να εξασφαλίζει μελλοντική επιτυχία, κατά τη μελέτη αποδείξεων, αν και το επίπεδο 1 φαίνεται να είναι το πλέον κρίσιμο.
- Το 75% των μαθητών Δευτέρας τάξης ελληνικού Λυκείου υπολείποντων του επιπέδου 3 και συνεπακόλουθα αδυνατούσαν να παρακολουθήσουν μαθήματα θεωρητικής Γεωμετρίας και να μελετήσουν αποδείξεις. Γενικά, οι μαθητές δύσκολα φτάνουν στο επίπεδο 3 της θεωρίας, ώστε να μπορούν να κατανοήσουν τη διδασκόμενη στο Λύκειο, Ευκλείδεια Γεωμετρία.
- Η διδασκαλία και η μάθηση που βασίζεται στη μεταγνώση και αναφέρεται στα επίπεδα γεωμετρικής σκέψης καθώς και στις φάσεις μάθησης του van Hiele βελτιώνουν τις γεωμετρικές δεξιότητες των μαθητών.
- Η εφαρμογή δραστηριοτήτων που βασίζονται στις φάσεις Van Hiele έχει θετικό αντίκτυπο στην ανάπτυξη υψηλότερων επιπέδων γεωμετρικής σκέψης.
- Τα Δυναμικά Περιβάλλοντα Γεωμετρίας σε συνδυασμό με τη θεωρία των Van Hiele ενδυναμώνουν τη μελέτη της Γεωμετρίας.
- Τα Δυναμικά Περιβάλλοντα Γεωμετρίας συμβάλλουν στην προώθηση των επιπέδων Van Hiele και στην ενίσχυση της κατανόησης των γεωμετρικών εννοιών από τους μαθητές.

ΕΠΙΠΕΔΑ ΓΕΩΜΕΤΡΙΚΗΣ ΣΚΕΨΗΣ ΚΑΙ ΔΥΝΑΜΙΚΑ ΠΕΡΙΒΑΛΛΟΝΤΑ

Μια βασική αρχή στη θεωρία των van Hiele, αν και υπονοούμενη (Crowley, 1987), αποτελεί η ενίσχυση των γεωμετρικών εμπειριών, που πρέπει να αποκομίζουν οι μαθητές, μέσα από πληθώρα και ποικιλία ενεργητικών, διερευνητικών και ανακαλυπτικών δράσεων, με τη συνδρομή εποπτικών υλικών και διδακτικών μέσων. Από τα πρώτα χρόνια του Δημοτικού Σχολείου η επιλογή και χρήση χειραπτικών και ψηφιακών εργαλείων προσφέρεται ως ένας

καταλυτικός και πλούσιος τρόπος αποτελεσματικής, διδακτικής παρέμβασης. Υλικά, όπως γεωπίνακες, τάγκραμ, καλαμάκια, κύβοι, lego, ενσφηνώματα, μακέτες, διάφορα πλακίδια για επιστρώσεις, πλέγματα, γεωμετρικά παζλ και φυσικά οι ψηφιακές τεχνολογίες βελτιώνουν τις φάσεις της μάθησης, λιπαίνουν και καλλιεργούν τη γνωστική ανάπτυξη και τη σκέψη των μαθητών, κατά την κατάκτηση των επιπέδων van Hiele (Crowley, 1987). Η προσθήκη ενός Δυναμικού Περιβάλλοντος Γεωμετρίας προσφέρει διττά εκπαιδευτικά ευεργετήματα, καθότι αφενός αιχμαλωτίζει την προσοχή και αυξάνει το ενδιαφέρον των μαθητών για τη Γεωμετρία και αφετέρου ενισχύει την κατανόησή της. Ακόμη, στις θετικές επενέργειες των Δυναμικών Λογισμικών μπορούν να συγκαταλεχθούν η αύξηση της απόδοσης των μαθητών στη Γεωμετρία, καθώς επίσης και του επίπεδου της εμπιστοσύνης τους στη μάθηση της Γεωμετρίας (Muti & Kusuma, 2025; Ruslau & Dadi, 2025; Naufal et al., 2021; Abdullah & Zakaria, 2013)

Οι εκπαιδευτικές πρακτικές που βασίζονται στα πρότυπα Van Hiele και η ταυτόχρονη χρήση Δυναμικών Λογισμικών διαδραματίζουν έναν ειδικό, γενναιόδωρο ρόλο ως προς τη βοήθεια που παρέχουν στους μαθητές για να προχωρήσουν μέσα σε ένα επίπεδο ή ακόμη και να αντιμετωπίσουν και τα μαθησιακά «εμπόδια» ενός υψηλότερου επιπέδου (Abdullah & Zakaria, 2012; 2011; Idris, 2007). Μάλιστα, η διδασκαλία μέσω των επιπέδων Hiele φαίνεται να παρέχει ένα πλήρες πλάνο διδασκαλίας και μάθησης, όταν χρησιμοποιείται ταυτόχρονα ένα δυναμικό εργαλείο-λογισμικό (Muti & Kusuma, 2025; Ruslau & Dadi, 2025; Naufal et al., 2021; Abdullah & Zakaria,, 2012; Choi-Koh, 2000), αφού ο διαμεσολαβητικός ρόλος των εργαλείων στην εισαγωγή των γεωμετρικών εννοιών προκρίνεται ως λίαν καθοριστικός (Patsiomitou & Emvalotis, 2010a; b). Η αξιοποίηση των Δυναμικών Περιβαλλόντων Γεωμετρίας, μέσω κατάλληλων δραστηριοτήτων, οι οποίες συνάδουν με τη σκέψη των μαθητών και την αγκαλιάζουν, αποκλείει δυσαρμονίες και μαθησιακές παραφωνίες κατά τη μελέτη των επιπέδων van Hiele, προσφέροντας και στέρεες γεφυρώσεις και συνδετικούς κρίκους κατά την αλυσιδωτή μετάβαση, από το ένα επίπεδο στο επόμενο (Meng, 2009).

Έρευνες έχουν δείξει ότι τα Λογισμικά Δυναμικής Γεωμετρίας ενισχύουν τους μαθητές στη μελέτη των γεωμετρικών εννοιών στοπαρωθητικό πλαίσιο ενεργοποίησης και αξιοποίησης της θεωρίας των van Hiele (Hartono et al., 2025; Ntshangase, Ndlovu & Oladele; Elbehary, 2023; Skarkos, 2013; Patsiomitou & Emvalotis, 2010a; b). Οι δραστηριότητες που βασίζονται στα επίπεδα σκέψης των van Hiele καθίστανται ευκολότερες και αποτελεσματικότερες με την παρουσία διάφορων τεχνολογικών ερεισμάτων και ειδικά μέσω Δυναμικών Περιβαλλόντων Γεωμετρίας. Σύμφωνα με το πρότυπο van Hiele, κάθε επίπεδο μάθησης στηρίζεται στο προηγούμενο και επεκτείνει τη σκέψη προετοιμάζοντάς την για το παραπάνω επίπεδο. Αυτό είναι σημαντικό για τους δασκάλους κατά την επιλογή και την αλληλουχία των ψηφιακών εκπαιδευτικών δραστηριοτήτων. Η συνειδητοποίηση και η γνώση του προτύπου των Van Hiele μπορούν να αποτελέσουν ένα σημαντικό πλεονέκτημα και ένα εργαλείο στην τάξη (Idris, 2007).

Έχουν αναπτυχθεί, από το 2000 και εντεύθεν, σε παγκόσμιο επίπεδο, πλούσιες, ελκυστικές και διασκεδαστικές δραστηριότητες, που βασίζονται στα πρότυπα των Van Hiele και στις προτεινόμενες φάσεις μάθησης, οι οποίες υλοποιήθηκαν στα γόνιμα περιβάλλοντα των Δυναμικών Λογισμικών Γεωμετρίας και της τεχνολογίας και του διαδικτύου γενικότερα (Restrepo-Ochoa, Gualdrón-Pinto, & Ávila-Ascanio, 2023; Özçakır, B., Özdemir, D., & Kıymaz, Y. (2020; Choi-Koh, 2000; Gawlick, 2005; Olkun & Sinoplu & Deryakulu, 2005; Patsiomitou, 2008; Idris, 2007; Meng, 2009; Patsiomitou & Emvalotis, 2010; Abdullah & Zakaria,, 2012; 2011; Lee & Kim, 2012). Γενικά, δείχτηκε ότι οι φάσεις μάθησης των van Hiele αποτελούν γόνιμο, μαθησιακά έδαφος για οργάνωση δραστηριοτήτων, οι οποίες ευδοκιμούν καλύτερα και παράγουν καλύτερα μαθησιακά αποτελέσματα στα πλούσια περιβάλλοντα της Δυναμικής Γεωμετρίας. Επιπλέον, διαπιστώθηκε ότι η διδασκαλία με βάση τις φάσεις των van Hiele και η χρήση Δυναμικών Λογισμικών μπορεί να αυξήσει το επίπεδο γεωμετρικής σκέψης των μαθητών. Η ενεργοποίηση των Δυναμικών Λογισμικών ως μέσων διδασκαλίας προσδίδει μια πλουραλιστικότητα στους τρόπους, που παρουσιάζεται μια γεωμετρική έννοια ή και ιδέα. Η ιδέα αυτή, αν και μπορεί να βρίσκεται σε επίπεδο ψυχικής ανάπτυξης, που να υπερβαίνει το επίπεδο της ικανότητάς των μαθητών, εξαιτίας αυτής της ποικιλίας των διδακτικών προσεγγίσεων, μπορεί να μετουσιωθεί ευχερέστερα σε γνώση. Οι μαθητές σε κλίμα ενθουσιασμού απολαμβάνουν το μάθημα και μαθαίνουν περισσότερα. Μάλιστα, σε πλαίσια εξέλιξης της αποκλίνουσας σκέψης τους, προσεγγίζουν το ίδιο πρόβλημα από διαφορετικές οπτικές και δίνουν διάφορες εξηγήσεις για το ίδιο μαθηματικό γεγονός. Τα Δυναμικά Λογισμικά Γεωμετρίας αναγνωρίζονται ευρέως ως πλεονεκτικά εργαλεία μη στατικής οπτικοποίησης, που δύνανται να προαγάγουν τη σκέψη των μαθητών. Προτείνεται δε (Gawlick, 2005), λόγω της πλεονεκτικής συνεπικουρίας των Δυναμικών Λογισμικών, και μια επανερμηνεία των επιπέδων van Hiele, όπως εμφανίζεται στην εικόνα 2.

Κοντολογίς, οι μαθητές ενεργοποιούν διάφορες κρίσιμες και δημιουργικές δεξιότητες σκέψης, που τις χρησιμοποιούν κατά την επίλυση προβλημάτων, μέσω της χρήσης Δυναμικών Περιβαλλόντων. Αυτή η πραγματικότητα παροτρύνει επιτυχώς τους μαθητές να επιτύχουν υψηλότερο επίπεδο γεωμετρικής κατανόησης και ειδικότερα μέχρι το τρίτο σειρά, στη θεωρία των van Hiele (Abdullah & Mohamed, 2008). Ο ρόλος του εκπαιδευτικού στην εκτέλεση των δραστηριοτήτων είναι σημαντικός αλλά και ο σχεδιασμός του ψηφιακού περιβάλλοντος και οι εργασίες που έχουν σχεδιαστεί για να υλοποιηθούν με τους μαθητές είναι εξίσου θεμελιώδεις (Baccaglini-Frank et al., 2025).

Εικόνα 2
Μια επανερμηνεία των επιπέδων, εντός Δυναμικών Λογισμικών Γεωμετρίας

Κλασική κατηγοριοποίηση των Επιπέδων van Hiele		Επαναδιατύπωση στη σκιά των Δυναμικών Περιβαλλόντων
0. Αναγνωρίστε αντικείμενα ως γεωμετρικές μορφές		0. Αναγνωρίστε σχήματα μέσα σε αντικείμενα
1. Αναγνωρίστε σχήματα από τις γεωμετρικές τους ιδιότητες		1. Αναγνωρίστε τις ιδιότητες των σχημάτων
2. Επιχειρηματολογήστε στηριζόμενοι σε σχέσεις μεταξύ των ιδιοτήτων		2. Κατασκευάστε σχήματα από τις ιδιότητες
3. Συστηματοποιήστε επιχειρήματα, ώστε να διαμορφωθούν παραγωγικές αποδείξεις		3. Συνθέστε οικογένειες των σχημάτων
4. Αναλύστε παραγωγικά συστήματα		4. Αναλύστε τις οικογένειες των σχημάτων

Επίσης, υποστηρίζεται ότι οι μαθητές με τη βοήθεια δυναμικών χειρισμών κινούνται από το πρώτο προς το δεύτερο van Hiele επίπεδο (Patsiomitou, 2008). Ειδικότερα, το μεγαλύτερο μέρος του εκπαιδευτικού υλικού που προτείνεται για την τάξη φαίνεται να προσιδιάζει περισσότερο με τα 3 πρώτα επίπεδα, δεδομένου ότι τα Δυναμικά Περιβάλλοντα Γεωμετρίας καλύπτουν και υποστηρίζουν, τουλάχιστον τα τρία πρώτα επίπεδα γεωμετρικής σκέψης των van Hiele (Özçakır, Özdemir & Kıymaz, 2020; Stumbles, 2018; Mastrogiannis & Anastopoulos, 2012; Gawlick, 2005). Μάλιστα, οι δυναμικοί χειρισμοί βοηθούν ιδιαίτερα στη μετάβαση από το πρώτο στο δεύτερο επίπεδο van Hiele, αφού οι μαθητές αναλύοντας και μελετώντας τα άπειρα, «ομοειδή» σχήματα που προκύπτουν, μπορεί να ανακαλύψουν τις χαρακτηριστικές ιδιότητές τους και έτσι να τα διακρίνουν και να τα ονοματίσουν.

Η λειτουργία του συρσίματος αποτελεί βασική συνιστώσα και για τη μετάβαση από το επίπεδο 1 στο επίπεδο 2. Οι μακροεντολές και οι γεωμετρικοί τόποι είναι ισχυρά εργαλεία για το βήμα από το επίπεδο 2 στο επίπεδο 3. Τέλος, οι οικογένειες των γεωμετρικών τόπων μπορούν να χρησιμοποιηθούν για τη μετάβαση από το επίπεδο 3 στο τελευταίο επίπεδο 4, της «αυστηρότητας» των van Hiele (Gawlick, 2005). Ομολογουμένως, η ένταξη των ψηφιακών τεχνολογιών στην εκπαιδευτική διαδικασία παρέχει την επιζητούμενη προστιθέμενη αξία, μέσω της παροχής επαγωγικών εργαλείων στους μαθητές, τα οποία είναι ικανά να αυξήσουν το επίπεδο Van Hiele πριν από το στάδιο των παραγωγικών αποδείξεων (Tzifas, 2005).

Για παράδειγμα, τα Δυναμικά Περιβάλλοντα Γεωμετρίας παρέχουν την ευκαιρία εύκολης δημιουργίας όλων των επίπεδων γεωμετρικών σχημάτων, υποστηρίζοντας το πρώτο επίπεδο van Hiele αλλά και το δεύτερο, που ακολουθεί. Βασικό χαρακτηριστικό των Δυναμικών Λογισμικών είναι η δυναμική τροποποίηση, η μετακίνηση και ο μετασχηματισμός των σχημάτων, με διατήρηση, όμως, των βασικών σχέσεων και ιδιοτήτων τους. Είναι σαν τα σχήματα να αντιδρούν στους χειρισμούς του χρήστη, ακολουθώντας τους νόμους της Γεωμετρίας, ακριβώς όπως τα υλικά αντικείμενα αντιδρούν, σύμφωνα με τους νόμους της Φυσικής. Η λειτουργία του συρσίματος παρέχει, άμεσα, τη δυνατότητα δυναμικών μετασχηματισμών και διαμόρφωσης δυναμικών όψεων των γεωμετρικών κατασκευών και σχημάτων, με αποτέλεσμα μόνο οπτικές διαφοροποιήσεις, αφού οι βασικές τους γεωμετρικές ιδιότητες παραμένουν σταθερές. Μέσω της απειρίας των σχημάτων, οι μαθητές μπορούν να διατυπώνουν υποθέσεις, όσον αφορά στις κοινές ιδιότητες των σχημάτων, και να οδηγούνται, επαγωγικά, σε γενικεύσεις (3ο επίπεδο). Προκειμένου να δοθεί μια γεωμετρική απόδειξη, που μπορεί να κατανοηθεί από έναν μαθητή, είναι σημαντικό να ενισχυθεί αυτός, από ένα καλό σχήμα. Υπάρχουν πολλά καλά παραδείγματα λειψών και εσφαλμένων γεωμετρικών αποδείξεων, που βασίστηκαν σε λανθασμένα σχήματα. Μερικές φορές, μία απόδειξη πρέπει να εξετάσει όλες τις πιθανές περιπτώσεις και επομένως απαιτούνται πολλά σχήματα για ένα απλό θεώρημα. Αυτή τη δυνατότητα, ασφαλώς, την παρέχουν άμεσα τα Δυναμικά Λογισμικά,, εισάγοντας και μυώντας, τους μαθητές σε αποδεικτικούς μμηχανισμούς.

Το τέταρτο επίπεδο συνάδει και προσιδιάζει περισσότερο στα Αναλυτικά Προγράμματα του Λυκείου, ενώ τα 3 πρώτα σε μαθητές της υποχρεωτικής Εκπαίδευσης. Τα Δυναμικά Περιβάλλοντα Γεωμετρίας καλύπτουν και υποστηρίζουν αυτά τα τρία πρώτα επίπεδα γεωμετρικής σκέψης των van Hiele. Με τη δημιουργία κατάλληλων ακολουθιακών δραστηριοτήτων, που αφορούν σε κάθε ιεραρχικό επίπεδο, ενθαρρύνονται διαδικασίες διερεύνησης που ξεκινούν από την οπτικοποίηση (νοερή απεικόνιση), κατόπιν, «αναλύονται» και, τέλος, μέσω εικασιών και συσχετισμών (3ο επίπεδο) μπορούν να καταλήξουν σε μαθηματικά αυστηρές αποδείξεις (4ο επίπεδο).

Συγκεκριμένα, μελέτες, που αξιοποίησαν, κατά την ανάλυση των δεδομένων τους, τη θεωρία των van Hiele, εστίασαν σε τρεις κυρίως εκπαιδευτικές ωφέλειες, που κομίζει στις σχολικές αίθουσες η χρήση των Δυναμικών περιβαλλόντων και ειδικότερα το Sketchpad (στο Patsiomitou & Emvalotis, 2010a;b):

- Ασφαλέστερες συμπεριφορές κατά τη δοκιμή των εικασιών και των κατασκευών
- Σε τεστ τα οποία εξέταζαν έννοιες ευκλείδειων μετασχηματισμών (μετατόπιση, συμμετρία, περιστροφή) τα αποτελέσματα ήταν σημαντικά υψηλότερα.
- Σημαντικά υψηλότερα αποτελέσματα στα μετά-tests

Τέλος, σε κάθε περίπτωση τα πλεονεκτήματα της θεωρίας van Hiele, σε μια στοίχιση με τη δυναμικότητα των Λογισμικών της Γεωμετρίας, προσφέρουν πλούσια και ενθουσιαστικά περιβάλλοντα, τα οποία, παρά την αποσπασματικότητα και την υποβάθμιση της Γεωμετρίας ως σχολικού μαθήματος, μπορούν να στηρίξουν πολύπλευρα και αποτελεσματικά τη διδασκαλία και τη μάθηση της Γεωμετρίας

ΣΥΖΗΤΗΣΗ, ΣΥΜΠΕΡΑΣΜΑΤΑ, ΠΡΟΤΑΣΕΙΣ

Η μελέτη και η μάθηση της Γεωμετρίας προσφέρει πληθώρα νοητικών και γνωστικών απολαβών. Μάλιστα, ένας γνώστης του γεωμετρικού πλούτου αποκτά θεωρήσεις για την ίδια τη φύση, αφού μπορεί να κατανοήσει πληρέστερα και αποτελεσματικότερα τις μορφές και τα μοτίβα της, τόσο σε μικροσκοπικό όσο και σε μακροσκοπικό επίπεδο. Η Γεωμετρία, ευκλείδεια ή μη, μπορεί να αποκωδικοποιήσει το σύμπαν, καθώς αυτό, κατά βάση, έχει γεωμετρικό υπόβαθρο και παρά τα φράκταλ (μορφοκλάσματα ή μορφοκλασματικά σύνολα) και το χάος, οι γεωμετρικές κανονικότητες οι αναλογίες, συμμετρίες, η τάξη, η ομορφιά της τέχνης, η αρμονία και οι αναλλοίωτες στη φύση είναι επιβλητικές και συναρπαστικές. Το σχολικό μάθημα της Γεωμετρίας, πέρα από τη μαθησιακή μέθεξη και τον ενθουσιασμό, που μπορεί να δημιουργήσει, δίνει την ευκαιρία στους μαθητές να αναπτύξουν και να βελτιώσουν δεξιότητες, όπως τη λεπτή κινητικότητα, τη δημιουργικότητα, τη συνεργασία και την επικοινωνία (σε ένα σχολείο που προάγει τις κοινωνικοπολιτισμικές και εποικοδομιστικές προσεγγίσεις), την κριτική σκέψη, την προσοχή στη λεπτομέρεια και την ακρίβεια, τη σχολαστικότητα, τη μεθοδικότητα και την αυτοεκτίμηση.

Ο Κέπλερ πίστευε ότι η Γεωμετρία βρίθει θησαυρών και πολύτιμων κοσμημάτων, όπως το Πυθαγόρειο Θεώρημα και η Χρυσή Τομή (ο γνωστός αριθμός φ, ο γεννήτορας της ομορφιάς και της καλαισθησίας στη φύση). Παραταύτα, είναι γεγονός αναμφισβήτητο ότι η αποσπασματικότητα, η περιθωριοποίηση και η υποβάθμιση του μαθήματος της Γεωμετρίας στην ελληνική εκπαίδευση δρέπει τους λειψούς και ασθενικούς, γνωστικούς καρπούς της. Επιπλέον, οι μαθητές μάλλον αντιμετωπίζουν σοβαρά προβλήματα στις αυστηρές μαθηματικές αποδείξεις, αν ληφθεί υπόψη ότι κατά την εισαγωγή τους στο Γυμνάσιο κομίζουν ως γνωστική «προίκα», τα δυο πρώτα, το πολύ, επίπεδα γεωμετρικής σκέψης του μοντέλου των van Hiele.

Με την ταυτόχρονη και αλληλοσυμπληρωματική επιστράτευση-συμπαράταξη των επιπέδων γεωμετρικής σκέψης των van Hiele, των Δυναμικών Περιβαλλόντων Γεωμετρίας και μιας συνεχούς, συστηματικής και καλά οργανωμένης επιμόρφωσης είναι πολύ πιθανό να αμβλυνθούν πολλά διδακτικά προσκόμματα και να αυξηθούν τα περιθώρια συμφιλίωσης των μαθητών με τη Γεωμετρία, ώστε να προκύψουν πολλά από τα οφέλη αυτού του σαγηνευτικού και μαγευτικού μαθήματος. Βέβαια, η κρισιμότερη συνιστώσα αυτού του συμπαγούς τρίπτυχου δεν είναι άλλη, παρά ένας κραταιός, μισθολογικά και επιστημονικά, εκπαιδευτικός, ο οποίος σύμφωνα και με τον Pierre van Hiele, πρέπει να βλέπει τους μαθητές του, ως αντιπάλους με κύρος, ικανούς να αναπτύξουν νέα επιχειρήματα, όπως, επίσης, και να μην ξεχνά ότι για τα παιδιά η Γεωμετρία ξεκινά με το παιχνίδι.

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ΘΠ12: Διαδίκτυο των πραγμάτων και εκπαίδευση

ΘΠ13: Αξιοποίηση της Τεχνητής Νοημοσύνης στην Εκπαίδευση

ΠΡΟΩΘΗΣΗ ΤΗΣ ΕΠΙΛΥΣΗΣ ΠΡΟΒΛΗΜΑΤΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ STEM: ΑΝΙΧΝΕΥΤΗΣ ΑΕΡΙΩΝ ΜΕ ΕΝΣΩΜΑΤΩΜΕΝΗ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

Νικόλαος Γ. Αλέξης
Εκπαιδευτικός, Ερευνητής
Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού,
Ανδρέα Παπανδρέου 37, Μαρούσι, 15180, Ελλάδα
Σχολή Χημικών Μηχανικών, Εθνικό Μετσόβιο Πολυτεχνείο,
Πολυτεχνειούπολη, Ζωγράφου, Αθήνα, 15772, Ελλάδα
e-mail: nalexis@sch.gr

Ευαγγελία Παυλάτου
Καθηγήτρια ΕΜΠ
Σχολή Χημικών Μηχανικών, Εθνικό Μετσόβιο Πολυτεχνείο,
Πολυτεχνειούπολη, Ζωγράφου, Αθήνα, 15772, Ελλάδα
e-mail: pavlatou@chemeng.ntua.gr

ΠΕΡΙΛΗΨΗ

Αυτή η μελέτη ερευνά την αποτελεσματικότητα της Εκπαίδευσης Βασισμένης σε Προβλήματα (Problem Based Learning - PBL) και της Εκπαίδευσης Δημιουργών (Maker Education) στην ενίσχυση των δεξιοτήτων επίλυσης προβλημάτων μαθητών δευτεροβάθμιας εκπαίδευσης μέσω της ανάπτυξης ενός Ανιχνευτή Αερίων με ενσωματωμένη Τεχνητή Νοημοσύνη (ΤΝ). Με την ενσωμάτωση της ΤΝ στην βιωματική εκπαίδευση STEM, αυτή η έρευνα παρέχει πρακτικές γνώσεις για καινοτόμες εκπαιδευτικές προσεγγίσεις που ενθαρρύνουν την κριτική σκέψη και την τεχνική επάρκεια.

Χρησιμοποιήθηκε μια μικτή μέθοδος έρευνας, που περιλάμβανε 32 μαθητές δευτεροβάθμιας επαγγελματικής εκπαίδευσης του τομέα Ηλεκτρολογίας, Ηλεκτρονικής και Αυτοματισμού. Οι συμμετέχοντες κατηγοριοποιήθηκαν σε τρεις ομάδες: Δημιουργικής Μάθησης (πρακτικά έργα), Εικονικής Μάθησης (προσομοιώσεις) και Κλασικής Μάθησης (παραδοσιακή διδασκαλία). Η μελέτη αξιολόγησε τις στάσεις των μαθητών, πριν και μετά την διδακτική παρέμβαση, συγκεντρώνοντας ποσοτικές και ποιοτικές πληροφορίες ως προς την επίλυση προβλημάτων με χρήση ερωτηματολογίου και ημι-δομημένων συνεντεύξεων. Παρόλο που το μικρό μέγεθος δείγματος περιορίζει τη γενίκευση, τα αποτελέσματα παρέχουν σημαντικές γνώσεις για την αποτελεσματικότητα της μάθησης μέσω κατασκευών με ενσωματωμένη ΤΝ.

Τα ευρήματα δείχνουν ότι ενώ όλες οι ομάδες παρουσίασαν βελτιώσεις στις ικανότητες επίλυσης προβλημάτων, η ομάδα Δημιουργικής Μάθησης παρουσίασε την σημαντικότερη πρόοδο. Οι μαθητές παρουσίασαν υψηλό επίπεδο ενδιαφέροντος και εμπλοκής ενώ τόνισαν ότι έκριναν ως εξαιρετική την εφαρμογή των μαθησιακών τους εμπειριών στον πραγματικό κόσμο. Επιπλέον, η μελέτη εντόπισε προκλήσεις όπως οι περιορισμοί πόρων, η εκπαίδευση των εκπαιδευτικών και η ανάγκη για δομημένη ενσωμάτωση της ΤΝ σε εκπαιδευτικά περιβάλλοντα. Μια εκτενέστερη ανάλυση των δεδομένων σχεδιάζεται να ενισχύσει τα ευρήματα.

Για να ενισχυθεί η πρακτική εφαρμογή, αυτή η παρουσίαση περιλαμβάνει συγκεκριμένα παραδείγματα ενσωμάτωσης της τεχνητής νοημοσύνης στην τάξη, θα συζητήσει τις καλύτερες πρακτικές για την εφαρμογή της και θα αναδείξει πιθανές προκλήσεις σε φάση εφαρμογής ευρείας κλίμακας κατασκευών με ενσωματωμένη ΤΝ. Η συζήτηση θα παρέχει στους εκπαιδευτικούς και τους ερευνητές πρακτικές γνώσεις για την ανάπτυξη βιωματικών δραστηριοτήτων μάθησης μέσω κατασκευών με ενσωματωμένη ΤΝ σε προγράμματα σπουδών STEM, με έμφαση στην καλλιέργεια τόσο τεχνικών όσο και ήπιων δεξιοτήτων στη δευτεροβάθμια εκπαίδευση.

Λέξεις-κλειδιά: Εκπαίδευση Δημιουργών (Maker Education), Εκπαίδευση Βασισμένη σε Προβλήματα (Problem Based Learning - PBL), STEM, Τεχνητή Νοημοσύνη (ΤΝ), Ανιχνευτής Αερίων με ενσωματωμένη ΤΝ.

ΕΙΣΑΓΩΓΗ

ΙΣΤΟΡΙΚΟ

Τα τελευταία χρόνια, η Εκπαίδευση Βασισμένη σε Προβλήματα (PBL) έχει αναδειχθεί ως αποτελεσματική διδακτική στρατηγική για την ενίσχυση των δεξιοτήτων επίλυσης προβλημάτων των μαθητών, ειδικά στην εκπαίδευση STEM (Miliou et al., 2022; Habbal et al., 2024). Η Εκπαίδευση Βασισμένη σε Προβλήματα (PBL) μεταβαίνει από την παραδοσιακή δασκαλοκεντρική παιδαγωγική σε έρευνα καθοδηγούμενη από τους μαθητές, ενθαρρύνοντας τους περισσότερους μαθητές να αλληλεπιδρούν με πραγματικά ζητήματα μέσω της συμμετοχής, της συνεργασίας και της κριτικής σκέψης (Barrows, 1986; Hmelo-Silver, 2004; Savery, 2006). Ταυτόχρονα, η Εκπαίδευση Δημιουργών (Maker Education) προάγει τη βιωματική μάθηση, τη δημιουργικότητα και την εφεύρεση, επιτρέποντας στους μαθητές να σκέφτονται πρακτικές λύσεις μέσω εργαλείων μηχανικής και τεχνολογίας (Halverson & Sheridan, 2014; Martinez & Stager, 2019).

Από την άλλη πλευρά, η αυξανόμενη σημασία της Τεχνητής Νοημοσύνης (ΤΝ) και αισθητήρων νανοτεχνολογίας στις σύγχρονες εταιρείες απαιτεί την ενσωμάτωσή τους στη δευτεροβάθμια εκπαίδευση, εξοπλίζοντας τους μαθητές με κρίσιμες δεξιότητες για το εργατικό δυναμικό του 21ου αιώνα (Luckin, 2018). Η κατασκευή ενός Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ, που χρησιμοποιεί ανίχνευση μέσω αισθητήρων και αλγορίθμους μηχανικής μάθησης για την αναγνώριση συγκεντρώσεων αερίων, προσφέρει μια ευκαιρία για την ενσωμάτωση της μηχανικής, της ΤΝ και της περιβαλλοντικής επιστήμης σε ένα εκπαιδευτικό πλαίσιο. Εμπλέκοντας τους μαθητές στο σχεδιασμό, την κατασκευή και τη δοκιμή τεχνολογιών, αυτή η εκπαιδευτική παρέμβαση ευθυγραμμίζεται με πραγματικές, εμπειρικές, ευκαιρίες μάθησης που αντικατοπτρίζουν τις προκλήσεις της μηχανικής στον πραγματικό κόσμο (Zawacki-Richter et al., 2019).

ΣΤΟΧΟΙ ΜΕΛΕΤΗΣ

Η ενίσχυση των ικανοτήτων επίλυσης προβλημάτων στους μαθητές της δευτεροβάθμιας εκπαίδευσης είναι απαραίτητη ώστε να αντιμετωπίσουν σύνθετες διεπιστημονικές προκλήσεις τόσο στις σπουδές τους όσο και στις καριέρες τους. Η συμβατική διδασκαλία στην τάξη συχνά αποτυγχάνει να παρέχει την διαδραστική και πρακτική εμπλοκή που είναι απαραίτητη για την βέλτιστη ανάπτυξη αυτών των ικανοτήτων. Η ενσωμάτωση της μάθησης μέσω προβλημάτων σε ένα πλαίσιο Εκπαίδευσης Δημιουργών επιτρέπει στους μαθητές να παράγουν ενεργά γνώση, να δοκιμάζουν υποθέσεις και να αναπτύσσουν λύσεις συνεργατικά.

Οι κύριοι στόχοι αυτής της έρευνας είναι:
Να προσδιοριστεί η επίδραση της PBL, στη βελτίωση των δεξιοτήτων επίλυσης προβλημάτων μεταξύ των μαθητών δευτεροβάθμιας εκπαίδευσης.
Να προσδιοριστούν τα ευεργετικά αποτελέσματα της Εκπαίδευσης Δημιουργών που περιλαμβάνει ΤΝ στη δευτεροβάθμια εκπαίδευση.
Να αναλύσουμε τις αντιλήψεις των μαθητών σχετικά με αυτή την εμπειρία μάθησης PBL, μέσω της Εκπαίδευσης Δημιουργών που περιλαμβάνει ΤΝ.

Οι ερευνητικές ερωτήσεις που καθοδηγούν αυτή τη μελέτη είναι οι εξής:
ΕΡ1: Ποια είναι η επίδραση στις ικανότητες επίλυσης προβλημάτων μαθητών δευτεροβάθμιας εκπαίδευσης μέσω της Εκπαίδευσης Δημιουργών και της ανάπτυξης ενός Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ σε περιβάλλον Εκπαίδευσης Βασισμένο σε Προβλήματα (PBL);
ΕΡ2: Ποιες είναι οι αντιλήψεις των μαθητών δευτεροβάθμιας εκπαίδευσης σχετικά με την εμπειρία μάθησής τους σε περιβάλλον Εκπαίδευσης Βασισμένο σε Προβλήματα (PBL);

Μια μελέτη μεικτών μεθόδων θα διεξαχθεί για τη συλλογή ποσοτικών και ποιοτικών δεδομένων σχετικά με τις ικανότητες επίλυσης προβλημάτων των μαθητών δευτεροβάθμιας εκπαίδευσης και τις εντυπώσεις τους από την παρέμβαση PBL, προκειμένου να απαντηθούν τα ερευνητικά ερωτήματα.

ΑΝΑΣΚΟΠΗΣΗ ΤΗΣ ΒΙΒΛΙΟΓΡΑΦΙΑΣ

ΕΙΣΑΓΩΓΗ

Η αυξανόμενη πολυπλοκότητα των πραγματικών προβλημάτων μηχανικής και τεχνολογίας έχει οδηγήσει σε μια εξέλιξη των εκπαιδευτικών πλαισίων, προάγοντας την ανάπτυξη προηγμένων γνωστικών και δεξιοτήτων επίλυσης

προβλημάτων στους μαθητές (Miller, 2017). Ορισμένα σχολεία δεν καταφέρνουν να εξοπλίσουν επαρκώς τους μαθητές για την αγορά εργασίας, συχνά λόγω της ασυμφωνίας των προγραμμάτων σπουδών με τις ανάγκες της αγοράς, της έλλειψης επιχειρηματικής εμπειρίας μεταξύ των εκπαιδευτικών και της υπερβολικής έμφασης στη θεωρητική γνώση (Davidson & Major, 2014; Holgaard & Kolmos, 2017). Το χάσμα μεταξύ της ακαδημαϊκής εκπαίδευσης και των αναγκών της αγοράς εργασίας υπογραμμίζει την αναγκαιότητα για νέες μεθόδους διδασκαλίας, όπως η Εκπαίδευση Βασισμένη σε Προβλήματα (PBL), για να βοηθήσουν στη σύνδεση της εκπαίδευσης με την πραγματική ζωή (Chen et al., 2021).

ΕΚΠΑΙΔΕΥΣΗ ΒΑΣΙΣΜΕΝΗ ΣΕ ΠΡΟΒΛΗΜΑΤΑ (PROBLEM BASED LEARNING - PBL)

Η PBL, έχει καθιερωθεί ως μια πολύ αποτελεσματική εκπαιδευτική μέθοδος για την ανάπτυξη δεξιοτήτων επίλυσης προβλημάτων στην εκπαίδευση μηχανικών. Δίνει στους μαθητές την ευκαιρία να ασχοληθούν με σύνθετα προβλήματα του πραγματικού κόσμου σε διεπιστημονικά περιβάλλοντα, προάγοντας την αυτοκατευθυνόμενη μάθηση και την πρακτική εφαρμογή της γνώσης. Η PBL ευθυγραμμίζεται αποτελεσματικά με τις σύγχρονες απαιτήσεις (Industry 4.0), όπου οι μηχανικοί πρέπει να αντιμετωπίζουν πολυδιάστατα προβλήματα μέσω ενός συνδυασμού τεχνικής επάρκειας και ήπιων δεξιοτήτων (soft skills), συμπεριλαμβανομένης της συνεργασίας και της επικοινωνίας. Η έρευνα δείχνει ότι η PBL προάγει την ανάπτυξη των απαραίτητων επαγγελματικών δεξιοτήτων στους φοιτητές μηχανικής (Warnock & Mohammadi-Aragh, 2016). Μέσω της PBL, οι μαθητές αποκτούν τόσο τεχνική εξειδίκευση όσο και την ικανότητα να αξιολογούν και να επιλύουν κακώς δομημένα προβλήματα, ένα ταλέντο που εκτιμάται ιδιαίτερα στον επιχειρηματικό κόσμο (Hadgraft & Kolmos, 2020). Η έρευνα αποκαλύπτει ότι οι μαθητές που συμμετέχουν στην εκπαίδευση με βάση τα έργα PBL επιδεικνύουν υψηλότερα επίπεδα εμπλοκής, κίνητρου και αυτοαποτελεσματικότητας σε σύγκριση με εκείνους που παρακολουθούν κλασική διδασκαλία μέσω διαλέξεων (Marra et al., 2014; Savin-Baden, 2014).

Συνολικά, η PBL γίνεται ολοένα και πιο δημοφιλής στην εκπαίδευση λόγω της:
Ενίσχυσης της Διαθεματικής Μάθησης: Το PBL συνδυάζει την εκπαίδευση STEM σε ενιαίες δραστηριότητες, αφαιρώντας τα συμβατικά όρια μεταξύ των επιστημών (Bybee, 2010; Vasquez et al., 2013).
Ενσωμάτωσης Πραγματικών Σεναρίων: Ενσωματώνοντας τη μάθηση σε αυθεντικές, πραγματικές καταστάσεις, η PBL ενισχύει την εμπλοκή των μαθητών και τις επαγγελματικές δεξιότητες επίλυσης προβλημάτων (Habbal et al., 2024).
Προώθησης Συνεργασίας και Αυτοκατευθυνόμενης Μάθησης: Η PBL καλλιεργεί την ομαδική εργασία και την αυτοκατευθυνόμενη μάθηση, θεμελιώδεις δεξιότητες για επαγγελματική επιτυχία στους τομείς που σχετίζονται με την επιστήμη και την τεχνολογία (Smith et al., 2022).

ΕΚΠΑΙΔΕΥΣΗ ΔΗΜΙΟΥΡΓΩΝ ΚΑΙ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

Η Εκπαίδευση Δημιουργών που ενσωματώνει ΤΝ (μηχανική μάθηση), προσφέρει μια νέα προσέγγιση που ενισχύει τους μαθητές με πολύτιμες τεχνικές δεξιότητες, δημιουργικότητας και επίλυσης προβλημάτων. Αυτή προσέγγιση έχει την δυναμική να συνδέσει τη θεωρητική γνώση με τις εφαρμογές στον πραγματικό κόσμο, διασφαλίζοντας ότι οι μαθητές διαθέτουν τις απαραίτητες δεξιότητες για τις σύνθετες ανάγκες των σύγχρονων επιχειρήσεων (Luckin, 2018; OECD, 2021).

Η κλασική εκπαίδευση που βασίζεται σε διαλέξεις συχνά αποτυγχάνει να επιτύχει την εμπλοκή των μαθητών και την ανάπτυξη πρακτικών δεξιοτήτων λόγω της εξάρτησής της από θεωρητικό περιεχόμενο και τυποποιημένες αξιολογήσεις. Η Εκπαίδευση Δημιουργών αφαιρεί αυτά τα προβλήματα παρέχοντας ενδιαφέρουσες, πρακτικές εκπαιδευτικές δραστηριότητες στις οποίες οι μαθητές συμμετέχουν στο σχεδιασμό, τον προγραμματισμό και τη δοκιμή λύσεων (Martinez & Stager, 2019). Η ενσωμάτωση πειραμάτων βασισμένων σε Arduino προσφέρει μια πρακτική και διαδραστική μέθοδο μάθησης που ευθυγραμμίζεται με τις αρχές της Εκπαίδευσης Δημιουργών. Επιπλέον, ο συνδυασμός πρακτικών πειραμάτων με εικονικά εργαστήρια δημιουργεί μια ολοκληρωμένη εκπαιδευτική εμπειρία, προσαρμόζοντας διάφορα στυλ μάθησης και η οποία θα μπορούσε να ενισχύσει τις ικανότητες επίλυσης προβλημάτων. (Papadimitropoulos & Pavlatou, 2021). Μελέτες δείχνουν ότι η εμπειρική, προσανατολισμένη σε κατασκευές μάθηση βελτιώνει την κινητοποίηση, την ομαδική εργασία και τις ικανότητες επίλυσης προβλημάτων των μαθητών, καθιστώντας την Εκπαίδευση Δημιουργών ένα βασικό στοιχείο στα σύγχρονα μαθήματα (Halverson & Sheridan, 2014).

Επιπλέον, η Εκπαίδευση Δημιουργών που περιλαμβάνει ΤΝ, καλλιεργεί τον υπολογιστικό τρόπο σκέψης και την εγγραμματοσύνη στην ΤΝ, δεξιότητες που εκτιμώνται ολοένα και περισσότερο σε διάφορους τομείς. Οι εφαρμογές της ΤΝ, συμπεριλαμβανομένης της μηχανικής μάθησης, της ρομποτικής και της ευφυούς αυτοματοποίησης, απαιτούν διεπιστημονική εξειδίκευση, και η ενσωμάτωσή τους στην δευτεροβάθμια εκπαίδευση διασφαλίζει ότι οι μαθητές θα αποκτήσουν μια σταθερή βάση στην ηθική της ΤΝ, την επιστήμη των δεδομένων και την αλγοριθμική επίλυση προβλημάτων (Zawacki-Richter et al., 2019). Καθώς οι τεχνολογίες ΤΝ εξαπλώνονται σε διάφορους τομείς, οι μαθητές πρέπει να διαθέτουν τις δεξιότητες που απαιτούνται για την εφαρμογή λύσεων ΤΝ σε σύνθετα προβλήματα (Patel et al.,

2022). Ένα κύριο όφελος της Εκπαίδευσης Δημιουργών που περιλαμβάνει ΤΝ είναι η δυνατότητά της για εξατομικευμένες μαθησιακές εμπειρίες. Αυτή η προσαρμογή βελτιώνει τα εκπαιδευτικά αποτελέσματα παρέχοντας στους μαθητές συγκεκριμένη υποστήριξη και αυξάνοντας την εμπλοκή τους με περιεχόμενο που αντικατοπτρίζει τα ενδιαφέροντα και τις δεξιότητές τους (Ng et al., 2023). Μια ισχυρή αντίληψη της αυτοαποτελεσματικότητας συσχετίζεται με το ισχυρό ενδιαφέρον των μαθητών για τη μελέτη των επιστημών, της τεχνολογίας, της μηχανικής και των μαθηματικών (STEM), υποδηλώνοντας ότι η αυτοπεποίθηση στις ικανότητές τους λειτουργεί ως κύρια κινητήρια δύναμη (Mitsopoulou & Pavlatou, 2024). Επιπλέον, με την δημιουργία κατασκευών με ενσωματωμένη ΤΝ, όπως έξυπνοι αισθητήρες και εργαλεία ανάλυσης δεδομένων, οι μαθητές αποκτούν πρακτική εμπειρία σε προηγμένες τεχνολογίες, προάγοντας τη δημιουργικότητα και την επιχειρηματική νοοτροπία (Lee & Tan, 2024).

ΣΥΜΠΕΡΑΣΜΑ

Η ενσωμάτωση της PBL στη εκπαίδευση σηματοδοτεί μια βιώσιμη στρατηγική που αντιμετωπίζει τις προκλήσεις του πραγματικού κόσμου στην μηχανική και την τεχνολογία, μειώνοντας αποτελεσματικά το χάσμα μεταξύ ακαδημαϊκής γνώσης και επιχειρηματικών αναγκών. Παρά τις δυσκολίες στην εφαρμογή, το πλεονέκτημα ανάπτυξης δεξιοτήτων επίλυσης προβλημάτων και της συμμετοχής των μαθητών στην δημιουργία της κατασκευής-λύσης το καθιστούν μια αξιόλογη εκπαιδευτική προσέγγιση. Η ενίσχυση της εξειδίκευσης των εκπαιδευτικών της δευτεροβάθμιας εκπαίδευσης σε αυτή την παιδαγωγική μέθοδο και η παροχή επαρκούς υποστήριξης για την εκπαίδευσή τους είναι βασικά στοιχεία για την αποτελεσματική εφαρμογή της PBL στα μαθήματα τεχνικών ειδικοτήτων της δευτεροβάθμιας εκπαίδευσης.

Συμπερασματικά, η ενσωμάτωση της Εκπαίδευσης Δημιουργών που περιλαμβάνει ΤΝ γίνεται απαραίτητη για την προετοιμασία των μαθητών για μια ταχέως μεταβαλλόμενη αγορά εργασίας και την ανάπτυξη των απαραίτητων δεξιοτήτων του 21ου αιώνα. Ενσωματώνοντας την ΤΝ στην Εκπαίδευση Δημιουργών, τα σχολεία μπορούν να παρέχουν στους μαθητές τις γνώσεις και τις δεξιότητες που είναι απαραίτητες για να πετύχουν σε μια κοινωνία που προσανατολίζεται όλο και περισσότερο στην ΤΝ.

ΜΕΘΟΔΟΛΟΓΙΑ

ΣΥΜΜΕΤΕΧΟΝΤΕΣ

Οι συμμετέχοντες σε αυτή τη μελέτη επιλέχθηκαν μέσω ανοιχτής πρόσκλησης και ήταν τριάντα δύο (32) μαθητές δευτεροβάθμιας εκπαίδευσης ηλικίας 15 έως 16 ετών, αποτελούμενοι από 94% αγόρια και 6% κορίτσια. Κάθε ένας από αυτούς ήταν μαθητής που ειδικευόταν στην Ηλεκτρολογία, Ηλεκτρονική και Αυτοματισμούς στην Β’ και Γ’ τάξη στο 1ο Επαγγελματικό Λύκειο Σχηματαρίου, Ελλάδα.

ΜΕΘΟΔΟΛΟΓΙΑ ΕΡΕΥΝΑΣ

Η έρευνα χρησιμοποίησε ένα σχεδιασμό μεικτών μεθόδων. Ποσοτικά και ποιοτικά δεδομένα συλλέχθηκαν συγκεκριμένα για τριγωνοποίηση και ανάλυση. Αυτή η μεθοδολογία παρέχει μια καλύτερη κατανόηση των ερευνητικών ερωτημάτων (Creswell & Plano, 2018). Τα ποσοτικά δεδομένα αποκτήθηκαν μέσω ενός ερωτηματολογίου αυτοαξιολόγησης, του Problem-Solving Inventory, που περιλάμβανε κλειστού τύπου ερωτήσεις σχετικά με τα χαρακτηριστικά της επίλυσης προβλημάτων, ενώ τα ποιοτικά δεδομένα συλλέχθηκαν μέσω ημι-δομημένων συνεντεύξεων που σχεδιάστηκαν για να εξερευνήσουν τις αντιλήψεις των συμμετεχόντων για το μάθημα PBL. Η έρευνα έλαβε έγκριση από την επιτροπή δεοντολογίας του πανεπιστημίου καθώς και τη συγκατάθεση των συμμετεχόντων και του σχολείου τους. Το ερωτηματολόγιο Q1 δόθηκε πριν από το αρχικό μέρος της εκπαιδευτικής παρέμβασης, ακολουθούμενο από το ερωτηματολόγιο Q2. Στη συνέχεια, κατά τη δεύτερη φάση, οι ομάδες των μαθητών χωρίστηκαν σε τρεις ομάδες. Η ομάδα Maker Learning (ML) ασχολείται με πρακτικές δημιουργικές δραστηριότητες με την τεχνολογία Arduino. Η ομάδα Εικονικής Μάθησης (VL) ασχολείται με προσομοιωτικές εργασίες με Arduino. Η ομάδα Κλασικής Μάθησης (C) παρέχει εκπαιδευτικό περιεχόμενο μέσω διαλέξεων βασισμένων σε παρουσιάσεις/στατικές απεικονίσεις μαθησιακού υλικού στον Διαδραστικό Πίνακα.

ΜΕΘΟΔΟΛΟΓΙΚΟ ΠΛΑΙΣΙΟ

MAKERSPACE - ΠΕΡΙΒΑΛΛΟΝ ΜΕΙΚΤΗΣ ΜΑΘΗΣΗΣ

Τα μαθήματα διδάσκονταν σε ένα «makerspace» - περιβάλλον μεικτής μάθησης σε εργαστήριο του σχολείου. Ένα «makerspace» είναι ένα περιβάλλον που προάγει την εμπλοκή των μαθητών στη δημιουργία και την αλληλεπίδραση

με υλικά, εξοπλισμό και εργαλεία, συμπεριλαμβανομένων αισθητήρων, ηλεκτρονικών, πολυμέτρων, πλακετών κυκλωμάτων, σταθμών συγκόλλησης και διάφορων ηλεκτρονικών συσκευών όπως τροφοδοτικά, γεννήτριες σημάτων και παλμογράφους. Πλατφόρμες προσομοίωσης όπως το Tinkercad και το Edge Impulse παρέχονταν στους μαθητές για να βοηθήσουν στη μελέτη και κατανόηση των εννοιών της μηχανικής μάθησης. Παραδείγματα εκτελούμενων εργασιών περιλαμβάνουν τη ρύθμιση μοντέλων μηχανικής μάθησης και το σχεδιασμό λειτουργιών βασισμένων σε μπλοκ για την αυτοματοποίηση συσκευών και αισθητήρων. Το προαναφερθέν περιβάλλον προάγει την ατομική πειραματική εργασία, τη συνεργατική μάθηση και την ομαδική εργασία (Saorin et al., 2017).

ΟΔΗΓΙΕΣ PBL

Το μάθημα βασίζεται στην PBL και αναπτύσσεται σύμφωνα με τις οδηγίες που παρατίθενται παρακάτω, κατευθυνόμενο προς τη δημιουργία του κατάλληλου PBL μαθησιακού περιβάλλοντος που καλύπτει τις ανάγκες των μαθητών. Η μαθησιακή εμπειρία καθοδηγείται από τους συμμετέχοντες μαθητές, οι οποίοι χρησιμοποιούν τους υλικοτεχνικούς πόρους που διαθέτουν και τις εμπειρίες τους κατά τη διάρκεια της εκπαιδευτικής διαδικασίας PBL (Chen et al., 2021). Ο σχεδιασμός του μαθήματος ακολούθησε τις ακόλουθες δώδεκα κατευθυντήριες οδηγίες προς εκπαιδευτικούς σχετικά με την εφαρμογή της PBL διαδικασίας.

1. Αφήστε την ιδιοκτησία του θέματος στους μαθητές, ως απαραίτητη PBL διαδικασία μάθησης.
2. Δείξτε ευελιξία στη συζήτηση των μαθησιακών αποτελεσμάτων.
3. Παροτρείνετε για ανώτερη απόδοση.
4. Επιτρέψτε στους μαθητές να επιτύχουν τα μαθησιακά αποτελέσματα μέσω εναλλακτικών διαδρομών.
5. Δώστε έμφαση στη μάθηση μέσω της αναστοχαστικής διαδικασίας.
6. Επιτρέψτε στους μαθητές να εκφράσουν τα σημεία κατανόησης και παρεξήγησης.
7. Υιοθετήστε τον ρόλο του διευκολυντή αντί αυτού του εκπαιδευτικού.
8. Μετατοπίστε την προσέγγιση διευκόλυνσης από το "Ακολούθησέ με" στο "Πειραματίσου".
9. Ανάδειξε τη μάθηση μέσω της αλληλεπίδρασης με άλλους.
10. Δημιουργήστε μαθησιακό περιβάλλον κατάλληλο για PBL.
11. Καθορίστε τον τρόπο αξιολόγησης.
12. .Λάβετε μέτρα για να ενισχύσετε τις δεξιότητες των μαθητών.

ΜΑΘΗΜΑ PBL «ΑΝΙΧΝΕΥΤΗΣ ΑΕΡΙΩΝ ΜΕ ΕΝΣΩΜΑΤΩΜΕΝΗ ΤΝ»

Οι μαθητές επέλεξαν την επίλυση του προβλήματος κατασκευής ενός «Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ». Διδάχθηκαν τις βασικές γνώσεις κατά τη διάρκεια των πρώτων τεσσάρων μαθημάτων και ακολούθησαν πρακτικές δραστηριότητες από το πέμπτο μέχρι το δέκατο μάθημα, πως να συνθέτουν προγράμματα με βάση μπλοκ, να χρησιμοποιούν αισθητήρες και να δημιουργούν συσκευές για να αντιμετωπίσουν το πρόβλημα. Κάθε μάθημα διαρκούσε 40 λεπτά, και όλα τα μαθήματα ολοκληρώθηκαν μέσα σε διάστημα τριών μηνών. Οι μαθητές ολοκλήρωσαν τη δημιουργία και τον σχεδιασμό του «Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ» στα δύο τελευταία μαθήματα. Μετά, τους δόθηκαν οδηγίες για να επιδείξουν και να αξιολογήσουν την λύση που δημιούργησαν.

Το ερωτηματολόγιο Q1 χορηγήθηκε σε όλους τους μαθητές για να καθοριστεί η ισοδυναμία όλων των ομάδων. Το πρώτο μέρος της Εκπαιδευτικής Παρέμβασης (ΕΠ1) εκτελέστηκε σε όλες τις ομάδες μαθητών. Στα πρώτα τέσσερα μαθήματα, οι εκπαιδευτικοί διατήρησαν τις δραστηριότητες σε βασικά επίπεδα (γνώση, κατανόηση, εφαρμογή), με στόχο να βοηθήσουν τους μαθητές να κατανοήσουν τις έννοιες του Arduino και της ΤΝ, συμπεριλαμβανομένης της μηχανικής μάθησης, και της ενσωμάτωσης λογισμικών και συστημάτων (π.χ., προγραμματισμός με μπλοκ, ηλεκτρονικές πλακέτες κυκλωμάτων), καθώς οι μελέτες έχουν δείξει την αποτελεσματικότητα αυτών των δραστηριοτήτων (Chiu et al., 2021; Johnson et al., 2020; Wang & Chen, 2022; Ng et al., 2023). Κατά τη διάρκεια αυτής της περιόδου, οι μαθητές δημιούργησαν ομάδες μάθησης που συμμετείχαν σε διάφορες δραστηριότητες προωθώντας τη μαθητοκεντρική μάθηση εντός του εκπαιδευτικού πλαισίου, χρησιμοποιώντας κατάλληλες παιδαγωγικές μεθόδους και διδακτικά εργαλεία για τη βελτίωση των αποτελεσμάτων της ψηφιακής εκπαίδευσης των μαθητών στην ΤΝ. Οι εκπαιδευτικοί παρείχαν σαφείς οδηγίες ενώ ταυτόχρονα επέτρεπαν στους μαθητές την ελευθερία να αναστοχάζονται τις εμπειρίες των μαθημάτων που απέκτησαν από τις δικές τους προσωπικές παρατηρήσεις, δημιουργώντας μια αίσθηση προσωπικής ιδιοκτησίας στους μαθητές σχετικά με τα αποτελέσματα της εκπαίδευσης.

Μετά την παραπάνω πρώτη φάση της εκπαιδευτικής παρέμβασης, το ερωτηματολόγιο Q2 διανεμήθηκε σε όλους τους μαθητές προκειμένου να ελεγχθεί αν όλες οι ομάδες ήταν ακόμη «ισοδύναμες». Στα επόμενα οκτώ μαθήματα, οι ομάδες των μαθητών χωρίστηκαν σε τρεις ομάδες και προετοιμάστηκαν να αντιμετωπίσουν το πρόβλημα του πραγματικού κόσμου που επέλεξαν. Η ομάδα Maker Learning (ML) μέσω πρακτικών και δημιουργικών δραστηριοτήτων με Arduino. Η ομάδα Εικονικής Μάθησης (VL) μέσω δραστηριοτήτων προσομοίωσης με Arduino. Η ομάδα Κλασικής

Μάθησης (C) μέσω διαλέξεων βασισμένων σε παρουσιάσεις/στατικές οπτικοποιήσεις μαθησιακού υλικού στον Διαδραστικό Πίνακα.

Οι μαθητές οργανώθηκαν σε ομάδες των τεσσάρων για να συνεργαστούν στον σχεδιασμό και την κατασκευή «Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ». Οι μαθητές ενθαρρύνθηκαν να ξεκινήσουν την ανάπτυξη, αναλογιζόμενοι την κατανόησή τους για το πώς οι αισθητήρες μεταδίδουν σήματα στους υπολογιστές και αναρωτώμενοι πώς αυτά τα δεδομένα μπορούν να χρησιμοποιηθούν για την επίλυση προβλημάτων του πραγματικού κόσμου. Χρησιμοποίησαν την πλατφόρμα εκπαίδευσης μοντέλων μηχανικής μάθησης, γνωστή ως Edge Impulse, για να αποκτήσουν μια εικόνα της έκτασης των συνόλων δεδομένων που θα μπορούσαν να εκπαιδευτούν για αποτελεσματική επεξεργασία σημάτων. Οι μαθητές εισήχθησαν σε αρχές της ψηφιακής επεξεργασίας σήματος. Οι εκπαιδευτικοί παρουσίασαν διάφορες επιλογές για τη δειγματοληψία και επεξεργασία των σημάτων των αερίων για να βελτιώσουν την κατανόηση των μαθητών σχετικά με τη δύναμη της ΤΝ στη διαχείριση της ταξινόμησης των σημάτων. Οι μαθητές καθοδηγήθηκαν να χρησιμοποιήσουν τεχνικές μηχανικής μάθησης για να εντοπίσουν χαρακτηριστικά από σύνολα δεδομένων που οι συμβατικές μέθοδοι δεν μπορούσαν να διακρίνουν ως σήματα "βλαβερών αερίων". Σε αυτό το πλαίσιο, μετά την ανάλυση των χαρακτηριστικών των σημάτων "βλαβερών αερίων", η μηχανή ήταν σε θέση να εντοπίσει τις ειδοποιήσεις και να τις ταξινομήσει. Κάθε μάθημα επικεντρωνόταν στην εκπαίδευση των μαθητών σύμφωνα με τις αρχές και τις διαδικασίες του PBL, χρησιμοποιώντας συγκεκριμένες διδακτικές τεχνικές, με στόχο να βελτιώσουν την αυτοπεποίθηση των μαθητών. Ο κύριος στόχος ήταν να βελτιωθεί η κατανόηση των μαθητών για διαδικασίες PBL και την εφαρμογή τους για την δημιουργία ενός «Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ».

Στο τελευταίο μάθημα, οι μαθητές παρουσίασαν τη εργασία τους ενώ εκτιμούσαν αυτή των άλλων μαθητών. Δείχνοντας τη δουλειά τους, αντιμετωπίζουν ερωτήσεις όπως "Τι είναι η ΤΝ;" και "Πώς λειτουργούν οι ανιχνευτές αερίων που χρησιμοποιούν ΤΝ;". Κατά τη διάρκεια των μαθημάτων, οι ηθικές έννοιες της ΤΝ, συμπεριλαμβανομένης της αξιοπιστίας, ασφάλειας, ιδιωτικότητας, ευθύνης, συμπερίληψης, ανοιχτότητας, συνειδητοποίησης, λογοδοσίας και άλλοι νομικοί κανόνες, εξηγήθηκαν. Επίσης, συζήτησαν τυχόν ηθικά ζητήματα που αντιμετωπίστηκαν σχετικά με την χρήση της ΤΝ.

Κατά τη διάρκεια αυτής της σειράς 12 μαθημάτων, οι μαθητές απέκτησαν βασικές γνώσεις και δεξιότητες στην ΤΝ, ενώ δημιουργούσαν, σχεδίαζαν και παρουσίαζαν τα επιτεύγματά τους. Η εφαρμογή των γνώσεων τους στον σχεδιασμό και την κατασκευή «Ανιχνευτή Αερίων με ενσωματωμένη ΤΝ» απεικονίζει μια αναβάθμιση των δεξιοτήτων επίλυσης προβλημάτων που εξαρτάται από την ανάπτυξη προηγμένων γνωστικών διαδικασιών και τη συνεργασία.

ΣΥΛΛΟΓΗ ΚΑΙ ΑΝΑΛΥΣΗ ΔΕΔΟΜΕΝΩΝ

Η μελέτη χρησιμοποίησε ένα σχεδιασμό μεικτών μεθόδων. Ποσοτικά και ποιοτικά δεδομένα συλλέχθηκαν ειδικά για τριγωνοποίηση και ανάλυση. Αυτή η μεθοδολογία παρέχει μια πιο ολοκληρωμένη εικόνα στις ερωτήσεις της μελέτης (Creswell & Plano, 2018). Τα ποσοτικά δεδομένα αποκτήθηκαν μέσω ενός ερωτηματολογίου αυτοαξιολόγησης, του Problem-Solving Inventory, που περιλάμβανε κλειστού τύπου ερωτήσεις σχετικά με τα χαρακτηριστικά της επίλυσης προβλημάτων, ενώ τα ποιοτικά δεδομένα συλλέχθηκαν μέσω ημι-δομημένων συνεντεύξεων που σχεδιάστηκαν για να εξερευνήσουν τις αντιλήψεις των μαθητών για το μάθημα PBL (Cohen, 2018).

ΤΟ ΕΡΓΑΛΕΙΟ ΑΞΙΟΛΟΓΗΣΗΣ ΕΠΙΛΥΣΗΣ ΠΡΟΒΛΗΜΑΤΩΝ (PSI)

Το Ερωτηματολόγιο Επίλυσης Προβλημάτων (PSI; Heppner & Petersen, 1982) έχει χρησιμοποιηθεί για την αξιολόγηση των στάσεων επίλυσης προβλημάτων. Το PSI έχει 32 στοιχεία που αξιολογούνται σε μια κλίμακα Likert (από 1 = Διαφωνώ Απόλυτα έως 6 = Συμφωνώ Απόλυτα) και κατηγοριοποιείται σε τρεις υποκλίμακες: (α) Αυτοπεποίθηση στην Επίλυση Προβλημάτων, (β) Στυλ Προσέγγισης-Αποφυγής και (γ) Προσωπικός Έλεγχος. Η Αυτοεκτίμηση στην Επίλυση Προβλημάτων αξιολογεί την αυτοεκτιμημένη αυτοπεποίθηση, πίστη και βεβαιότητα στην αποτελεσματική επίλυση ζητημάτων, με 11 στοιχεία (π.χ., "Εμπιστεύομαι την ικανότητά μου να επιλύω νέα και δύσκολα προβλήματα."). Το Στυλ Προσέγγισης-Αποφυγής αξιολογεί τις τάσεις των ατόμων να αντιμετωπίζουν ή να αποφεύγουν τα προβλήματα και αποτελείται από 16 στοιχεία (π.χ., "Όταν μια λύση σε ένα πρόβλημα δεν είναι επιτυχής, δεν εξετάζω γιατί δεν λειτούργησε."). Τέλος, ο Προσωπικός Έλεγχος αξιολογεί πτυχές της αυτορρύθμισης σχετικά με τα συναισθήματα και τη συμπεριφορά, περιλαμβάνοντας πέντε στοιχεία (π.χ., "Όταν οι πρώτες μου προσπάθειες να λύσω ένα πρόβλημα αποτυγχάνουν, γίνομαι ανήσυχος για την ικανότητά μου να χειριστώ την κατάσταση.").

Το PSI έχει προσαρμοστεί στην Ελλάδα και έχει δείξει αξιοπιστία και εγκυρότητα ως ένα έγκυρο εργαλείο για την αξιολόγηση των στάσεων επίλυσης προβλημάτων στον ελληνικό πληθυσμό, ενώ έδειξε συντελεστή αξιοπιστίας άλφα 0,90 για την αυτοπεποίθηση στην επίλυση προβλημάτων, 0,89 για το στυλ προσέγγισης-αποφυγής, 0,72 για τον προσωπικό έλεγχο και 0,91 για τη συνολική βαθμολογία της κλίμακας (Kourmousi et al., 2016). Οι ερευνητές αυτής της

πιλοτικής μελέτης βρήκαν έναν υψηλό συντελεστή αξιοπιστίας alpha 0,73 για το ερωτηματολόγιο Q2 PSI και 0,77 για το ερωτηματολόγιο Q1 PSI με βάση το δείγμα τους.

ΣΥΝΕΝΤΕΥΞΕΙΣ

Η αξιολόγηση νέων εκπαιδευτικών παρεμβάσεων είναι κρίσιμη, καθώς βασίζεται στις πληροφορίες που αποκτώνται από συνεντεύξεις με μαθητές και παρατηρήσεις εκπαιδευτικών για να καθοριστεί η χρησιμότητά τους και ο αντίκτυπός τους (Beagon et al., 2019). Για να αποκτήσουν ευρεία εικόνα της μεθοδολογίας του μαθήματος και να εντοπίσουν τάσεις που σχετίζονται με το PBL από την οπτική των μαθητών, οι ερευνητές δημιούργησαν έναν ημι-δομημένο οδηγό συνέντευξης. Ο οδηγός σχεδιάστηκε για να διασφαλίσει ότι οι απαντήσεις των μαθητών ευθυγραμμίζονταν άμεσα με τη μεθοδολογία PBL που χρησιμοποιήθηκε κατά τη διάρκεια της διδασκαλίας. Η τεχνική της τριγωνοποίησης ενισχύει τα ευρήματα μέσω του συνδυασμού πολλαπλών πηγών δεδομένων. Οι συνεντεύξεις πραγματοποιήθηκαν μετά την ολοκλήρωση του μαθήματος, με μέση διάρκεια σχεδόν 10 λεπτά. Πριν από τις συνεντεύξεις, οι ερευνητές καθόρισαν τους στόχους της μελέτης και έλαβαν συγκατάθεση. Στις συνεντεύξεις, οι συμμετέχοντες ζητήθηκε αρχικά να παρέχουν τις συνολικές τους εντυπώσεις για κάθε φάση, ακολουθούμενες από ερωτήσεις σχετικά με συγκεκριμένες πτυχές της PBL που αφορούν κάθε φάση (π.χ., διαδικασίες και στρατηγικές μάθησης που χρησιμοποιήθηκαν, αντιληπτές προκλήσεις και ευκαιρίες, καθοδήγηση και υποστηρικτικά χαρακτηριστικά, αντιληπτά αποτελέσματα μάθησης) (Patton, 2002).

ΣΥΖΗΤΗΣΗ

Μία πρωταρχική ανάλυση των δεδομένων αποκάλυψε ότι το περιβάλλον PBL μπορεί να επηρεάσει θετικά το επίπεδο των δεξιοτήτων επίλυσης προβλημάτων των μαθητών δευτεροβάθμιας εκπαίδευσης και, επιπλέον, την μαθησιακή τους εμπειρία. Με τη σύγκριση του βαθμού επιρροής μεταξύ των εκπαιδευτικών προσεγγίσεων Maker Learning (ML), Virtual Learning (VL) και Classic Learning (C), φαίνεται ότι τα αποτελέσματα της μάθησης μέσω της ML αναπτύσσει στους μαθητές δεξιότητες επίλυσης προβλημάτων σε πολύ υψηλό επίπεδο, ενώ τα αποτελέσματα μάθησης της VL ακολουθούν πολύ κοντά. Μέσω αυτής της μελέτης, στοχεύουμε να προσδιορίσουμε την επίδραση των εκπαιδευτικών προσεγγίσεων και των αποτελεσμάτων τους που ενισχύουν τους μαθητές με κρίσιμες δεξιότητες επίλυσης προβλημάτων, προετοιμάζοντάς τους για μελλοντικές καριέρες στην επιστήμη και την τεχνολογία.

Η Εκπαίδευση Βασισμένη σε Προβλήματα (PBL) και η Εκπαίδευση Δημιουργών που περιλαμβάνει ΤΝ έδειξε σαφή και στατιστικά σημαντική βελτίωση στις ικανότητες επίλυσης προβλημάτων των μαθητών δευτεροβάθμιας εκπαίδευσης. Ενώ όλες οι ομάδες παρουσίασαν ανάπτυξη, η ομάδα ML έδειξε τη μεγαλύτερη βελτίωση, αντηχώντας τα αποτελέσματα προηγούμενης έρευνας σε κατασκευαστικά, πρακτικά μαθησιακά περιβάλλοντα. Αυτό το εύρημα είναι ιδιαίτερα σχετικό με τα επιχειρήματα διεθνών οργανισμών (OECD) που τονίζουν τη σημασία του πλαισίου εμπειρικής μάθησης στην καλλιέργεια δεξιοτήτων του 21ου αιώνα, συμπεριλαμβανομένης της προσαρμοστικότητας, της καινοτομίας και της επίλυσης προβλημάτων. Καθώς οι εκπαιδευτικές τεχνολογίες και οι εφαρμογές ΤΝ συνεχίζουν να εξελίσσονται, η μελλοντική έρευνα θα πρέπει να εξετάσει πώς αυτά τα υβριδικά μοντέλα μάθησης αποδίδουν σε διάφορα εκπαιδευτικά περιβάλλοντα και πληθυσμούς μαθητών. Μια εκτενέστερη ανάλυση των δεδομένων σχεδιάζεται να ενισχύσει τα ευρήματα.

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ΚΑΛΛΙΕΡΓΕΙΑ ΤΗΣ ΗΠΙΑΣ ΔΕΞΙΟΤΗΤΑΣ ΤΗΣ ΚΡΙΤΙΚΗΣ ΣΚΕΨΗΣ ΜΕΣΩ ΤΝ ΣΤΟ ΔΗΜΟΤΙΚΟ ΣΧΟΛΕΙΟ

Θεοδώρου Μιχαήλ
ΠΕ70, Διευθυντής 9/θ Δημοτικό Σχολείο Γραικοχωρίου
ΔΠΕ Θεσπρωτίας
email: mtheodor@sch.gr

Γκιόκα Δήμητρα
ΠΕ 70, Διευθύντρια 6/θ Δημοτικό Σχολείο Ασπροκλησίου Σαγιάδας
ΔΠΕ Θεσπρωτίας
email: dgioka@sch.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά την αξιοποίηση των chatbots, στην καλλιέργεια της ήπιας δεξιότητας της κριτικής σκέψης σε μαθητές των μεγαλύτερων τάξεων του Δημοτικού Σχολείου. Σχεδιάστηκαν διδακτικά σενάρια σε πέντε γνωστικά αντικείμενα (Γλώσσα, Ιστορία, Αγωγή του Πολίτη, Γεωγραφία, Εργαστήρια Δεξιοτήτων), με τη συνδυαστική χρήση τριών δωρεάν εργαλείων: ChatGPT, Gemini 2.0 Flash και Gemini 2.0 Flash Thinking. Τα σενάρια εφαρμόστηκαν σε δύο Δημοτικά Σχολεία του νομού Θεσπρωτίας και η αποτίμηση των αποτελεσμάτων έγινε μέσω ημιδομημένων συνεντεύξεων σε πέντε εκπαιδευτικούς.

Τα ευρήματα ανέδειξαν ότι τα chatbots συνέβαλαν καθοριστικά στον σχεδιασμό δραστηριοτήτων που ενισχύουν την ανάλυση και τη σύγκριση απόψεων, την τεκμηρίωση ή την αμφισβήτηση άποψης, τον εντοπισμό έμμεσων μηνυμάτων και fake news, τη λήψη τεκμηριωμένης άποψης και την επίλυση προβλήματος. Επιπλέον, πρότειναν καινοτόμες ιδέες που υπερέβαιναν το αρχικό διδακτικό πλάνο των εκπαιδευτικών.

Ωστόσο, με το prompting παρατηρήθηκαν περιορισμοί ως προς την ακρίβεια συγκεκριμένων πληροφοριών, γεγονός που αντιμετωπίστηκε με τη συνδυαστική χρήση της διαδικτυακής αναζήτησης (searching). Συνολικά, η μελέτη επιβεβαιώνει τις προοπτικές των εργαλείων ΤΝ ως υποστηρικτικών μηχανισμών στην εκπαιδευτική πράξη, επισημαίνοντας όμως την ανάγκη για κριτικό ψηφιακό γραμματισμό τόσο από τους εκπαιδευτικούς όσο και από τους μαθητές.

Τέλος η έρευνα θέτει τη βάση για μελλοντικά προγράμματα ευρύτερης κλίμακας, ενταγμένα στο θεωρητικό πλαίσιο της Θεωρίας της Αλλαγής.

Λέξεις – κλειδιά: chatbots, καλλιέργεια κριτικής σκέψης, δημοτικό σχολείο.

ΕΙΣΑΓΩΓΗ

Ήπιες δεξιότητες

Ο όρος 'ήπιες δεξιότητες' (soft skills) από τον κόσμο των επιχειρήσεων και της εργασίας, πέρασε γρήγορα στην εκπαίδευση. Πολλοί παγκόσμιοι οργανισμοί (ΟΟΣΑ) και εκπαιδευτικά συστήματα, αντιλήφθηκαν την αξία τους για την ανάπτυξη της προσωπικότητας και φρόντισαν να τις καλλιεργήσουν μέσω σχολικών προγραμμάτων (Scheerens, et al., 2020).

Σύμφωνα με τον ΟΟΣΑ (OECD, 2019) και πολλούς ερευνητές (Taylor et al., 2017), οι ήπιες δεξιότητες καλλιεργούνται πιο αποτελεσματικά, όταν οι μαθητές στην παιδική ηλικία ενταχθούν σε περιβάλλοντα μάθησης και κοινωνικής αλληλεπίδρασης.

Σε αντιδιαστολή με τις σκληρές δεξιότητες (hard skills), που είναι αντικειμενικά μετρήσιμες και πιστοποιούνται, οι ήπιες δεξιότητες είναι υποκειμενικές και δύσκολά μετρήσιμες. Ωστόσο είναι εξαιρετικά σημαντικές για την προσωπική και επαγγελματική επιτυχία του ατόμου (Claxton et al., 2016), γιατί όπως εύστοχα παρατηρούν οι Heckman & Kautz (2012), αφορούν τα χαρακτηριστικά της προσωπικότητας.

Στη βιβλιογραφία δεν υπάρχει επίσημος ορισμός. Για την Allvin (2016) είναι οι δεξιότητες μάθησης του 21ου αιώνα. Ο Rao (2012) αναφέρεται σε δεξιότητες επικοινωνίας, διαπραγμάτευσης, γραφής, ακρόασης, και επίλυσης προβλημάτων. Η Soffel (2016) τις κατηγοριοποιεί σε βασικούς γραμματισμούς, ικανότητες και χαρακτηριστικά προσωπικότητας. Ο Diakiw (2016) αναφέρεται κυρίως στην αυτογνωσία και την ανάπτυξη θετικών σχέσεων. Οι Bhagra & Sharma (2018) τις κατηγοριοποίησαν σε τρεις ομάδες, που αφορούν ενδοπροσωπικά, διαπροσωπικά και διανοητικά χαρακτηριστικά. Οι Claxton et al. (2016) τις καθορίζουν ως τάσεις σκέψης, ενώ τέλος η Duckworth (2016) τις αναφέρει ως θέληση για επίτευξη κάποιου σκοπού.

Ιδιαίτερο ενδιαφέρον για την εκπαίδευση έχει το μοντέλο που πρότεινε το Παγκόσμιο Οικονομικό Φόρουμ (WEF, 2016), κατηγοριοποιώντας τις ήπιες δεξιότητες σε τρεις κατηγορίες, όπως και η Soffel (2016). Σε Βασικούς Γραμματισμούς - Foundational Literacies (βασικές δεξιότητες στην καθημερινότητα), σε Ικανότητες – Competencies (αντιμετώπιση σύνθετων προκλήσεων που απαιτούν κριτική σκέψη, συνεργασία, δημιουργικότητα, επικοινωνία) και σε Χαρακτηριστικά προσωπικότητας - Character Qualities (περιέργεια, επιμονή, πρωτοβουλία, προσαρμοστικότητα, κ.ά.). Το μοντέλο αυτό κατά την άποψη κάποιων ερευνητών προσφέρει μια πιο ολοκληρωμένη αντίληψη των ήπιων δεξιοτήτων, που χαρακτηρίζονται επίσης και ως δεξιότητες του 21ου αι (Feraco et al., 2022).

Θα μπορούσε να ειπωθεί ότι οι ήπιες δεξιότητες συνθέτουν τον χαρακτήρα του ανθρώπου, που όλοι θα θέλαμε να έχουμε φίλο, συνεργάτη, προϊστάμενο και γενικότερα δίπλα μας.

Στη συνέχεια θα γίνει αναφορά στην ήπια δεξιότητα που θα αποτελέσει το κεντρικό σημείο της παρούσας μελέτης, δηλαδή στην κριτική σκέψη και αν αυτή μπορεί να καλλιεργηθεί, με την αξιοποίηση της Τεχνητής Νοημοσύνης.

Κριτική Σκέψη

Η κριτική σκέψη, αν και ως ήπια δεξιότητα δεν είναι εύκολα μετρήσιμη ή παρατηρήσιμη, αποτυπώνεται σε συμπεριφορές και επιλογές των μαθητών (Shek & Merrick, 2017). Η κριτική σκέψη ορίζεται ως η ικανότητα ανεξάρτητης αξιολόγησης πληροφοριών και ιδεών. Αποτελεί απαραίτητο εφόδιο για την λήψη τεκμηριωμένων αποφάσεων, την επίλυση προβλημάτων και την αποτελεσματική επικοινωνία. Βοηθάει στη διάκριση της αλήθειας από την παραπληροφόρηση και στην κριτική αντιμετώπιση των επιχειρημάτων (Raj et al., 2022).

Η ανάπτυξη της κριτικής σκέψης στους μαθητές επηρεάζεται από πλήθος παραγόντων. Γνωστικές θεωρίες υπογραμμίζουν την σταδιακή εξέλιξη της ικανότητας κριτικής σκέψης (DeVries, 2000), με τον Piaget να εστιάζει στην ατομική κατασκευή γνώσης και τον Vygotsky στην κοινωνική αλληλεπίδραση (Nardo, 2021). Παράλληλα, ψυχολογικά χαρακτηριστικά όπως η νοημοσύνη, ευνοούν την κριτική σκέψη. Επιπρόσθετα, κοινωνικοί και περιβαλλοντικοί παράγοντες, όπως το υποστηρικτικό περιβάλλον στην οικογένεια και το σχολείο επιδρούν θετικά στην κριτική σκέψη (Kuhn, 1999).

Η υιοθέτηση κατάλληλων διδακτικών προσεγγίσεων, ενθαρρύνει την κριτική σκέψη μέσω της συμμετοχής, της ανάλυσης και της επίλυσης προβλημάτων (Marin & Halpern, 2011). Εκπαιδευτικές δραστηριότητες, όπως η ανάλυση πηγών, η αξιολόγηση επιχειρημάτων και η λύση προβλημάτων, προσφέρουν ευκαιρίες για εξάσκηση. Η ενθάρρυνση της

αμφισβήτησης, της έρευνας και της διατύπωσης τεκμηριωμένων απόψεων αποτελούν βασικά στοιχεία καλλιέργειας κριτικής σκέψης, όπως και οι ευκαιρίες για μεταφορά της σε πολλαπλά πεδία (Tiruneh et al., 2018).

Η ανάπτυξη καινοτόμων διδακτικών προσεγγίσεων και η αξιοποίηση της τεχνολογίας για την καλλιέργεια της κριτικής σκέψης, αποτελούν βασικές προκλήσεις (Meirbekoy et al., 2022). Επιπλέον, η καλλιέργεια κριτικής σκέψης οφείλει να υπερβεί τα στενά ακαδημαϊκά πλαίσια μιας συμβατικής αίθουσας διδασκαλίας και να ενσωματωθεί σε όλες τις εκπαιδευτικές βαθμίδες, από την παιδική ηλικία έως την ενηλικίωση και σε κάθε είδους δράση, εντός και εκτός σχολικής αίθουσας (Tiruneh et al., 2018).

Chatbots στην Εκπαίδευση

Τα chatbots είναι προηγμένα μοντέλα τεχνητής νοημοσύνης που μπορούν να κατανοήσουν και να παράγουν ανθρώπινες συνομιλίες. Λαμβάνουν πληροφορίες από Μεγάλα Δεδομένα (Big Data) και τις επεξεργάζονται μέσω Μηχανικής Μάθησης (Machine Learning). Έχουν γνωρίσει ραγδαία άνθηση τα τελευταία χρόνια (Agarwal & Wadhwa, 2020).

Η Τεχνητή Νοημοσύνη (ΤΝ) εφαρμόζεται σήμερα σε πολλά και διαφορετικά πεδία (Han, 2023· Nicolescu & Tudorache, 2022). Προφανώς ο τομέας της εκπαίδευσης δεν θα μπορούσε να μείνει ανεπηρέαστος (Guilherme, 2019).

Μοντέλα ΤΝ χρησιμοποιούνται για εξατομικευμένη μάθηση, προσαρμοσμένη στο μαθησιακό προφίλ του μαθητή. Chatbots, που δίνουν στους μαθητές πληροφορίες, απαντώντας άμεσα στις ερωτήσεις τους και σε τυχόν απορίες, εφαρμόζονται ήδη στις υποχρεωτικές βαθμίδες εκπαίδευσης (Amanatidis et al., 2021). Η χρήση των chatbots στην εκπαίδευση, χρησιμοποιείται σε διάφορα μαθησιακά αντικείμενα, όπως της Γλώσσας (Huang et al., 2022). Οι μελέτες αναφέρουν τις δυνατότητες των chatbots στην βελτίωση γλωσσικών δεξιοτήτων (Kwon et al., 2023), τη συμβολή τους σε σενάρια διδασκαλίας (Runtian, 2024), καθώς και σε παραγωγή ποικίλων γλωσσικών ασκήσεων (Theodorou et al, 2024a).

Η ΤΝ αξιοποιείται ήδη στην Ειδική Αγωγή για την αξιολόγηση και τον σχεδιασμό παρεμβάσεων (Marino et al., 2023), αλλά και στη διδασκαλία συναισθηματικών στόχων (Kang et al., 2022). Ακόμα, η ΤΝ εφαρμόζεται στη διοίκηση της σχολικής μονάδας για την αντιμετώπιση του βραχνά της γραφειοκρατίας στην εκπαίδευση (Lakasas, 2024), επιδρώντας θετικά στις δεξιότητες των εκπαιδευτικών (Hagag et al., 2023), απελευθερώνοντας χρόνο για πιο δημιουργικές ασχολίες (Filgueiras, 2023). Για παράδειγμα, σύμφωνα με τους Θεοδώρου κ.ά. (Theodorou 2024b), τα chatbots μπορούν να χρησιμοποιηθούν με επιτυχία στην συμπλήρωση όλων των πεδίων της πλατφόρμας διαχείρισης αναφορών για περιστατικά ενδοσχολικής βίας και εκφοβισμού.

Διλήμματα

Ωστόσο, η χρήση chatbots στην εκπαίδευση, ενώ προσφέρει αναμφισβήτητα πλεονεκτήματα, φέρνει στο προσκήνιο και ορισμένα ηθικά διλήμματα (Akgun & Greenhow, 2022). Η διασφάλιση της ιδιωτικότητας λόγω της συγκέντρωσης δεδομένων, η διαρροή εκπαιδευτικών πληροφοριών, η επίδραση στην ανθρώπινη σκέψη και στην ανθρώπινη αλληλεπίδραση, αλλά και η αντιμετώπιση των ψηφιακών ανισοτήτων (ψηφιακό χάσμα), αποτελούν ζωτικής σημασίας προκλήσεις που οφείλουμε να αντιμετωπίσουμε για να διασφαλίσουμε παράλληλα μια ολοκληρωμένη, δίκαιη και ηθική υιοθέτηση της ΤΝ στην εκπαίδευση, προς όφελος του κοινωνικού συνόλου (Bu, 2022).

Πολλοί ερευνητές επίσης, τονίζουν ότι η ανεξέλεγκτη χρήση της από τους μαθητές, μπορεί να προκαλέσει σύγχυση, ιδίως στους αρχάριους και στους νεότερους και θα πρέπει να γίνεται μέσα σε ένα καλά οριοθετημένο πλαίσιο (Runtian, 2024). Επιπλέον, στους κινδύνους που προκύπτουν έχει καταγραφεί και η πιθανότητα αποδόμησης της σχέσης δασκάλου μαθητή (Bu, 2022).

Η Ευρωπαϊκή Ένωση φαίνεται να αναγνωρίζει τη σημασία και την επίδραση της ΤΝ στην εκπαίδευση, αλλά και τους κινδύνους που εγκυμονεί η χρήση της. Για το σκοπό αυτό θέσπισε το "Σχέδιο δράσης για την Ψηφιακή Εκπαίδευση για την Ευρώπη 2021-2027". Το νομικό αυτό κείμενο εστιάζει στην ανάπτυξη ψηφιακών δεξιοτήτων στους μαθητές και στην ενσωμάτωση της ΤΝ στο εκπαιδευτικό σύστημα (Annette, 2021).

Η Ευρωπαϊκή Επιτροπή μέσω του Σχεδίου, έχει θέσει ως στόχο κυρίως τη διαμόρφωση ενός κοινού πλαισίου για την ανάπτυξη ψηφιακών δεξιοτήτων, μειώνοντας το ψηφιακό χάσμα μεταξύ των πολιτών της. Έτσι, φιλοδοξεί να

προωθήσει την τεχνητή νοημοσύνη με έναν κοινωνικά δίκαιο τρόπο, διασφαλίζοντας την ηθική και υπεύθυνη χρήση της στην εκπαίδευση, χωρίς να οξύνει τις κοινωνικές ανισότητες (European Commission, 2020).

Από την άλλη πλευρά, πρέπει να αναφερθεί ότι δεν συμμερίζονται όλοι τις ανησυχίες για την εξέλιξη και τις επιπτώσεις της ΤΝ σε θέματα. Για παράδειγμα ο Ν. Νεγρεπόντε (Negroponte, 2025) είναι αντίθετος με όσους ζητούν ρύθμιση της ΤΝ.

Η παρούσα μελέτη θα επιχειρήσει να απαντήσει στα παρακάτω ερευνητικά ερωτήματα:

Η αξιοποίηση των chatbots (ChatGPT, Gemini 2.0 Flash και Gemini 2.0 Flash Thinking) συμβάλλει στον σχεδιασμό διδακτικών σεναρίων που καλλιεργούν την κριτική σκέψη σε μαθητές των μεγάλων τάξεων του Δημοτικού Σχολείου;

Αν τα chatbots συμβάλλουν στην ανάπτυξη της κριτικής σκέψης, ποιες συγκεκριμένες όψεις της κριτικής σκέψης καλλιεργούν και ποιο είναι το επίπεδο πρωτοτυπίας των προτεινόμενων δραστηριοτήτων;

Ποιοι περιορισμοί και ποιες προκλήσεις επηρεάζουν την αποτελεσματικότητα των chatbots στην εκπαιδευτική πρακτική;

ΣΚΟΠΟΣ - ΜΕΘΟΔΟΣ

Σκοπός της παρούσας μελέτης είναι η διερεύνηση των δυνατοτήτων της Τεχνητής Νοημοσύνης στην καλλιέργεια της ήπιας δεξιότητας της κριτικής σκέψης σε μαθητές των μεγάλων τάξεων του Δημοτικού Σχολείου. Πιο συγκεκριμένα, η μελέτη επικεντρώνεται στην εξέταση της αποτελεσματικότητας των Chatbots στο σχεδιασμό διδακτικών σεναρίων που καλλιεργούν την κριτική σκέψη. Τα διδακτικά σενάρια θα σχεδιαστούν στα μαθήματα Γλώσσα, Ιστορία, Αγωγή του Πολίτη, Εργαστήρια Δεξιοτήτων και Γεωγραφία.

Η εφαρμογή των προηγμένων μοντέλων τεχνητής νοημοσύνης έγινε από εκπαιδευτικούς δυο διαφορετικών Δημοτικών Σχολείων του Ν. Θεσπρωτίας, οι οποίοι χρησιμοποίησαν τα chatbots, ως υποστηρικτικά εργαλεία στο σχεδιασμό και την ανάπτυξη διδακτικών σεναρίων.

Η αποτίμηση έγινε από ομάδα πέντε εκπαιδευτικών των δυο σχολείων, με ημιδομημένες συνεντεύξεις. Αξιολογήθηκε η συμβολή των προτεινόμενων δραστηριοτήτων στην επίτευξη των διδακτικών στόχων, η πρωτοτυπία των προτεινόμενων δραστηριοτήτων και η ταχύτητα απόκρισης των εργαλείων με βάση τον αριθμό των προτροπών.

Η εμπειρική έρευνα πραγματοποιήθηκε σε δυο φάσεις. Στην πρώτη φάση, που έλαβε χώρα κατά τη διάρκεια των δυο πρώτων τριμήνων του σχολικού έτους 2024 – 2025, σχεδιάστηκαν και υλοποιήθηκαν τα διδακτικά σενάρια. Στη δεύτερη φάση, μετά τις 10 Μαρτίου 2025, έγινε η ανάλυση και η συγγραφή των ευρημάτων.

Στην έρευνα χρησιμοποιήθηκαν οι δωρεάν εκδόσεις τριών διαδεδομένων εργαλείων Τεχνητής Νοημοσύνης (αλφαβητικά) : Chat GPT, Gemini 2.0 Flash & Gemini 2.0 Flash Thinking (experimental). Το πρώτο εργαλείο είναι της Microsoft και άλλα δυο της Google.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Στα αποτελέσματα δεν παρουσιάζεται η διαδικασία των αλυσιδωτών προτροπών (chain prompting), λόγω περιορισμού χώρου. Τα διδακτικά σενάρια, επίσης λόγω περιορισμού χώρου, παρουσιάζονται συνοπτικά.

Ιστορία: Δ΄ τάξη, 18ο Κεφ., Η ναυμαχία της Σαλαμίνας.

«Συζήτηση – Debate: Πού θα έπρεπε να δοθεί η ναυμαχία;».

Στόχος: Οι μαθητές αναλύουν τα επιχειρήματα των δύο πλευρών (Ευρυβιάδης - Θεμιστοκλής) και αποφασίζουν. Διαδικασία: Χωρίζονται σε δύο ομάδες αντίστοιχα. Κάθε ομάδα συλλέγει επιχειρήματα από το κείμενο και προσπαθεί να πείσει την άλλη πλευρά. Στο τέλος, γίνεται ψηφοφορία με θέμα "Αν ήσουν ναύαρχος, τι θα αποφάσιζες;".

«Παιχνίδι ρόλων: Αν ήσουν ο Ξέρξης…».

Στόχος: Οι μαθητές αναπτύσσουν ενσυναίσθηση και σκέφτονται στρατηγικά. Διαδικασία: Κάποιοι μαθητές αναλαμβάνουν τον ρόλο του Ξέρξη και των συμβούλων του, διαβάζουν το κείμενο και προσπαθούν να σκεφτούν ένα διαφορετικό σχέδιο για τον περσικό στόλο. Παρουσιάζουν τη στρατηγική τους στην τάξη και εκτιμούν αν θα είχε αλλάξει η έκβαση της μάχης.

«Δημοσιογράφοι στην Αρχαία Ελλάδα».

Στόχος: Να ερμηνεύσουν τα γεγονότα με βάση διαφορετικές οπτικές. Διαδικασία: Οι μαθητές γράφουν ένα άρθρο εφημερίδας για τη Ναυμαχία της Σαλαμίνας από διαφορετικές οπτικές: Αθηναίος πολεμιστής, Πέρσης στρατηγός, Σπαρτιάτης πολίτης και ένας έμπορος που επηρεάζεται από τον πόλεμο. Μετά τη συγγραφή, οι μαθητές συζητούν πώς το ίδιο γεγονός μπορεί να ερμηνευτεί με διαφορετικούς τρόπους.

«Εξαφάνιση φιδιού από το Ερέχθειο».

Στόχος: αξιολόγηση ηθικών διλημμάτων και διάκριση γεγονότος από την παραπλάνηση. Διαδικασία: Τεχνική των ερωτήσεων. Γιατί ο Θεμιστοκλής χρειάστηκε να χρησιμοποιήσει ένα τέχνασμα για να πείσει τους Αθηναίους; Θεωρείτε ότι ήταν σωστός ο τρόπος που χρησιμοποίησε ο Θεμιστοκλής για να πείσει τους Αθηναίους; Γιατί; Μπορείτε να σκεφτείτε παρόμοιες περιπτώσεις σήμερα, όπου οι άνθρωποι προσπαθούν να πείσουν τους άλλους χρησιμοποιώντας μη λογικά επιχειρήματα;

Εργαστήρια Δεξιοτήτων: Ψηφιακή βιωσιμότητα (digital sustainability)

«Συζητήσεις και Debate»

Στόχος: Επιχειρηματολογία – Διαφορετικές οπτικές. Διαδικασία: Θέματα για συζήτηση: "Τα πλεονεκτήματα και μειονεκτήματα του cloud storage από περιβαλλοντική σκοπιά", "Είναι τα social media ενεργειακά σπάταλα;", "Να επιβληθεί περιορισμός στον χρόνο χρήσης ηλεκτρονικών συσκευών για οικολογικούς λόγους;". Διαχωρισμός ομάδων σε υποστηρικτές και αντιπάλους ενός θέματος, ώστε οι μαθητές να αναπτύξουν επιχειρήματα και να μάθουν να εξετάζουν πολλαπλές οπτικές.

«Υπολογισμός και Σύγκριση Ψηφιακού Αποτυπώματος»

Στόχος: Συγκέντρωση και Ανάλυση δεδομένων. Εργαστηριακή δραστηριότητα όπου οι μαθητές υπολογίζουν το ψηφιακό αποτύπωμά τους (κατανάλωση kWh, τόνερ, χαρτιού, κτλ) και προτείνουν τρόπους οικολογικής χρήσης της ψηφιακής τεχνολογίας

«Σύνδεση με πολιτικές και δίκτυα»

Στόχος: Αναζήτηση βιώσιμων πολιτικών. Διαδικασία: Σύνδεση με το Ευρωπαϊκό Πλαίσιο GreenComp, έναν κοινό οδηγό της ΕΕ για την ανάπτυξη 12 βασικών περιβαλλοντικών δεξιοτήτων. Σύνδεση με εθνικά δίκτυα (ecoschools) & διεθνή (FEE).

Κοινωνική και Πολιτική Αγωγή: Στ' τάξη, 2Β, Δικαιώματα και υποχρεώσεις του Πολίτη

"Φανταστείτε ότι ο Θεόδωρος Κολοκοτρώνης ζει σήμερα. Πώς θα έδειχνε τον πατριωτισμό του;»
Στόχος: Μεταφορά ιστορικών δεδομένων στο παρόν. Να αναγνωρίσουν ότι ο πατριωτισμός σε καιρό ειρήνης εκδηλώνεται με την καθημερινή στάση του υπεύθυνου πολίτη. Διαδικασία: Χωρίζουμε τους μαθητές σε 4 ομάδες και η κάθε ομάδα σκέφτεται πέντε πράξεις που θα έκανε σήμερα ο ήρωας για να αποδείξει την αγάπη του για την πατρίδα. Θεματικές: Σεβασμός στους Νόμους και τη Δημόσια περιουσία, Φορολογική συνείδηση, Σεβασμός στον Συμπολίτη και Παιδεία. Παρουσίαση ιδεών, διάλογος, ψηφοφορία.

Γεωγραφία: Στ΄ τάξη, 27ο Κεφ., Το κλίμα της Ευρώπης και οι ανθρώπινες δραστηριότητες

«Ζω στην Ισλανδία – Ζω στην Ελλάδα»
Στόχος: Οι μαθητές κατανοούν πώς διαφορετικά περιβάλλοντα επηρεάζουν τον τρόπο ζωής των ανθρώπων. Διαδικασία: Οι μαθητές σε έναν πίνακα 2 στηλών, συμπληρώνουν για την κάθε χώρα διαφορές στο ντύσιμο, φαγητό, διασκέδαση, αθλήματα.

«Έχει ψαράδες στην Αυστρία;»

Στόχος: Οι μαθητές ανακαλύπτουν πώς η γεωγραφία καθορίζει επαγγέλματα και οικονομικές δραστηριότητες. Διαδικασία: οι μαθητές χωρίζονται σε 3 ομάδες (Νάξος, Μόναχο, Όσλο). Γράφουν από ένα απλό κείμενο για τα επαγγέλματα, τα προϊόντα, τον Τουρισμό και τη Βιομηχανία κάθε περιοχής. Η Ελλάδα έχει 'βαριά βιομηχανία';

«Μεσογειακοί και Βόρειοι λαοί»

Στόχος: Οι μαθητές σκέφτονται αν οι άνθρωποι γίνονται πιο κοινωνικοί ή εσωστρεφείς λόγω του κλίματος. Διαδικασία: Προβληματισμός – Ερωτήματα – σύνδεση κλίματος με χαρακτήρα και καθημερινότητα (πχ σιέστα). Οι μαθητές καλούνται να τεκμηριώσουν την άποψη ότι οι Μεσογειακοί λαοί που ζουν σε ζεστό κλίμα, ανοιχτούς χώρους, έχουν περισσότερες κοινωνικές σχέσεις, γιατί ζουν έξω. Αντίστοιχα, οι Βόρειοι είναι πιο εσωστρεφείς.

«Γεωγραφικές γειτονιές: Ελλάδα – Ελβετία»

Στόχος: Να κατανοήσουν οι μαθητές ότι η γεωγραφική θέση μιας χώρας επηρεάζει την πολιτική, την οικονομία, την άμυνα, τον πολιτισμό και την καθημερινή ζωή των ανθρώπων της. Διαδικασία: οι μαθητές χωρίζονται σε δυο ομάδες και καταγράφουν με ποια κράτη συνορεύει η Ελλάδα και με ποια η Ελβετία. Στη συνέχεια βρίσκουν πηγές που να πληροφορούν για τις αμυντικές δαπάνες, τις πολιτισμικές επιρροές, την εξωτερική πολιτική, τις διαμάχες και τους πολέμους της κάθε χώρας. Στο τέλος συνδέουν αιτίες με αποτελέσματα σε οικονομία, εξωτερική πολιτική, ροές μεταναστών, υγεία, παιδεία.

Γλώσσα και Ανθολόγιο Ε΄ και Στ΄ τάξης. «Ανάλυση και Σύγκριση Κειμένων»

«Ανάλυση και Σύγκριση κειμένων»

Στόχος: Να αναπτύξουν οι μαθητές την ικανότητα σύγκρισης και αξιολόγησης διαφορετικών απόψεων και ύφους. Διαδικασία: Επιλέγουμε δύο κείμενα με διαφορετική σκοπιά για το ίδιο θέμα (π.χ. άρθρο υπέρ και κατά των social media).Οι μαθητές εντοπίζουν επιχειρήματα, σκοπό συγγραφέα, ύφος. Συζητούν: Ποιο επιχείρημα είναι πιο πειστικό;

"Ψάξε το Υπονοούμενο" (Κρυφά Μηνύματα στα Κείμενα)

Στόχος: Ανάπτυξη ενσυναίσθησης και ανάλυσης προθέσεων. Διαδικασία: Δίνουμε ένα κείμενο όπου δεν αναφέρεται άμεσα το βασικό μήνυμα (π.χ. μια διαφήμιση). Οι μαθητές καλούνται να απαντήσουν: "Τι υπονοεί το κείμενο χωρίς να το λέει ξεκάθαρα;"

«Fake News»

Στόχος: Να μάθουν οι μαθητές να αμφισβητούν πληροφορίες και να ελέγχουν πηγές. Διαδικασία: Δίνουμε μια αληθινή και μια ψεύτικη είδηση (π.χ. από εφημερίδες ή διαδίκτυο). Ζητάμε να εντοπίσουν: Πώς μπορούμε να καταλάβουμε αν είναι αλήθεια; Ποιες πηγές είναι αξιόπιστες; Πώς επηρεάζουν τα fake news τη γνώμη του κόσμου;"

«Δελτίο Ειδήσεων»

Στόχος: Ανάλυση και αξιολόγηση είδησης. Διαδικασία: παραθέτουμε ένα απόσπασμα μιας είδησης και ζητάμε από τους μαθητές να διακρίνουν σημεία που παρουσιάζουν το γεγονός ή μια υποκειμενική άποψη. Δείχνουμε ένα βίντεο με μια είδηση και ζητάμε από τους μαθητές να εντοπίσουν γλωσσικά στοιχεία (λέξεις, σχήματα υπερβολής) και παραγλωσσικά στοιχεία (ring tones, μουσική υπόκρουση, φωτισμός, ζουμ, κ.ά.), που επηρεάζουν την ερμηνεία της είδησης από το κοινό. Οι μαθητές καταγράφουν τη σειρά ειδήσεων σε διαφορετικά κανάλια και συζητάνε αν η σειρά μιας είδησης, επηρεάζει τον αντίκτυπό της.

ΣΥΜΠΕΡΑΣΜΑΤΑ - ΠΕΡΙΟΡΙΣΜΟΙ

Κρίνοντας από τα διδακτικά σενάρια που αναφέρθηκαν στα αποτελέσματα, παρατηρείται ότι και στα πέντε διδακτικά αντικείμενα προτάθηκαν δραστηριότητες που καλλιεργούν την κριτική σκέψη. Πιο συγκεκριμένα, προτάθηκαν δραστηριότητες που καλλιεργούν σημαντικές όψεις της κριτικής σκέψης, όπως την αξιολόγηση πληροφοριών και πηγών, τη λήψη τεκμηριωμένων αποφάσεων, την ανάλυση και επίλυση προβλημάτων, τη διάκριση της αλήθειας από την παραπληροφόρηση, την κριτική αντιμετώπιση των επιχειρημάτων, την ενθάρρυνση της αμφισβήτησης και τη μεταφορά των δεξιοτήτων αυτών σε πολλαπλά πεδία (Marin & Halpern, 2011; Raj et al., 2022; Tiruneh et al., 2018). Εκπαιδευτικές δραστηριότητες όπως οι παραπάνω, προσφέρουν ευκαιρίες για εξάσκηση και καλλιέργεια της κριτικής σκέψης (Tiruneh et al., 2018).

Οι εκπαιδευτικοί που συμπλήρωσαν τις ημιδομημένες συνεντεύξεις, συμφώνησαν ότι τα chatbots μπορούν να σχεδιάσουν σε ικανοποιητικό βαθμό διδακτικά σενάρια που καλλιεργούν την κριτική σκέψη. Επίσης ανέφεραν και περιπτώσεις όπου τα chatbots ξεπέρασαν τα όρια της σκέψης τους, προτείνοντας μάλιστα πρωτότυπες δραστηριότητες, που αυτοί δεν είχαν σκεφτεί: «η εξαφάνιση του φιδιού στο Ερέχθειο» και «η συνέντευξη με έναν έμπορο» (Ιστορία), η σύνδεση δράσεων με εθνικό και διεθνές δίκτυο (Εργαστήρια Δεξιοτήτων) και τα «Δελτία Ειδήσεων», ήταν μερικές από αυτές τις πρωτότυπες δραστηριότητες. Και όλα αυτά με υψηλή ταχύτητα απόκρισης, ελάχιστες προτροπές και ελάχιστα λάθη.

Από την άλλη πλευρά, παρατηρήθηκαν περιορισμοί και προκλήσεις, που σαφώς θα πρέπει να λάβει υπόψη ο εκπαιδευτικός στο σχεδιασμό των διδακτικών σεναρίων. Για παράδειγμα σε περιπτώσεις που χρειάστηκε να γίνει εστίαση σε συγκεκριμένη πληροφορία (όπως χρονολογία, όνομα, κ.ά.), τα chatbots φάνηκε κάποιες φορές να υστερούν, παρέχοντας αντικρουόμενες και λανθασμένες πληροφορίες. Σε αυτές τις περιπτώσεις, για αποφυγή του κινδύνου της παραπληροφόρησης, έγινε χρήση του διαδικτύου με αναζήτηση (search) στον ιστό. Φάνηκε δηλαδή το searching να υπερτερεί του prompting στην εγκυρότητα της πληροφορίας. Επίσης παρατηρήθηκε ότι ο τρόπος σύνταξης μιας προτροπής ή η γλώσσα που δίνεται η προτροπή (αγγλικά ή ελληνικά), επιδρά στα αποτελέσματα που θα λάβει ο χρήστης.

Συμπερασματικά μπορεί να υποστηριχθεί ότι τα chatbots είναι ελατήρια σκέψης, αρκεί να υπάρχει σκέψη. Δηλαδή αν δοθεί από τον χρήστη μια καλά δομημένη προτροπή (ή αλυσίδα προτροπών) και ο χρήστης γνωρίζει το αντικείμενο αναφοράς, τότε τα αποτελέσματα που θα λάβει, θα απογειώσουν την σκέψη του. Σε διαφορετική περίπτωση, υπάρχει σοβαρός κίνδυνος να ληφθούν αφιλτράριστα αποτελέσματα αμφίβολης ποιότητας και αναξιόπιστα.

Ένας σημαντικός περιορισμός στην παρούσα εμπειρική μελέτη, είναι ο μικρός αριθμός εκπαιδευτικών που χρησιμοποίησαν εργαλεία ΤΝ και συμπλήρωσαν τις ημιδομημένες συνεντεύξεις. Θα μπορούσε μελλοντικά να γίνει ένας ευρύτερος ερευνητικός σχεδιασμός, που να εμπλέκει μεγαλύτερο δείγμα εκπαιδευτικών και σχολείων και να περιλαμβάνει ένα πρόγραμμα παρέμβασης με σκοπό την τροποποίηση συμπεριφορών των μαθητών, σε πιο οργανωμένο, δομημένο και μετρήσιμο πλαίσιο, όπως αυτό που παρέχει η Θεωρία της Αλλαγής, με τα επιμέρους στάδιά της (Kail & Lumley, 2012).

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E- TWINNING PROGRAM: "PHOTO MAGIC, FROM OLD PHOTOS TO AI"

Καλοκίδου Βασιλική
Εκπαιδευτικός Πρωτοβάθμιας Εκπαίδευσης ΠΕ60, Msc
23ο Νηπιαγωγείο Σταυρούπολης, Θεσσαλονίκη, Ελλάδα
e-mail: vaso.kal74@gmail.com

Ρουσσέτη Κυριακή
Εκπαιδευτικός Πρωτοβάθμιας Εκπαίδευσης ΠΕ60, Msc
2ο Νηπιαγωγείο Νέων Μαλγάρων, Θεσσαλονίκη, Ελλάδα
e-mail: krous81@gmail.com

ΠΕΡΙΛΗΨΗ

Το έργο αποτελεί ένα Ευρωπαϊκό project που εκπονήθηκε στην πλατφόρμα ESEP τη σχολική χρονιά 2024-2025. Στο έργο συμμετέχουν 19 μέλη, από την Ελλάδα, Τουρκία, Πορτογαλία, Ιταλία και Ρουμανία. Ιδρυτές του είναι το 23ο Νηπιαγωγείο Σταυρούπολης Θεσσαλονίκης και το ICS di Scandale από το San Mauro Marchesato, Ιταλία.

Το πρόγραμμα επικεντρώνεται στην παιδαγωγική αξιοποίηση της τεχνητής νοημοσύνης και την ενσωμάτωσή της σε υπάρχοντα μαθησιακά περιβάλλοντα και πλατφόρμες μάθησης. Αφόρμηση αποτελεί μία βαλίτσα που βρίσκεται τυχαία έξω από το νηπιαγωγείο, γεμάτη με παλιές φωτογραφίες και αντικείμενα μιας γυναίκας της παλιάς εποχής. Οι φωτογραφίες αποτελούν το έναυσμα για να ξεκινήσουμε το ταξίδι μας, από τις παλιές φωτογραφίες έως την Τεχνητή Νοημοσύνη. Ένα ταξίδι γνωριμίας με την ιστορία της φωτογραφίας, τις ασπρόμαυρες και έγχρωμες φωτογραφίες, τις φωτογραφίες πορτραίτα, τη φωτογραφία του δρόμου, αλλιώτικες φωτογραφίες με στόχο την καλλιέργεια ενσυναίσθησης και ευαισθησίας, σε συνδυασμό με τις δυνατότητες που προσφέρουν τα εργαλεία Τεχνητής Νοημοσύνης στη βελτίωση, δημιουργία, επεξεργασία και μετατροπή της εικόνας.

Εργαλεία ΤΝ που χρησιμοποιήθηκαν είναι τα εξής:
https://www.bing.com/images/create , https://www.remove.bg/el , https://padlet.com/ , https://deepai.org/ , https://genially.com/ , https://www.canva.com/ , https://www.artbreeder.com/ , https://ai.nero.com/ , http://vidnoz.com/ , https://en.linoit.com/ , https://www.cartoonize.net/

Λέξεις – κλειδιά: Προσχολική Αγωγή, Ευρωπαϊκά Προγράμματα, Τεχνητή Νοημοσύνη

ΕΙΣΑΓΩΓΗ

Ο όρος Τεχνητή Νοημοσύνη αναφέρεται στις διαδικασίες με τις οποίες οι μηχανές (δηλαδή τα συστήματα υπολογιστών) μπορούν να προσομοιώσουν τη φυσική νοημοσύνη που επιδεικνύουν οι άνθρωποι, όπως η μάθηση, η συλλογιστική και η αυτοδιόρθωση (Διδακτική των Νέων Τεχνολογιών). Ο όρος τεχνητή νοημοσύνη είναι ένας γενικός όρος που περιλαμβάνει ένα ευρύ φάσμα μεθόδων και τεχνικών. Η ανάπτυξή και η εξέλιξή της βασίζεται στην ποσότητα, στην ποιότητα και την ευκολία πρόσβασης των μεγάλων δεδομένων.

Η τεχνητή νοημοσύνη προσφέρει τεράστια οφέλη και ευκαιρίες στην οικονομική ανάπτυξη, τη βελτίωση των γεωργικών συστημάτων, την αντιμετώπιση της υγείας, την αποτελεσματική διαχείριση της κλιματικής αλλαγής καθώς και τη βελτίωση της ποιότητας της εκπαίδευσης.

Στον τομέα της εκπαίδευσης η τεχνητή νοημοσύνη μπορεί να ενδυναμώσει τους εκπαιδευτικούς εξατομικεύοντας τη μαθησιακή εμπειρία με τη συλλογή, ανάλυση και συσχέτιση αλληλεπιδράσεων που συμβαίνουν τόσο σε εικονικές αλλά και φυσικές τάξεις με δυνατότητα δημιουργίας ψηφιακών προφίλ για κάθε μαθητή. Εξασφαλίζονται δίκαιες και χωρίς αποκλεισμούς εκπαιδευτικές ευκαιρίες για άτομα που ζουν σε απομακρυσμένες περιοχές, πρόσφυγες, καθώς και άτομα με αναπηρίες. Προωθείται η συνεργατική μάθηση καθώς άτομα από διάφορα γεωγραφικά μέρη έχουν πρόσβαση σε συλλογική μάθηση που υποστηρίζεται από υπολογιστή. Επιπλέον η τεχνητή νοημοσύνη χρησιμοποιείται και για την υποστήριξη του συστήματος με την εξόρυξη εκπαιδευτικών δεδομένων για κατανομή πόρων και υπηρεσίες καθοδήγησης για τον σχηματισμό προφίλ ικανοτήτων του μαθητή, ώστε να επιλέξει με μεγαλύτερη ευκολία τις μελλοντικές σπουδές του, με απώτερο στόχο την καλύτερη δυνατή επαγγελματική του αποκατάσταση. Επίσης, η ΤΝ μπορεί να χρησιμοποιηθεί για την επέκταση της εκπαίδευσης πέρα από την παραδοσιακή τάξη μιμούμενη τη διαδικασία ενός ανθρώπινου δασκάλου.

ΤΟ ΣΧΕΔΙΟ ΔΡΑΣΗΣ ΤΗΣ ΕΥΡΩΠΑΪΚΗΣ ΕΝΩΣΗΣ ΓΙΑ ΤΗΝ Τ.Ν.

Τα τελευταία χρόνια γίνονται προσπάθειες για την τοποθέτηση της τεχνητής νοημοσύνης στην πρωτοβάθμια και δευτεροβάθμια εκπαίδευση, σε συνδυασμό με την εκπαίδευση υπολογιστικής σκέψης, την εκπαίδευση STEAM, την εκπαιδευτική ρομποτική κ.α. Το Σχέδιο Δράσης για την Ψηφιακή Εκπαίδευση (2021-2027) της Ευρωπαϊκής Επιτροπής, αποτελεί μία πρωτοβουλία της Ευρωπαϊκής Ένωσης, η οποία θέτει ένα κοινό όραμα μεταξύ των χωρών- μελών για εκπαίδευση υψηλής ποιότητας. Αποτελεί βασικό παράγοντα για την υλοποίηση του οράματος με στόχο τη δημιουργία ενός Ευρωπαϊκού Χώρου Εκπαίδευσης ως το 2025. Καθορίζει δύο στρατηγικές προτεραιότητες και 14 δράσεις για τη στήριξή τους.

Πρώτη προτεραιότητα είναι «η προώθηση της ανάπτυξης ενός οικοσυστήματος ψηφιακής εκπαίδευσης υψηλών επιδόσεων» με 6 δράσεις. Ξεκινώντας από τον εποικοδομητικό διάλογο μεταξύ των κρατών-μελών σχετικά με την ψηφιακή εκπαίδευση και τις ψηφιακές δεξιότητες και στη συνέχεια συστήνοντας ειδικά συμβούλια, καταλήγει στην καταγραφή κατευθυντήριων γραμμών δεοντολογίας για τη χρήση ΤΝ και δεδομένων στο πλαίσιο της διδασκαλίας και της μάθησης για τους εκπαιδευτικούς πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης.

Ακολουθεί η δεύτερη προτεραιότητα, δηλαδή «η ενίσχυση των ψηφιακών δεξιοτήτων και ικανοτήτων για τον ψηφιακό μετασχηματισμό των εμπλεκομένων στην εκπαιδευτική διαδικασία» με τις υπόλοιπες 7 δράσεις. Αρχικά, καταρτίζονται οι κατευθυντήριες γραμμές για τους εκπαιδευτικούς και το υπόλοιπο προσωπικό με στόχο την προώθηση του ψηφιακού γραμματισμού και την αντιμετώπιση της παραπληροφόρησης μέσω της εκπαίδευσης και της κατάρτισης. Στη συνέχεια, ακολουθούν δράσεις όπως η επικαιροποίηση του ευρωπαϊκού πλαισίου ψηφιακών ικανοτήτων, ώστε να συμπεριληφθούν η τεχνητή νοημοσύνη και οι σχετικές δεξιότητες με τα δεδομένα, η έκδοση ευρωπαϊκού πιστοποιητικού ψηφιακών δεξιοτήτων και η σύσταση συμβουλίου σχετικά με τη βελτίωση της όλης διαδικασίας. Φυσικά, υπάρχει ανατροφοδότηση του όλου εγχειρήματος με συλλογή δεδομένων από τις εμπλεκόμενες χώρες- μέλη και ορίζονται περίοδοι πρακτικής άσκησης στο πλαίσιο της πρωτοβουλίας «ψηφιακή ευκαιρία». Η Ευρωπαϊκή Ένωση τέλος, δίνει μεγάλη σημασία στη συμμετοχή των γυναικών στις θετικές επιστήμες, την τεχνολογία, τη μηχανική και τα μαθηματικά, δηλαδή τις σπουδές πάνω στα STEM και προσπαθεί να το ενισχύσει αυτό από μικρότερες ηλικίες, σε όλη τη διάρκεια πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης, ξεκινώντας από το νηπιαγωγείο.

ΠΕΡΙΓΡΑΦΗ ΠΡΟΓΡΑΜΜΑΤΟΣ

Το έργο αποτελεί ένα ευρωπαϊκό πρόγραμμα διάρκειας 8 μηνών, από τον Οκτώβριο του 2024 ως και τον Μάϊο του 2025. Συμμετείχαν συνολικά 19 εκπαιδευτικοί από 5 ευρωπαϊκές χώρες: Ελλάδα, Ιταλία, Ρουμανία, Πορτογαλία και

Τουρκία.

Το μαθησιακό περιβάλλον οργανώθηκε κατάλληλα δίνοντας έμφαση στις διεργασίες της διερευνητικής, της παιγνιώδους και της συνεργατικής μάθησης . Σύμφωνα με τη διερευνητική μάθηση δίνεται έμφαση στην ενεργό συμμετοχή του παιδιού στη μαθησιακή διαδικασία (Blessinger & Carfora, 2014, όπως παρατίθεται στο Πρόγραμμα Σπουδών για την Προσχολική Εκπαίδευση, 2022). Πρόκειται για μία διαδικασία ανάπτυξης εσωτερικών κινήτρων μάθησης και θετικών στάσεων και συμπεριφορών απέναντι στο καινούριο, που ενισχύει την ικανότητα των παιδιών να ανταποκρίνονται δημιουργικά στις προκλήσεις και οδηγεί στην αγάπη για τη μάθηση, βάζοντας τα θεμέλια για μια διά βίου προοπτική (Penderi, Petrogiannis & McDermott, 2014, όπως παρατίθεται στο Πρόγραμμα Σπουδών για την Προσχολική Εκπαίδευση, 2022). Η διερευνητική μάθηση στηρίζεται στην κονστρουκτιβιστική προσέγγιση, την κοινωνικοπολιτισμική και την ανακαλυπτική μάθηση όπου το παιδί επιστρατεύει τις προγενέστερες γνώσεις του για να ανταποκριθεί στις ανάγκες της διερευνητικής διαδικασίας, χειρίζεται τα αντικείμενα και επενεργεί στο περιβάλλον αποκτώντας νέες εμπειρίες. Επιπλέον στις δραστηριότητες του προγράμματος αποδόθηκαν χαρακτηριστικά παιγνιώδους διάθεσης υποκινούμενα από τα ενδιαφέροντα των παιδιών με σκοπό να κατακτήσουν γνώσεις, να αναπτύξουν στάσεις και δεξιότητες που είναι σημαντικές για την προσωπική τους εξέλιξη και την κατανόηση του κόσμου. Τέλος, μέσω της συνεργατικής μάθησης δόθηκε η ευκαιρία στα παιδιά των συνεργαζόμενων σχολείων να αλληλεπιδράσουν μεταξύ τους, με τους εκπαιδευτικούς αλλά και με τα εργαλεία και τα υλικά που χρησιμοποίησαν, ενισχύοντας με αυτό τον τρόπο την επικοινωνία αλλά και την κριτική τους σκέψη.

Πριν ξεκινήσουμε πρώτα συστηνόμαστε τόσο οι εκπαιδευτικοί όσο και τα σχολεία μας. Περιγράφουμε το μέρος που βρίσκεται το σχολείο μας, αν είναι σε αστική ή αγροτική περιοχή, καθώς και τι ακριβώς κάνουμε, πώς περνάμε τη μέρα μας, σύμφωνα πάντα με το Αναλυτικό Πρόγραμμα Σπουδών για την Προσχολική Αγωγή της κάθε χώρας. Κατόπιν, αναφερόμαστε στον Κώδικα Δεοντολογίας (netiquette), τον οποίο θα εφαρμόσουμε σε όλη τη διάρκεια του προγράμματος και περνάμε στις επιμέρους ενότητες.

Η κεντρική ιδέα του έργου είναι μία βαλίτσα, η οποία καταφθάνει σε κάθε σχολείο, γεμάτη με προσωπικά αντικείμενα και φωτογραφίες μίας γυναίκας, από όταν ήταν μωρό μέχρι και σήμερα. Τα παιδιά παρατηρούν ιδιαίτερα τις φωτογραφίες και ξεκινά μία συζήτηση για τις διαφορές μεταξύ των παλαιότερων φωτογραφιών και των σημερινών, αλλά και τους τρόπους με τους οποίους οι άνθρωποι απαθανάτιζαν στιγμές της ζωής τους στο παρελθόν (μέσω της ζωγραφικής, της φωτογραφίας από κάποιον επαγγελματία που διέθετε τον απαραίτητο φωτογραφικό εξοπλισμό) μέχρι και σήμερα που είναι πολύ εύκολο να φωτογραφίσουμε ακόμη και τον εαυτό μας με ένα κινητό τηλέφωνο, αλλά και να επεξεργαστούμε τις φωτογραφίες μέσω εργαλείων (πχ φίλτρα, αυτοκόλλητα). Το κάθε σχολείο συμπληρώνει έναν ψηφιακό συνεργατικό εννοιολογικό χάρτη σχετικά με αυτά που γνωρίζουν τα παιδιά για την τέχνη της φωτογραφίας, αλλά και αυτά που θέλουν να μάθουν. Σε αυτόν θα ανατρέξουμε στο τέλος του έργου, όταν θα έρθει η ώρα της ανασκόπησης και της αξιολόγησης, για να διαπιστώσουμε κατά πόσο οι στόχοι που είχαμε θέσει επιτεύχθηκαν.

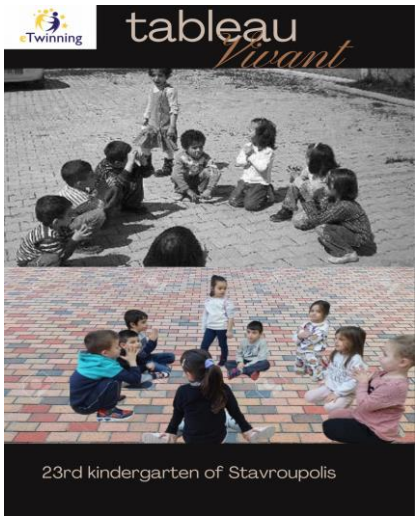
Αρχικά, γίνεται μία διαδικτυακή έρευνα από τα σχολεία σχετικά με την ιστορία της φωτογραφίας και τους σταθμούς- ορόσημα στην εξέλιξή της και συμπληρώνεται μία ιστοριογραμμή και ένα ψηφιακό συνεργατικό έγγραφο. Ξεκινώντας από τον Κινέζο φιλόσοφο Mozi, το 400 π.Χ., ο οποίος θεωρούσε ότι ο άνθρωπος μπορεί να σκηνοθετήσει τη ζωή του και να αλλάξει τις συνθήκες μέσα στις οποίες ζει, απλά αλλάζοντας την οπτική του στα πράγματα. Ο Έλληνας φιλόσοφος Αριστοτέλης το 350 π.Χ. μίλησε πρώτος για τον τρόπο με τον οποίο ταξιδεύει το φως, παρατηρώντας τις ακτίνες του ήλιου κατά τη διάρκεια μίας ηλιακής έκλειψης. Στο σύγγραμμά του «Προβλήματα» περιγράφει την κατασκευή ενός σκοτεινού θαλάμου, μέσα από τον οποίο ταξιδεύει το φως και αντικατοπτρίζει την εξωτερική εικόνα μέσα σ΄ αυτόν, αλλά ανεστραμμένη. Αυτή η κατασκευή αιώνες μετά υπήρξε η έμπνευση για την πρώτη συσκευή φωτογράφισης με το ίδιο όνομα και το 1826 την πρώτη μόνιμη φωτογραφία. Πληροφορούμαστε επίσης για την εξέλιξη της φωτογραφίας από ασπρόμαυρη σε έγχρωμη, τα φωτογραφικά φιλμ, τα είδη των φακών και των φωτογραφικών μηχανών, μέχρι σήμερα που προτιμάμε συνήθως τις ψηφιακές φωτογραφίες, με τη χρήση των κινητών τηλεφώνων, των τάμπλετ, τις οποίες μπορούμε εύκολα να επεξεργαστούμε κιόλας μέσω ψηφιακών εργαλείων, φίλτρων και της Τεχνητής Νοημοσύνης φυσικά.

Στο σημείο αυτό εισάγουμε τα παιδιά στην έννοια της Τεχνητής Νοημοσύνης χρησιμοποιώντας την εργαλειοθήκη του προγράμματος Erasmus+ "I'm not a Robot: working with artificial intelligence in early childhood education". Συστήνουμε τον «Ψηφιακό Βοηθό» και με τη βοήθειά του αναπτύσσονται οι ακόλουθες δραστηριότητες:

- **Ασπρόμαυρη και έγχρωμη φωτογραφία**: Τα παιδιά συνειδητοποιούν τη σημασία των χρωμάτων στη ζωή μας και διαχωρίζουν ασπρόμαυρες και έγχρωμες φωτογραφίες σε ταμπλό.

- **«Tableau vivant- Ζωντανή φωτογραφία»**: Τα παιδιά διαλέγουν ασπρόμαυρες φωτογραφίες από το διαδίκτυο που απεικονίζουν παιδιά να παίζουν και τις αναρτούν σε συνεργατικό έγγραφο. Στη συνέχεια διαλέγουν κάποια/ ες και τη ζωντανεύουν. Τις τοποθετούν μαζί και συγκρίνουν τα αποτελέσματα. (Εικόνες 1α και 1β)

Εικόνα 1α και 1β
Tableau vivant





- **Χρωματισμός ασπρόμαυρης εικόνας με χρήση ΤΝ**: Τα παιδιά διαλέγουν μία εικόνα και προσπαθούν να μαντέψουν τι χρώματα έχει. Στη συνέχεια τη χρωματίζουν χρησιμοποιώντας διάφορα εργαλεία ΤΝ. (Εικόνα 2)

Εικόνα 2
Χρωματισμός ασπρόμαυρης εικόνας με ΤΝ



- **Η έννοια της «Προτροπής»:** Τα παιδιά καλούνται να βάλουν τις φωτογραφίες της γιαγιάς σε χρονολογική σειρά από το παρελθόν προς το παρόν. Στη συνέχεια με τη βοήθεια της ΤΝ φτιάχνουν νέες φωτογραφίες δίνοντας προτροπές, πχ «φτιάξε μου μία φωτογραφία με ένα κορίτσι (γιαγιά) και την οικογένειά της» (Εικόνα 3), «φτιάξε μου μία φωτογραφία με μία κοπέλα (γιαγιά) και τις φίλες της» (Εικόνα 4)

- **Πορτρέτο στη φωτογραφία**: Το κάθε σχολείο γράφει στη γλώσσα του τη λέξη «πορτρέτο» και δημιουργείται ένα πολυγλωσσικό συννεφόλεξο. Τα παιδιά μαθαίνουν για τα διάφορα ρεύματα ζωγραφικής και μελετούν αντιπροσωπευτικούς πίνακες ζωγραφικής του καθενός. Ακολουθεί παρατήρηση πορτρέτων και συζήτηση με τη στρατηγική See- Think- Wonder του Project Zero Visible Thinking routines απ΄ το Harvard University, μια μετασχηματιστική και μαθητοκεντρική προσέγγιση στη μάθηση, με την οποία ενθαρρύνονται οι μαθητές να παρατηρούν, να ερμηνεύουν και να διερευνούν διάφορα θέματα, προωθώντας την κριτική σκέψη και την ενεργό

συμμετοχή στην τάξη. Κατόπιν, γίνεται διαχωρισμός μεταξύ «πορτρέτα- πίνακες» και «πορτρέτα- φωτογραφίες». Επίσης, τα παιδιά μαθαίνουν για την **προσωπογραφία** και την **αυτοπροσωπογραφία**, μελετώντας τα έργα του Picasso. Χρησιμοποιούν κινητές συσκευές (κινητό τηλέφωνο, ταμπλέτα) για να φωτογραφίσουν και να δημιουργήσουν έκθεση με τα πορτρέτα των φίλων τους.

Εικόνα 3
«Φτιάξε μου μια φωτογραφία με ένα κορίτσι και την οικογένειά της»



Εικόνα 4
«Φτιάξε μου μία φωτογραφία με μία κοπέλα και τις φίλες της»



- **Τέχνη και ΤΝ:** Τα σχολεία μέσω εποπτικού υλικού έρχονται σε επαφή με τα ρεύματα ζωγραφικής από τον 15ο αι. έως σήμερα. Γίνεται αναφορά στα ιδιαίτερα χαρακτηριστικά της κάθε εποχής και τα παιδιά μελετούν αντιπροσωπευτικούς πίνακες. Στη συνέχεια δημιουργούν μία συνεργατική παρουσίαση. Επιλέγουν έναν πίνακα ζωγραφικής, αναζητούν πληροφορίες στο διαδίκτυο για το όνομα του καλλιτέχνη, το κίνημα ζωγραφικής που εκπροσωπεί, την ιστορία πίσω από τον πίνακα. Επιλέγουν ένα πορτραίτο από τον πίνακα και χρησιμοποιούν εργαλεία τεχνητής νοημοσύνης για να μετατρέψουν το πορτραίτο σε πίνακα ζωγραφικής άλλης εποχής ή κινήματος. (Εικόνα 5,6)

Εικόνα 5
Δημιουργία του πίνακα του Van Gogh από ιμπρεσσιονιστική σε στυλ ροκοκό



Εικόνα 6
«Το κορίτσι με το μαργαριταρένιο σκουλαρίκι» του Johannes Vermeer



- **«Φωτογραφία του δρόμου»:** Πρόκειται για ένα είδος φωτογραφίας που καταγράφει την καθημερινή ζωή σε δημόσιο χώρο. Η ίδια η δημοσιότητα του χώρου επιτρέπει στον φωτογράφο να τραβήξει ειλικρινείς φωτογραφίες αγνώστων, συχνά εν αγνοία τους. Οι φωτογράφοι του δρόμου δεν έχουν απαραίτητα κάποιον κοινωνικό σκοπό στο μυαλό τους, αλλά προτιμούν να απομονώνουν και να αποτυπώνουν στιγμές που διαφορετικά θα μπορούσαν να περάσουν απαρατήρητες. Δίνονται οδηγίες στους γονείς των παιδιών να τα βοηθήσουν να φωτογραφήσουν τους δρόμους έξω από το σπίτι τους και να τις αναρτήσουν σε συνεργατικό διαδικτυακό χάρτη. Έτσι, χρησιμοποιείται η «ανεστραμμένη τάξη», μία εκπαιδευτική μέθοδος «η οποία μεταφέρει την παράδοση του μαθήματος έξω από την αίθουσα διδασκαλίας (κυρίως μέσω βίντεο) προκειμένου να αφιερωθεί περισσότερος χρόνος στην τάξη σε διαδραστικές δραστηριότητες όπου οι μαθητές ασχολούνται ενεργά με το περιεχόμενο της διδασκαλίας» (Flipped Learning Network, 2016).

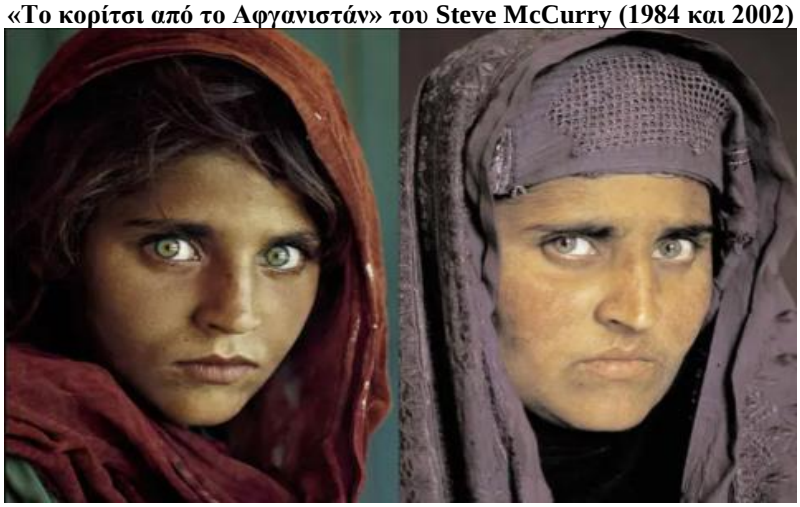
- «**Ταξιδεύω σε άλλο μέρος**»: Τα παιδιά κάθε σχολείου αναρτούν σε συνεργατικό έγγραφο μία φωτογραφία της πόλης ή του χωριού τους. Στη συνέχεια φωτογραφίζονται ομαδικά στο σχολείο τους. Με τη βοήθεια ψηφιακού εργαλείου αφαιρείται το φόντο από τη φωτογραφία τους. Επιλέγουν μία φωτογραφία από το μέρος που βρίσκεται ένα άλλο σχολείο και προσθέτουν με την ΤΝ τους εαυτούς τους στο μέρος εκείνο. Έτσι, μπορούν να «ταξιδέψουν» σε όποιο μέρος τους αρέσει. (Εικόνα 7)

Εικόνα 7
«Ταξιδεύω σε μία άλλη πόλη»



- **Μια διαφορετική βαλίτσα. «Το κορίτσι από το Αφγανιστάν»**: Αφορμή για τη δραστηριότητα είναι η διάσημη φωτογραφία του φωτορεπόρτερ Steve McCurry, που το 1984, στη διάρκεια του Σοβιετοαφγανικού πολέμου απεικόνισε την νεαρή Αφγανή Sharbat Gula, η οποία κατέφυγε πρόσφυγας στο Πακιστάν και δημοσιεύτηκε στο εξώφυλλο του περιοδικού National Geografic(1985). Ο ίδιος φωτογράφος απαθανάτισε το ίδιο κορίτσι, γυναίκα πια, σχεδόν 20 χρόνια μετά (Εικόνα 8). Στη δραστηριότητα εφαρμόζεται το παιδαγωγικό μοντέλο των 5Ε, το οποίο βασίζεται στην εποικοδομητική θεωρία της μάθησης, η οποία υποδηλώνει ότι οι άνθρωποι κατασκευάζουν τη γνώση και το νόημα από τις εμπειρίες τους. Με την κατανόηση και τον αναστοχασμό των δραστηριοτήτων, οι μαθητές είναι σε θέση να συμβιβάσουν τη νέα γνώση με τις προηγούμενες ιδέες. Το μοντέλο 5Ε επικεντρώνεται στο να επιτρέπει στους μαθητές να κατανοήσουν μια έννοια με την πάροδο του χρόνου μέσω μιας σειράς καθορισμένων βημάτων ή φάσεων. Αυτές οι φάσεις περιλαμβάνουν: Ενεργοποίηση, Εξερεύνηση, Εξήγηση, Επεξεργασία και Αξιολόγηση. Τα παιδιά χωρίστηκαν σε ομάδες και δούλεψαν σε σταθμούς μάθησης, οι οποίοι περιελάμβαναν εποπτικό υλικό, βίντεο, φωτογραφίες και αντικείμενα προσφύγων. Ενημερώθηκαν σχετικά με τη σημασία του να είναι κανείς πρόσφυγας, γιατί συμβαίνει αυτό, αφού παρακολούθησαν σχετικά βίντεο και πήραν πληροφορίες, δραματοποίησαν τη ζωή ενός πρόσφυγα. Προβληματίστηκαν σχετικά με τα αντικείμενα που θα έπαιρναν τα ίδια τα παιδιά μαζί τους αν τους συνέβαινε να πρέπει να εγκαταλείψουν το σπίτι τους για να σωθούν και έκαναν ερωτήσεις στο chat gpt, όσα θα ήθελαν να ρωτήσουν το συγκεκριμένο κορίτσι. Δημιούργησαν συνεργατικά ψηφιακά βιβλία (e-books) με αφορμή μία φωτογραφία («λασπωμένα παπούτσια») αν την τοποθετούσαν στην αρχή, στη μέση και στο τέλος της ιστορίας. Τέλος, μετά από ψηφοφορία, αποφάσισαν και δημιούργησαν συνεργατικά μία αφίσα με μηνύματα αγάπης και συμπαράστασης για τους πρόσφυγες.

Εικόνα 8
«Το κορίτσι από το Αφγανιστάν» του Steve McCurry (1984 και 2002)



- **Διαγωνισμός φωτογραφίας:** Τα σχολεία σε συνεργατικό συννεφόλεξο αποφασίζουν το θέμα της φωτογραφίας που θα δημιουργήσουν να είναι η «Φαντασία». Στη συνέχεια σε συνεργατικό έγγραφο αποφασίζουν να θέσουν στα εργαλεία Τεχνητής Νοημοσύνης μία κοινή προτροπή και να παράγουν το καθένα σχολείο τη δική του φωτογραφία, ανάλογα με το στυλ που επιθυμεί. Η προτροπή είναι: «Άνοιξε μία μαγική πόρτα και πέρασε σε έναν κόσμο, όπου τα παιδιά βοηθούν έναν μονόκερο να επιστρέψει στο σπίτι του πετώντας πάνω σε ένα ουράνιο τόξο». Η φωτογραφία με τις περισσότερες ψήφους κερδίζει ένα βραβείο, φτιαγμένο από τα παιδιά (Εικόνα 9). Η δραστηριότητα έχει ως στόχους: α) να αναπτύξουν τα παιδιά τη δημιουργικότητά τους πειραματιζόμενα με διαφορετικά στυλ, β) να αποκτήσουν μια βασική κατανόηση του τρόπου λειτουργίας των εικόνων που δημιουργούνται με τεχνητή νοημοσύνη (π.χ. προτροπές, στυλ, παραλλαγές εικόνων), γ) να αναπτύξουν την ικανότητα να εκτιμούν τα έργα τέχνης των άλλων και να συμμετέχουν σε φιλικό ανταγωνισμό να αναπτύξουν την ικανότητα να δίνουν σαφείς υποδείξεις και να αξιολογούν τα αποτελέσματα και δ) να κατανοήσουν ότι οι εικόνες που δημιουργούνται από την ΤΝ βασίζονται σε δεδομένα και υποδείξεις και όχι σε τυχαία δημιουργία.

Εικόνα 9
Η φωτογραφία με τις περισσότερες ψήφους



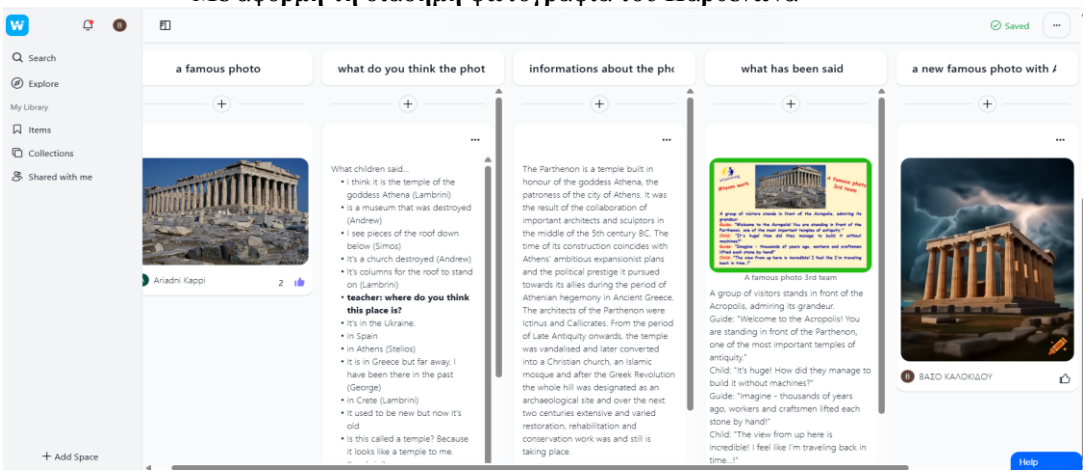
- **Διάσημες φωτογραφίες:** Σκοπός της δραστηριότητας είναι να παρουσιαστούν στα παιδιά εικόνες που είχαν μεγάλη ιστορική ή κοινωνική επίδραση και να δημιουργήσουν τα ίδια μια νέα διάσημη φωτογραφία. Τα σχολεία χωρίζονται σε ομάδες των 5 μελών, όπου το κάθε μέλος έχει μία αποστολή: Το 1ο μέλος βρίσκει μία διάσημη φωτογραφία από το διαδίκτυο, το 2ο μέλος μαντεύει και γράφει τι νομίζει ότι δείχνει η φωτογραφία, πότε τραβήχτηκε, γιατί τραβήχτηκε κ.λπ. Το 3ο μέλος ψάχνει στο διαδίκτυο για τις πραγματικές πληροφορίες σχετικά με τη φωτογραφία, το 4ο μέλος φαντάζεται και δημιουργεί έναν διάλογο ή κάποιες λέξεις που θα μπορούσαν να έχουν ειπωθεί τη στιγμή που τραβήχτηκε η φωτογραφία και το 5ο μέλος χρησιμοποιεί το εργαλείο craiyon.com για να δημιουργήσει μια νέα διάσημη φωτογραφία με τη βοήθεια της τεχνητής νοημοσύνης, γράφοντας τον τίτλο της φωτογραφίας στο πλαίσιο της προτροπής. (Εικόνα 10)

- **Η γιαγιά μας αφηγείται τη ζωή της:** Στόχος της δραστηριότητας είναι να καταλάβουν οι μαθητές πως η τεχνητή νοημοσύνη μας βοηθά να μετατρέψουμε μία εικόνα σε βίντεο. Η δραστηριότητα πραγματοποιείται σε ζευγάρια που επιλέχτηκαν τυχαία με το διαδικτυακό εργαλείο τυχαίας επιλογής keamk. Τα ζευγάρια συνεργάζονται και χρησιμοποιούν το διαδικτυακό εργαλείο chatterpix kids για να αποδώσουν λόγο και ήχο στην εικόνα.

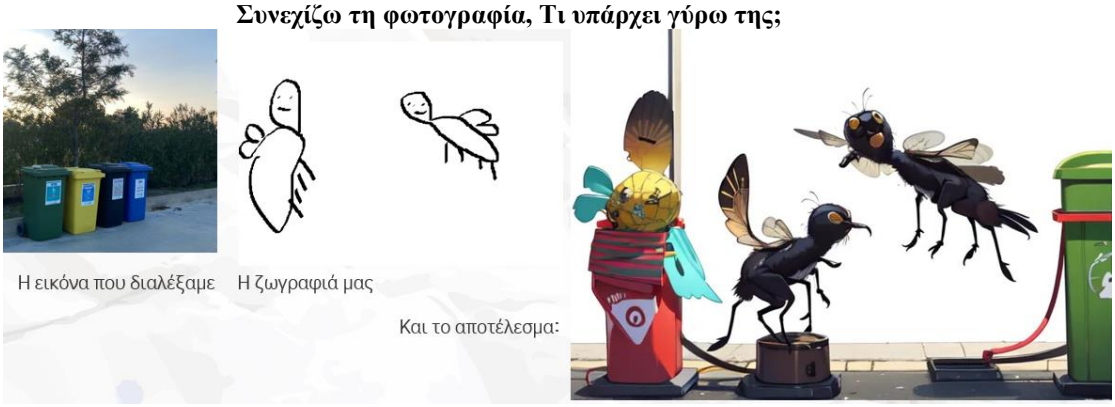
- **Συνεχίζω τη φωτογραφία. Τι υπάρχει γύρω της;:** Στόχος της δραστηριότητας είναι να κατανοήσουν τα παιδιά ότι με τη βοήθεια της ΤΝ μπορούμε να μετατρέψουμε ένα σκίτσο μας (σε χαρτί ή ψηφιακό) σε χρωματιστή εικόνα. Τα σχολεία διαλέγουν εικόνες από το διαδίκτυο και τις αναρτούν σε συνεργατικό έγγραφο. Στη συνέχεια, το κάθε σχολείο διαλέγει μία εικόνα που του αρέσει και προσπαθεί να φανταστεί τι μπορεί να υπάρχει γύρω της. Το σχεδιάζει (σε χαρτί ή στον υπολογιστή μέσω ενός προγράμματος ζωγραφικής) και κατόπιν, με τη βοήθεια εργαλείων ΤΝ ενώνει τις δύο εικόνες (του διαδικτύου και το σκίτσο) και χρησιμοποιώντας την κατάλληλη προτροπή, παράγεται μία τρίτη εικόνα. (Εικόνα 11)

- **Αξιολόγηση:** Τα παιδιά μέσω εργαλείων ΤΝ γίνονται καρτούν και στέλνουν τις εντυπώσεις τους από το πρόγραμμα και τις ευχές τους στους φίλους τους. (Εικόνα 12)

Εικόνα 10
Με αφορμή τη διάσημη φωτογραφία του Παρθενώνα



Εικόνα 11
Συνεχίζω τη φωτογραφία, Τι υπάρχει γύρω της;



Εικόνα 12
Γινόμαστε καρτούν



ΣΥΜΠΕΡΑΣΜΑΤΑ

Το Ευρωπαϊκό έργο eTwinning: "photo mAgIc - from old photos to AI" που υλοποιήθηκε τη φετινή χρονιά στα Νηπιαγωγεία μας ολοκληρώθηκε έχοντας επιτύχει τους στόχους οι οποίοι είχαν τεθεί αρχικά. Η μάθηση επιτεύχθηκε μέσα από διαδικασίες που ήταν αναπτυξιακά κατάλληλες για τα παιδιά προσχολικής ηλικίας, ήταν ευχάριστες και προωθούσαν την ενεργό συμμετοχή των παιδιών σε καταστάσεις που είχαν νόημα για εκείνα. Το πρόγραμμα έδωσε έμφαση στις διεργασίες της διερευνητικής, της παιγνιώδους και της συνεργατικής μάθησης . Κατάφερε με κατάλληλη παιδαγωγική προσέγγιση να φέρει τα παιδιά σε επαφή με την τεχνητή νοημοσύνη, καλλιεργώντας δεξιότητες που είναι θεμελιώδεις για το μέλλον τους, χωρίς να χάσει την ουσία του παιχνιδιού, της έκφρασης και της δημιουργίας.

Τα παιδιά εξοικειώθηκαν σταδιακά με τα εργαλεία τεχνητής νοημοσύνης καθώς χρησιμοποιήθηκαν αναπτυξιακά κατάλληλα ψηφιακά εργαλεία για να παίξουν, να εκφραστούν και να μάθουν. Αναγνώρισαν και εφάρμοσαν τις ορθές χρήσεις των εργαλείων τεχνητής νοημοσύνης ώστε να καταστούν ψηφιακά εγγράμματα και να αντιληφθούν τη θέση των τεχνολογιών στην κοινωνία και τον πολιτισμό. Ανέπτυξαν τις κοινωνικές δεξιότητές τους, τις δεξιότητες επικοινωνίας και συνεργασίας καθώς εργάστηκαν σε ομάδες και αξιοποίησαν τις δεξιότητές τους για την επίτευξη συλλογικών στόχων.

Τα παιδιά απέκτησαν κριτική σκέψη απέναντι στα εργαλεία ΤΠΕ και τεχνητής νοημοσύνης καθώς παρατήρησαν πως αρκετές φορές τα αποτελέσματα των εργαλείων τεχνητής νοημοσύνης είχαν κάποια «λάθη» (π.χ εικόνες στις οποίες έλειπαν κάποια μέλη του σώματος, δημιουργία ανθρώπων με ασιατικά χαρακτηριστικά κ.α). Παρατήρησαν πως όταν οι προτροπές είναι στην αγγλική γλώσσα τα αποτελέσματα είναι καλύτερα σε σχέση με τις προτροπές στα ελληνικά. Επιπλέον, προβληματίστηκαν σχετικά με την ηθική χρήση της τεχνητής νοημοσύνης και την αξιοπιστία των πληροφοριών που βλέπουμε στον υπολογιστή. Αφορμή ήταν η δραστηριότητα όπου με τη βοήθεια της τεχνητής νοημοσύνης ταξιδέψαμε σε ένα άλλο μέρος.

Τέλος, δεν πρέπει να παραληφθεί ότι από το πρόγραμμα δεν ωφελήθηκαν μόνο οι μαθητές/τριες, αλλά και οι εκπαιδευτικοί, καθώς αναπτύχθηκαν πρακτικές που εφαρμόστηκαν από τους νηπιαγωγούς όλων των συνεργαζόμενων χωρών συμβάλλοντας στη δική τους επιμόρφωση και επαγγελματική τους εξέλιξη.

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ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ: ΠΑΡΑΓΩΓΗ ΓΡΑΠΤΟΥ ΛΟΓΟΥ ΣΤΗΝ ΣΤ' ΤΑΞΗ

Λαπαρίδου Κλεοπάτρα
Επαγγελματική ιδιότητα :Εκπαιδευτικός ΠΕ 70,Med
Φορέας επαγγελματικής ιδιότητας: Δημοτικό σχολείο Δρεπάνου Κοζάνης ΠΔΕ Κοζάνης
Τοποθεσία :Ελλάδα
e-mail: lapkl@yahoo.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία εξετάζει τις εφαρμογές της Τεχνητής Νοημοσύνης (ΤΝ) στην πρωτοβάθμια εκπαίδευση ,εστιάζοντας στη βελτίωση της μαθησιακής διαδικασίας ,στην εξατομίκευση της μάθησης και στην υποστήριξη των εκπαιδευτικών. Μέσω βιβλιογραφικής επισκόπησης και ανάλυσης των υπαρχουσών εφαρμογών ,αναδεικνύονται οι βασικές χρήσεις της ΤΝ, όπως η προσωποποιημένη μάθηση, η αυτόματη αξιολόγηση, οι έξυπνοι βοηθοί και τα εκπαιδευτικά παιχνίδια**.**

Ιδιαίτερη έμφαση δίνεται στη χρήση της ΤΝ για την ανάπτυξη γλωσσικών δεξιοτήτων ,την ενσωμάτωση μαθητών με ειδικές ανάγκες και την ανάπτυξη γλωσσικών δεξιοτήτων και τη δημιουργία διαδραστικών περιβαλλόντων μάθησης. Στην παρούσα μελέτη, παρουσιάζεται ένα διδακτικό σενάριο για μαθητές/μαθήτριες ΣΤ' Δημοτικού, όπου εργαλεία ΤΝ, όπως το ChatGPT ,το LanguageTool, το Imagine AI και το Book Creator υποστηρίζουν τη διαδικασία παραγωγής γραπτού λόγου, ενισχύοντας τη δημιουργικότητα και τις ψηφιακές δεξιότητες των μαθητών/μαθητριών.

Τα αποτελέσματα δείχνουν ότι η ΤΝ συμβάλλει στη διαφοροποιημένη μάθηση, την ενίσχυση της ενεργούς συμμετοχής και την ανάπτυξη δεξιοτήτων του 21^{ου} αιώνα. Ωστόσο επισημαίνονται προκλήσεις, όπως η ηθική χρήση ,η προστασία προσωπικών δεδομένων και ο ρόλος του/της εκπαιδευτικού. Παρά τα εμπόδια, η ενσωμάτωση της ΤΝ στην εκπαίδευση προσφέρει σημαντικές ευκαιρίες για τον εκσυγχρονισμό της διδακτικής πρακτικής και την ενίσχυση της μαθησιακής εμπειρίας.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Παραγωγή Λόγου, Εκπαίδευση, Τεχνολογία

ΕΙΣΑΓΩΓΗ

Η Τεχνητή Νοημοσύνη (ΤΝ) έχει αρχίσει να διαδραματίζει σημαντικό ρόλο στην εκπαίδευση, προσφέροντας νέες δυνατότητες στη μαθησιακή διαδικασία (Luckin et al., 2016). Στην πρωτοβάθμια εκπαίδευση ,οι εφαρμογές της ΤΝ συμβάλλουν στην εξατομίκευση της διδασκαλίας, στην προώθηση της ενεργούς συμμετοχής των μαθητών/μαθητριών και στη βελτίωση των γλωσσικών και ψηφιακών τους δεξιοτήτων (Holmes et al., 2019). Ωστόσο, η ενσωμάτωση αυτών των τεχνολογιών συνοδεύεται από προκλήσεις, όπως η ηθική χρήση των δεδομένων και η διατήρηση της παιδαγωγικής αξίας της διδασκαλίας (Selwyn, 2019).

Η παρούσα εργασία εξετάζει τις βασικές εφαρμογές της ΤΝ στην πρωτοβάθμια εκπαίδευση, παρουσιάζει μια μελέτη περίπτωσης σχετικά με τη χρήση εργαλειών ΤΝ στην ανάπτυξη του γραπτού λόγου και συζητά τα οφέλη και τις προκλήσεις που προκύπτουν από την υιοθέτησή της.

ΕΦΑΡΜΟΓΕΣ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΤΗΝ ΠΡΩΤΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ

Προσωποποιημένη Μάθηση

Η ΤΝ επιτρέπει την εξατομίκευση της διδασκαλίας, προσαρμόζοντας το περιεχόμενο και τον ρυθμό μάθησης στις ανάγκες κάθε μαθητή/μαθήτριας (Chen et al., 2020). Προγράμματα όπως τα έξυπνα εκπαιδευτικά λογισμικά αξιολογούν τις δεξιότητες των μαθητών/μαθητριών και παρέχουν προσαρμοσμένα μαθήματα. (Kulik & Fletcher, 2016).

Μερικές από τις εφαρμογές προσωποποιημένης μάθησης είναι το Dreambox Learning, η οποία παρέχει εξατομικευμένα μαθηματικά προσαρμοσμένα στο επίπεδο κάθε μαθητή/μαθήτριας. Χρησιμοποιεί προσαρμοστική τεχνολογία για να παρέχει εξατομικευμένες μαθησιακές εμπειρίες, προσαρμόζοντας τη δυσκολία των ασκήσεων στις ανάγκες του μαθητή/μαθήτριας. Είναι επί πληρωμή.

Το Duolingo είναι μια άλλη εφαρμογή Τεχνητής Νοημοσύνης. Χρησιμοποιείται για την εκμάθηση ξένων γλωσσών ,παρέχοντας εξατομικευμένες ασκήσεις και προσαρμογή της δυσκολίας ανάλογα με την πρόοδο του/της μαθητή/μαθήτριας .Διαθέτει δωρεάν βασική έκδοση με προαιρετική premium συνδρομή.

Έξυπνοι Βοηθοί και Chatbots

Οι ψηφιακοί βοηθοί ,όπως το ChatGPT, μπορούν να υποστηρίξουν τους/τις μαθήτριες στην αναζήτηση πληροφοριών, την εξάσκηση στη γραφή και τη λεκτική επικοινωνία (Wollny et al., 2021). Τα chatbots λειτουργούν ως διαδραστικοί δάσκαλοι, προσφέροντας υποστήριξη με ερωτήσεις και απαντήσεις (Molnar, 2020). Το ChatGPT έχει τόσο δωρεάν όσο και επί πληρωμή εκδόσεις

Gamification και Διαδραστικά Περιβάλλοντα

Η ενσωμάτωση στοιχείων παιχνιδιού στη μάθηση (gamification) αυξάνει τη δέσμευση των μαθητών/μαθητριών (Deterding et al., 2011). Πλατφόρμες που χρησιμοποιούν ΤΝ προσφέρουν διαδραστικά περιβάλλοντα, όπου οι μαθητές /μαθήτριες μαθαίνουν μέσω παιχνιδιών και προκλήσεων (Hamari et al., 2014). Μία από τις πιο δημοφιλείς διαδραστικές πλατφόρμες προγραμματισμού είναι το Scratch, η οποία επιτρέπει στους/στις μαθητές /μαθήτριες να δημιουργούν τα δικά τους παιχνίδια και ιστορίες και είναι *εντελώς δωρεάν* .*Ένα άλλο διαδραστικό εργαλείο* κουίζ που επιτρέπει στους/στις μαθητές/μαθήτριες να μαθαίνουν μέσω παιχνιδιού είναι το Kahoot , το οποίο είναι δωρεάν *με premium επιλογές.*

Αυτόματη Αξιολόγηση

Η ΤΝ επιτρέπει την αυτόματη διόρθωση εργασιών ,τη δημιουργία εξατομικευμένων σχολίων και την παροχή άμεσης ανατροφοδότησης στους/στις μαθητές/μαθήτριες (Jordan, 2020), διευκολύνοντας τους/τις εκπαιδευτικούς στη διαχείριση των μαθησιακών επιδόσεων (Chassignol et al., 2018).Τέτοιες εφαρμογές είναι το Google Forms & Quizzes, οι οποίες επιτρέπουν τη δημιουργία αυτοματοποιημένων ερωτηματολογίων με άμεση βαθμολόγηση και ανατροφοδότηση και είναι δωρεάν. Άλλες εφαρμογές δωρεάν αλλά με premium επιλογές είναι το Quizziz , και το Socrative ,οι οποίες παρέχουν διαδραστικά κουίζ με δυνατότητα αυτόματης αξιολόγησης και ανάλυσης απόδοσης. Επίσης το Edpuzzle δίνει τη δυνατότητα στους/στις εκπαιδευτικούς να προσθέσουν ερωτήσεις σε βίντεο και να λαμβάνουν αυτόματη αξιολόγηση των απαντήσεων. Είναι δωρεάν με περιορισμούς.

Υποστήριξη Μαθητών με Ειδικές Ανάγκες

Η ΤΝ συμβάλλει στην εκπαίδευση μαθητών/μαθητριών με ειδικές ανάγκες μέσω προγραμμάτων αναγνώρισης ομιλίας, μετατροπής κειμένου σε ομιλία και εργαλείων που προσαρμόζουν το εκπαιδευτικό περιεχόμενο στις ανάγκες κάθε μαθητή/μαθήτριας (Aroyo & Dicheva, 2004). Παραδείγματα τέτοιων εφαρμογών είναι Google Text-to-Speech, το Microsoft Immersive Reader ,το Speech Central τα οποία είναι δωρεάν για χρήση με ορισμένους περιορισμούς.

ΠΕΡΙΓΡΑΦΗ ΔΙΔΑΚΤΙΚΗΣ ΠΡΟΤΑΣΗΣ

Τίτλος εκπαιδευτικού σεναρίου: «Ακούω πολύ θόρυβο στο σχολείο από τα αυτοκίνητα. Τι μπορεί να γίνει για να βελτιωθεί η κατάσταση;» Δημοσίευση ενός άρθρου στη διαδικτυακή τοπική εφημερίδα.
Τάξη στην οποία απευθύνεται: Στ' Δημοτικού
Χρόνος υλοποίησης του σεναρίου:2 Διδακτικές ώρες
Εμπλεκόμενες Γνωστικές Περιοχές: Γλώσσα, Πληροφορική, Αισθητική Αγωγή

Προαπαιτούμενες γνώσεις μαθητών/μαθητριών

Ως προς το γνωστικό αντικείμενο οι μαθητές/μαθήτριες έχουν αποκτήσει τις βασικές δεξιότητες γραφής άρθρου (δομή, εισαγωγή, ανάπτυξη, συμπεράσματα), έχουν εξασκηθεί στη χρήση επιχειρημάτων και τεκμηρίωσης για την υποστήριξη προτάσεων και γνωρίζουν βασικούς ορθογραφικούς και γραμματικούς κανόνες.

Ως προς τις ψηφιακές δεξιότητες οι μαθητές/μαθήτριες είναι εξοικειωμένοι/ες με τη χρήση υπολογιστή, την πλοήγηση στο διαδίκτυο, τη γραφή προτάσεων στον επεξεργαστή κειμένου και έχουν εξασκηθεί στις βασικές λειτουργίες των χρησιμοποιούμενων λογισμικών (λογισμικά εννοιολογικής χαρτογράφησης ,οπτικοποίησης αλλά και λογισμικά ανάπτυξης της δημιουργικότητας ,καθώς επίσης και με τη χρήση διαδικτυακών πλατφόρμων για τη δημοσίευση άρθρων.

Γενικός σκοπός και στόχοι του σεναρίου

Οι μαθητές/μαθήτριες να αναπτύξουν δεξιότητες γραπτού λόγου και κριτικής σκέψης, διερευνώντας ένα πραγματικό πρόβλημα του σχολείου τους (θόρυβος από τα αυτοκίνητα) και διατυπώσουν τεκμηριωμένες προτάσεις για την αντιμετώπισή του, αξιοποιώντας σύγχρονα εργαλεία Τεχνητής Νοημοσύνης (ΤΝ).

Ως προς τη γνωστική διαδικασία οι μαθητές/μαθήτριες να είναι σε θέση
- Να κατανοήσουν τη δομή και τα χαρακτηριστικά ενός άρθρου γνώμης.
- Να εξασκηθούν στη διατύπωση επιχειρημάτων και προτάσεων με σαφήνεια.
- Να ενισχύσουν τη δεξιότητα κριτικής σκέψης, αξιολογώντας την κατάσταση και προτείνοντας λύσεις.

Ως προς τη χρήση εφαρμογών ΤΝ
- Να χρησιμοποιήσουν εργαλεία ΤΝ (π.χ ChatGPT) για την αναδιαμόρφωση και βελτίωση του κειμένου τους.
- Να εφαρμόσουν εργαλεία γλωσσικού ελέγχου (π.χ Language Tool,) για τη διόρθωση γραμματικών και συντακτικών λαθών.
- Να δημιουργήσουν εικόνες με ΤΝ imagine και το Book Creator για την ενίσχυση του άρθρου τους.
- Να χρησιμοποιήσουν την εφαρμογή Padlet.

Ως προς τη μαθησιακή διαδικασία
- Να συνεργαστούν σε ομάδες για τη συλλογή πληροφοριών και τη σύνταξη του άρθρου.
- Να παρουσιάσουν τις απόψεις τους και να αναπτύξουν δεξιότητες επιχειρηματολογίας.
- Να δημοσιεύσουν το άρθρο τους σε μια διαδικτυακή πλατφόρμα, ενισχύοντας τη σύνδεση της μάθησης με την πραγματική ζωή.

Υλικοτεχνική Υποδομή

Οι μαθητές/μαθήτριες εργάζονται σε ανομοιογενείς ομάδες των τριών ή τεσσάρων ατόμων στο εργαστήριο Πληροφορικής. Στην επιφάνεια εργασίας των Ηλεκτρονικών Υπολογιστών θα υπάρχουν εγκατεστημένες εφαρμογές Τ.Ν ChatGPT, Language Tool, Imagine και Book Creator.

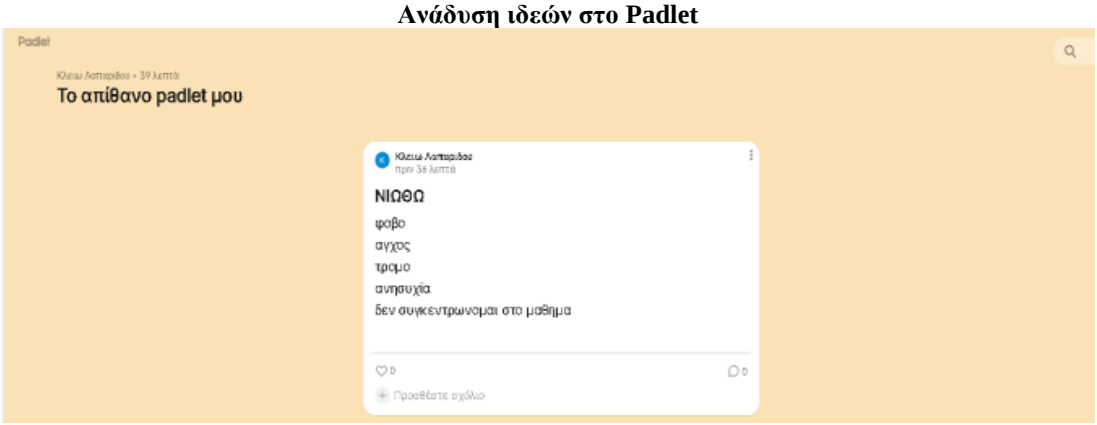
Περιγραφή δραστηριοτήτων σεναρίου

Στην αρχή γίνονται κάποιες δραστηριότητες ψυχολογικής και γνωστικής προετοιμασίας για την αποτίμηση υπάρχουσας γνώσης και ανίχνευση αναπαραστάσεων και γνωστικών δυσκολιών.

Στόχος: Ανάδυση ιδεών και προβληματισμός των μαθητών/μαθητριών σχετικά με τον θόρυβο που προκαλείται από τα αυτοκίνητα δίπλα στο σχολείο. Εξαιτίας του γεγονότος ότι το Δημοτικό Σχολείο Δρεπάνου-Κοζάνης βρίσκεται δίπλα σε κεντρικό δρόμο, η ενεργοποίηση των μαθητών γίνεται ακούγοντας πραγματικό θόρυβο από τα αυτοκίνητα έξω από το σχολείο. Ο/Η εκπαιδευτικός ζητάει τη διερεύνηση του προβλήματος και προσπαθεί να ανιχνεύσει τα αρνητικά συναισθήματα που προκαλούνται στους/στις μαθητές/μαθήτριες. Ύστερα από συζήτηση γίνεται καταγραφή των ιδεών στο Padlet.

Το Padlet είναι ένας ψηφιακός πίνακας ανακοινώσεων με πολλές δυνατότητες όπως το να γράφουν κείμενο, να ανεβάζουν εικόνες και βίντεο. Το σημαντικό στοιχείο του λογισμικού είναι πως όλοι οι συμμετέχοντες μπορούν να δουν τις αναρτήσεις των άλλων ομάδων και να αλληλεπιδρούν ταυτόχρονα.

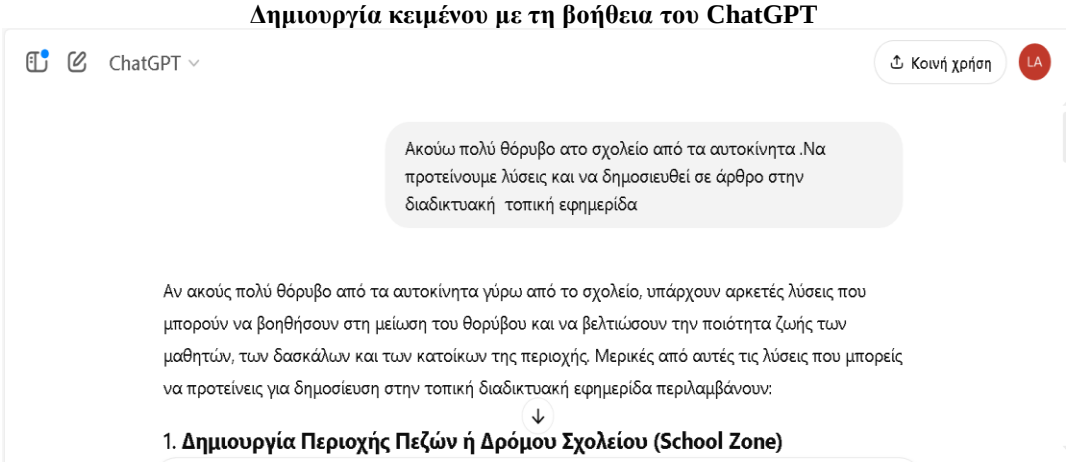
Εικόνα 1
Ανάδυση ιδεών στο Padlet



Έπειτα ο, η εκπαιδευτικός προτείνει στα παιδιά την ιδέα να γράψουν ένα άρθρο με θέμα:
«Ακούω πολύ θόρυβο στο σχολείο από τα αυτοκίνητα. Τι μπορεί να γίνει για να βελτιωθεί η κατάσταση;» Το άρθρο αυτό μπορεί να δημοσιευτεί στην διαδικτυακή τοπική εφημερίδα προτείνοντας λύσεις αντιμετώπισης του προβλήματος. Η συγγραφή του άρθρου θα γίνει με τη βοήθεια εφαρμογών Τεχνητής Νοημοσύνης.

Ο ρόλος του/της εκπαιδευτικού καθ' όλη την διάρκεια της συγγραφής είναι καθοδηγητικός και υποστηρικτικός. Αρχικά τα παιδιά ανά ομάδες γράφουν στο τετράδιό τους, αφού συζητήσουμε στην τάξη ποια προβλήματα δημιουργεί ο θόρυβος στο σχολείο από τα αυτοκίνητα , τις ιδέες τους για πιθανές λύσεις που θα μπορούσαν να δοθούν για την αντιμετώπιση του προβλήματος. Οι λύσεις καταγράφονται στο Padlet.

Εικόνα 2
Δημιουργία κειμένου με τη βοήθεια του ChatGPT



Εφαρμογή ChatGPT

Στη συνέχεια οι μαθητές/τριες ανοίγουν την εφαρμογή ChatGpt στους υπολογιστές τους και προσπαθούν να βελτιώσουν το κείμενό τους. Η εφαρμογή ChatGPT διορθώνει, βελτιώνει και προτείνει ιδέες για κείμενα. Βοηθά στη συγγραφή ιστοριών, άρθρων ,ποιημάτων και άλλων δημιουργικών κειμένων.

Το ChatGPT προσφέρει στρατηγικές για να γίνει το κείμενο ακόμη πιο επαγγελματικό , οπότε οι μαθητές/μαθήτριες επεξεργάζονται το κείμενό τους και με τη βοήθεια της Τεχνητής Νοημοσύνης καταλήγουν στο τελικό άρθρο που θα σταλεί στη διαδικτυακή εφημερίδα.

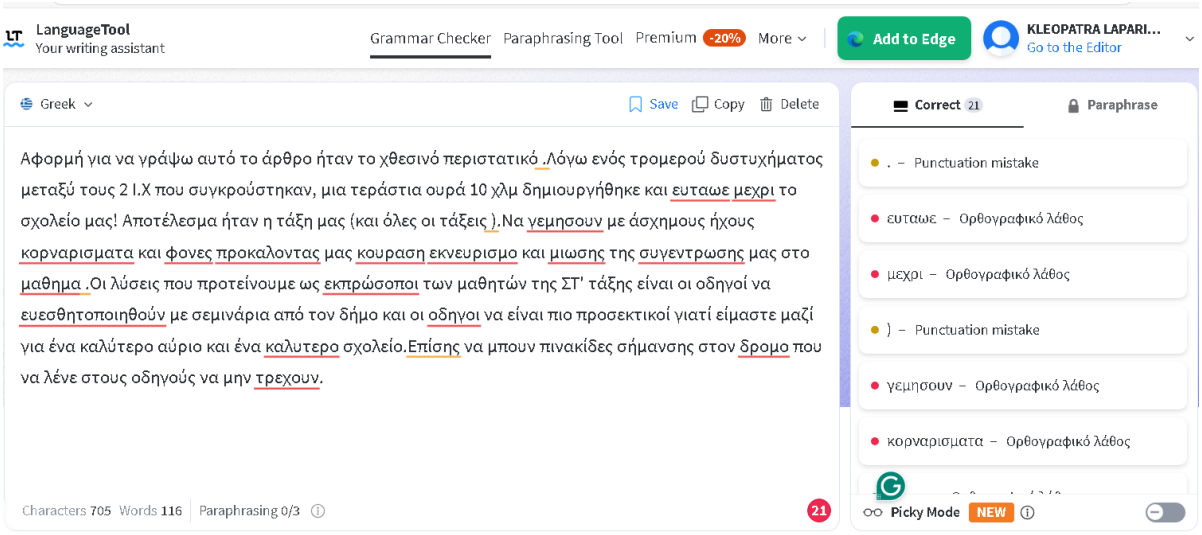
Εφαρμογή Language Tool

Έπειτα ,αφού γίνει η επιλογή του τελικού άρθρου, οι μαθητές/μαθήτριες πληκτρολογούν το άρθρο στην εφαρμογή Language Tool. Η εφαρμογή LanguageTool είναι ένα εργαλείο διόρθωσης κειμένων που παρέχει βοήθεια σε πολλές γλώσσες, συμπεριλαμβανομένων των ελληνικών. Εντοπίζει και προτείνει διορθώσεις για ορθογραφικά, γραμματικά και συντακτικά λάθη στο κείμενο. Εξετάζει τη σύνταξη και προτείνει αλλαγές για να γίνει το κείμενο πιο κατανοητό και επαγγελματικό.

Τα παιδιά συζητούν και ανταλλάσουν ιδέες μεταξύ τους, αναφέρονται στον τρόπο εργασίας τους, σε τυχόν προβλήματα που αντιμετώπισαν, εκφράζουν τις σκέψεις και τα συναισθήματά τους για τη διαδικασία και το παραγόμενο υλικό.

Μέσω της εφαρμογής γίνεται αυτόματη διόρθωση των άρθρων τους και βγαίνουν στατιστικά στοιχεία σχετικά με το ποσοστό γραμματικών και ορθογραφικών λαθών που υπάρχουν.

Εικόνα 3.
Διόρθωση κειμένου ορθογραφικά και γραμματικά με το Language Tool



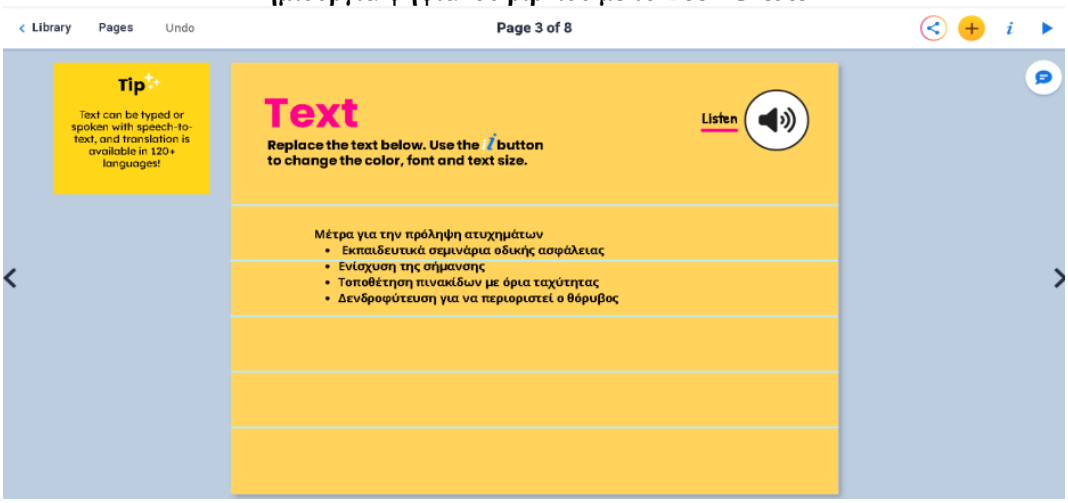
Εφαρμογή Book Creator

Αφού ολοκληρωθεί το άρθρο γραμματικά και συντακτικά τα παιδιά προτείνουν να γίνει ένα ψηφιακό βιβλίο εισάγοντας ήχο και εικόνα για να προσελκύσουν ακόμη περισσότερο το ενδιαφέρον των πολιτών και της Δημοτικής αρχής του τόπου. Αυτό θα γίνει αξιοποιώντας τη χρήση της Τεχνητής Νοημοσύνης χρησιμοποιώντας την εκπαιδευτική εφαρμογή Book Creator. Το ψηφιακό βιβλίο μπορεί να κοινοποιηθεί σε μαθητές/μαθήτριες ,γονείς και κοινότητες μέσω cloud

Το Book Creator επιτρέπει τη δημιουργία ψηφιακών βιβλίων και χρησιμοποιείται ευρέως σε σχολεία και εκπαιδευτικά περιβάλλοντα για να βοηθήσει μαθητές/μαθήτριες και εκπαιδευτικούς να δημιουργούν ,να μοιράζονται και

να διαβάζουν διαδραστικά βιβλία. Οι χρήστες μπορούν να γράφουν κείμενα, να προσθέτουν εικόνες, σχέδια, ηχητικά αποσπάσματα και βίντεο. Υποστηρίζει αφήγηση και ηχογράφηση, καθιστώντας το ιδανικό για πολυτροπικά βιβλία.

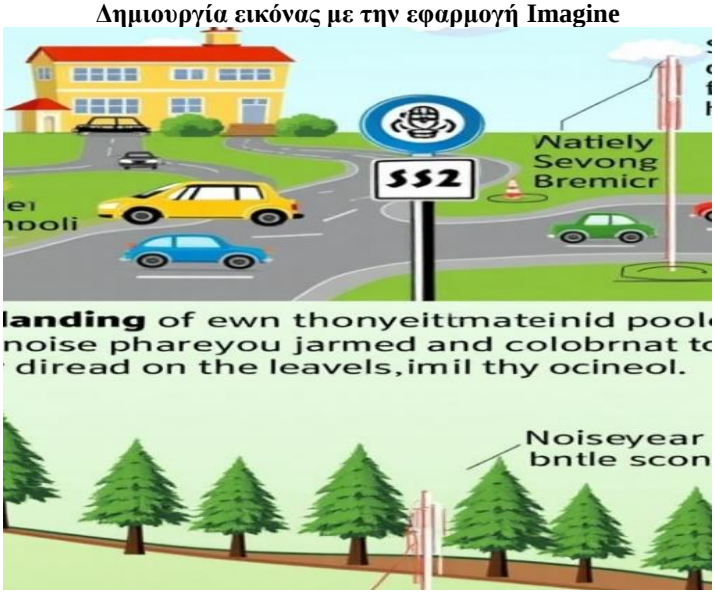
Εικόνα 4
Δημιουργία ψηφιακού βιβλίου με το Book Creator



Εφαρμογή Imagine

Τα παιδιά χρησιμοποιούν την εφαρμογή Imagine για να προσθέσουν εικόνα στο άρθρο τους. Η εφαρμογή Imagine χρησιμοποιεί την τεχνολογία τεχνητής νοημοσύνης για να δημιουργεί εικόνες από κείμενα (text-to-image), ο χρήστης δηλαδή μπορεί να πληκτρολογήσει μια περιγραφή ή μια ιδέα και η εφαρμογή δημιουργεί μια εικόνα που αντιπροσωπεύει αυτή την περιγραφή.

Εικόνα 5
Δημιουργία εικόνας με την εφαρμογή Imagine



Εντυπώσεις των παιδιών από την υλοποίηση του σεναρίου

Η υλοποίηση του σεναρίου «Ακούω πολύ θόρυβο στο σχολείο από τα αυτοκίνητα. Τι μπορεί να γίνει για να βελτιωθεί η κατάσταση;», δημοσίευση ενός άρθρου στη διαδικτυακή τοπική εφημερίδα, άφησε θετικές εντυπώσεις στους μαθητές/μαθήτριες ,τόσο ως προ το θέμα όσο και ως προς τις μεθόδους που χρησιμοποιήθηκαν. Εστιάζοντας ιδιαίτερα στην ενσωμάτωση της Τεχνητής Νοημοσύνης (AI) τα παιδιά εντυπωσιάστηκαν από τα εργαλεία AI που χρησιμοποιήθηκαν, όπως οι αυτόματες προτάσεις βελτίωσης των κειμένων. Έδειξαν ενθουσιασμό στο πως η AI μπορεί να συμβάλλει στη συλλογή και ανάλυση δεδομένων. Ενισχύθηκε η δημιουργική γραφή και η παραγωγή περιεχομένου

και η συγγραφή και η διόρθωση του άρθρου έγινε πιο εύκολη και πιο ενδιαφέρουσα με τη χρήση της Τεχνητής Νοημοσύνης . Πολλά παιδιά ανέφεραν ότι ένιωσαν πιο σίγουρα για τις ιδέες τους ,αφού μπορούσαν να λαμβάνουν άμεσες προτάσεις και να βελτιώνουν το κείμενό τους. Οι μαθητές/μαθήτριες οπτικοποίησαν τα δεδομένα τους με την Τεχνητή Νοημοσύνη και θεώρησαν ότι αυτό έκανε το άρθρο τους πιο εκλυστικό. Τα παιδιά εντυπωσιάστηκαν από το πώς η τεχνολογία μπορεί να μετατρέψει ένα κείμενο, έναν προβληματισμό σε ένα οπτικά ενδιαφέρον αποτέλεσμα. Επίσης ,το γεγονός ότι το άρθρο τους θα δημοσιευτεί σε μια τοπική διαδικτυακή εφημερίδα τα έκανε να νιώσουν ότι η φωνή τους έχει αξία και αντίκτυπο και ότι συμμετέχουν σε ένα πραγματικό πρόβλημα που αφορά όλους και όλες. Μερικά παιδιά εξέφρασαν τη χαρά τους και την ικανοποίησή τους που μπορούν να προτείνουν λύσεις και να ευαισθητοποιήσουν την κοινότητα.

Δυσκολίες και προβληματισμοί κατά την υλοποίηση του σεναρίου

Εξαιτίας του γεγονότος ότι οι μαθητές/μαθήτριες δεν είναι εξοικειωμένοι/ες ακόμη με τις διάφορες εφαρμογές της ΤΝ χρειάστηκε αρκετός χρόνος και περισσότερη καθοδήγηση από τον/την εκπαιδευτικό της τάξης. Ιδιαίτερα σημαντική ήταν η συμβολή και η πολύτιμη βοήθεια του πληροφορικού του σχολείου μας για περαιτέρω διευκρινήσεις γύρω από τη αξιοποίηση των εφαρμογών. Επιπροσθέτως, υπήρξαν αρκετά τεχνικά προβλήματα και εμπόδια ως προς τη σύνδεση με το διαδίκτυο τα οποία γρήγορα ξεπεράστηκαν. Κάποιοι/ες μαθητές/τριες εξέφρασαν τις ενστάσεις τους για την αξιοπιστία των πληροφοριών που παρέχουν οι εφαρμογές ΤΝ. Αυτό έδωσε το έναυσμα για ενδιαφέρουσες συζητήσεις μέσα στην τάξη και την ανάγκη κριτικής σκέψης και διασταύρωσης δεδομένων.

Μαρτυρίες των παιδιών σχετικά με το διδακτικό σενάριο

"Ήταν σαν να γίναμε μικροί δημοσιογράφοι! Μάθαμε πώς να γράφουμε καλύτερα και να χρησιμοποιούμε νέα εργαλεία !"

"Δεν ήξερα ότι η τεχνητή νοημοσύνη μπορεί να βοηθήσει σε περιβαλλοντικά θέματα! Μπορούμε να τη χρησιμοποιήσουμε και σε άλλα προβλήματα; "

"Είναι ωραίο να βλέπουμε τη δουλειά μας δημοσιευμένη. Νιώθουμε ότι προσφέρουμε κάτι στην κοινότητα!

ΣΥΜΠΕΡΑΣΜΑΤΑ

Οι μαθητές βίωσαν το σενάριο ως μια καινοτόμο και διαδραστική εμπειρία. Η χρήση της Τεχνητής Νοημοσύνης ενίσχυσε την ερευνητική τους διάθεση, τη δημιουργικότητά τους και την αίσθηση συμμετοχής σε μια πραγματική κοινωνική δράση. Παρά τις δυσκολίες, η συνολική τους στάση ήταν θετική, με ενδιαφέρον για περαιτέρω διερεύνηση της AI στην εκπαίδευση.

ΠΡΟΤΑΣΕΙΣ ΒΕΛΤΙΩΣΗΣ ΤΟΥ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΣΕΝΑΡΙΟΥ

Με βάση τις εμπειρίες των μαθητών/μαθητριών και τις εντυπώσεις που καταγράφηκαν προτείνονται τρόποι βελτίωσης του σεναρίου με έμφαση στην καλύτερη ενσωμάτωση της Τεχνητής Νοημοσύνης και τη διευκόλυνση της μαθησιακής διαδικασίας. Οι μαθητές/μαθήτριες μπορούν να πειραματιστούν περισσότερο με εργαλεία όπως το ChatGPT ή το Grammarly, ζητώντας προτάσεις για τίτλους, τρόπους ενίσχυσης επιχειρημάτων ή δομής άρθρου. Οι μαθητές/μαθήτριες μπορούν να αξιοποιήσουν εργαλεία AI για γραφιστική (π.χ Canva AI) ώστε να δημιουργήσουν αφίσες ή ακόμα και βίντεο που θα παρουσιάζουν το πρόβλημα της ηχορύπανσης και τις λύσεις που προτείνουν. Θα μπορούσε να προστεθεί ένα διαδραστικό quiz όπου οι μαθητές/μαθήτριες θα συζητήσουν τα οφέλη και τους κινδύνους της AI στη δημοσιογραφία και την περιβαλλοντική ευαισθητοποίηση και να γίνει με αυτόν τον τρόπο αξιολόγηση των διαδραστικών δραστηριοτήτων. Όλες αυτές οι βελτιώσεις μπορούν να κάνουν το σενάριο πιο εμπλουτισμένο, διαδραστικό και προσαρμοσμένο στις σύγχρονες δεξιότητες των μαθητών/μαθητριών. Η καλύτερη αξιοποίηση της AI και η ενίσχυση της συνεργασίας με την κοινότητα μπορούν να αυξήσουν τον αντίκτυπο της δράσης και να προσφέρουν στους/στις μαθητές/μαθήτριες μια ουσιαστική εμπειρία.

ΗΘΙΚΑ ΔΙΛΗΜΜΑΤΑ ΓΥΡΩ ΑΠΌ ΤΗΝ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ, ΠΡΟΣΤΑΣΙΑ ΠΡΟΣΩΠΙΚΩΝ ΔΕΔΟΜΕΝΩΝ ΚΑΙ Ο ΡΟΛΟΣ ΤΟΥ ΔΑΣΚΑΛΟΥ

Η Τεχνητή Νοημοσύνη(AI) έχει εισέλθει δυναμικά στην εκπαίδευση, δημιουργώντας τόσο ευκαιρίες όσο και προβληματισμούς. Η χρήση της από μαθητές/μαθήτριες και εκπαιδευτικούς συνοδεύεται από ηθικά διλήμματα, ζητήματα προστασίας προσωπικών δεδομένων και την ανάγκη επαναπροσδιορισμού του ρόλου του δασκάλου/δασκάλας.

Ηθικά Διλήμματα στη χρήση της AI στην εκπαίδευση

Η AI αλλάζει ριζικά τον τρόπο που οι μαθητές/μαθήτριες αναζητούν πληροφορίες, δημιουργούν περιεχόμενο και αλληλεπιδρούν με τη γνώση. Ωστόσο αυτό εγείρει σημαντικά ηθικά ζητήματα όπως η αξιοπιστία και η παραπληροφόρηση . Οι αλγόριθμοι δεν είναι αλάνθαστοι και μπορεί να παράγουν λανθασμένες ή παραπλανητικές πληροφορίες (Bender, Gebru, McMillan-Major, & Shmitchell, 2021).Οι μαθητές πρέπει να μαθαίνουν να ελέγχουν την εγκυρότητα των πηγών. Ακόμη, σύμφωνα με τον Selwyn (2019) υποθιστάται η δημιουργικότητα των μαθητών/μαθητριών, καθώς μειώνεται η κριτική σκέψη τους και η αυτενέργειά τους, αν βασίζονται στην Τεχνητή Νοημοσύνη για την παραγωγή κειμένων ,αφισών ή ερευνών. Επίσης, πρέπει να υπάρχει διαφάνεια και δεοντολογία. Όταν η AI συμμετέχει στη συγγραφή άρθρων ή στην ανάλυση δεδομένων, τίθεται το ερώτημα :ποιος/ποια είναι ο/η πραγματικός δημιουργός**; Οι μαθητές/μαθήτριες πρέπει να γνωρίζουν ότι η ηθική χρήση της AI απαιτεί στη συμβολή της τεχνολογίας** (Floridi & Cowls, 2019).

Προστασία προσωπικών δεδομένων

Η χρήση AI στην εκπαίδευση απαιτεί αυξημένη προσοχή στα προσωπικά δεδομένα των μαθητών/μαθητριών. Πρέπει να υπάρχει αυξημένη προσοχή στη συλλογή και αποθήκευση δεδομένων. Πολλά εργαλεία AI καταγράφουν δεδομένα χρηστών ,δημιουργώντας ανησυχίες για την ιδιωτικότητα και την ασφάλεια(Zuboff, 2019). Οι μαθητές/μαθήτριες πρέπει να γνωρίζουν ποια δεδομένα κοινοποιούν και πώς χρησιμοποιούνται. Σύμφωνα με τον West (2019) ο/η εκπαιδευτικός πρέπει να εκπαιδεύσει τους /τις μαθητές/μαθήτριες στον ψηφιακό αλφαβητισμό και να τους/τις εξηγήσει πώς να προστατεύουν τα προσωπικά τους στοιχεία ,να αποφεύγουν την καταχώρηση ευαίσθητων δεδομένων και να κατανοούν τους όρους χρήσης των εφαρμογών AI.Ακόμη οι μαθητές/μαθήτριες πρέπει να προβληματιστούν σχετικά με την ηθική χρήση των δεδομένων και το ποιος ελέγχει την AI και αν οι αλγόριθμοι αναπαράγουν κοινωνικές ανισότητες (Noble, 2018).

Ο ρόλος του/της εκπαιδευτικού στην Τεχνητή Νοημοσύνη

Ο/Η εκπαιδευτικός δεν αντικαθιστάται από την AI. Αντίθετα ,ο ρόλος του/της γίνεται ακόμα πιο χρήσιμος. Είναι σημαντικό να διδάξει στους/στις μαθητές/μαθήτριες πώς να χρησιμοποιούν την Τεχνητή Νοημοσύνη ως εργαλείο ενίσχυσης της μάθησης και όχι ως υποκατάστατο της σκέψης (Luckin, 2018). Ο ρόλος του/της εκπαιδευτικού δεν είναι απλά να διδάσκει ,αλλά να καθοδηγεί τους/τις μαθητές/μαθήτριες στην εξερεύνηση και κατανόηση της AI με έναν ισορροπημένο τρόπο (Holmes, Bialik, & Fadel, 2019).

Η AI στην εκπαίδευση φέρνει μεγάλες προκλήσεις αλλά και ευκαιρίες .Ο/Η δάσκαλος/α πρέπει να λειτουργεί ως διαμεσολαβητής ανάμεσα στην τεχνολογία και την ηθική χρήση της, διασφαλίζοντας ότι οι μαθητές/μαθήτριες αναπτύσσουν κριτική σκέψη, ψηφιακή υπευθυνότητα και συνείδηση γύρω από την προστασία προσωπικών δεδομένων.

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Η ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΥΠΗΡΕΣΙΑ ΑΝΤΙΜΕΤΩΠΙΣΗΣ ΤΟΥ ΣΧΟΛΙΚΟΥ ΕΚΦΟΒΙΣΜΟΥ

Μαρκολέφας Νικόλαος
Υποψήφιος Διδάκτορας Πανεπιστημίου Πελοποννήσου,
Τρίπολη, Ελλάδα
e-mail: n_markolefas@hotmail.com

Λαμπίρη Παυλίνα
Εκπαιδευτικός Κλάδου ΠΕ06 Αγγλικής Γλώσσας, MSc στο Πανεπιστήμιο του Μάντσεστερ,
Αθήνα, Ελλάδα
e-mail: pavlampiri@yahoo.com

Τζιαφέρη Στυλιανή
Αναπληρώτρια Καθηγήτρια Πανεπιστημίου Πελοποννήσου,
Τρίπολη, Ελλάδα
e-mail: stziafer@go.uop.gr

ΠΕΡΙΛΗΨΗ

Στις μέρες μας εκατομμύρια μαθητές παγκοσμίως δεν έχουν εξασφαλισμένο ένα ασφαλές σχολικό περιβάλλον, καθώς σε σχολεία ανά την υφήλιο τα παιδιά και οι έφηβοι μαθαίνουν να ζουν με τον φόβο ως συνέπεια του σχολικού εκφοβισμού. Η σχετική μελέτη αναδεικνύει τη σοβαρότητα και τη περιπλοκότητα του κοινωνικού φαινομένου που ονομάζεται σχολικός εκφοβισμός. Την τελευταία δεκαετία, κυρίως συνεπεία της γρήγορης ψηφιοποίησης, οι εφαρμογές για κινητές συσκευές και ηλεκτρονικούς υπολογιστές επηρεάζουν καθοριστικά τις ζωές των παιδιών καθώς οι μαθητές σε σημαντικό βαθμό ζουν και μαθαίνουν μέσα από αυτές. Σκοπός της παρούσας μελέτης είναι να ενισχύσει την κατανόησή μας σχετικά με τον τρόπο με τον οποίο οι έξυπνες, διαδραστικές τεχνολογίες συμβάλλουν στη μάθηση και στην ενδυνάμωση των χρηστών των εφαρμογών που στοχεύουν στην καταπολέμηση του σχολικού εκφοβισμού.

Λέξεις – κλειδιά: Σχολικός εκφοβισμός, τεχνητή νοημοσύνη, εφαρμογές κατά του σχολικού εκφοβισμού.

ΕΙΣΑΓΩΓΗ

Το σχολείο διεθνώς διαδραματίζει ένα πολύπλευρο και πολυεπίπεδο ρόλο στην εξέλιξη των μαθητών. Παράλληλα στις μέρες μας οι εκπαιδευτικοί δεν έχουν μονοδιάστατο ρόλο, καθώς εκτός από τη μετάδοση γνώσεων και στη διευκόλυνση της μαθησιακής διαδικασίας, οφείλουν να στοχεύουν και στην ολόπλευρη ψυχοκοινωνική, συναισθηματική και σωματική ανάπτυξη των μαθητών ώστε αυτοί να μπορούν να ανταποκριθούν στις σύγχρονες προκλήσεις και απειλές της κοινωνίας (Artinopoulou et al, 2016). Μεταξύ άλλων ο ρόλος των εκπαιδευτικών στην πρόληψη, τον εντοπισμό και την αντιμετώπιση του σχολικού εκφοβισμού είναι κεφαλαιώδους σημασίας, καθώς συχνά είναι οι πρώτοι που καλούνται να διαχειριστούν τέτοιου είδους περιστατικά. Γενικότερα οι εκπαιδευτικοί παίζουν καθοριστικό ρόλο στην προώθηση ενός ασφαλούς σχολικού περιβάλλοντος, στο οποίο κάθε μαθητής αισθάνεται ότι ανήκει και γίνεται αποδεκτός. Βασική στόχευση η δημιουργία μιας σχολικής πολιτικής πρόληψης της σχολικής βίας και του εκφοβισμού, στην οποία οι εκπαιδευτικοί μπορούν να επηρεάσουν ουσιαστικά προς το καλύτερο τη ζωή των μαθητών τους (Antoniou et al, 2024).

Γίνεται εμφανές ότι τα σχολεία οφείλουν να παρέχουν στα παιδιά και τους εφήβους ασφάλεια. Στην σύγχρονη εποχή όμως φαίνεται ότι αρκετά παιδιά, αλλά και εκπαιδευτικοί, βλέπουν πως αυτή η προσδοκία δεν καλύπτεται επαρκώς από τις έως τώρα ακολουθούμενες πρακτικές, τις οποίες και τελικά αμφισβητούν (Stamelos et al, 2015) υποστηρίζοντας ότι απαιτούνται αλλαγές (Markolefas, 2021). Αυτή η πραγματικότητα έχει στρέψει το ενδιαφέρον της εκπαιδευτικής πολιτικής στην αναγκαιότητα λήψης αποφασιστικών μέτρων πρόληψης και αντιμετώπισής.

Ο σχολικός εκφοβισμός είναι ένα σημαντικό πρόβλημα για τα παιδιά και τους εφήβους (Biswas et al., 2020) και σύμφωνα με τον Παγκόσμιο Οργανισμό Υγείας αποτελεί σημαντική απειλή για τη δημόσια υγεία (Katsantonis et al, 2021). Οι συνέπειες του είναι πολυδιάστατες και πολύπλευρες καθώς δεν επηρεάζει μόνο την ψυχική υγεία και τις κοινωνικές δεξιότητες, αλλά ενδέχεται να έχει συνέπειες που διαρκούν ακόμη και μετά την ενηλικίωση (Man et al., 2022). Σύμφωνα με μελέτες του Ινστιτούτου Εκπαιδευτικής Πολιτικής, (IEP, 2017) μεταξύ άλλων προκύπτει η συσχέτιση κοινωνικών φαινόμενων όπως ο σχολικός εκφοβισμός/bullying και η μαθητική διαρροή/εγκατάλειψη. Σε πιο ακραίες περιπτώσεις, μπορεί να οδηγήσει σε σκέψεις αυτοκτονίας και, τελικά, σε θάνατο (Zhu et al., 2022).

Η σοβαρότητα των επιπτώσεων του σχολικού εκφοβισμού στα παιδιά και τους εφήβους τον καθιστά προτεραιότητα μελέτης ή και παρέμβασης για αρκετούς ερευνητές. Κομβικό ζήτημα είναι η απάντηση στο ερώτημα: Πώς μπορούμε να μειώσουμε τον επιπολασμό του σχολικού εκφοβισμού και τις επιπτώσεις του σε παιδιά και εφήβους; Επιπλέον να εξεταστεί η δυνατότητα ανάπτυξης νέων τρόπων παρέμβασης με τους οποίους θα «εφοδιάσουμε» όσους εμπλέκονται με το θέμα και κυρίως όσους παρεμβαίνουν σε τέτοια περιστατικά (εκπαιδευτικούς, ψυχολόγους, κοινωνικούς λειτουργούς, σχολικούς νοσηλευτές κλπ). Σε αυτό το πλαίσιο οι νέες τεχνολογίες συχνά θεωρούνται ελπιδοφόρες (Lafrance, et al., 2024). Αποτέλεσμα είναι τα τελευταία χρόνια, τα προγράμματα, οι εφαρμογές και η τεχνητή νοημοσύνη (ΤΝ) να έχουν μελετηθεί ως εργαλεία παρέμβασης σε περιβάλλοντα και περιπτώσεις σχολικού εκφοβισμού.

Η βιβλιογραφική μελέτη έγινε τον Φεβρουάριο του 2025 αξιοποιώντας τις βάσεις δεδομένων Google Scholar, Researchgate και Academia. Κριτήρια εισδοχής ήταν τα εξής: Η δημοσίευση να έχει γίνει στην ελληνική, αγγλική ή ισπανική γλώσσα κατά το χρονικό διάστημα 2015-2025, σε επιστημονικό περιοδικό είτε σε πρακτικά επιστημονικού συνεδρίου είτε να αποτελεί επίσημη πολιτική για τον σχολικό εκφοβισμό και την ΤΝ είτε να είναι κάποιο εμπεριστατωμένο εγχειρίδιο πάνω στη θεματική. Επιπλέον παρουσιάζονται συνοπτικά εφαρμογές οι οποίες αναφέρονται τουλάχιστον σε δύο δημοσιεύσεις προκειμένου να είναι δυνατή η αντιπαραβολή τους.

Ο ΣΧΟΛΙΚΟΣ ΕΚΦΟΒΙΣΜΟΣ

Ο σχολικός εκφοβισμός/θυματοποίηση (victimization) ή bullying στην Αγγλική γλώσσα ή και «νταηλίκι» στην Ελληνική καθομιλουμένη, αποτελεί έκφραση και μέρος της ενδοσχολικής βίας. Είναι ένα σοβαρό εκπαιδευτικό και κοινωνικό φαινόμενο (Trigka – Mertika, 2015) και ταυτόχρονα ένα φαινόμενο παγκόσμιας εμβέλειας (Artinopoulou, et al., 2025). Ειδικότερα, το φαινόμενο του σχολικού εκφοβισμού επισημαίνεται και καταγράφεται από τη δεκαετία του 1970. Η πρώτη ουσιαστική μελέτη του φαινομένου διεξήχθη το 1978 στη Νορβηγία (Markolefas, 2021). Ως ερευνητικός τομέας, οι δημοσιεύσεις και οι παρεμβάσεις έχουν αυξηθεί εκθετικά από τη δεκαετία του 1970, με αποτέλεσμα την εμφάνιση εκατοντάδων σχετικών άρθρων ετησίως. Η σημασία του ζητήματος αναγνωρίζεται και από την καθιέρωση, από το 2020, της ετήσιας Παγκόσμιας Ημέρας κατά της Βίας και του Εκφοβισμού στο Σχολείο, συμπεριλαμβανομένου και του Κυβερνοεκφοβισμού, όπως ορίστηκε από τη UNICEF (Artinopoulou et al., 2025). Σε έκθεση σχετικά με την ασφάλεια και την ένταξη σε μαθησιακά περιβάλλοντα, η UNESCO, σημειώνει (2018:60): «Έννοιες όπως ο εκφοβισμός δε διαθέτουν τυποποιημένο παγκόσμιο ορισμό και οι έρευνες ποικίλλουν σημαντικά».

Η Αμερικάνικη Ψυχολογική Εταιρία, ορίζει τον σχολικό εκφοβισμό (bullying) ως μια επίμονη, απειλητική και επιθετική σωματική συμπεριφορά ή λεκτική κακοποίηση που απευθύνεται σε άλλους ανθρώπους, ειδικά εκείνους που είναι νεότεροι, μικρότεροι, ασθενέστεροι ή σε κάποια άλλη κατάσταση σχετικής μειονεξίας (APA, 2018b). Στον καθηγητή Dan Olweus (Artinopoulou, et al, 2025) ο οποίος θεωρείται ο θεωρητικός και θεμελιωτής του πεδίου αποδίδεται ο ευρύτερα αποδεκτός ορισμός: *«ένας μαθητής γίνεται αντικείμενο εκφοβισμού ή θυματοποιείται όταν υποβάλλεται κατ' επανάληψη και κατ' εξακολούθηση σε αρνητικές ενέργειες από έναν ή περισσότερους μαθητές. Μία ενέργεια θεωρείται αρνητική όταν κάποιος σκόπιμα βλάπτει ή επιχειρεί να βλάψει ή να ενοχλήσει κάποιον άλλον. Επιπλέον, μεταξύ των μαθητών υπάρχει διαφορά δύναμης, που σημαίνει ότι ο μαθητής που εκτίθεται στις αρνητικές ενέργειες δυσκολεύεται να αμυνθεί»* (Olweus, 2009:29). Σύμφωνα με τον Olweus, το φαινόμενο του εκφοβισμού έχει τρία βασικά χαρακτηριστικά: «είναι σκόπιμη βλάβη, πραγματοποιείται κατ' επανάληψη και κατ' εξακολούθηση και λαμβάνει θέση μέσα σε μια διαπροσωπική σχέση που χαρακτηρίζεται από ανισότητα δύναμης» (Markolefas et al, 2024β:347).

Το μειονέκτημα αυτού του τύπου των προσεγγίσεων είναι ότι απαιτείται μια περαιτέρω διάκριση του ιστορικού του δράστη, καθιστώντας αναγκαία την κατηγοριοποίηση των εμπλεκομένων σε ομάδες (Αντωνίου, Βαλιανάτος &, Βαρθαλάμη, 2024). Ένας μεταγενέστερος ορισμός αναφέρει ότι ο εκφοβισμός των παιδιών και των νέων εμποδίζει την εμπειρία του ανήκειν, της ουσιαστικής συμμετοχής στην κοινότητα και της δυνατότητας συμμετοχής (Helgeland & Lund, 2017).

Όπως γίνεται εμφανές ο σχολικός εκφοβισμός αποτελεί ένα ομαδικό φαινόμενο, εφόσον δεν αφορά μόνο τον/τους εκφοβιζόμενο/ους μαθητή/ές και εκείνον/ους που εκφοβίζονται, αλλά περιλαμβάνει όσους τυγχάνει να είναι παρόντες σε αυτά τα περιστατικά, δηλαδή στους παρατηρητές. Επιπλέον αφορά ακόμα αυτούς που δεν είναι παρόντες, όμως έχουν γνώση των επαναλαμβανόμενων αρνητικών περιστατικών/πράξεων. Αυτοί μπορεί να είναι μαθητές, εκπαιδευτικοί, ειδικό εκπαιδευτικό προσωπικό, ή άλλοι εργαζόμενοι στη σχολική μονάδα ή ακόμα και γονείς/κηδεμόνες. Γενικά στο φαινόμενο του bullying εμπλέκονται πολλά μέρη, όπως: ο μαθητής ή ομάδα μαθητών που ασκεί εκφοβισμό, ο/οι μαθητής/ές που δέχεται/ονται εκφοβισμό, τα παιδιά θεατές, οι εκπαιδευτικοί ή άλλο προσωπικό της σχολικής μονάδας και οι γονείς/κηδεμόνες (KEDS, 2015).

Στη χώρα μας, η μελέτη της σχετικής βιβλιογραφίας αναδεικνύει ότι η σχολική βία και ο εκφοβισμός έχουν πάρει μεγάλες διαστάσεις στις ζωές παιδιών και εφήβων από τη δεκαετία του 1980 μέχρι σήμερα (KEDS, 2015; Karkania & Vaikousi, 2021; Markolefas et al, 2024α). Σύμφωνα με τα ευρήματα έρευνας από το Χαμόγελο του παιδιού (Xamogelo tou paidiou, 2023), στην οποία συμμετείχαν 2.293 παιδιά, κατά το σχολικό έτος 2022-2023 ένα στα τρία παιδιά (32,4%), στην Ελλάδα υπήρξε θύμα σχολικού εκφοβισμού. Νεότερη ερευνητική μελέτη από τον ίδιο φορέα για το σχολικό έτος 2023-2024, στην οποία συμμετείχαν 2047 παιδιά, τα ποσοστά ήταν κατά 3,1% αυξημένα με το 35,5% των μαθητών σε όλη τη χώρα να αναφέρει ότι έχει πέσει θύμα εκφοβισμού (Antoniou et al, 2024).

ΚΥΒΕΡΝΟΕΚΦΟΒΙΣΜΟΣ (CYBERBULLYING)

Μία ιδιαίτερη μορφή εκφοβισμού είναι ο κυβερνοεκφοβισμός (Cyberbullying). Σύμφωνα με τον κυβερνητικό οργανισμό των Η.Π.Α stopbullying (2024), ο κυβερνοεκφοβισμός περιγράφεται ως ο εκφοβισμός που λαμβάνει χώρα μέσω ψηφιακών συσκευών όπως κινητά τηλέφωνα, υπολογιστές και tablet. Ο κυβερνοεκφοβισμός μπορεί να συμβεί μέσω: SMS, κειμένου και εφαρμογών ή μέσω διαδικτύου σε μέσα κοινωνικής δικτύωσης, φόρουμ ή τυχερών παιχνιδιών όπου οι άνθρωποι μπορούν να δουν, να συμμετάσχουν ή να μοιραστούν περιεχόμενο. Ο κυβερνοεκφοβισμός περιλαμβάνει την αποστολή, δημοσίευση ή κοινοποίηση αρνητικού, επιβλαβούς, ψευδούς ή κακόβουλου περιεχομένου που αφορά κάποιο άτομο, καθώς και τη διάδοση προσωπικών δεδομένων ή πληροφοριών με σκοπό την πρόκληση αμηχανίας ή ταπείνωσης. Σε ορισμένες περιπτώσεις, ο κυβερνοεκφοβισμός μπορεί να υπερβεί τα όρια και να λάβει τη μορφή παράνομης ή ακόμη και εγκληματικής συμπεριφοράς (StopBullying, 2024).

Γινεται εμφανές ότι η τεχνολογία έχει δώσει ακόμα περισσότερους τρόπους στα παιδιά που εκφοβίζουν ακόμα και να βασανίσουν τα θύματά τους, κυρίως μέσω των πλατφόρμων κοινωνικής δικτύωσης, γραπτών μηνυμάτων και άλλων εικονικών αλληλεπιδράσεων (Kapari & Stavrou, 2022). Ο κυβερνοεκφοβισμός έχει γίνει μείζον ζήτημα για τα σχολεία, όπως αποδεικνύεται από τον αριθμό των αυτοκτονιών που μπορούν να εντοπιστούν άμεσα σε εκδηλώσεις εκφοβισμού. Λόγω της φύσης του φαινομένου οι νόμοι εξακολουθούν να είναι ασαφείς σχετικά με τον κυβερνοεκφοβισμό και αυτή η συνθήκη δημιουργεί μια επιπλέον πρόκληση για την αντιμετώπιση του φαινομένου, καθώς οι εμπλεκόμενοι δεν είναι σίγουροι για το πώς να χειριστούν νομικά τέτοια ζητήματα (Gaffney et al., 2019).

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ (ΤΝ)

Προκειμένου να προσεγγίσουμε τον όρο ΤΝ, οφείλουμε να αποδεχτούμε την παραδοχή ότι είναι μια δυναμική πραγματικότητα σε συνεχή εξέλιξη. Αυτό προκύπτει ακόμα και από τις συνεχείς τροποποιήσεις που προτείνονται στο σχετικό νομοθετικό πλαίσιο στο πλαίσιο της Ευρωπαϊκής Ένωσης (ΕΕ) (De Obesso Arias, et al., 2023). Ο κανονισμός της ΕΕ για την ΤΝ θεωρείται το πρώτο ολοκληρωμένο νομοθετικό πλαίσιο για την ΤΝ παγκοσμίως. Βασικός σκοπός του είναι η «αντιμετώπιση των κινδύνων για την υγεία, την ασφάλεια και τα θεμελιώδη δικαιώματα». Επίσης αυτός ο κανονισμός προστατεύει «τη δημοκρατία, το κράτος δικαίου και το περιβάλλον» (European Commission, 2024β:1).

Το έτος 1956, έντεκα από τα πιο λαμπρά μαθηματικά μυαλά της εποχής, συναντήθηκαν στο καλοκαιρινό ερευνητικό πρόγραμμα του Dartmouth. Σε αυτή τη συνάντηση, που διήρκεσε δύο μήνες, προέκυψαν διαφοροποιήσεις, αντιπαραθέσεις και προβληματισμός. Μετά από μια περίοδο χωρίς σταθερή πρόοδο φτάσαμε στον 21ο αιώνα. Αξιοποιώντας τα Big Data χάρη στον όγκο πληροφοριών (volume), την διαθέσιμη ταχύτητα (velocity) συλλογής πληροφοριών και την ποικιλία διαθέσιμων δεδομένων (variety), που παρέχουν δόθηκε μεγάλη ώθηση με αποτέλεσμα την οριστική απογείωση της τεχνολογίας της ΤΝ και στο άλμα από τη βιομηχανία 4.0 στη 5.0 βιομηχανική επανάσταση (De Obesso Arias, et al., 2023).όπου μηχανές και άνθρωποι συνεργάζονται για την επίτευξη των επιθυμητών αποτελεσμάτων.

Στις ημέρες μας μια βασική παραδοχή είναι ότι για την προσέγγιση του όρου ΤΝ δεν υπάρχει ένας κοινά αποδεκτός ορισμός, πιο σωστά υφίστανται πολλοί αποδεκτοί ορισμοί. Κατά μια ευρεία προσέγγιση, Τεχνητή Νοημοσύνη - ΤΝ (Artificial Intelligence - AI) είναι «η επιστήμη που έχει στόχο την ανάπτυξη ευφυών συστημάτων» (Koumbarakis, 2020:2). Με βάση τους στόχους της η ΤΝ είναι η επιστήμη που έχει στόχο την ανάπτυξη συστημάτων που: ενεργούν σαν τον άνθρωπο, σκέφτονται σαν τον άνθρωπο, σκέφτονται ορθολογικά (rationally), ενεργούν ορθολογικά (Koumbarakis, 2020:3). Με απόφαση της Ευρωπαικής Επιτροής (2024α) η ΤΝ *«είναι ένα ταχέως εξελισσόμενο σύνολο τεχνολογιών που μπορούν να συμβάλλουν στην επίτευξη ευρείας κλίμακας οικονομικών και κοινωνικών οφελών σε ολόκληρο το φάσμα των κλάδων και των κοινωνικών δραστηριοτήτων. Ταυτόχρονα, ανάλογα με τις περιστάσεις που αφορούν τη συγκεκριμένη εφαρμογή και χρήση της, η ΤΝ μπορεί να δημιουργήσει κινδύνους και να αποβεί επιζήμια για τα δημόσια συμφέροντα και τα θεμελιώδη δικαιώματα που προστατεύονται από το δίκαιο της Ένωσης».*

Σύμφωνα με το λεξικό ψυχολογίας της Αμερικάνικής Ψυχολογικής Εταιρίας (APA, 2018a), ως ΤΝ ορίζεται, ένας επιμέρους κλάδος της επιστήμης των υπολογιστών που στοχεύει στην παραγωγή προγραμμάτων που προσομοιώνουν την ανθρώπινη νοημοσύνη. Οι ερευνητές τεχνητής νοημοσύνης συχνά αναπτύσσουν πολύ υψηλού επιπέδου γλώσσες υπολογιστών για το σκοπό αυτό, όπως LISP, PROLOG και Smalltalk. Υπάρχουν πολλοί κλάδοι της τεχνητής νοημοσύνης, όπως η ρομποτική , η όραση υπολογιστών, η μηχανική μάθηση, το παιχνίδι και τα έμπειρα συστήματα . Η ΤΝ έχει υποστηρίξει επίσης την έρευνα σε άλλους σχετικούς τομείς, συμπεριλαμβανομένης της γνωστικής επιστήμης και της υπολογιστικής γλωσσολογίας. Τέλος οι Abduljabbar, et al, (2019) ορίζουν την ΤΝ (AI) ως ένα πεδίο της επιστήμης των υπολογιστών που κάνει τις μηχανές να λειτουργούν σαν ανθρώπινος εγκέφαλος

ΤΝ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗ ΑΝΘΡΩΠΩΝ ΚΑΙ ΣΥΜΠΕΡΙΦΟΡΩΝ

Σε μελέτη των Palos-Sánchez, et al, (2022) μέσω βιβλιογραφικής ανάλυσης των πλεονεκτημάτων και των προκλήσεων της τεχνητής νοημοσύνης στη διαχείριση ανθρώπων φαίνεται ότι το κύριο πλεονέκτημα της τεχνητής νοημοσύνης είναι η βελτίωση των καναλιών επικοινωνίας όλων των εμπλεκομένων. Στον αντίποδα, μεταξύ των δυσκολιών που πρέπει να ξεπεραστούν είναι η πιθανή απανθρωποποίηση που μπορεί να προκαλέσει αυτή η νέα μορφή επικοινωνίας μεταξύ εργαζομένων (Fritts & Cabrera, 2021).

Η συνηθέστερη επαφή όμως που έχει ο μέσος χρήστης του διαδικτύου είναι η αξιοποίηση της ΤΝ από εταιρείες – μέσων κοινωνικής δικτύωσης, όπως το X (Twitter) και το Instagram. Οι οποίες εργάζονται ενεργά προκειμένου να δημιουργούν αλγόριθμους που μπορούν να χρησιμοποιηθούν για τον εντοπισμό κυβερνοεκφοβισμού επισημαίνοντας ύποπτο περιεχόμενο, με σκοπό να αντιμετωπιστούν, να προληφθούν και να ελαχιστοποιηθούν τα περιστατικά κυβερνοεκφοβισμού (Gomez, et al. 2021). Το 2019, το Instagram κυκλοφόρησε μια λειτουργία που προειδοποιεί έναν χρήστη εάν το σχόλιό του θεωρείται δυνητικά προσβλητικό. Αυτό επιτρέπει στον χρήστη να ξανασκεφτεί εάν επιθυμεί να συνεχίσει να δημοσιεύει το περιεχόμενο που έχει επισημανθεί. Το X λαμβάνει επίσης μέτρα για τον περιορισμό του επιβλαβούς περιεχομένου εφαρμόζοντας μια συγκεκριμένη πολιτική ανάλογα με το επίπεδο σοβαρότητας, όπως ο περιορισμός της ορατότητας μιας ανάρτησης ή η αποστολή άμεσου μηνύματος σε έναν χρήστη που αναφέρθηκε από άλλους χρήστες (Gomez, et al. 2021).

Η απεραντοσύνη του κοινόχρηστου περιεχομένου στις πλατφόρμες καθιστά αδύνατη τη διαχείριση του αποκλειστικά μέσω ανθρώπινης προσπάθειας, χωρίς να αναφερθεί το ενδεχόμενο ψυχολογικής βλάβης που μπορεί να

προκαλέσει στους συντονιστές η διαχείριση τέτοιων περιστατικών, λόγω της ευαισθησίας και της συναισθηματικά βαριάς φύσης του ίδιου του αντικειμένου (Roberts, 2019). Δεν είναι τυχαίο που τα τελευταία χρόνια έχουμε γίνει μάρτυρες μιας σταθερής αύξησης των ερευνητικών προσπαθειών για την εύρεση αποτελεσματικών τρόπων αξιοποίησης της φυσικής διαδικασίας της ΤΝ και την αποτελεσματική αντιμετώπιση του προβλήματος (Milosevic et al., 2022). Αυτό θα επέτρεπε μια πιο αποτελεσματική διαχείριση του φαινομένου κυρίως μέσω της πρόληψης. Σε αντίθεση με την αντιδραστική εποπτεία, όπου ένας χρήστης αναφέρει ένα μέρος περιεχομένου το οποίο στη συνέχεια αποστέλλεται σε εποπτεία και υποβάλλεται σε επεξεργασία με αυτοματοποιημένο τρόπο ή εναλλακτικά διερευνάται από ανθρώπους, η προληπτική εποπτεία βασίζεται στις προαναφερθείσες τεχνικές για τον αυτόματο εντοπισμό τέτοιων περιπτώσεων παραβίασης πολιτικής πριν αναφερθούν από τους χρήστες (Milosevic et al., 2022).

Εκτός από τον έλεγχο περιεχομένου η ΤΝ μας δίνει και την δυνατότητα τεχνολογιών προσαρμογής μάθησης. Οι οποίες αναφέρονται σε εκπαιδευτικά συστήματα που αξιοποιούν την ανάλυση δεδομένων μέσω τεχνητής νοημοσύνης με στόχο την εξατομίκευση της μαθησιακής εμπειρίας. Αυτές οι τεχνολογίες προσαρμόζουν δυναμικά την παρουσίαση του εκπαιδευτικού περιεχομένου με βάση την απόδοση, το ρυθμό μάθησης και τις προτιμήσεις ενός μεμονωμένου μαθητή. Με τη παρατεταμένη και συνεχή ανάλυση δεδομένων σχετικά με τις αλληλεπιδράσεις των μαθητών, οι τεχνολογίες προσαρμογής μάθησης παρέχουν εξατομικευμένη υποστήριξη/ανατροφοδότηση και βελτιστοποιημένες οδούς μάθησης για τη ενίσχυση της συμμετοχής και των επιδόσεων των μαθητών (Strielkowski et.al., 2024).

Αξίζει να σημειωθεί ότι ο κανονισμός της ΕΕ για την Τεχνητή Νοημοσύνη εισάγει ένα ενιαίο ρυθμιστικό πλαίσιο για όλα τα κράτη μέλη. Το πλαίσιο αυτό περιγράφει μη αποδεκτούς κινδύνους και προβλέπει την απαγόρευση ενός πολύ περιορισμένου αριθμού ιδιαίτερα επιβλαβών χρήσεων της ΤΝ, οι οποίες θεωρούνται αντίθετες με τις αξίες της ΕΕ και παραβιάζουν θεμελιώδη δικαιώματα (European Commission, 2024β: 1–2) όπως: εκμετάλλευση ευάλωτων χαρακτηριστικών των προσώπων, χειραγώγηση και χρήση τεχνικών που απευθύνονται στο υποσυνείδητο, κοινωνική βαθμολόγηση για δημόσιους και ιδιωτικούς σκοπούς, «ατομική προληπτική αστυνόμευση με βάση αποκλειστικά την κατάρτιση προφίλ, μη στοχευμένη συγκομιδή δεδομένων από το διαδίκτυο ή τις τηλεοράσεις κλειστού κυκλώματος για εικόνες προσώπου με σκοπό τη δημιουργία ή την επέκταση βάσεων δεδομένων, αναγνώριση συναισθημάτων στο χώρο εργασίας και στα εκπαιδευτικά ιδρύματα, εκτός αν χρησιμοποιείται για ιατρικούς λόγους ή λόγους ασφάλειας (π.χ. παρακολούθηση των επιπέδων κόπωσης ενός πιλότου), βιομετρική κατηγοριοποίηση φυσικών προσώπων με σκοπό να συναχθεί η φυλή, τα πολιτικά φρονήματα, η συμμετοχή σε συνδικαλιστική οργάνωση, οι θρησκευτικές ή φιλοσοφικές πεποιθήσεις ή ο γενετήσιος προσανατολισμός τους. Θα εξακολουθήσει να επιτρέπεται η επισήμανση ή το φιλτράρισμα συνόλων δεδομένων και η κατηγοριοποίηση των δεδομένων στον τομέα της επιβολής του νόμου, εξ αποστάσεως βιομετρική ταυτοποίηση σε πραγματικό χρόνο σε δημόσιους χώρους από τις αρχές επιβολής του νόμου, με την επιφύλαξη επακριβώς προσδιορισμένων εξαιρέσεων. Ο κανονισμός για την ΤΝ προβλέπεται να εφαρμοστεί στις 2 Αυγούστου 2026, δύο έτη μετά την έναρξη ισχύος του, με κάποιες εξαιρέσεις οι οποίες είναι πέρα του αντικειμένου τους παρούσας μελέτης (European Commission, 2024β:7).

ΤΝ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗ ΣΧΟΛΙΚΟΥ ΕΚΦΟΒΙΣΜΟΥ

Τα τελευταία χρόνια έχουν δημοσιευτεί επιστημονικές μελέτες ανά τον κόσμο στον τομέα της προστασίας των παιδιών και των εφήβων από τον σχολικό εκφοβισμό και τον κυβερνοεκφοβισμό, ταυτόχρονα η αναζήτηση μιας αποτελεσματικής λύσης η οποία παράλληλα σέβεται βασικές αρχές ιδιωτικότητας και θεμελιωδών δικαιωμάτων (European Commission, 2024β) είναι πρόκληση. Παρακάτω παρουσιάζονται πέντε εφαρμογές/προγράμματα τα οποία πληρούν τα κριτήρια αποδοχής.

EMOTOTENT

Το EmotoTent είναι ένα διαδραστικό σύστημα κοινωνικο-συναισθηματικής μάθησης που αναπτύχθηκε από την Antle και την ερευνητική της ομάδα το 2019, το οποίο σχεδιάστηκε για να βοηθήσει τα παιδιά να διαχειρίζονται τα συναισθήματά τους και να τα διδάξει πώς να αλληλεπιδρούν με τους άλλους με ενσυναίσθηση (Kinnunen, 2022). Είναι ένα κοινωνικό-τεχνολογικό πρόγραμμα, που προβλέπεται να ολοκληρωθεί μέχρι το 2030, και αναμένεται να βοηθήσει τα παιδιά να εκπληρώσουν τους κοινωνικο-συναισθηματικούς τους στόχους, ώστε να βελτιωθεί η κουλτούρα των σχολείων και να προαχθεί η ευημερία των παιδιών σε όλη τους τη ζωή (Antle et al.,2019). Στο πρόγραμμα EmotoTent τα παιδιά μαθαίνουν και εξασκούνται στη ρύθμιση των συναισθημάτων και την ενσυναίσθηση, με συνομηλίκους, κατοικίδια ζώα και έναν ρομποτικό σκύλο, με τρόπους βιωματικούς, ενσώματους και παιγνιώδεις (Antle et al., 2019). Η σκηνή (ψηφιακός χώρος) EmotoTent περιλαμβάνει τέσσερα στοιχεία: αυτοκόλλητα τατουάζ βιοαισθητήρων, (πολύ)ακουστικά προβολής εικόνων, έναν ρομποτικό πράκτορα – σκύλο και ένα διαδραστικό τρισδιάστατο ολογραφικό περιβάλλον – σκηνή (Kinnunen, 2022).

Κατά τη χρήση του EmotoTent (Antle et al., 2019), κάθε παιδί φοράει ένα αυτοκόλλητο τατουάζ βιοαισθητήρων, το οποίο μετρά τις δραστηριότητες του εγκεφάλου, της καρδιάς και των μυϊκών ιστών. Αυτές οι δραστηριότητες μεταφράζονται σε δεδομένα συναισθήματος για να χρησιμοποιηθούν από τα άλλα εξαρτήματα. Τα ακουστικά προβολής εικόνων ανακατασκευάζουν τις νοητικές εικόνες των παιδιών σύμφωνα με τα δεδομένα συναισθημάτων και τις προβάλλουν σε διαδραστικά ολογράμματα μέσα στη σκηνή και στη συνέχεια η σκηνή επεξεργάζεται τις χειρονομίες των παιδιών. Ο ρομποτικός πράκτορας σκύλος βρίσκεται μέσα στη σκηνή μαζί με τα παιδιά, κυρίως για υποστήριξη κατά τη διάρκεια της (απειλητικής) κατάστασης, αλλά μπορεί επίσης να διδάξει στα παιδιά για τον εκφοβισμό ενώ ταυτόχρονα τα παιδιά μπορούν να παίξουν μαζί του (Antle et al., 2019).

Το σύστημα EmotoTent δεν αντιμετωπίζει άμεσα τον εκφοβισμό, αλλά επιδιώκει ένα καλύτερο σχολικό περιβάλλον για όλους, διδάσκοντας στα παιδιά πώς οφείλουν να αντιμετωπίζουν τους άλλους (Kinnunen, 2022). Ο σχεδιασμός της δραστηριότητας EmotoTent βασίζεται στην εξελισσόμενη εμπειρική κατανόηση της ενσυναίσθησης και της συμπόνιας. Μια βασική μορφή αλληλεπίδρασης του EmotoTent περιλαμβάνει ένα παιδί που θυμάται ένα γεγονός ή μια εμπειρία κατά την οποία ένιωσε ένα συγκεκριμένο συναίσθημα (Antleetal, 2019). Οι αναμνήσεις αμβλύνονται ως προς την σημαντικότητα εξασφαλίζοντας ότι η αναβίωση ενός συναισθήματος δεν είναι τραυματική.

STOPBULLY

Το StopBully είναι μια εφαρμογή για Android, που αναπτύχθηκε στη Μαλαισία, με σκοπό την εκπαίδευση κατά του εκφοβισμού και την ευαισθητοποίηση των εφήβων προκειμένου να αντιμετωπιστεί ο εκφοβισμός. Η εφαρμογή διαθέτει έξι διαφορετικές λειτουργίες. Οι τέσσερις πρώτες αφορούν σε: βίντεο, παιχνίδια, κουίζ και κόμικς, οι οποίες σχεδιάστηκαν για να διδάξουν τους χρήστες σχετικά με τον εκφοβισμό και τις συνέπειές του. Αφετηρία στη λειτουργία του είναι η προβολή εισαγωγικού βίντεο που απεικονίζει το ιστορικό μίας διαλυμένης φιλίας ως αποτέλεσμα του εκφοβισμού (Neo et a.l, 2018).

Ένα σημαντικό μέρος της εφαρμογής είναι τα εκπαιδευτικά παιχνίδια που περιέχει, αλλά εκεί που διαφέρει από τις άλλες λύσεις/προτάσεις είναι τα επιπλέον χαρακτηριστικά που διαθέτει. Οι άλλες δυο λειτουργίες του αφορούν στην ενημέρωση για μια σελίδα πληροφοριών, τους Befrienders, που είναι ένα διεθνές κέντρο υποστήριξης για την πρόληψη της αυτοκτονίας. Επιπλέον προβλέπεται η λειτουργία κομβίου έκτακτης ανάγκης, το οποίο συνδέει τον χρήστη της εφαρμογής απευθείας με τις αρμόδιες αρχές (Kinnunen, 2022). Αυτές οι λειτουργίες μπορούν να χρησιμοποιηθούν σε πραγματικές καταστάσεις εκφοβισμού ακόμα και όταν κάποιος βιώνει τις αρνητικές συνέπειες του εκφοβισμού. Γίνεται εμφανές ότι η εφαρμογή δεν περιορίζεται στην πρόληψη αλλά παρέχει δυνατότητα υποστήριξης κατά τη διάρκεια και μετά την εμφάνιση μιας εκφοβιστικής κατάστασης (Neo, et al., 2018). Επιπλέον υπάρχει πρόβλεψη εξέτασης των χρηστών μέσω σχετικών κουίζ τα οποία αξιολογούν την γνώση που απέκτησαν και εμπέδωσαν μέσω της εφαρμογής. Τέλος, παρέχονται βίντεο πρόληψης του εκφοβισμού στον κυβερνοχώρο με πρόθεση να εκπαιδεύσουν τους χρήστες στην αποφυγή του κυβερνοεκφοβισμού (Neo et al.,2018).

Η ομάδα που σχεδιάζει και εποπτεύει την εφαρμογή είναι διεπιστημονική και περιλαμβάνει μεταξύ άλλων, ψυχολόγους με γνώσεις και εμπειρία στα θέματα του εκφοβισμού και της ενσυναίσθησης, καθώς και ειδικούς στα γραφικά υπολογιστών. Οι χαρακτήρες του παιχνιδιού, σχεδιάστηκαν από δύο φοιτητές Καλών Τεχνών ακολουθώντας τις οδηγίες των ψυχολόγων. Πραγματοποιήθηκαν διάφορα στάδια αξιολόγησης του παιχνιδιού, από τα οποία προέκυψαν αρκετές ιδέες για την τελειοποίηση και τη βελτίωση της πιλοτικής εφαρμογής. Μετά τις απαραίτητες προσαρμογές, πραγματοποιήθηκε μια επαναληπτική μελέτη χρηστών, προκειμένου να αξιολογηθεί η χρηστικότητα, η δυνατότητα αναπαραγωγής και η αποτελεσματικότητα του παιχνιδιού στην αλλαγή των συμπεριφορών που σχετίζονται με τον εκφοβισμό (Raminhos, 2015).

Τα πειραματικά αποτελέσματα αναδεικνύουν την σημασία της θετικής ανατροφοδότησης των συμμετεχόντων. Επιπλέον συμφωνούν ότι η εφαρμογή είναι ένα αποτελεσματικό εργαλείο για διδασκαλία και διαδραστική μάθηση. Προκειμένου να βελτιωθεί η εφαρμογή του προγράμματος προτείνεται η προσαρμογή του στα ιδιαίτερα χαρακτηριστικά του κάθε σχολείου (Neo et al., 2018).

PREVER (Prevention of Racial Stigma)

Μία ακόμα εφαρμογή η οποία σχεδιάστηκε στην Ισπανία και απευθύνεται σε smartphones είναι το PREVER το οποίο επικεντρώνεται στην ανίχνευση εκφοβισμού σε μαθητές κάτω των 16 ετών. Έχει σχεδιαστεί για να εμπλέκει όχι μόνο τους μαθητές αλλά και τους εκπαιδευτικούς (Alberola et al, 2020). Επιπλέον αξιολογεί τις διακρίσεις με βάση τις προκαταλήψεις σε νέους κάτω των 16 ετών έναντι των αλλοδαπών συμμαθητών τους (Álvarez et al., 2016). Η εφαρμογή αυτή συνδυάζει την πρόσωπο με πρόσωπο αλληλεπίδραση μεταξύ των μαθητών με την εικονική αλληλεπίδραση. Ο

εκπαιδευτικός επιβλέπει αυτή την αλληλεπίδραση προκειμένου να ανιχνεύσει αρνητικές συμπεριφορές. Η εφαρμογή ενσωματώνει τεχνικές παιχνιδοποίησης με βάση ένα παιχνίδι επαυξημένης πραγματικότητας. Το κυρίαρχο στοιχείο είναι ότι οι μαθητές έχουν την δυνατότητα να παρακολουθούν την τάξη τους στα κινητά τους τηλέφωνά με επαυξημένες πληροφορίες ενώ παράλληλα τους δίνεται η δυνατότητα να σχετίζονται με τους αντιπάλους τους στην εφαρμογή. Οι μαθητές αλληλεπιδρούν ελεύθερα μεταξύ τους και η εφαρμογή συλλέγει δεδομένα.

Εργαλεία όπως το PREVER είναι προσανατολισμένα στην προώθηση της εικονικής και φυσικής αλληλεπίδρασης μεταξύ των μαθητών, δεδομένου ότι η αλληλεπίδραση είναι ζωτικής σημασίας για την καταπολέμηση του εκφοβισμού (Alberola et al, 2020). Η εφαρμογή καταγράφει όλες τις αλληλεπιδράσεις ανάμεσα στους μαθητές, ενώ παράλληλα δίνεται η δυνατότητα πρόσβασης στους εκπαιδευτικούς, στο διακομιστή και στη λήψη των σχετικών πληροφοριών ώστε να καταγράψουν και αυτοί τι συμβαίνει ανάμεσα στους μαθητές μέσα στην τάξη, σε ένα κοινωνιόγραμμα αλληλεπιδράσεων της ομάδας (Álvarez et al., 2016). Για την καλύτερη κατανόηση της λειτουργίας της εφαρμογής, μπορεί να παρουσιαστεί ένα παράδειγμα αλληλεπίδρασης κατά τη διάρκεια του παιχνιδιού. Συγκεκριμένα, η εφαρμογή δίνει στον μαθητή τη δυνατότητα να σχηματίσει μια ομάδα φίλων για την εκτέλεση μιας συγκεκριμένης εργασίας, όπως η οργάνωση ενός ποδοσφαιρικού αγώνα. Ο μαθητής έχει επίσης τη δυνατότητα να αποκλείσει συμμαθητές του από την ομάδα μέσω σχετικής επιλογής στο κινητό του τηλέφωνο. Η ενέργεια αυτή καταγράφεται και παρακολουθείται από τον υπεύθυνο εκπαιδευτικό (Álvarez et al., 2016).

Σχετικά με τους βασικούς περιορισμούς για τη χρήση αυτού του είδους των τεχνολογιών στην τάξη είναι η προϋπόθεση για τους μαθητές και τους εκπαιδευτικούς να έχουν πρόσβαση σε ένα κινητό τηλέφωνο με κατάλληλες προδιαγραφές. Μετά την εγκατάσταση της εφαρμογής απαιτείται η αλληλεπίδραση με τους συμμαθητές τους. Τέλος δεν μπορεί να εξασφαλιστεί το επαρκές επίπεδο εμπλοκής και αλληλεπίδρασης των μαθητών κατά τη διάρκεια χρήσης της εφαρμογής (Álvarez et al., 2016).

HAPPY 8-12 & HAPPY 12-16

Το Happy 8-12 και το Happy 12-16 είναι δύο λογισμικά σχεδιασμένα για την εκπαίδευση συναισθηματικών ικανοτήτων σε καταστάσεις καθημερινής ζωής καθώς και σε καταστάσεις σύγκρουσης μεταξύ συνομηλίκων στο δημοτικό και γυμνάσιο, αντίστοιχα (Ros-Morente et al, 2018). Οι εφαρμογές αυτές εξετάζουν τρεις διαφορετικούς ρόλους που διαδραματίζουν οι μαθητές: το άτομο που επιδεικνύει επιθετική συμπεριφορά, το άτομο που υφίσταται την επιθετικότητα και τους παρευρισκόμενους. Οι εφαρμογές δίνουν την δυνατότητα εξέτασης 25 καταστάσεων/συγκρούσεων που αναμένεται να εκπαιδεύσουν τους μαθητές. Το Happy 8-12 δοκιμάστηκε πιλοτικά σε σχεδόν 600 μαθητές, ενώ αντίστοιχά το Happy 12-16 δοκιμάστηκε πιλοτικά σε περισσότερους από 900 μαθητές (Alberola et al., 2020). Οι ικανότητες που καλλιεργούνται με αυτά τα λογισμικά όπως περιγράφονται από την Ερευνητική Ομάδα Ψυχοπαιδαγωγικού Προσανατολισμού (GROP), είναι ο ηθικός ρεαλισμός, η ισότητα και η δικαιοσύνη (Ros-Morente et al, 2018). Τα αποτελέσματα έρευνας σε δείγμα Ισπανών φοιτητών, δείχνουν ότι η εκπαίδευση συναισθηματικών ικανοτήτων μέσω νέων μεθόδων, όπως τα λογισμικά παιχνιδοποίησης, συμβάλλει στη βελτίωση της συναισθηματικής νοημοσύνης, στη μείωση του άγχους και στην ενίσχυση της ακαδημαϊκής επίδοσης (Ros-Morente et al., 2018).

Προκειμένου να εξασφαλιστεί η αποτελεσματικότητα του λογισμικού, απαιτείται η συνεισφορά του εκπαιδευτικού. Τα Happy 8-12 και Happy 12-16 έχουν σχεδιαστεί με στόχο τη διαδραστική συνεργασία των μαθητών ώστε να γίνουν πιο αυτόνομοι και ευέλικτοι (Ros-Morente et al, 2018). Στο πλαίσιο σχετικής έρευνας που έγινε σε 574 μαθητές στην 5η και 6η τάξη του δημοτικού σχολείου, τα αποτελέσματα έδειξαν ότι το Happy 8-12 βελτίωσε σημαντικά τις συναισθηματικές ικανότητες των μαθητών, μείωσε τα επίπεδα άγχους και βελτίωσε την ατμόσφαιρα τόσο στο προαύλιο όσο και στην τάξη, αυξάνοντας αισθητά την ακαδημαϊκή επιτυχία (Filella et al., 2016). Συνολικά, το εκπαιδευτικό βιντεοπαιχνίδι Happy αποδείχθηκε ένα πολλά υποσχόμενο εργαλείο, καθώς δίνει τη δυνατότητα τόσο στους μαθητές όσο και στους επαγγελματίες να εντοπίσουν το αρχικό τους επίπεδο συναισθηματικής ικανότητας και ευημερίας, με στόχο την εκπαίδευσή τους σε μια αποτελεσματική και προσαρμοστική διαχείριση των συναισθημάτων.

Παράλληλα, ενισχύει μια στάση πρόληψης της σύγκρουσης που μπορεί να υπάρχουν στο περιβάλλον των μαθητών ή και στην καθημερινή ζωή. Το έργο αυτό έχει αποδείξει ότι ένα λογισμικό ή ένα παιχνιδοποιημένο πρόγραμμα, όπως είναι το Happy στις δύο εκδόσεις του (8-12 και 12-16) μπορεί να προσαρμοστεί και να λειτουργήσει σε διαφορετικές ηλικιακές ομάδες και περιπτώσεις (Ros-Morente et al, 2018).

KIVA

Το KiVa είναι ένα ολοκληρωμένο πρόγραμμα κατά του σχολικού εκφοβισμού που καταρτίστηκε στο Πανεπιστήμιο Turku της Φινλανδίας. Πριν την εφαρμογή του στα σχολεία στηρίχτηκε σε μακρόχρονη έρευνα, από την

οποία προέκυψαν οι τρεις βασικοί του άξονες: ομαδικές δράσεις για όλους τους μαθητές, ατομικές δράσεις για τους εμπλεκόμενους σε περιστατικά εκφοβισμού και συνεχής επιτήρηση της κατάστασης. Είναι σημαντικό να τονιστεί πως κατά το σχεδιασμό του προγράμματος υπήρξε συστηματική συνεργασία με εκπαιδευτικούς, ώστε να διασφαλιστεί πως θα είναι λειτουργικό και εφαρμόσιμο (Markolefas et al, 2024β). Μεταξύ άλλων περιλαμβάνονται διαδικτυακά παιχνίδια, στα οποία δεν έχει δυνατότητα πρόσβασης το ευρύ κοινό. Ένα από αυτά αναπτύχθηκε σε στυλ κινουμένων σχεδίων 2D και παρουσιάζει διαφορετικές καταστάσεις, ενώ ο παίκτης καλείται να πάρει τη σωστή απόφαση. Τα δεδομένα που παράγονται από αυτά τα βιντεοπαιχνίδια δεν αποθηκεύονται (Raminhos et al., 2015). Το πρόγραμμα δεν δίνει έμφαση μόνο στα παιδιά που εκφοβίζονται και στα παιδιά που εκφοβίζουν, αλλά και στους παρευρισκόμενους ώστε να αυξήσει τη συμπόνια/ενσυναίσθηση των θεατών και να τους ενθαρρύνει να σκέφτονται για το πώς να παρεμβαίνουν στον εκφοβισμό.

Το KiVa έχει σχεδιαστεί για τη βασική εκπαίδευση (τάξεις 1-9, παιδιά ηλικίας 7-15 ετών) και έχει κριθεί αποτελεσματικό στη μείωση του εκφοβισμού μεταξύ των μαθητών στη φινλανδική πρωτοβάθμια εκπαίδευση (τάξεις 1-6), αλλά με πιο μέτρια αποτελεσματικότητα στη δευτεροβάθμια εκπαίδευση (Herkama, et al., 2023). Επίσης παρέχει γραφικές απεικονίσεις και ενημερωτικά δελτία για την εισαγωγή/παρουσίαση του προγράμματος στους γονείς. Για την αντιμετώπιση οξέων περιστατικών εκφοβισμού, στο πλαίσιο του προγράμματος KiVa συγκροτείται ειδική ομάδα από το προσωπικό του σχολείου, η οποία ακολουθεί συγκεκριμένες και λεπτομερείς κατευθυντήριες γραμμές για τη διαχείρισή τους. Επιπλέον, τα σχολεία που εφαρμόζουν το πρόγραμμα παρακολουθούν την πρόοδό τους μέσω ανατροφοδότησης που βασίζεται στις ετήσιες έρευνες του KiVa, στις οποίες συμμετέχουν τόσο οι μαθητές όσο και το προσωπικό (Herkama et al.,

Τα ερευνητικά δεδομένα δείχνουν ότι το πρόγραμμα KiVa είναι συνολικά αποτελεσματικό, καθώς στα φινλανδικά σχολεία όπου εφαρμόστηκε, οι περιπτώσεις σχολικού εκφοβισμού μειώθηκαν κατά το ήμισυ. Παράλληλα, διαπιστώθηκε μείωση του άγχους και της κατάθλιψης μεταξύ των παιδιών, γεγονός που συνέβαλε στη βελτίωση της αυτοεκτίμησής τους και στην ενίσχυση των ακαδημαϊκών τους κινήτρων (Neo et al., 2018).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Το φαινόμενο του σχολικού εκφοβισμού συνδέεται άρρηκτα με το σχολείο, τόσο ως χώρο όσο και ως θεσμό, καθώς τα περιστατικά στα οποία ασκείται συστηματικά και με σαφή πρόθεση απευθύνονται στα αδύναμα μέλη της σχολικής κοινότητας. Απαραίτητη προϋπόθεση για την αποτελεσματική πρόληψη και διαχείριση της ενδοσχολικής βίας και του σχολικού εκφοβισμού είναι η διεξοδική μελέτη του φαινομένου η καταγραφή της υφιστάμενης κατάστασης σε διεθνές και εθνικό ερευνητικό επίπεδο (Artinopoulou et al, 2023) και η λήψη αντίστοιχων πρωτοβουλιών διαχείρισης και αντιμετώπισης. Γενικότερος στόχος των προαναφερθεισών εφαρμογών/προγραμμάτων είναι το σχολείο ως χώρος και ως θεσμός όπου οι μαθητές θα μάθουν να διαχειρίζονται πραγματικά προβλήματα, οι προτεινόμενες λύσεις να είναι ουσιαστικές και αποτελεσματικές και να υπάρχει η μέριμνα/δυνατότητα όσα μαθαίνουν στο σχολείο να τα εφαρμόζουν και εκτός σχολείου (Markolefas et al, 2024β).

Στην παρούσα μελέτη παρουσιάστηκε μια ποικιλία διαφορετικών επιλογών σχετικά με τον τρόπο χρήσης της τεχνολογίας ως μεθόδου πρόληψης και αντιμετώπισης του εκφοβισμού. Εξετάζοντας τις πιθανές λύσεις, έγινε εμφανές ότι διάφορα είδη τεχνολογιών μπορούν να αξιοποιηθούν στη μάχη κατά του εκφοβισμού. Η ανάπτυξη της ενσυναίσθησης είναι ένας κοινός παρονομαστής στις λύσεις που παρουσιάζονται. Σήμερα υπάρχουν εργαλεία και ανιχνευτές που έχουν την δυνατότητα άμεσης εμπλοκής στις πιθανές καταστάσεις εκφοβισμού. Οι επιτυχημένες τεχνολογικές λύσεις μειώνοντας τον αριθμό των περιστατικών εκφοβισμού που συμβαίνουν, θα ελαττώσουν και την εμφάνιση των πιο σοβαρών προβλημάτων που προκαλούνται από τον εκφοβισμό (Kinnunen, 2022).

Όποια εφαρμογή/πρόγραμμα επιλεγεί οφείλει να εξασφαλίζει την προστασία της ιδιωτικής ζωής και των δικαιωμάτων των εμπλεκομένων (European Commission, 2024β). Ενδεχομένως στο μέλλον όταν έχουν ωριμάσει οι συνθήκες να εξεταστεί ο εντοπισμός του τέλειου συνδυασμού λύσεων – προτάσεων, αξιοποιώντας τις απόψεις των εμπλεκομένων, σχετικά με την πρόληψη του εκφοβισμού, συνδυάζοντας τον εκφοβισμό με την τεχνολογία (Kinnunen, 2022). Όποια και να είναι τα προγράμματα/λύσεις που θα επιλεχθούν κατά του σχολικού εκφοβισμού απαιτείται η κατάλληλη επιμόρφωση των εκπαιδευτικών για την επιτυχή εφαρμογή και αποτελεσματική λειτουργία τους (Markolefas et al, 2024β). Αναγκαία συνθήκη και προϋπόθεση για την επιτυχή επιμόρφωση και την στοχευμένη επιστημονική υποστήριξη των υπηρετούντων στην εκπαίδευση, και κατ' επέκταση για την καλλιέργεια κατάλληλου παιδαγωγικού κλίματος στα σχολεία, είναι η παροχή χρηματοδότησης. Τέλος είναι αναγκαίο να δρομολογηθεί ένα νέο πλαίσιο οργάνωσης της σχολικής ζωής και στήριξη με δομές συμβουλευτικής υποστήριξης των σχολικών μονάδων (Karkania & Vaikousi, 2021) λαμβάνοντας υπόψη και τις σύγχρονες τεχνολογικές εξελίξεις.

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ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ: ΜΙΑ ΒΙΒΛΙΟΜΕΤΡΙΚΗ ΑΝΑΛΥΣΗ ΤΩΝ ΤΑΣΕΩΝ ΚΑΙ ΤΩΝ ΜΕΛΛΟΝΤΙΚΩΝ ΚΑΤΕΥΘΥΝΣΕΩΝ ΤΗΣ ΕΡΕΥΝΑΣ- ΠΡΩΤΑ ΕΥΡΗΜΑΤΑ

Μαρία Μητρούλια[1]
Υποψήφια διδάκτορας
email: m.mitroulia@uoi.gr

Θωμάς Κιτσαντάς[2]
Λέκτορας

Κωσταντινιά Τσιλιγιάννη[3]
Εργαστηριακό Διδακτικό Προσωπικό

Ευάγγελος Χύτης[4]
Καθηγητής

[1,2,3,4] Πανεπιστήμιο Ιωαννίνων, Τμήμα Λογιστικής και Χρηματοοικονομικής, Ελλάδα

ΠΕΡΙΛΗΨΗ

Η Τεχνητή Νοημοσύνη (ΤΝ) στην εκπαίδευση έχει εξελιχθεί τα τελευταία χρόνια σε έναν από τους πιο ραγδαία αναπτυσσόμενους και δυναμικούς ερευνητικούς τομείς. Η αυξανόμενη ενσωμάτωσή της στις εκπαιδευτικές διαδικασίες έχει δημιουργήσει νέες ευκαιρίες για καινοτομία στη διδασκαλία και τη μάθηση, αλλά και προκλήσεις που σχετίζονται με ζητήματα δεοντολογίας, ακαδημαϊκής ακεραιότητας και παιδαγωγικής αξιοποίησης. Η παρούσα μελέτη πραγματοποιεί μια συστηματική βιβλιομετρική ανάλυση της ερευνητικής δραστηριότητας γύρω από την ΤΝ στην εκπαίδευση, με στόχο τη χαρτογράφηση των τάσεων, των θεματικών αξόνων και των μελλοντικών κατευθύνσεων του πεδίου. Το δείγμα περιλαμβάνει συναφείς δημοσιεύσεις από τη βάση δεδομένων Scopus για την περίοδο 2016–2024, οι οποίες αναλύθηκαν με τα εργαλεία Bibliometrix R και VOSviewer. Τα πρώτα αποτελέσματα αναδεικνύουν μια εκθετική αύξηση του επιστημονικού ενδιαφέροντος μετά το 2019, με κυρίαρχες θεματικές τις εφαρμογές των μεγάλων γλωσσικών μοντέλων, την ηθική της ΤΝ, τη μαθησιακή εξατομίκευση και την ακαδημαϊκή ακεραιότητα. Η έρευνα συμβάλλει στη διαμόρφωση μιας επίκαιρης εικόνας του γνωστικού πεδίου και προσφέρει χρήσιμες προτάσεις για μελλοντικές ερευνητικές και εκπαιδευτικές πρωτοβουλίες.

Λέξεις-κλειδιά: Τεχνητή νοημοσύνη, εκπαίδευση, βιβλιομετρική ανάλυση, βάση δεδομένων Scopus

ΕΙΣΑΓΩΓΗ

Η Τέταρτη Βιομηχανική Επανάσταση έχει επιταχύνει την ανάπτυξη των τεχνολογιών πληροφορίας, με την Τεχνητή Νοημοσύνη (ΤΝ) να αποτελεί τον πλέον καθοριστικό παράγοντα της μετασχηματιστικής αυτής πορείας (Ibegbulam et al., 2023). Στην εκπαίδευση, οι εφαρμογές της ΤΝ, όπως τα ευφυή συστήματα διδασκαλίας, η αυτόματη αξιολόγηση, η ανάλυση συναισθημάτων και η ανάπτυξη της κριτικής σκέψης, έχουν αναδείξει νέες δυνατότητες για βελτίωση της ποιότητας και της αποδοτικότητας της μάθησης (Doroudi, 2023; Kamalov et al., 2023). Η εμφάνιση εργαλείων όπως το ChatGPT και τα Large Language Models (LLM) έχει επηρεάσει καθοριστικά τον τρόπο με τον οποίο η εκπαιδευτική κοινότητα προσεγγίζει τη μάθηση, την αξιολόγηση και την εκπαιδευτική δεοντολογία (Ali et al., 2024; Dwivedi et al., 2023).

Παρά την αυξανόμενη ερευνητική δραστηριότητα, η υπάρχουσα βιβλιογραφία παρουσιάζει ετερογένεια ως προς το θεωρητικό πλαίσιο, τις μεθοδολογικές προσεγγίσεις και το πεδίο εφαρμογής (Durak et al., 2024; Zawacki-Richter et al., 2019). Οι περισσότερες μελέτες επικεντρώνονται σε επιμέρους ζητήματα, χωρίς να προσφέρουν μια συνολική χαρτογράφηση του ερευνητικού οικοσυστήματος της ΤΝ στην εκπαίδευση. Για τον λόγο αυτό, η παρούσα εργασία επιδιώκει μια πολυδιάστατη αποτύπωση του πεδίου μέσω μιας βιβλιομετρικής ανάλυσης, απαντώντας σε πέντε αρχικά ερευνητικά ερωτήματα που αφορούν τις τάσεις δημοσιεύσεων και αναφορών, τους πιο επιδραστικούς ερευνητικούς φορείς, τις κυρίαρχες θεματικές, τα δίκτυα συνεργασίας και τις προοπτικές για μελλοντική έρευνα. Η συμβολή της μελέτης είναι διττή: αφενός ενισχύει τη θεωρητική κατανόηση της σχέσης ανάμεσα στην ΤΝ και την εκπαίδευση, και αφετέρου προσφέρει πρακτικές κατευθύνσεις για την ανάπτυξη εκπαιδευτικών πολιτικών και την ενίσχυση της επιστημονικής συνεργασίας.

ΜΕΘΟΔΟΛΟΓΙΑ

Η έρευνα βασίστηκε στη μέθοδο της βιβλιομετρικής ανάλυσης, η οποία συνδυάζει ποσοτικές και ποιοτικές τεχνικές για τη διερεύνηση της ερευνητικής δραστηριότητας σε ένα συγκεκριμένο επιστημονικό πεδίο (Donthu et al., 2021; Mukherjee et al., 2022). Η συγκεκριμένη μεθοδολογική προσέγγιση έχει εφαρμοστεί ευρέως σε πλήθος ερευνών από διαφορετικούς επιστημονικούς κλάδους (Chytis et al., 2024; Mitroulia et al., 2023), γεγονός που επιβεβαιώνει την αξιοπιστία και τη χρησιμότητά της για τη χαρτογράφηση της επιστημονικής παραγωγής.

Τα δεδομένα συλλέχθηκαν αποκλειστικά από τη βάση Scopus, μία από τις πιο αξιόπιστες και εκτενείς ακαδημαϊκές πηγές, χρησιμοποιώντας τον όρο αναζήτησης “artificial intelligence” AND “education” στα πεδία τίτλου, περίληψης και λέξεων-κλειδιών. Εφαρμόστηκαν κριτήρια επιλογής που περιόρισαν το δείγμα σε επιστημονικά άρθρα δημοσιευμένα μεταξύ 2016 και 2024 στην αγγλική γλώσσα και ενταγμένα στο πεδίο των «κοινωνικών επιστήμων». Το τελικό δείγμα περιλαμβάνει 3.744 άρθρα. Η ανάλυση πραγματοποιήθηκε σε δύο επίπεδα. Πρώτον, εφαρμόστηκε ανάλυση απόδοσης (performance analysis) για την αξιολόγηση της ερευνητικής παραγωγής συγγραφέων, ιδρυμάτων, χωρών και επιστημονικών περιοδικών βάσει δεικτών όπως ο αριθμός δημοσιεύσεων, οι αναφορές και ο δείκτης Hirsch (Hirsch, 2005). Δεύτερον, πραγματοποιήθηκε ανάλυση επιστημονικής χαρτογράφησης (science mapping), με χρήση των τεχνικών βιβλιογραφικής σύζευξης, ανάλυσης συν-συγγραφέων και ανάλυσης συν-λέξεων (Van Eck & Waltman, 2010). Η διαδικασία ακολούθησε το πρότυπο PRISMA (Page et al., 2021), εξασφαλίζοντας τη διαφάνεια των αποτελεσμάτων.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η ανάλυση ανέδειξε ραγδαία αύξηση των δημοσιεύσεων μετά το 2019, με ετήσιο ρυθμό ανάπτυξης 57,1% (Εικόνα 1). Ο μέσος αριθμός συγγραφέων ανά άρθρο ήταν 3,6, ενώ περίπου το 22% των δημοσιεύσεων προέκυψαν από διεθνείς συνεργασίες, γεγονός που υποδηλώνει ένα σταδιακά πιο διασυνδεδεμένο ερευνητικό περιβάλλον. Οι Ηνωμένες Πολιτείες ηγούνται του πεδίου με 774 δημοσιεύσεις και πάνω από 20.000 αναφορές, ακολουθούμενες από την Κίνα, το Ηνωμένο Βασίλειο και την Αυστραλία, ενώ το Χονγκ Κονγκ και η Ινδία παρουσιάζουν υψηλό δείκτη επιρροής ανά δημοσίευση. Τα περιοδικά «Sustainability» και «International Journal of Information Management» αποτελούν τις πιο παραγωγικές και επιδραστικές πηγές αντίστοιχα.

Η θεματική ανάλυση αποκάλυψε έξι κύριες ομάδες ερευνών. Η πρώτη αφορά τη μετασχηματιστική επίδραση της ΤΝ στην εκπαιδευτική πολιτική και πρακτική (Dwivedi et al., 2021, 2023). Η δεύτερη εστιάζει στη χρήση της ΤΝ στην ανώτατη εκπαίδευση και στη διαδικτυακή μάθηση (Crompton & Burke, 2023; Ouyang & Jiao, 2021). Η τρίτη ασχολείται με τα ζητήματα της ακαδημαϊκής ακεραιότητας που προκύπτουν από τη χρήση γενετικής ΤΝ (Cotton et al., 2024; Rudolph et al., 2023). Η τέταρτη αναλύει την επίδραση της ΤΝ στη διδακτική πράξη (Popenici & Kerr, 2017), ενώ οι δύο τελευταίες διερευνούν την αξιοποίηση των chatbots και τη συμβολή της ΤΝ στην ενίσχυση της μαθησιακής εμπειρίας (Cooper, 2023; Tlili et al., 2023).

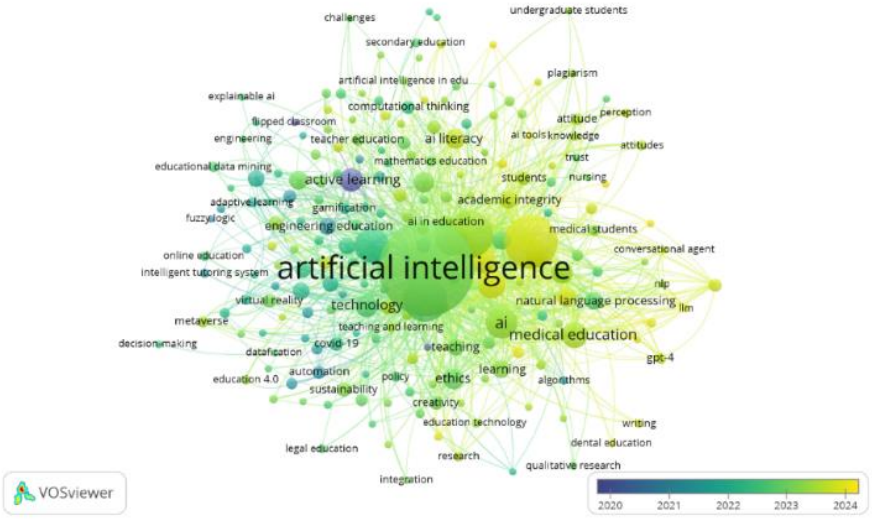
Εικόνα 1
Ετήσια Επιστημονική Παραγωγή για το χρονικό διάστημα 2016-2024



Πηγή: Δημιουργία από τους συγγραφείς

Η ανάλυση συν-συγγραφέων κατέδειξε περιορισμένη διασύνδεση μεταξύ των ερευνητικών ομάδων, γεγονός που καταδεικνύει την ανάγκη για μεγαλύτερη διεπιστημονική συνεργασία (Turner & Baker, 2020). Αντίθετα, η ανάλυση συν-λέξεων αποκάλυψε ένα δυναμικό και συνεχώς εξελισσόμενο εννοιολογικό τοπίο. Οι πιο συχνά εμφανιζόμενες λέξεις-κλειδιά ήταν "artificial intelligence", "education", "ChatGPT" και "machine learning" (Εικόνα 2). Η χρονική ανάλυση των όρων έδειξε τη σταδιακή μετάβαση του ενδιαφέροντος από τις τεχνολογικές εφαρμογές προς ζητήματα ηθικής, ψηφιακών δεξιοτήτων και εκπαιδευτικής πολιτικής (Holmes et al., 2022; Xiao et al., 2025).

Εικόνα 2.
Ανάλυση συν-λέξεων (οπτικοποίηση επικάλυψης) άρθρων



Πηγή: Δημιουργία από τους συγγραφείς

Σημειώσεις: Η εικόνα δείχνει την οπτικοποίηση της ανάλυσης συν-λέξεων, καταγράφοντας τη χρονική κατανομή των λέξεων-κλειδιών των συγγραφέων σε κάθε ομάδα. Δημιουργήθηκε από το λογισμικό VOSviewer. Η χρωματική κλίμακα ποικίλλει, με το μπλε να αντιπροσωπεύει τις παλαιότερες χρονικές περιόδους, ενώ το πράσινο και το κίτρινο τις πιο πρόσφατες.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η μελέτη αυτή προσφέρει μια ολοκληρωμένη χαρτογράφηση της ερευνητικής δραστηριότητας γύρω από την Τεχνητή Νοημοσύνη στην εκπαίδευση. Η ραγδαία αύξηση των δημοσιεύσεων, η διεθνής διάχυση της έρευνας και η ποικιλομορφία των θεματικών αποδεικνύουν ότι πρόκειται για ένα ώριμο, αλλά ταυτόχρονα αναδυόμενο πεδίο με έντονες προοπτικές ανάπτυξης. Τα αποτελέσματα υποδεικνύουν ότι η επιστημονική κοινότητα στρέφεται πλέον από την τεχνολογική διάσταση της ΤΝ προς την κατανόηση των κοινωνικών, ηθικών και παιδαγωγικών της επιπτώσεων. Επίσης,

αναδεικνύεται η ανάγκη ενίσχυσης της συνεργασίας μεταξύ ερευνητών και θεσμών, προκειμένου να ενισχυθεί η διεπιστημονικότητα και να προωθηθεί η υπεύθυνη χρήση της ΤΝ στην εκπαίδευση.

Παρά τους περιορισμούς που σχετίζονται με τη χρήση μόνο της βάσης Scopus και την εστίαση σε άρθρα περιοδικών, η παρούσα εργασία συμβάλλει σημαντικά στη συστηματική κατανόηση της δυναμικής του πεδίου. Επόμενες έρευνες μπορούν να επεκτείνουν τα αποτελέσματα μέσα από συγκριτικές προσεγγίσεις, διεύρυνση των πηγών και ανάλυση του τρόπου με τον οποίο η ΤΝ μετασχηματίζει την εκπαιδευτική πράξη, τη γνώση και τη μαθησιακή εμπειρία. Η Τεχνητή Νοημοσύνη δεν αποτελεί απλώς εργαλείο τεχνολογικής καινοτομίας, αλλά έναν καταλύτη που επαναπροσδιορίζει τη διδασκαλία, τη μάθηση και την εκπαιδευτική επιστήμη στον 21ο αιώνα.

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Η ΧΡΗΣΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ ΣΕ ΜΑΘΗΤΕΣ ΜΕ ΜΑΘΗΣΙΑΚΕΣ ΔΥΣΚΟΛΙΕΣ – ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ

Παπαλεξανδράτου Παρθενόπη
Μεταπτυχιακή Φοιτήτρια
Πανεπιστήμιο Δυτικής Αττικής – Τμήμα Δημόσιας και Κοινοτικής Υγείας
Αθήνα, Ελλάδα
e-mail: envihealth2344@uniwa.gr

Σταθοπούλου Αγάθη
Εργαστηριακό Διδακτικό Προσωπικό
Πανεπιστήμιο Δυτικής Αττικής – Τμήμα Δημόσιας και Κοινοτικής Υγείας
Αθήνα, Ελλάδα
e-mail: a.stathopoulou@uniwa.gr

Σκαναβή Κωνσταντίνα
Καθηγήτρια
Πανεπιστήμιο Δυτικής Αττικής – Τμήμα Δημόσιας και Κοινοτικής Υγείας
Αθήνα, Ελλάδα
e-mail: kskanavi@uniwa.gr

ΠΕΡΙΛΗΨΗ

Οι μαθησιακές δυσκολίες είναι μια νευροαναπτυξιακή διαταραχή που επηρεάζει σημαντικό ποσοστό μαθητών παγκοσμίως, δημιουργώντας ακαδημαϊκές και κοινωνικοσυναισθηματικές προκλήσεις που μπορεί να επηρεάσουν την ενήλικη ζωή. Παρόλο που οι μαθησιακές δυσκολίες δεν είναι πλήρως αντιμετωπίσιμες, τα άτομα που ζουν με αυτές μπορούν να ενισχύσουν σημαντικά τις ικανότητές τους, με τη βοήθεια κατάλληλων μεθόδων διδασκαλίας και υποστηρικτικών εργαλείων. Ο έγκαιρος εντοπισμός των μαθησιακών δυσκολιών και η παροχή κατάλληλης παρέμβασης είναι υψίστης σημασίας όχι μόνο για την υποστήριξη των μαθητών με μαθησιακές δυσκολίες στην αντιμετώπιση των ακαδημαϊκών αναγκών τους αλλά και για την ενίσχυση της κοινωνικής και συναισθηματικής τους ευημερίας, της σωστής ανάπτυξής τους και τη βελτίωση της ποιότητας της ζωής τους. Η τεχνητή νοημοσύνη προσφέρει καινοτόμες δυνατότητες για την υποστήριξη των μαθητών με μαθησιακές δυσκολίες, προσφέροντας εξατομικευμένα ψηφιακά εργαλεία και στρατηγικές μάθησης προσαρμοσμένα στις ιδιαίτερες εκπαιδευτικές τους ανάγκες. Σκοπός αυτής της μελέτης είναι, μέσω της συστηματικής βιβλιογραφικής ανασκόπησης, να εξετάσει τις πιο πρόσφατες εφαρμογές τεχνητής νοημοσύνης που έχουν αναπτυχθεί για την υποστήριξη των μαθητών με μαθησιακές δυσκολίες και την αποτελεσματικότητά τους στη βελτίωση των ακαδημαϊκών τους επιδόσεων. Μέσα από τη βιβλιογραφική αναζήτηση στις βάσεις δεδομένων Scopus, PubMed και Google Scholar εντοπίστηκε περιορισμένος αριθμός μελετών αναφορικά με τον ρόλο της τεχνητής νοημοσύνης στην εκπαίδευση μαθητών με μαθησιακές δυσκολίες. Εντούτοις, μέσα από αυτές τις μελέτες φάνηκε ότι η τεχνητή νοημοσύνη μπορεί να ενισχύσει την εκπαιδευτική πορεία των ατόμων με μαθησιακές δυσκολίες και να διευκολύνει τη μαθησιακή διαδικασία, βελτιώνοντας τις μαθησιακές τους επιδόσεις, μειώνοντας τις προκλήσεις και τις ανισότητες που αντιμετωπίζουν και παρέχοντας με αυτόν τον τρόπο ίσες ευκαιρίες επιτυχίας στον εκπαιδευτικό τομέα. Η συστηματική ανασκόπηση της υπάρχουσας βιβλιογραφίας, σε συνδυασμό με τα ευρήματα της μελέτης, καταδεικνύει ουσιώδη κενά και ανάγκες στην ενσωμάτωση της τεχνητής νοημοσύνης στην εκπαίδευση μαθητών με μαθησιακές δυσκολίες. Συγκεκριμένα, για την περαιτέρω ανάπτυξη της τεχνητής νοημοσύνης στην εκπαίδευση, κρίνεται απαραίτητη η δημιουργία εφαρμογών που θα καλύπτουν τις μαθησιακές ανάγκες των μαθητών με μαθησιακές δυσκολίες και όχι μόνο των φοιτητών. Επιπλέον, η έρευνα επικεντρώνεται κυρίως στη δυσλεξία, αφήνοντας άλλες μαθησιακές δυσκολίες ανεξερεύνητες, γεγονός που αναδεικνύει την ανάγκη για περαιτέρω μελέτες. Παράλληλα, η έλλειψη ερευνών σχετικά με τις αντιλήψεις των εκπαιδευτικών υπογραμμίζει την ανάγκη διερεύνησης του ρόλου τους στην ενσωμάτωση της τεχνητής νοημοσύνης στη διδασκαλία. Τέλος, προτείνεται η περαιτέρω μελέτη υφιστάμενων εφαρμογών, με στόχο τη βελτίωση των αλγορίθμων εξατομίκευσης και τη βέλτιστη απόδοσή τους στην εκπαίδευση μαθητών και φοιτητών με μαθησιακές δυσκολίες.

Λέξεις – κλειδιά: Τεχνητή νοημοσύνη, μαθησιακές δυσκολίες, εξατομικευμένη μάθηση, ψηφιακά εργαλεία, στρατηγικές μάθησης, εξατομικευμένες παρεμβάσεις.

ΕΙΣΑΓΩΓΗ

Οι Μαθησιακές Δυσκολίες (ΜΔ) είναι μια νευρολογική διαταραχή που επηρεάζει μία ή περισσότερες από τις βασικές ψυχολογικές διαδικασίες που εμπλέκονται στην κατανόηση ή στη χρήση προφορικού ή γραπτού λόγου και επηρεάζουν την ικανότητα ενός ατόμου να λαμβάνει, να αποθηκεύει, να επεξεργάζεται, να ανακτά ή να επικοινωνεί πληροφορίες (Handler, Fierson and Section on Ophthalmology and Council on Children with Disabilities, et al., 2011; Ouherrou, et al., 2019). Οι ΜΔ επηρεάζουν έως και το 10% του παγκόσμιου πληθυσμού (Alone and Bamnote, 2023; Dhamal and Mehrotra, 2021; Rico-Olarte, et al., 2020) και εμφανίζονται στους μαθητές ανεξάρτητα από τη μητρική τους γλώσσα ή το μέσο διδασκαλίας (Vidyadharan and Tharayil, 2019). Οι μαθητές με ΜΔ μπορεί να υποφέρουν ακαδημαϊκά και κοινωνικοσυναισθηματικά εάν οι δυσκολίες που αντιμετωπίζουν δεν ανιχνευθούν εγκαίρως (Ravichandran, et al., 2023). Ενώ οι ειδικές μαθησιακές δυσκολίες δεν μπορούν να επιλυθούν πλήρως και είναι δια βίου (Alshehri, et al., 2023; David and Balakrishnan, 2010; Turan and Atila, 2021; Youssef and Youssef, 2019), όσοι ζουν με αυτές εξακολουθούν να είναι σε θέση να βελτιώσουν σημαντικά τις δυνατότητές τους με τη βοήθεια κατάλληλων μεθόδων διδασκαλίας και βοηθητικών εργαλείων (David and Balakrishnan, 2010; Turan and Atila, 2021; Youssef and Youssef, 2019). Ο έγκαιρος εντοπισμός της ΜΔ και η παροχή κατάλληλης παρέμβασης είναι υψίστης σημασίας όχι μόνο για την υποστήριξη των μαθητών με ΜΔ στην αντιμετώπιση των ακαδημαϊκών αναγκών τους αλλά και για την ενίσχυση της κοινωνικής και συναισθηματικής τους ευημερίας (Bhatti, et al., 2024; Fortes, et al., 2016; Zhai and Panjwani-Charania, 2023), της σωστής ανάπτυξής τους και τη βελτίωση της ποιότητας της ζωής τους (Fortes, et al., 2016; Turan and Atila, 2021). Η ταχεία ανάπτυξη της τεχνητής νοημοσύνης (ΤΝ) στην εκπαίδευση έχει τη δυνατότητα να αυξήσει τις ευκαιρίες μάθησης, να εμπλουτίσει τις εξατομικευμένες μαθησιακές εμπειρίες, να προσφέρει απεριόριστες δυνατότητες και συναρπαστικές ευκαιρίες για την αντιμετώπιση εκπαιδευτικών ζητημάτων, να επιτύχει τα επιθυμητά μαθησιακά αποτελέσματα βελτιώνοντας τη μάθηση (Zheng, et al., 2023) και να βοηθήσει και να ενδυναμώσει τους εκπαιδευτικούς ώστε να κάνουν τη μαθησιακή διαδικασία μια απολαυστική εμπειρία για τους μαθητές (Fitria, 2021).

Σκοπός της μελέτης αποτελεί μία όσο το δυνατόν πληρέστερη καταγραφή των νέων ερευνητικών δεδομένων σχετικά με το ρόλο της ΤΝ στην εκπαίδευση των μαθητών και φοιτητών με ΜΔ. Για το σκοπό αυτό, διεξήχθη συστηματική ανασκόπηση (Systematic Literature Review – SLR) άρθρων της διεθνούς βιβλιογραφίας σχετικά με το θέμα.

Κατόπιν μελέτης της διεθνούς βιβλιογραφίας, διατυπώθηκαν τα ακόλουθα διερευνητικά ερωτήματα:

1. Ποιες εφαρμογές της τεχνητής νοημοσύνης έχουν αναπτυχθεί τα τελευταία χρόνια (2021-2024) για την υποστήριξη μαθητών και φοιτητών με μαθησιακές δυσκολίες;
2. Ποια είναι τα αποτελέσματα αυτών των εφαρμογών στη βελτίωση των μαθησιακών επιδόσεων των μαθητών και φοιτητών με ΜΔ;
3. Πώς αντιλαμβάνονται οι εκπαιδευτικοί τη χρήση της τεχνητής νοημοσύνης ως εργαλείο στήριξης των μαθητών και φοιτητών με μαθησιακές δυσκολίες;

ΜΕΘΟΔΟΛΟΓΙΑ

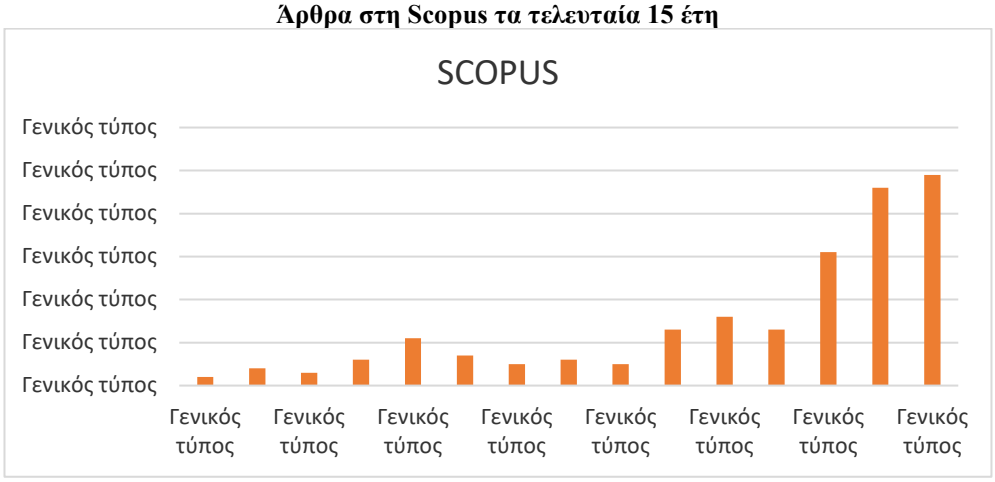
Η παρούσα εργασία βασίστηκε στη μέθοδο της συστηματικής ανασκόπησης. Για τη διεξαγωγή της ακολουθήθηκε μια διαδικασία 4 σταδίων:

1. Εύρεση διεθνούς βιβλιογραφίας βασισμένη στον τίτλο και την περίληψη
2. Επιλογή και εξαίρεση μελετών (βάσει κριτηρίων ένταξης και αποκλεισμού)
3. Διεξοδική μελέτη της επιλεγμένης βιβλιογραφίας
4. Εξαγωγή Αποτελεσμάτων

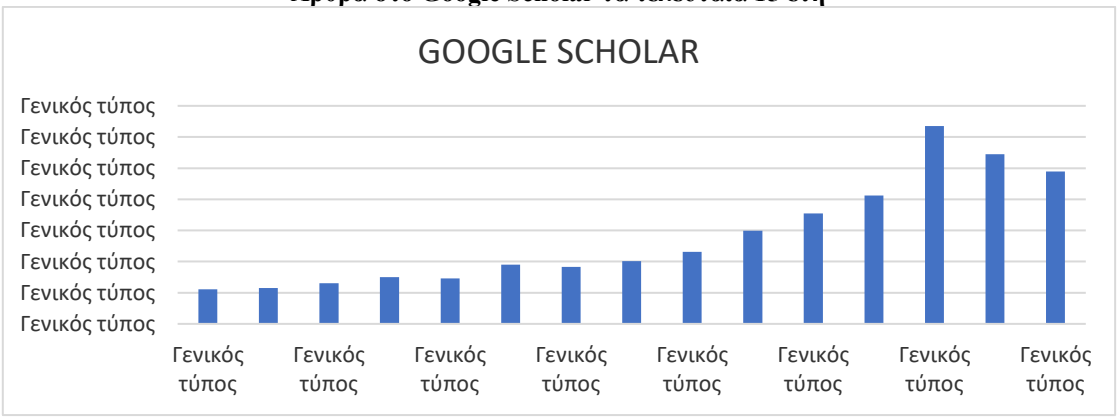
Αναφορικά με τη στρατηγική αναζήτησης, για τη συλλογή της κατάλληλης βιβλιογραφίας πραγματοποιήθηκε ηλεκτρονική αναζήτηση μελετών σε τρεις βάσεις δεδομένων, τη Scopus, τη Google Scholar και την PubMed. Η αναζήτηση ολοκληρώθηκε τον Οκτώβριο του 2024. Προκειμένου να απαντηθούν τα ερευνητικά ερωτήματα αποτελεσματικά, να εξασφαλιστεί η γενίκευση των ευρημάτων και να αποφευχθούν μεροληψίες στην επιλογή των άρθρων, τέθηκε ένα σύνολο ειδικών κριτηρίων ένταξης και αποκλεισμού σε αυτή τη μελέτη που στοχεύουν στη βελτίωση της εστίασης και τον εντοπισμό των σχετικών ερευνών, όπως φαίνεται στον (**Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**). Η προκαταρκτική μελέτη που πραγματοποιήθηκε υποδηλώνει ότι η χρήση της ΤΝ στην υποστήριξη μαθητών με ΜΔ, αν και ξεκίνησε να αναπτύσσεται σημαντικά από τη δεκαετία του 1990, αυξήθηκε τα τελευταία 10-15 έτη. Οι (Εικόνες 1, 2 και 3) δείχνουν χρόνο με τον χρόνο τον αυξανόμενο αριθμό αποτελεσμάτων των δημοσιευμένων άρθρων με θέμα «τεχνητή νοημοσύνη» και «μαθησιακές δυσκολίες», όπως προκύπτουν από τη Scopus, τη Google Scholar και την PubMed τη χρονική περίοδο 2010 – 2024. Τα τελευταία τρία έτη, 2022 – 2024, υπήρξε ραγδαία αύξηση στον αριθμό των αποτελεσμάτων των δημοσιευμένων άρθρων. Αξιοσημείωτο είναι ότι τα έτη αυτά αναλογούν σε ένα μεγάλο ποσοστό, δηλαδή το 58.06%, 39.80% και 54.09% όλων των αποτελεσμάτων της 15ετίας στη

Scopus, Google Scholar και PubMed αντίστοιχα. Επομένως, η αναζήτηση περιορίστηκε σε αυτά τα έτη και επεκτάθηκε ένα έτος επιπλέον για να συμπεριλάβει το έτος 2021, καθώς το 2021 μπορεί να αποτέλεσε σημείο εκκίνησης της αυξητικής τάσης τα επόμενα έτη. Έτσι, διασφαλίζεται ότι όλες οι σχετικές με τα νέα δεδομένα μελέτες συμπεριλήφθηκαν στην ανασκόπηση.

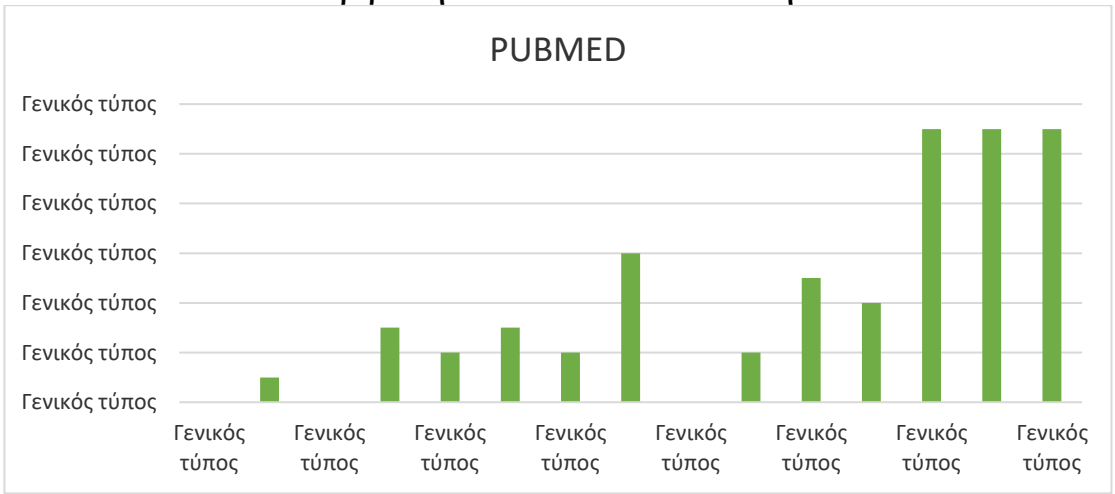
Εικόνα 1
Άρθρα στη Scopus τα τελευταία 15 έτη



Εικόνα 2
Άρθρα στο Google Scholar τα τελευταία 15 έτη



Εικόνα 3
Άρθρα στην PubMed τα τελευταία 15 έτη



Αναφορικά με το δείγμα, η μελέτη αυτή εστιάζει σε μαθητές σχολικής ηλικίας και φοιτητές πανεπιστημίου. Καθώς το εκπαιδευτικό σύστημα ίσως διαφέρει από χώρα σε χώρα επιλέχθηκαν μελέτες που αφορούσαν μαθητές δημοτικού έως λυκείου ηλικίας 6-18 ετών καθώς και φοιτητές ανώτερης εκπαίδευσης. Ειδικότερα, η μελέτη περιλαμβάνει μόνο μαθητές και φοιτητές διαγνωσμένους με ΜΔ επειδή η εστίαση σε διαγνωσμένους μαθητές/ φοιτητές με ΜΔ εξασφαλίζει πιο ακριβή και στοχευμένα δεδομένα, αποφεύγοντας γενικεύσεις από μη διαγνωσμένους μαθητές/ φοιτητές με παρόμοια συμπτώματα. Επιπροσθέτως, επιλέχθηκαν άρθρα στην αγγλική γλώσσα δημοσιευμένα σε έγκριτα περιοδικά. Ως έγκριτα περιοδικά ορίζονται αυτά που αποδελτιώνονται σε βάσεις δεδομένων όπως η Google Scholar, η Scopus και η PubMed. Πιο συγκεκριμένα επιλέχθηκαν μόνο Έρευνες Πεδίου, Μετα- αναλύσεις και Συστηματικές Ανασκοπήσεις για να διασφαλιστεί η εγκυρότητα των αποτελεσμάτων και των συμπερασμάτων, καθώς αυτές παρέχουν τα πιο αξιόπιστα και τεκμηριωμένα δεδομένα σχετικά με την αποτελεσματικότητα των εφαρμογών της ΤΝ στην υποστήριξη μαθητών με ΜΔ. Ως τομέας μελέτης ορίστηκε αποκλειστικά ο τομέας της Εκπαίδευσης και αποκλείστηκαν μελέτες διεξαγμένες σε ιατρικά ή κλινικά περιβάλλοντα. Τέλος, το περιεχόμενο των μελετών που συμπεριλήφθηκαν εστιάζει στην υποστήριξη μαθητών και φοιτητών με ΜΔ αποκλείοντας μελέτες εστιασμένες στη διάγνωση, επειδή ο σκοπός αυτής της μελέτης είναι η υποστήριξη της διδασκαλίας και της μάθησης μαθητών και φοιτητών ήδη διαγνωσμένων με ΜΔ.

Πίνακας 1
Κριτήρια ένταξης και αποκλεισμού μελετών

	ΚΡΙΤΗΡΙΑ ΕΝΤΑΞΗΣ	ΚΡΙΤΗΡΙΑ ΑΠΟΚΛΕΙΣΜΟΥ
ΧΡΟΝΙΚΑ ΟΡΙΑ	2021-2024	Έτη πριν το 2021
ΔΕΙΓΜΑ	Μαθητές σχολικής ηλικίας και φοιτητές πανεπιστημίου	Μαθητές προσχολικής ηλικίας ή ενήλικες που δεν είναι φοιτητές
ΠΛΗΘΥΣΜΟΣ - ΣΤΟΧΟΣ	Μαθητές και φοιτητές διαγνωσμένοι με ΜΔ	Μαθητές/ φοιτητές μη διαγνωσμένοι με ΜΔ ή μαθητές/ φοιτητές χωρίς ΜΔ ή μαθητές/ φοιτητές με άλλες ειδικές εκπαιδευτικές ανάγκες
ΕΙΔΗ ΜΕΛΕΤΩΝ	Άρθρα	Άλλες πηγές εκτός άρθρων
ΕΙΔΗ ΑΡΘΡΩΝ	Έρευνες Πεδίου, Μετα-αναλύσεις, Συστηματικές Ανασκοπήσεις	Reviews
ΓΛΩΣΣΑ ΔΗΜΟΣΙΕΥΣΗΣ	Αγγλικά	Άλλη γλώσσα εκτός των Αγγλικών
ΤΟΜΕΑΣ ΜΕΛΕΤΗΣ	Εκπαίδευση	Κλινικά περιβάλλοντα
ΕΣΤΙΑΣΗ ΠΕΡΙΕΧΟΜΕΝΟΥ	Το περιεχόμενο εστιάζει στην υποστήριξη μαθητών και φοιτητών με ΜΔ ή/ και στη δημιουργία κατάλληλων εκπαιδευτικών παρεμβάσεων	Το περιεχόμενο εστιάζει στη διάγνωση ή σε γενικότερες ψυχοκοινωνικές παρεμβάσεις ατόμων με ΜΔ που δεν σχετίζονται με την εκπαιδευτική διαδικασία

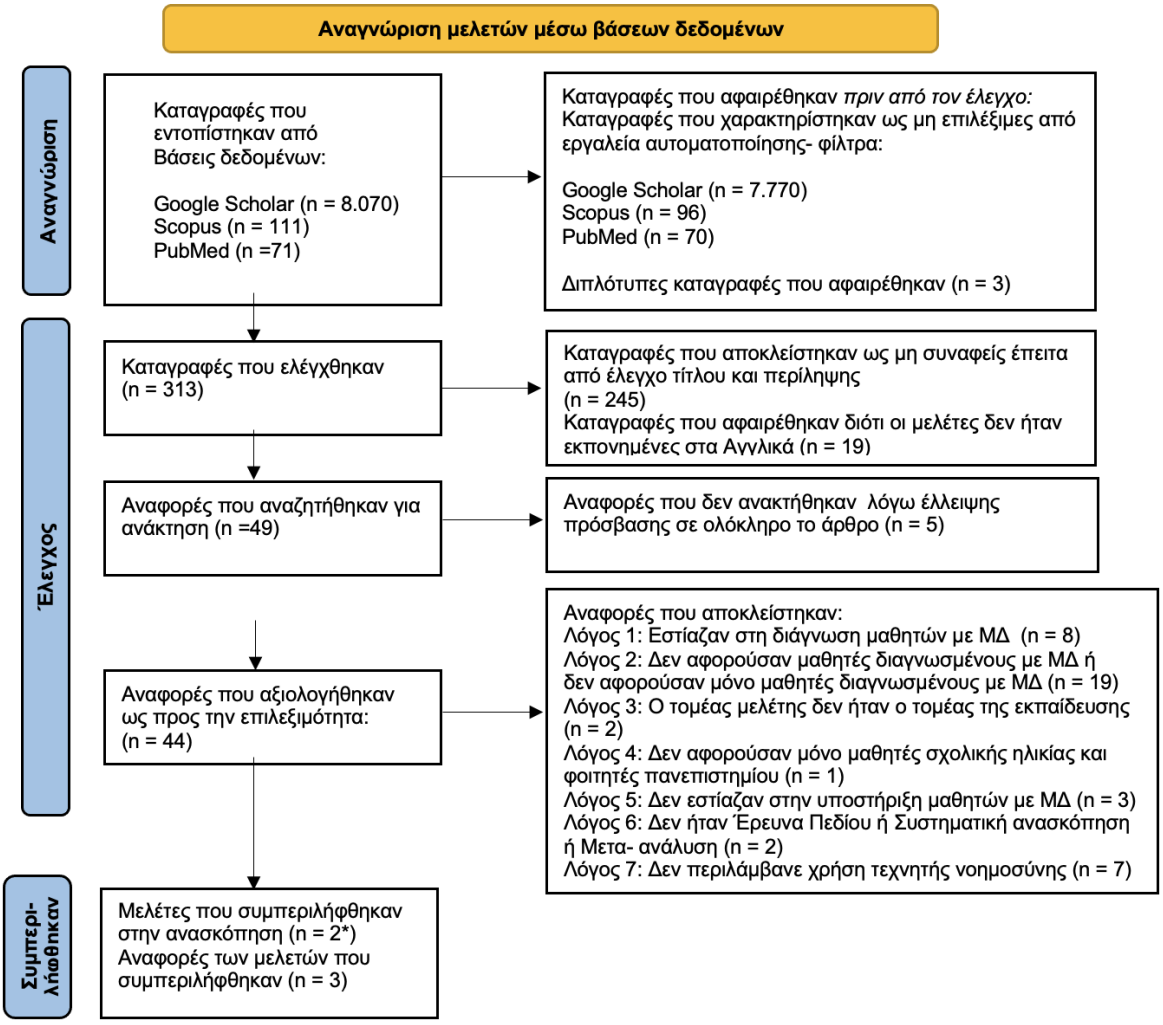
Για την επιλογή των πιο συναφών μελετών, εφαρμόστηκαν φίλτρα βασισμένα στα καθορισμένα κριτήρια ένταξης και αποκλεισμού. Τα φίλτρα αυτά περιόρισαν την αναζήτηση σε άρθρα δημοσιευμένα την περίοδο 2021-2024, διαθέσιμα στα αγγλικά και σε μορφή πλήρους κειμένου ανοιχτής πρόσβασης. Στην περίπτωση της PubMed, χρησιμοποιήθηκαν επιπλέον φίλτρα για μετα-αναλύσεις και συστηματικές ανασκοπήσεις, προκειμένου να εξασφαλιστεί η επιλογή μελετών υψηλής ποιότητας.. Η αφαίρεση των διπλότυπων πραγματοποιήθηκε με τη χρήση του εργαλείου Zotero και η εξαγωγή αποτελεσμάτων διεξήχθη με τη χρήση του διαγράμματος ροής PRISMA (PRISMA Flow Diagram, 2020).

Για τη διαδικασία επιλογής μελετών, αρχικά πραγματοποιήθηκε ηλεκτρονική αναζήτηση στις τρεις βάσεις δεδομένων, τη Scopus, τη Google Scholar και την PubMed, όπως προαναφέρθηκε, με τη χρήση της λογικής Boolean και πιο συγκεκριμένα με τους όρους ("Artificial Intelligence" OR "AI") AND ("learning difficult*" OR "learning disabilit*" OR "learning disorder*"). Η αναζήτηση έφερε 111 αποτελέσματα στη Scopus, 8.070 στη Google Scholar και 71 στην PubMed. Ως εκ τούτου, 8.252 άρθρα συμπεριλήφθηκαν στο αρχικό στάδιο ελέγχου καταλληλότητας. Στη συνέχεια, εφαρμόστηκαν τα φίλτρα που προαναφέρθηκαν μειώνοντας έτσι τα αποτελέσματα στα 316. Έπειτα, τα αποτελέσματα μειώθηκαν σε 313 με την αφαίρεση των διπλότυπων που πραγματοποιήθηκε με τη χρήση του εργαλείου Zotero. Μετά τη διαδικασία ελέγχου του τίτλου και της περίληψης αποκλείστηκαν 245 μελέτες που δεν ήταν συναφείς με την έρευνα

καθώς και 19 που ήταν εκπονημένες στα Ιταλικά, Πορτογαλικά, Σουηδικά, Ισπανικά, Ινδονησιακά, Ρωσικά και Κινέζικα. Συνεπώς τα αποτελέσματα περιορίστηκαν σε 49.Στη συνέχεια, έγινε προσπάθεια ανάκτησης αυτών των μελετών, κατά την οποία τα αποτελέσματα μειώθηκαν σε 44 εφόσον δεν υπήρξε πρόσβαση σε 5 άρθρα. Τέλος, μετά τη διεξοδική μελέτη των 44 άρθρων τα αποτελέσματα μειώθηκαν σε 2, όπως φαίνεται στον **Σφάλμα! Το αρχείο προέλευσης της αναφοράς δ εν βρέθηκε.**. Από αυτά τα δύο άρθρα, το ένα που ήταν Έρευνα Πεδίου χρησιμοποιήθηκε εξ ολοκλήρου καθώς και μία αναφορά μελέτης του, ενώ από το δεύτερο, που ήταν συστηματική ανασκόπηση, αξιοποιήθηκαν μόνο δύο αναφορές μελετών που πληρούσαν τα κριτήρια ένταξης για αυτή την έρευνα. Συνεπώς, 4 άρθρα συμπεριλήφθηκαν στη μελέτη.

Το Prisma (Preferred Reporting Items for Systematic reviews and Meta-Analyses), το οποίο δημοσιεύτηκε για πρώτη φορά το 2009 και αναθεωρήθηκε το 2020, αναπτύχθηκε με σκοπό να αυξηθεί η σαφήνεια, η διαφάνεια, η ποιότητα και η αξία των συστηματικών ανασκοπήσεων και των μετα- αναλύσεων (Sohrabi, et al., 2021). Στην παρούσα συστηματική ανασκόπηση η διεξαγωγή των αποτελεσμάτων πραγματοποιήθηκε με τη χρήση του παρακάτω διαγράμματος ροής PRISMA 2020 (PRISMA Flow Diagram, 2020), που καθιστά τη διαδικασία επιλογής μελετών πιο διαφανή και αξιόπιστη και ενισχύει την εγκυρότητα της μεθοδολογικής διαδικασίας, και στο οποίο παρουσιάζεται η διαδικασία αναζήτησης, εντοπισμού, ελέγχου καταλληλόλητας και τελικής επιλογής των άρθρων που πληρούσαν τα κριτήρια ένταξης στη συστηματική ανασκόπηση (Εικόνα 4).

Εικόνα 4
Διάγραμμα Ροής 2 PRISMA 2020 (PRISMA Flow Diagram, 2020)



* Η μία εκ των δύο μελετών, η οποία ήταν συστηματική ανασκόπηση, δεν χρησιμοποιήθηκε ως μελέτη αλλά χρησιμοποιήθηκαν δύο αναφορές μελετών της οι οποίες πληρούσαν τα κριτήρια ένταξης για την έρευνα.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Στην παρούσα συστηματική ανασκόπηση αναλύθηκαν μελέτες που πληρούσαν τα προκαθορισμένα κριτήρια ένταξης και αξιοποιούσαν την ΤΝ στην εκπαίδευση μαθητών και φοιτητών διαγνωσμένων με ΜΔ. Οι 4 αυτές μελέτες που συμπεριλήφθηκαν εφαρμόζουν διαφορετικές μεθόδους και τεχνολογίες ΤΝ, με στόχο την υποστήριξη των μαθητών/φοιτητών με ΜΔ και τη βελτίωση της μαθησιακής τους εμπειρίας. Από τα αποτελέσματα διαφαίνεται πως υπάρχει ένα ευρύ φάσμα δυνατοτήτων της ΤΝ, από συστήματα συστάσεων και πλατφόρμες προσαρμοσμένης μάθησης που προτείνουν εξατομικευμένο περιεχόμενο και στρατηγικές μάθησης, έως και εφαρμογές και ψηφιακά εργαλεία που διευκολύνουν την ανάγνωση και την επικοινωνία ατόμων με ΜΔ. Πιο αναλυτικά, τα κύρια ευρήματα των μελετών είναι τα εξής:

Στη μελέτη των Zingoni, et al. (2021) που διεξήχθη στην Ιταλία και την Ισπανία, διερευνήθηκε η ανάπτυξη και οι πρώτες εκτιμήσεις αποτελεσματικότητας της πλατφόρμας «BESPECIAL», η οποία σχεδιάστηκε στα πλαίσια του έργου VRAIlexia για να προσφέρει εξατομικευμένη υποστήριξη σε φοιτητές πανεπιστημίου με δυσλεξία. Η πλατφόρμα συνδυάζει τεχνητή νοημοσύνη και εικονική πραγματικότητα προσφέροντας με αυτόν τον τρόπο ένα καινοτόμο περιβάλλον μάθησης που ανταποκρίνεται στις ιδιαίτερες ανάγκες και στις δυσκολίες των φοιτητών. Οι φοιτητές με δυσλεξία αντιμετώπιζαν σημαντικές δυσκολίες στην πανεπιστημιακή τους πορεία κυρίως στην ανάγνωση, τη μνήμη και την κατανόηση σύνθετων εννοιών. Η πλατφόρμα αυτή αναπτύχθηκε για να παρέχει εξατομικευμένη υποστήριξη στους φοιτητές, λαμβάνοντας υπόψη αυτές τις δυσκολίες και προσφέροντας τα κατάλληλα εργαλεία και στρατηγικές μάθησης για την αντιμετώπισή τους. Στόχος ήταν να ενισχυθούν οι δεξιότητες των φοιτητών με δυσλεξία, να βελτιωθεί η ακαδημαϊκή επίδοσή τους και να μειωθεί ο κίνδυνος εγκατάλειψης των σπουδών τους. Το δείγμα της έρευνας αποτελούνταν από 700 πανεπιστημιακούς φοιτητές διαγνωσμένους με δυσλεξία, κυρίως από σχολές ανθρωπιστικών σπουδών. Τα εργαλεία που χρησιμοποιήθηκαν για τη συλλογή δεδομένων στην έρευνα ήταν τα εξής: 1) Η πλατφόρμα «BESPECIAL», η οποία χρησιμοποιεί ΤΝ για να αξιολογήσει τις ατομικές ανάγκες των φοιτητών και εικονική πραγματικότητα (Virtual Reality- VR) για την παρακολούθηση προόδου 2) ψυχομετρικές δοκιμασίες που μετρούν την αυτοπεποίθηση, το άγχος και την αυτοεκτίμηση 3) OCR (Optical Character Recognition) για τη συλλογή δεδομένων από κλινικές αναφορές και 4) ερωτηματολόγια που ανέλυσαν τις ιδιαίτερες ανάγκες των φοιτητών, ενώ η προσαρμογή των στρατηγικών μάθησης βασίστηκε σε αυτά τα δεδομένα. Στα προκαταρκτικά αποτελέσματα διαφαίνεται πως η πλατφόρμα επέδειξε σημαντική βελτίωση τόσο στην ακαδημαϊκή επίδοση των φοιτητών όσο και στην αυτοπεποίθησή τους, καθώς οι συμμετέχοντες ανέφεραν πως βελτιώθηκαν στην κατανόηση και στην ανάκληση των διδαγμένων εννοιών αλλά και πως ενισχύθηκε η αυτοπεποίθησή τους. Ανέφεραν επίσης τη χρησιμότητα των διαδραστικών εμπειριών εικονικής πραγματικότητας οι οποίες - μέσω της οπτικοποίησης – τους επέτρεψαν την ενεργή συμμετοχή στη μάθηση και την καλύτερη κατανόηση δύσκολων εννοιών, αλλά και της τεχνητής νοημοσύνης που πρόσφερε στρατηγικές μάθησης που ανταποκρίνονταν στις ατομικές προκλήσεις που αντιμετώπιζαν. Συμπερασματικά, η έρευνα έδειξε πως η πλατφόρμα «BESPECIAL» μπορεί να παρέχει υποστήριξη σε φοιτητές με δυσλεξία και αποδεικνύει πως η εξατομίκευση, σε συνδυασμό με τεχνολογίες όπως η τεχνητή νοημοσύνη και η εικονική πραγματικότητα, μπορεί να βελτιώσει την ακαδημαϊκή επίδοση των φοιτητών αυτών. Η μελέτη προτείνει την ενσωμάτωση των σύγχρονων τεχνολογιών στις στρατηγικές μάθησης, και όχι τον περιορισμό τους σε απλά υποστηρικτικά εργαλεία, προκειμένου να βελτιώνονται διαρκώς οι δεξιότητες των φοιτητών με δυσλεξία και να παρέχονται ίσες ευκαιρίες για την επιτυχία τους στον ακαδημαϊκό τομέα.

Η μελέτη των Wang, et al. (2022) διερεύνησε τη χρήση ενός μοντέλου Επαυξανόμενης Εναλλακτικής Επικοινωνίας (Augmentative Alternative Communication - AAC) που αξιοποιεί την τεχνητή νοημοσύνη για την υποστήριξη μαθητών και φοιτητών με δυσλεξία. Η έρευνα διεξήχθη στην Κίνα και την Ινδία και στόχος της ήταν να βελτιωθούν οι δεξιότητες ανάγνωσης και μάθησης των μαθητών και φοιτητών μέσω ενός ευέλικτου συστήματος προσαρμοσμένο στις ατομικές τους ιδιαίτερες ανάγκες. Αναφορικά με το δείγμα, η έρευνα περιέλαβε 20 μαθητές – φοιτητές με δυσλεξία από σχολεία και πανεπιστήμια. Τα εργαλεία που χρησιμοποιήθηκαν για τη συλλογή δεδομένων ήταν: 1) ερωτηματολόγια αξιολόγησης για τη συλλογή δεδομένων σχετικά με τις ανάγκες των μαθητών και τις δυσκολίες τους στην ανάγνωση και την κατανόηση 2) ειδικά σχεδιασμένα εικονογράμματα (pictograms) για την υποστήριξη των μαθητών και φοιτητών κατά τη διαδικασία της μάθησης μέσω της οπτικοποίησης των πληροφοριών 3) το υβριδικό μοντέλο AI-AAC το οποίο ενσωμάτωσε τα εικονογράμματα και 4) αλγόριθμοι μηχανικής μάθησης (Machine Learning-ML) για την ταξινόμηση δεδομένων και την παρουσίαση κατάλληλων συστάσεων. Πιο συγκεκριμένα οι αλγόριθμοι που εφαρμόστηκαν ήταν εξής: Maximum Entropy (ME), Support Vector Machine (SVM), Complement Naive Bayes (CNB) και Naive Bayes (NB). Οι αλγόριθμοι αυτοί συγκρίθηκαν ως προς την αποτελεσματικότητα τους τόσο στην ταξινόμηση δεδομένων όσο και στην παροχή κατάλληλων συστάσεων προσαρμοσμένων στις ιδιαίτερες ανάγκες των μαθητών και φοιτητών. Τα αποτελέσματα έδειξαν ότι το μοντέλο AI – AAC ήταν εξαιρετικά αποτελεσματικό στην υποστήριξη των μαθητών και φοιτητών με δυσλεξία και στη βελτίωση της μαθησιακής διαδικασίας. Ειδικότερα, η έρευνα διαπίστωσε ότι το AI – AAC αύξησε την ακρίβεια των εξατομικευμένων συστάσεων κατά 40.88%, με συνολική ακρίβεια 94.98%. Παράλληλα, η αποτελεσματικότητα αυξήθηκε κατά 39.71%, με συνολική απόδοση 96.95%. Επιπλέον, παρατηρήθηκε

μείωση κατά 36.56% στην προσπάθεια που χρειαζόταν ένας μαθητής – φοιτητής για την κατανόηση και ολοκλήρωση των εκπαιδευτικών δραστηριοτήτων, ενώ ο χρόνος απόκρισης μειώθηκε κατά 66.34%, βελτιώνοντας την εμπειρία μάθησης μέσω ταχύτερης πρόσβασης στις πληροφορίες και τα εργαλεία υποστήριξης. Συμπερασματικά, το μοντέλο AI – AAC αποδεικνύεται εξαιρετικά αποτελεσματικό στη βελτίωση των μαθησιακών δεξιοτήτων μαθητών και φοιτητών με δυσλεξία παρέχοντάς τους προσαρμοσμένη και εξατομικευμένη υποστήριξη. Τα υψηλά ποσοστά ακρίβειας και αποτελεσματικότητας του AI – AAC υποδεικνύουν ότι τέτοιου είδους εξατομικευμένα εργαλεία μπορούν να ανταποκριθούν στις ειδικές μαθησιακές ανάγκες των μαθητών και φοιτητών με δυσλεξία προσφέροντας καλύτερη πρόσβαση σε κατάλληλη υποστήριξη και αυξάνοντας τις δυνατότητές τους στην ανάγνωση και την κατανόηση.

Η μελέτη των Morciano, et al. (2024), η οποία έλαβε χώρα στην Ιταλία και την Ισπανία, επικεντρώθηκε στη χρήση ενός συστήματος συστάσεων με τεχνητή νοημοσύνη για την παροχή εξατομικευμένης υποστήριξης φοιτητών με δυσλεξία κατά τη μαθησιακή τους πορεία στο πανεπιστήμιο. Στόχος της έρευνας ήταν να συγκριθούν τρία μοντέλα συστάσεων συνεργατικού φιλτραρίσματος, ένα βάσει στοιχείων (item – based model), ένα βάσει χρήστη (user- based model) και ένα σταθμισμένο υβριδικό (weighted – hybrid model) ώστε να επιλεγεί το μοντέλο που προσφέρει τα βέλτιστα εργαλεία υποστήριξης και στρατηγικές μάθησης στους φοιτητές με δυσλεξία για βελτίωση της ακαδημαϊκής τους επίδοσης. Το δείγμα της έρευνας αποτελούνταν από 1.237 Ιταλούς φοιτητές με δυσλεξία οι οποίοι συμπλήρωσαν ερωτηματολόγια αυτοαξιολόγησης σχετικά με τα περισσότερο χρησιμοποιούμενα ψηφιακά εργαλεία (17) και στρατηγικές μάθησης (22). Επιπλέον, το σύστημα δοκιμάστηκε σε 50 φοιτητές (20 με δυσλεξία και 30 χωρίς) για την αξιολόγηση της αποτελεσματικότητας των συστάσεων. Τα εργαλεία που χρησιμοποιήθηκαν στην έρευνα ήταν: 1) τα τρία μοντέλα συστάσεων συνεργατικού φιλτραρίσματος (item-based model, user-based model και weighted hybrid model) 2) τρεις μετρικές ομοιότητας (Pearson correlation, Euclidean distance και Cosine similarity) 3) ο αλγόριθμος μηχανικής μάθησης K-Nearest Neighbors (k-NN) 4) ερωτηματολόγια που περιλάμβαναν τα 39 ψηφιακά εργαλεία και στρατηγικές μάθησης. Το κάθε μοντέλο συγκρίθηκε και με τις τρεις μετρικές ομοιότητας.

Στα αποτελέσματα διαφαίνεται πως το υβριδικό μοντέλο συστάσεων παρουσίασε την υψηλότερη απόδοση με ακρίβεια 85%, ανάκληση 83% και χαμηλό ποσοστό σφάλματος 11,93%. Το σύστημα αποδείχθηκε βοηθητικό στους φοιτητές με δυσλεξία εντοπίζοντας τα καταλληλότερα εργαλεία και στρατηγικές μάθησης με βάση τις ανάγκες τους. Οι φοιτητές με δυσλεξία που χρησιμοποίησαν αυτό το σύστημα αύξησαν τη βαθμολογία τους κατά σχεδόν μία μονάδα (σε κλίμακα 1-10) σε σύγκριση με εκείνους που δεν έλαβαν συστάσεις από το σύστημα. Συμπερασματικά, τα θετικά αποτελέσματα της μελέτης έδειξαν πως το σύστημα συστάσεων μπορεί να χρησιμοποιηθεί αποτελεσματικά στην εκπαίδευση για την υποστήριξη φοιτητών με ΜΔ κατά τη διάρκεια της εκπαιδευτικής τους πορείας, προτείνοντάς τους τα βέλτιστα εργαλεία και στρατηγικές μάθησης και παρέχοντάς τους εξατομικευμένη βοήθεια που βελτιώνει την επίδοσή τους και μειώνει τις προκλήσεις που αντιμετωπίζουν.

Στη μελέτη των Zingoni, et al. (2024), η οποία διεξήχθη στην Ιταλία, δημιουργήθηκε ένα μοντέλο ταξινόμησης των πιο χρήσιμων μεθοδολογιών για την εξατομικευμένη υποστήριξη των πανεπιστημιακών φοιτητών με δυσλεξία. Ο αλγόριθμος πρόβλεψης βασίστηκε σε τεχνικές εποπτευόμενης μηχανικής μάθησης (Machine Learning- ML) για να προτείνει προσαρμοσμένα ψηφιακά υποστηρικτικά εργαλεία και στρατηγικές μάθησης στους φοιτητές βάσει των ατομικών τους μαθησιακών δυσκολιών. Στόχος ήταν η βελτίωση της εκπαιδευτικής τους πορείας και η ενίσχυση των δεξιοτήτων τους. Ο αλγόριθμος εκπαιδεύτηκε και δοκιμάστηκε σε δεδομένα που αποκτήθηκαν μέσω ενός ερωτηματολογίου αυτοαξιολόγησης, το οποίο σχεδιάστηκε και στη συνέχεια συμπληρώθηκε από 1.217 Ιταλούς φοιτητές διαγνωσμένους με δυσλεξία, οι οποίοι αποτελούσαν το κύριο δείγμα της έρευνας. Επιπλέον, για την αξιολόγηση της αποτελεσματικότητας του συστήματος ταξινόμησης σε πραγματική περίπτωση, πραγματοποιήθηκε δοκιμή σε 43 φοιτητές. Τα ερωτηματολόγια περιλάμβαναν ερωτήσεις αναφορικά με τις μαθησιακές δυσκολίες των φοιτητών, τα υποστηρικτικά εργαλεία και τις στρατηγικές μάθησης που θεωρούσαν χρήσιμα και επέτρεψαν τον εντοπισμό 17 χρήσιμων εργαλείων και 22 χρήσιμων στρατηγικών. Οι απαντήσεις του ερωτηματολογίου δόθηκαν σε μορφή κλίμακας Likert, επιτρέποντας στους ερευνητές να ποσοτικοποιήσουν τη χρησιμότητα των προτεινόμενων υποστηρικτών εργαλείων και στρατηγικών μάθησης. Τα εργαλεία που χρησιμοποιήθηκαν στη μελέτη ήταν τα εξής: 1) τέσσερις από τους εποπτευόμενους αλγόριθμους μηχανικής μάθησης με τις καλύτερες επιδόσεις για ταξινόμηση και πιο συγκεκριμένα οι random forest (RF), linear/logistic regression (LR), k-nearest neighbors (kNN) και support-vector machines (SVM) 2) μετρικές απόδοσης: ακρίβεια, ανάκληση και βαθμολογία F1 (F1-score) 3) τα ερωτηματολόγια αυτοαξιολόγησης. Στα αποτελέσματα διαφαίνεται ότι η μέση ακρίβεια πρόβλεψης/ συστάσεων ήταν 88,7% για τα εργαλεία και 91,6% για τις στρατηγικές μάθησης. Παγκοσμίως, η επιτευχθείσα μέση ακρίβεια είναι 90,4%. Πραγματοποιήθηκε νέος υπολογισμός της μέσης ακρίβειας πρόβλεψης μετά τον αποκλεισμό των τεσσάρων εργαλείων και τεσσάρων στρατηγικών για τα οποία είχε επιτευχθεί ποσοστό χαμηλότερο από 85%, με αποτέλεσμα αύξηση της μέση ακρίβειας σε 92,7% για τα εργαλεία, 94,8% για τις στρατηγικές και 94,0% σε παγκόσμιο επίπεδο. Επιπλέον, ο προτεινόμενος αλγόριθμος δοκιμάστηκε σε πραγματική περίπτωση, επιτυγχάνοντας ακρίβεια πρόβλεψης υψηλότερη από 90% προτείνοντας χρήσιμες και μη μεθοδολογίες υποστήριξης σε ένα δείγμα 43 φοιτητών με δυσλεξία. Συμπερασματικά, το σύστημα ταξινόμησης που αναπτύχθηκε είναι αποτελεσματικό στη παροχή εξατομικευμένης υποστήριξης φοιτητών με δυσλεξία, βοηθώντας τους

να εντοπίζουν τα καταλληλότερα εργαλεία και στρατηγικές μάθησης με βάση τις ατομικές τους ανάγκες. Ο αλγόριθμος που εφαρμόστηκε μπορεί να επιτύχει τον επιδιωκόμενο στόχο μειώνοντας το χάσμα μεταξύ φοιτητών με δυσλεξία και χωρίς. Αυτή ή επιτυχία ανοίγει νέες προοπτικές για την προσέγγιση του ζητήματος της δυσλεξίας στα πανεπιστήμια, εστιάζοντας στην προσαρμογή των διδακτικών δραστηριοτήτων στις ανάγκες των φοιτητών, αντί να περιορίζεται μόνο στη μείωση του φόρτου σπουδών ή των υποχρεώσεών τους.

ΣΥΜΠΕΡΑΣΜΑΤΑ – ΣΥΖΗΤΗΣΗ

Σκοπός της παρούσας έρευνας υπήρξε η καταγραφή και ανάλυση των νέων ερευνητικών δεδομένων που αφορούν το ρόλο της ΤΝ στην εκπαίδευση ατόμων με ΜΔ. Στόχος ήταν μέσω μια συστηματικής ανασκόπησης της βιβλιογραφίας να διερευνηθούν τα εργαλεία και οι εφαρμογές ΤΝ που έχουν αναπτυχθεί τα τελευταία έτη (2021-2024) για την υποστήριξη μαθητών και φοιτητών με ΜΔ και η αποτελεσματικότητά τους στη βελτίωση των ακαδημαϊκών επιδόσεων αυτού του πληθυσμού.

Η ανάπτυξη της τεχνητής νοημοσύνης την τελευταία τετραετία έχει ενισχύσει τη δυνατότητα παροχής εξατομικευμένης υποστήριξης σε μαθητές και φοιτητές με ΜΔ με βάση τις ιδιαίτερες εκπαιδευτικές τους ανάγκες, βελτιώνοντας την εκπαιδευτική τους εμπειρία και επιτρέποντάς τους ευκαιρίες στη μάθηση ισάξιες με εκείνες των ατόμων χωρίς μαθησιακές δυσκολίες. Η ραγδαία αύξηση του αριθμού σχετικών δημοσιεύσεων αυτά τα τελευταία έτη υποδηλώνει την αυξανόμενη αναγνώριση της ΤΝ ως υποστηρικτικό εργαλείο στην εκπαίδευση. Παρά την πρόοδο αυτή, από τα αποτελέσματα της αναζήτησης των ερευνών που πραγματοποιήθηκε, φάνηκε ότι δεν έχει πραγματοποιηθεί σημαντικός αριθμός ερευνών που να αφορά το μαθητικό και φοιτητικό πληθυσμό με ΜΔ και επιπλέον, ο περιορισμένος αυτός αριθμός ερευνών αφορούσε αποκλειστικά τη δυσλεξία και όχι γενικότερα τις ΜΔ. Ειδικότερα, από τις 4 μελέτες που πληρούσαν τα κριτήρια ένταξης της συστηματικής ανασκόπησης, οι τρεις αναφερόταν αποκλειστικά σε φοιτητές πανεπιστημίου και μόνο η μία αφορούσε και ένα μικρό ποσοστό σχολικού πληθυσμού.

Σύμφωνα με το πρώτο διερευνητικό ερώτημα, οι εφαρμογές της ΤΝ που αναπτύχθηκαν για την υποστήριξη μαθητών και φοιτητών κατά τα έτη 2021-2024 είναι η πλατφόρμα «BESPECIAL» που χρησιμοποιεί τεχνητή νοημοσύνη και εικονική πραγματικότητα (Zingoni, et al., 2021), το μοντέλο Επαυξανόμενης Εναλλακτικής Επικοινωνίας (Augmentative Alternative Communication- AAC) που χρησιμοποιεί αλγόριθμους μηχανικής μάθησης (Wang, Muthu and Sivaparthipan, 2022), ένα υβριδικό μοντέλο συστάσεων συνεργατικού φιλτραρίσματος (Hybrid Recommendation System) που χρησιμοποιεί μετρικές ομοιότητας (Morciano, et al., 2024) και ένα σύστημα ταξινόμησης που χρησιμοποιεί αλγόριθμους μηχανικής μάθησης (Zingoni, Taborri and Calabrò,2024).

Σύμφωνα με το δεύτερο διερευνητικό ερώτημα, οι εφαρμογές αυτές έδειξαν θετικά αποτελέσματα στη βελτίωση των μαθησιακών επιδόσεων των μαθητών και φοιτητών με ΜΔ, οι οποίοι παρουσίασαν βελτίωση στην ανάγνωση και την επικοινωνία, βελτίωση στην κατανόηση και στην ανάκληση των διδαγμένων εννοιών, γενικότερη βελτίωση στη μαθησιακή διαδικασία, αύξηση στη βαθμολογία τους κατά περίπου μία μονάδα, καθώς και αύξηση στην αυτοπεποίθηση και την αυτοεκτίμησή τους. Μέσω αυτών των εφαρμογών που παρέχουν εξατομικευμένη υποστήριξη προτείνοντας τις καταλληλότερες στρατηγικές μάθησης και τα καταλληλότερα ψηφιακά εργαλεία, διευκολύνθηκε όλη η μαθησιακή διαδικασία και μειώθηκαν τα εμπόδια που αντιμετωπίζουν οι μαθητές και οι φοιτητές με ΜΔ. Επιπλέον, μειώθηκαν οι ανισότητες μεταξύ μαθητών/ φοιτητών με ΜΔ και χωρίς, παρέχοντας ίσες ευκαιρίες επιτυχίας στον εκπαιδευτικό τομέα. Συνεπώς, αποδεικνύεται η δυνατότητα της ΤΝ να υποστηρίζει πιο αποτελεσματικά την εκπαίδευση μαθητών και φοιτητών με ΜΔ.

Για την περαιτέρω ανάπτυξη της ΤΝ στην εκπαίδευση κρίνεται απαραίτητη η ανάπτυξη εφαρμογών που θα εστιάζουν στις μαθησιακές ανάγκες των μαθητών με ΜΔ και όχι μόνο των φοιτητών. Επιπλέον, τα άρθρα που συμπεριλήφθηκαν στη συστηματική ανασκόπηση αφορούσαν τη δυσλεξία και όχι γενικότερα τις μαθησιακές δυσκολίες, γεγονός που υποδεικνύει την ανάγκη για περαιτέρω έρευνες που να εξετάζουν και άλλες ΜΔ προκειμένου να καλυφθούν οι διαφορετικές εκπαιδευτικές ανάγκες των μαθητών. Επίσης, το τρίτο ερευνητικό ερώτημα δεν απαντήθηκε καθώς, παρά τη διεξοδική αναζήτηση, δεν βρέθηκαν έρευνες να διερευνούν τις αντιλήψεις των εκπαιδευτικών αναφορικά με τη χρήση της τεχνητής νοημοσύνης ως εργαλείο στήριξης των μαθητών με ΜΔ. Η έλλειψη αυτή υποδηλώνει ένα πιθανό κενό στη βιβλιογραφία και αναδεικνύει την ανάγκη για περαιτέρω έρευνα που θα εξετάζει τις αντιλήψεις των εκπαιδευτικών καθώς οι απόψεις τους μπορεί να είναι καθοριστικές στην ενσωμάτωση της ΤΝ στη μαθησιακή διαδικασία. Τέλος, προτείνεται περισσότερη έρευνα στις ήδη υπάρχουσες εφαρμογές προκειμένου να βελτιωθούν οι αλγόριθμοι εξατομίκευσης και να εξασφαλιστεί η βέλτιστη απόδοσή τους στην εκπαίδευση μαθητών και φοιτητών με ΜΔ.

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SEARCH vs PROMPT: ΝΕΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ ΜΕ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

Ευαγγελία Δημουλά
Καθηγήτρια Πληροφορικής, ΠΕ86
2ο Πρότυπο Γυμνάσιο Αθήνας
edimoula@gmail.com

Αικατερίνη Ρήγα
Διευθύντρια, Καθηγήτρια Πληροφορικής, ΠΕ86
26ο Πειραματικό ΓΕ.Λ. Αθηνών (Μαράσλειο)
katsouf12@gmail.com

Παναγιώτα Κοντζίνου
Καθηγήτρια Μαθηματικών, ΠΕ03
26ο Πειραματικό ΓΕ.Λ. Αθηνών (Μαράσλειο)
pkontzinou11@gmail.com

ΠΕΡΙΛΗΨΗ

Η εργασία αυτή διερευνά τη συγκριτική δυναμική δύο ψηφιακών προσεγγίσεων στην εκπαιδευτική διαδικασία: της παραδοσιακής αναζήτησης πληροφοριών (search) και της διατύπωσης προτροπών σε γλωσσικά μοντέλα Τεχνητής Νοημοσύνης (prompting). Εστιάζοντας στις εφαρμογές τους στη σχολική τάξη, εξετάζεται πώς οι δύο αυτές πρακτικές επηρεάζουν τη γνωστική διαδικασία, την ανάπτυξη δεξιοτήτων του 21ου αιώνα, καθώς και τη στάση μαθητών και εκπαιδευτικών απέναντι στη γνώση.

Αξιοποιώντας μελέτες περίπτωσης από τη διδασκαλία της Πληροφορικής, των Μαθηματικών και της Περιβαλλοντικής Εκπαίδευσης, αποτυπώνονται οι δυνατότητες και οι περιορισμοί κάθε μεθόδου. Η μεθοδολογία βασίστηκε σε ποιοτική ανάλυση διδακτικών σεναρίων και εκπαιδευτικών παρεμβάσεων με εργαλεία τεχνητής νοημοσύνης, σε συνδυασμό με βιβλιογραφική επισκόπηση έγκριτων ακαδημαϊκών πηγών.

Τα αποτελέσματα αναδεικνύουν ότι η αναζήτηση απαιτεί δεξιότητες φιλτραρίσματος πληροφορίας και αξιολόγησης πηγών, αλλά είναι χρονοβόρα και επιρρεπής σε παραπληροφόρηση. Το prompting, αντίθετα, παρέχει άμεσες, προσωποποιημένες και ερμηνευτικές απαντήσεις, ενισχύοντας τη διερεύνηση και τον αναστοχασμό. Ωστόσο, η υπερβολική εξάρτηση από τα γλωσσικά μοντέλα μπορεί να υπονομεύσει την αυτονομία του μαθητή.

Η εργασία καταλήγει ότι ο συνδυασμός των δύο προσεγγίσεων είναι παιδαγωγικά και διδακτικά επωφελής. Προτείνεται η ανάπτυξη μικτών μοντέλων μάθησης που ενσωματώνουν τόσο τη δεξιότητα της αναζήτησης όσο και τη δημιουργική χρήση προτροπών, στο πλαίσιο ενός στοχαστικού, ψηφιακά ενισχυμένου σχολείου.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, Εκπαίδευση, Prompting, Αναζήτηση, ChatGPT, Ψηφιακός Γραμματισμός

ΕΙΣΑΓΩΓΗ

Η ενσωμάτωση της Τεχνητής Νοημοσύνης (Luckin, 2018; UNESCO, 2021) στην εκπαιδευτική διαδικασία προκαλεί σημαντικές εξελίξεις στον τρόπο με τον οποίο οι μαθητές αποκτούν και διαχειρίζονται τη γνώση. Η προτροπή είναι μια τεχνική που χρησιμοποιείται σε συστήματα γενετικής τεχνητής νοημοσύνης (GenAI) για τη διευκόλυνση της αλληλεπίδρασης μεταξύ προγραμματιστών, τελικών χρηστών και του μοντέλου και περιλαμβάνει την παροχή συγκεκριμένων οδηγιών ή ερωτημάτων για την καθοδήγηση των απαντήσεων του μοντέλου (Sander Schulhoff). Το prompting δίνει τη δυνατότητα (Allen, 2023; VanLehn, 2011) για διαλογική και εξατομικευμένη μάθηση, ενεργοποιώντας τον μαθητή και ενισχύοντας τη μεταγνωστική του ικανότητα.

Η αναζήτηση είναι μια διαδικασία που επιτρέπει στα άτομα να προμηθεύονται ανεξάρτητα πληροφορίες στο διαδίκτυο, μειώνοντας την εξάρτηση από τοπικά ιδρύματα όπως κυβερνήσεις ή βιβλιοθήκες. Τονίζει τη σημασία της πρόσβασης σε διάφορες πηγές πληροφοριών και της επαλήθευσης της ακρίβειάς τους, βοηθώντας τους χρήστες να αποφεύγουν την παραπληροφόρηση (Zhang, 2023). Συνεπώς, η χρήση search προάγει (Papamitsiou and Economides, 2014; Selwyn, 2022) την κριτική σκέψη και την ικανότητα πλοήγησης σε πολλαπλές πηγές. Ο εκπαιδευτικός καλείται (Floridi and Cowls, 2019; OECD, 2021) να διαμορφώσει ένα περιβάλλον που υποστηρίζει και τις δύο αυτές στρατηγικές μάθησης, αναπτύσσοντας ταυτόχρονα τον ψηφιακό γραμματισμό και την ηθική χρήση της ΤΝ.

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η εργασία υπογραμμίζει ότι οι παραδοσιακές μέθοδοι αναζήτησης αντιμετωπίζουν συχνά προκλήσεις όπως ανεπαρκής επιλογή λέξεων-κλειδιών, περιορισμένη διασταύρωση πληροφοριών, και δυσκολίες στην αξιολόγηση της αξιοπιστίας της πηγής. Αυτοί οι περιορισμοί μπορούν να οδηγήσουν σε γνωστική υπερφόρτωση για τους χρήστες, καθώς αγωνίζονται να συνθέσουν τεράστιες ποσότητες πληροφοριών χωρίς αποτελεσματικές επιλογές φιλτραρίσματος. Το προτεινόμενο σύστημα στοχεύει στην αντιμετώπιση αυτών των ζητημάτων ενισχύοντας τις δυνατότητες αναζήτησης μέσω AI και NLP, βελτιώνοντας έτσι τη δυνατότητα ανακάλυψης των πόρων και μειώνοντας τη γνωστική επιβάρυνση των χρηστών στην ακαδημαϊκή έρευνα (Gupta, 2025).Η παραδοσιακή μέθοδος αναζήτησης πληροφοριών περιλαμβάνει διάφορα βασικά βήματα: επιλογή λέξεων-κλειδιών, διασταύρωση πληροφοριών, αξιολόγηση αξιοπιστίας πηγών, σύνθεση πληροφοριών και διαχείριση γνωστικής υπερφόρτωσης. Αυτά τα βήματα είναι ζωτικής σημασίας για την αποτελεσματική έρευνα και λήψη αποφάσεων, ειδικά σε ακαδημαϊκά και επαγγελματικά περιβάλλοντα. Κάθε βήμα έχει το δικό του σύνολο προκλήσεων και μεθοδολογιών. Η αποτελεσματική επιλογή λέξεων-κλειδιών είναι θεμελιώδης για την ανάκτηση πληροφοριών και περιλαμβάνει τον προσδιορισμό όρων που αντιπροσωπεύουν με ακρίβεια το ερευνητικό θέμα. Η μελέτη του Vaibhav Gupta υπογραμμίζει τη χρήση AI και NLP (Neuro-Linguistic Programming, Νευρογλωσσικό Προγραμματισμό) για την ενίσχυση των αναζητήσεων βάσει λέξεων-κλειδιών, επιτρέποντας πολύγλωσση υποστήριξη και προηγμένες επιλογές φιλτραρίσματος, οι οποίες βελτιώνουν την ακρίβεια και την ένταξη των αναζητήσεων (Gupta, 2025).

Η αξιολόγηση της αξιοπιστίας των πηγών είναι κρίσιμη για τη διασφάλιση της αξιοπιστίας των πληροφοριών εξασφαλίζεται με τη σύγκριση πληροφοριών από πολλαπλές πηγές για την επαλήθευση γεγονότων και την απόκτηση ολοκληρωμένης κατανόησης ενός θέματος. Αυτή η διασταύρωση βοηθά στην ελαχιστοποίηση της χρήσης αναξιόπιστων δεδομένων ακολουθώντας το προβλεπόμενο μοντέλο προσέγγισης (Prokopovych-Tkachenko et al., 2024). Επιπλέον στοιχείο που πρέπει να προσεχθεί είναι πως πραγματοποιείται η συγκέντρωση δεδομένων από διάφορες πηγές για τη δημιουργία μιας συνεκτικής κατανόησης ή συμπεράσματος, σύνθεση η οποία είναι απαραίτητη για την εξαγωγή ουσιαστικών συμπερασμάτων από διαφορετικά δεδομένα (Li et al., 2018). Θα πρέπει να αποφευχθεί η γνωστική υπερφόρτωση επειδή ο/η μαθητής/τρια κατακλύζεται από υπερβολικές πληροφορίες ώστε να αποφεύγεται η μειωμένη εστίαση και παραγωγικότητα. Αυτό το φαινόμενο είναι ιδιαίτερα διαδεδομένο μεταξύ φοιτητών και ερευνητών που έχουν πρόσβαση σε πολλαπλές πηγές πληροφοριών, οδηγώντας σε απόσπαση της προσοχής και μειωμένη ακαδημαϊκή επίδοση (Safy, 2024).

Ενώ οι παραδοσιακές μέθοδοι αναζήτησης πληροφοριών είναι αποτελεσματικές, δεν είναι χωρίς προκλήσεις. Η ταχεία ανάπτυξη των πληροφοριών και των τεχνολογικών εξελίξεων απαιτούν την εξέλιξη αυτών των μεθόδων. Η ενσωμάτωση της τεχνητής νοημοσύνης και της ανάλυσης μεγάλων δεδομένων μπορεί να ενισχύσει τις παραδοσιακές προσεγγίσεις, καθιστώντας τις πιο αποτελεσματικές και προσαρμόσιμες στις σύγχρονες ερευνητικές ανάγκες. Ωστόσο, είναι απαραίτητο να εξισορροπηθεί η τεχνολογική ολοκλήρωση με την κριτική σκέψη και τις αναλυτικές δεξιότητες για να διασφαλιστεί η αξιοπιστία και η συνάφεια των πληροφοριών. Σε ότι αφορά την τεχνική prompting, η διαδικασία διατύπωσης μιας ερώτησης, απόκτησης προσαρμοσμένης απάντησης, αίτησης διευκρίνισης και αναδιατύπωσης της ερώτησης περιλαμβάνει αρκετές προηγμένες τεχνικές επεξεργασίας φυσικής γλώσσας και αλληλεπίδρασης ανθρώπου-υπολογιστή. Αυτές οι τεχνικές έχουν σχεδιαστεί για να ενισχύσουν την ακρίβεια και τη συνάφεια των απαντήσεων στα συστήματα απάντησης ερωτήσεων. Η ενσωμάτωση αυτών των μεθόδων μπορεί να βελτιώσει σημαντικά την

αλληλεπίδραση μεταξύ χρηστών και συστημάτων τεχνητής νοημοσύνης, διασφαλίζοντας ότι οι παρεχόμενες πληροφορίες είναι ακριβείς και κατάλληλες για το πλαίσιο.

Καθοριστικό είναι να προτρέπονται οι χρήστες - μαθητές χρηστών να συγκεντρώσουν πρόσθετες πληροφορίες με «ερωτήματα ενεργοποίησης» που απαιτούν διευκρίνιση πριν από την υποβολή για να βελτιώσουν το ερώτημα αναζήτησης, διασφαλίζοντας ότι το σύστημα αναζήτησης λαμβάνει ένα πιο ακριβές ερώτημα για επεξεργασία (Igarashi et al., 2008). Βαρύτητα πρέπει να δοθεί στη βελτίωση της αρχικής ερώτησης και στην ενσωμάτωση νέων περιορισμών για μια πιο ακριβή ερμηνεία μέσω διαλόγων διευκρίνισης για την αποσαφήνιση των ερωτήσεων (Quintano and Rodrigues, 2008). Οι μαθητές πρέπει να αντιληφθούν ότι η μέθοδος αλληλεπίδρασης ερωτήσεων και απαντήσεων περιλαμβάνει ανάλυση πρόθεσης για τον προσδιορισμό των προθέσεων του χρήστη και των σχετικών στοιχείων, η οποία βοηθά στη δημιουργία μιας ακριβούς απάντησης (Li et al., 2019) και ότι η συνεχής επαναδιατύπωση ερωτήσεων είναι μια στρατηγική που βελτιώνει τις εργασίες συλλογισμού ζητώντας από το μοντέλο να εξηγήσει την ερώτηση πριν τη λύσει. Αυτή η προσέγγιση ενισχύει την απόδοση του μοντέλου ενθαρρύνοντας λεπτομερείς απαντήσεις, οι οποίες είναι ευεργετικές για πολύπλοκες ερωτήσεις (Yugeswardeenoo et al., 2024).

Ενώ αυτές οι τεχνικές ενισχύουν σημαντικά την αλληλεπίδραση μεταξύ χρηστών και συστημάτων τεχνητής νοημοσύνης, εξακολουθούν να υπάρχουν προκλήσεις στη διασφάλιση της επεκτασιμότητας και της ακρίβειας με βάση τα συμφραζόμενα των αυτοματοποιημένων συστημάτων δημιουργίας ερωτήσεων. Επιπλέον, η αποτελεσματικότητα αυτών των συστημάτων βασίζεται σε μεγάλο βαθμό στην ποιότητα των προτροπών εισόδου, όπως επισημαίνεται σε μελέτες σχετικά με αποτελεσματικές τεχνικές προτροπής για μοντέλα όπως το ChatGPT (Kővári, 2024). Καθώς ο τομέας της αλληλεπίδρασης ανθρώπου-υπολογιστή συνεχίζει να εξελίσσεται, η ενσωμάτωση γνώσεων από διάφορους κλάδους θα είναι ζωτικής σημασίας για την αντιμετώπιση αυτών των προκλήσεων και την περαιτέρω βελτίωση των δυνατοτήτων των συστημάτων απάντησης ερωτήσεων.

ΥΛΙΚΟ ΚΑΙ ΜΕΘΟΔΟΛΟΓΙΑ

Η ανάλυση πραγματοποιήθηκε με θεματική κατηγοριοποίηση των παρατηρήσεων και των παραδοτέων (π.χ. δυσκολίες εντοπισμού αξιόπιστων πηγών, ακρίβεια/αιτιολόγηση απαντήσεων, βαθμός αυτονομίας), σε συνδυασμό με σύγκριση των δύο πρακτικών ως προς τον χρόνο, τη γνωστική επιβάρυνση και την ποιότητα της τεκμηρίωσης.

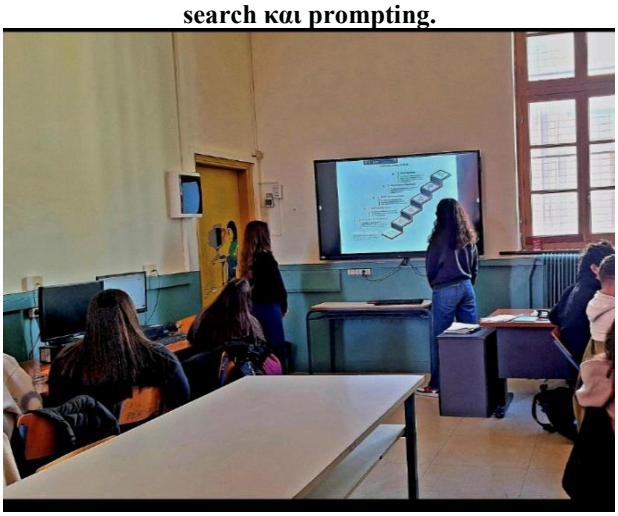
Ως δεδομένα αξιοποιήθηκαν: (α) τα παραγόμενα έργα των μαθητών, (β) οι ενδιάμεσες εκδοχές/διορθώσεις και τα συχνά σφάλματα που καταγράφηκαν κατά τη διάρκεια της εργασίας, και (γ) οι σύντομες παρατηρήσεις των εκπαιδευτικών κατά την υλοποίηση (εμπόδια, ερωτήματα, ανάγκες καθοδήγησης). Όπου υπήρχε δυνατότητα, αποτυπώθηκαν και απλά περιγραφικά μεγέθη (π.χ. ποσοστά ομάδων με συντακτικά σφάλματα, ποσοστά ορθών λύσεων).

Το υλικό προήλθε από τρεις μελέτες περίπτωσης σε διαφορετικά γνωστικά αντικείμενα (Πληροφορική, Μαθηματικά, Περιβαλλοντική Εκπαίδευση), όπως περιγράφονται αναλυτικά στη συνέχεια. Οι δραστηριότητες οργανώθηκαν σε φάσεις (Search και Prompting) και ολοκληρώθηκαν με παραδοτέα ανά ομάδα/μαθητή (κώδικας, λύσεις ασκήσεων, παρουσιάσεις, infographics, podcasts).

Η διδακτική εφαρμογή και η συλλογική επεξεργασία των δραστηριοτήτων στην τάξη αποτυπώνονται ενδεικτικά στην (Εικόνα 1).

Η παρούσα εργασία βασίζεται σε ποιοτική ανάλυση διδακτικών σεναρίων και εκπαιδευτικών παρεμβάσεων που υλοποιήθηκαν σε πραγματικές σχολικές τάξεις, με στόχο τη συγκριτική αποτίμηση των πρακτικών search και prompting. Η προσέγγιση είναι περιγραφική και ερμηνευτική και εστιάζει στον τρόπο με τον οποίο οι μαθητές αλληλεπιδρούν με τις πρακτικές search και prompting, στις δυσκολίες που αναδύονται, καθώς και στα μαθησιακά ίχνη που παράγονται κατά τη διάρκεια της διδακτικής διαδικασίας, όπως αποτυπώνεται ενδεικτικά στον κύκλο prompting που αξιοποιήθηκε στην τάξη. Η ανάλυση λαμβάνει υπόψη τόσο τη διαδικασία μάθησης όσο και την ποιότητα των παραγόμενων παραδοτέων, δίνοντας έμφαση στη γνωστική εμπλοκή και στη μεταγνωστική δραστηριοποίηση των μαθητών. Επιπλέον, εξετάζεται ο ρόλος της καθοδήγησης του εκπαιδευτικού στη διαμόρφωση στρατηγικών χρήσης των δύο πρακτικών και στη διαχείριση της γνωστικής επιβάρυνσης. Τέλος, η μελέτη επιχειρεί να αναδείξει παιδαγωγικές συνθήκες υπό τις οποίες η συνδυαστική αξιοποίηση search και prompting μπορεί να υποστηρίξει βαθύτερες μορφές μάθησης και κριτικού ψηφιακού γραμματισμού (Εικόνα 2).

Εικόνα 1
Στιγμιότυπο από τη διδακτική εφαρμογή σε πραγματικό σχολικό περιβάλλον, κατά το οποίο οι μαθητές παρακολουθούν και συζητούν τα στάδια της μαθησιακής διαδικασίας στο πλαίσιο της συγκριτικής προσέγγισης search και prompting.



Εικόνα 2.
Οπτικοποίηση του κύκλου prompting κατά τη διάρκεια της διδασκαλίας, που αξιοποιήθηκε από τους μαθητές για αναδιατύπωση ερωτημάτων, αναστοχασμό και βελτίωση των παραγόμενων απαντήσεων.



Ερευνητικος Σχεδιασμος Και Πλαισιο

Πίνακας 1
Συνοπτική σύγκριση Search και Prompting στην εκπαιδευτική πράξη

Διάσταση	**Search**	**Prompting**
Χρόνος/Ροή εργασίας	Πολλαπλά βήματα (λέξεις-κλειδιά, επιλογή πηγών, ανάγνωση, σύνθεση). Συχνά χρονοβόρο.	Άμεση παραγωγή απάντησης/παραδείγματος. Επιτάχυνση, με ανάγκη ελέγχου.
Τεκμηρίωση	Απαιτεί παραπομπές και διασταύρωση πηγών.	Κίνδυνος «αφανών» πηγών – χρειάζεται έλεγχος/παραπομπές.
Γνωστική επιβάρυνση	Υψηλή όταν υπάρχει υπερπληθώρα πληροφοριών.	Μπορεί να μειώνει το φορτίο, αλλά να οδηγεί σε παθητικότητα αν δεν υπάρχει καθοδήγηση.
Κριτικός γραμματισμός	Ενισχύεται μέσω αξιολόγησης αξιοπιστίας.	Πρέπει να καλλιεργηθεί ρητά (έλεγχος ορθότητας, εντοπισμός σφαλμάτων/προκαταλήψεων).
Ρόλος εκπαιδευτικού	Καθοδήγηση σε στρατηγικές αναζήτησης και αξιολόγηση πηγών.	Διδασκαλία τεχνικών prompt, διατύπωση στόχων, και παιδαγωγικό πλαίσιο για υπεύθυνη χρήση.

ΜΕΛΕΤΕΣ ΠΕΡΙΠΤΩΣΗΣ / ΕΦΑΡΜΟΓΕΣ ΣΤΗΝ ΤΑΞΗ

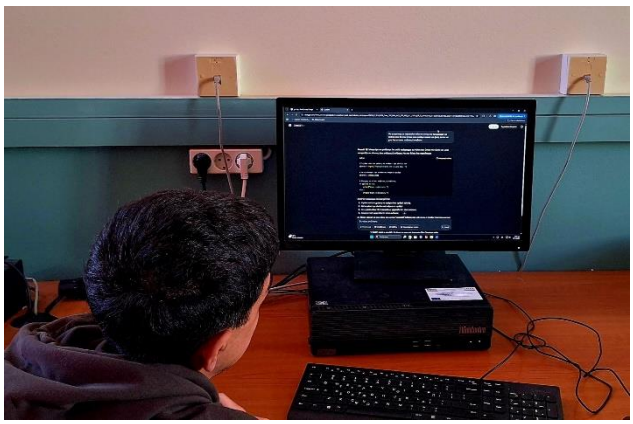
Οι τεχνικές search (αναζήτηση πληροφοριών στο διαδίκτυο) και prompting (υποβολή ερωτήματος σε εργαλεία Τεχνητής Νοημοσύνης όπως το ChatGPT) μπορούν να αξιοποιηθούν με πολλούς τρόπους στην εκπαιδευτική διαδικασία, προσφέροντας στους μαθητές ευκαιρίες για αυτενέργεια, εξατομικευμένη μάθηση και καλλιέργεια ψηφιακών δεξιοτήτων. Παρακάτω παρουσιάζονται τρεις μελέτες περιπτώσεων που αναδεικνύουν την εφαρμογή των δύο αυτών τεχνικών σε διαφορετικά γνωστικά αντικείμενα.

Μελέτη Περίπτωσης: Πληροφορική - Κατανόηση της Δομής Επιλογής if/else σε Python με Search και Prompting.

Στην ενότητα της Πληροφορικής, οι μαθητές της Β΄ Γυμνασίου κλήθηκαν να κατανοήσουν τη λειτουργία των δομών επιλογής (if/else) στην Python. Η διδακτική παρέμβαση διαμορφώθηκε σε δύο φάσεις. Στην πρώτη, εφαρμόστηκε η παραδοσιακή μέθοδος αναζήτησης: οι μαθητές αναζήτησαν διαδικτυακά τη σύνταξη και χρήση της εντολής if/else. Οι πιο έμπειροι χρησιμοποίησαν εξειδικευμένες πηγές όπως το W3Schools και το StackOverflow, ενώ άλλοι περιορίστηκαν σε εισαγωγικά blogs ή βίντεο χωρίς επαρκή παιδαγωγική τεκμηρίωση. Αν και η αναζήτηση προσέφερε πληθώρα υλικού, πολλοί μαθητές δυσκολεύτηκαν να εντοπίσουν τη σωστή πληροφορία, να κατανοήσουν τη σύνταξη και να τη μεταφέρουν στο δικό τους πρόβλημα. Ενδεικτικά, το 58% των ομάδων παρουσίασε συντακτικά σφάλματα ή λανθασμένη λογική κατά την πρώτη φάση.

Στη δεύτερη φάση, χρησιμοποιήθηκε prompting: οι μαθητές έδωσαν στο ChatGPT σαφείς εντολές, όπως «Γράψε κώδικα σε Python που ελέγχει την ηλικία ενός χρήστη και τυπώνει “Ενήλικας” αν είναι άνω των 18 και “Ανήλικος” αλλιώς». Το εργαλείο παρείχε έτοιμο κώδικα, επεξήγηση, παραμετροποίηση και δυνατότητα διαλόγου. Η άμεση ανατροφοδότηση ενίσχυσε την κατανόηση, ενώ η δυνατότητα παραλλαγών βοήθησε στη γενίκευση του εννοιολογικού σχήματος. Η ατομική αλληλεπίδραση των μαθητών με το εργαλείο γενετικής ΤΝ στο πλαίσιο της συγκεκριμένης δραστηριότητας αποτυπώνεται ενδεικτικά στην (Εικόνα 3).

Εικόνα 3
ΣΤΙΓΜΙΟΤΥΠΟ ΑΠΟ ΤΗ ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΠΛΗΡΟΦΟΡΙΚΗΣ: ΑΤΟΜΙΚΗ ΑΛΛΗΛΕΠΙΔΡΑΣΗ ΜΑΘΗΤΗ ΜΕ ΕΡΓΑΛΕΙΟ ΓΕΝΕΤΙΚΗΣ ΤΝ ΚΑΤΑ ΤΗ ΔΙΑΤΥΠΩΣΗ ΚΑΙ ΕΠΕΞΕΡΓΑΣΙΑ PROMPT ΓΙΑ ΤΗΝ ΚΑΤΑΝΟΗΣΗ ΤΗΣ ΔΟΜΗΣ ΕΠΙΛΟΓΗΣ IF/ELSE ΣΕ PYTHON.



Η σύγκριση ανέδειξε ότι η μέθοδος prompting:

- επιτάχυνε τη διαδικασία μάθησης,
- προσέφερε στοχευμένη καθοδήγηση,
- ενίσχυσε την αυτοπεποίθηση αρχάριων μαθητών.

Ωστόσο, παρατηρήθηκε ότι η υπερβολική εξάρτηση από τις απαντήσεις του ChatGPT μείωσε τη δημιουργική σκέψη στις ομάδες με υψηλότερο επίπεδο. Αυτό επιβεβαιώνει και τη σχετική μελέτη των Kasnecietal. (2023), που προειδοποιεί ότι χωρίς καθοδήγηση, το prompting ενδέχεται να περιορίσει τη διερευνητική σκέψη σε μαθητές υψηλών δυνατοτήτων.

Μελέτη Περίπτωσης: Μαθηματικά - Δευτεροβάθμιες Εξισώσεις με Search και Prompting.

Στη διδασκαλία των δευτεροβάθμιων εξισώσεων στην Α΄ Λυκείου, εφαρμόστηκε παρόμοιο σχήμα σύγκρισης. Οι μαθητές χωρίστηκαν σε δύο ομάδες. Η πρώτη ομάδα χρησιμοποίησε παραδοσιακή αναζήτηση (search): πληκτρολόγησαν στο Google «Πώς λύνουμε δευτεροβάθμια εξίσωση;». Οι πηγές που εμφανίστηκαν περιλάμβαναν σημειώσεις, εκπαιδευτικά βίντεο και άρθρα από blogs. Παρά την ποικιλία, η κατανόηση των εννοιών αποδείχθηκε ελλιπής: οι μαθητές αντιγράφουν τύπους χωρίς να κατανοούν το θεωρητικό τους υπόβαθρο, όπως έχει διαπιστωθεί και από σχετική μελέτη των Hew and Cheung (2013) για την επιφανειακή μάθηση μέσω διαδικτυακών πηγών.

Η δεύτερη ομάδα εργάστηκε με prompting: χρησιμοποίησε το εξής prompt στο ChatGPT: «Λύσε βήμα-βήμα την εξίσωση $2x^2 - 3x - 5 = 0$ και εξήγησέ το σαν να είμαι μαθητής Α΄ Λυκείου». Το αποτέλεσμα ήταν μια πλήρως αναλυτική και προσαρμοσμένη απάντηση, με επεξήγηση της διακρίνουσας, των τύπων και του συλλογισμού, σε γλώσσα προσιτή και με δυνατότητα επανάληψης.

Η εκπαιδευτική αξιολόγηση έδειξε:

- υψηλότερο ποσοστό σωστών λύσεων στην ομάδα του prompting (86% έναντι 64%),
- μεγαλύτερη αναστοχαστική κατανόηση (οι μαθητές μπορούσαν να εξηγήσουν «γιατί» ακολουθήθηκε κάθε βήμα),
- αλλά και τάση παθητικής αποδοχής της απάντησης χωρίς έλεγχο.

Όπως προτείνει και η Holmesetal. (2022), η χρήση LLMs στα Μαθηματικά πρέπει να πλαισιώνεται με καθοδήγηση και διασταύρωση, ώστε να αποφεύγεται η γνωστική απάθεια (cognitivepassivity).

Μελέτη Περίπτωσης: Περιβαλλοντικό Πρόγραμμα - Κλιματική Αλλαγή

Η τρίτη μελέτη περίπτωσης πραγματοποιήθηκε στο πλαίσιο Περιβαλλοντικού Προγράμματος, με στόχο την κατανόηση των επιπτώσεων της κλιματικής αλλαγής στον φυσικό και ανθρωπογενή χώρο. Οι μαθητές, σε ομάδες, κλήθηκαν να συγκρίνουν τις δύο προσεγγίσεις (search και prompting) για τη συλλογή, ανάλυση και σύνθεση πληροφοριών.

Φάση 1 - Search: Οι ομάδες αναζήτησαν δεδομένα από επιστημονικούς και θεσμικούς ιστότοπους (IPCC, WWF, ΥΠΕΝ, ΕΚΠΑ). Εκπαιδεύτηκαν στην επιλογή λέξεων-κλειδιών, στην αξιολόγηση πηγών και στη διασταύρωση στοιχείων. Παρά την προσπάθεια, υπήρξαν δυσκολίες:

- στην επεξεργασία πυκνών επιστημονικών κειμένων,
- στην κατανόηση των γεωπολιτικών διαφορών μεταξύ περιοχών,
- στην εννοιολογική σύνδεση δεδομένων.

Φάση 2 - Prompting: Οι μαθητές χρησιμοποίησαν εργαλεία ΤΝ για:

- να ζητήσουν περίληψη επιπτώσεων της κλιματικής αλλαγής στην Ελλάδα,
- να συγκρίνουν περιοχές (π.χ. Ελλάδα vs Σαχάρα),
- να δημιουργήσουν υποθετικά σενάρια (π.χ. αύξηση 2 °C),
- και να πάρουν προτάσεις πολιτικών προσαρμογής.

Το prompting επέτρεψε:

- σύνθεση πληροφορίας από διαφορετικά επίπεδα,
- ενίσχυση της συνθετικής ικανότητας,
- αλλά και βαθύτερη διατύπωση ερωτημάτων.

Αναλυτική αξιολόγηση των παραγόμενων έργων (PowerPoint, infographics, podcasts) έδειξε ότι η υβριδική χρήση Search and Prompting παρήγαγε ποιοτικά ανώτερες και πιο δημιουργικές εργασίες. Οι μαθητές ανέπτυξαν ικανότητες πληροφοριακού γραμματισμού, συνεργατικότητας και στοχαστικής χρήσης της ΤΝ. Αυτό συνάδει με τις κατευθύνσεις της UNESCO (2021) για την ενσωμάτωση ΤΝ σε περιβάλλοντα συμμετοχικής μάθησης. Ως Γενικά Συμπεράσματα προέκυψαν ότι οι τρεις μελέτες περιπτώσεων δείχνουν ότι η συνδυαστική αξιοποίηση των τεχνικών search και prompting:

- Εξυπηρετεί διαφορετικά μαθησιακά στυλ και επίπεδα ετοιμότητας.
- Ενισχύει την αυτονομία και την ενεργή μάθηση.
- Προσφέρει διαφοροποιημένες μαθησιακές διαδρομές.
- Υποστηρίζει την εξοικείωση με σύγχρονα ψηφιακά εργαλεία.

Ο εκπαιδευτικός καλείται να καθοδηγήσει τους μαθητές στη σωστή επιλογή μεθόδου, να ενισχύσει τον κριτικό γραμματισμό τους και να προάγει τη μεταγνωστική επίγνωση, ώστε να μπορούν να επιλέγουν συνειδητά το κατάλληλο εργαλείο ανάλογα με το πρόβλημα που αντιμετωπίζουν.

ΑΝΑΛΥΣΗ ΠΛΕΟΝΕΚΤΗΜΑΤΩΝ ΚΑΙ ΠΕΡΙΟΡΙΣΜΩΝ

Η τεχνική της αναζήτησης (searching) προσφέρει σημαντικά πλεονεκτήματα στην εκπαιδευτική διαδικασία, καθώς ενισχύει την αυτενέργεια του μαθητή, του επιτρέπει να εκτεθεί σε πληθώρα πηγών και να αναπτύξει δεξιότητες εντοπισμού, αξιολόγησης και επιλογής έγκυρης πληροφορίας. Στα παραδείγματα της Πληροφορικής και των Μαθηματικών, η αναζήτηση οδηγεί στη γνωριμία με ποικίλες προσεγγίσεις επίλυσης προβλημάτων, ενώ στο περιβαλλοντικό πρόγραμμα αναπτύσσει τη διερευνητική ικανότητα και τη συνεργατική μάθηση. Ωστόσο, πρόκειται για μία διαδικασία που μπορεί να αποδειχθεί χρονοβόρα, ιδιαίτερα όταν ο μαθητής δεν διαθέτει επαρκή εμπειρία στο φιλτράρισμα περιεχομένου ή όταν το υλικό είναι δυσνόητο. Η μη εξατομικευμένη φύση των αποτελεσμάτων μπορεί να προκαλέσει σύγχυση ή να οδηγήσει σε γνωστικά λάθη, ειδικά σε περιπτώσεις χαμηλής μαθησιακής ετοιμότητας.

Αντίθετα, η τεχνική του prompting με τη χρήση Τεχνητής Νοημοσύνης προσφέρει άμεση, προσαρμοσμένη και διαδραστική υποστήριξη. Οι μαθητές λαμβάνουν εξατομικευμένες απαντήσεις, επεξηγήσεις και δυνατότητες εμβάθυνσης μέσω αναδιατύπωσης των ερωτημάτων. Στην περίπτωση του προγραμματισμού, το prompting διευκολύνει τους αρχάριους να κατανοήσουν τη λογική του κώδικα, ενώ στα Μαθηματικά παρέχει καθοδήγηση βήμα-βήμα, προσαρμοσμένη στο επίπεδο του μαθητή. Στα περιβαλλοντικά σενάρια, υποστηρίζει τη σύνθεση δεδομένων, τη διατύπωση υποθετικών σεναρίων και την ερμηνεία πολύπλοκων φαινομένων. Παρ' όλα αυτά, η αποτελεσματικότητα της τεχνικής εξαρτάται σε μεγάλο βαθμό από την ικανότητα του μαθητή να διατυπώνει σωστά και σαφή prompts, γεγονός που απαιτεί καθοδήγηση και εξάσκηση. Επιπλέον, χρειάζεται κριτική στάση απέναντι στις απαντήσεις της ΤΝ, ώστε να αποφεύγεται η άκριτη αποδοχή ανακριβών ή απλουστευμένων πληροφοριών.

ΨΗΦΙΑΚΕΣ ΚΑΙ ΜΕΤΑΓΝΩΣΤΙΚΕΣ ΔΕΞΙΟΤΗΤΕΣ

Η αξιοποίηση των τεχνικών searching και prompting συμβάλλει ουσιαστικά στην ανάπτυξη ψηφιακών δεξιοτήτων, οι οποίες κρίνονται απαραίτητες στη σύγχρονη εκπαιδευτική πραγματικότητα. Μέσα από τις δραστηριότητες που περιγράφονται στις μελέτες περίπτωσης, οι μαθητές εξασκούνται στην πλοήγηση στο διαδίκτυο, στην επιλογή λέξεων-κλειδιών, στην αξιολόγηση της εγκυρότητας των πληροφοριών, καθώς και στη χρήση εργαλείων Τεχνητής Νοημοσύνης. Ειδικά στο περιβαλλοντικό πρόγραμμα, η αναζήτηση σε επιστημονικές πηγές και θεσμικούς φορείς απαιτεί την ικανότητα αναγνώρισης αξιόπιστων δεδομένων και σωστής ψηφιακής τεκμηρίωσης. Αντίστοιχα, η χρήση prompting καλλιεργεί δεξιότητες ψηφιακής επικοινωνίας με προηγμένα συστήματα, ενώ εισάγει τους μαθητές στις βασικές αρχές αλληλεπίδρασης με αυτόματα υπολογιστικά περιβάλλοντα, ενισχύοντας την τεχνολογική τους επάρκεια.

Παράλληλα, οι περιπτώσεις μελέτης αποδεικνύουν πως οι δύο τεχνικές ενισχύουν ουσιαστικά και τις μεταγνωστικές δεξιότητες των μαθητών. Μέσα από την αναζήτηση, οι μαθητές μαθαίνουν να παρακολουθούν τη διαδικασία της μάθησής τους, να εντοπίζουν σημεία που δεν κατανοούν, και να αναπροσαρμόζουν τις στρατηγικές τους (π.χ. αλλαγή λέξεων-κλειδιών, αναζήτηση απλούστερων πηγών). Στην περίπτωση του prompting, η επαναδιατύπωση ερωτημάτων, η κριτική αποτίμηση των απαντήσεων και η απαίτηση για περαιτέρω διευκρινίσεις ενισχύουν την ικανότητα εσωτερικού ελέγχου της μάθησης. Οι μαθητές καλούνται να αξιολογούν πότε και πώς να χρησιμοποιούν κάθε εργαλείο, να στοχάζονται πάνω στις δικές τους απορίες και να συνδέουν τη νέα γνώση με προηγούμενες εμπειρίες, καλλιεργώντας έτσι δεξιότητες αυτορρύθμισης και γνωστικής ευελιξίας.

Η αποτελεσματικότητα αυτών των τεχνικών μπορεί να ποικίλει ανάλογα με τις ατομικές διαφορές, όπως οι προηγούμενες γνώσεις και οι αρχικές μεταγνωστικές ικανότητες (Reid and Morrison, 2014). Επιπλέον, ενώ τα ψηφιακά εργαλεία μπορούν να βελτιώσουν τη μάθηση, ενδέχεται να μην αντικαταστήσουν πλήρως τις διακριτικές αλληλεπιδράσεις και τα σχόλια που παρέχονται από ανθρώπινους εκπαιδευτές, όπως τονίζεται από τη σημασία της γλωσσικής ανταλλαγής στη μάθηση (Schroeder, 2017). Επιπλέον, οι ηθικές επιπτώσεις της χρήσης της τεχνητής νοημοσύνης και των ψηφιακών τεχνολογιών στην εκπαίδευση πρέπει να εξεταστούν προσεκτικά για να εξασφαλιστούν δίκαιες και αποτελεσματικές μαθησιακές εμπειρίες (Pillajo, 2024).

ΚΟΜΒΙΚΟΣ ΡΟΛΟΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ

Ο ρόλος του δασκάλου είναι πράγματι καθοριστικός στη χρήση των τεχνικών αναζήτησης και προτροπής μέσα στην τάξη. Οι εκπαιδευτικοί ενεργούν ως κρίσιμοι μεσάζοντες μεταξύ των μαθητών και των τεχνολογικών εργαλείων που έχουν σχεδιαστεί για την ενίσχυση της μάθησης. Η συμμετοχή τους είναι απαραίτητη όχι μόνο στην εφαρμογή αυτών

των τεχνικών αλλά και στο σχεδιασμό και την προσαρμογή τους για την επίτευξη εκπαιδευτικών στόχων. Η τεχνογνωσία των εκπαιδευτικών και η κατανόηση των παιδαγωγικών αναγκών τους καθιστούν απαραίτητους για την αποτελεσματική ενσωμάτωση των τεχνικών αναζήτησης και προτροπής στις δραστηριότητες της τάξης. Αυτή η ενσωμάτωση είναι ζωτικής σημασίας για την προώθηση ενός περιβάλλοντος ευνοϊκού για τη μάθηση και την κριτική σκέψη.

Εκπαιδευτικοί ως Συνεργάτες στην Τεχνολογία Αναζήτησης

Οι εκπαιδευτικοί αποτελούν αναπόσπαστο μέρος του σχεδιασμού και της εφαρμογής εργαλείων αναζήτησης στην τάξη. Η συμμετοχή τους διασφαλίζει ότι αυτά τα εργαλεία είναι προσαρμοσμένα στο εκπαιδευτικό πλαίσιο και ανταποκρίνονται στις ειδικές ανάγκες των μαθητών (Murgia et al., 2021)].

Οι μαθητές χρειάζονται καθοδήγηση για την αποτελεσματική επιλογή λέξεων-κλειδιών, ώστε να διαμορφώσουν στοχευμένες και ακριβείς αναζητήσεις. Η εκπαίδευσή τους σε στρατηγικές αναζήτησης -όπως η χρήση φίλτρων, λογικών τελεστών και διαφοροποιημένων όρων- αποτελεί απαραίτητη δεξιότητα για την αξιόπιστη και αποδοτική πλοήγηση στο ψηφιακό περιβάλλον. Παράλληλα, είναι αναγκαίο οι μαθητές να διδαχθούν πώς να αξιολογούν τα αποτελέσματα της αναζήτησης κριτικά, να αναγνωρίζουν την εγκυρότητα και την αξιοπιστία των πηγών, να εντοπίζουν προκαταλήψεις ή διαφημιστικά κίνητρα, και να αποφεύγουν την άκριτη υιοθέτηση της πρώτης πληροφορίας που εντοπίζουν.

Τεχνικές Προτροπής στην Ψηφιακή Παιδαγωγική

Η προτροπή είναι μια κρίσιμη τεχνική διδασκαλίας που υποστηρίζει ψηφιακά περιβάλλοντα μάθησης. Οι εκπαιδευτικοί διαδραματίζουν βασικό ρόλο στην εφαρμογή διαφόρων τύπων προτροπής, όπως η διερεύνηση και η αποσαφήνιση ερωτήσεων, για την ενίσχυση της αφοσίωσης των μαθητών και των μαθησιακών αποτελεσμάτων (Rad et al., 2024), (Pearce and Chiavaroli, 2020). Η χρήση προτροπής σε εκπαιδευτικά περιβάλλοντα, έχει αποδειχθεί ότι βελτιώνει σημαντικά τις δεξιότητες κριτικής σκέψης και συλλογιστικής των μαθητών, υπογραμμίζοντας τη σημασία των στρατηγικών προτροπής υπό την καθοδήγηση δασκάλων (Wuryaningrum, 2022)].

Η παρέμβαση του εκπαιδευτικού είναι καθοριστική στη διαμόρφωση ουσιαστικών και αποτελεσματικών prompts, καθώς η ποιότητα του ερωτήματος επηρεάζει άμεσα την ποιότητα της απάντησης από την Τεχνητή Νοημοσύνη. Οι μαθητές πρέπει να μάθουν να διατυπώνουν σαφείς, πλήρεις και νοηματικά εύστοχες ερωτήσεις, να προσαρμόζουν τα prompts στις μαθησιακές τους ανάγκες, και να ζητούν διευκρινίσεις ή παραδείγματα όταν χρειάζεται. Ο εκπαιδευτικός οφείλει επίσης να ενθαρρύνει την κριτική χρήση των απαντήσεων που παρέχουν τα εργαλεία ΤΝ, προτρέποντας τους μαθητές να επαληθεύουν τις πληροφορίες, να εντοπίζουν πιθανές ανακρίβειες ή γενικεύσεις και να αναγνωρίζουν παραπλανητικά ή ψευδή στοιχεία. Μέσω αυτής της διαδικασίας, καλλιεργείται η δεξιότητα της κριτικής σκέψης, της μεταγνώσης και της υπεύθυνης ψηφιακής συμμετοχής, με τον εκπαιδευτικό να λειτουργεί ως εμψυχωτής και εγγυητής ποιότητας της μαθησιακής εμπειρίας.

ΣΥΖΗΤΗΣΗ

Τα ευρήματα από τις τρεις μελέτες περίπτωσης καταδεικνύουν ότι η επιλογή μεταξύ των πρακτικών search και prompting δεν συνιστά τεχνική λεπτομέρεια, αλλά ουσιαστική παιδαγωγική απόφαση, η οποία επηρεάζει τον τρόπο συγκρότησης της γνώσης, το επίπεδο μαθητικής εμπλοκής και την ανάπτυξη γνωστικών, μεταγνωστικών και ψηφιακών δεξιοτήτων. Η συγκριτική αποτίμηση των δύο προσεγγίσεων αναδεικνύει ότι ενεργοποιούν διαφορετικούς μηχανισμούς μάθησης και εξυπηρετούν διακριτούς μαθησιακούς στόχους.

Η πρακτική του search ενισχύει τον πληροφοριακό και κριτικό γραμματισμό, καθώς απαιτεί από τους μαθητές να διατυπώνουν κατάλληλες λέξεις-κλειδιά, να εντοπίζουν αξιόπιστες πηγές, να αξιολογούν την εγκυρότητα των πληροφοριών και να συνθέτουν δεδομένα από πολλαπλές αναφορές. Ωστόσο, τα δεδομένα των μελετών περίπτωσης δείχνουν ότι η υπερπληθώρα πληροφοριών και η ανομοιογένεια των διαδικτυακών πηγών συχνά οδηγούν σε αυξημένη γνωστική επιβάρυνση, ιδίως σε μαθητές με περιορισμένες στρατηγικές αναζήτησης. Τα συντακτικά σφάλματα, οι ελλιπείς αιτιολογήσεις και η δυσκολία μεταφοράς της γνώσης σε νέο πλαίσιο συνιστούν ενδεικτικά παραδείγματα των περιορισμών αυτής της προσέγγισης.

Αντίθετα, η πρακτική του prompting προσφέρει άμεση ανατροφοδότηση, προσωποποιημένη καθοδήγηση και δυνατότητα διαλόγου, στοιχεία που διευκολύνουν την κατανόηση σύνθετων εννοιών και επιταχύνουν τη μαθησιακή διαδικασία. Τα αυξημένα ποσοστά ορθών λύσεων και η βελτιωμένη ικανότητα των μαθητών να εξηγούν τον συλλογισμό τους υποδηλώνουν ότι τα εργαλεία γενετικής ΤΝ μπορούν να λειτουργήσουν ως γνωστικά υποστηρίγματα (scaffolds), ιδιαίτερα για αρχάριους μαθητές. Παράλληλα, όμως, αναδείχθηκε ο κίνδυνος παθητικής αποδοχής των παραγόμενων

απαντήσεων, κυρίως σε μαθητές υψηλότερου γνωστικού επιπέδου, γεγονός που επιβεβαιώνει την ανάγκη για σαφές παιδαγωγικό πλαίσιο.

Στο πλαίσιο αυτό, η αξιοποίηση της γενετικής ΤΝ στην τάξη προϋποθέτει ρητές διδακτικές συμβάσεις και συστηματική καθοδήγηση, ώστε οι μαθητές να διατηρούν έλεγχο στη μαθησιακή διαδικασία και να αναπτύσσουν δεξιότητες αυτορρύθμισης και μεταγνώσης. Κρίσιμης σημασίας αναδεικνύονται η διαφάνεια ως προς το τι παράγεται από το εργαλείο και τι από τον μαθητή, η αποφυγή κοινοποίησης προσωπικών δεδομένων, καθώς και η κατανόηση ότι οι απαντήσεις της ΤΝ ενδέχεται να περιέχουν σφάλματα, ανακρίβειες ή μεροληψίες. Η συστηματική διασταύρωση πληροφοριών, η απαίτηση τεκμηρίωσης και η ιεράρχηση κριτηρίων αξιοπιστίας λειτουργούν ως αντίβαρο στον κίνδυνο παραπληροφόρησης. Παράλληλα, πρακτικές όπως η διατύπωση σαφών μαθησιακών στόχων πριν από την αλληλεπίδραση, η καταγραφή ενδιάμεσων βημάτων και η αναστοχαστική αξιολόγηση του αποτελέσματος ενισχύουν τη μεταγνωστική επίγνωση και μετατρέπουν το prompting από μηχανιστική χρήση εργαλείου σε ενεργή γνωστική διαδικασία. Όταν αυτές οι δεξιότητες καλλιεργούνται ρητά, η γενετική ΤΝ δεν υποκαθιστά τη σκέψη, αλλά λειτουργεί ως μέσο ενίσχυσής της.

Ιδιαίτερη σημασία αποκτούν και τα ζητήματα ηθικής και υπεύθυνης χρήσης της ΤΝ. Τα ευρήματα δείχνουν ότι η παιδαγωγική αξιοποίηση οφείλει να περιλαμβάνει σαφείς κανόνες για την αναφορά χρήσης εργαλείων ΤΝ, την τεκμηρίωση πηγών, την αποφυγή αντιγραφής και την κριτική στάση απέναντι σε πιθανές μεροληψίες. Με αυτόν τον τρόπο, η ΤΝ μετασχηματίζεται από «μηχανή απαντήσεων» σε αφορμή για καλλιέργεια υπευθυνότητας, ακαδημαϊκής ακεραιότητας και κριτικής σκέψης. Ως προς τις παιδαγωγικές προεκτάσεις, προκύπτει η ανάγκη για σκόπιμο σχεδιασμό δραστηριοτήτων που συνδυάζουν search και prompting με διακριτούς στόχους. Η αναζήτηση μπορεί να αξιοποιείται για τον εντοπισμό και τη σύγκριση πηγών, ενώ το prompting για επεξεργασία, αναδιατύπωση, δημιουργία ερωτημάτων και αναστοχασμό. Ο κριτικός ψηφιακός γραμματισμός ενισχύεται όταν οι μαθητές καλούνται να τεκμηριώνουν επιλογές, να αιτιολογούν συμπεράσματα και να παρουσιάζουν τη διαδρομή σκέψης τους και όχι μόνο το τελικό αποτέλεσμα.

Συνεπώς, ο ρόλος του εκπαιδευτικού αναδεικνύεται καθοριστικός. Ο εκπαιδευτικός λειτουργεί ως ρυθμιστής της μαθησιακής διαδικασίας: διαμορφώνει κριτήρια, καθοδηγεί την επαλήθευση, σχεδιάζει αυθεντικές εργασίες και αξιολογεί με έμφαση στη διαδικασία. Η συνειδητή και παιδαγωγικά τεκμηριωμένη ενσωμάτωση των πρακτικών search και prompting μπορεί να συμβάλει ουσιαστικά στην ανάπτυξη κριτικού ψηφιακού γραμματισμού, μεταγνωστικής επίγνωσης και ενεργού συμμετοχής των μαθητών στη μαθησιακή διαδικασία.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Ο συνδυασμός των τεχνικών search και prompting αναδεικνύεται ως ένα ισχυρό και συμπληρωματικό διδακτικό εργαλείο που προάγει την κριτική, ενεργητική και εξατομικευμένη μάθηση. Μέσω της αναζήτησης (search), οι μαθητές έρχονται σε επαφή με πληθώρα πηγών, αναπτύσσουν δεξιότητες εντοπισμού, αξιολόγησης και οργάνωσης πληροφοριών, και εξοικειώνονται με την ψηφιακή πλοήγηση σε αυθεντικά περιβάλλοντα. Η διαδικασία αυτή ενισχύει την αυτενέργεια και την κριτική σκέψη, ενώ η χρήση εργαλείων ΤΝ μέσω prompting επιτρέπει άμεση πρόσβαση σε εξατομικευμένο περιεχόμενο, ενισχύοντας τη μεταγνώση, την επανατροφοδότηση και τη βελτίωση της κατανόησης. Το ChatGPT, ως εκπαιδευτικός «συνομιλητής», προσφέρει τη δυνατότητα στους μαθητές να διερευνούν έννοιες, να ζητούν παραδείγματα και να αποσαφηνίζουν απορίες, με τρόπο ευέλικτο και διαδραστικό. Ωστόσο, και οι δύο τεχνικές απαιτούν παιδαγωγική καθοδήγηση, κριτική επίγνωση και δεοντολογική χρήση. Οι εκπαιδευτικοί καλούνται να διδάξουν στους μαθητές πώς να επιλέγουν αποτελεσματικές λέξεις-κλειδιά, πώς να αξιολογούν κριτικά τις πηγές και τις απαντήσεις, και πώς να διατυπώνουν ουσιαστικά και ακριβή prompts. Η ενσωμάτωση των τεχνικών αυτών στη διδακτική πράξη δεν αφορά απλώς την τεχνολογική καινοτομία, αλλά την καλλιέργεια ψηφιακού γραμματισμού, μεταγνωστικών δεξιοτήτων και υπεύθυνης μάθησης στον σύγχρονο ψηφιακό κόσμο.

Η ενσωμάτωση της τεχνολογίας στην τάξη είναι περίπλοκη και απαιτεί συνεχή προσαρμογή και υποστήριξη. Οι εκπαιδευτικοί πρέπει να είναι εξοπλισμένοι με την απαραίτητη εκπαίδευση και πόρους για την αποτελεσματική εφαρμογή αυτών των τεχνικών. Επιπλέον, η ταχεία εξέλιξη των εκπαιδευτικών τεχνολογιών απαιτεί συνεχή επαγγελματική ανάπτυξη για να συμβαδίζει με τις νέες μεθόδους και εργαλεία. Παρά τις προκλήσεις αυτές, ο αποφασιστικός ρόλος των εκπαιδευτικών στην αξιοποίηση των τεχνικών αναζήτησης και προτροπής παραμένει ακρογωνιαίος λίθος της αποτελεσματικής ψηφιακής παιδαγωγικής.

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ΘΠ14: Διδακτική Αξιοποίηση της Εκπαιδευτικής Ρομποτικής

Wedosave: FORGOTTENBABYSYNDROME ΡΟΜΠΟΤΙΚΟ ΣΥΣΤΗΜΑ ΠΡΟΣΤΑΣΙΑΣ ΤΗΣ ΖΩΗΣ ΑΠΟ ΤΟ ΣΥΝΔΡΟΜΟ ΞΕΧΑΣΜΕΝΟΥ ΠΑΙΔΙΟΥ.

Αυγουλάς Νικόλαος
Καθηγητής Πληροφορικής ΠΕ86
Υποδιευθυντής 11ου Δημοτικού Σχολείου Καλαμαριάς
e-mail: navgou11dim@gmail.com

ΠΕΡΙΛΗΨΗ

Το Wedosave:ForgottenBabySyndrome είναι μια ρομποτική εφαρμογή που κατασκευάστηκε και προγραμματίστηκε από τους μαθητές και μαθήτριες της Στ τάξη του 11ου Δημοτικού Σχολείου Καλαμαριάς που περιλαμβάνει κατάλληλους αυτοματισμούς για την πρόληψη περιστατικών του Συνδρόμου Ξεχασμένου Παιδιού.

Η χρονική διάρκεια εκπόνησης του συγκεκριμένου Project ήταν 6 εβδομάδες στις οποίες τα παιδιά ήρθαν σε επαφή με τον μικροελεγκτή MICROBIT και το περιβάλλον προγραμματισμού του, δούλεψαν σε ομάδες των τεσσάρων και ακολουθώντας στοχευμένες δραστηριότητες κατανόησης της λειτουργίας της συσκευής και των δυνατοτήτων της και ανακάλυψαν τις λειτουργίες που αυτό προσφέρει για την επίλυση του προβλήματος που τους δόθηκε.

Το Σύνδρομο Ξεχασμένου Παιδιού αφορά την περίπτωση που ο/η οδηγός αυτοκινήτου που συνοδεύει ανήλικο ειδικά σε βρεφική ηλικία, δύναται να ξεχάσει την παρουσία του παιδιού στην καμπίνα και να αποχωρήσει, αφήνοντας το σε επικίνδυνο για την υγεία του περιβάλλον, ιδίως τους καλοκαιρινούς μήνες.

Η ρομποτική διάταξη αποτελείται από αισθητήρες βάρους που προσαρμόζονται στο παιδικό καρεκλάκι και αισθητήρα για τη μέτρηση της θερμοκρασίας εντός του αυτοκινήτου. Ταυτόχρονα, υπάρχουν συσκευές ειδοποίησης του συνοδού όπως κινητό τηλέφωνο και smart watch, αλλά και ενεργοποίησης του συναγερμού του αυτοκινήτου ώστε το παιδί, με τη βοήθεια κάποιου περαστικού, να βγει από το αυτοκίνητο και να μεταφερθεί σε δροσερό περιβάλλον.

Τέλος, κατασκευάστηκε αυτόματος μηχανισμός για να ανοίγει το παράθυρο και να δροσίζεται το παιδί, μέχρι ο συνοδός ή κάποιος περαστικός να το απομακρύνει από τον κίνδυνο.
Όλες οι κατασκευές, όπως ο μηχανισμός παραθύρου, και οι συσκευές με τους αισθητήρες και τους προειδοποιητικούς μηχανισμούς, αποτελούνται από Microbit τα οποία επικοινωνούν μεταξύ τους με ραδιοκύματα.

Το Wedosave προσέφερε μαθησιακά οφέλη σε πολλαπλά επίπεδα, καθώς βασίστηκε

- στον επικοδομητισμό καθώς οι μαθητές/τριες κατέγραψαν, σχεδίασαν κατασκεύασαν και ανέλυσαν παραμέτρους της λύσης του προβλήματος ,
- την ομαδοσυνεργατική διδασκαλία χωριζόμενοι σε ομάδες των 3 και 4 ατόμων,
- τη διαθεματική προσέγγιση αφού οι μαθητές χρησιμοποίησαν τις γνώσεις τους από τη φυσική και τα ηλεκτρικά κυκλώματα αλλά και τη βιολογία και τους τρόπους με τους οποίους δροσίζεται το σώμα μας,
- τη μέθοδο project καθώς οι εργασία πέρασε από διαφορετικά στάδια (σχεδιασμός, ανάλυση, κατασκευή και παρουσίαση)
- την εξατομικευμένη μάθηση καθώς οι μαθητές/τριες μπορούσαν να επιλέξουν με ποιο κομμάτι της εργασίας θα ήθελαν να ασχοληθούν περισσότερο.

Λόγω της ιδιαίτερης απήχησης του Wedosave, εκτός από την παρουσίαση του στο Μαθητικό Συνέδριο Πληροφορικής της Περιφερειακής Δ/νσης Κεντρικής Μακεδονίας και στο Φεστιβάλ Μαθητικές Ρομποτικής του Πειραματικού Γυμνασίου Πανεπιστημίου Μακεδονίας και Φεστιβάλ Ρομποτικής Δ/νσης Β/θμιας Νομού Πέλλας, οι μαθητές είχαν την ευκαιρία να δώσουν συνεντεύξεις σε πλήθος Μέσων Μαζικής Επικοινωνίας αποκτώντας εμπειρία αλλά και αυτοπεποίθηση για τις προσπάθειές και τις δυνατότητές τους.

Λέξεις – κλειδιά: Σύνδρομο Ξεχασμένου Παιδιού, STEM, Microbit, ρομποτική, προγραμματισμός.

ΕΙΣΑΓΩΓΗ

Το φαινόμενο του Συνδρόμου Ξεχασμένου Παιδιού (Forgotten Baby Syndrome – FBS) αποτελεί μία δυνητικά θανατηφόρα κατάσταση, η οποία έχει απασχολήσει έντονα τόσο τη διεθνή επιστημονική κοινότητα όσο και την κοινωνία των πολιτών (Barrington, 2019). Στις Ηνωμένες Πολιτείες Αμερικής, κατά τις τελευταίες δύο δεκαετίες, έχουν καταγραφεί πάνω από 900 θάνατοι βρεφών και μικρών παιδιών που εγκαταλείφθηκαν από λάθος σε σταθμευμένα οχήματα, κυρίως κατά τη διάρκεια των θερινών μηνών, λόγω της ταχείας ανόδου της θερμοκρασίας στο εσωτερικό των αυτοκινήτων (Turner, 2018, Middleton, 2022).

Ερευνητικά δεδομένα καταδεικνύουν ότι ακόμη και σε ήπιες εξωτερικές θερμοκρασίες, της τάξεως των 25–30°C (McLaren et al., 2005), το εσωτερικό ενός αυτοκινήτου μπορεί να φτάσει τους 50°C μέσα σε 10 λεπτά, και σε λιγότερο από 30 λεπτά να προσεγγίσει ή και να ξεπεράσει τους 65°C (NHTSA, 2023), θέτοντας σε άμεσο κίνδυνο τη ζωή οποιουδήποτε παγιδευμένου οργανισμού. Η θερμοπληξία και η αφυδάτωση επέρχονται ραγδαία, ιδιαίτερα στα βρέφη, τα οποία έχουν περιορισμένη ικανότητα ρύθμισης της θερμοκρασίας του σώματός τους (Null, 2023).

Το πρόβλημα αυτό, παρότι συνδέεται κυρίως με ψυχολογικούς και κοινωνικούς παράγοντες –όπως η έλλειψη ύπνου, το άγχος, ή η μεταβολή της ρουτίνας του φροντιστή–, απαιτεί καινοτόμες τεχνολογικές παρεμβάσεις που να μπορούν να εντοπίζουν εγκαίρως τον κίνδυνο και να ενεργοποιούν μηχανισμούς ειδοποίησης και αποσόβησης του κινδύνου, πριν να είναι αργά.

Απαντώντας σε αυτή την ανάγκη, μαθητές και μαθήτριες της Στ΄ τάξης του 11ου Δημοτικού Σχολείου Καλαμαριάς ανέπτυξαν, στο πλαίσιο του μαθήματος Πληροφορικής, την ρομποτική κατασκευή "Wedosave: Forgotten Baby Syndrome". Η κατασκευή αυτή βασίζεται στη χρήση μικροελεγκτών τύπου Microbit και στοχεύει στην ανίχνευση της παρουσίας βρέφους ή μικρού παιδιού εντός του οχήματος, καθώς και στην αυτόματη ειδοποίηση του/της συνοδού και την ενεργοποίηση μηχανισμών ασφαλείας, όπως το άνοιγμα των παραθύρων για αερισμό.

Το έργο εντάσσεται σε ένα ευρύτερο παιδαγωγικό πλαίσιο, όπου η εκπαίδευση STEM (Science, Technology, Engineering, Mathematics) συνδυάζεται με την κοινωνική ευαισθητοποίηση και ενσωματώνει την παιδαγωγική βιωματική μάθηση (Karagounis, 2023; De Costa, 2025). Πράγματι, η εμπλοκή των μαθητών σε ένα πρόβλημα πραγματικής ζωής ενίσχυσε τη βιωματική τους μάθηση, προήγαγε την ενσυναίσθηση και καλλιέργησε τη δημιουργική και αναλυτική τους σκέψη. Μέσω της μεθόδου project και της ομαδοσυνεργατικής προσέγγισης, οι μαθητές ανέλαβαν ενεργό ρόλο στη διαμόρφωση της λύσης, βιώνοντας σε βάθος την έννοια της υπεύθυνης και κοινωνικά προσανατολισμένης καινοτομίας.

Εικόνα 1
Wedosave:ForgottenBabySyndrome 11ο ΔΣ Καλαμαριάς



Η χρήση τέτοιων προσομοιώσεων επιτρέπει στους μαθητές να σχεδιάζουν, κατασκευάζουν και αξιολογούν αποτελεσματικές λύσεις σε πραγματικά προβλήματα, ενισχύοντας παράλληλα δεξιότητες όπως η επίλυση προβλήματος, ο προγραμματιστικός σχεδιασμός, η καινοτομία και η τεχνολογική έκφραση (De Costa, 2025). Επιπλέον, η διδακτική αυτή πρακτική εντάσσεται στα πλαίσια της διαφοροποιημένης διδασκαλίας, προσφέροντας ευκαιρίες συμμετοχής σε μαθητές με διαφορετικά μαθησιακά προφίλ, μέσω ανάθεσης ρόλων (π.χ. προγραμματισμός, κατασκευή, παρουσίαση) που ανταποκρίνονται στα ενδιαφέροντα και τις δεξιότητές τους (De Costa, 2025). Τέλος, η ενσωμάτωση της εκπαιδευτικής ρομποτικής στην πρωτοβάθμια εκπαίδευση προάγει την ανάπτυξη υπολογιστικής σκέψης (computational

thinking) – κεντρικής δεξιότητας σύμφωνα με τα αναλυτικά προγράμματα STEM (Anastasopoulou, 2022, Karagounis, 2023) – και συνεισφέρει στην τεχνολογικό γραμματισμό.

Η παρούσα εργασία παρουσιάζει τη σύλληψη, τον σχεδιασμό και την υλοποίηση του Wedosave, αναδεικνύοντας τόσο τη λειτουργική του διάσταση όσο και την παιδαγωγική του αξία. Η υλοποίηση του έργου αποδεικνύει ότι ακόμη και οι μαθητές του δημοτικού μπορούν να συμμετέχουν σε ουσιαστικές δράσεις κοινωνικής τεχνολογίας, όταν υποστηρίζονται από κατάλληλα εκπαιδευτικά περιβάλλοντα και μεθοδολογίες.

Η ΚΑΤΑΣΚΕΥΗ

Η κατασκευή του ρομποτικού συστήματος Wedosave συνιστά μια ολοκληρωμένη τεχνολογική λύση που ενσωματώνει αισθητήρες και αυτοματισμούς με στόχο την προστασία των παιδιών από τις θανατηφόρες συνέπειες της θερμοπληξίας εντός σταθμευμένων οχημάτων. Οι μαθητές/τριες εργάστηκαν ομαδικά για την ανάπτυξη ενός δικτύου μικροελεγκτών τύπου Microbit, οι οποίοι επικοινωνούν μεταξύ τους ασύρματα μέσω ραδιοκυμάτων, επιτρέποντας την ανταλλαγή κρίσιμων πληροφοριών για την κατάσταση εντός του οχήματος (εικόνα 2).

Εικόνα 2
Το σύστημα Wedosave:FSB



Κεντρικό ρόλο στη λειτουργικότητα του συστήματος κατέχει ο αισθητήρας βάρους, ο οποίος εντοπίζει την παρουσία παιδιού στο παιδικό κάθισμα. Ο αισθητήρας αυτός σχεδιάστηκε από τους μαθητές με αυτοσχέδια υλικά, αναδεικνύοντας τη δημιουργικότητα και την εφαρμογή της γνώσης Φυσικής (κυρίως στα ηλεκτρικά κυκλώματα) που απέκτησαν στο σχολείο. Παράλληλα, ενσωματώθηκε αισθητήρας θερμοκρασίας για την παρακολούθηση της εσωτερικής θερμοκρασίας της καμπίνας του αυτοκινήτου.

Σε περίπτωση που διαπιστωθεί ταυτόχρονη ύπαρξη παιδιού και επικίνδυνης θερμοκρασίας, το σύστημα ενεργοποιεί τρεις μηχανισμούς ειδοποίησης και παρέμβασης: αποστολή ειδοποίησης στον/στη συνοδό μέσω φορητής συσκευής (π.χ. ρολόι ή κινητό), ηχητικό συναγερμό εντός του αυτοκινήτου, καθώς και ενεργοποίηση κινητήρα για το άνοιγμα παραθύρων με σκοπό τη μείωση της θερμοκρασίας. Ο σχεδιασμός αυτός προϋπέθετε τη χρήση κατάλληλων δομών επιλογής και επανάληψης και παραμετροποίησης μέσω μεταβλητών στον προγραμματισμό των Microbit.

Επιπλέον, για τη διευκόλυνση της παρουσίασης του έργου σε συνέδρια και φεστιβάλ ρομποτικής, οι μαθητές δημιούργησαν ένα πρόσθετο Microbit προσομοίωσης, το οποίο στέλνει εντολές επικίνδυνης ή ασφαλούς θερμοκρασίας προς το κύριο σύστημα, επιτρέποντας την επιτάχυνση της επίδειξης. Η κατασκευή αυτή αποδεικνύει την κατανόηση των μαθητών στην έννοια της προσομοίωσης, η οποία αποτελεί βασικό εργαλείο στην εκπαιδευτική ρομποτική και την ερευνητική μεθοδολογία STEM (Zeigler & Nutaro, 2016, Anastasopoulou, 2022).

Η όλη διαδικασία αποτέλεσε για τους μαθητές ένα πλαίσιο εφαρμοσμένης μάθησης, όπου η θεωρητική γνώση συνδέθηκε με τη δημιουργία ενός λειτουργικού προϊόντος. Η ενσωμάτωση της κατασκευής στο γνωστικό αντικείμενο της Πληροφορικής υπηρέτησε διδακτικούς στόχους που σχετίζονται με την επίλυση προβλήματος, τον προγραμματιστικό σχεδιασμό και την καινοτομία (Papert, 1980), ενώ ενίσχυσε τις δεξιότητες συνεργασίας, αναστοχασμού και τεχνολογικής έκφρασης των παιδιών.

ΔΙΔΑΚΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

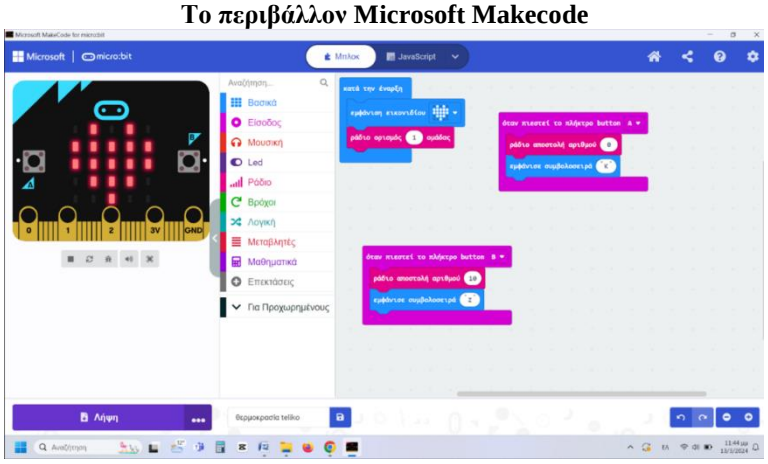
Η εκπαιδευτική αξιοποίηση της ρομποτικής κατασκευής Wedosave εντάσσεται στο πλαίσιο του μαθήματος της Πληροφορικής στην Στ΄ τάξη του Δημοτικού Σχολείου και σχετίζεται άμεσα με τις θεματικές ενότητες «Υλοποιώ Σχέδια

Έρευνας» και «Προγραμματίζω τον Υπολογιστή». Η εφαρμογή της εκπαιδευτικής ρομποτικής ως μέσο διδασκαλίας ενισχύει την εμπλοκή των μαθητών με το αντικείμενο μέσω βιωματικής και διερευνητικής μάθησης, όπως αυτή ορίζεται από τις σύγχρονες παιδαγωγικές προσεγγίσεις του STEM (Martín-Páez et al., 2019, Papadimitriou, 2020) και της μεθόδου project.

Η διδακτική πορεία ξεκίνησε ήδη από την Ε΄ τάξη, όπου οι μαθητές/τριες είχαν την ευκαιρία να γνωρίσουν βασικές δομές προγραμματισμού μέσω της δημιουργίας ψηφιακού παιχνιδιού στο περιβάλλον Scratch, διαδικασία κατά την οποία οι μαθητές/τριες γνώρισαν και χρησιμοποίησαν όλες τις βασικές δομές προγραμματισμού όπως η δομή επανάληψης και η δομή επιλογής αλλά και η δημιουργία και χρήση μεταβλητών. Κατά τη μετάβασή τους στη Στ΄ τάξη, μεταφέρθηκαν ομαλά σε πιο σύνθετες προγραμματιστικές απαιτήσεις, χρησιμοποιώντας το περιβάλλον Microsoft MakeCode, το οποίο προσφέρει οπτικό προγραμματισμό προσαρμοσμένο στο αναπτυξιακό επίπεδο των μαθητών του Δημοτικού.

Αρχικά, στα πρώτα εισαγωγικά μαθήματα πραγματοποιήθηκαν δραστηριότητες εξοικείωσης με το περιβάλλον προγραμματισμού και τις βασικές δυνατότητες του μικροελεγκτή microbit, όπως η μέτρηση και εμφάνιση θερμοκρασίας στην οθόνη LED. Προοδευτικά, προστέθηκαν συνθήκες ελέγχου που επιτρέπουν στο σύστημα να διακρίνει μεταξύ ασφαλών και επικίνδυνων θερμοκρασιών, στοιχείο που εμβαθύνει στην εννοιολογική κατανόηση των δομών επιλογής και μεταβλητών. Συγκεκριμένα, ζητήθηκε από τους μαθητές η μέτρηση της θερμοκρασίας από το ενσωματωμένο θερμόμετρο του microbit με απλή εμφάνιση της στην οθόνη του ενώ αργότερα προστέθηκε η λειτουργία εμφάνισης ανάλογου μηνύματος όταν η θερμοκρασία θεωρείται επικίνδυνη ή ασφαλής για τη ζωή (εικόνα 3).

Εικόνα 3
Το περιβάλλον Microsoft Makecode

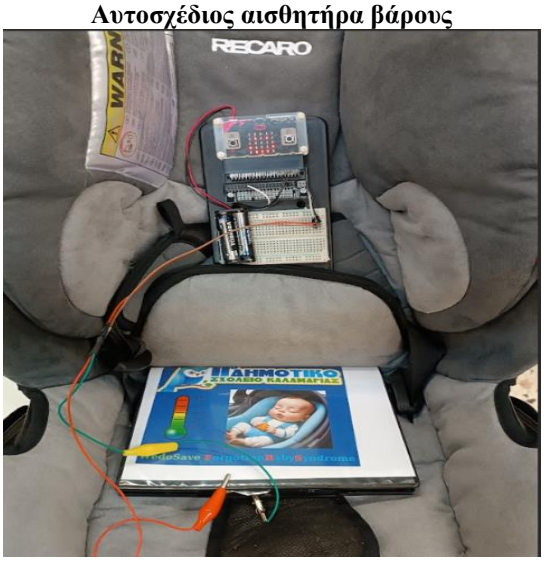


Σταδιακά, οι μαθητές/τριες προγραμμάτισαν τα microbit ώστε να αποστέλλουν μηνύματα μεταξύ τους για να ενεργοποιούνται τα προειδοποιητικά ηχητικά σήματα αλλά και ο κινητήρας, ο οποίος αναμένεται να ανοίξει το παράθυρο σε περίπτωση κινδύνου. Αυτό επιτυγχάνεται με τη δυνατότητα που έχουν τα microbit αφενός να στέλνουν κωδικοποιημένα ραδιοσήματα μεταξύ τους και αφετέρου με κατάλληλο προγραμματισμό, να ελέγχουν τις τιμές που μεταδόθηκαν και να προβαίνουν σε ανάλογες ενέργειες.

Βασικό κομμάτι της κατασκευής, είναι ο αισθητήρας βάρους που τοποθετείται στο καθισματάκι και ειδοποιεί τα συστήματα για την ύπαρξη ή όχι παιδιού στο αυτοκίνητο. Έχοντας τη δυνατότητα να προστεθούν στο microbit και επιπλέον αισθητήρες από τους ήδη ενσωματωμένους, αποφασίστηκε να χρησιμοποιηθούν οι γνώσεις των μαθητών/τριων στη Φυσική Ε' Δημοτικού και συγκεκριμένα στα ηλεκτρικά κυκλώματα. Ο αυτοσχέδιος αισθητήρας αποτελείται από μία θήκη DVD στην οποία προσαρμόστηκε μικρό ελατήριο για να το κρατάει ανοιχτό όταν δεν κάθεται το παιδί, ενώ στις άκρες του συνδέθηκαν καλώδια με ένα κομμάτι αλουμινόχαρτο που θα λειτουργεί ως καλός αγωγός του ηλεκτρισμού. Η άλλη άκρη των καλωδίων συνδέθηκε στους ακροδέκτες του microbit το οποίο τα τροφοδοτεί με ηλεκτρικό ρεύμα χαμηλής τάσης από τις μπαταρίες του δημιουργώντας έτσι ένα ηλεκτρικό κύκλωμα που μένει ανοιχτό όταν το παιδικό κάθισμα είναι κενό, ενώ κλείνει λόγω βάρους όταν το παιδί κάθεται. (εικόνα 4).

Η συνολική προσέγγιση επιβεβαιώνει ότι η ενσωμάτωση της εκπαιδευτικής ρομποτικής στην Πρωτοβάθμια Εκπαίδευση (Alimisis, 2013) μπορεί να αποτελέσει ισχυρό εργαλείο ανάπτυξης υπολογιστικής σκέψης, δημιουργικότητας και τεχνολογικού γραμματισμού, ενώ παράλληλα ενισχύει τη διαθεματικότητα και την ενεργή συμμετοχή όλων των μαθητών στη μαθησιακή διαδικασία.

Εικόνα 4
Αυτοσχέδιος αισθητήρα βάρους



ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ

Η ενότητα του προγραμματισμού αποτέλεσε το πιο δημιουργικό και απαιτητικό στάδιο του έργου Wedosave. Μέσα από τη διαχείριση πραγματικών συνθηκών, όπως η αυξημένη θερμοκρασία και η παρουσία παιδιού, οι μαθητές εφαρμόζουν έννοιες υπολογιστικής σκέψης (computational thinking), όπως παραμετροποίηση, λογική σύνδεση συνθηκών και ανάπτυξη αλγορίθμων (Chaudhary et al., 2016; Chevalier et al., 2021). Το σύστημα βασίζεται σε μια απλή αλλά αποτελεσματική κωδικοποίηση, όπου η θερμοκρασία αντιστοιχεί σε ακέραιες τιμές (π.χ. 1 = κρύο, 10 = ζέστη) και ο αισθητήρας βάρους σε 0 ή 1, επιτρέποντας την αξιολόγηση της κατάστασης και τη λήψη αποφάσεων μέσω δομών ελέγχου if-then-else (Chaudhary et al., 2016).

ΠΙΝΑΚΑΣ 1
Πίνακας τιμών και ενεργειών

ΘΕΡΜΟΚΡΑΣΙΑ	ΑΙΣΘΗΤΗΡΑΣ ΒΑΡΟΥΣ	ΕΝΕΡΓΕΙΑ
ΚΡΥΟ = 1	ΟΧΙ ΠΑΙΔΙ ΣΤΟ ΚΑΘΙΣΜΑ = 0	ΕΜΦΑΝΙΣΕ Χ ΠΑΡΑΘΥΡΟ ΚΛΕΙΣΤΟ
ΚΡΥΟ = 1	ΠΑΙΔΙ ΣΤΟ ΚΑΘΙΣΜΑ = 1	ΕΜΦΑΝΙΣΕ ☺ ΠΑΡΑΘΥΡΟ ΚΛΕΙΣΤΟ
ΖΕΣΤΗ = 10	ΟΧΙ ΠΑΙΔΙ ΣΤΟ ΚΑΘΙΣΜΑ = 0	ΕΜΦΑΝΙΣΕ Χ ΠΑΡΑΘΥΡΟ ΚΛΕΙΣΤΟ
ΖΕΣΤΗ = 10	ΠΑΙΔΙ ΣΤΟ ΚΑΘΙΣΜΑ = 1	ΕΜΦΑΝΙΣΕ ☹ ΠΑΡΑΘΥΡΟ ΑΝΟΙΧΤΟ

Το σύστημα αποτελείται από ένα κεντρικό microbit που ελέγχει θερμοκρασία και βάρος στο καρεκλάκι, δύο προειδοποιητικά microbit που λειτουργούν σαν σειρήνες (ένα στο αυτοκίνητο σαν συναγερμός και ένα σαν ρολόι που θα φοράει ο οδηγός) και ένα Microbit το οποίο διαθέτει κινητήρα που θα ανοίγει το παράθυρο του αυτοκινήτου. Τα τρία τελευταία εκτελούν παρόμοια προγράμματα ενώ το κεντρικό είναι πιο πολύπλοκο καθώς λαμβάνει μηνύματα από τους αισθητήρες, υπολογίζει και μεταδίδει αντίστοιχα μηνύματα στα υπόλοιπα Microbit (εικόνα 5).

Οι μαθητές/τριές εκπαιδεύτηκαν στην πλειοψηφία τους να προγραμματίζουν και τα τέσσερα microbit, εντούτοις υπήρξε πρόβλεψη σε περίπτωση μαθητών με ειδικές μαθησιακές ανάγκες να ασχοληθούν είτε με τον προγραμματισμό των microbit που λειτουργούν προειδοποιητικά είτε να ασχοληθούν με την κατασκευή του παραθύρου με τα εκπαιδευτικά τουβλάκια κατασκευών. (εικόνα 6,7)

Ο προγραμματισμός περιλαμβάνει δομές επιλογής και επανάληψης που διδάχθηκαν τόσο κατά την προηγούμενη σχολική χρονιά στην Ε΄ δημοτικού όσο και στις αρχικές ασκήσεις εξοικείωσης. Το περιβάλλον προγραμματισμού microbit είναι εύχρηστο και διασκεδαστικό για τους μαθητές καθώς περιλαμβάνει γραφικό εξομοιωτή microbit που δείχνει άμεσα τα αποτελέσματα των εντολών που του δόθηκαν και δίνει τη δυνατότητα μελέτης στο σχολείο αλλά και από το σπίτι χωρίς την προϋπόθεση αγοράς microbit.

Η χρήση οπτικού περιβάλλοντος προγραμματισμού, όπως το Microsoft MakeCode, συνοδεύεται από γραφικό εξομοιωτή, ενισχύοντας την άμεση ανατροφοδότηση και ενθαρρύνοντας την ανάλυση σφαλμάτων σε πραγματικό χρόνο

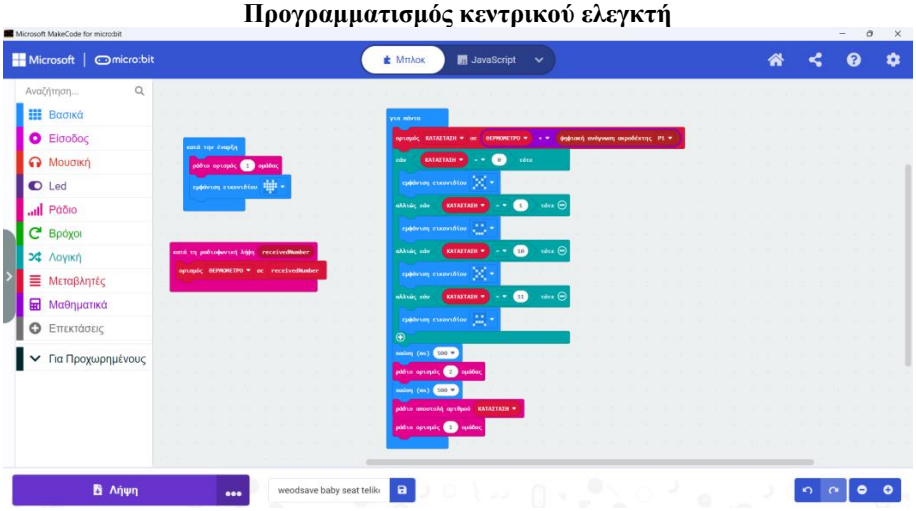
(Chevalier et al., 2021; Karagounis, 2023). Αυτό υποστηρίζει ταυτόχρονα την ανάπτυξη της υπολογιστικής σκέψης και της ακρίβειας στην εκτέλεση εντολών

Εικόνα 5
Αυτοσχέδιος αισθητήρα βάρους



Ειδικά, η εφαρμογή διερευνητικής εκπαίδευσης μέσω της ρομποτικής συνδέεται με την ενίσχυση ενδιαφέροντος , όπως καταγράφεται σε μελέτες, ακόμα και σε μαθητικό επίπεδο (Chaudhary et al., 2016).

Εικόνα 6
Προγραμματισμός κεντρικού ελεγκτή



Εικόνα 7
Κατασκευή για τον μηχανισμό παραθύρου



Ιδιαίτερη φροντίδα δόθηκε στη διαφοροποιημένη διδασκαλία, με ανάθεση ρόλων όπως «προγραμματιστής», «μηχανικός» ή «παρουσιαστής», εξασφαλίζοντας την ενεργό συμμετοχή και των μαθητών με μαθησιακές ιδιαιτερότητες (Tomlinson, 2014, Chevalier et al., 2021). Τέλος, η εμπλοκή τους σε πολυπαραγοντικές αλληλεπιδράσεις πραγματικού χρόνου ενίσχυσε την κατανόηση των σχέσεων μεταξύ εισόδου–επεξεργασίας–εξόδου, αποτελώντας λειτουργικό παράδειγμα υπολογιστικής σκέψης, όπως ορίζεται στα σύγχρονα STEM προγράμματα (Chevalier et al., 2021; Karagounis, 2023).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Το έργο Wedosave απέφερε ουσιαστικά μαθησιακά οφέλη σε πολλαπλά επίπεδα, εδραιωμένα σε σύγχρονες παιδαγωγικές προσεγγίσεις. Καταρχάς, στηρίχθηκε στις αρχές του εποικοδομητισμού, καθώς οι μαθητές και μαθήτριες είχαν την ευκαιρία να διατυπώσουν το πρόβλημα, να αναλύσουν τις κρίσιμες παραμέτρους του, να σχεδιάσουν και να υλοποιήσουν τις απαραίτητες ρομποτικές διατάξεις και, εν συνεχεία, να προγραμματίσουν και να αξιολογήσουν την αποτελεσματικότητα των λύσεων που πρότειναν. Παράλληλα, η μαθησιακή διαδικασία οργανώθηκε στη βάση της ομαδοσυγκεντρωτικής διδασκαλίας, με έντονη αλληλεπίδραση μεταξύ των μελών κάθε ομάδας, συνεργατική λήψη αποφάσεων και συστηματική παρουσίαση των αποτελεσμάτων στην ολομέλεια της τάξης.

Η εκπαιδευτική παρέμβαση ενσωμάτωσε στοιχεία διαθεματικής διδασκαλίας, αξιοποιώντας γνώσεις από τη Φυσική —κυρίως σε ό,τι αφορά τα ηλεκτρικά κυκλώματα— καθώς και από τη Βιολογία, όπως η κατανόηση της λειτουργίας της εφίδρωσης ως μηχανισμού θερμορύθμισης του ανθρώπινου οργανισμού. Παράλληλα, εφαρμόστηκαν αρχές εξατομικευμένης μάθησης, με σκοπό την ενεργό ένταξη όλων των μαθητών, συμπεριλαμβανομένων και εκείνων με ειδικές εκπαιδευτικές ανάγκες, οι οποίοι είχαν τη δυνατότητα να επιλέξουν το τμήμα της δραστηριότητας (κατασκευαστικό ή προγραμματιστικό) στο οποίο επιθυμούσαν να εμπλακούν. Η όλη διδακτική προσέγγιση βασίστηκε στη μεθοδολογία του project, η οποία περιλαμβάνει τον σχεδιασμό, την ανάλυση, την υλοποίηση και την παρουσίαση της εργασίας.

Η υλοποίηση ενός μαθητικού project με επίκεντρο την επίλυση αυθεντικών, κοινωνικά κρίσιμων προβλημάτων παρουσιάζει σημαντική εκπαιδευτική και κοινωνική προστιθέμενη αξία. Τέτοιου είδους εγχειρήματα γεφυρώνουν τη θεωρητική γνώση με την εφαρμογή της στην πράξη, ενισχύοντας τη βιωματική και ενεργό μάθηση, ενώ παράλληλα αναδεικνύουν τη χρηστικότητα της σχολικής γνώσης στη ζωή των μαθητών.

Πρωτίστως, τέτοιες παρεμβάσεις ενισχύουν την κριτική και δημιουργική σκέψη, καθιστώντας τους μαθητές ικανούς να αναλύουν πολύπλοκες καταστάσεις και να αναπτύσσουν λειτουργικές λύσεις, καλλιεργώντας πνεύμα καινοτομίας και πειραματισμού. Επιπλέον, ευνοούν την ανάπτυξη συνεργατικών δεξιοτήτων, με τους μαθητές να εργάζονται σε ομάδες, να διαμοιράζονται ρόλους και να αναλαμβάνουν ευθύνες, ενισχύοντας την επικοινωνία και την ομαδική συνέργεια.

Μία ακόμη καθοριστική παράμετρος αφορά την ανάπτυξη κοινωνικής ευαισθησίας. Οι μαθητές δεν εμπλέκονται απλώς με θεωρητικά σενάρια αλλά με πραγματικά προβλήματα που αφορούν την καθημερινότητα και την ευημερία της κοινότητας, όπως η ασφάλεια των παιδιών, η προστασία της ζωής και η χρήση της τεχνολογίας προς όφελος ευάλωτων κοινωνικών ομάδων. Έτσι, η εκπαιδευτική διαδικασία αποκτά πραγματιστική διάσταση και κοινωνικό αντίκτυπο, ενισχύοντας τη συνείδηση του ενεργού πολίτη.

Τέλος, η ενασχόληση με προβλήματα του πραγματικού κόσμου ενισχύει τη μαθησιακή κινητοποίηση και τη διάθεση για διερεύνηση. Οι μαθητές παρακινούνται να αναζητήσουν πληροφορίες, να πειραματιστούν με λύσεις και να αναστοχαστούν επάνω στα σφάλματα και τα αποτελέσματα των επιλογών τους, ενισχύοντας την ανθεκτικότητα και την ικανότητα διαχείρισης της αποτυχίας. Το project Wedosave, επομένως, δεν αποτέλεσε απλώς μια σχολική εργασία, αλλά μια ολοκληρωμένη εκπαιδευτική εμπειρία, η οποία συνέβαλε στη διαμόρφωση υπεύθυνων, δημιουργικών και κοινωνικά ευαισθητοποιημένων μαθητών, ικανών να ανταποκριθούν στις απαιτήσεις του σύγχρονου κόσμου.

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ΘΠ15: Παιχνιδοποίηση (Gamification) στην Εκπαίδευση

ΜΕΛΕΤΗ ΤΗΣ ΑΠΟΤΕΛΕΣΜΑΤΙΚΟΤΗΤΑΣ ΚΑΙΝΟΤΟΜΩΝ ΔΙΔΑΚΤΙΚΩΝ ΠΑΡΕΜΒΑΣΕΩΝ ΓΙΑ ΤΗ ΜΑΘΗΣΗ ΤΟΥ ΑΤΟΜΙΚΟΥ ΠΡΟΤΥΠΟΥ BOHR ΚΑΙ ΤΟΥ ΠΕΡΙΟΔΙΚΟΥ ΠΙΝΑΚΑ

Αδραμερινά Αικατερίνη
Υποψήφια διδακτόρισσα
Τμήμα Χημείας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: katerinaadra@gmail.com

Κουταλάς Βασίλης
Εργαστηριακό Διδακτικό Προσωπικό
Τμήμα Χημείας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: bkoutalas@chem.auth.gr

Χαριστός Νικόλαος
Επίκουρος Καθηγητής
Τμήμα Χημείας, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: nicharis@chem.auth.gr

ΠΕΡΙΛΗΨΗ

Θέματα όπως το Ατομικό Πρότυπο του Bohr και ο Περιοδικός Πίνακας, παραμένουν απαιτητικά στη διδασκαλία της Χημείας, με ιδιαίτερες δυσκολίες για τους μαθητές της Α' Λυκείου. Στο πλαίσιο αυτής της πρόκλησης, η παρούσα μελέτη διερευνά τον αντίκτυπο διαφορετικών στρατηγικών διδασκαλίας έναντι της παραδοσιακής τυπικής παράδοσης, αξιοποιώντας περιβάλλοντα ψηφιακής διάδρασης, επιτραπέζιου παιχνιδιού και χρήσης ρομποτικού συστήματος. Διερευνά πόσο συμβάλουν στην πραγματική κατανόηση του Ατομικού Προτύπου του Bohr και του Περιοδικού Πίνακα και αυξάνουν την ενεργό εμπλοκή των μαθητών. Ο σχεδιασμός και η διεξαγωγή της έρευνας αναπτύχθηκαν σε δύο φάσεις, ξεκινώντας με μια πιλοτική φάση για τη διόρθωση απαραίτητων αλλαγών και συνεχίζοντας με την κύρια φάση. Η ανάλυση των δεδομένων, τόσο ποσοτικών όσο και ποιοτικών, αποκαλύπτει ότι οι διδακτικές παρεμβάσεις που βασίζονται σε παιγνιώδεις προσεγγίσεις φαίνεται να ενισχύουν σημαντικά τόσο τη γνωστική απόδοση, όσο και την ενεργό συμμετοχή των μαθητών στη μαθησιακή διαδικασία, σε σύγκριση με την παραδοσιακή προσέγγιση, ενώ η ρομποτική παρέμβαση, αν και ελκυστική, δεν επιφέρει εξίσου υψηλές μαθησιακές αποδόσεις. Τα αποτελέσματα ενισχύουν την ανάγκη επαναπροσδιορισμού της διδασκαλίας της Χημείας με τη χρήση μοντέλων διδασκαλίας που να εκφράζουν μια πληθώρα στυλ μάθησης των εκάστοτε μαθητών. Η σύγκριση των εν λόγω παρεμβάσεων με την παραδοσιακή διδασκαλία αποκαλύπτει διαφορές στην επίδοση των μαθητών, προσφέροντας σημαντικά ερευνητικά συμπεράσματα για την αναμόρφωση της διδασκαλίας της Χημείας.

Λέξεις-κλειδιά: Χημεία, παιχνιδοποίηση, διδακτικές παρεμβάσεις, ψηφιακά μέσα, ρομποτική, Ατομικό Πρότυπο του Bohr.

ΕΙΣΑΓΩΓΗ

Η εκπαιδευτική πραγματικότητα του 21αιώνα, μέσα από την αλληλεπίδραση κοινωνικών, τεχνολογικών και παιδαγωγικών μετασχηματισμών, απαιτεί διδακτικές προσεγγίσεις που να μην στοχεύουν μόνο στη μεταφορά γνώσης αλλά και να επικεντρώνονται στην ενεργό συμμετοχή των μαθητών, στη βαθύτερη κατανόηση των γνώσεων και στην ενίσχυση της κριτικής σκέψης (Hoai et al., 2023). Στο πλαίσιο αυτό, η Χημεία αποτελεί ιδανικό πεδίο για την ανάπτυξη της επιστημονικής και αναλυτικής σκέψης. Οι σύγχρονες παιδαγωγικές μέθοδοι ενσωματώνουν τις αρχές της ενεργητικής και διερευνητικής μάθησης και μπορούν να βοηθήσουν τους μαθητές να χτίσουν ισχυρά θεμέλια γνώσεων.

Η μάθηση σύνθετων χημικών εννοιών, όπως το Ατομικό Πρότυπο του Bohr και ο Περιοδικός Πίνακας, ήδη από την Α' τάξη του Λυκείου, ενώ απαιτεί τη χρήση μεθόδων διδασκαλίας με ενεργή μάθηση, πολλοί εκπαιδευτικοί εξακολουθούν να χρησιμοποιούν παραδοσιακά μοντέλα διδασκαλίας (Musengimana et al., 2021). Οι έννοιες αυτές απαιτούν από τους μαθητές να κατανοήσουν μη ορατά φαινόμενα και να δομήσουν πολύπλοκες νοητικές αναπαραστάσεις. Παρά τις συστηματικές προσπάθειες των εκπαιδευτικών, οι παραδοσιακές μορφές διδασκαλίας αποδεικνύονται συχνά ανεπαρκείς στην επίτευξη βαθιάς κατανόησης, για αυτό και προτείνεται η χρήση ενός υβριδικού μοντέλου μάθησης, τυπικής παράδοσης και χρήσης εικονικών προσομοιώσεων και διαδραστικών οπτικοποιήσεων του μικρόκοσμου (Aldosari *et al.*, 2022 · Hoai *et al.*, 2023).

Η διεθνής βιβλιογραφία (Jani *et al.*, 2024· Ndabezitha & Gravett, 2024) υπογραμμίζει ότι δεν υφίσταται ένα «ιδανικό» διδακτικό μοντέλο που να ανταποκρίνεται στις ανάγκες όλων των μαθητών και όλων των εποχών. Κάθε παιδαγωγική προσέγγιση οφείλει να προσαρμόζεται δυναμικά στο εκάστοτε μαθησιακό πλαίσιο, λαμβάνοντας υπόψη το γνωστικό επίπεδο των μαθητών, τις κοινωνικές και πολιτισμικές παραμέτρους, αλλά και την τεχνολογική πρόοδο. Η εξέλιξη των διδακτικών παρεμβάσεων δείχνει την ανάγκη συνεχούς επαναπροσδιορισμού της σχέσης μεταξύ του εκπαιδευτικού, του μαθητή και της γνώσης, χωρίς φυσικά να αποκλείει τη διακριτική χρήση δασκαλοκεντρικών πρακτικών, όταν αυτές λειτουργούν υποστηρικτικά. Σίγουρα, υπάρχουν πολλά εμπόδια για να είναι η χρήση της κάθε διδακτικής προσέγγισης αποτελεσματική, όπως να μην έχει πλήρως κατανοήσει ο εκπαιδευτικός το διδακτικό μοντέλο που χρησιμοποιεί (Retnomurti *et al.*, 2024), οι ελλιπείς δεξιότητες (ψηφιακές και εκπαιδευτικές) των εκπαιδευτικών, οι χαμηλοί πόροι της σχολικής μονάδας και η μειωμένη διάθεση του διδακτικού προσωπικού να χρησιμοποιήσει κάποιο ενναλακτικό διδακτικό μοντέλο (Shah et al., 2024).

Νέες εκπαιδευτικές τεχνολογίες και καινοτόμα μοντέλα διδασκαλίας κερδίζουν έδαφος (Alsaedi, 2024). Διαφορετικά παιδαγωγικά σχήματα, όπως δραστηριότητες βασισμένες σε παιχνίδι, η χρήση διαδραστικών ψηφιακών μέσων και εφαρμογών ρομποτικής, συγκαταλέγονται στις σύγχρονες τεχνικές που δύναται να ενισχύσουν τη μαθησιακή συμμετοχή και εμπλοκή των μαθητών (Al-Hafdi & Alhalafawy, 2024· Zeybek & Saygı, 2024). Η παιχνιδοποίηση, είτε με τη μορφή επιτραπέζιων (T. C. Wang & Hung, 2024), είτε ψηφιακών δραστηριοτήτων, κινητοποιεί τους μαθητές μέσω της πρόκλησης του παιχνιδιού, δημιουργώντας μαθησιακά περιβάλλοντα υψηλής ελκυστικότητας και εμπλοκής (Badajos *et al.*, 2023 · Stojanovska, 2021). Τα ψηφιακά μέσα επιτρέπουν την εξατομίκευση της μάθησης και την άμεση ανατροφοδότηση (Lampropoulos & Kinshuk, 2024). Παράλληλα, τα ρομποτικά συστήματα, αν και περισσότερο γνωστά στον χώρο της Πληροφορικής και της Μηχανικής, αποκτούν σταδιακά εφαρμογή στις Φυσικές Επιστήμες, ενισχύοντας τη σύνδεση θεωρίας και πράξης, μέσω της σχεδίασης, της κατασκευής και του προγραμματισμού. Εύλογο είναι να απαιτείται περεταίρω έρευνα στο κατά πόσο βοηθάει η καθοδηγούμενη πρακτική με ενσωμάτωση των STEM (Science, Technology, Engineering and Mathematics) στα εκπαιδευτικά προγράμματα σπουδών (Jaipal-Jamani, 2023).

ΕΡΕΥΝΗΤΙΚΟΙ ΣΤΟΧΟΙ ΚΑΙ ΕΡΩΤΗΜΑΤΑ

Η παρούσα μελέτη επιδιώκει να διερευνήσει την εκπαιδευτική αξία τριών εναλλακτικών καινοτόμων προσεγγίσεων για την κατανόηση του Ατομικού Προτύπου του Bohr και του Περιοδικού Πίνακα έναντι της τυπικής παράδοσης. Οι διδακτικές παρεμβάσεις βασίζονται αντίστοιχα: (α) στη δημιουργία και χρήση ψηφιακού παιχνιδιού, (β) στη δημιουργία και εφαρμογή επιτραπέζιου παιχνιδιού και (γ) στην εκπαιδευτική αξιοποίηση ρομποτικού συστήματος EV3. Ο στόχος είναι να διερευνηθεί η επίδραση κάθε παρέμβασης στην ουσιαστική κατανόηση των επιστημονικών εννοιών από τους μαθητές, αλλά και στην κινητοποίηση, εμπλοκή και ικανοποίησή τους από τη μαθησιακή διαδικασία. Στο πλαίσιο αυτό, οι επιμέρους ερευνητικοί στόχοι διαμορφώνονται ως εξής:

- Να αξιολογηθεί η επίδραση τριών καινοτόμων παρεμβάσεων: ψηφιακού παιχνιδιού, επιτραπέζιου συνεργατικού παιχνιδιού και ρομποτικού συστήματος EV3 στη βελτίωση των επιδόσεων των μαθητών.
- Να συγκριθούν οι παραπάνω παρεμβάσεις με την παραδοσιακή διδασκαλία.
- Να εξαχθούν παιδαγωγικά συμπεράσματα και προτάσεις για τη δυνατότητα πρακτικής ενσωμάτωσης αυτών των προσεγγίσεων στη σχολική τάξη.

Με γνώμονα τους παραπάνω στόχους, η έρευνα διατυπώνει τα εξής ερευνητικά ερωτήματα:

1. Πόσο αυξάνεται η επίδοση των μαθητών μετά την εφαρμογή των τριών εναλλακτικών καινοτόμων διδακτικών παρεμβάσεων σε σύγκριση με την παραδοσιακή διδασκαλία;
2. Ποιες από τις παρεμβάσεις οδηγούν σε καλύτερα μαθησιακά αποτελέσματα;

Η απάντηση στα παραπάνω ερωτήματα στοχεύει να συμβάλει στην αναδιαμόρφωση των διδακτικών πρακτικών στο μάθημα της Χημείας και στη συστηματική ένταξη πολυτροπικών, ενεργητικών μοντέλων διδασκαλίας στην ελληνική εκπαιδευτική κοινότητα.

ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ ΔΙΕΞΑΓΩΓΗ ΤΗΣ ΕΡΕΥΝΑΣ

Η παρούσα μελέτη οργανώθηκε σε δύο διακριτές φάσεις: την πιλοτική εφαρμογή και την κύρια φάση της έρευνας. Ο σχεδιασμός βασίστηκε σε πρότυπα ποσοτικής εκπαιδευτικής έρευνας, με στόχο την αποτίμηση της αποτελεσματικότητας τριών καινοτόμων διδακτικών παρεμβάσεων σε σύγκριση με την παραδοσιακή διδασκαλία.

Πιλοτική Φάση

Η πιλοτική φάση υλοποιήθηκε κατά το σχολικό έτος 2023–2024 σε σχολική μονάδα της Αριδαίας, με τη συμμετοχή 127 μαθητών της Α’ Λυκείου, κατανεμημένων σε πέντε ομάδες των 22–26 ατόμων. Στόχος της φάσης αυτής ήταν η διερεύνηση και η αξιολόγηση της καταλληλόλητας του ερευνητικού σχεδίου και ο εντοπισμός πιθανών δυσκολιών στην εφαρμογή των παρεμβάσεων. Με βάση τα ευρήματα της πιλοτικής φάσης, έγιναν οι απαραίτητες βελτιώσεις, στο υλικό, στο σχεδιασμό και στις διαδικασίες της διεξαγωγής της έρευνας.

Κύρια Φάση

Η κύρια φάση της έρευνας διεξήχθη σε σχολική μονάδα της Θεσσαλονίκης κατά το σχολικό έτος 2024–2025, με τη συμμετοχή 93 μαθητών της Α’ Λυκείου, οι οποίοι κατανεμήθηκαν με τυχαίο τρόπο σε τέσσερις σχεδόν ισάριθμες ομάδες (22-24 ατόμων), σε καθεμία από τις οποίες διεξήχθη διαφορετική διδακτική παρέμβαση:

- *Ομάδα Ψηφιακής Παρέμβασης:* εφαρμόστηκε ψηφιακό παιχνίδι εμπλουτισμένο με επεξηγηματικό πολυμεσικό υλικό, συνδυαστικά με παρουσίαση θεωρίας μέσω ψηφιακών διαφανειών.
- *Ομάδα Επιτραπέζιου Παιχνιδιού:* συμμετείχε σε απτό συνεργατικό παιχνίδι εμπλουτισμένο με συνοδευτική παρουσίαση θεωρίας μέσω ψηφιακών διαφανειών.
- *Ομάδα Ρομποτικού Συστήματος:* υλοποίησε δραστηριότητα με τη χρήση ρομποτικού συστήματος EV3, συνδυαστικά με παρουσίαση θεωρίας μέσω ψηφιακών διαφανειών .
- *Ομάδα Ελέγχου:* παρακολούθησε τη διδασκαλία με παραδοσιακή τυπική προσέγγιση, σύμφωνα με το εγκεκριμένο σχολικό εγχειρίδιο εμπλουτισμένο με συνοδευτική παρουσίαση θεωρίας μέσω ψηφιακών διαφανειών.

Όλοι οι μαθητές είχαν προηγουμένως διδαχθεί την ενότητα του Ατομικού Προτύπου και του Περιοδικού Πίνακα από τον υπεύθυνο καθηγητή του σχολείου τους, περίπου 2–3 εβδομάδες πριν από την ερευνητική παρέμβαση, γεγονός που διασφάλισε ότι όλοι οι συμμετέχοντες είχαν κοινό γνωστικό υπόβαθρο. Η ερευνητική διαδικασία τηρήθηκε εντός του πλαισίου του ωρολογίου προγράμματος, χωρίς να διαταράσσεται η κανονικότητα του σχολικού περιβάλλοντος.

Η συνολική διάρκεια της ερευνητικής διαδικασίας για κάθε ομάδα ανήλθε σε 4–5 διδακτικές ώρες, κατανεμημένες ως εξής:

- 1 διδακτική ώρα: χορήγηση αρχικού ερωτηματολογίου και pre-test αξιολόγησης.
- 1–2 διδακτικές ώρες: εφαρμογή της αντίστοιχης διδακτικής παρέμβασης.
- 1 διδακτική ώρα: χορήγηση τελικού ερωτηματολογίου και post-test μετά την παρέμβαση (σε διάστημα 2–3 εβδομάδων από την έναρξη).

Εργαλεία της Έρευνας

- Τεστ αξιολόγησης των επιστημονικών εννοιών της ενότητας.
- Φύλλο ερωτήσεων απαντήσεων για το επιτραπέζιο παιχνίδι.
- Φύλλο ερωτήσεων απαντήσεων του ψηφιακού παιχνιδιού Bohr’s Model /Α’ Λυκείου (Α’ Επίπεδο).
- Φύλλο ερωτήσεων απαντήσεων με τη χρήση του EV3.

ΔΙΔΑΚΤΙΚΕΣ ΠΑΡΕΜΒΑΣΕΙΣ

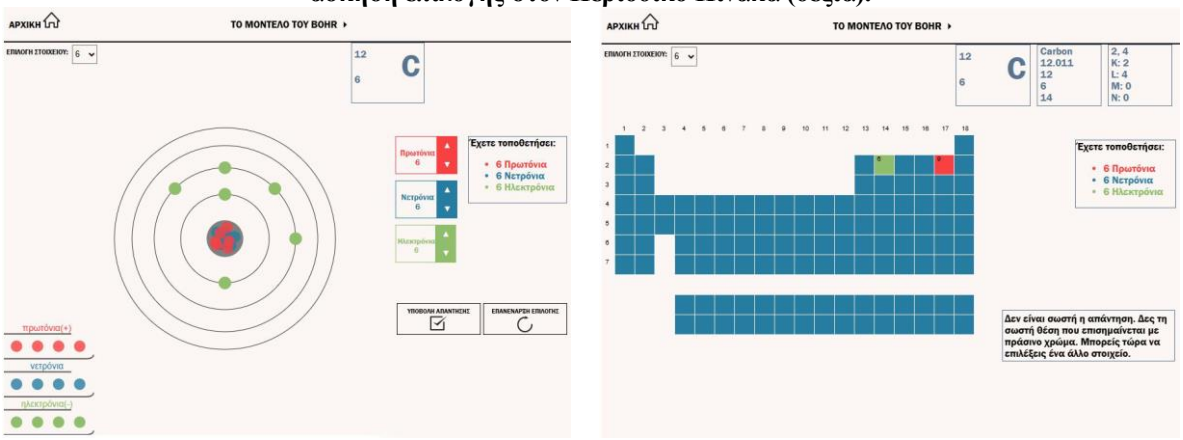
Η ερευνητική μελέτη περιλάμβανε την ανάπτυξη και τη χρήση τριών εναλλακτικών διδακτικών παρεμβάσεων με στόχο την εμβάθυνση των συμμετεχόντων στις έννοιες της Δομής του Ατόμου, με έμφαση στο Ατομικό Πρότυπο του Bohr και τη σχέση του με τον Περιοδικό Πίνακα. Κάθε παρέμβαση σχεδιάστηκε με βάση τις αρχές της ενεργητικής και εμπειρικής μάθησης, ενσωματώνοντας διαφορετικές τεχνολογίες και τεχνικές μάθησης. Οι παρεμβάσεις αναπτύχθηκαν και εφαρμόστηκαν με παιδαγωγική συνέπεια και ενιαίο διδακτικό στόχο, ώστε να καταστεί δυνατή η σύγκριση της αποτελεσματικότητάς τους. Αναλυτικότερα:

Παρέμβαση 1: Ψηφιακό Εκπαιδευτικό Παιχνίδι (Ομάδα 1)

Η παρέμβαση αξιοποίησε διαδραστικό εκπαιδευτικό λογισμικό με τίτλο Bohr's Model, το οποίο σχεδιάστηκε και αναπτύχθηκε ειδικά για τις ανάγκες της μελέτης (Εικόνα 1). Το ψηφιακό παιχνίδι περιλάμβανε ασκήσεις διαβαθμισμένης δυσκολίας, που επέτρεπαν στους μαθητές να δομούν επιλεγμένα ή τυχαία άτομα τοποθετώντας σωματίδια πρωτονίων, νετρονίων και ηλεκτρονίων σε κατάλληλες προκαθορισμένες ή επιτρεπτές περιοχές. Κατόπιν, οι μαθητές καλούνταν να εντοπίσουν τη θέση του στοιχείου στον Περιοδικό Πίνακα. Το λογισμικό προσέφερε άμεση ανατροφοδότηση με ταυτόχρονη ενθάρρυνση των παικτών για την προσπάθειά τους, δυνατότητα επαναληπτικής εξάσκησης και προοδευτική αύξηση του επιπέδου δυσκολίας.

Οι μαθητές εργάζονταν σε ομάδες των 2–3 ατόμων με χρήση σταθερών υπολογιστών και παράλληλα συμπλήρωναν συνεργατικά ανώνυμο φύλλο εργασίας, έχοντας τη δυνατότητα να χρησιμοποιήσουν το παιχνίδι. Η διάρκεια της παρέμβασης ήταν μία διδακτική ώρα, στην οποία υπήρξε και παρουσίαση της θεωρίας μέσω ψηφιακών διαφανειών.

Εικόνα 1
Απεικόνιση του εκπαιδευτικού λογισμικού «Bohr's Model». Η άσκηση δόμησης του ατόμου (αριστερά) και η άσκηση επιλογής στον Περιοδικό Πίνακα (δεξιά).



Παρέμβαση 2: Επιτραπέζιο Εκπαιδευτικό Παιχνίδι (Ομάδα 2)

Το επιτραπέζιο παιχνίδι είχε ως στόχο την ενεργό συμμετοχή των μαθητών μέσω συνεργασίας και υγιούς ανταγωνισμού (Εικόνα 2). Οι ομάδες (2–3 μαθητές) καλούνταν να απαντήσουν σε ερωτήσεις σχετικές με τη δομή των ατόμων και την αντιστοίχιση της θέσης τους στον Περιοδικό Πίνακα, ενώ παράλληλα συναγωνίζονταν για την ταχύτερη και ορθότερη επίλυση των ερωτήσεων. Το ταμπλό του παιχνιδιού απεικόνιζε το Ατομικό Πρότυπο του Bohr και τα φύλλα δραστηριότητας περιλάμβαναν ερωτήσεις κατανόησης και εννοιολογικής αποσαφήνισης. Οι μαθητές διατηρούσαν υψηλό επίπεδο εμπλοκής, καθώς προσπαθούσαν να απαντήσουν σωστά και να κατακτήσουν τον στόχο του παιχνιδιού, δηλαδή να είναι οι πρώτοι που απαντούσαν σωστά σε όλες τις ερωτήσεις που τους υποδείκνυε ο αριθμός των ζαριών. Μετά το τέλος της δραστηριότητας, συμπλήρωναν ατομικό ερωτηματολόγιο αξιολόγησης. Η διάρκεια της παρέμβασης ήταν μία διδακτική ώρα, στην αρχή της οποίας προηγήθηκε από παρουσίαση της θεωρίας μέσω ψηφιακών διαφανειών.

Εικόνα 2
Το ταμπλό και τα αντικείμενα του επιτραπέζιου εκπαιδευτικού παιχνιδιού (αριστερά) και στιγμιότυπο από τη διεξαγωγή του παιχνιδιού σε δύο ομάδες μαθητών (δεξιά)

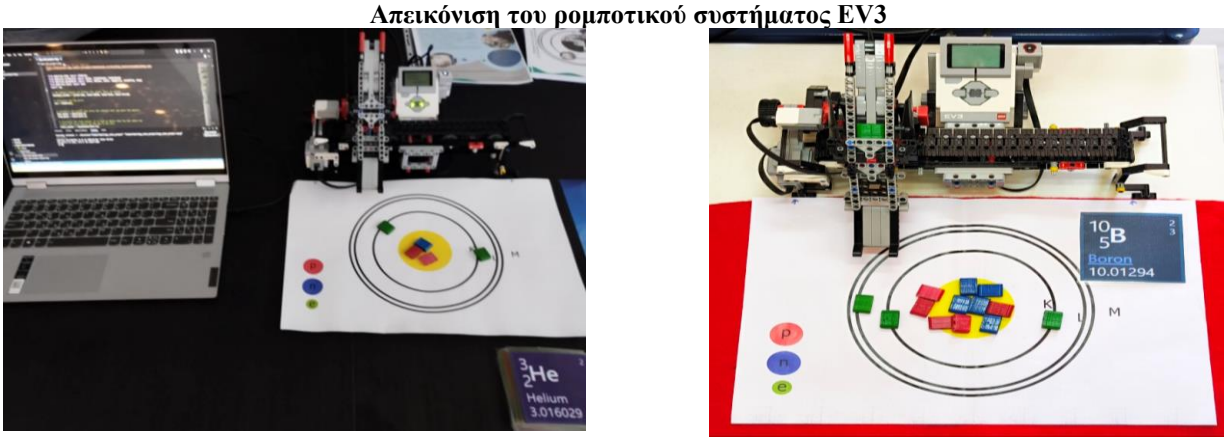


Παρέμβαση 3: Εκπαιδευτική Ρομποτική με EV3 (Ομάδα 3)

Η παρέμβαση βασίστηκε στη χρήση του ρομποτικού συστήματος LEGO Mindstorms EV3, συναρμολογημένο και προγραμματισμένο εκ των προτέρων ώστε να προσομοιώνει τον τρόπο δόμησης των ατόμων με υποατομικά σωματίδια (Εικόνα 3). Οι μαθητές, οργανωμένοι σε ομάδες των τεσσάρων, επέλεγαν τον αριθμό και το είδος των σωματιδίων ανά χρώμα (ηλεκτρόνια, πρωτόνια, νετρόνια) με βάση την κάρτα του εκάστοτε χημικού στοιχείου που λάμβαναν τυχαία από μια στοίβα καρτών-χημικών στοιχείων. Κατόπιν, παρατηρούσαν την κίνηση του ρομπότ που τοποθετούσε τα σωματίδια στο ταμπλό-μοντέλο του Bohr. Η προσομοίωση των σωματιδίων έγινε από χρωματιστά τουβλάκια (κόκκινα, μπλε και πράσινα), τα οποία είχαν σχεδιαστεί και εκτυπωθεί με εκτυπωτή 3D από τον εκπαιδευτικό - ερευνητή σε προηγούμενο χρόνο. Το κάθε τουβλάκι είχε ως εξόγκωμα τον αντίστοιχο συμβολισμό p, n, e στη γραφή του Braille.

Η διαδικασία παρείχε αυθεντικές ευκαιρίες βιωματικής μάθησης, καθώς οι μαθητές έλεγχαν την ακρίβεια της εκτέλεσης του ρομπότ και επιχειρηματολογούσαν σχετικά με την ορθότητα των αποτελεσμάτων. Τέλος, συμπλήρωσαν σχετικό φύλλο αξιολόγησης. Η συνολική διάρκεια της παρέμβασης ήταν δύο διδακτικές ώρες και περιείχε παρουσίαση της θεωρίας μέσω ψηφιακών διαφανειών.

Εικόνα 3
Απεικόνιση του ρομποτικού συστήματος EV3



Τυπική Διδασκαλία (Ομάδα Ελέγχου- Ομάδα 4)

Η διδασκαλία βασίστηκε στο εγκεκριμένο σχολικό εγχειρίδιο της Χημείας της Α΄ λυκείου, συνδυαστικά με ψηφιακή παρουσίαση των εννοιών και πραγματοποιήθηκε από τον ερευνητή-εκπαιδευτικό. Περιλάμβανε τη χρήση λευκού πίνακα, με στόχο την οπτικοποίηση μοντέλων και την καθοδηγούμενη επεξεργασία των εννοιών. Οι μαθητές συμμετείχαν σε συζήτηση, απαντούσαν σε ερωτήσεις και λύνανε ασκήσεις κατανόησης με την υποστήριξη του διδάσκοντος. Η παρέμβαση διήρκεσε συνολικά μία διδακτική ώρα.

ΚΡΙΤΗΡΙΑ ΣΥΜΜΕΤΟΧΗΣ ΚΑΙ ΗΘΙΚΕΣ ΔΙΑΣΦΑΛΙΣΕΙΣ

Η έρευνα σχεδιάστηκε και υλοποιήθηκε σύμφωνα με τις αρχές της επιστημονικής και εκπαιδευτικής δεοντολογίας, με στόχο την προστασία των δικαιωμάτων των συμμετεχόντων και την ενίσχυση της εγκυρότητας της διαδικασίας. Πριν από την υλοποίηση των παρεμβάσεων, πραγματοποιήθηκε λεπτομερής ενημέρωση των μαθητών και των γονέων/κηδεμόνων τους σχετικά με τους σκοπούς, τις μεθόδους, το περιεχόμενο και τη διάρκεια της έρευνας. Η συμμετοχή ήταν εθελοντική και πραγματοποιήθηκε μόνο κατόπιν υπογεγραμμένης συγκατάθεσης, διασφαλίζοντας τη συνειδητή και ενημερωμένη αποδοχή όλων των όρων. Τηρήθηκαν αυστηρά οι κανόνες προστασίας προσωπικών και ευαίσθητων δεδομένων, σύμφωνα με τον Γενικό Κανονισμό για την Προστασία Δεδομένων (GDPR), καθώς και οι αρχές ανωνυμίας και εμπιστευτικότητας που διέπουν την εκπαιδευτική έρευνα. Η συλλογή, διαχείριση και αποθήκευση των δεδομένων πραγματοποιήθηκε με τρόπο που αποτρέπει οποιονδήποτε συσχετισμό με την ταυτότητα των μαθητών.

Όσον αφορά τη σύνθεση του δείγματος, η επιλογή των συμμετεχόντων για την πιλοτική και την κύρια φάση βασίστηκε σε παιδαγωγικά τεκμηριωμένα κριτήρια. Ειδικότερα, δόθηκε έμφαση στο να εξαιρεθούν στην ανάλυση απαντήσεις συμμετεχόντων, οι οποίοι δεν απάντησαν στις ερωτήσεις των τεστ αξιολόγησης είτε λόγω ύπαρξης μη επαρκών επικοινωνιακών δεξιοτήτων στην ελληνική γλώσσα, ή στην απουσία διαπιστωμένων μαθησιακών δυσκολιών. Παρότι δεν κατέστη δυνατή η πλήρης ισοκατανομή ως προς το φύλο εξαιτίας λειτουργικών περιορισμών του σχολικού πλαισίου, σε όλες τις ομάδες ο εκπαιδευτικός της σχολικής κοινότητας είχε διδάξει τα συγκεκριμένα διδακτικά αντικείμενα πριν από την κάθε διδακτική παρέμβαση, ώστε να γίνει η προσπάθεια όλοι οι συμμετέχοντες να ξεκινήσουν από το ίδιο γνωστικό υπόβαθρο.

ΑΝΑΛΥΣΗ ΔΕΔΟΜΕΝΩΝ

Για την ποσοτική ανάλυση των δεδομένων χρησιμοποιήθηκε το στατιστικό πακέτο IBM SPSS Statistics (Version 29.0.1.0 (171)). Πραγματοποιήθηκε αρχικά περιγραφική ανάλυση των επιδόσεων στα pre-test και post-test, με σκοπό την αποτύπωση της γενικής εικόνας των μαθησιακών μεταβολών σε κάθε ομάδα. Υπολογίστηκαν βασικοί δείκτες όπως ο μέσος όρος (Μ.Ο.), η τυπική απόκλιση (Τ.Α.), καθώς και το εύρος τιμών.

Στη συνέχεια, για τη διερεύνηση στατιστικά σημαντικών διαφορών μεταξύ των τεσσάρων ομάδων, επιλέχθηκε ο μη παραμετρικός έλεγχος Kruskal–Wallis, καθώς δεν πληρούνταν οι προϋποθέσεις κανονικότητας για όλες τις ομάδες. Οι πολλαπλές συγκρίσεις πραγματοποιήθηκαν με post hoc ελέγχους πολλαπλών συγκρίσεων.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η επεξεργασία και ανάλυση των δεδομένων που συλλέχθηκαν μέσω των ερευνητικών εργαλείων πραγματοποιήθηκε με τη χρήση τόσο ποσοτικών όσο και ποιοτικών μεθόδων. Οι βασικοί άξονες της ανάλυσης περιλαμβάνουν τις επιδόσεις των μαθητών στα αρχικά και τελικά τεστ αξιολόγησης (pre-test και post-test).

Περιγραφική Στατιστική και Συγκριτική Ανάλυση

Αρχικά, διενεργήθηκε περιγραφική ανάλυση των επιδόσεων των μαθητών, με υπολογισμό βασικών στατιστικών δεικτών, όπως ο μέσος όρος και η τυπική απόκλιση για τα pre-test και post-test. Από το δείγμα αφαιρέθηκαν 5 άτομα, των οποίων οι απαντήσεις δεν καλύπταν τις προϋποθέσεις (τυχαίες ή μηδενικές απαντήσεις). Η συνολική εικόνα καταδεικνύει θετική μεταβολή των επιδόσεων, με μέσο όρο στο pre-test 26,24 μονάδες (SD = 18,82) και στο post-test 40,84 μονάδες (SD = 25,34). Η μέση βελτίωση ανήλθε σε 14,60 μονάδες (SD = 11,60), γεγονός που υποδηλώνει μια γενικευμένη αύξηση των γνωστικών επιδόσεων στο σύνολο του δείγματος. Τα περιγραφικά στατιστικά για τους μέσους όρους επίδοσης ανά παρέμβαση ήταν τα παρακάτω:

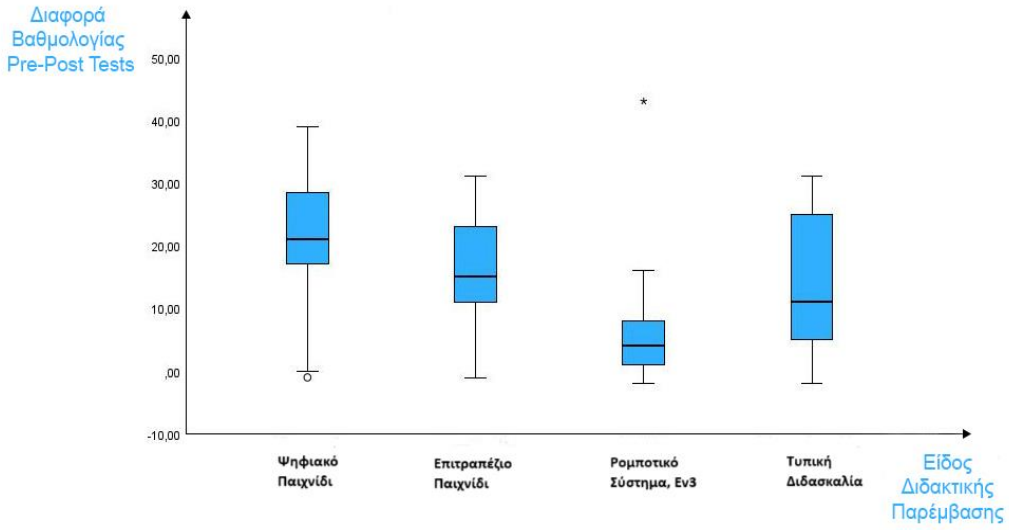
- Στο ψηφιακό παιχνίδι ο μέσος όρος βελτιώθηκε από 30,43 στο pre-test, σε 52,78 στο post-test.
- Στο επιτραπέζιο παιχνίδι ο μέσος όρος βελτιώθηκε από 42,24 στο pre-test, σε 58,52 στο post-test.
- Στο ρομποτικό σύστημα ο μέσος όρος βελτιώθηκε από 13,38 στο pre-test, σε 19,83 στο post-test.
- Στην τυπική παράδοση ο μέσος όρος βελτιώθηκε από 20,05 στο pre-test, σε 33,75 στο post-test.

Ο μη παραμετρικός έλεγχος Kruskal–Wallis που διενεργήθηκε, λόγω της μη κανονικότητας της κατανομής των δεδομένων και της ανισομερούς κατανομής του δείγματος, έδειξε στατιστικά σημαντικές διαφορές στις επιδόσεις των μαθητών μεταξύ των ομάδων ($\chi^2(3) = 24{,}701$, $p < .001$), επιβεβαιώνοντας ότι η διδακτική μέθοδος επηρέασε ουσιαστικά τα μαθησιακά αποτελέσματα. Η ανάλυση πολλαπλών συγκρίσεων (post hoc) ανέδειξε ότι οι ομάδες που συμμετείχαν σε ψηφιακή και επιτραπέζια παιχνιδοποίηση παρουσίασαν τη μεγαλύτερη βελτίωση, ενώ η ομάδα με ρομποτικό σύστημα κατέγραψε τη μικρότερη πρόοδο.

Πιο συγκεκριμένα η βελτίωση παρουσιάζεται ως εξής (Διάγραμμα 1):

- Η ψηφιακή παρέμβαση σημείωσε τη μεγαλύτερη μέση βελτίωση επιδόσεων (22,35 μονάδες).
- Ακολούθησε η επιτραπέζια παρέμβαση με μέση αύξηση 16,29 μονάδων.
- Η τυπική διδασκαλία σημείωσε βελτίωση 13,70 μονάδων.
- Η ρομποτική παρέμβαση είχε τη μικρότερη επίδοση (6,46 μονάδες).

Διάγραμμα 1
Θηκογράμματα βελτίωσης ανά παρέμβαση



Αν και η παρέμβαση με το ρομποτικό σύστημα προσέφερε ενδιαφέροντα στοιχεία βιωματικής μάθησης, ενδέχεται η χαμηλότερη αποτελεσματικότητά της να οφείλεται στον περιορισμένο διαθέσιμο χρόνο και στο ήδη συναρμολογημένο και προγραμματισμένο ρομποτικό σύστημα, δηλαδή στην μη ενεργό και εξατομικευμένη συμμετοχή των μαθητών ή ακόμα και στο αρχικό χαμηλό γνωστικό επίπεδο των συμμετεχόντων. Αυτές οι υποθέσεις απαιτούν περαιτέρω διερεύνηση σε μελλοντικές μελέτες.

ΣΥΖΗΤΗΣΗ

Τα ευρήματα της παρούσας μελέτης επιβεβαιώνουν την αποτελεσματικότητα των καινοτόμων διδακτικών παρεμβάσεων στην κατανόηση θεμελιωδών επιστημονικών εννοιών από μαθητές της Α' Λυκείου. Η αξιοσημείωτη βελτίωση των επιδόσεων στο post-test σε σύγκριση με το pre-test καταδεικνύει τη δυνατότητα των παιχνιδοποιημένων και ψηφιακών μεθόδων να ενισχύσουν ουσιαστικά τη γνωστική πρόοδο των μαθητών σε θέματα που με παραδοσιακό τρόπο διδασκαλίας ήταν δύσκολο να γίνουν κατανοητά από τους μαθητές.

Ειδικότερα, η παρέμβαση με το ψηφιακό παιχνίδι φάνηκε να λειτουργεί ενισχυτικά, αξιοποιώντας τη φιλική στάση των μαθητών προς τις νέες τεχνολογίες και προσφέροντας άμεση ανατροφοδότηση, εξατομικευμένη εμπλοκή και προσαρμογή στο γνωστικό τους επίπεδο. Η πλούσια διαδραστικότητα και η δυνατότητα διερεύνησης με εξατομικευμένο ρυθμό φαίνεται να διευκόλυναν την κατανόηση και την εμβάθυνση στις έννοιες του Ατομικού Προτύπου του Bohr και του Περιοδικού Πίνακα.

Αντίστοιχα, η παρέμβαση με το εκπαιδευτικό επιτραπέζιο παιχνίδι, παρότι λιγότερο τεχνολογικά προσαρμοσμένη, καλλιέργησε τη συνεργασία, την επικοινωνία μεταξύ των μαθητών και την ενεργό εμπλοκή τους σε μαθησιακές δραστηριότητες με απτικό και κοινωνικό χαρακτήρα. Η συνδυαστική επίδραση του ανταγωνιστικού και συνεργατικού πλαισίου φαίνεται να διατήρησε υψηλό το ενδιαφέρον και να ενίσχυσε την εμπέδωση των εννοιών μέσα από την αλληλεπίδραση και την ανατροφοδότηση μεταξύ συνομηλίκων.

Η παρέμβαση με τη χρήση του ρομποτικού συστήματος EV3, αν και παιδαγωγικά ενδιαφέρουσα και πρωτότυπη, παρουσίασε τη μικρότερη βελτίωση. Παρά το υψηλό επίπεδο τεχνολογικής καινοτομίας, φαίνεται ότι το περιορισμένο χρονικό πλαίσιο, η μειωμένη ενεργή συμμετοχή των μαθητών, το αυξημένο τεχνικό βάρος και η ανάγκη για προϋπάρχουσες δεξιότητες διαχείρισης του υλικού, λειτούργησαν ανασταλτικά. Οι μαθητές ενδέχεται να

επικεντρώθηκαν περισσότερο στον χειρισμό του ρομποτικού μέσου και λιγότερο στη σύνδεσή του με το γνωστικό αντικείμενο, γεγονός που καθιστά εμφανή την ανάγκη για καλύτερο διδακτικό σχεδιασμό και περισσότερο χρόνο αλληλεπίδρασης σε μελλοντικές εφαρμογές.

Η παρούσα μελέτη αποδεικνύει ότι η τεχνολογία δεν αποτελεί από μόνη της εγγύηση μαθησιακής επιτυχίας. Αντίθετα, η παιδαγωγική αξιοποίηση των ψηφιακών και φυσικών εργαλείων, ο προσεκτικός διδακτικός σχεδιασμός και η ευελιξία προσαρμογής στις ανάγκες των μαθητών, αναδεικνύονται ως κρίσιμοι παράγοντες για την επιτυχία των καινοτόμων μεθόδων.

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΤΑΣΕΙΣ

Η παρούσα έρευνα τονίζει τη δυναμική των παιχνιδοποιημένων και πολυτροπικών διδακτικών παρεμβάσεων στη βελτίωση της μαθησιακής εμπειρίας και των γνωστικών επιδόσεων στη Χημεία. Οι μέθοδοι που αξιοποιούν διαδραστικά ψηφιακά εργαλεία και ομαδοσυνεργατικές πρακτικές φαίνεται να προσφέρουν πολλαπλά οφέλη: γνωστικά, κοινωνικά και συναισθηματικά.

Η παρέμβαση με το επιτραπέζιο παιχνίδι, αν και τεχνολογικά λιγότερο προηγμένη, ενίσχυσε την ενεργή συμμετοχή, την αναστοχαστική συζήτηση και τη συνεργατική μάθηση. Από την άλλη, η ρομποτική εφαρμογή, παρότι παρέχει υψηλό επίπεδο κινητοποίησης και σύνδεσης με την τεχνολογία STEM, απαιτεί αναθεώρηση του διδακτικού χρόνου, περισσότερη εμπλοκή στη χρήση του ρομποτικού συστήματος, ώστε να είναι μεγαλύτερη η ενεργός συμμετοχή των μαθητών στη διαδικασία της μάθησης.

Με βάση τα συμπεράσματα της παρούσας έρευνας προτείνεται**:**

- Η συστηματική ένταξη παιχνιδοποιημένων και συνεργατικών μεθόδων στη διδασκαλία των Φυσικών Επιστημών.
- Η ενίσχυση της επιμόρφωσης των εκπαιδευτικών σε παιδαγωγικές πρακτικές που αξιοποιούν τεχνολογικά και απτικά μέσα.
- Η επέκταση της έρευνας σε διαφορετικά γνωστικά αντικείμενα της Χημείας σε όλες τις τάξεις.
- Η υιοθέτηση μακροπρόθεσμων ερευνητικών σχεδίων που να εξετάζουν την επίδραση αυτών των παρεμβάσεων.
- Η συνεργασία καθηγητών με διαφορετικά γνωστικά αντικείμενα, με στόχο την εύρεση ιδανικότερου τρόπου χρήσης του συγκεκριμένου ρομποτικού συστήματος, ώστε να επιτευχθεί η μάθηση των διαφόρων γνωστικών αντικειμένων.

Η συνολική αποτίμηση των αποτελεσμάτων αναδεικνύει την αναγκαιότητα μετάβασης από μονοδιάστατα δασκαλοκεντρικά μοντέλα διδασκαλίας σε μαθητοκεντρικές, εμπειρικές και πολυτροπικές προσεγγίσεις. Η ανάπτυξη ενός εκπαιδευτικού περιβάλλοντος, που προάγει τη δημιουργική και ενεργή συμμετοχή του μαθητή, συνιστά θεμέλιο για τη διαμόρφωση ενός ουσιαστικού, βιώσιμου και παιδαγωγικά σύγχρονου σχολείου.

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ΜΑΘΑΙΝΩ ΤΟΝ ΜΑΚΕΔΟΝΙΚΟ ΑΓΩΝΑ

Κικίδου Μαρία
Δ/ντρια Σχολικής Μονάδας, Εκπαιδευτικός Αγγλικής Γλώσσας,
Α/θμια Εκπ/ση Ν. Πέλλας,
MA Bilingual Translation,
Μεταπτυχιακό Δίπλωμα Επιστήμες της Αγωγής με Ν.Τ.
Έδεσσα, Ελλάδα
Email: mkikidou@yahoo.gr

Γκιούρος Φίλιππος
Δικηγόρος
Πρόεδρος Μουσείου Γέσιου ΑΜΚΕ
Έδεσσα, Ελλάδα
Email: contact@yessiosmuseum.com

ΠΕΡΙΛΗΨΗ

Ο σχεδιασμός, η εφαρμογή και η αξιολόγηση εκπαιδευτικών μουσειοπαιδαγωγικών προγραμμάτων αποτέλεσε προτεραιότητα για την αστική μη κερδοσκοπική εταιρία «Μουσείο Γέσιου - Ο Μακεδονικός Αγώνας και η Έδεσσα ΑΜΚΕ».

Συγκεκριμένα, -μέσα σε ένα πολυαισθητηριακό περιβάλλον –στις αίθουσες του Μουσείου- και Αδιαδραστικό εκπαιδευτικό πλαίσιο, που χρησιμοποιεί και αναδεικνύει την αξία των Ν.Τ. και των web2 εργαλείων-, επιχειρήθηκε η καλλιέργεια των πολιτισμικών δεξιοτήτων των μαθητών/τριών γυμνασίων και λυκείων στα περιεχόμενα και στα εκθέματα της συλλογής του μουσείου, στην τοπική ιστορία και στον πολιτισμό.

Ο σχεδιασμός του εκπαιδευτικού προγράμματος «Μαθαίνω τον Μακεδονικό Αγώνα», για μαθητές/τριες Γυμνασίων και Λυκείων (ηλικίας 13-17 ετών) βασίστηκε σε διάφορες μεθόδους, τεχνικές,προσεγγίσεις και περιβάλλοντα. Δόθηκε ιδιαίτερη έμφαση στις αρχές της παιχνιδοκεντρικής προσέγγισης (Domnus, 2010) και έτσι σχεδιάστηκε ένα εκπαιδευτικό, ψηφιακό δωμάτιο απόδρασης - escape room, ακολουθώντας τα τρία βασικά στάδια, σύμφωνα με τα χαρακτηριστικά της δραστηριοκεντρικής προσέγγισης–προστάδιο, κύριο στάδιο, μεταστάδιο- (Willis, 1996). Στο πρόγραμμα ενσωματώθηκαν εναλλακτικοί τρόποι αξιολόγησης καταγραφής συναισθημάτων των μαθητών/τριών που συμμετέχουν.

Λέξεις - κλειδιά: παιχνιδοκεντρική προσέγγιση, μουσειοπαιδαγωγικά προγράμματα, εκπαιδευτικά δωμάτια απόδρασης, educational escape rooms

ΕΙΣΑΓΩΓΗ

Τα τελευταία χρόνια παρατηρείται μια αυξανόμενη έμφαση στον κοινωνικό ρόλο των μουσείων, τα οποία μετασχηματίζονται από απλοί χώροι φύλαξης εκθεμάτων σε ζωντανούς κόμβους μάθησης και κοινωνικής αλληλεπίδρασης. Ιδιαίτερα η εκπαιδευτική διάσταση των μουσείων αναδεικνύεται ως κεντρικός άξονας της σύγχρονης μουσειοπαιδαγωγικής, η οποία επιδιώκει να ενεργοποιήσει τους επισκέπτες μέσα από βιωματικές, διαδραστικές και πολυαισθητηριακές προσεγγίσεις (Hein, 1998, Hooper-Greenhill, 2007).

Στο πλαίσιο αυτό, το Μουσείο Γέσιου – Ο Μακεδονικός Αγώνας και η Έδεσσα, ακολουθώντας τις επιταγές της σύγχρονης μουσειοπαιδαγωγικής επιστήμης, υιοθετεί μια επικοινωνιακή προσέγγιση με στόχο την αποτελεσματική προσέλκυση και ενεργό συμμετοχή του σχολικού κοινού (Stefanou, 2010· Nikonanou & Nakou, 2015). Μέσω της σχεδίασης και υλοποίησης καινοτόμων εκπαιδευτικών προγραμμάτων, το μουσείο ενισχύει τη σύνδεση της τοπικής ιστορίας με τις σύγχρονες μαθησιακές πρακτικές, ενθαρρύνοντας την κριτική σκέψη και τη συναισθηματική εμπλοκή των μαθητών/τριών.

ΤΟ ΜΟΥΣΕΙΟ ΓΕΣΙΟΥ – Ο ΜΑΚΕΔΟΝΙΚΟΣ ΑΓΩΝΑΣ ΚΑΙ Η ΕΔΕΣΣΑ

Το Μουσείο «Γέσιου – Ο Μακεδονικός Αγώνας και η Έδεσσα», το οποίο ιδρύθηκε το 2024 με πρωτοβουλία του Χρήστου Γέσιου, συνιστά έναν σημαντικό τόπο συλλογικής μνήμης, αφιερωμένο στην ανάδειξη και διατήρηση της ιστορικής παρακαταθήκης του Μακεδονικού Αγώνα (1904–1908). Μέσα από τρεις διακριτές θεματικές ενότητες, η έκθεση επιδιώκει να προσφέρει μια πολύπλευρη και βιωματική παρουσίαση της ιστορικής διαδρομής που οδήγησε στην ενσωμάτωση της Μακεδονίας στον εθνικό κορμό.

Εικόνα 1
Το Μουσείο Γέσσιου



Η πρώτη ενότητα αποτελεί έναν ιστορικό άξονα αφήγησης που ξεκινά από την Ελληνική Επανάσταση του 1821 και εκτείνεται έως την εγκατάσταση των προσφύγων μετά τη Μικρασιατική Καταστροφή. Το χρονολόγιο αναδεικνύει κρίσιμους σταθμούς και μεταβατικές φάσεις της ιστορικής πορείας του ελληνισμού στη Μακεδονία, ενισχύοντας την κατανόηση των μακροϊστορικών συνθηκών που οδήγησαν στον Μακεδονικό Αγώνα.

Η δεύτερη ενότητα εστιάζει στην ένοπλη φάση του Αγώνα, την περίοδο 1904–1908, φωτίζοντας τη δράση των «αόρατων» αγωνιστών που έδρασαν υπό εξαιρετικά δύσκολες και επικίνδυνες συνθήκες στα βαλτώδη μέρη της περιοχής.

Η προσέγγιση αυτή αποδίδει έμφαση όχι μόνο στα στρατιωτικά γεγονότα, αλλά και στην ανθρώπινη διάσταση του Αγώνα, αναδεικνύοντας τις θυσίες και την ανιδιοτελή προσφορά εκείνων που έδρασαν στον Μακεδονικό Αγώνα.

Η τρίτη ενότητα επικεντρώνεται στον τοπικό πληθυσμό και ειδικότερα στους Εδεσσαίους, αναδεικνύοντας τον καθοριστικό ρόλο της πόλης της Έδεσσας και των κατοίκων της. Μέσα από προσωπικές αφηγήσεις, προφορικές μαρτυρίες και τεκμήρια, η ενότητα συνθέτει μια πολυφωνική εικόνα της συμμετοχής της τοπικής κοινωνίας στον Αγώνα, φέρνοντας στο προσκήνιο τις μικρές, αλλά καθοριστικές πράξεις προσφοράς.

ΤΑ ΕΚΠΑΙΔΕΥΤΙΚΑ ΠΡΟΓΡΑΜΜΑΤΑ – ΣΚΟΠΟΣ – ΜΕΘΟΔΟΛΟΓΙΑ

Το Μουσείο «Γέσιου – Ο Μακεδονικός Αγώνας και η Έδεσσα», αναγνωρίζοντας τον πολιτισμικό και εκπαιδευτικό του ρόλο, αξιοποιεί τη μουσειακή εμπειρία ως εργαλείο μεταφοράς ιστορικών γνώσεων και καλλιέργειας κριτικής ιστορικής συνείδησης. Μέσα από τη διαρκή αλληλεπίδραση με την τοπική κοινωνία και ειδικότερα με τη μαθητική κοινότητα, το μουσείο επιδιώκει την ανάπτυξη εκπαιδευτικών δράσεων, βασισμένων στη συνεργασία με ειδικούς επιστήμονες και εκπαιδευτικούς, σε εθελοντική βάση, για τον σχεδιασμό και την εφαρμογή παιδαγωγικών παρεμβάσεων. Τα προγράμματα οργανώθηκαν ηλικιακά, λαμβάνοντας υπόψη τις γνωστικές και συναισθηματικές ανάγκες των παιδιών, και εστιάζουν στην αξιοποίηση της ιστορικής αφήγησης και των μουσειακών αντικειμένων ως αφηγηματικών και παιδαγωγικών εργαλείων. Στόχος είναι η ενίσχυση της σχέσης των μαθητών με την τοπική ιστορία και η ανάδειξη της σημασίας του Μακεδονικού Αγώνα στην ιστορική ένταξη της Μακεδονίας στον εθνικό κορμό. Παράλληλα, δίνεται έμφαση στη μελέτη της συμβολής της Έδεσσας και των αποκαλούμενων Αόρατων Αγωνιστών στην επιτυχή έκβαση του Αγώνα, προσφέροντας ένα παράδειγμα ηρωισμού και τοπικής συλλογικής δράσης, που λειτουργεί παιδαγωγικά (Kasvikis et al., 2020· Nikonanou, 2015).

Τα εκπαιδευτικά προγράμματα εντάσσονται σε μια γενικότερη επιδίωξη προώθησης της τοπικής ιστορίας στην εκπαιδευτική κοινότητα, με τρόπο ενεργητικό και συμμετοχικό. Έχουν ως στόχο να κινητοποιήσουν τους εκπαιδευτικούς ως διαμεσολαβητές γνώσης και τους μαθητές ως ενεργούς ερευνητές, ενισχύοντας τις διαδικασίες της διερεύνησης, της παρατήρησης, της βιωματικής εμπειρίας και της σύνδεσης των νέων γνώσεων με τις προσωπικές εμπειρίες των συμμετεχόντων. Η παιδαγωγική προσέγγιση βασίζεται σε αρχές που ενθαρρύνουν την αυτενέργεια και την καλλιέργεια της ιστορικής ενσυναίσθησης (Fourliga et al; Nikonanou & Nakou, 2002).

ΣΧΕΔΙΑΣΜΟΣ – ΜΕΘΟΔΟΛΟΓΙΑ – ΥΛΟΠΟΙΗΣΗ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΠΡΟΓΡΑΜΜΑΤΩΝ

Ο σχεδιασμός των προγραμμάτων στηρίχθηκε στις εξής θεωρητικές και μεθοδολογικές προσεγγίσεις:

- τη μουσειακή μάθηση, ως διαδικασία μάθησης με αυθεντικά αντικείμενα και χωρικά συμφραζόμενα,
- τη βιωματική προσέγγιση, που δίνει έμφαση στην εμπειρία και τη συναισθηματική εμπλοκή,
- τη θεματοκεντρική προσέγγιση, που οργανώνει τη γνώση με βάση θεματικούς άξονες,
- τη χρήση παιγνιωδών στοιχείων και μεθοδολογιών (εκπαιδευτική παιχνιδοποίηση, game based learning),
- την εφαρμογή εκπαιδευτικών δωματίων απόδρασης (educational escape rooms) με τη χρήση web2 εργαλείων, όπως το Genially –στο οποίο ενσωματώθηκε επιπλέον αυθεντικό υλικό, εκπαιδευτικά εργαλεία και πλατφόρμες (learning apps, google forms, padlet, κλπ.) ακολουθώντας έτσι και τις αρχές των Τεχνολογιών Πληροφορίας και Επικοινωνιών (ΤΠΕ) στον εκπαιδευτικό σχεδιασμό,
- την πολιτισμική αγωγή ως εφαλτήριο για την ανάπτυξη ιστορικής, κοινωνικής και αισθητικής κατανόησης και συνείδησης.

Ως προς τους μαθησιακούς στόχους του συγκεκριμένου προγράμματος, οι συμμετέχοντες μαθητές και μαθήτριες αναμένεται:

- να αποκτήσουν ιστορική γνώση για τον Μακεδονικό Αγώνα και την καθημερινότητα των Εδεσσαίων της εποχής,
- να αναπτύξουν αυξημένο ενδιαφέρον για την τοπική ιστορία και τη μουσειακή εμπειρία,
- να συμμετάσχουν ενεργά μέσω διαδραστικών, δημιουργικών και παιγνιωδών δραστηριοτήτων,
- να συνεργαστούν και να αλληλεπιδράσουν ομαδικά, ενισχύοντας την κοινωνική μάθηση,
- και τέλος, να δημιουργήσουν θετική συναισθηματική σύνδεση με τον χώρο του μουσείου και να βιώσουν τη μάθηση ως προσωπική και συλλογική εμπειρία.

ΤΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΠΡΟΓΡΑΜΜΑ

Διαρκεια: 90 λεπτά
Μέγιστος αριθμός: 27 μαθητές/ τριες Β/θμιας Εκπ/σης

«Μαθαίνω τον Μακεδονικό Αγώνα» για μαθητές/ τριες Γυμνασίων και Λυκείων (ηλικίας 13-17 ετών)

Η κινητροδότηση των μαθητών/ τριών Γυμνασίων και Λυκείων επιχειρείται με το εκπαιδευτικό πρόγραμμα «Μαθαίνω τον Μακεδονικό Αγώνα»! Μία μοναδική εμπειρία βιώνουν οι μαθητές/ τριες Γυμνασίων και Λυκείων που παρακολουθούν το συγκεκριμένο εκπαιδευτικό πρόγραμμα, καθώς ο σχεδιασμός του βασίστηκε στις ιδιαίτερες ηλικιακές ανάγκες τους. Χρησιμοποιώντας τις Νέες Τεχνολογίες, σε μικρές ομάδες (ομαδοσυνεργατική), σε tablet, μαθαίνουν για τον Μακεδονικό Αγώνα. Προσπαθούν να λύσουν γρίφους και να απαντήσουν σε κουίζ που υπάρχουν ενσωματωμένα σε ψηφιακό, εκπαιδευτικό δωμάτιο απόδρασης (escape room) ακολουθώντας τις αρχές της εκπαιδευτικής παιχνιδοποίησης και τέλος αξιοποιούν τον χρόνο τους στο μουσείο ευχάριστα, βγάζοντας τις δικές τους φωτογραφίες σε ειδικά διαμορφωμένο stand Μακεδονομάχου. Ο σχεδιασμός του προγράμματος ακολουθεί τα τρία βασικά στάδια, σύμφωνα με τα χαρακτηριστικά της δραστηριοκεντρικής προσέγγισης –προστάδιο, κύριο στάδιο, μεταστάδιο- (Willis, 1996)

Εικόνα 2
Στιγμιότυπο από δωμάτιο απόδρασης



ΣΥΜΠΕΡΑΣΜΑΤΑ – ΑΠΟΤΕΛΕΣΜΑΤΑ

Στο πλαίσιο του κοινωνικού και διαμεσολαβητικού του ρόλου, το Μουσείο «Γέσιου – Ο Μακεδονικός Αγώνας και η Έδεσσα» ανέπτυξε ένα δυναμικό μοντέλο μουσειοπαιδαγωγικής παρέμβασης, με έμφαση στην εισαγωγή καινοτόμων, πολυτροπικών και βιωματικών προσεγγίσεων. Η εκπαιδευτική του δράση δεν περιορίστηκε στην παθητική μετάδοση ιστορικής πληροφορίας, αλλά σχεδιάστηκε ολιστικά, ενσωματώνοντας στοιχεία ενεργητικής μάθησης, συναισθηματικής εμπλοκής και κοινωνικογνωστικής αλληλεπίδρασης, σύμφωνα με τις αρχές της κονστρουκτιβιστικής μάθησης σε μουσειακά περιβάλλοντα (Hein, 1998).

Εικόνα 3
Εφαρμογή του προγράμματος



Ο σχεδιασμός των εκπαιδευτικών προγραμμάτων οργανώθηκε με βάση τη διαθεματικότητα, την ηλικιακή καταλληλότητα και τη σύνδεση της γνώσης με τις εμπειρίες των μαθητών. Ιδιαίτερη μέριμνα δόθηκε στο μεταγνωστικό στάδιο της εκπαιδευτικής διαδικασίας, με την ενσωμάτωση εναλλακτικών μεθόδων αξιολόγησης, όπως η ανάλυση συναισθηματικών αποκρίσεων, η χρήση ψηφιακού πίνακα ανακοινώσεων (padlet), ερωτηματολογίων στάσεων, καθώς και η συμπλήρωση ερωτηματολογίου google forms.

Αυτό το παιδαγωγικό πλαίσιο ενισχύει την ανατροφοδότηση (feedback) σε πολλαπλά επίπεδα: τόσο από τους μαθητές προς τον εκπαιδευτικό και το μουσείο. Παράλληλα, η διαδικασία αυτή συμβάλλει στη συνεχή βελτίωση του περιεχομένου και της προσέγγισης των προγραμμάτων, μετατρέποντας τη μουσειακή εμπειρία σε δυναμικό πεδίο αναστοχασμού και παιδαγωγικής καινοτομίας.

Συνολικά, η μουσειοπαιδαγωγική φιλοσοφία και μάθηση που διέπει τη λειτουργία του Μουσείου Γένσιου προτάσσει μια πολιτειοκεντρική προσέγγιση της ιστορίας, όπου η τοπική μνήμη μετασχηματίζεται σε ενεργή γνώση και πολιτισμική κατανόηση. Η προσέγγιση αυτή εναρμονίζεται με τις σύγχρονες θεωρίες μουσειακής μάθησης, δίνοντας έμφαση στην εμπειρία, στη βιωματική μάθηση και στη διάδραση, στην εμπλοκή.

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ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ ΑΝΑΠΤΥΞΗ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΕΦΑΡΜΟΓΗΣ ΕΙΚΟΝΙΚΗΣ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑΣ ΓΙΑ ΤΗΝ ΔΙΔΑΣΚΑΛΙΑ ΤΟΥ ΚΑΛΛΙΤΕΧΝΙΚΟΥ ΚΙΝΗΜΑΤΟΣ "DE STIJL"

Ναζλίδου Ιωάννα
Υποψήφια διδάκτορας
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: ionnaz@gmail.com

Ευκολίδης Νικόλαος
Αναπληρωτής Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: nefkolidis@uowm.gr

Καλαμακίδου Ιωάννα
Φοιτήτρια
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: joannakalam@gmail.com

Κυράτσης Παναγιώτης
Καθηγητής
Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, Πανεπιστήμιο Δυτικής Μακεδονίας
Κοίλα Κοζάνη, 50100, Ελλάδα
e-mail: pkyratsis@uowm.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη περίπτωσης αποτελεί κομμάτι ενός ευρύτερου ερευνητικού έργου του Πανεπιστημίου Δυτικής Μακεδονίας που αφορά τον συνδυασμό καινοτόμων τεχνολογικών εργαλείων και εκπαιδευτικών μεθόδων με σκοπό τη βελτίωση των μαθησιακών αποτελεσμάτων και την ενίσχυση της διαδικασίας μάθησης.

Η έρευνα πραγματοποιήθηκε στο Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων και αφορά τον σχεδιασμό και ανάπτυξη μιας ψηφιακής εφαρμογής σε περιβάλλον εικονικής πραγματικότητας που έχει ως στόχο να αποτελέσει ένα βοηθητικό εργαλείο εκπαίδευσης για τη διδασκαλία εικαστικών και καλλιτεχνικών κινημάτων. Η προτεινόμενη εφαρμογή εισάγει την τεχνολογία εικονικής πραγματικότητας για την εκπαίδευση φοιτητών του τμήματος πάνω στο καλλιτεχνικό κίνημα του De Stijl. Η εκπαιδευτική διαδικασία ενισχύεται αξιοποιώντας στρατηγικές μάθησης που βασίζονται στο παιχνίδι εξυπηρετώντας συγκεκριμένους εκπαιδευτικούς στόχους. Η τελική μορφή της εφαρμογής προσομοιάζει με ένα παιχνίδι εικονικής πραγματικότητας που βασίζεται στη λογική ανάπτυξης ψηφιακών εκπαιδευτικών δωματίων διαφυγής. Το εκπαιδευτικό αντικείμενο ενσωματώνεται αρμονικά στο συνολικό σχεδιασμό της εφαρμογής, μέσα από τη δημιουργία ειδικά σχεδιασμένων γρίφων όπου οι χρήστες καλούνται να επιλύσουν. Τελικός στόχος είναι μέσω της αλληλεπίδρασης με αντικείμενα του εικονικού περιβάλλοντος, οι φοιτητές να γνωρίσουν και να κατανοήσουν καλύτερα βασικά ιστορικά στοιχεία, αισθητικά κριτήρια και τις κύριες σχεδιαστικές αρχές του καλλιτεχνικού κινήματος.

Η εφαρμογή σχεδιάστηκε σύμφωνα με ένα μεθοδολογικό πλαίσιο που υιοθετεί στοιχεία από την σχεδιαστική σκέψη και δημιουργική διαδικασία για την ανάπτυξη νέων προϊόντων, έχοντας ως άξονες σχεδιασμού τις δυνατότητες χρήσης της τεχνολογίας εικονικής πραγματικότητας και την αξιοποίηση της παιχνιδοποίησης ως βασική μέθοδο μάθησης.

Η δοκιμή της εφαρμογής πραγματοποιήθηκε στο Τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων. Στην διαδικασία πρώιμης αξιολόγησης συμμετείχε ένα πρώτο δείγμα 8 φοιτητών του τμήματος. Η μεθοδολογία που ακολουθήθηκε αφορούσε τη συμπλήρωση ερωτηματολογίων και την απάντηση σε ερωτήσεις γνώσεων σχετικών με το εκπαιδευτικό αντικείμενο, πριν και μετά την χρήση της εφαρμογής.

Τα αποτελέσματα που προέκυψαν έδειξαν σημαντική βελτίωση στα μαθησιακά αποτελέσματα όσον αφορά την επίδοση των φοιτητών. Από ένα σύνολο 10 ερωτήσεων, ο μέσος όρος των σωστών απαντήσεων ήταν 6,63 πριν τη χρήση της εφαρμογής και 9,00 μετά τη χρήση της εφαρμογής (αύξηση 35,75%). Αύξηση επίσης σημειώθηκε και στην θετική άποψη των φοιτητών για την ενσωμάτωση της τεχνολογίας εικονικής πραγματικότητας στην διαδικασία μάθησης, πριν και μετά τη χρήση της εφαρμογής (αύξηση 15,15%) όπως και των εκπαιδευτικών παιχνιδιών (αύξηση 8,82%). Όσον αφορά τη συνολική εμπειρία τα αποτελέσματα έδειξαν ότι οι φοιτητές έκριναν πολύ θετικά την εμπειρία τους από τη χρήση της εφαρμογής με μέσο όρο αξιολόγησης σύμφωνα με την 5βάθμια κλίμακα του Likert, 4,5 (90%). Ως προς τον παράγοντα του ενθουσιασμού, η αξιολόγηση των φοιτητών ήταν 4,38 (87,50%). Ενώ στο κατά πόσο η εμπειρία τους φάνηκε παρακινητική και ενδιαφέρουσα, η αξιολόγηση ήταν 4,63 (92,50%).

Συνολικά, τα πρώτα ευρήματα της αξιολόγησης δείχνουν μια πολύ ενθαρρυντική προοπτική για τη δημιουργία μιας ελκυστικής εκπαιδευτικής εμπειρίας που παρακινεί σημαντικά το ενδιαφέρον, και τον ενθουσιασμό των φοιτητών ως προς το εκπαιδευτικό αντικείμενο.

Η παρούσα εργασία αναμένεται να συμβάλει στη συνεχιζόμενη έρευνα στον τομέα των τεχνολογικών εξελίξεων και στην εφαρμογή καινοτόμων πρακτικών σε εκπαιδευτικά περιβάλλοντα, με στόχο τη βελτιστοποίηση της μαθησιακής εμπειρίας και των μαθησιακών αποτελεσμάτων. Διερευνά και προτείνει δημιουργικούς τρόπους συνδυασμού εργαλείων τεχνολογίας εμβύθισης και μεθοδολογιών μάθησης που βασίζονται στο παιχνίδι εστιάζοντας παράλληλα σε συγκεκριμένους εκπαιδευτικούς στόχους.

Λέξεις – κλειδιά: Μεθοδολογίες εκπαίδευσης, τεχνολογίες εμβύθισης, εικονική πραγματικότητα, παιχνιδοποίηση, σχεδιασμός προϊόντων.

ΕΙΣΑΓΩΓΗ

Η ολοένα και αυξανόμενη τάση της ενσωμάτωσης αναδυόμενων τεχνολογιών σε εκπαιδευτικά περιβάλλοντα, διαμορφώνει πλέον ένα νέο τοπίο εκπαιδευτικών απαιτήσεων για καινοτομία και δημιουργικότητα και στην τριτοβάθμια εκπαίδευση (Montés et al., 2022). Η ταχύτατη αυτή εξέλιξη των σύγχρονων τεχνολογιών προσφέρει νέες ευκαιρίες για τη δημιουργία και ενίσχυση των μαθησιακών εμπειριών. Προς αυτήν τη κατεύθυνση, οι εκπαιδευτικοί καλούνται να εντάξουν την τεχνολογική πρόκληση σε ένα δημιουργικό εκπαιδευτικό πλαίσιο το οποίο θα προσελκύσει το ενδιαφέρον των φοιτητών ενώ παράλληλα θα αποτελεί ένα αποτελεσματικό εκπαιδευτικό εργαλείο αναφορικά με την βελτίωση της μαθησιακής επίδοσης (Bertrand and Namukasa, 2023).

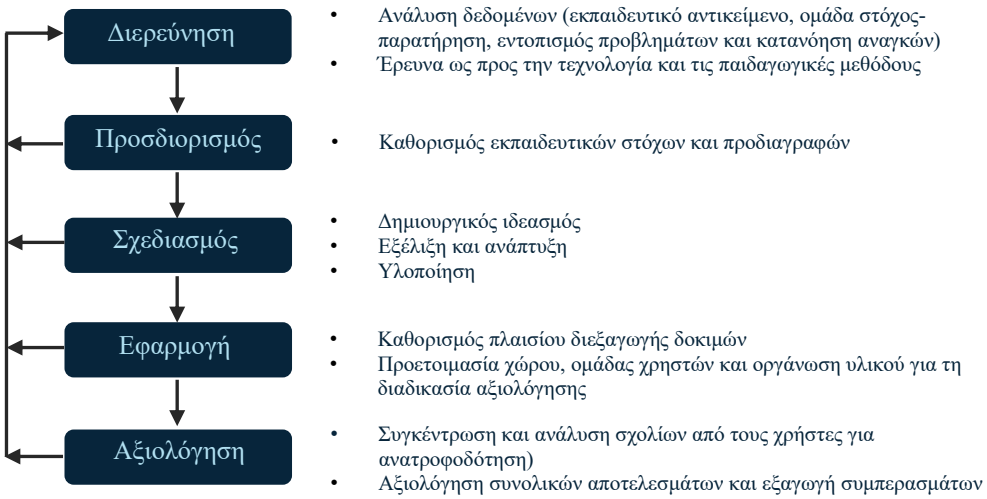
Η παρούσα μελέτη εντάσσεται σε μία ευρύτερη έρευνα του Τμήματος Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, του Πανεπιστημίου Δυτικής Μακεδονίας και αφορά τον συνδυασμό καινοτόμων τεχνολογικών εργαλείων και εκπαιδευτικών μεθόδων με σκοπό τη βελτίωση των μαθησιακών αποτελεσμάτων και την ενίσχυση της διαδικασίας μάθησης. Η συγκεκριμένη εργασία αφορά τον σχεδιασμό και ανάπτυξη μιας ψηφιακής εφαρμογής σε περιβάλλον εικονικής πραγματικότητας, αξιοποιώντας στρατηγικές μάθησης που βασίζονται στο παιχνίδι με στόχο να αποτελέσει ένα βοηθητικό εργαλείο εκπαίδευσης για τη διδασκαλία εικαστικών και καλλιτεχνικών κινημάτων.

ΕΙΚΟΝΙΚΗ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ ΚΑΙ ΠΑΙΧΝΙΔΟΠΟΙΗΣΗ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Η εικονική πραγματικότητα είναι ένας τύπος καθηλωτικής τεχνολογίας που προσομοιώνει διαδραστικά εικονικά περιβάλλοντα, στα οποία οι χρήστες αισθάνονται ότι είναι φυσικά παρόντες. Τα κύρια χαρακτηριστικά της είναι η αίσθηση της εμβύθισης *(immersion),* της παρουσίας *(presence)* και της διαδραστικότητας *(interactivity)* (Walsh and Pawlowski, 2002). Η αξιοποίηση της εικονικής πραγματικότητας στην εκπαίδευση μπορεί να θεωρηθεί ως μια μετασχηματιστική πλατφόρμα μάθησης που μπορεί να προσαρμοστεί για διαφορετικές παιδαγωγικές προσεγγίσεις (Tsivitanidou et al., 2021). Μπορεί να προσφέρει μια ισχυρή νοητική και γνωστική σύνδεση με το παρουσιαζόμενο εκπαιδευτικό περιεχόμενο, που θα διεγείρει και θα παρακινήσει τους εκπαιδευόμενους (Riva et al., 2007).

Από την άλλη η ενσωμάτωση στοιχείων παιχνιδιού στην εκπαιδευτική διαδικασία μπορεί να ενισχύσει τους παιδαγωγικούς στόχους. Τα εκπαιδευτικά παιχνίδια προσφέρουν ένα ιδανικό πλαίσιο για την ανάπτυξη ποικίλων δεξιοτήτων σε διαφορετικά γνωστικά αντικείμενα, ενώ ταυτόχρονα ενισχύουν την ικανότητα επίλυσης προβλημάτων, οδηγώντας τους εκπαιδευόμενους στην αναζήτηση δημιουργικών λύσεων (Giannakos, 2013). Η αξιοποίηση τεχνικών παιχνιδιού στην διαδικασία μάθησης, βοηθά σε καλύτερη αφομοίωση του περιεχομένου του μαθήματος και συμβάλλει στη δημιουργία θετικών συμπεριφορικών στάσεων (Gill et al., 2022). Οι μεθοδολογίες μάθησης που βασίζονται στο παιχνίδι, ενσωματωμένες σε περιβάλλοντα εικονικής πραγματικότητας, προσφέρουν μια ενισχυμένη και εμβυθιστική εμπειρία παιχνιδιού. Αυτός ο τύπος παιχνιδιού εικονικής πραγματικότητας εμπλέκει ενεργά τους εκπαιδευόμενους στη μαθησιακή διαδικασία, βελτιώνοντας την συνολική εμπειρία μάθησης (Udeozor et al., 2021).

Διάγραμμα 1
Προτεινόμενη μεθοδολογία.



ΜΕΘΟΔΟΛΟΓΙΑ

Το βασικό ζητούμενο στον σχεδιασμό προϊόντων αφορά την εύρεση δημιουργικών λύσεων για την επίλυση σύνθετων προβλημάτων (Kyratsis et al., 2020). Ο σχεδιασμός της εφαρμογής στη παρούσα εργασία αντιμετωπίζεται ως μία σύνθετη σχεδιαστική πρόκληση με στόχο όχι μόνο την ανάπτυξη μιας εκπαιδευτικής εφαρμογής σε περιβάλλον εικονικής πραγματικότητας αλλά τη δημιουργία μιας ελκυστικής και μαθητοκεντρικής εκπαιδευτικής εμπειρίας. Μια μεθοδολογία σχεδίασης άμεσα συνυφασμένη με τη δημιουργία νέων προϊόντων είναι η σχεδιαστική σκέψη *(Design Thinking).* Η σχεδιαστική σκέψη αναφέρεται στην ικανότητα χρήσης της δημιουργικότητας και της ανθρωποκεντρικής σκέψης για την εύρεση λύσεων και τη δημιουργία νέων ιδεών (Chon and Sim, 2019). Αποτελεί μία μεθοδολογία δημιουργικής επίλυσης προβλημάτων, η οποία εστιάζει στις ανάγκες των χρηστών. Το πιο ευρέως γνωστό μοντέλο σχεδιαστικής σκέψης είναι το μοντέλο του Stanford, και τα πιο συχνά χρησιμοποιούμενα στάδια της διαδικασίας σχεδιαστικής σκέψης είναι τα εξής: *ενσυναίσθηση (empathize), ορισμός (define), ιδεοποίηση (ideate), πρωτοτυποποίηση (prototype) και δοκιμή (test)* (Plattner, 2020).

Η προτεινόμενη μεθοδολογία υιοθετεί στοιχεία από την σχεδιαστική σκέψη *(Design Thinking)* και δημιουργική διαδικασία για την ανάπτυξη νέων προϊόντων, έχοντας ως άξονες σχεδιασμού τις δυνατότητες ενσωμάτωσης της τεχνολογίας εικονικής πραγματικότητας και την αξιοποίηση της παιχνιδοποίησης ως βασική μέθοδο μάθησης. Τα βήματα και τα επιμέρους στάδια της προτεινόμενης μεθοδολογίας αποτυπώνονται στο παρακάτω διάγραμμα (Διάγραμμα 1).

ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ ΑΝΑΠΤΥΞΗ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΕΦΑΡΜΟΓΗΣ

ΔΙΕΡΕΥΝΗΣΗ:

Εκπαιδευτικό αντικείμενο: Αφορά το θεωρητικό μάθημα της Ιστορίας Design, το οποίο διδάσκεται στους φοιτητές κατά το πρώτο εξάμηνο σπουδών στο τμήμα Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων. Περιλαμβάνει τη διδασκαλία σε συγκεκριμένες ιστορικές περιόδους που ξεχωρίζουν για τα σχεδιαστικά τους στυλ, τις φιλοσοφίες τους και τα ιδανικά. Στόχος του μαθήματος είναι οι φοιτητές να κατανοήσουν και να αξιολογήσουν τα διαφορετικά ιστορικά πλαίσια, ώστε να μπορούν να ερμηνεύσουν σχεδιαστικά αντικείμενα, περιβάλλοντα και συστήματα σε σχέση με τις σύγχρονες σχεδιαστικές πρακτικές. Ως αντικείμενο μάθησης στη μελέτη περίπτωσης, επιλέχτηκε το καλλιτεχνικό κίνημα ‘De Stijl’

Ομάδα στόχος: Η εφαρμογή απευθύνεται σε φοιτητές του τμήματος Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων και κυρίως φοιτητές μεγαλύτερων ετών που έχουν ήδη διδαχτεί το συγκεκριμένο αντικείμενο. Πραγματοποιήθηκε παρακολούθηση του μαθήματος, συζητήσεις με φοιτητές και διδάσκοντες, όπου καταγράφηκαν τα ανάλογα σχόλια και οι παρατηρήσεις. Τα βασικά ζητήματα που εντοπίστηκαν αφορούν κυρίως την δυσκολία συγκέντρωσης των φοιτητών και την γενικότερη έλλειψη ενδιαφέροντος ως αποτέλεσμα της φυσικής και αναμενόμενης αντίδρασης τους προς τα θεωρητικά μαθήματα. Επίσης διαπιστώθηκε η ανάγκη δημιουργίας ενός πλαισίου πρακτικής αλληλεπίδρασης με το αντικείμενο του μαθήματος το οποίο θα μπορούσε να προσελκύσει περισσότερο το ενδιαφέρον των φοιτητών.

Αξιοποίηση τεχνολογίας εικονικής πραγματικότητας και παιδαγωγικών μεθόδων παιχνιδιού: Σε προηγούμενη έρευνα μας πραγματοποιήθηκε μία εκτενής βιβλιογραφική ανασκόπηση σε περιπτώσεις που αφορούσαν τους τρόπους ενσωμάτωσης διαφορετικών διαδραστικών τεχνολογιών στην εκπαίδευση σχεδιασμού προϊόντων (Nazlidou et al., 2024). Αναφορικά με την αξιοποίηση της τεχνολογίας εικονικής πραγματικότητας οι περισσότερες περιπτώσεις αφορούσαν την ενσωμάτωση της στα πλαίσια εξάσκησης των φοιτητών στη διαδικασία σχεδιασμού προϊόντων. Η εικονική πραγματικότητα μπορεί να ενταχθεί είτε στα αρχικά στάδια της διαδικασίας σχεδιασμού, είτε πιο μετά σαν μέσο οπτικοποίησης και πρωτοτυποίησης των σχεδίων, κατανόησης σύνθετων πτυχών του, αξιολόγησης διάφορων παραμέτρων και παρουσίασης του τελικού σχεδίου. Πέρα από την διαδικασία σχεδίασης συγκεκριμένων προϊόντων, η εικονική πραγματικότητα μπορεί να ενσωματωθεί και για τη διδασκαλία διαφορετικών εκπαιδευτικών αντικειμένων. Σε θεωρητικά μαθήματα η εικονική πραγματικότητα μπορεί να αποτελέσει ένα υποστηρικτικό εργαλείο μάθησης εμβυθίζοντας τους φοιτητές σε ένα προσομοιωμένο περιβάλλον όπου μπορούν να αλληλοεπιδράσουν με το μαθησιακό αντικείμενο με ποικίλους τρόπους (Cordero-Guridi et al., 2022; Zhang, 2023). Άλλες χρήσεις αφορούν την βελτίωση διάφορων τεχνικών δεξιοτήτων (Acuña and Melón, 2022; Mathur et al., 2023) ή ενίσχυση απαραίτητων ικανοτήτων στους φοιτητές όπως για παράδειγμα την ενίσχυση της χωρικής αντίληψης των φοιτητών και την ικανότητα τους να κατανοούν πολύπλοκες γεωμετρικές μορφολογίες (González, 2018). Ενδιαφέρον παρουσιάζουν οι περιπτώσεις που η τεχνολογία εικονικής πραγματικότητας συνδυάζεται με μεθόδους μάθησης που βασίζονται σε στρατηγικές παιχνιδιών (Gonzalez Almaguer et al., 2021; Gonzalez-Almaguer et al., 2022). Στις περιπτώσεις αυτές το εκπαιδευτικό αντικείμενο ενσωματώνεται μέσα σε μηχανισμούς παιχνιδιών, βοηθώντας τους φοιτητές να είναι πιο προσηλωμένοι στους στόχους

και να συμμετέχουν πιο ενεργά στη διαδικασία μάθησης. Στην έρευνα (Chandramouli et al., 2018) παρουσιάζεται μία εκπαιδευτική ενότητα για την εκπαίδευση φοιτητών σε προηγμένες διαδικασίες παραγωγής όπου το εκπαιδευτικό περιεχόμενο παρουσιάζεται μέσω στοιχείων παιχνιδιού κάνοντας την αλληλεπίδραση πιο διασκεδαστική μειώνοντας το γνωστικό φορτίο. Μία περίπτωση που επίσης σχετίζεται και με το εκπαιδευτικό αντικείμενο της παρούσας εργασίας, είναι η μελέτη των Gill et al., οι οποίοι ανέπτυξαν ένα θεωρητικό μάθημα για το καλλιτεχνικό κίνημα του Bauhaus, σε περιβάλλον εικονικής πραγματικότητας με διαδραστικές δραστηριότητες εμπλουτισμένες με στοιχεία παιχνιδοποίησης, πάζλ και γρίφους (Gill et al., 2022).

ΠΡΟΣΔΙΟΡΙΣΜΟΣ:

Ο κύριος εκπαιδευτικός στόχος της εκπαιδευτικής εφαρμογής είναι να δημιουργήσει μια διαφορετική εμπειρία μάθησης, μέσω της οποίας οι φοιτητές να κατανοήσουν καλύτερα τα βασικά ιστορικά στοιχεία, τα αισθητικά κριτήρια και τις κύριες σχεδιαστικές αρχές του καλλιτεχνικού κινήματος De Stijl. Η εκπαιδευτική εφαρμογή θα πρέπει να είναι αποτελεσματική ως προς:

α) τη βελτίωση της μαθησιακής απόδοσης
β) την αύξηση του ενδιαφέροντος και του κινήτρου των φοιτητών
γ) την δημιουργία μιας θετικής εκπαιδευτικής εμπειρίας

ΣΧΕΔΙΑΣΜΟΣ:

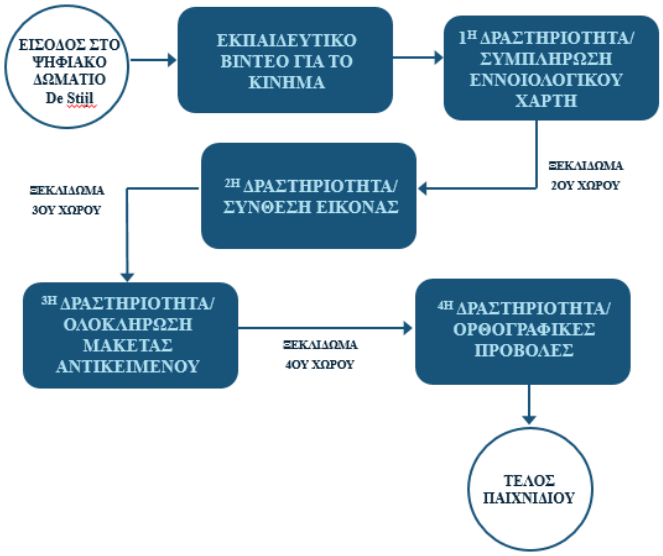
Δημιουργικός Ιδεασμός: Στο αρχικό στάδιο του σχεδιασμού περιλαμβάνει μία ελεύθερη καταγραφή ιδεών με λέξεις και φράσεις που συνδέονται νοηματικά και ιεραρχικά μέσω ενός εννοιολογικού χάρτη (Εικόνα 1). Η καταγραφή περιλαμβάνει την οργάνωση των ιδεών που έχουν προκύψει από το προηγούμενο στάδιο της έρευνας και αφορά τον τρόπο διασύνδεσης των επιμέρους θεματικών γύρω από ένα ενιαίο κεντρικό πυρήνα.

Εικόνα 1
Εννοιολογικός χάρτης ιδεών.



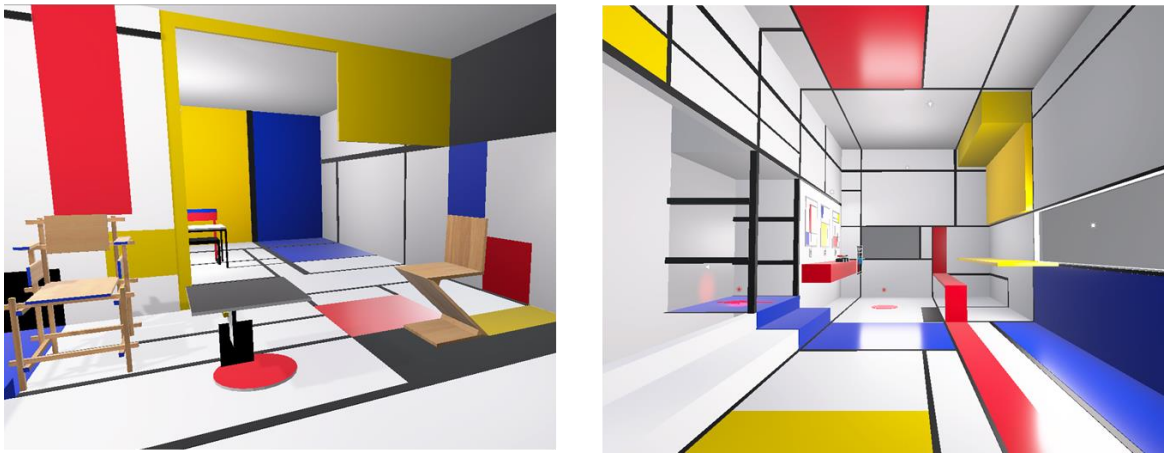
Περιγραφή εφαρμογής: Ο σχεδιασμός της εφαρμογής ανταποκρίνεται στη λογική ανάπτυξης των ψηφιακών εκπαιδευτικών δωματίων διαφυγής. Ο χρήστης βρίσκεται εγκλωβισμένος στο παρελθόν, στη χρονική περίοδο που υπήρξε το κίνημα De Stijl. Το υλικό του εκπαιδευτικού αντικειμένου ενσωματώνεται αρμονικά μέσα σε ειδικά σχεδιασμένους γρίφους όπου ο χρήστης καλείται να επιλύσει. Η λύση κάθε γρίφου, ανοίγει έναν επιπλέον χώρο στο δωμάτιο για τον επόμενο γρίφο, μέχρι να ολοκληρωθεί το παιχνίδι. Ο χρήστης μπορεί να περιηγηθεί ελεύθερα στο χώρο χωρίς τη πίεση του χρόνου. Σκοπός είναι μέσω της αλληλεπίδρασης του με αντικείμενα του εικονικού περιβάλλοντος και να διασκεδάσει και να επιτευχθούν οι ζητούμενοι εκπαιδευτικοί στόχοι. Στην παρακάτω εικόνα αποτυπώνεται το διάγραμμα ροής του παιχνιδιού (Διάγραμμα 2).

Διάγραμμα 2
Διάγραμμα ροής παιχνιδιού



Σχεδιασμός γραφικών: Το ψηφιακό περιβάλλον μέσα στο οποίο περιηγούνται οι χρήστες αποτέλεσε κανονικό αντικείμενο σχεδιασμού κατά τη δημιουργία της εφαρμογής. Πρόθεση στον σχεδιασμό των γραφικών, δεν ήταν οι χρήστες να επισκέπτονται έναν εικονικό χώρο που απλά θα μαθαίνουν πληροφορίες για το κίνημα του De Stijl αλλά να βιώνουν την εμπειρία περιήγησης σ΄έναν περιβάλλον που ο ίδιος θα έχει σχεδιαστεί σύμφωνα με τις αρχές του κινήματος De Stijl (Εικόνα 2).

Εικόνα 2
Σχεδιασμός γραφικών



Σχεδιασμός δραστηριοτήτων: Οι δραστηριότητες που καλείται να ολοκληρώσει ο χρήστης κατά τη διάρκεια του παιχνιδιού είναι ευθυγραμμισμένες με τους μαθησιακούς στόχους και βασίζονται στη λογική της γενετικής θεωρίας μάθησης (Tobias, 2010), σύμφωνα με την οποία, οι νέες πληροφορίες ενσωματώνονται στις ήδη προϋπάρχουσες γνώσεις και τις γνωστικές διεργασίες του εκπαιδευόμενου. Όλες οι δραστηριότητες έχουν σχεδιαστεί ώστε να ανταποκρίνονται στις σχεδιαστικές αρχές του κινήματος De Stijl και αποδίδονται μέσα από γνώριμα μαθησιακά αντικείμενα που έχουν διδαχτεί οι φοιτητές κατά τη διάρκεια της φοίτησης τους στη σχολή. Πιο συγκεκριμένα, αφορούν τη συμπλήρωση εννοιολογικού χάρτη, την ικανότητα αναγνώρισης στοιχείων σύνθεσης σε εικόνα, την κατασκευή μακέτας και την κατανόηση της τρισδιάστατης γεωμετρίας μέσω των ορθογραφικών προβολών.

Υλοποίηση: Για την υλοποίηση της εφαρμογής, αξιοποιήθηκε η τεχνολογία iVR (immersive Virtual Reality) μέσω συστήματος HMD (Head-Mounted Display). Η συγκεκριμένη συσκευή φοριέται στο κεφάλι του χρήστη και

προβάλλει το εικονικό περιβάλλον με βάση τη θέση και τον προσανατολισμό της κεφαλής του. Παράλληλα, με τη χρήση ειδικών χειριστηρίων, καταγράφονται οι κινήσεις των χεριών στον ψηφιακό χώρο, επιτρέποντας την ενεργή αλληλεπίδραση με το περιβάλλον. Κατά αυτόν τον τρόπο ο εξοπλισμός παρέχει υποστήριξη με ηχητικές, απτικές και αισθητηριακές διεπαφές. Η εφαρμογή δημιουργήθηκε στο Unity3D, που αποτελεί μια πλατφόρμα ανάπτυξης παιχνιδιών και διαδραστικών εμπειριών, η οποία χρησιμοποιείται και παρέχει εκτενή υποστήριξη για VR συσκευές με κύρια γλώσσα προγραμματισμού τη C#. Ο σχεδιασμός των γραφικών πραγματοποιήθηκε με το λογισμικό μοντελοποίησης 3D αντικειμένων: Blender.

ΕΦΑΡΜΟΓΗ:

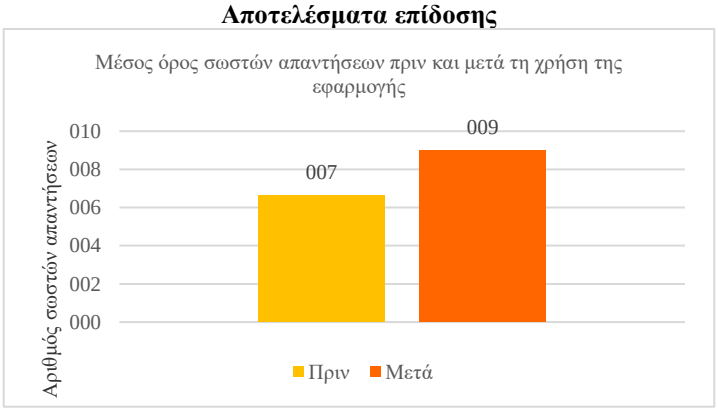
Στο επόμενο στάδιο μετά την υλοποίηση ακολούθησε η δοκιμή της εκπαιδευτικής εφαρμογής από φοιτητές του τμήματος Μηχανικών Σχεδίασης Προϊόντων και Συστημάτων, ώστε να ελεγχθεί η αποτελεσματικό της σε σχέση με τα κριτήρια αξιολόγησης. Η εφαρμογή βρίσκεται ακόμα στη 1η φάση της αξιολόγησης, όπου συμμετείχε ένα πρώτο δείγμα 8 φοιτητών. Οι δοκιμές πραγματοποιήθηκαν στους χώρους των εργαστηρίων του τμήματος. Η διαδικασία που ακολουθήθηκε είναι η εξής:

- εισαγωγική ενημέρωση των φοιτητών αναφορικά με την εκπαιδευτική εφαρμογή
- μικρή παρουσίαση για την χρήση του εξοπλισμού
- συμπλήρωση τεστ γνώσεων και ερωτηματολογίου πριν τη διεξαγωγή των δοκιμών
- χρήση της εφαρμογής από τους φοιτητές κατά τη διάρκεια των οποίων καταγράφηκαν σχόλια και παρατηρήσεις από τους ερευνητές
- συμπλήρωση τεστ γνώσεων και ερωτηματολογίου μετά την ολοκλήρωση των δοκιμών.

ΑΠΟΤΕΛΕΣΜΑΤΑ ΑΞΙΟΛΟΓΗΣΗΣ/ΣΥΜΠΕΡΑΣΜΑΤΑ

Τα τεστ γνώσεων πριν και μετά τη διεξαγωγή των δοκιμών περιελάμβαναν 10 ερωτήσεις πολλαπλής επιλογής και ήταν πανομοιότητα, καθώς ο στόχος ήταν να αξιολογηθούν οι γνώσεις των φοιτητών σχετικά με το κίνημα De Stijl και να διαπιστωθεί εάν υπήρξε βελτίωση μετά τη χρήση της εκπαιδευτικής εφαρμογής. Τα αποτελέσματα που προέκυψαν έδειξαν σημαντική βελτίωση στα μαθησιακά αποτελέσματα όσον αφορά την επίδοση των φοιτητών (Διάγραμμα 3). Ο μέσος όρος των σωστών απαντήσεων ήταν 6,63 πριν τη χρήση της εφαρμογής και 9,00 μετά τη χρήση της εφαρμογής. Σημειώθηκε αύξηση επίδοσης κατά 35,75%.

Διάγραμμα 3
Αποτελέσματα επίδοσης



Το ερωτηματολόγιο που συμπληρώθηκε πριν τις δοκιμές περιελάμβανε ερωτήσεις τύπου κλίμακας Likert αναφορικά με προηγούμενες εμπειρίες των φοιτητών με την τεχνολογία εικονικής πραγματικότητας και τα εκπαιδευτικά παιχνίδια καθώς και την άποψη τους για την ενσωμάτωση τους στην εκπαίδευση (Πίνακας 1). Αντίστοιχα το ερωτηματολόγιο που συμπληρώθηκε μετά τις δοκιμές περιέλαμβανε κάποιες κοινές ερωτήσεις και κάποιες γενικές που κατέγραφαν την συνολική εμπειρία των συμμετεχόντων από τη χρήση της εφαρμογής.

Σύμφωνα με τα αποτελέσματα, λιγότεροι από τους μισούς φοιτητές είχαν προηγούμενη εμπειρία χρήσης της τεχνολογίας εικονικής πραγματικότητας. Η άποψη τους για την ενσωμάτωση της τεχνολογίας εικονικής πραγματικότητας και των εκπαιδευτικών παιχνιδιών στην εκπαίδευση ήταν γενικά θετική και σημείωσε περεταίρω αύξηση μετά τις δοκιμές. Όσον αφορά τη συνολική εμπειρία τα αποτελέσματα έδειξαν ότι οι φοιτητές έκριναν πολύ θετικά την εκπαιδευτική εφαρμογή, με μέσο όρο αξιολόγησης σύμφωνα με την 5βάθμια κλίμακα του Likert, 4,5 (90%). Ως προς τον

παράγοντα του ενθουσιασμού, η αξιολόγηση των φοιτητών ήταν 4,38 (87,50%). Ενώ στο κατά πόσο η εμπειρία τους φάνηκε παρακινητική και ενδιαφέρουσα, η αξιολόγηση ήταν 4,63 (92,50%).

Πίνακας 1
Αποτελέσματα ερωτηματολογίων πριν και μετά τη χρήση της εφαρμογής

Ερώτηση	**Μ.Ο.**	
	Πριν	**Μετά**
Έχετε χρησιμοποιήσει και πόσο συχνά τεχνολογία εικονικής πραγματικότητας;	2,25	-
Πόσο θεωρείτε ότι μπορεί να συμβάλει θετικά η τεχνολογία εικονικής πραγματικότητας στην εκπαίδευση;	4,13	4,75
Πόσο θεωρείτε ότι τα εκπαιδευτικά παιχνίδια μπορούν να συμβάλουν θετικά στη μάθηση;	4,38	4,75
Πόσο θεωρείτε ότι τα εκπαιδευτικά παιχνίδια σε περιβάλλον εικονικής πραγματικότητας μπορούν να συμβάλουν θετικά στη μάθηση;	4,25	4,63
Πως θα χαρακτηρίζατε τη συνολική εμπειρία σας από τη χρήση της εφαρμογής;	-	4,50
Πόσο θεωρείτε ότι μπορεί να σας ενθουσίασε η χρήση της εφαρμογής;	-	4,38
Πόσο θεωρείτε ότι η διαδικασία μάθησης μέσω της εφαρμογή γίνεται πιο παρακινητική και ενδιαφέρουσα;	-	4,63

Σύμφωνα με τα αποτελέσματα, λιγότεροι από τους μισούς φοιτητές είχαν προηγούμενη εμπειρία χρήσης της τεχνολογίας εικονικής πραγματικότητας. Η άποψη τους για την ενσωμάτωση της τεχνολογίας εικονικής πραγματικότητας και των εκπαιδευτικών παιχνιδιών στην εκπαίδευση ήταν γενικά θετική και σημείωσε περεταίρω αύξηση μετά τις δοκιμές. Όσον αφορά τη συνολική εμπειρία τα αποτελέσματα έδειξαν ότι οι φοιτητές έκριναν πολύ θετικά την εκπαιδευτική εφαρμογή, με μέσο όρο αξιολόγησης σύμφωνα με την 5βάθμια κλίμακα του Likert, 4,5 (90%). Ως προς τον παράγοντα του ενθουσιασμού, η αξιολόγηση των φοιτητών ήταν 4,38 (87,50%). Ενώ στο κατά πόσο η εμπειρία τους φάνηκε παρακινητική και ενδιαφέρουσα, η αξιολόγηση ήταν 4,63 (92,50%).

Τα σχόλια των φοιτητών κατά τη διάρκεια των δοκιμών ήταν γενικά θετικά. Παρατηρήθηκε ότι υπήρξε αυξημένο ενδιαφέρον και ανταπόκριση από όλους τους φοιτητές για την συμμετοχή τους στην έρευνα. Οι περισσότερες ερωτήσεις που σημειώθηκαν αφορούσαν κατά κύριο λόγο την χρήση του εξοπλισμού και τη δυσκολία προσαρμογής στο περιβάλλον εικονικής πραγματικότητας. Συνολικά, τα πρώτα ευρήματα της αξιολόγησης δείχνουν μια πολύ ενθαρρυντική προοπτική για τη δημιουργία μιας ελκυστικής εκπαιδευτικής εμπειρίας που παρακινεί σημαντικά το ενδιαφέρον, και τον ενθουσιασμό των φοιτητών ως προς το εκπαιδευτικό αντικείμενο.

Για την ολοκλήρωση αξιολόγησης της εφαρμογής σε επόμενο στάδιο, θα χρησιμοποιηθεί μεγαλύτερο δείγμα φοιτητών ώστε να ενσωματωθούν περισσότερα δεδομένα, που σχετίζονται με την αποτελεσματικότητα της ως εργαλείο βελτίωσης της μαθησιακής απόδοσης. Επίσης θα αξιολογηθεί ως προς επιπλέον ποιοτικά κριτήρια και παρακινητικούς παράγοντες που θα κρίνουν την συνολική εμπειρία και στάση των χρηστών απέναντι στην εφαρμογή. Τέλος σε επόμενη φάση, η εφαρμογή πρόκειται να ενισχυθεί περεταίρω με την προσθήκη και άλλων καλλιτεχνικών κινημάτων για τον εμπλουτισμό της εκπαιδευτικής εμπειρίας όσον αφορά το συγκεκριμένο εκπαιδευτικό αντικείμενο.

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ΟΤΑΝ Η ΙΣΤΟΡΙΑ ΓΙΝΕΤΑΙ ΠΑΙΧΝΙΔΙ: ΑΞΙΟΠΟΙΩΝΤΑΣ ΤΗΝ ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΤΗΝ ΠΑΙΧΝΙΔΟΠΟΙΗΣΗ ΣΤΟ ΜΑΘΗΜΑ ΤΗΣ ΙΣΤΟΡΙΑΣ

Δρ. Ευάγγελος Σίτας
Εκπαιδευτικός ΠΕ02
1ο Γυμνάσιο Νεοχωρίου - ΔΔΕ Αιτωλοακαρνανίας, Ελλάδα
e-mail: vagsit@gmail.com

ΠΕΡΙΛΗΨΗ

Ανέκαθεν η πλειονότητα των μαθητών υποστηρίζει ότι η Ιστορία είναι ένα δύσκολο μάθημα και πως η επιτυχία έρχεται μέσα από την αποστήθιση της διδακτέας ύλης. Στην παρούσα εργασία προτείνεται ένας νέος τρόπος προσέγγισης που έχει ως στόχο να βελτιώσει την εμπλοκή των μαθητών απελευθερώνοντας τους από τα δεσμά της μετωπικής αφήγησης και της αποστήθισης. Θα προτείνουμε μεθόδους για την ενσωμάτωση της ΤΝ σε παιχνιδοποιημένες δραστηριότητες διδασκαλίας και θα εξετάσουμε κατά πόσο η χρήση αυτών των μηχανισμών μπορεί να βελτιώσει την εμπλοκή των μαθητών και τη γνωστική τους απόδοση σε σύγκριση με παραδοσιακές μεθόδους διδασκαλίας.

Αρχικά, αναλύθηκαν οι ανάγκες των μαθητών και καθορίστηκαν οι εκπαιδευτικοί στόχοι. Έπειτα σχεδιάστηκαν οι παιχνιδοποιημένες δραστηριότητες. Με τη βοήθεια της τεχνητής νοημοσύνης προσαρμόσαμε και βελτιώσαμε τις υπάρχουσες δραστηριότητες. Δυο ομάδες μαθητών συμμετείχαν στην έρευνα και ο διαχωρισμός τους σε πειραματική ομάδα και ομάδα ελέγχου έγινε τυχαία. Συγκρίναμε τα αποτελέσματα των ομάδων με χρήση διαγνωστικών και τελικών αξιολογήσεων. Η πιλοτική εφαρμογή έδειξε αυξημένη εμπλοκή και βελτιωμένη απόδοση των μαθητών σε σύγκριση με παραδοσιακές μεθόδους.

Τα τελευταία χρόνια, η παιχνιδοποίηση έχει αναδειχθεί ως μια σύγχρονη παιδαγωγική προσέγγιση, που στην πιο απλή της εκδοχή, χρησιμοποιώντας δηλαδή προκλήσεις, ανταμοιβές και πίνακες κατάταξης, έχει αποδειχθεί ότι μπορεί να βελτιώσει την μαθησιακή εμπειρία. Σήμερα, η τεχνητή νοημοσύνη συνιστά ίσως μια από τις μεγαλύτερες τάσεις στο χώρο της ψηφιακής τεχνολογίας και ολοένα εξελίσσεται ως η τεχνολογία του μέλλοντος φέρνοντας επανάσταση τόσο στον τρόπο που διδάσκουμε όσο και στον τρόπο που μαθαίνουμε. Ο συνδυασμός αυτών των δύο μπορεί να προσφέρει σημαντικά οφέλη στην εκπαίδευση γενικότερα και στην διδασκαλία της ιστορίας ειδικότερα..

Λέξεις – κλειδιά: παιχνιδοποίηση, τεχνητή νοημοσύνη, διδασκαλία ιστορίας, καινοτόμες παιδαγωγικές προσεγγίσεις.

ΕΙΣΑΓΩΓΗ

Η διδασκαλία της Ιστορίας στη δευτεροβάθμια εκπαίδευση αντιμετωπίζει διαχρονικά προκλήσεις που σχετίζονται με τη χαμηλή εμπλοκή των μαθητών και τη δυσκολία σύνδεσης των ιστορικών γνώσεων με τις προσωπικές τους εμπειρίες. Πολλοί μαθητές αντιλαμβάνονται το μάθημα ως αποστήθιση αποκομμένων γεγονότων και ημερομηνιών, χωρίς αφήγηση ή κριτική επεξεργασία (Wineburg, 2001, p. 65). Η τάση αυτή περιορίζει την ενεργό συμμετοχή και τη νοηματοδότηση της ιστορικής γνώσης.

Σύγχρονες παιδαγωγικές προσεγγίσεις υπογραμμίζουν τη σημασία της ενεργητικής, βιωματικής μάθησης, κατά την οποία ο μαθητής αποκτά γνώση μέσα από την εμπειρία και τη στοχαστική ενασχόληση με πραγματικά προβλήματα (Kolb, 1984, p. 38). Εντός αυτού του πλαισίου, ιδιαίτερο ενδιαφέρον παρουσιάζει ο συνδυασμός δύο καινοτόμων μεθόδων: της παιχνιδοποίησης και της τεχνητής νοημοσύνης (ΤΝ), που αξιοποιούνται όλο και περισσότερο σε σύγχρονα περιβάλλοντα μάθησης.

Η παιχνιδοποίηση μεταφέρει χαρακτηριστικά των παιχνιδιών όπως για παράδειγμα οι πόντοι, οι προκλήσεις και οι επιβραβεύσεις στο εκπαιδευτικό περιβάλλον, ενισχύοντας την εσωτερική παρακίνηση, την περιέργεια και τη γνωστική δέσμευση (Gee, 2007, pp. 19–21). Πλήθος μελετών επιβεβαιώνουν τη θετική της συμβολή στην ενίσχυση της εμπλοκής και των επιδόσεων των μαθητών (Deterding et al., 2011, p. 10). Παράλληλα, η ΤΝ προσφέρει δυναμικά, διαδραστικά μαθησιακά περιβάλλοντα, υποστηρίζοντας την εξατομίκευση της διδασκαλίας, την αυτόματη προσαρμογή της δυσκολίας και την παροχή προσωποποιημένης ανατροφοδότησης (Luckin et al., 2016, p. 6). Εφαρμογές όπως οι διάλογοι με ιστορικές προσωπικότητες μέσω γενετικών γλωσσικών μοντέλων (π.χ. ChatGPT) αναδεικνύουν τις δυνατότητες της ΤΝ για προσομοίωση, αφήγηση και κριτική επεξεργασία του ιστορικού παρελθόντος (Holmes et al., 2021, p. 3).

Ο συνδυασμός παιχνιδοποίησης και ΤΝ οδηγεί στη διαμόρφωση ενός υβριδικού παιδαγωγικού μοντέλου, το οποίο μετατρέπει τη μάθηση της Ιστορίας σε μια εμπειρία «παιχνιδιού σκέψης». Η παιχνιδοποίηση λειτουργεί ως μηχανισμός ενεργοποίησης, ενώ η ΤΝ προσφέρει προσαρμοστική υποστήριξη και ευκαιρίες για διερευνητική μάθηση (Bruner, 1996, pp. 43–45; Vygotsky, 1978, p. 86). Η προσέγγιση αυτή εδράζεται σε θεωρίες όπως ο εποικοδομισμός (Piaget, 1952, Vygotsky, 1978), η βιωματική μάθηση (Kolb, 1984), η αυτοκαθοριζόμενη παρακίνηση (Deci & Ryan, 2000) και η εκπαιδευτική ευθυγράμμιση (Biggs & Tang, 2011), που τονίζουν τη σημασία της ενεργού εμπλοκής και της σύνδεσης στόχων, δραστηριοτήτων και αξιολόγησης.

Η παρούσα μελέτη διερευνά πώς ο συνδυασμός παιχνιδοποίησης και ΤΝ επηρεάζει την εμπλοκή, τις επιδόσεις και τη στάση των μαθητών απέναντι στη διδασκαλία της Ιστορίας. Εστιάζει στην ενίσχυση της νοηματοδοτημένης και βιωματικής μάθησης μέσω τεχνολογικά υποστηριζόμενων στρατηγικών. Παρά την αυξανόμενη έρευνα για τις δύο αυτές τεχνολογίες ξεχωριστά, η συνδυαστική τους εφαρμογή στο μάθημα της Ιστορίας παραμένει ελλιπώς διερευνημένη. Η παρούσα εργασία στοχεύει να καλύψει αυτό το ερευνητικό κενό, προτείνοντας ένα παιδαγωγικά τεκμηριωμένο, καινοτόμο και εφαρμοσμένο μοντέλο διδασκαλίας.

ΜΕΘΟΔΟΛΟΓΙΑ ΚΑΙ ΠΕΡΙΓΡΑΦΗ ΤΗΣ ΠΑΡΕΜΒΑΣΗΣ

Δεδομένου ότι τα σχολικά τμήματα είχαν ήδη διαμορφωθεί από τη σχολική μονάδα, η επιλογή των ομάδων έγινε με βάση τις υπάρχουσες συνθήκες και όχι μέσω τυχαίας κατανομής. Συνεπώς, η παρούσα μελέτη ακολούθησε σχέδιο προ-τεστ/μετά-τεστ με ομάδα ελέγχου στο πλαίσιο ενός σχεδιασμού quasi-experimental (Creswell & Creswell, 2018). Συμμετείχαν είκοσι (20) μαθητές της Γ΄ τάξης Γυμνασίου από δύο παράλληλα τμήματα της ίδιας σχολικής μονάδας. Ένα τμήμα ορίστηκε ως πειραματική ομάδα, όπου εφαρμόστηκε η διδακτική παρέμβαση με στοιχεία παιχνιδοποίησης και τεχνητής νοημοσύνης, ενώ το άλλο αποτέλεσε την ομάδα ελέγχου, στην οποία εφαρμόστηκε παραδοσιακή διδασκαλία.

Για τη διασφάλιση της αρχικής ομοιογένειας των ομάδων (Fraenkel et al., 2012), διεξήχθη προκαταρκτικό διαγνωστικό τεστ. Η μεθοδολογική αυτή επιλογή ενίσχυσε την αξιοπιστία της σύγκρισης, επιτρέποντας οι ενδεχόμενες διαφορές στα μαθησιακά αποτελέσματα να αποδοθούν στην εκπαιδευτική παρέμβαση και όχι σε προϋπάρχουσες διαφορές μεταξύ των ομάδων.

Η παρέμβαση περιλάμβανε τον σχεδιασμό και την εφαρμογή ενός ψηφιακού μαθησιακού περιβάλλοντος εμπλουτισμένου, με στοιχεία παιχνιδοποίησης και τεχνητής νοημοσύνης (Shute & Ke, 2012; Holmes et al., 2021). Στο πλαίσιο της παιχνιδοποίησης, το περιβάλλον ενσωμάτωνε σύστημα πόντων, επιπέδων και επιβραβεύσεων που ανταμείβουν την ολοκλήρωση δραστηριοτήτων. Παράλληλα, υπήρχε πίνακας κατάταξης όπου οι μαθητές μπορούσαν να παρακολουθούν την πρόοδό τους. Η κάθε διδακτική ενότητα είχε σχεδιαστεί ως «κεφάλαιο» μιας αφηγηματικής περιπέτειας, στην οποία οι μαθητές αναλάμβαναν ρόλους και εκπλήρωναν αποστολές εμπνευσμένες από ιστορικά γεγονότα.

Η τεχνητή νοημοσύνη αξιοποιήθηκε μέσω δύο βασικών εργαλείων: ενός chatbot και ενός προσαρμοστικού συστήματος κουίζ. Το chatbot βασίστηκε σε σύγχρονο γλωσσικό μοντέλο TN (παρόμοιο με το ChatGPT) και χρησιμοποιήθηκε μέσω του διαδραστικού πίνακα της τάξης. Ο εκπαιδευτικός είχε προσχεδιάσει την αλληλεπίδραση με το chatbot μέσω κατάλληλων προτροπών (prompts), που παρείχαν ιστορικό πλαίσιο, αφηγηματικά στοιχεία και ρόλους ιστορικών προσώπων. Οι μαθητές μπορούσαν να του απευθύνουν ερωτήσεις σχετικά με το περιεχόμενο της ενότητας ή να εμπλακούν σε προσομοιωμένους διαλόγους, «συνεντεύξεις» ή σεναριακές αλληλεπιδράσεις με πρόσωπα του παρελθόντος.

Παράλληλα, το προσαρμοστικό σύστημα κουίζ λειτουργούσε ως εργαλείο αυτοαξιολόγησης, προσαρμόζοντας τη δυσκολία των ερωτήσεων βάσει της απόδοσης κάθε μαθητή. Οι μαθητές λάμβαναν άμεση και εξατομικευμένη ανατροφοδότηση, με προτάσεις για επανάληψη ή ενίσχυση όπου κρινόταν απαραίτητο (Shute, 2008). Επιπλέον, στο περιβάλλον είχαν ενσωματωθεί προγραμματισμένα «μυστικά μπόνους», σχεδιασμένα από τον εκπαιδευτικό, τα οποία ενεργοποιούνταν από συγκεκριμένους συνδυασμούς σωστών απαντήσεων ή ενεργειών. Η προσθήκη αυτή είχε στόχο να ενισχύσει την περιέργεια, το ενδιαφέρον και την εξερεύνηση, στοιχεία που είναι κρίσιμα στην καλλιέργεια εσωτερικής παρακίνησης.

Η διδακτική παρέμβαση διήρκεσε οκτώ εβδομάδες. Κατά την πρώτη εβδομάδα, πραγματοποιήθηκε το αρχικό διαγνωστικό τεστ (pre-test) και διανεμήθηκε ερωτηματολόγιο μέτρησης του ενδιαφέροντος και της εμπλοκής των μαθητών. Στις επόμενες έξι εβδομάδες εφαρμόστηκε η κύρια φάση της παρέμβασης. Η πειραματική ομάδα εργάστηκε στο ψηφιακό περιβάλλον με στοιχεία παιχνιδοποίησης και τεχνητής νοημοσύνης, ενώ η ομάδα ελέγχου διδάχθηκε την ίδια ύλη με παραδοσιακές μεθόδους. Ο διδάσκων εκπαιδευτικός ήταν κοινός και για τις δύο ομάδες, γεγονός που επέτρεψε τον έλεγχο της μεταβλητής της διδακτικής επάρκειας και συνέπειας. Την όγδοη εβδομάδα διεξήχθη το post-test και επαναλήφθηκε το ερωτηματολόγιο εμπλοκής.

Η συλλογή δεδομένων περιλάμβανε ποσοτικά και ποιοτικά στοιχεία. Τα ποσοτικά δεδομένα περιλάμβαναν τις επιδόσεις των μαθητών στα τεστ και τα κουίζ, καθώς και δείκτες εμπλοκής όπως ο χρόνος ενασχόλησης και η συχνότητα συμμετοχής. Για την πειραματική ομάδα, τα δεδομένα καταγράφηκαν αυτόματα από την πλατφόρμα, ενώ για την ομάδα ελέγχου βασίστηκαν σε παρατηρήσεις. Παράλληλα, διεξήχθησαν ημιδομημένες συνεντεύξεις με δείγμα μαθητών από κάθε ομάδα και τηρήθηκε ημερολόγιο παρατηρήσεων από τον εκπαιδευτικό.

Η ανάλυση των ποσοτικών δεδομένων πραγματοποιήθηκε με ελέγχους t-test για ανεξάρτητα και εξαρτημένα δείγματα, καθώς και με ανάλυση συσχετίσεων Pearson. Για τα ποιοτικά δεδομένα εφαρμόστηκε θεματική ανάλυση, μέσω της οποίας κωδικοποιήθηκαν οι απαντήσεις των μαθητών και αναδείχθηκαν τάσεις σχετικά με το ενδιαφέρον, τη συμμετοχή και τις αντιλήψεις τους για την παρέμβαση. Όλες οι διαδικασίες διεξήχθησαν τηρώντας τις ηθικές αρχές της ανωνυμίας και της εθελοντικής συμμετοχής, με προηγούμενη συγκατάθεση των γονέων.

Στο πλαίσιο της διδακτικής παρέμβασης αναπτύχθηκαν και εφαρμόστηκαν τρία αντιπροσωπευτικά διδακτικά σενάρια που ενσωμάτωναν την παιχνιδοποίηση και την τεχνητή νοημοσύνη, με σκοπό την ενίσχυση της βιωματικής μάθησης, της συνεργατικής εργασίας και της ενεργούς συμμετοχής των μαθητών.

Στο πρώτο σενάριο, οι μαθητές εργάστηκαν ομαδικά για να ετοιμάσουν ερωτήσεις και να «συνομιλήσουν» με ιστορικές προσωπικότητες, όπως ο Ιωάννης Καποδίστριας, μέσω ενός chatbot βασισμένου σε τεχνητή νοημοσύνη (Holmes et al., 2021; Zawacki-Richter et al., 2019). Αφού μελέτησαν το ιστορικό πλαίσιο και τον ρόλο κάθε προσώπου, σχεδίασαν ερωτήσεις που εμβάθυναν σε ιστορικά γεγονότα, προσωπικά διλήμματα και κοινωνικές συγκρούσεις της εποχής. Οι απαντήσεις του ψηφιακού βοηθού έδιναν την ευκαιρία για διάλογο και ερμηνεία, και συχνά γεννούσαν συζήτηση μέσα στην τάξη σχετικά με την ιστορική αξιοπιστία και τη νοηματοδότηση του παρελθόντος. Η παιχνιδοποίηση υποστηρίχθηκε μέσω πόντων (Ryan & Deci, 2000) για την πρωτοτυπία των ερωτήσεων και την ακρίβεια των συμπερασμάτων, καθώς και με τη χορήγηση του εμβλήματος «Ιστορικός Ερευνητής» σε ομάδες που επέδειξαν αυξημένη ικανότητα κριτικής ανάλυσης.

Το δεύτερο σενάριο αφορούσε τη συμμετοχή των μαθητών σε ένα διαδραστικό, προσαρμοστικό ιστορικό quiz. Η δραστηριότητα υλοποιήθηκε σε προσαρμοσμένο ψηφιακό περιβάλλον, βασισμένο σε Moodle με προσθήκες quiz, το οποίο υποστήριζε την παροχή ανατροφοδότησης και την προσαρμογή της δυσκολίας των ερωτήσεων (Keller, 2008). Όσο οι μαθητές απαντούσαν σωστά, το σύστημα παρήγαγε πιο απαιτητικές ερωτήσεις, ενώ σε περιπτώσεις δυσκολίας, ενεργοποιούνταν βοηθητικά hints. Η πλατφόρμα παρουσίαζε σταδιακά νέες ενότητες ως «πίστες» και η πρόοδος καταγραφόταν σε leaderboard, ενισχύοντας τη διάθεση συμμετοχής. Στόχος ήταν να ενισχυθεί η κατανόηση και η ενεργή εμπλοκή μέσα από ένα δυναμικό μαθησιακό παιχνίδι γνώσεων. Η παιχνιδοποίηση περιλάμβανε πόντους, προσωπικά επιτεύγματα και προαιρετικά σήματα διάκρισης για συνέπεια ή βελτίωση.

Στο τρίτο σενάριο, οι μαθητές ανέλαβαν να δημιουργήσουν εικόνες με τη βοήθεια ενός εργαλείου τεχνητής νοημοσύνης (Mayer, 2009), επιλέγοντας μια συγκεκριμένη ιστορική περίοδο ή γεγονός. Η κάθε ομάδα δημιουργούσε μία εικόνα (π.χ. μια σκηνή από τη μάχη των Θερμοπυλών ή από την καθημερινή ζωή στο Βυζάντιο) και την παρουσίαζε στις υπόλοιπες ομάδες χωρίς να αποκαλύψει το πλαίσιο. Οι υπόλοιποι προσπαθούσαν να μαντέψουν την ιστορική περίοδο και το γεγονός, τεκμηριώνοντας την άποψή τους με βάση ενδυμασία, σκηνικό και σύμβολα. Ακολουθούσε συζήτηση και διόρθωση, με έμφαση στη σύνδεση οπτικών στοιχείων και ιστορικής πληροφορίας. Η παιχνιδοποίηση ενισχύθηκε με βαθμούς για σωστή τεκμηρίωση, και η ομάδα με τις περισσότερες εύστοχες αναγνωρίσεις ή την πιο δημιουργική παρουσίαση λάμβανε το ψηφιακό σήμα «Ιστορικός Ντετέκτιβ».

Κοινό χαρακτηριστικό των τριών σεναρίων αποτέλεσε η ενεργός συμμετοχή των μαθητών ως πρωταγωνιστών της μαθησιακής διαδικασίας. Αντί να περιορίζονται στον ρόλο του παθητικού δέκτη γνώσης, οι μαθητές ανέλαβαν ρόλους παίκτη, ερευνητή, δημοσιογράφου και συνεργάτη, εμπλεκόμενοι σε διαδικασίες λήψης αποφάσεων, επίλυσης προβλημάτων και αλληλεπίδρασης με ένα δυναμικό μαθησιακό περιβάλλον. Η χρήση της τεχνητής νοημοσύνης ενίσχυσε την εξατομίκευση της μάθησης και την ανάπτυξη της κριτικής σκέψης, ενώ η παιχνιδοποίηση αύξησε το ενδιαφέρον, την περιέργεια και το εσωτερικό κίνητρο των μαθητών. Η παιδαγωγική αυτή προσέγγιση ευθυγραμμίζεται με τις αρχές της ενεργού και βιωματικής μάθησης και ανταποκρίνεται στις σύγχρονες θεωρίες παρακίνησης και συνεργατικής εκπαίδευσης (Ryan & Deci, 2000; Keller, 2008) . Όπως θα αναδειχθεί και στην ανάλυση των αποτελεσμάτων που ακολουθεί, η εφαρμογή αυτών των καινοτόμων σεναρίων συσχετίστηκε με σημαντικές βελτιώσεις τόσο στις μαθησιακές επιδόσεις όσο και στις στάσεις των μαθητών απέναντι στο μάθημα της Ιστορίας.

ΑΝΑΛΥΣΗ ΚΑΙ ΕΡΜΗΝΕΙΑ ΔΕΔΟΜΕΝΩΝ

Μετά την ολοκλήρωση της διδακτικής παρέμβασης, τα δεδομένα που συλλέχθηκαν αναλύθηκαν ποσοτικά και ποιοτικά, με στόχο να διερευνηθούν οι διαφορές μεταξύ της πειραματικής ομάδας (παιχνιδοποίηση και τεχνητή νοημοσύνη) και της ομάδας ελέγχου, καθώς και η εσωτερική εξέλιξη κάθε ομάδας από το προ-τεστ στο μετά-τεστ.

Τα αποτελέσματα του τελικού τεστ (post-test) στην ύλη της Ιστορίας ανέδειξαν σαφή υπεροχή της πειραματικής ομάδας έναντι της ομάδας ελέγχου. Η μέση επίδοση της πειραματικής ομάδας διαμορφώθηκε στο 81% (με τυπική απόκλιση ≈6,5%), ενώ η ομάδα ελέγχου σημείωσε μέση βαθμολογία 71% (ΤΑ ≈7,2%). Η διαφορά των 10 ποσοστιαίων μονάδων κρίθηκε στατιστικά σημαντική με βάση τον έλεγχο t-test για ανεξάρτητα δείγματα ($t(23) \approx 2.18$, $p < 0.05$), γεγονός που ενισχύει την υπόθεση ότι η εφαρμογή της εκπαιδευτικής παρέμβασης συνέβαλε θετικά στη μαθησιακή πρόοδο.

Αξίζει να σημειωθεί ότι στο αρχικό διαγνωστικό τεστ (pre-test), οι δύο ομάδες είχαν παρόμοια απόδοση, με μέσο όρο περίπου 62% και για τις δύο. Παρότι οι μέσοι όροι των δύο ομάδων ήταν παρόμοιοι, υπήρχαν μικρές διαφοροποιήσεις στην κατανομή των επιμέρους επιδόσεων, γεγονός που ενισχύει τη μεθοδολογική αξιοπιστία της παρέμβασης. Η αριθμητική σύμπτωση στον μέσο όρο υποδηλώνει ότι οι ομάδες ξεκίνησαν από παρόμοιο επίπεδο γνώσεων, καθιστώντας τις παρατηρούμενες μεταβολές στο post-test πιο εύλογα αποδιδόμενες στην επίδραση της διδακτικής προσέγγισης και όχι σε εξωτερικούς παράγοντες. Μετά την παρέμβαση, η πειραματική ομάδα εμφάνισε μέση βελτίωση περίπου 19 ποσοστιαίων μονάδων, έναντι 9 μονάδων της ομάδας ελέγχου. Η στατιστική ανάλυση εντός ομάδων με paired t-test επιβεβαίωσε τη σημαντική βελτίωση (Creswell & Creswell, 2018; Cohen, Manion, & Morrison, 2017) της πειραματικής ομάδας ($p < 0.01$), ενώ και η ομάδα ελέγχου παρουσίασε βελτίωση ($p < 0.05$), αλλά με μικρότερο εύρος και ένταση.

Πίνακας 1
Σύγκριση Απόδοσης Πειραματικής και Ομάδας Ελέγχου

Φάση	**Ομάδα**	**Μέσος Όρος (%)**
Pre-test	Πειραματική	62
Post-test	Πειραματική	81
Pre-test	Έλεγχος	62
Post-test	Έλεγχος	71

Το γράφημα που συνοδεύει την ενότητα (Πίνακας 1) απεικονίζει τη σύγκριση των μέσων όρων πριν και μετά την παρέμβαση. Φαίνεται καθαρά ότι, ενώ οι δύο ομάδες ξεκίνησαν από παρόμοια αφετηρία, μόνο η πειραματική ομάδα σημείωσε αισθητή πρόοδο άνω των 15 ποσοστιαίων μονάδων.

Τα ευρήματα αυτά συνάδουν με αντίστοιχα αποτελέσματα της διεθνούς βιβλιογραφίας που τεκμηριώνουν τη θετική επίδραση της παιχνιδοποίησης και της τεχνολογικά υποστηριζόμενης μάθησης. Για παράδειγμα, έρευνες σε μαθητικό πληθυσμό Δευτεροβάθμιας Εκπαίδευσης έχουν δείξει ότι η ενσωμάτωση ψηφιακών εργαλείων και προσαρμοστικής αξιολόγησης οδηγεί σε βελτίωση των επιδόσεων, της αυτοπεποίθησης και της ενεργούς εμπλοκής (Huang et al., 2020). Η παρούσα μελέτη προσθέτει σε αυτή τη συζήτηση, προτείνοντας ένα παιδαγωγικά τεκμηριωμένο μοντέλο μάθησης που συνδυάζει την τεχνητή νοημοσύνη με την εκπαιδευτική παιχνιδοποίηση.

Η ανάλυση των δεικτών εμπλοκής ανέδειξε επίσης ουσιώδεις διαφορές μεταξύ των δύο ομάδων. Σύμφωνα με τα δεδομένα καταγραφής της ψηφιακής πλατφόρμας, οι μαθητές της πειραματικής ομάδας αφιέρωσαν, κατά μέσο όρο, περίπου 45 λεπτά περισσότερα την εβδομάδα σε δραστηριότητες σχετικές με την Ιστορία πέρα από τον τυπικό διδακτικό χρόνο. Αντίθετα, οι μαθητές της ομάδας ελέγχου αφιέρωσαν περίπου 20 λεπτά, κυρίως για εργασία στο σπίτι ή μελέτη.

Σε σχετική ερώτηση του τελικού ερωτηματολογίου, 10 από τους 13 μαθητές της πειραματικής ομάδας (περίπου 77%) δήλωσαν ότι τα παιχνιδοποιημένα στοιχεία και τα εργαλεία τεχνητής νοημοσύνης ενίσχυσαν το ενδιαφέρον, την εμπλοκή και την απόδοσή τους. Αντίστοιχα, στην ομάδα ελέγχου, 5 από τους 12 μαθητές (ποσοστό 42%) χαρακτήρισαν το μάθημα «πολύ ενδιαφέρον», ενώ το αντίστοιχο ποσοστό στην πειραματική ομάδα ανήλθε σε 62%.

Η βαθμολογία ενδιαφέροντος/εμπλοκής σε πενταβάθμια κλίμακα Likert ήταν κατά μέσο όρο 4.3/5 για την πειραματική ομάδα και 3.0/5 για την ομάδα ελέγχου, γεγονός που αποτυπώνει την υψηλότερη συναισθηματική και γνωστική επένδυση των μαθητών στο καινοτόμο περιβάλλον.

Οι ποιοτικές παρατηρήσεις επιβεβαίωσαν τα ποσοτικά ευρήματα: οι μαθητές της πειραματικής ομάδας έδειξαν αυξημένη προθυμία για συμμετοχή, αναζητούσαν πρόσθετες αποστολές, και αλληλεπιδρούσαν ενεργά με τον chatbot. Στην ομάδα ελέγχου, η συμμετοχή περιοριζόταν κυρίως σε λίγους, ήδη δραστήριους μαθητές. Χαρακτηριστικές είναι οι μαρτυρίες που καταγράφηκαν. Ένας μαθητής της πειραματικής ομάδας δήλωσε: *«Κάθε μέρα ανυπομονούσα να δω τι νέο θα έχει το "παιχνίδι" της ιστορίας. Έμαθα πράγματα χωρίς να βαρεθώ καθόλου.»* Αντίστοιχα, μια μαθήτρια της ομάδας ελέγχου ανέφερε: *«Μου άρεσε η ιστορία φέτος, αλλά νομίζω θα μου άρεσε πιο πολύ αν κάναμε κι εμείς αυτά τα παιχνίδια που έκαναν οι άλλοι.»* Τα παραπάνω στοιχεία ενισχύουν την ερμηνεία ότι η αξιοποίηση της τεχνητής νοημοσύνης και της παιχνιδοποίησης δεν ενίσχυσε μόνο τη γνωστική εμπλοκή, αλλά και τη συναισθηματική σύνδεση των μαθητών με το μάθημα της Ιστορίας (Fredricks et al., 2004)

Πέρα από τις ποσοτικές επιδόσεις, αξιολογήθηκε και η ποιότητα της μάθησης μέσω ανοικτών ερωτήσεων και συζητήσεων στην τάξη. Οι απαντήσεις των μαθητών της πειραματικής ομάδας παρουσίαζαν, κατά μέσο όρο, μεγαλύτερη πληρότητα και βάθος ερμηνείας. Για παράδειγμα, στην ερώτηση «Εξήγησε δύο βασικούς λόγους που οδήγησαν στη Γαλλική Επανάσταση», οι μαθητές της ομάδας ελέγχου ανέφεραν γενικά σύντομες απαντήσεις με λέξεις-κλειδιά όπως «φορολογία» και «ανισότητες». Αντίθετα, αρκετοί μαθητές της πειραματικής ομάδας ανέπτυξαν ευρύτερα τις απαντήσεις τους, ενσωματώνοντας ιστορικό πλαίσιο και πληροφορίες που εντόπισαν μέσω του διαλόγου με το chatbot τεχνητής νοημοσύνης.

Αυτό υποδηλώνει όχι μόνο ενίσχυση της κατανόησης, αλλά και ενθάρρυνση της κριτικής σκέψης και της αυτονομίας στη μάθηση. Οι μαθητές δεν περιορίστηκαν στην ανάκληση απομνημονευμένων στοιχείων, αλλά ερμήνευσαν, συνέδεσαν και επιχειρηματολόγησαν — δεξιότητες που καλλιεργούνται σε περιβάλλοντα αυξημένης εμπλοκής και νοήματος.

Ιδιαίτερο ενδιαφέρον παρουσιάζει η πορεία μαθητών με χαμηλή αρχική επίδοση. Στην ομάδα ελέγχου, οι μαθητές που σημείωσαν κάτω από 50% στο προ-τεστ παρουσίασαν περιορισμένη βελτίωση και παρέμειναν σε συγκριτικά χαμηλά επίπεδα. Στην πειραματική ομάδα, ωστόσο, αρκετοί από τους μαθητές αυτούς βελτίωσαν σημαντικά τις επιδόσεις τους, με ορισμένους να φτάνουν ή και να ξεπερνούν το 70% στο μετά-τεστ.

Η πρόοδος αυτή αποδίδεται αφενός στην ανατροφοδότηση του προσαρμοστικού quiz, που επιτρέπει στους μαθητές να εργάζονται με βάση τον ρυθμό και τις ανάγκες τους, και αφετέρου στη θετική ψυχολογική επίδραση της παιχνιδοποίησης, που ενίσχυσε το ενδιαφέρον, την επιμονή και την αυτοπεποίθησή τους. Όπως δήλωσε χαρακτηριστικά ένας μαθητής με ΔΕΠΥ: «Ήταν η πρώτη φορά που κατάφερα να μην αποσπαστώ σε μάθημα Ιστορίας.»

Το εύρημα αυτό τονίζει τον ρόλο των ψηφιακών εργαλείων όχι ως υποκατάστατων, αλλά ως ενισχυτών της μαθησιακής εμπειρίας, ιδιαίτερα για μαθητές που αντιμετωπίζουν προκλήσεις στο παραδοσιακό μοντέλο διδασκαλίας.

Όπως παρουσιάζεται στον Πίνακα 1, η πειραματική ομάδα (με χρήση παιχνιδοποίησης και τεχνητής νοημοσύνης) υπερείχε της ομάδας ελέγχου σε όλους τους εξεταζόμενους δείκτες. Ιδιαίτερα αξιοσημείωτη ήταν η σημαντικά μεγαλύτερη μέση βελτίωση στη βαθμολογία του τεστ: 18,6 ποσοστιαίες μονάδες για την πειραματική ομάδα, έναντι 9,2 μονάδων της ομάδας ελέγχου.

Επιπλέον, 8 από τους 13 μαθητές της πειραματικής ομάδας (περίπου 62%) βελτίωσαν την απόδοσή τους κατά πάνω από 15 μονάδες (π.χ. από 52% σε 70% ή από 65% σε 83%), ενώ μόνο 3 από τους 12 μαθητές της ομάδας ελέγχου (25%) παρουσίασαν ανάλογη πρόοδο. Τα στοιχεία αυτά υποδεικνύουν ότι η διδακτική παρέμβαση συνέβαλε ουσιαστικά στην ποιοτική ενίσχυση της μαθησιακής επίδοσης.

Η αυξημένη εμπλοκή των μαθητών τεκμηριώνεται επίσης από τα ποιοτικά και ποσοτικά δεδομένα. Στο τελικό ερωτηματολόγιο, 11 από τους 13 μαθητές της πειραματικής ομάδας (περίπου 85%) ανέφεραν ότι ένιωσαν «πολύ ενεργά εμπλεκόμενοι» στο μάθημα, σε αντίθεση με 5 από τους 12 στην ομάδα ελέγχου (42%) (Reeve, 2012; Deci & Ryan, 2000). Παράλληλα, το 77% των μαθητών της πειραματικής ομάδας αξιολόγησε θετικά τη συμβολή της νέας μεθόδου στην κατανόηση και στο κίνητρό τους για μάθηση.

Ένα πρόσθετο στοιχείο αποτελεί η αυτοαναφερόμενη ενασχόληση εκτός τάξης: οι μαθητές της πειραματικής ομάδας αφιέρωσαν, κατά μέσο όρο, 45 λεπτά επιπλέον την εβδομάδα σε δραστηριότητες σχετικές με την Ιστορία — είτε για την ολοκλήρωση αποστολών, είτε από αυξημένο προσωπικό ενδιαφέρον. Αντιθέτως, στην ομάδα ελέγχου ο αντίστοιχος μέσος όρος ήταν μόλις 20 λεπτά. Τα αποτελέσματα αυτά υποδεικνύουν ότι οι δύο ομάδες ακολούθησαν διαφορετική τροχιά μάθησης, με την πειραματική ομάδα να παρουσιάζει σαφώς ταχύτερη και ουσιαστικότερη πρόοδο (Clark et al., 2017; Dichev & Dicheva, 2017).

Σε συμφωνία με επισημάνσεις των Dichev & Dicheva, (2017), η αποτελεσματικότητα της παιχνιδοποίησης εξαρτάται από το πλαίσιο. Παρά τα γενικά θετικά αποτελέσματα, παρατηρήθηκαν και ορισμένες προκλήσεις. Σε κάποιες περιπτώσεις, ορισμένοι μαθητές επικεντρώθηκαν υπερβολικά στους πόντους και τις επιβραβεύσεις, προσεγγίζοντας τη δραστηριότητα ως ανταγωνιστικό παιχνίδι σε βάρος της ουσίας. Ο εκπαιδευτικός χρειάστηκε να παρέμβει για να τονίσει τη σημασία της ιστορικής επιχειρηματολογίας. Επιπλέον, σημειώθηκαν μεμονωμένα περιστατικά όπου ο AI βοηθός παρείχε απλουστευμένες ή ελαφρώς ανακριβείς απαντήσεις. Ωστόσο, αυτά τα περιστατικά αξιοποιήθηκαν ως ευκαιρίες για συζήτηση σχετικά με τα όρια και τους κινδύνους της τεχνητής νοημοσύνης, ενισχύοντας την ψηφιακή εγγραμματοσύνη των μαθητών.

Συνολικά, η ποσοτική ανάλυση επιβεβαίωσε τη θετική επίδραση της παρέμβασης στις επιδόσεις και τη συμμετοχή, ενώ η ποιοτική ανάλυση αποκάλυψε βελτίωση στη στάση των μαθητών και ενδείξεις βαθύτερης μάθησης. Τα αποτελέσματα που ακολουθούν, συνοδευόμενα από πίνακες και γραφήματα, τεκμηριώνουν με περισσότερη λεπτομέρεια τις διαφορές μεταξύ των ομάδων και τις βελτιώσεις που παρατηρήθηκαν.

Η θεματική ανάλυση των ημιδομημένων συνεντεύξεων αποκάλυψε κυρίως θετικές εμπειρίες. Η πλειονότητα των μαθητών της πειραματικής ομάδας (7 από τους 10) ανέφερε ότι αισθανόταν πιο ενεργή στο μάθημα. Όλοι οι συμμετέχοντες της πειραματικής ομάδας (10 στους 10) επεσήμαναν ότι «το μάθημα έμοιαζε με παιχνίδι», γεγονός που ενίσχυσε το ενδιαφέρον τους. Πέντε μαθητές σημείωσαν ότι δεν φοβούνταν να κάνουν λάθη, καθώς είχαν τη δυνατότητα να προσπαθήσουν ξανά, μια εμπειρία που προωθεί την ασφαλή μάθηση και ενθαρρύνει τη συνεχή προσπάθεια. Τέσσερις μαθητές δήλωσαν ότι η αλληλεπίδραση με το chatbot ήταν από τα αγαπημένα τους στοιχεία. Όπως ανέφεραν χαρακτηριστικά: «Ήταν σαν να έχω τον δικό μου καθηγητή προσωπικά» και «με βοήθησε όταν κόλλησα, χωρίς να νιώσω ντροπή που ρώτησα». Αυτές οι παρατηρήσεις υπογραμμίζουν τον ρόλο της ΤΝ στη δημιουργία ενός υποστηρικτικού περιβάλλοντος, όπου οι μαθητές λαμβάνουν καθοδήγηση ακριβώς όταν τη χρειάζονται.

Ένα μικρό ποσοστό μαθητών (2 στους 10) εξέφρασε επιφυλάξεις ή μεικτές εμπειρίες. Κάποιοι ανέφεραν ότι αρχικά βρήκαν το σύστημα πολύπλοκο *(«είχε πολλά πράγματα να κάνεις, στην αρχή μπερδεύτηκα»*), ενώ ένας μαθητής προτίμησε έναν πιο παραδοσιακό ρυθμό, δηλώνοντας ότι *«μερικές φορές σκεφτόμουν τους πόντους αντί για το μάθημα»*. Αυτές οι απόψεις αναδεικνύουν ότι οι μαθησιακές καινοτομίες δεν ταιριάζουν το ίδιο σε όλους τους μαθητές και επηρεάζονται από χαρακτηριστικά προσωπικότητας και μαθησιακές προτιμήσεις. Αξιοσημείωτο είναι ότι ακόμη και μαθητές με ήδη υψηλό ενδιαφέρον για την Ιστορία δήλωσαν πως η παρέμβαση δεν άλλαξε ουσιαστικά τη στάση τους, καθώς είχαν ούτως ή άλλως εσωτερικό κίνητρο. Αντιθέτως, οι μαθητές που στο παρελθόν έδειχναν αδιαφορία, παρουσίασαν τη μεγαλύτερη μεταστροφή. Όπως σημείωσε ένας μαθητής: «*Παλιά κοιτούσα το ρολόι πότε θα τελειώσει το μάθημα. Τώρα περνάει η ώρα και δεν το καταλαβαίνω*».

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η ενσωμάτωση της παιχνιδοποίησης και της τεχνητής νοημοσύνης στη διδασκαλία της Ιστορίας οδήγησε σε σημαντικές βελτιώσεις τόσο στις ακαδημαϊκές επιδόσεις όσο και στη συμμετοχή και τη στάση των μαθητών. Οι σύγχρονες αυτές προσεγγίσεις αποδείχθηκαν αποτελεσματικές στην υπέρβαση παραδοσιακών εμποδίων, όπως η μονοτονία και η παθητικότητα, μετατρέποντας το μάθημα σε μια συμμετοχική και ζωντανή μαθησιακή εμπειρία. Τα δεδομένα επιβεβαιώνουν την υπόθεση ότι η παιγνιώδης μάθηση, σε συνδυασμό με την προσαρμοστική υποστήριξη της τεχνητής νοημοσύνης, μπορεί να παρακινήσει ακόμη και τους μαθητές με χαμηλό αρχικό ενδιαφέρον ή απόδοση, ενισχύοντας την αυτοπεποίθησή τους και προάγοντας βαθύτερη κατανόηση του ιστορικού περιεχομένου.

Τα ευρήματα της μελέτης καταδεικνύουν ότι ο συνδυασμός παιχνιδοποίησης και τεχνητής νοημοσύνης (ΤΝ) συνιστά αποτελεσματική παιδαγωγική προσέγγιση στη διδασκαλία της Ιστορίας στη δευτεροβάθμια εκπαίδευση. Η βελτίωση των επιδόσεων της πειραματικής ομάδας συμφωνεί με διεθνείς έρευνες όπου η παιχνιδοποίηση συνέβαλε στη βελτίωση της κατανόησης πολύπλοκων ιστορικών εννοιών. Στην παρούσα μελέτη, η χρήση παιχνιδοποιημένων δραστηριοτήτων παρείχε στους μαθητές σκοπό και νόημα στη μάθηση, ευνοώντας το ενδογενές κίνητρο και την ενεργό συμμετοχή, όπως υποστηρίζεται και από τις θεωρίες παρακίνησης (Deci & Ryan, 2000) και εμπλοκής. Η άμεση ανατροφοδότηση και η δυνατότητα προσαρμογής του επιπέδου δυσκολίας μέσω της ΤΝ επέτρεψαν έναν κύκλο ταχείας μάθησης, που δύσκολα επιτυγχάνεται σε παραδοσιακά περιβάλλοντα. Το γεγονός ότι οι μαθητές της πειραματικής ομάδας αφιέρωσαν περισσότερο χρόνο και ανέπτυξαν πληρέστερες απαντήσεις υποδηλώνει ουσιαστική μάθηση, πέραν της απλής απόκτησης βαθμών. Η αυξημένη εμπλοκή των μαθητών ερμηνεύεται εν μέρει από τη θεωρία της ροής, όπου η ισορροπία πρόκλησης και δεξιοτήτων, οι σαφείς στόχοι και η άμεση ανατροφοδότηση προάγουν βαθιά συμμετοχή (Csikszentmihalyi, 1990; Hamari et al., 2014). Χαρακτηριστικές είναι οι μαρτυρίες μαθητών που περιέγραψαν ότι «δεν καταλάβαιναν πώς περνούσε η ώρα» ή ότι «ήθελαν να συνεχίσουν και στο σπίτι», φράσεις που συνάδουν με τα γνωρίσματα της εμπειρίας ροής. Η ΤΝ διαδραμάτισε καίριο ρόλο σε αυτήν την ισορροπία, προσαρμόζοντας την πρόκληση και παρέχοντας στήριξη όταν απαιτούνταν. Αυτή η μορφή παιχνιδοποίησης με δυναμική προσαρμογή στις ανάγκες των μαθητών ενίσχυσε την εξατομικευμένη μάθηση, κάτι που ευθυγραμμίζεται με τις τάσεις εξατομικευμένης εκπαίδευσης με AI (Holmes et al., 2021; Zawacki-Richter et al., 2019). Τα ποιοτικά δεδομένα ανέδειξαν επίσης σημαντικά παιδαγωγικά οφέλη. Η πλειονότητα των μαθητών ανέφερε αυξημένο ενδιαφέρον, αίσθημα ασφάλειας ως προς την έκφραση ερωτήσεων και θετική εμπειρία μάθησης. Ιδιαίτερα, μαθητές με χαμηλότερες αρχικές επιδόσεις σημείωσαν δυσανάλογα μεγάλη πρόοδο, όπως έχει καταγραφεί και σε άλλες έρευνες όπου η παιχνιδοποίηση βελτίωσε την αυτοπεποίθηση και τη συμμετοχή ευάλωτων ομάδων (Clark et al., 2017). Παρότι το συνολικό αποτέλεσμα ήταν θετικό, επισημάνθηκαν και προκλήσεις. Μικρή μερίδα μαθητών δυσκολεύτηκε με τη πολυπλοκότητα του παιχνιδιού ή επικεντρώθηκε υπερβολικά στην απόκτηση πόντων εις βάρος της μάθησης. Επιπλέον, η ΤΝ παρείχε σε λίγες περιπτώσεις ανακριβείς ή απλουστευμένες απαντήσεις, κάτι που ανέδειξε την ανάγκη για κριτική αξιολόγηση ακόμη και ψηφιακών πηγών – μια δεξιότητα που διδάχθηκε ως μέρος της διαδικασίας. Οι περιορισμοί της μελέτης περιλαμβάνουν το μικρό μέγεθος δείγματος, την πιθανή επίδραση του νεωτερισμού και τον ρόλο του εκπαιδευτικού, του οποίου η θετική στάση και η τεχνολογική επάρκεια ήταν κρίσιμες για την επιτυχία της παρέμβασης. Η μακροπρόθεσμη αποτελεσματικότητα της προσέγγισης παραμένει επίσης αντικείμενο μελλοντικής διερεύνησης.

Η παρούσα μελέτη έδειξε ότι η παιχνιδοποίηση, όταν συνδυάζεται με τεχνητή νοημοσύνη και εντάσσεται σε παιδαγωγικά τεκμηριωμένο πλαίσιο, μπορεί να βελτιώσει σημαντικά τις μαθησιακές επιδόσεις, την εμπλοκή και την ποιότητα μάθησης στο μάθημα της Ιστορίας. Η προσέγγιση ωφέλησε ιδιαίτερα μαθητές που παραδοσιακά αντιμετώπιζαν δυσκολίες, ενισχύοντας τη συμμετοχή και την αυτοπεποίθησή τους. Τα ευρήματα υποδεικνύουν ότι η εφαρμογή παιχνιδοποιημένων και τεχνολογικά υποστηριζόμενων στρατηγικών μπορεί να μεταμορφώσει τη διδακτική πράξη, ευθυγραμμίζοντας τη μάθηση με τις συνήθειες και τις ανάγκες των σύγχρονων μαθητών. Η χρήση της ΤΝ δεν αντικατέστησε τον ρόλο του εκπαιδευτικού αλλά λειτούργησε υποστηρικτικά, προάγοντας την εξατομικευμένη μάθηση και ενισχύοντας τις δεξιότητες κριτικής σκέψης (Luckin et al., 2016; Holmes et al., 2021). Για μελλοντικές έρευνες, προτείνεται η διεύρυνση του δείγματος, η μακροχρόνια παρακολούθηση των αποτελεσμάτων και η διερεύνηση της επίδρασης διαφορετικών μορφών παιχνιδιού και AI στην εκπαίδευση (Creswell & Creswell, 2018; Reeves & Hedberg, 2003). Οι εκπαιδευτικοί και οι σχεδιαστές προγραμμάτων σπουδών καλούνται να εξετάσουν πώς μπορούν να αξιοποιήσουν αυτές τις καινοτομίες, με παιδαγωγική σκοπιμότητα και τεχνική προετοιμασία. Η διδασκαλία της Ιστορίας μπορεί να πάψει να θεωρείται μονότονη και να εξελιχθεί σε μια δυναμική διαδικασία μάθησης που καλλιεργεί όχι μόνο τη γνώση αλλά και τις δεξιότητες του 21ου αιώνα, μετατρέποντας την τάξη σε έναν χώρο ενεργής ανακάλυψης και συμμετοχής.

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Η ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΠΑΙΧΝΙΔΙΩΝ ΓΙΑ ΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΝΑΓΝΩΣΗΣ ΣΕ ΠΟΛΥΓΛΩΣΣΕΣ ΤΑΞΕΙΣ ΕΛΛΗΝΙΚΟΥ ΔΗΜΟΤΙΚΟΥ ΣΧΟΛΕΙΟΥ: Η ΠΕΡΙΠΤΩΣΗ ΤΟΥ D_READ-NARRATE

Χρίστου Θεοφανώ
Μεταδιδακτορική ερευνήτρια
Τομέας Γλωσσολογίας, Τμήμα Φιλολογίας, Πανεπιστήμιο Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: t.christou@uoi.gr

Μαστροπαύλου Μαρία
Αναπληρώτρια Καθηγήτρια
Τομέας Γλωσσολογίας, Τμήμα Φιλολογίας, Πανεπιστήμιο Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: mmastrop@uoi.gr

Πρέντζα Αλεξάνδρα
Ε.ΔΙ.Π.
Τομέας Γλωσσολογίας, Τμήμα Φιλολογίας, Πανεπιστήμιο Ιωαννίνων
Ιωάννινα, Ελλάδα
e-mail: aprentza@uoi.gr

ΠΕΡΙΛΗΨΗ

Στο συγκεκριμένο άρθρο παρουσιάζεται ένα καινοτόμο εκπαιδευτικό λογισμικό, το D_Read-Narrate, το οποίο έχει σχεδιαστεί για να υποστηρίξει τις γλωσσικές, αναγνωστικές και αφηγηματικές δεξιότητες, μονόγλωσσων, αλλά κυρίως δίγλωσσων παιδιών (8-12 ετών), που φοιτούν σε ελληνικά δημόσια δημοτικά σχολεία. Το λογισμικό αξιοποιεί τμήματα του iRead, ενός ήδη ολοκληρωμένου λογισμικού (https://iread-project.eu/), το οποίο σχεδιάστηκε στο πλαίσιο του προγράμματος χρηματοδότησης Horizon 2020. Στόχος είναι να παρουσιαστεί ο σχεδιασμός του λογισμικού, ο τρόπος λειτουργίας του καθώς και να δοθεί ένα ενδεικτικό σχέδιο μαθήματος που αφορά στη χρήση του λογισμικού κατά την εκπαιδευτική πράξη. Το συγκεκριμένο λογισμικό αναπτύχθηκε στο πλαίσιο του έργου: «Ψηφιακές εφαρμογές για τη διδασκαλία της ανάγνωσης και της αφήγησης σε πολύγλωσσες τάξεις ελληνικού δημοτικού σχολείου: D_Read-Narrate». Το έργο υλοποιείται στο πλαίσιο του Εθνικού Σχεδίου Ανάκαμψης και Ανθεκτικότητας «Ελλάδα 2.0», με τη χρηματοδότηση της Ευρωπαϊκής Ένωσης – NextGenerationEU (Φορέας Υλοποίησης: ΕΛ.ΙΔ.Ε.Κ.). Έχει ως αντικείμενο την ανάπτυξη μιας σειράς εκπαιδευτικών διαδικτυακών εφαρμογών που ενισχύουν τις γλωσσικές δεξιότητες των μαθητών/τριών δημοτικού σχολείου που κατακτούν την Ελληνική ως δεύτερη γλώσσα (Γ2). Το λογισμικό περιλαμβάνει: εργαλεία εκπαιδευτικού (ψηφιακές τάξεις, αξιολόγηση, ανάθεση εργασιών), λογισμικό γλωσσικής αξιολόγησης πριν, κατά και μετά τη χρήση του, καθώς και προφίλ μαθητών με αποθηκευμένες επιδόσεις και εξατομικευμένη ανατροφοδότηση. Και οι τρεις εφαρμογές του λογισμικού αλληλεπιδρούν με το Μοντέλο Πεδίου (Domain Model), το οποίο αποτελεί τον μαθησιακό και γλωσσικό πυρήνα του D_Read-Narrate και διαμορφώνει τα ατομικά Μοντέλα Χρήστη (User Models) κατά τη διάρκεια της χρήσης του. Από τον Μάρτιο του 2025, το λογισμικό χρησιμοποιείται σε δημόσια δημοτικά σχολεία με τάξεις υποδοχής, καθώς και σε σχολεία με μεγάλο αριθμό δίγλωσσων μαθητών (π.χ. σχολεία διαπολιτισμικής εκπαίδευσης) με στόχο και την αξιολόγηση της αποτελεσματικότητάς του.

Λέξεις – κλειδιά: Έξυπνα παιχνίδια, ανάγνωση, δίγλωσσοι, γλωσσικές δεξιότητες.

ΕΙΣΑΓΩΓΗ

Ο γραμματισμός είναι μια βασική δεξιότητα που διαμορφώνει το μορφωτικό επίπεδο, την ένταξη στην κοινωνική ζωή και τις μελλοντικές ευκαιρίες απασχόλησης των ατόμων (UNESCO, 1959). Η ανάπτυξη του γραμματισμού και των δεξιοτήτων ανάγνωσης κατά τα πρώτα σχολικά έτη είναι θεμελιώδους σημασίας για τις μετέπειτα σχολικές τους επιδόσεις, αλλά δεν επιτυγχάνεται στον ίδιο βαθμό από όλους/όλες τους/τις μαθητές/μαθήτριες. Διάφοροι παράγοντες όπως η περιορισμένη γνώση της γλώσσας του σχολείου, όπως συμβαίνει συχνά με μαθητές από οικογένειες μεταναστών ή προσφύγων, μπορεί να αποτελέσει εμπόδιο για την ανάπτυξη αυτών των δεξιοτήτων, θέτοντας έναν μεγάλο αριθμό μαθητ(ρι)ών σε μειονεκτική θέση, τόσο σε ακαδημαϊκό όσο και σε κοινωνικό επίπεδο.

Τα διαδοχικά δίγλωσσα παιδιά που εκτέθηκαν σε μια δεύτερη γλώσσα (Γ2) μετά την ηλικία των 3-4 ετών τείνουν να παρουσιάζουν ελλείμματα σε διάφορα επίπεδα της γλώσσας (φωνολογία, ορθογραφία, μορφοσύνταξη, λεξιλόγιο), γεγονός που, όπως δείχνουν σχετικές έρευνες (August and Shanahan, 2009; Bonifaci et al., 2020), τείνει να επηρεάζει αρνητικά τις αναγνωστικές και αφηγηματικές τους δεξιότητες.

Μελέτες έχουν δείξει ότι τα ψηφιακά εκπαιδευτικά παιχνίδια έχουν τη δυνατότητα να ενισχύουν την ανάπτυξη των δεξιοτήτων γραμματισμού των ατόμων γιατί: α) επιτρέπουν στους/στις μαθητές/μαθήτριες να επαναλαμβάνουν ασκήσεις και να παίρνουν άμεση ανατροφοδότηση (Holmes, 2011; Prensky, 2001α) και β) ενθαρρύνουν τη διάθεσή τους να συμμετέχουν ενεργά στην επίλυση προβλημάτων και στην αλληλεπίδραση με τους/τις δασκάλους/ες (Vasalou et al., 2021; Zakopoulou et al., 2017). Η χρήση εφαρμογών για την ανάπτυξη του γραπτού λόγου έχει συσχετιστεί με τη βελτίωση της ικανότητας αναγνώρισης των γραφημάτων από παιδιά στην πρώιμη σχολική ηλικία (Neumann, 2016), ενώ έχει φανεί ότι η χρήση ηλεκτρονικών βιβλίων μπορεί να ενισχύσει την ανάπτυξη του λεξιλογίου και τις ικανότητες φωνολογικής επίγνωσης (Ihmeideh, 2014). Αξίζει να σημειωθεί ότι τα ψηφιακά παιχνίδια γραμματισμού συμβάλλουν στη διαμόρφωση θετικής στάσης των μαθητ(ρι)ών απέναντι σε ένα γνωστικό αντικείμενο (Hidi and Renninger, 2006), καθώς οι δεξιότητές τους ενισχύονται μέσω της εξάσκησης και της άμεσης ανατροφοδότησης (Prensky, 2001α), μέσα από διαφορετικά επίπεδα δυσκολίας (Holmes, 2011), εφόσον στα παιχνίδια αυξάνεται το επίπεδο δυσκολίας όσο παίζουν τα παιδιά. Πρέπει, επίσης, να τονιστεί ότι τα παιχνίδια θεωρούνται ιδιαίτερα αποτελεσματικά στις μικρές ηλικίες (Prensky, 2001β), καθώς οι μαθητές ασχολούνται περισσότερο με δραστηριότητες που παρουσιάζονται μέσω παιχνιδιού (Garris et al., 2002), κάτι που ενισχύει άτυπα τη διαδικασία της μάθησης (Tobias et al., 2011), εφόσον δημιουργούνται κίνητρα μέσω της διασκέδασης (Bisson and Luckner, 1996).

Εν κατακλείδι, ολοένα και περισσότερα επιστημονικά στοιχεία δείχνουν ότι η τεχνολογία και η παιχνιδοποίηση (gamification) μπορούν να ενισχύσουν την ανάπτυξη γλωσσικών δεξιοτήτων γενικά και, ειδικά, δεξιοτήτων γραμματισμού μέσω της επανάληψης και της ανατροφοδότησης (Holmes, 2011), της αυξημένης εμπλοκής και της αύξησης των κινήτρων (Abrams and Walsh, 2014), ενώ τα οφέλη της παιχνιδοποίησης για την εκμάθηση της Γ2 έχουν επίσης τεκμηριωθεί ευρέως από σχετικά ερευνητικά δεδομένα (Flores, 2015; Rachels and Rockinson-Szapkiw, 2018).

Στόχος της παρούσας μελέτης είναι να αναλύσει τον σχεδιασμό και τις βασικές λειτουργίες του εκπαιδευτικού λογισμικού D_Read-Narrate, καθώς και να παρουσιάσει ένα ενδεικτικό σχέδιο μαθήματος για την εκπαιδευτική του εφαρμογή στην πράξη. Δεδομένου ότι η αξιολόγηση της αποτελεσματικότητάς του λογισμικού βρίσκεται σε εξέλιξη κατά την τρέχουσα περίοδο, η παρούσα μελέτη εστιάζει στην αναλυτική περιγραφή του εργαλείου καθώς και στην παρουσίαση ενός ενδεικτικού παιδαγωγικού σεναρίου χρήσης του.

ΤΟ ΛΟΓΙΣΜΙΚΟ D_READ-NARRATE

Το λογισμικό D_Read-Narrate (https://dread-narrate.gr/) αναπτύχθηκε στο πλαίσιο του έργου: «Ψηφιακές εφαρμογές για τη διδασκαλία της ανάγνωσης και της αφήγησης σε πολύγλωσσες τάξεις ελληνικού δημοτικού σχολείου: D_Read-Narrate». Το έργο υλοποιείται στο πλαίσιο του Εθνικού Σχεδίου Ανάκαμψης και Ανθεκτικότητας «Ελλάδα 2.0», με τη χρηματοδότηση της Ευρωπαϊκής Ένωσης – NextGenerationEU (Φορέας Υλοποίησης: ΕΛ.ΙΔ.Ε.Κ.). Έχει ως στόχο την εξέλιξη και την ενσωμάτωση των υφιστάμενων εφαρμογών του iRead (https://iread-project.eu/), ενός ολοκληρωμένου εκπαιδευτικού εργαλείου σχεδιασμένου να υποστηρίξει την ανάπτυξη αναγνωστικών δεξιοτήτων σε μαθητές/τριες με δυσλεξία, αρχάριους/ες αναγνώστες/ριες και μαθητές/τριες αγγλικής ως ξένης γλώσσας. Το έργο υλοποιήθηκε στο πλαίσιο του προγράμματος «Ψηφιακές υποδομές εξατομικευμένης εκμάθησης της ανάγνωσης (iRead)» και χρηματοδοτήθηκε από το Horizon 2020. Στο πλαίσιο του D_Read-Narrate επεκτείνονται και προσαρμόζονται οι λειτουργίες του iRead στις ιδιαίτερες γλωσσικές ανάγκες δίγλωσσων μαθητ(ρι)ών (κατώτερου) μεσαίου επιπέδου γλωσσομάθειας ως προς την ελληνική γλώσσα. Στόχος του συγκεκριμένου προγράμματος είναι η δημιουργία ενός νέου, καινοτόμου εκπαιδευτικού λογισμικού, το οποίο απευθύνεται σε έναν πληθυσμό που αντιμετωπίζει γλωσσικά, εκπαιδευτικά και συχνά κοινωνικά προβλήματα, δηλαδή σε δίγλωσσους μαθητές που κατακτούν την Ελληνική ως Γ2. Το

περιεχόμενο και το γλωσσικό υλικό που περιλαμβάνεται στο D_Read-Narrate έχει επιλεγεί έτσι ώστε να στοχεύει τόσο στις γλωσσικές όσο και στις εκπαιδευτικές/σχολικές ανάγκες των δίγλωσσων μαθητ(ρι)ών του δημοτικού σχολείου, εξασφαλίζοντας άμεση αντιστοιχία μεταξύ του περιεχομένου του λογισμικού και του Αναλυτικού προγράμματος σπουδών ως προς τη Γλώσσα στο Δημοτικό Σχολείο, το οποίο έχει ήδη καταγραφεί προκειμένου να γίνει η τελική ανάλυση και αντιστοίχιση του περιεχομένου του με το λογισμικό D_Read-Narrate. Τα γλωσσικά φαινόμενα καταγράφηκαν και στη συνέχεια κατηγοριοποιήθηκαν ανά τάξη. Ειδικότερα, μελετήθηκε το Αναλυτικό Πρόγραμμα Γλώσσας για όλες τις τάξεις του δημοτικού (Α΄–ΣΤ΄), τα εγχειρίδια της Γλώσσας και τα επίσημα κείμενα οδηγιών διδασκαλίας, ώστε να εξαχθεί μια πλήρης λίστα γλωσσικών φαινομένων. Όλα τα παραπάνω συγκεντρώθηκαν σ' έναν πίνακα αντιστοιχιών («φαινόμενο ↔ τάξη»), με σύντομες οδηγίες. Έτσι, διασφαλίζεται ότι κάθε δραστηριότητα του D_Read-Narrate εστιάζει σε συγκεκριμένες γλωσσικές δεξιότητες, ακριβώς εκεί όπου απαιτούνται σύμφωνα με το εκάστοτε Αναλυτικό Πρόγραμμα.

Το D_Read-Narrate αποτελείται από δύο κύριες εφαρμογές: μια εφαρμογή Έξυπνων Παιχνιδιών (Smart Games), η οποία επικεντρώνεται στην παρουσίαση γραμματικών φαινομένων της Ελληνικής εν είδη ασκήσεων, και μια εφαρμογή Αναγνώστη/Αφηγητή (Reader/Narrator), με δραστηριότητες που προάγουν την ανάγνωση και τις αφηγηματικές δεξιότητες των μαθητών. Εκτός από τις δύο κύριες εφαρμογές που υπάρχουν στο συγκεκριμένο λογισμικό, το D_Read-Narrate περιλαμβάνει και τα εξής: α) ένα ολοκληρωμένο λεξικό, το οποίο περιέχει γραμματικά επισημειωμένες λέξεις, β) εργαλεία εκπαιδευτικού (πρωτόκολλα και διαδικασίες αξιολόγησης μαθητών, ψηφιακές τάξεις, ανάθεση εργασιών), γ) λογισμικό αξιολόγησης γλωσσικών δεξιοτήτων για να διαπιστωθεί το επίπεδο γλωσσομάθειας των δίγλωσσων μαθητών και δ) σελίδα με το προφίλ μαθητών. Τα χαρακτηριστικά των παιχνιδιών[1] και των βοηθητικών εφαρμογών του D_Read-Narrate περιγράφονται παρακάτω. Πριν την περιγραφή των παιχνιδιών είναι απαραίτητη η επεξήγηση της λειτουργίας των Μοντέλων Πεδίου, πάνω στα οποία βασίζονται τα παιχνίδια και τα οποία είναι απαραίτητα για την ανάπτυξη των παιχνιδιών.

Τα Μοντέλα Πεδίου (Domain Models)

Στο D_Read-Narrate υπάρχουν δύο Μοντέλα Πεδίου, ένα για μονόγλωσσους και ένα για δίγλωσσους μαθητές. Κάθε μοντέλο πεδίου είναι ένα μια ολοκληρωμένη βάση δεδομένων γνώσεων η οποία αποτελεί το γλωσσικό υλικό που περιλαμβάνεται στο D_Read-Narrate και καθορίζει ποια γλωσσικά στοιχεία εμπεριέχονται στα παιχνίδια, το επίπεδο δυσκολίας των φαινομένων αλλά και τα προαπαιτούμενά τους. Οι πληροφορίες στα Μοντέλα Πεδίου τροφοδοτούν σε πραγματικό χρόνο τα παιχνίδια με κατάλληλο υλικό και υποστηρίζουν την εξατομικευμένη πορεία μάθησης για τον κάθε μαθητή. Το γλωσσικό υλικό κατηγοριοποιείται σε 4 επίπεδα δυσκολίας.

Τα παιχνίδια αλληλεπιδρούν με τα Μοντέλα Πεδίου, τα οποία αποτελούν τον μαθησιακό και γλωσσικό πυρήνα του D_Read-Narrate και διαμορφώνουν τα ατομικά Μοντέλα Χρήστη (User Models) κατά τη διάρκεια της χρήσης των παιχνιδιών. Τα Μοντέλα Πεδίου είναι το στοιχείο εκείνο που καθιστά το D_Read-Narrate καινοτόμο για τα ελληνικά και διεθνή δεδομένα. Οι γλωσσικές κατηγορίες εντός των Μοντέλων Πεδίου επιλέχθηκαν με βάση τα αποτελέσματα εκτεταμένης βιβλιογραφικής ανασκόπησης και ταξινομήθηκαν ως προς τη δυσκολία ή την πολυπλοκότητά τους με βάση μια αρχική ταξινόμηση των πεδίων ανά κατηγορία, η οποία διαμορφώθηκε από εμπειρικά δεδομένα (Mastropavlou et al., 2020). Τα επιλεγμένα χαρακτηριστικά καλύπτουν φαινόμενα απαραίτητα για την ανάπτυξη της ανάγνωσης, δομές που συνήθως διδάσκονται/αναπτύσσονται πρώτα και εμφανίζονται περισσότερο στα κείμενα που απευθύνονται σε παιδιά των ομάδων στόχων μας, καθώς και πιο δύσκολα φαινόμενα που δυσκολεύουν τα δίγλωσσα παιδιά. Τα επίπεδα γλωσσικής ανάλυσης που περιλαμβάνονται στα Μοντέλα Πεδίου και τα οποία αξιοποιούνται στα Έξυπνα Παιχνίδια είναι: η φωνολογία, η μορφολογία και η σύνταξη. Σε κάθε γλωσσικό επίπεδο εμπεριέχονται διάφορες γλωσσικές υποκατηγορίες και συσχετιζόμενα γλωσσικά φαινόμενα (Πίνακας 1).

Τα Μοντέλα Πεδίου φιλτράρουν και επιλέγουν ποιες ασκήσεις θα αντλήσουν τα παιχνίδια, με βάση το επίπεδο του μαθητή. Μέσα από τον καθορισμό των επιπέδων δυσκολίας και τον ορισμό των προαπαιτούμενων φαινομένων καθορίζεται με ποια φαινόμενα θα έρθει αρχικά σε επαφή το παιδί και ποια θα ακολουθήσουν. Τα Μοντέλα ενημερώνονται για τη γλωσσική ικανότητα των παιδιών μέσω των επιδόσεών τους στα παιχνίδια. Για παράδειγμα, για ένα παιδί μπορεί να μην είναι διαθέσιμα όλα τα γλωσσικά χαρακτηριστικά για εξάσκηση μέσω των παιχνιδιών καθώς υπάρχουν γλωσσικά προαπαιτούμενα. Συγκεκριμένα, ένα παιδί θα έρθει σε επαφή αρχικά με παιχνίδια για το κλιτικό επίθημα *-ος* (άνθρωπος) και ακολούθως με το κλιτικό επίθημα *-ών* (πορτών), δεδομένου ότι κρίνεται πιο δύσκολη η γενική πληθυντικού συγκριτικά με την ονομαστική ενικού.

[1] Η εφαρμογή για τον Αναγνώστη/Αφηγητή δεν έχει ακόμη ολοκληρωθεί.

Πίνακας 1
Ενδεικτικό περιεχόμενο των Μοντέλων Πεδίου

Γλωσσικά επίπεδα	**Γλωσσικές υποκατηγορίες**	**Φαινόμενα**
Φωνολογία	Αντιστοιχία γραφήματος με φώνημα	2:1 (μπ - /b/ κλπ.)
		1:2 (π.χ. ξ - /ks/, ψ - /ps/)
Μορφολογία	Κλιτική μορφολογία	Καταλήξεις ουσιαστικών (-ος/-ού/-ό(ν)/..., -α/-ας/-α,... κλπ.)
		Καταλήξεις ρημάτων (-ω/-εις/-ει/... κλπ.)
	Παραγωγική μορφολογία	Καταλήξεις ονομάτων (-άκι, -ίτσα, ίτης κλπ.), ρημάτων (-ίζω, -ώνω, -εύω, κλπ.) και επιθέτων (-ώδης, -ικός, κλπ.)
		Προθήματα (προσ-, υπο-, υπερ-, κλπ.)
Σύνταξη	Λειτουργικές λέξεις	Προθέσεις (από, με, για, σε)
		Άρθρα (ο/η/το/..., ένας/μία/ένα/...)
		Αντωνυμίες (με, σε, τον κλπ.)
	Φωνή (ενεργητική, παθητική κλπ.)	Παθητικά ρήματα (συλλαμβάνομαι)
		Αυτοπαθητικά (χτενίζομαι)
		Αλληλοπαθητικά (αγκαλιάζονται)
		Αποθετικά (σκέφτομαι)
	Εξαρτημένες προτάσεις	Αναφορικές
		Συμπληρωματικές
		Επιρρηματικές
	Αναφορικά στοιχεία	Προσωπικές αντωνυμίες
		Οριστικές και αόριστες ονοματικές φράσεις
		Κενά υποκείμενα

<u>Τα «Έξυπνα Παιχνίδια» (Smart Games)</u>

Η εφαρμογή «Έξυπνα Παιχνίδια» (Smart Games) είναι μια ψηφιακή εφαρμογή που περιλαμβάνει ένα σύνολο δραστηριοτήτων με τη μορφή γλωσσικών παιχνιδιών και γρίφων, τα οποία αποσκοπούν στη βελτίωση των δεξιοτήτων των μαθητ(ρι)ών στους τομείς της φωνολογίας, της δομής των λέξεων (μορφολογία) και της κατανόησης των προτάσεων (σύνταξη) με διασκεδαστικό τρόπο, κάτι που δίνει κίνητρο στα παιδιά για μάθηση. Τα συγκεκριμένα παιχνίδια χαρακτηρίζονται «έξυπνα», μιας και παρέχουν στους μαθητές εξατομικευμένη υποστήριξη, προκειμένου να αντιμετωπιστούν τα γλωσσικά ελλείμματα που τυχόν έχουν. Με αυτόν τον τρόπο, οι μαθητές έχουν τη δυνατότητα να βελτιωθούν, εφόσον, μέσω της εξατομικευμένης βοήθειας που λαμβάνουν, μπορούν να μεταφέρονται αυτόματα από το

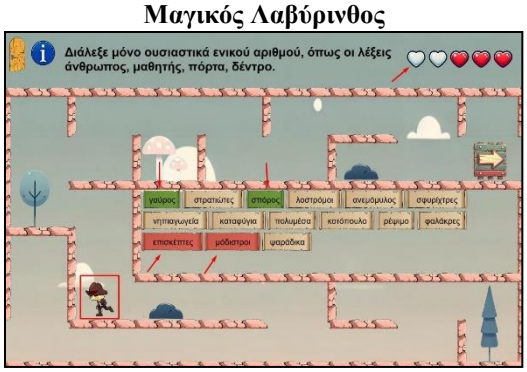
λογισμικό σταδιακά σε δραστηριότητες αυξανόμενης δυσκολίας και πολυπλοκότητας. Παράλληλα, οδηγούνται σε δραστηριότητες που καθορίζονται με βάση τα ατομικά τους χαρακτηριστικά και δυσκολίες (γλωσσικό προφίλ και επίπεδο ελληνομάθειας). Τα παιχνίδια είναι σχεδιασμένα, ώστε να ενισχύουν τις δεξιότητες της αυτοματοποίησης και της ακρίβειας ως προς τη χρήση της γλώσσας.

Οι δραστηριότητες, οι οποίες έχουν τη μορφή παιχνιδιών ή γρίφων, περιλαμβάνουν ασκήσεις δημιουργίας λέξεων (π.χ. επιλογή κατάλληλων τμημάτων για τη δημιουργία μιας νέας λέξης), δημιουργίας προτάσεων (επιλογή κατάλληλης λέξης για τοποθέτηση σε κενό μέσα σε μια πρόταση με βάση τη σημασία, τοποθέτηση λέξεων στο σωστό πλαίσιο με βάση τη γραμματική τους κατηγορία). Το εκπαιδευτικό περιεχόμενο (π.χ. γράμματα, λέξεις, φράσεις, προτάσεις) αντλείται από τα Μοντέλα Πεδίου του D_Read-Narrate και παρουσιάζεται με σειρά αυξανόμενης δυσκολίας, με βάση τον καθορισμό του επιπέδου δυσκολίας που αντιστοιχεί σε κάθε φαινόμενο όπως επισημαίνεται στα Μοντέλα Πεδίου, καθώς και την ατομική επίδοση κάθε μαθητή στα παιχνίδια.

Εικόνα 1
Ποταμόπλοιο



Εικόνα 2
Μαγικός Λαβύρινθος



Εικόνα 3
Βαρέλια



Εικόνα 4
Γέφυρα Σπηλαίου



Εικόνα 5
Αερόστατα



Στο D_Read-Narrate περιλαμβάνονται 5 παιχνίδια: 1) «Ποταμόπλοιο» (Εικόνα 1). Στο συγκεκριμένο παιχνίδι, εμφανίζεται ένα σύνολο από σακούλες αλευριού με επιλογές που απαντούν στην ερώτηση που έχει τεθεί. Πατώντας πάνω

σε μια σακούλα, το παιχνίδι αποθηκεύει την απάντηση. Αν το παιδί πατήσει λάθος σακούλα, ο ήρωας θα προσπαθήσει να μεταφέρει τη συγκεκριμένη σακούλα, αλλά το σκάφος θα βυθιστεί και ο ήρωας θα επιστρέψει στην αρχική θέση, ενώ η επιλεγμένη σακούλα δε θα είναι πλέον διαθέσιμη. Εάν το παιδί πατήσει τη σωστή σακούλα (μόνο μία μπορεί να είναι η σωστή), ο ήρωας θα τη μεταφέρει στην πλευρά του φάρου. 2) «Μαγικός Λαβύρινθος» (Εικόνα 2). Στο παιχνίδι «Μαγικός Λαβύρινθος» εμφανίζεται ένα σύνολο παπύρων με επιλογές που μπορούν να απαντήσουν στο συγκεκριμένο ερώτημα. Αν το παιδί πατήσει έναν σωστό πάπυρο (υπάρχουν πολλοί σωστοί πάπυροι), ο συγκεκριμένος πάπυρος θα χρωματιστεί πράσινος και ο ήρωας θα μεταφερθεί στην έξοδο. Αν πατήσει σε λάθος πάπυρο, ο συγκεκριμένος πάπυρος θα χρωματιστεί κόκκινος. Αν το παιδί βρει όλους τους σωστούς παπύρους ο ήρωας θα φτάσει στην έξοδο του λαβυρίνθου. 3) «Βαρέλια» (Εικόνα 3). Το παιχνίδι «Βαρέλια», εμφανίζει ένα σύνολο βαρελιών με επιλογές που μπορούν να γεμίσουν το συγκεκριμένο πλαίσιο. Το παιδί πρέπει να μετακινήσει τα βαρέλια στις σωστές θέσεις. Σέρνοντας και αφήνοντας το βαρέλι στις κενές θέσεις το παιδί μπορεί να απαντήσει στην ερώτηση. Εάν το παιδί μετακινήσει το βαρέλι σε λανθασμένη θέση, το βαρέλι θα επιστρέψει στην αρχική του θέση. Αν γεμίσει όλα τα κενά με τα σωστά βαρέλια, ο ήρωας θα πηδήξει πάνω από τα βαρέλια και θα φτάσει στην άλλη πλευρά. 4) «Γέφυρα Σπηλαίου» (Εικόνα 4). Στο συγκεκριμένο παιχνίδι, εμφανίζονται κάποια πλακίδια με επιλογές που μπορούν να συμπληρώσουν το δεδομένο πλαίσιο. Τα παιδιά πρέπει να τα μετακινήσουν στις σωστές θέσεις σέρνοντας και αφήνοντάς τα όπου θεωρούν κατάλληλο. 5) «Αερόστατα» (Εικόνα 5). Το παιχνίδι αυτό παρουσιάζει ένα σύνολο μπαλονιών με επιλογές που απαντούν σε συγκεκριμένη ερώτηση. Πατώντας πάνω σε ένα μπαλόνι, το παιχνίδι επικυρώνει την απάντηση. Σε όλα τα παιχνίδια, σε περίπτωση λάθους, χάνεται μια καρδιά και εμφανίζεται στην οθόνη μήνυμα ανατροφοδότησης, ενώ όταν ολοκληρώνεται μια δραστηριότητα εμφανίζεται μήνυμα επιβράβευσης.

Υποστηρικτικές εφαρμογές

Το λογισμικό D_Read-Narrate περιλαμβάνει επίσης υποστηρικτικές εφαρμογές που βοηθούν στη διαδικασία διδασκαλίας/μάθησης τόσο για τους/τις εκπαιδευτικούς όσο και για τους/τις μαθητές/μαθήτριες. Αυτές περιλαμβάνουν τα εξής:

- Εργαλεία εκπαιδευτικού: Οι εκπαιδευτικοί μπορούν να συνδεθούν με έναν προσωπικό λογαριασμό, ο οποίος τους προσφέρει εξατομικευμένα εργαλεία που βοηθούν τη διδασκαλία. Μέσω του προφίλ τους, οι εκπαιδευτικοί μπορούν:
    - να συμπληρώνουν λίστες αξιολόγησης αφηγήσεων για να αξιολογούν τις προφορικές αφηγήσεις των μαθητ(ρι)ών τους και να τους στέλνουν ανατροφοδότηση,
    - να δημιουργούν ψηφιακές τάξεις για ομαδικές εργασίες, όπως η ομαδική δημιουργία ιστοριών κ.λπ.,
    - να παρακολουθούν τις επιδόσεις των μαθητ(ρι)ών τους σε δραστηριότητες που αφορούν τη γλώσσα ή την ανάγνωση,
    - να αναθέτουν δραστηριότητες κ.λπ..

- Εφαρμογή αξιολόγησης γλωσσικού επιπέδου (screening). Η συγκεκριμένη εφαρμογή δίνει τη δυνατότητα στους εκπαιδευτικούς να αξιολογήσουν σε μικρό χρονικό διάστημα τις γλωσσικές ικανότητες των μαθητ(ρι)ών τους πριν από την πρώτη χρήση του λογισμικού D_Read-Narrate. Τη συγκεκριμένη εφαρμογή έχουν τη δυνατότητα να τη χρησιμοποιήσουν τόσο κατά τη διάρκεια όσο και μετά τη χρήση του D_Read-Narrate, ώστε να παρακολουθούν την πρόοδο και τις επιδόσεις των μαθητών τους. Συγκεκριμένα, για την ενσωμάτωση της εφαρμογής αξιολόγησης γλωσσικού επιπέδου έγινε προσαρμογή των σταθμισμένων τεστ «Ας Μιλήσουμε Ελληνικά» (ΙΙ, ΙΙΙ), τα οποία δημιουργήθηκαν για την αξιολόγηση του επιπέδου γλωσσικής επάρκειας των δίγλωσσων μαθητών στο πλαίσιο του προγράμματος «Εκπαίδευση Μουσουλμανοπαίδων 2002-2004» (Τζεβελέκου κ.ά. 2004). Τα συγκεκριμένα τεστ υπάρχουν στο διαδίκτυο στη σελίδα: http://www.diapolis.auth.gr/eclass/mod/folder/view.php?id=457.

- Προφίλ μαθητ(ρι)ών : Οι μαθητές/μαθήτριες θα μπορούν να:
    - αποθηκεύουν την επίδοσή τους
    - βλέπουν τις βαθμολογίες τους κ.λπ.
    - ενημερώνουν για την επίδοση και την επιλογή του εκπαιδευτικού περιεχομένου τα Έξυπνα Παιχνίδια, παρέχοντας εξατομικευμένη μάθηση.

ΑΞΙΟΛΟΓΗΣΗ ΤΟΥ ΛΟΓΙΣΜΙΚΟΥ

Με την ολοκλήρωση το λογισμικού, κρίνεται απαραίτητη η αξιολόγηση της λειτουργίας και αποτελεσματικότητας των εφαρμογών του D_Read-Narrate ως εργαλείων διδασκαλίας σε φυσικές συνθήκες. Βασικός στόχος της αξιολόγησης του λογισμικού D_Read-Narrate είναι να διερευνηθεί η επίδρασή του:(α) στις γλωσσικές δεξιότητες (λεξιλόγιο, γραμματική) καθώς και στην αναγνωστική και αφηγηματική ικανοτήτων των μαθητ(ρι)ών, (β) στη

συνολική σχολική τους επίδοση, και (γ) στα κίνητρα, την αυτοπεποίθηση και τη στάση τους απέναντι στη χρήση της ελληνικής γλώσσας στην τάξη. Επίσης, δευτερεύων στόχος της αξιολόγησης του λογισμικού είναι να καταγράψει τις στάσεις και εντυπώσεις των μαθητ(ρι)ών και εκπαιδευτικών απέναντι στη χρήση του λογισμικού και στην ένταξή του στη διδασκαλία.

Συγκεκριμένα, αξιολογείται η πρώτη έκδοση των εφαρμογών του D_Read-Narrate, οι οποίες εφαρμόζονται σε δείγμα 33 δίγλωσσων μαθητ(ρι)ών και 90 μονόγλωσσων μαθητ(ρι)ών τυπικής ανάπτυξης με μητρική γλώσσα την ελληνική από ερευνητές/ερευνήτριες της ομάδας του Πανεπιστημίου Ιωαννίνων (Π.Ι.). Οι συμμετέχοντες/ουσες της πειραματικής ομάδας επιλέχθηκαν με βάση συγκεκριμένα κριτήρια επιλογής, τα οποία περιλαμβάνουν: (i) χρονολογική ηλικία (8-12 ετών), (ii) μη ελληνική Γ1, (iii) 2-5 χρόνια έκθεσης στην ελληνική γλώσσα και (iv) απουσία οποιασδήποτε γλωσσικής παθολογίας ή μαθησιακής δυσκολίας. Η ομάδα ελέγχου επελέγη με βάση τα κριτήρια (i) και (iv) παραπάνω, ενώ το κριτήριο (ii) περιλαμβάνει την ελληνική ως Γ1.

Πριν και μετά τη χρήση του λογισμικού γίνεται αξιολόγηση των επικοινωνιακών δεξιοτήτων καθώς και των δεξιοτήτων ανάγνωσης των μαθητ(ρι)ών (στα ελληνικά) με την αξιοποίηση του εργαλείου γλωσσικής αξιολόγησης που θα είναι ενσωματωμένο στο D_Read-Narrate. Επιπρόσθετα, αξιολογείται η αναγνωστική ικανότητα των μαθητ(ρι)ών με το Τεστ Ανάγνωσης-Α (Τεστ-Α) (Παντελιάδου και Αντωνίου, 2008). Το συγκεκριμένο τεστ απευθύνεται σε μαθητές Γ΄ Δημοτικού έως Γ΄ Γυμνασίου και περιέχει 10 δραστηριότητες, οι οποίες αποσκοπούν στην αξιολόγηση των παιδιών στα εξής: α) Αποκωδικοποίηση, β) Ευχέρεια, γ) Μορφολογία-Σύνταξη και δ) Κατανόηση. Παράλληλα, οι δίγλωσσοι/ες μαθητές/μαθήτριες κλήθηκαν να συμπληρώσουν με τη βοήθεια των ερευνητών και ένα ερωτηματολόγιο καταγραφής γλωσσικού ιστορικού. Το ερωτηματολόγιο αποτελείται από τρεις ενότητες οι οποίες αφορούν: 1) γενικές πληροφορίες για τους/τις μαθητές/μαθήτριες, 2) πληροφορίες για το οικογενειακό και γλωσσικό ιστορικό, 3) πληροφορίες για την τρέχουσα χρήση της γλώσσας από τα παιδιά.

Πίνακας 2
Σύντομο σχέδιο μαθήματος

Στόχοι μαθήματος: Ενίσχυση της εκμάθησης των συμπληρωματικών προτάσεων και άσκηση της χρήσης τους. *Προτεινόμενη τάξη-στόχος:* Μονόγλωσσοι: Δ΄ τάξη, Δίγλωσσοι: Δ΄, Ε΄ ή ΣΤ΄ τάξη. Μπορεί να χρησιμοποιηθεί με όλη την τάξη και σε μαθήματα μικρών ομάδων. *Δραστηριότητα* (35 λεπτά): *Απαιτούμενα*: τάμπλετ, πίνακας, διαδραστικός πίνακας, τετράδιο. *Εισαγωγή* (5 λεπτά): Ο/Η εκπαιδευτικός εισάγει τον τρόπο εισαγωγής, τη σημασία και τη λειτουργία των συμπληρωματικών προτάσεων («ότι», «να») και χρησιμοποιεί τον πίνακα για να δώσει παραδείγματα προτάσεων που εισάγονται με ότι, να. Παράλληλα, ακούει και καταγράφει προτάσεις από τα παιδιά. *Ομαδικό παιχνίδι* (20 λεπτά): *Εκπαιδευτικός*: Με τη χρήση του διαδραστικού πίνακα ή του υπολογιστή και του προτζέκτορα ξεκινάει μαζί με τα παιδιά να παίζουν τα παιχνίδια που έχει ήδη επιλέξει (Ακρίβειας: Λαβύρινθος, Μπαλόνια, Σύνθεσης πρότασης: Γέφυρα, ποταμόπλοιο). Καλεί κάποια παιδιά να επιλέγουν τις απαντήσεις. Σημειώνουν στο τετράδιο τα ρήματα που υπάρχουν πριν από το τους συμπληρωματικούς δείκτες «ότι» και «να». *Παιδιά*: Συζητούν τις διαθέσιμες επιλογές και συμφωνούν στη σωστή απάντηση πριν την επιλέξουν στο παιχνίδι. Πριν κάνουν την επιλογή στο παιχνίδι, γράφουν στο τετράδιο τα ρήματα που εισάγουν συμπληρωματική πρόταση. *Ομαδική συζήτηση* (10 λεπτά): Ο/Η εκπαιδευτικός συζητά και αναλύει τις λανθασμένες επιλογές των παιδιών. Σχηματίζονται μεγαλύτερες ομάδες 4-6 ατόμων. Τα παιδιά συζητούν τι έχουν μάθει κατά τη διάρκεια του μαθήματος. *Ολοκλήρωση μαθήματος* (5 λεπτά): Ο/Η εκπαιδευτικός δίνει εργασία για το σπίτι, κατά την οποία καλούνται οι μαθητές/ μαθήτριες να γράψουν 10 δικές τους προτάσεις με «ότι», «να».

Πριν τη χρήση και αξιολόγηση του λογισμικού στις τάξεις, έγινε ένα εργαστήριο εκπαίδευσης και συνεργασίας μεταξύ των ερευνητών του Π.Ι. και των εκπαιδευτικών που συμμετέχουν στο πρόγραμμα, μέσω του οποίου επιτεύχθηκε η εξοικείωση των εκπαιδευτικών με τις εφαρμογές του D_Read-Narrate. Στο πλαίσιο του εργαστηρίου συζητήθηκαν και τρόποι πιθανής ένταξης του λογισμικού στο μάθημα. Ενδεικτικά, παρατίθεται ένα σύντομο σχέδιο μαθήματος, στο οποίο φαίνεται η αξιοποίηση του λογισμικού κατά τη διδασκαλία των Συμπληρωματικών προτάσεων (Πίνακας 2).

Αφού ολοκληρώθηκε το εργαστήριο ξεκίνησε η αξιοποίηση των εφαρμογών του D_Read-Narrate από τους/τις εκπαιδευτικούς. Η χρήση του λογισμικού κυμαίνεται από 10 έως 20 λεπτά κάθε φορά στο πλαίσιο του μαθήματος και

γίνεται από τον/την εκπαιδευτικό με την υποστήριξη μέλους της ερευνητικής ομάδας. Η αξιολόγηση του λογισμικού πρόκειται να ολοκληρωθεί τον Δεκέμβριο του 2025, οπότε και αναμένονται τα συνολικά τελικά αποτελέσματα

ΣΥΜΠΕΡΑΣΜΑ

Το συγκεκριμένο έργο αναμένεται να έχει σημαντικό κοινωνικό και επιστημονικό αντίκτυπο. Ο κοινωνικός του αντίκτυπος σχετίζεται με το γεγονός ότι το D_Read-Narrate στοχεύει στην ενίσχυση των δεξιοτήτων επικοινωνίας και μάθησης των δίγλωσσων μαθητ(ρι)ών και, ως εκ τούτου, αναμένεται να βελτιώσει τις ακαδημαϊκές τους επιδόσεις. Παράλληλα, φιλοδοξεί να μειώσει τα μαθησιακά χάσματα που δημιουργούνται από τη γλωσσική ποικιλότητα και την όποια καθυστέρηση στην κατάκτηση της γλώσσας του σχολείου, βελτιώνοντας την ομαλή ένταξη και τις σχολικές επιδόσεις των παιδιών με μεταναστευτικό υπόβαθρο ή με άλλη μητρική γλώσσα εκτός της Ελληνικής.

Ο επιστημονικός αντίκτυπος του έργου έγκειται στη συμβολή του στην επιστημονική γνώση σχετικά με την αλληλεπίδραση μεταξύ της γραμματικής γνώσης και των δεξιοτήτων που σχετίζονται με το κείμενο (ανάγνωση και αφήγηση) σε δίγλωσσα και ελληνόφωνα παιδιά. Επιπλέον, δεδομένης της καθολικότητας της δι-/πολυγλωσσίας, το έργο αναμένεται να έχει ευρύτερο επιστημονικό αντίκτυπο, καθώς τα ευρήματά του μπορούν να μεταφερθούν σε άλλα δίγλωσσα (μη ελληνικά) περιβάλλοντα. Η παραγόμενη υποδομή, ο σχεδιασμός του παιχνιδιού και το παιδαγωγικό μοντέλο μπορούν να αξιοποιηθούν και μετά το τέλος του έργου για ερευνητικούς σκοπούς.

Τέλος, μέσα από την πιλοτική εφαρμογή του D_Read-Narrate καταδεικνύεται ότι η στοχευμένη, εξατομικευμένη μάθηση ενισχύει με τρόπο ουσιαστικό τις γλωσσικές και αναγνωστικές δεξιότητες των μαθητών δημοτικού, ιδιαίτερα των δίγλωσσων που μαθαίνουν την Ελληνική ως Γ2. Μέσα από τα δυναμικά Μοντέλα Πεδίου το λογισμικό προσαρμόζει σε πραγματικό χρόνο το επίπεδο δυσκολίας και το είδος των δραστηριοτήτων στις επιδόσεις και ανάγκες του κάθε παιδιού. Το λογισμικό υποστηρίζει την αυτονομία των μαθητών, δίνοντάς τους την αίσθηση ελέγχου της μαθησιακής τους διαδρομής και ενισχύοντας την αυτοπεποίθηση μέσω συνεχούς ανατροφοδότησης. Επίσης, διευκολύνει τους εκπαιδευτικούς να εντοπίσουν γλωσσικά κενά και να παρέμβουν με στοχευμένο τρόπο, αξιοποιώντας εξατομικευμένα πρωτόκολλα αξιολόγησης και ψηφιακά εργαλεία παρακολούθησης επιδόσεων.

Η οριστική αξιολόγηση του λογισμικού, σε εξέλιξη έως τον Δεκέμβριο του 2025, θα επιτρέψει την ποσοτική και ποιοτική εκτίμηση της αποτελεσματικότητάς του, δίνοντας τη δυνατότητα περαιτέρω βελτιστοποίησης και κλιμάκωσης σε ολοένα μεγαλύτερο αριθμό σχολικών μονάδων.

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VIRTUAL ALGOLAB: ΑΝΑΠΤΥΞΗ VR ΠΑΙΧΝΙΔΙΟΥ ΓΙΑ ΔΟΜΕΣ ΔΕΔΟΜΕΝΩΝ ΚΑΙ ΑΛΓΟΡΙΘΜΟΥΣ

Αναγνώστου Παύλος
Προπτυχιακός φοιτητής
Τμήμα Μηχανικών Η/Υ & Πληροφορικής
Πανεπιστήμιο Ιωαννίνων, Ελλάδα
e-mail: cs05440@uoi.gr

Ντερμάρης Νικόλαος
Προπτυχιακός φοιτητής
Τμήμα Μηχανικών Η/Υ & Πληροφορικής
Πανεπιστήμιο Ιωαννίνων, Ελλάδα
e-mail: cs05477@uoi.gr

Χρόνη Μαρία
Ε.ΔΙ.Π.
Τμήμα Μηχανικών Η/Υ & Πληροφορικής
Πανεπιστήμιο Ιωαννίνων, Ελλάδα
e-mail: mchroni@uoi.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία επικεντρώνεται στην υποστήριξη της διδασκαλίας βασικών εννοιών των Δομών Δεδομένων και Αλγορίθμων, μέσω της ανάπτυξης ενός διαδραστικού εκπαιδευτικού περιβάλλοντος εικονικής πραγματικότητας (Virtual Reality – VR). Στόχος είναι η ενίσχυση της εννοιολογικής κατανόησης μέσω βιωματικής και πειραματικής αλληλεπίδρασης, αξιοποιώντας τις δυνατότητες της VR τεχνολογίας.

Το Virtual AlgoLab, είναι ένα εκπαιδευτικό VR παιχνίδι, υλοποιημένο στην πλατφόρμα Unity, το οποίο περιλαμβάνει έναν εικονικό χώρο με τέσσερα ανεξάρτητα παιχνίδια (minigame). Κάθε παιχνίδι (minigame) έχει σχεδιαστεί ώστε να αποτυπώνει και να αναδεικνύει μία θεμελιώδη έννοια της Πληροφορικής: συνδεδεμένες λίστες, κόμβους, κύκλους Hamilton και δυαδική αναζήτηση. Η δομή του περιβάλλοντος χρήστη είναι εργονομική και απλοποιημένη, με στόχο την υποστήριξη της πλοήγησης από αρχάριους χρήστες χωρίς προηγούμενη εμπειρία σε VR συστήματα.

Η λειτουργικότητα του παιχνιδιού εστιάζει στην ενεργή εμπλοκή των χρηστών μέσω πλοήγησης, επιλογής, και αλληλεπίδρασης με αντικείμενα και έννοιες που αντιστοιχούν σε αλγοριθμικές διαδικασίες ή δομές δεδομένων. Η σχεδίαση βασίστηκε σε παιδαγωγικές αρχές ενεργητικής μάθησης και εννοιολογικής μεταφοράς σε ψηφιακά περιβάλλοντα.

Για την αποτίμηση της αποτελεσματικότητας του παιχνιδιού στην επίτευξη του σκοπού του, πραγματοποιήθηκαν δοκιμές με μαθητές δημοτικού, και φοιτητές. Παρατηρήθηκε πως το VR Algolabs καταφέρνει με επιτυχία να ελκύσει το ενδιαφέρον όλων των ηλικιακών ομάδων, ενώ οι χρήστες που το αξιολόγησαν δεν παρουσίασαν ιδιαίτερη δυσκολία στην κατανόηση του στόχου και του θεωρητικού υπόβαθρου από κάθε minigame.

Λέξεις-Κλειδιά: Virtual Reality, AlgoLab, εκπαιδευτικό παιχνίδι, Δομές Δεδομένων, Αλγόριθμοι, Unity.

ΕΙΣΑΓΩΓΗ

Η διδασκαλία αφηρημένων εννοιών, όπως οι δομές δεδομένων και οι αλγόριθμοι, αποτελεί σήμερα αναγκαιότητα, αλλά και διαχρονική πρόκληση, ιδίως στον τομέα της πληροφορικής, όπου η κατανόηση αφηρημένων εννοιών όπως οι δομές δεδομένων και οι αλγόριθμοι μπορεί να αποδειχθεί δύσκολη για τους φοιτητές. Η καλλιέργεια της αλγοριθμικής και υπολογιστικής σκέψης (αναφορά ΠΣ) και αποτελεί βασική δεξιότητα του 21ου αιώνα ξεκινώντας από την προσχολική κιόλας εκπαίδευση.

Η υπολογιστική σκέψη είναι έννοια ευρύτερη της αλγοριθμικής. Η υπολογιστική σκέψη υπάρχει στον τομέα της επιστήμης των υπολογιστών από τη δεκαετία του 1950, όπου συχνά διατυπωνόταν ως αλγοριθμική σκέψη (Denning 2009). Καθώς ο τομέας προχωρούσε, αναπτύχθηκε μια διάκριση μεταξύ των δύο όρων. Η αλγοριθμική σκέψη πηγάζει από την έννοια του αλγορίθμου, η οποία αναφέρεται στην επίλυση ενός προβλήματος αναπτύσσοντας ένα σύνολο βημάτων που λαμβάνονται σε μια ακολουθία για την επίτευξη του επιθυμητού αποτελέσματος (Katai 2014). Η αλγοριθμική σκέψη είναι η διαδικασία σκέψης για τη διαμόρφωση των βημάτων που οδηγούν στο επιθυμητό αποτέλεσμα (Hu 2011; Katai 2014), ή όπως αναφέρεται από τους (Cooper et al. 2010) «η αλγοριθμική σκέψη δεν απαιτεί υπολογιστή και μαθηματική σκέψη και εξαρτάται σχεδόν αποκλειστικά από την ικανότητα τυποποίησης του ανθρώπου για αφαίρεση». Συγκεκριμένα, η αλγοριθμική σκέψη είναι μια δεξιότητα προσανατολισμένη στη λεπτομέρεια που εμπλέκει τη γνωστική ικανότητα κάποιου για κατανόηση και ανάλυση προβλημάτων, αναπτύσσοντας μια ακολουθία βημάτων προς μια κατάλληλη λύση, βελτιστοποιώντας την ακολουθία βημάτων και βρίσκοντας εναλλακτικά βήματα για να διασφαλιστεί ότι λαμβάνονται υπόψη εναλλακτικές προσεγγίσεις στη λύση (Futschek 2006). Παραδοσιακά, η πληροφορική ακολουθούσε μια αλγοριθμική δομή όπου λαμβάνεται μια είσοδος και υποβάλλεται σε επεξεργασία διαδοχικά για να παρέχει μια έξοδο. Έτσι, η αλγοριθμική σκέψη είναι μια από τις βασικές δεξιότητες στην υπολογιστική σκέψη. Πράγματι, οι Yadav, Stephenson και Hong (Yadav et al. 2017) υποστήριξαν ότι «οι αλγόριθμοι είναι κεντρικοί τόσο στην επιστήμη των υπολογιστών όσο και στην υπολογιστική σκέψη. Οι αλγόριθμοι αποτελούν τη βάση των πιο βασικών εργασιών που εκτελεί ο καθένας, από την τήρηση μιας απλής συνταγής μαγειρικής έως την παροχή περίπλοκων οδηγιών οδήγησης». Οι Kiss και Akri (Kiss and Akri, 2017) διαπίστωσαν ότι η έλλειψη υπόβαθρου στην αλγοριθμική σκέψη μείωνε τους φοιτητές στην τριτοβάθμια εκπαίδευση και υποστήριξαν ότι οι παραδοσιακές στρατηγικές διδασκαλίας ήταν ακατάλληλες για την ενίσχυση του εννοιολογικού πλαισίου που απαιτείται για τον προγραμματισμό και την επίλυση προβλημάτων. Έτσι, τόνισαν την ανάγκη για στρατηγική εστίαση στην αλγοριθμική και υπολογιστική σκέψη στην πρωτοβάθμια και δευτεροβάθμια εκπαίδευση.

Στα Νέα Προγράμματα Σπουδών (ΠΣ) αναδεικνύεται η σημαντικότητα καλλιέργειας της αλγοριθμικής σκέψης θέτοντάς την στο 1ο Θεματικό πεδίο όλων των τάξεων της Πρωτοβάθμιας και Δευτεροβάθμιας εκπαίδευσης, καθώς η ανάπτυξή της αποτελεί βασικό πυλώνα για την καλλιέργεια της υπολογιστικής σκέψης των μαθητών με σκοπό την επίλυση αυθεντικών προβλημάτων του πραγματικού κόσμου.

Στο πλαίσιο αυτό, η ανάπτυξη διαδραστικών και ελκυστικών εκπαιδευτικών εργαλείων αποτελεί πρόκληση, ιδίως για έννοιες όπως οι δομές δεδομένων και οι αλγόριθμοι. Η εικονική πραγματικότητα (VR) έχει αναδειχθεί ως μια πολλά υποσχόμενη τεχνολογία για την εκπαίδευση, προσφέροντας νέες δυνατότητες στη διδασκαλία (Mikropoulos and Natsis 2011). Η ενσωμάτωση της εικονικής πραγματικότητας στην εκπαίδευση παρουσιάζει ουσιαστικά ένα μέσο για την παροχή εξατομικευμένης ανατροφοδότησης στους μαθητές, βελτιώνοντας την κατανόηση του αντικειμένου (Marougkas et al. 2023). Οι μαθητές μπορούν να δουν και να τροποποιήσουν δυναμικά αλγορίθμους, να πειραματιστούν με δεδομένα και να παρατηρήσουν σε πραγματικό χρόνο την εκτέλεση προγραμματιστικών διαδικασιών.

ΚΙΝΗΤΡΑ ΚΑΙ ΣΤΟΧΟΙ

Σκοπός της παρούσας εργασίας είναι η ανάπτυξη ενός VR παιχνιδιού με στόχο την υποστήριξη της εκπαίδευσης στις δομές δεδομένων και τους αλγορίθμους, το οποίο ονομάζεται Virtual AlgoLab. Το Virtual AlgoLab, στοχεύει στην αξιοποίηση των δυνατοτήτων της εικονικής πραγματικότητας για τη δημιουργία ενός καινοτόμου εκπαιδευτικού παιχνιδιού που θα διδάσκει δομές δεδομένων και αλγορίθμους με έναν ελκυστικό και διαισθητικό τρόπο. Το παιχνίδι επιτρέπει στους χρήστες να οπτικοποιούν και να αλληλεπιδρούν με αφηρημένες έννοιες, όπως ο πίνακας, η λίστα, η συνδεδεμένη λίστα, και με τους αλγορίθμους δυαδικής αναζήτησης και εύρεσης κύκλων Hamilton, σε ένα εικονικό περιβάλλον. Αυτό επιτυγχάνεται μέσω της χρήσης ελκυστικών τρισδιάστατων γραφικών και διαδραστικών μηχανισμών, με σκοπό να ενισχυθεί η συμμετοχή των μαθητών και να διευκολυνθεί η βαθύτερη κατανόηση των θεμελιωδών αρχών της πληροφορικής. Επίσης, στα νέα προγράμματα σπουδών έχει εισαχθεί η διδασκαλία ποιο σύνθετων αλγορίθμων, όπως ο αλγόριθμος εύρεσης σύντομων μονοπατιών (αλγόριθμος Dijkstra) στο Γυμνάσιο, γεγονός που καθιστά αναγκαία τη κατανόηση της δομής της συνδεδεμένης λίστας.

Η έρευνα για τη χρήση εργαλείων εικονικής πραγματικότητας μετρά αρκετά χρόνια. Οι Μικρόπουλος και Νάτσης στην εργασία τους (Mikropoulos and Natsis 2011), παρουσίασαν μια ανασκόπηση της εμπειρικής έρευνας που έγινε μέσα σε μία δεκαετία (1999–2009) γύρω από τη χρήση εικονικών περιβαλλόντων (virtual environments - VEs) στην εκπαίδευση, τα αποτελέσματα της οποίας υποστηρίζουν ότι τα εικονικά περιβάλλοντα έχουν σημαντική δυναμική στην εκπαίδευση, ιδίως όταν είναι σχεδιασμένα με βάση παιδαγωγικές αρχές. Επίσης, οι συγγραφείς τονίζουν την ανάγκη για περαιτέρω έρευνα σε πιο εμβυθιστικά VEs και σε μεγαλύτερη ποικιλία γνωστικών αντικειμένων. Αντίστοιχη μελέτη για την περίοδο 2010–2022 (Al-Ansi 2023), τονίζει τη σημασία της AR και VR στην εκπαιδευτική διαδικασία, αναγνωρίζοντας τα πλεονεκτήματά τους, αλλά και τις προκλήσεις που συνδέονται με την εφαρμογή τους. Επισημαίνεται η ανάγκη για περαιτέρω έρευνα και ανάπτυξη, ώστε να επιτευχθεί η ευρεία και αποτελεσματική ενσωμάτωσή τους στην εκπαίδευση.

Οι οπτικοποιήσεις αποτελούν μια κοινή προσέγγιση για την αντιμετώπιση των δυσκολιών της εκμάθησης αφηρημένων εννοιών. Ειδικότερα για τις δομές δεδομένων και τους αλγόριθμους, τα διαγράμματα και οι κινούμενες εικόνες (animations) χρησιμοποιούνται συχνά για τη γραφική απεικόνιση των τυποποιημένων λειτουργιών τους (Brown et al., 1984; Halim et al., 2012; Hansen et al., 2002; Shaffer et al.; 2010). Ωστόσο, πρόσφατες μελέτες έχουν δείξει ότι οι οπτικοποιήσεις από μόνες τους δεν επαρκούν για την επιτυχή εκμάθηση δομών δεδομένων και αλγορίθμων. Καθώς οι μαθητές τείνουν να ενδιαφέρονται περισσότερο για περιβάλλοντα όπου μπορούν να εξερευνήσουν, να πειραματιστούν και να προβλέψουν, τα εργαλεία οπτικοποίησης που δεν προσφέρουν υψηλή διαδραστικότητα και επαρκή ανατροφοδότηση μπορεί να μην αποτελούν κίνητρο για πολλούς μαθητές (Dicheva and Hodge, 2018; Esponda-Argüero, 2010; Hundhausen, 2002).

Για την αντιμετώπιση των προβλημάτων που σχετίζονται με τα χαμηλά κίνητρα, η μάθηση βασισμένη σε παιχνίδια (GBL) έχει δείξει πολλά υποσχόμενα αποτελέσματα σε διάφορους κλάδους και ακαδημαϊκά επίπεδα (Li και Tsai, 2013; Qian και Clark; 2016). Τα εκπαιδευτικά παιχνίδια έχει αποδειχθεί ότι βελτιώνουν την αποτελεσματικότητα της μάθησης, το ενδιαφέρον και τα κίνητρα, ενώ επιτρέπουν στους μαθητές να επιτύχουν μια σειρά μαθησιακών στόχων (Dicheva και Hodge, 2018; Souza et al., 2017). Τα παιχνίδια ικανοποιούν σημαντικές παιδαγωγικές αρχές, όπως η παροχή άμεσης ανατροφοδότησης και η σαφήνεια των στόχων. Υπάρχει μια ιδιαίτερη ευκαιρία για τη χρήση εκπαιδευτικών παιχνιδιών για τη διδασκαλία των δομών δεδομένων και των αλγορίθμων. Μια πρόσφατη μελέτη των Battistella κ.ά. διαπίστωσε ότι λιγότερο από το 10% των παιχνιδιών που σχετίζονται με την πληροφορική ήταν υλοποιημένα γύρω από θεμελιώδεις έννοιες των δομών δεδομένων και των αλγορίθμων (Battistella κ.ά.; 2017).

Στην εργασία (Gerini et al.;2023) προτείνεται το VRCoding, ένα σύστημα μπλοκ-προγραμματισμού σε περιβάλλον εικονικής πραγματικότητας που συνδυάζει gamification με passive haptics, με στόχο την ενίσχυση της υπολογιστικής σκέψης. Το περιβάλλον υλοποιείται ως μια εικονική αίθουσα arcade, όπου οι χρήστες λύνουν προγραμματιστικές ασκήσεις χειριζόμενοι φυσικά αντικείμενα τα οποία αντιστοιχούν σε εικονικά μπλοκ. Πειραματική αξιολόγηση με μαθητές και φοιτητές έδειξε ότι το VRCoding αυξάνει το αίσθημα εμβύθισης και τη θετική εμπειρία χρήστη σε σχέση με παραδοσιακά περιβάλλοντα τύπου Blockly, αν και εντοπίστηκαν ζητήματα απόδοσης λόγω προβλημάτων στην παρακολούθηση αντικειμένων. Οι Shabanah et al. (Shabanah et al.; 2010) προτείνουν την έννοια του Algorithm Game Visualization, όπου εκπαιδευτικά ψηφιακά παιχνίδια σχεδιάζονται έτσι ώστε να αναπαριστούν αλγορίθμους μέσω γραφικών και παιγνιώδους αλληλεπίδρασης. Αναλύεται η αρχιτεκτονική και οι βασικές σχεδιαστικές αρχές των "αλγοριθμικών παιχνιδιών", ενώ παρουσιάζονται παραδείγματα όπως παιχνίδια για δυαδική αναζήτηση, συνδεδεμένες λίστες και δυαδικά δέντρα αναζήτησης. Η εργασία υποστηρίζει ότι το "παίζω" αποτελεί μια νέα μορφή ενεργής εμπλοκής με τις οπτικοποιήσεις, που συνδυάζει ευχαρίστηση με γνωστική εμπλοκή, ενισχύοντας έτσι την κατανόηση πολύπλοκων εννοιών αλγορίθμων. Οι Oyelere et al. (Oyelere et al.; 2023) πραγματοποίησαν πιλοτική αξιολόγηση της εφαρμογής iThinkSmart, η οποία ενσωματώνει εκπαιδευτικά mini-games σε περιβάλλον εικονικής πραγματικότητας με σκοπό την ενίσχυση των δεξιοτήτων υπολογιστικής σκέψης σε φοιτητές ανώτατης εκπαίδευσης. Τα παιχνίδια —συμπεριλαμβανομένων των Tower of Hanoi και River Crossing— υλοποιούνται μέσα σε μια εικονική εξερεύνηση τοποθεσιών και αξιολογούνται τόσο ποσοτικά (μέσω του Objective Distance μοντέλου αξιολόγησης) όσο και ποιοτικά (με συνεντεύξεις χρηστών). Τα ευρήματα δείχνουν ότι το παιχνίδι ενίσχυσε τη γνωστική εμπλοκή, την περιέργεια και την απόκτηση δεξιοτήτων όπως η αναδρομή, η αποσύνθεση προβλήματος και η αλγοριθμική σκέψη. Στην εργασία των Rajeev και Sharma, προτείνεται ένα 3D-μοντέλο που χρησιμοποιεί το 3d-max και το sketch-up για τη διδασκαλία συνδεδεμένης λίστας και δυαδικών δέντρων αναζήτησης (Rajeev και Sharma;2020). Άλλη μια εργασία που αφορά τους αλγόριθμους, (Grivokostopoulou et al. 2016) παρουσιάζεται ένα εκπαιδευτικό περιβάλλον που συνδυάζει εικονική πραγματικότητα (VR) και gamification για τη διδασκαλία αλγορίθμων αναζήτησης σε προπτυχιακούς φοιτητές.

Αυτή η εργασία συμβάλλει στην εμβάθυνση της έρευνας σχετικά με τη χρήση της εικονικής πραγματικότητας ως εκπαιδευτικού εργαλείου για την κατανόηση των βασικών δομών δεδομένων, του πίνακα, της λίστας και της συνδεδεμένης λίστας καθώς και των αλγορίθμων εύρεσης κύκλου Hamilton και δυαδικής αναζήτησης από μαθητές. Η συνεισφορά της παρούσας εργασίας έγκειται στην εμπεριστατωμένη περιγραφή του σχεδιασμού και της υλοποίησης του

Virtual AlgoLab, ένα VR παιχνίδι που έχει σχεδιαστεί με γνώμονα την εκμάθηση των στοιχειωδών δομών από παιδιά μικρής ηλικίας. Το παιχνίδι αυτό ενσωματώνει στοιχεία gamification, διαδραστικότητας και εικονικής πραγματικότητας, προσφέροντας μια μοναδική συνδυαστική προσέγγιση για τη δημιουργία ενός ελκυστικού και αποτελεσματικού εκπαιδευτικού περιβάλλοντος. Επίσης, υλοποιεί δομές και αλγόριθμους με τρόπο κατανοητό για παιδιά σχολικής ηλικίας που έρχονται πρώτη φορά σε επαφή με τις έννοιες αυτές. Η χρήση εικονικών αναπαραστάσεων αποτελεί μια καινοτόμο εναλλακτική λύση στα παραδοσιακά εργαστήρια, προσφέροντας στους μαθητές τη δυνατότητα να βιώσουν αυθεντικές εμπειρίες μάθησης, ιδίως σε περιπτώσεις όπου η φυσική παρουσία μπορεί να ενέχει κινδύνους ή να υπόκειται σε περιορισμούς χωροχρόνου. Τα περιβάλλοντα εικονικής πραγματικότητας παρέχουν μια μοναδική ευκαιρία στους μαθητές να πειραματιστούν και να εξερευνήσουν πολύπλοκες έννοιες με έναν τρόπο που δεν είναι εφικτός στα παραδοσιακά εκπαιδευτικά πλαίσια (Duwan et al., 2019).

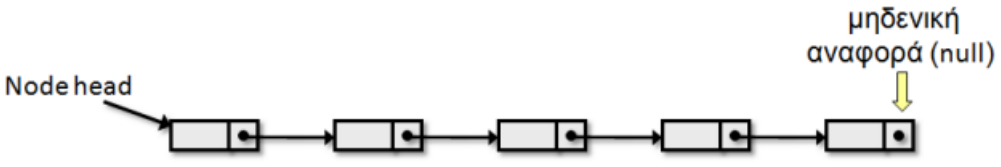
Στην επόμενη ενότητα, θα παρουσιαστεί το θεωρητικό υπόβαθρο, το οποίο θα περιλαμβάνει μια επισκόπηση των δομών δεδομένων και των αλγόριθμων που υλοποιήθηκα. Στην συνέχεια, θα παρουσιαστεί η περιγραφή της εφαρμογής εικονικής πραγματικότητας που υλοποιήθηκε, παρέχοντας μια εμπεριστατωμένη παρουσίαση της αρχιτεκτονικής του συστήματος, των κύριων λειτουργικών μονάδων και των διεπαφών χρήστη που συνθέτουν το Virtual AlgoLab. Επιπλέον, θα αναφερθούμε στις τεχνικές λεπτομέρειες της διαδικασίας ανάπτυξης, παρέχοντας πληροφορίες σχετικά με τις γλώσσες προγραμματισμού, τα εργαλεία και τις βιβλιοθήκες που χρησιμοποιήθηκαν για τη δημιουργία του παιχνιδιού. Η τελευταία ενότητα αφορά στα συμπεράσματα σχετικά με την αποτελεσματικότητα του παιχνιδιού και θα προταθούν κατευθύνσεις για μελλοντική έρευνα.

ΘΕΩΡΗΤΙΚΌ ΥΠΟΒΑΘΡΟ

Ένας πίνακας (array), η θεμελιώδης δομή δεδομένων, είναι ένας τύπος δεδομένων που αποθηκεύει δεδομένα (στοιχεία) του ιδίου τύπου (π.χ. πίνακας ακεραίων, πίνακας δεικτών σε ακέραιους κ.λπ.), σε συνεχόμενες θέσεις στη μνήμη (δηλαδή στη μνήμη, το i-οστο στοιχείο κάθε πίνακα βρίσκεται αμέσως μετά το $(i-1)$-οστο στοιχείο του και αμέσως πριν από το $(i+1)$-οστο στοιχείο του) και στα οποία γίνεται αναφορά με χρήση ακέραιου δείκτη (δηλαδή, για έναν πίνακα A χρησιμοποιούμε τον συμβολισμό $A[2]$ για το 3ο στοιχείο του A εάν θεωρήσουμε ότι το 1ο στοιχείο του πίνακα είναι το $A[0]$ (όπως συμβαίνει στις γλώσσες προγραμματισμού C και Java)) (Georgiadis et al.; 2016). Ο δείκτης, είναι μια μεταβλητή που μπορεί να έχει οποιοδήποτε όνομα. Είναι όμως σύνηθες στον προγραμματισμό να χρησιμοποιούνται ως δείκτες οι μεταβλητές i, j, k. Η ευελιξία των πινάκων έγκειται στην ικανότητά τους να αποθηκεύουν δεδομένα διαφόρων τύπων, όπως ακέραιους αριθμούς, χαρακτήρες ή ακόμα και άλλους πίνακες, καθιστώντας τους απαραίτητους σε πολλούς αλγορίθμους. Οι πίνακες αποτελούν μια θεμελιώδη δομή δεδομένων στην επιστήμη των υπολογιστών, αλλά οι μαθητές συχνά αντιμετωπίζουν δυσκολίες στην κατανόηση και τη χρήση τους (Vrachnos & Jimoyiannis, 2017). Οι μαθητές συχνά δυσκολεύονται να κατανοήσουν την έννοια των δεικτών, τη διάκριση μεταξύ δεικτών και τιμών στοιχείων και τη διαχείριση της μνήμης που σχετίζεται με τη δημιουργία και την τροποποίηση πινάκων.

Μια συνδεδεμένη λίστα (Εικόνα 1), σε αντίθεση με έναν πίνακα, είναι μια δυναμική δομή δεδομένων, που αποτελείται από μια ακολουθία κόμβων, όπου κάθε κόμβος περιέχει ένα στοιχείο δεδομένων και έναν δείκτη προς τον επόμενο κόμβο της ακολουθίας. Οι μαθητές συχνά δυσκολεύονται να κατανοήσουν την έννοια των δεικτών, τις διαδικασίες εισαγωγής και διαγραφής κόμβων και τη διαχείριση της μνήμης που σχετίζεται με τη δημιουργία και την τροποποίηση συνδεδεμένων λιστών. Η εργασία των Zingaro et al. (Zingaro et al., 2018) διερευνά τις δυσκολίες που αντιμετωπίζουν οι φοιτητές με τις βασικές δομές δεδομένων, όπως οι πίνακες, οι συνδεδεμένες λίστες και τα δυαδικά δέντρα αναζήτησης. Η εν λόγω έρευνα, αναδεικνύοντας τις κοινές παρανοήσεις και τις προκλήσεις που αντιμετωπίζουν οι μαθητές, υπογραμμίζει την ανάγκη για εναλλακτικές διδακτικές προσεγγίσεις, όπως η χρήση της εικονικής πραγματικότητας, για την αποτελεσματικότερη εκμάθηση των πινάκων.

Εικόνα 1
Μια απλά συνδεδεμένη λίστα με 5 κόμβους



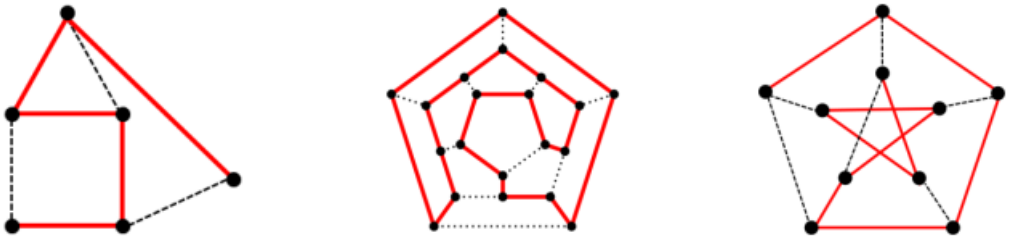
Ο αλγόριθμος δυαδικής αναζήτησης είναι ένας αποτελεσματικός αλγόριθμος για την εύρεση ενός συγκεκριμένου στοιχείου σε έναν ταξινομημένο πίνακα σε χρόνο $O(\log_2 n)$. Ο αλγόριθμος λειτουργεί διαιρώντας

επανειλημμένα το διάστημα αναζήτησης στο μισό μέχρι να βρεθεί το στοιχείο ή να προσδιοριστεί ότι το στοιχείο δεν υπάρχει στον πίνακα. Ο αλγόριθμος χρησιμοποιεί την μέθοδο «διαίρει και βασίλευε» (divide and conquer). Η βασική ιδέα της μεθόδου συνίσταται στη διάσπαση του προβλήματος που μας ενδιαφέρει σε (δύο, τις περισσότερες φορές) μικρότερα προβλήματα. Εάν αυτά δεν είναι αρκετά μικρά, ώστε να μπορούμε να τα επιλύσουμε απευθείας, επαναλαμβάνουμε τη διαδικασία διάσπασης και ούτω καθεξής. Όταν πλέον φθάσουμε σε προβλήματα τα οποία μπορούν να επιλυθούν απευθείας, τα επιλύουμε και αρχίζουμε να συνθέτουμε κατάλληλα τις λύσεις των προβλημάτων αυτών, ώστε να υπολογίσουμε τη λύση μεγαλύτερων προβλημάτων της διάσπασης και ούτω καθεξής, έως ότου φθάσουμε στο αρχικό μας πρόβλημα (Georgiadis et al.; 2016).

Κατά την ενασχόληση των μαθητών με τον αλγόριθμο της δυαδικής αναζήτησης σε ταξινομημένες λίστες, προωθείται η ανάπτυξη θεμελιωδών δεξιοτήτων υπολογιστικής σκέψης. Αρχικά, οι μαθητές μαθαίνουν να αναλύουν και να κατανοούν τη διατύπωση του προβλήματος, αναγνωρίζοντας τη σημασία της διάταξης των στοιχείων (Wing, 2006· Grover & Pea, 2013). Καθώς εισάγονται στη στρατηγική "divide and conquer", κατανοούν τη λογική διαμερισμού της λίστας, εντοπίζοντας το μέσο στοιχείο και συγκρίνοντάς το με το ζητούμενο, ώστε να περιορίσουν το εύρος αναζήτησης (Cormen et al., 2009). Η διαδικασία αυτή ενισχύει την κατανόηση αφηρημένων εννοιών όπως η δυαδική λογική, η υπό συνθήκη εκτέλεση και η αναδρομή (Lye & Koh, 2014). Παράλληλα, οι μαθητές αντιλαμβάνονται ότι η υλοποίηση μπορεί να επιτευχθεί είτε επαναληπτικά είτε αναδρομικά, γεγονός που ενισχύει τη μεταγνωστική τους επίγνωση σχετικά με διαφορετικές προσεγγίσεις στην επίλυση προβλημάτων (Grover et al., 2015). Η οπτική αναπαράσταση της διαδικασίας μέσω γραφικών εργαλείων ή εκπαιδευτικών παιχνιδιών διευκολύνει την κατανόηση και την εσωτερίκευση της αλγοριθμικής ροής (Hundhausen et al., 2002), ενώ ταυτόχρονα δημιουργεί συνθήκες ενεργούς εμπλοκής των μαθητών. Τέλος, η συζήτηση για την αποδοτικότητα του αλγορίθμου, ιδίως ως προς την πολυπλοκότητα O(log n), προσφέρει μια εισαγωγή σε έννοιες ανάλυσης απόδοσης, συγκριτικής αξιολόγησης και επιλογής κατάλληλων αλγορίθμων, που αποτελούν βασικά στοιχεία του ψηφιακού εγγραμματισμού (Denning, 2009).

Παρά την ευρεία χρήση του, ο αλγόριθμος της δυαδικής αναζήτησης παρουσιάζει σημαντικές γνωστικές προκλήσεις για τους μαθητές, ακόμη και σε προχωρημένα επίπεδα εκπαίδευσης. Έρευνες έχουν δείξει ότι πολλοί φοιτητές δυσκολεύονται να κατανοήσουν τη λογική του "διαίρει και βασίλευε", ιδιαίτερα τον εντοπισμό και τη σωστή χρήση του μέσου δείκτη (Zingaro & Porter, 2014). Συχνές παρανοήσεις περιλαμβάνουν τη σύγχυση μεταξύ των ορίων της υπολίστας (αρχή–τέλος) και την εσφαλμένη σύγκριση του ζητούμενου στοιχείου με το μεσαίο (Lister et al., 2009). Επιπλέον, η αφηρημένη φύση της δυαδικής αναζήτησης —η οποία προϋποθέτει αναδρομική ή επαναληπτική σκέψη, καθώς και διανοητική παρακολούθηση του διαμερισμού της λίστας— καθιστά δύσκολη τη διατήρηση της γνωστικής συνέπειας, ιδίως σε μαθητές με ελλιπή εμπειρία σε αλγοριθμική σκέψη (Fouh, Akbar, & Shaffer, 2012). Οι αναπαραστάσεις που βασίζονται μόνο σε κείμενο ή ψευδοκώδικα συχνά επιδεινώνουν τη σύγχυση, ενώ η ενσωμάτωση οπτικών εργαλείων ή διαδραστικών προσομοιώσεων έχει αποδειχθεί αποτελεσματική στην ενίσχυση της κατανόησης (Hundhausen et al., 2002). Οι παραπάνω δυσκολίες καθιστούν τη διδασκαλία της δυαδικής αναζήτησης ιδιαίτερα απαιτητική, ενώ υποδεικνύουν την ανάγκη για πολυτροπικές στρατηγικές και παραδείγματα που γεφυρώνουν τη θεωρία με την πράξη.

Εικόνα 2
Γραφήματα με διαδρομές και κύκλους Hamilton



Στην θεωρία γραφημάτων το πρόβλημα της διαδρομής Hamilton (Hamiltonian path problem ή HP) και το πρόβλημα του κύκλου Hamilton (Hamiltonian cycle problem ή HC) ορίζονται ως τα προβλήματα καθορισμού, εάν ένα γράφημα έχει ή όχι μία διαδρομή ή έναν κύκλο Hamilton. Μία διαδρομή $P = (u, x_1, x_2, \ldots, x_p, v)$ μεταξύ δύο κόμβων u και v ενός γραφήματος G ονομάζεται διαδρομή Hamilton, εάν περιέχει όλους τους κόμβους του G ακριβώς μία φορά (άρα, $p=n$-2 εάν P είναι διαδρομή Hamilton). Μία διαδρομή Hamilton $((u, x_1, x_2, \ldots, x_{v-2}, v)$ ονομάζεται κύκλος Hamilton, εάν οι τερματικοί κόμβοι u και v της διαδρομής είναι γειτονικοί (δηλαδή συνδέονται με ακμή). Το γράφημα (α) της Εικόνας 2 έχει μία διαδρομή Hamilton (κόκκινη διαδρομή), ενώ το γράφημα (β) έχει κύκλο Hamilton. Το γράφημα (γ)

του ίδιου σχήματος, γράφημα Herschel, είναι το μικρότερο δυνατό πολυεδρικό γράφημα που δεν έχει κύκλο Hamilton (Nikolopoulos et al. 2015).

Η έννοια των γραφημάτων (graphs) αποτελεί κεντρικό θεμέλιο της σύγχρονης υπολογιστικής επιστήμης, με εφαρμογές που εκτείνονται από τα κοινωνικά δίκτυα και τη χαρτογράφηση δικτύων έως τη ρομποτική και τη θεωρία βελτιστοποίησης. Η ενσωμάτωση της διδασκαλίας των γραφημάτων από την πρωτοβάθμια και δευτεροβάθμια εκπαίδευση προτείνεται όλο και συχνότερα στη βιβλιογραφία ως στρατηγική για την ενίσχυση της υπολογιστικής σκέψης, της αφηρημένης αναπαράστασης και της συστημικής επίλυσης προβλημάτων (Bocconi et al., 2022· Grover & Pea, 2013). Ειδικότερα, η ενασχόληση με τον κύκλο Hamilton, αν και αποτελεί NP-πλήρες πρόβλημα στη θεωρία της πολυπλοκότητας, μπορεί να προσεγγιστεί παιδαγωγικά μέσω δραστηριοτήτων που ενθαρρύνουν τον πειραματισμό, την αναζήτηση διαδρομών και την ανακάλυψη μέσω διερεύνησης (Dagienė & Stupurienė, 2016). Μέσα από κατάλληλες αναπαραστάσεις (π.χ. παιχνίδια ρόλων, εφαρμογές τύπου "ταξιδιώτη") τα παιδιά μπορούν να οικοδομήσουν ισχυρές εννοιολογικές βάσεις σχετικά με την έννοια της βελτιστοποίησης και των αλγοριθμικών περιορισμών. Πολλές μελέτες έχουν αναδείξει ότι η πρώιμη επαφή των μαθητών με έννοιες όπως οι γράφοι, οι κύκλοι και οι διαδρομές βελτιώνει την κατανόηση θεμελιωδών εννοιών της επιστήμης υπολογιστών και αναπτύσσει κριτική και στρατηγική σκέψη (Tedre & Denning, 2021). Συνεπώς, η συστηματική εισαγωγή της έννοιας των γραφημάτων —συμπεριλαμβανομένου του κύκλου Hamilton— στην υποχρεωτική εκπαίδευση δεν είναι απλώς εφικτή, αλλά παιδαγωγικά επιθυμητή, καθώς προάγει δεξιότητες που σχετίζονται με τον 21ο αιώνα και δημιουργεί τις βάσεις για τη μελλοντική ενασχόληση των μαθητών με πιο προχωρημένα αντικείμενα, όπως η θεωρία αλγορίθμων και η τεχνητή νοημοσύνη.

ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ ΑΝΑΠΤΥΞΗ VR ΕΦΑΡΜΟΓΗΣ

Η τεχνολογία εικονικής πραγματικότητας (VR) αποτελεί ένα διαρκώς εξελισσόμενο πεδίο, το οποίο δημιουργεί νέες προκλήσεις αλλά και δυνατότητες για την ανάπτυξη εκπαιδευτικών εφαρμογών. Η ανάπτυξη τέτοιων εφαρμογών υποστηρίζεται από ένα ευρύ φάσμα εργαλείων λογισμικού και κατασκευαστών συσκευών, που προσφέρουν τόσο εξοπλισμό όσο και απαραίτητες βιβλιοθήκες. Στο πλαίσιο της παρούσας εργασίας, αναπτύχθηκε το VR AlgoLab, ένα εκπαιδευτικό εργαλείο βασισμένο σε τεχνολογία VR, με στόχο την υποστήριξη της διδασκαλίας εννοιών Δομών Δεδομένων και Αλγορίθμων σε νεαρές ηλικίες.

Η εφαρμογή αναπτύχθηκε στην πλατφόρμα Unity (έκδοση 6000.0.39f1) και έχει σχεδιαστεί ώστε να είναι πλήρως συμβατή με τον εξοπλισμό Meta Quest 2, που χρησιμοποιήθηκε ως περιβάλλον εκτέλεσης και αξιολόγησης. Η βασική πρόκληση της υλοποίησης εντοπίστηκε στην εναρμόνιση του λογισμικού με τα συστήματα παρακολούθησης κίνησης και αλληλεπίδρασης του Meta Quest 2, καθώς και στην προσαρμογή του περιβάλλοντος χρήστη στις εργονομικές ανάγκες νεαρών μαθητών.

Το πρώτο στάδιο της ανάπτυξης αφορούσε τον καθορισμό της δομής της εφαρμογής. Η εκπαιδευτική εμπειρία σχεδιάστηκε να προσομοιώνει τη λειτουργία ενός εικονικού εργαστηρίου, στο οποίο ο χρήστης μπορεί να περιηγείται ελεύθερα και να αλληλεπιδρά με θεματικούς πάγκους εργασίας. Κάθε πάγκος αντιπροσωπεύει ένα υποπαιχνίδι (minigame), το οποίο επικεντρώνεται σε μια θεμελιώδη έννοια, όπως συνδεδεμένες λίστες, κόμβοι, κύκλοι Hamilton και δυαδική αναζήτηση..

Εικόνα 3
Τα χειριστήρια ενός Meta Quest 2



Η διαμόρφωση του εικονικού περιβάλλοντος πραγματοποιήθηκε εξ ολοκλήρου στο Unity, με σχεδιαστικές αρχές που ενισχύουν την ευκρίνεια, την προσβασιμότητα και την εργονομία. Για την παραγωγή των τρισδιάστατων

μοντέλων που χρησιμοποιούνται στους πάγκους, αξιοποιήθηκε το λογισμικό Blender, επιτρέποντας την προσαρμοσμένη δημιουργία διαδραστικών αντικειμένων που ενσωματώθηκαν στο παιχνίδι. Μετά την ολοκλήρωση του σχεδιασμού του περιβάλλοντος, προχωρήσαμε στην ενσωμάτωση των VR βιβλιοθηκών και των πακέτων υποστήριξης του Meta Quest 2 εντός του Unity, προκειμένου να διασφαλιστεί η αξιόπιστη και χαμηλής καθυστέρησης επικοινωνία μεταξύ χρήστη και εφαρμογής. Η επιτυχής διασύνδεση επέτρεψε την πλήρη αντιστοίχιση κινήσεων του χρήστη στον πραγματικό κόσμο με τις ενέργειες εντός του εικονικού περιβάλλοντος, διασφαλίζοντας έτσι φυσική αλληλεπίδραση και αυξημένη εμπειρία εμβύθισης. Στην Εικόνα 3, απεικονίζονται οι πάγκοι με τα παιχνίδια.

Κατά την ανάπτυξη, εντοπίστηκαν δύο βασικές προκλήσεις σχετικές με την αλληλεπίδραση του χρήστη. Η πρώτη αφορούσε τον χωρικό περιορισμό του πραγματικού περιβάλλοντος, που εμπόδιζε την προσέγγιση απομακρυσμένων σημείων του εργαστηρίου. Για την επίλυση, υλοποιήθηκαν δύο μηχανισμοί πλοήγησης: α.Κίνηση μέσω των αναλογικών μοχλών (joysticks) στα χειριστήρια του Meta Quest 2. β. Σύστημα τηλεμεταφοράς (teleportation) από πάγκο σε πάγκο, ενεργοποιούμενο μέσω του δεύτερου joystick.

Η δεύτερη πρόκληση σχετιζόταν με την αλληλεπίδραση με τα αντικείμενα στους πάγκους. Για την υποστήριξή της, σχεδιάστηκε ένα σύνολο βασικών ενεργειών, οι οποίες ενεργοποιούνται ανάλογα με το εκάστοτε υποπαιχνίδι:

- Μετακίνηση αντικειμένων και τοποθέτησή τους σε προκαθορισμένες θέσεις.
- Σύνδεση κόμβων με ευθύγραμμα τμήματα με διαδραστικό τρόπο.
- Ελεύθερη μετακίνηση αντικειμένων χωρίς συγκεκριμένο τελικό στόχο.

Αυτοί οι μηχανισμοί διαμορφώνουν το πλαίσιο των δραστηριοτήτων σε κάθε πάγκο εργασίας, προσφέροντας πλήρη λειτουργικότητα και ενεργή εμπλοκή του χρήστη με τις υπό διδασκαλία έννοιες.

Για την καθοδήγηση του χρήστη κατά την εκτέλεση κάθε υποπαιχνιδιού, σχεδιάστηκε ένα σύστημα παρουσίασης οδηγιών με χρήση των UI Elements του Unity. Συγκεκριμένα, χρησιμοποιήθηκαν Panels και Text Meshes, τα οποία παρέχουν τις απαραίτητες πληροφορίες σχετικά με τον στόχο και τα βήματα κάθε δραστηριότητας. Το σύστημα έχει δομηθεί ώστε να προσαρμόζεται δυναμικά στο περιεχόμενο και στη διάταξη της οθόνης, διασφαλίζοντας αναγνωσιμότητα και σαφήνεια, ακόμη και για μικρές οθόνες VR. Τα UI στοιχεία ενσωματώνονται τόσο κατά την είσοδο του χρήστη στο εργαστήριο (οθόνη καλωσορίσματος), όσο και τοπικά σε κάθε πάγκο εργασίας, με σκοπό τη συνεχή υποστήριξη της μαθησιακής διαδικασίας. Η Εικόνα 4 παρουσιάζει μερικά από αυτά τα UI Elements.

Εικόνα 4
UI στοιχεία στο VR Algolabs



Τέλος, η σχεδίαση του VR AlgoLab περιλαμβάνει μηχανισμό επιβράβευσης και οπτικής ανατροφοδότησης κατά την ολοκλήρωση κάθε υποπαιχνιδιού. Για τον σκοπό αυτό αξιοποιήθηκε το Unity Particle System, το οποίο επιτρέπει την ενσωμάτωση εφέ, όπως έκρηξη κονφετί, που σηματοδοτούν επιτυχία και δημιουργούν θετική συναισθηματική απόκριση. Τα εφέ αυτά λειτουργούν ως ένδειξη ολοκλήρωσης και παρέχουν σαφές νοηματικό κλείσιμο για τον χρήστη, όπως φαίνεται και στην Εικόνα 5.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η εργασία αυτή ανέδειξε τη δυνατότητα αξιοποίησης της Εικονικής Πραγματικότητας ως αποτελεσματικού μέσου διδακτικής υποστήριξης σε έννοιες Δομών Δεδομένων και Αλγορίθμων. Η ανάπτυξη του VR AlgoLab κατέδειξε ότι είναι εφικτή η δημιουργία εργονομικών και λειτουργικών περιβαλλόντων μάθησης, τα οποία ενισχύουν τη μαθησιακή εμπλοκή μέσω βιωματικής αλληλεπίδρασης. Πιλοτικές δοκιμές σε μαθητές και φοιτητές έδειξαν θετική αποδοχή, επιβεβαιώνοντας την καταλληλότητά του για εκπαιδευτική χρήση. Μελλοντική έρευνα προτείνεται να επικεντρωθεί στην

εμπειρική αποτίμηση της αποτελεσματικότητας της εφαρμογής σε μεγαλύτερο δείγμα μαθητών, καθώς και στην επέκταση του περιεχομένου της με επιπλέον θεματικές ενότητες και παιγνιώδεις δραστηριότητες.

Εικόνα 5.
Particle effects κατά την ολοκλήρωση του παιχνιδιού.



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ΘΠ16: Εικονική, Επαυξημένη και Μικτή Πραγματικότητα στην Εκπαίδευση

ΘΠ17: Διαδικτυακά εκπαιδευτικά περιβάλλοντα για την ενίσχυση της μικτής και της εξ αποστάσεως εκπαίδευσης

ΠΡΟΕΤΟΙΜΑΖΟΝΤΑΣ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΞΕΤΑΣΕΙΣ ΤΗΝ ΕΠΟΧΗ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ. ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ: ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ ΕΚΠΑΙΔΕΥΣΗ & ΤΕΧΝΟΛΟΓΙΕΣ ΣΕ ΣΥΣΤΗΜΑΤΑ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΔΙΔΑΣΚΑΛΙΑΣ ΚΑΙ ΜΑΘΗΣΗΣ-ΕΠΙΣΤΗΜΕΣ ΤΗΣ ΑΓΩΓΗΣ (ΕΤΑ-ΕΑΠ)

Ευαγγελία Μανούσου
Επίκουρη καθηγήτρια
Ελληνικό Ανοικτό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: manousoug@eap.gr

Γιάννης Γκιόσος
Αναπληρωτής Καθηγητής, Διευθυντής ΠΜΣ ΕΤΑ
Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών
Αθήνα, Ελλάδα
e-mail: gkiosos.ioannis@ac.eap.gr

Αντωνία Μαρία Χαρτοφύλακα
ΣΕΠ ΕΑΠ, Βοηθός διευθυντή προγράμματος Σπουδών
Ελληνικό Ανοικτό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: chartofylaka.antonia@ac.eap.gr

Κυριακή Ρασσιά
Υποψήφια Διδάκτορας
Ελληνικό Ανοικτό Πανεπιστήμιο
Αθήνα, Ελλάδα
e-mail: kyriaki.rassia@ac.eap.gr

Μαρία Κουτσούμπα
Καθηγήτρια, Συντονίστρια ΕΤΑ52
Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών
Αθήνα, Ελλάδα
e-mail: makouba@phed.uoa.gr

ΠΕΡΙΛΗΨΗ

Οι εξ αποστάσεως εξετάσεις, που καθιερώθηκαν κατά την περίοδο της πανδημίας και παραμένουν σε χρήση στο Ελληνικό Ανοικτό Πανεπιστήμιο (ΕΑΠ), αποτελούν μια διαδικασία που απαιτεί συνεχή επαναπροσδιορισμό. Και αυτό διότι οι εξετάσεις αυτής της μορφής όχι μόνο εισάγουν νέες προκλήσεις, αλλά και απαιτούν διαφορετικές στρατηγικές αξιολόγησης για τη διασφάλιση της εγκυρότητας και αξιοπιστίας των αποτελεσμάτων. Σημαντικά ζητήματα που εγείρονται περιλαμβάνουν τις διαδικασίες ταυτοποίησης και επιτήρησης των φοιτητών/τριών, την επιλογή θεμάτων εξετάσεων (μορφή, περιεχόμενο κ.ά.), καθώς και την εξασφάλιση της ευθυγράμμισης αυτών με τους εκπαιδευτικούς στόχους.

Στο πλαίσιο αυτό, η τεχνολογία έχει διαδραματίσει καίριο ρόλο σε αυτή τη μεταμόρφωση, ενσωματώνοντας εργαλεία όπως το λογισμικό ανίχνευσης ομοιότητας (Turnitin) και εξειδικευμένα λογισμικά επιτήρησης. Παράλληλα, η εμφάνιση της Τεχνητής Νοημοσύνης ενισχύει τις προκλήσεις, καθώς απαιτείται μια πιο σύνθετη και στοχευμένη προσέγγιση για την ανάπτυξη θεμάτων που αποτρέπουν τη μη αυθεντική συμμετοχή των φοιτητών/τριών. Για παράδειγμα, οι εξετάσεις με ανοικτά βιβλία, βασική επιλογή στο υπό μελέτη Πρόγραμμα Μεταπτυχιακών Σπουδών (ΠΜΣ) «Εκπαίδευση & Τεχνολογίες σε Συστήματα Εξ Αποστάσεως Διδασκαλίας και Μάθησης - Επιστήμες της Αγωγής (ΕΤΑ)» του ΕΑΠ της παρούσας εργασίας, αναδεικνύουν την κριτική σκέψη ως τον πρωταρχικό παράγοντα αξιολόγησης. Η εστίαση στη δεξιότητα αυτή αποτελεί ακρογωνιαίο λίθο της εκπαιδευτικής διαδικασίας και αντανακλά τις απαιτήσεις της σύγχρονης εποχής.

Στη βάση αυτή, η εργασία αυτή στοχεύει στη συστηματική παρουσίαση και ανάλυση των διαδικασιών που εφαρμόστηκαν στις εξ αποστάσεως εξετάσεις του ΠΜΣ ΕΤΑ του ΕΑΠ κατά την πενταετία (2020-2025), καταδεικνύοντας τα οφέλη και τις προκλήσεις. Επιπλέον, συζητείται η εξέλιξη των μεθόδων αξιολόγησης, με έμφαση στη διασφάλιση ότι οι φοιτητές/τριες εμπλέκονται ουσιαστικά και αποδεικνύουν τη γνώση και τις δεξιότητες που ανέπτυξαν κατά τη διάρκεια των Θεματικών Ενοτήτων.

Ως προς τη μεθοδολογία της, η παρούσα εργασία εστιάζει στο σύνολο των διαδικασιών των εξ αποστάσεως εξετάσεων και πρακτικών αξιολόγησης που εφαρμόστηκαν στο ΠΜΣ «ΕΤΑ» του ΕΑΠ στη διάρκεια 11 εξαμήνων. Εξετάζεται η ανάπτυξη θεμάτων εξετάσεων και πρακτικών αξιολόγησης και κατά πόσο αυτές ευθυγραμμίζονται με τις τεχνολογικές και παιδαγωγικές εξελίξεις. Μελετάται ο τρόπος με τον οποίο οι διδάσκοντες/ουσες προσαρμόζονται στην ενσωμάτωση εργαλείων όπως το Turnitin, για την αποτροπή φαινομένων λογοκλοπής, και της Τεχνητής Νοημοσύνης, για την πρόκληση αυθεντικής εμπλοκής των φοιτητών/τριών στις εξετάσεις. Διερευνάται η εφαρμογή κάποιων από τις πρακτικές που υιοθετήθηκαν στο πλαίσιο της μορφής αυτών των εξ αποστάσεως εξετάσεων.

Λέξεις κλειδιά: εξ αποστάσεως εκπαίδευση, τεχνολογία, ψηφιακές εξετάσεις, εγκυρότητα, αξιοπιστία, αυθεντική αξιολόγηση, κριτική σκέψη

ΕΙΣΑΓΩΓΗ

Παρά την αυξανόμενη διεθνή βιβλιογραφία σχετικά με την εξ αποστάσεως αξιολόγηση και τις επιπτώσεις της ΤΝ στη μαθησιακή διαδικασία (Vorvilas et al., 2023· Aristeidou et al., 2024), παραμένει περιορισμένη η συστηματική μελέτη πραγματικών πανεπιστημιακών πρακτικών αξιολόγησης σε περιβάλλοντα όπου η ΤΝ είναι ήδη διαθέσιμη και χρησιμοποιείται από τους φοιτητές. Οι περισσότερες έρευνες επικεντρώνονται σε θεωρητικές προσεγγίσεις, σε τεχνολογικά εργαλεία ή σε μεμονωμένες μορφές αξιολόγησης, χωρίς να εξετάζουν ολιστικά πώς ένα πρόγραμμα σπουδών ανασχεδιάζει τις εξετάσεις του σε βάθος χρόνου (Ioakeimidou et al., 2023· Froehlich et al., 2023). Ειδικότερα, απουσιάζουν μελέτες που να καταγράφουν διαχρονικά (2020–2025) τις αλλαγές στις εξ αποστάσεως εξετάσεις ενός ελληνικού ΑΕΙ και να αναλύουν πώς οι εκπαιδευτικοί προσαρμόζουν τις πρακτικές τους σε συνθήκες αυξημένης χρήσης εργαλείων ΤΝ. Η παρούσα εργασία καλύπτει αυτό το ερευνητικό κενό, προσφέροντας μια τεκμηριωμένη μελέτη περίπτωσης που συνδέει τις τεχνολογικές εξελίξεις με τις παιδαγωγικές αποφάσεις και τις πρακτικές αξιολόγησης.

Σκοπός της εργασίας είναι η συστηματική παρουσίαση και ανάλυση των διαδικασιών που εφαρμόστηκαν στις εξ αποστάσεως εξετάσεις του ΠΜΣ ΕΤΑ του ΕΑΠ κατά την πενταετία 2020–2025, αναδεικνύοντας τα οφέλη, τις προκλήσεις και τις στρατηγικές προσαρμογής. Ειδικότερα, η εργασία επιδιώκει να:(α) αποτυπώσει τη διαδικασία λήψης αποφάσεων και τον ανασχεδιασμό των εξ αποστάσεως εξετάσεων, (β) αξιολογήσει τους κύριους τύπους εξέτασης ως προς την καλλιέργεια κριτικής σκέψης και τη διασφάλιση της ακαδημαϊκής ακεραιότητας, και (γ) προτείνει κατευθύνσεις πολιτικής και πρακτικής για τη βιώσιμη ενσωμάτωση της ΤΝ στην εξ αποστάσεως αξιολόγηση.

Με βάση τα παραπάνω, η εργασία μελετά τα ακόλουθα ερευνητικά ερωτήματα:

- Πώς έχει επηρεάσει η ΤΝ τη διαδικασία των εξ αποστάσεως εξετάσεων στο ΠΜΣ ΕΤΑ του ΕΑΠ την περίοδο 2020–2025;
- Με ποιους τρόπους διασφαλίζονται η ισοτιμία, η ακεραιότητα, η εγκυρότητα και η αξιοπιστία των εξ αποστάσεως εξετάσεων στην εποχή της ΤΝ;
- Ποιες μορφές αξιολόγησης αναδεικνύονται ως παιδαγωγικά βιώσιμες και αποτελεσματικές για το μέλλον, λαμβάνοντας υπόψη τις δυνατότητες και τους περιορισμούς της ΤΝ;

Η εργασία συμβάλλει στη διεθνή συζήτηση για την εξ αποστάσεως αξιολόγηση καθώς προσφέρει μια διαχρονική μελέτη περίπτωσης που αποτυπώνει την εξέλιξη των εξετάσεων σε πραγματικό πρόγραμμα σπουδών.. Επιπλέον αναδεικνύει παιδαγωγικές και τεχνολογικές στρατηγικές που μπορούν να αξιοποιηθούν από άλλα ΑΕΙ, και προτείνει πλαίσιο κατευθύνσεων για τη βιώσιμη ενσωμάτωση της ΤΝ στην αξιολόγηση, συνδέοντας θεωρία, πρακτική και θεσμικές ανάγκες. Ειδικότερα, παρουσιάζονται σχεδιαστικές προσεγγίσεις θεμάτων και χαρτογραφούνται οι ρόλοι εργαλείων όπως το Turnitin και οι τεχνολογίες επιτήρησης, ενταγμένα σε μια ανθρωποκεντρική κουλτούρα αξιολόγησης που θέτει στο επίκεντρο την κριτική σκέψη και την ακαδημαϊκή δεοντολογία.

ΒΙΒΛΙΟΓΡΑΦΙΚΗ ΕΠΙΣΚΟΠΗΣΗ

Η αξιολόγηση στην ανώτατη εκπαίδευση αποτελεί κρίσιμο και πολυδιάστατο πεδίο, καθώς δεν αποσκοπεί μόνο στη μέτρηση της επίδοσης αλλά στην αποτύπωση των μαθησιακών αποτελεσμάτων και στην καλλιέργεια δεξιοτήτων με διάρκεια (Creswell, 2016· Balboni, 2016). Στην εξ αποστάσεως εκπαίδευση, η ανάγκη για έγκυρα και αξιόπιστα μοντέλα αξιολόγησης γίνεται εντονότερη, καθώς εγείρονται αμφιβολίες για την αυθεντικότητα και τη διαφάνεια της διαδικασίας (Vorvilas et al., 2023· Aristeidou et al., 2024). Η διεθνής βιβλιογραφία αναδεικνύει τέσσερις βασικούς άξονες:

α) Μετατόπιση από την αναπαραγωγή γνώσης σε αυθεντικές αξιολογήσεις: Έρευνες δείχνουν ότι οι εκπαιδευτικές διαδικασίες κάθε είδους (δραστηριότητες, εξετάσεις κτλ) που βασίζονται στην απομνημόνευση και στην απλή αναπαραγωγή δεν οδηγούν σε ουσιαστική μάθηση. Αντιθέτως, ζητούμενα είναι η εκπόνηση δραστηριοτήτων που προάγουν τον κριτικό στοχασμό, τον αναστοχασμό και τη δημιουργία νέας γνώσης (Mezzadri, 2020· Lionarakis, 2005). Η διατύπωση θεμάτων που απαιτούν σύνθετη σκέψη και προσωπικό αποτύπωμα συμβάλλει στην καλλιέργεια γνωστικών και μεταγνωστικών δεξιοτήτων. Ειδικότερα, η διεθνής βιβλιογραφία επιβεβαιώνει τη σημασία της κριτικής σκέψης ως θεμελιώδους δεξιότητας στην εξ αποστάσεως εκπαίδευση με την ανάγκη για κατάλληλες διδακτικές προσεγγίσεις που να ενθαρρύνουν τον αναστοχασμό, την ανάλυση και τη σύνθεση πληροφοριών, μιας δεξιότητας που ανάγεται σε προτεραιότητα (Manousou, 2025).

β) Θεσμικά και ηθικά πλαίσια: Η διεθνής και ελληνική βιβλιογραφία συγκλίνει στο ότι η αξιολόγηση στην εξ αποστάσεως εκπαίδευση δεν μπορεί να αποσυνδεθεί από τη θέσπιση σαφών θεσμικών και δεοντολογικών πλαισίων, τα οποία διασφαλίζουν την ισότητα πρόσβασης, τη διαφάνεια των διαδικασιών και την ποιότητα των αποτελεσμάτων (Chaudhary & Dey, 2013· Baume, 2020· Domínguez-Figaredo et al., 2022). Η ανάγκη αυτή γίνεται ακόμη πιο έντονη σε περιόδους κρίσης, όπως η πανδημία, όταν τα ΑΕΙ αναγκάστηκαν να υιοθετήσουν αιφνιδίως εξ αποστάσεως εξετάσεις. Η

ελληνική εμπειρία ανέδειξε μεν σοβαρές προκλήσεις που αφορούν την ακαδημαϊκή ακεραιότητα, την προστασία των προσωπικών δεδομένων και την αποτροπή φαινομένων ανισότητας, αλλά ταυτόχρονα ανέδειξε και δυνατότητες για αναθεώρηση των παραδοσιακών προσεγγίσεων, με έμφαση σε εναλλακτικές μορφές αξιολόγησης που προάγουν την κριτική σκέψη και την αυτονομία του φοιτητή (Ioakeimidou et al., 2023· Froehlich et al., 2023).

Πέραν της τεχνοκρατικής διάστασης, η συζήτηση για την αξιολόγηση στην εξ αποστάσεως εκπαίδευση συνδέεται με τις ανθρωποκεντρικές και ηθικές αξίες που πρέπει να τη διέπουν. Ήδη από τις κατευθυντήριες γραμμές της UNESCO (2006) τονίζεται η ανάγκη για παιδαγωγικές προσεγγίσεις που θέτουν τον φοιτητή/την φοιτήτρια στο επίκεντρο, ενσωματώνοντας αρχές ισότητας, σεβασμού και κοινωνικής δικαιοσύνης. Νεότερες μελέτες (Bozkurt et al., 2024· Tasis, 2022) ενισχύουν αυτή την κατεύθυνση, υποστηρίζοντας ότι η αξιολόγηση δεν πρέπει να περιορίζεται σε εργαλείο μέτρησης επιδόσεων, αλλά να λειτουργεί ως οργανικό μέρος της μαθησιακής διαδικασίας που καλλιεργεί υπευθυνότητα, διάλογο και ηθική συνείδηση. Συνεπώς, τα θεσμικά και ηθικά πλαίσια συνιστούν τον θεμέλιο λίθο για τη διαμόρφωση μιας κουλτούρας αξιολόγησης στην εξ αποστάσεως εκπαίδευση που να είναι όχι μόνο αξιόπιστη και δίκαιη, αλλά και βαθιά συμβατή με τις αρχές της δημοκρατίας, της ισότητας ευκαιριών και της δια βίου μάθησης.

γ) Ρόλος της Τεχνητής Νοημοσύνης: Όσον αφορά την τεχνητή νοημοσύνη, οι έρευνα διεθνώς υπογραμμίζει την ανάγκη για κριτική χρήση της στην εκπαιδευτική διαδικασία. Είναι γεγονός ότι η αξιοποίησή της μπορεί να συμβάλει στην παροχή εξατομικευμένης μάθησης και στην ανάπτυξη ψηφιακών δεξιοτήτων, ωστόσο η αλόγιστη χρήση της μπορεί να προκαλέσει απώλεια αυθεντικής σκέψης, παγίωση προκαταλήψεων και αναστολή πρωτοβουλίας. Συνεπώς, η ενσωμάτωσή της στην εκπαιδευτική διαδικασία θα πρέπει να γίνει με τρόπο που να μην υποκαθιστά αλλά να υποστηρίζει την αναλυτική και αναστοχαστική σκέψη (Manousou, 2025).

Το πλαίσιο Artificial Intelligence-Based Assessment in Education (AIBA) που προτείνουν οι Fang, Roscoe και McNamara (2023) αναδεικνύει την πολυδιάστατη φύση αυτών των συστημάτων, λαμβάνοντας υπόψη σκοπούς, δομές, πηγές δεδομένων, υπολογιστικές μεθόδους και βαθμό ορατότητας. Τα ευρήματα αυτά επιβεβαιώνουν την άποψη των Vlachopoulos και Makri (2024) ότι οι αυθεντικές μορφές αξιολόγησης είναι απαραίτητες για την καλλιέργεια δεξιοτήτων του 21ου αιώνα. Παρομοίως, ο Du Plessis (2025) τονίζει ότι η δυναμική της αξιολόγησης με έργα (project-based) μπορεί να ενισχύσει τη μάθηση όταν αυτή υποστηρίζεται από την ΤΝ. Την ίδια στιγμή, οι ανησυχίες των Bozkurt et al. (2024) σχετικά με τις αλγοριθμικές προκαταλήψεις και τους κινδύνους της «λανθάνουσας αξιολόγησης» (stealth assessment) υπογραμμίζουν την ανάγκη για προσεκτικά σχεδιασμένα πλαίσια. Τα στοιχεία δείχνουν ότι η ΤΝ αναδιαμορφώνει τις πρακτικές αξιολόγησης, ωστόσο η αποτελεσματικότητά της εξαρτάται από την ισορροπία ανάμεσα στην καινοτομία, τη διαφάνεια και την παιδαγωγική υπευθυνότητα.

Επομένως, στο πεδίο των εξ αποστάσεως εξετάσεων, η εισαγωγή εργαλείων ΤΝ μεταβάλλει ριζικά το τοπίο, λειτουργώντας τόσο ως πηγή προσαρμοστικότητας και ανατροφοδότησης όσο και ως πρόκληση για την ακαδημαϊκή ακεραιότητα. Ζητήματα όπως η λογοκλοπή, η αυθεντικότητα και η δεοντολογία καθιστούν αναγκαία τη διαμόρφωση νέων κατευθυντήριων γραμμών για τη χρήση της.

δ) Ανάμεικτες και εναλλακτικές μορφές αξιολόγησης: Στη διεθνή και ελληνική βιβλιογραφία, όπως στις έρευνες των Ioakeimidou et al. (2023), Aristeidou et al. (2024) και Kinley (2023), καταγράφεται ένα πλουραλιστικό φάσμα εναλλακτικών μορφών αξιολόγησης που υιοθετούνται από τα Ανοικτά και εξ Αποστάσεως Πανεπιστήμια. Οι γραπτές εξετάσεις εξακολουθούν να αποτελούν μια από τις πιο διαδεδομένες μορφές εξέτασης, οι οποίες μπορεί να είναι με ανοικτά ή κλειστά βιβλία και να συνοδεύονται από ηλεκτρονικό έλεγχο λογοκλοπής. Στόχος τους είναι να περιοριστεί η αποστήθιση και να ενισχυθεί η κριτική ανάλυση, με τις ερωτήσεις να απαιτούν συχνά αναπτυξιακές απαντήσεις που βασίζονται σε βιβλιογραφικές αναφορές. Δίπλα σε αυτές, σημαντική θέση κατέχουν οι προφορικές εξετάσεις, οι οποίες χρησιμοποιούνται είτε αυτόνομα είτε συνδυαστικά με γραπτή αξιολόγηση. Παρότι προτείνονται από τη συντριπτική πλειονότητα των ιδρυμάτων, η εφαρμογή τους είναι σχετικά περιορισμένη, καθώς απαιτούν υψηλή επένδυση σε χρόνο και οργάνωση (Ioakeimidou et al., 2023). Εξίσου κεντρικό ρόλο διαδραματίζουν τα projects και οι ερευνητικές εργασίες, που συνδέονται με την αυθεντική μάθηση και την ανάπτυξη δεξιοτήτων συνεργασίας, έρευνας και επίλυσης προβλημάτων. Η παρουσίασή τους μπορεί να γίνεται με τη μορφή γραπτών μελετών, αλλά και μέσω βίντεο παρουσιάσεων ή προσομοιώσεων, που προσφέρουν μια πιο δυναμική διάσταση στην αξιολόγηση. Σημαντική καινοτομία αποτελεί επίσης η αξιοποίηση των e-portfolios, τα οποία συγκεντρώνουν αντιπροσωπευτικές εργασίες του φοιτητή/τριας κατά τη διάρκεια του εξαμήνου, αναδεικνύοντας όχι μόνο τα μαθησιακά αποτελέσματα αλλά και τον τρόπο με τον οποίο αυτά κατακτήθηκαν. Το εργαλείο αυτό ενισχύει τη μεταγνωστική επίγνωση και την αυτοαξιολόγηση, ωστόσο απαιτεί σημαντική χρονική επένδυση και πρέπει να ενταχθεί εξαρχής στο σχεδιασμό του μαθήματος, ώστε να συνδέεται άμεσα με τους μαθησιακούς στόχους. Η καταγραφή αυτή δείχνει ότι τα πανεπιστήμια υιοθετούν μια μεγάλη ποικιλία μορφών αξιολόγησης, οι οποίες ανταποκρίνονται στις ανάγκες της εξ αποστάσεως εκπαίδευσης και επιδιώκουν να ισορροπήσουν την εγκυρότητα και την αξιοπιστία με την αυθεντικότητα και τη φοιτητοκεντρική προσέγγιση (Manousou & Rassia, 2024).

Οι προφορικές εξετάσεις, τα projects, τα portfolios, οι εξετάσεις με ανοικτά βιβλία και οι προσομοιώσεις αναγνωρίζονται όλο και περισσότερο στη διεθνή βιβλιογραφία ως πρακτικές που ενισχύουν την εγκυρότητα και την αξιοπιστία της αξιολόγησης, προσφέροντας ταυτόχρονα δυνατότητες αποτροπής της επιφανειακής μάθησης (Hughes & Tait, 2021· Guangul, 2020· Ioakeimidou et al., 2023). Σε αντίθεση με τις παραδοσιακές μορφές εξέτασης που εστιάζουν κυρίως στην αναπαραγωγή γνώσεων, οι πρακτικές αυτές καλλιεργούν την ικανότητα κριτικής σκέψης, την ανάλυση, τη δημιουργικότητα και την εφαρμογή της γνώσης σε πραγματικά ή προσομοιωμένα περιβάλλοντα.

Σημαντική παράμετρος αποτελεί, επίσης, η ανάπτυξη μικτών μοντέλων αξιολόγησης (blended assessment), τα οποία συνδυάζουν την εξ αποστάσεως με τη δια ζώσης διάσταση. Έρευνες καταδεικνύουν ότι τα μοντέλα αυτά ενισχύουν την εμπιστοσύνη των φοιτητών/τριών, καθώς προσφέρουν ευελιξία χωρίς να αποδυναμώνουν την αίσθηση ακαδημαϊκής ακεραιότητας (Cross, et al., 2023). Παράλληλα, συμβάλλουν στη βελτίωση της εκπαιδευτικής εμπειρίας, εφόσον συνδυάζουν τα πλεονεκτήματα της τεχνολογικής υποστήριξης με την αξία της άμεσης ανθρώπινης αλληλεπίδρασης και της προσωπικής ανατροφοδότησης.

Φαίνεται, επομένως, ότι η ενσωμάτωση αυτών των πρακτικών συνιστά ουσιαστική μετατόπιση από τη μονοδιάστατη αξιολόγηση γνώσεων προς ένα πιο πλούσιο, ευέλικτο και ανθρωποκεντρικό σύστημα, το οποίο ανταποκρίνεται καλύτερα στις ανάγκες της σύγχρονης εκπαίδευσης. Συνολικά, η βιβλιογραφία συγκλίνει στο ότι η εξ αποστάσεως αξιολόγηση χρειάζεται να ξεπεράσει τα στενά τεχνικά ζητήματα και να εδραιωθεί σε παιδαγωγικές και δεοντολογικές αρχές που προάγουν την κριτική σκέψη, την ισότητα και την ακαδημαϊκή ακεραιότητα. Η ενότητα αυτή λειτουργεί ως φακός ερμηνείας των ευρημάτων της παρούσας μελέτης περίπτωσης, φωτίζοντας τόσο τις προκλήσεις όσο και τις προοπτικές για μια ανθρωποκεντρική και βιώσιμη αξιολόγηση στην ανώτατη εξ αποστάσεως εκπαίδευση.

ΜΕΛΕΤΗ ΠΕΡΙΠΤΩΣΗΣ ΤΟ ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ ΕΤΑ ΤΟΥ ΕΑΠ

Το Ελληνικό Ανοικτό Πανεπιστήμιο (ΕΑΠ), ως ίδρυμα εξειδικευμένο στην εξ αποστάσεως εκπαίδευση, διαθέτει ένα κεντρικά οργανωμένο αλλά και αποκεντρωμένα εφαρμοζόμενο πλαίσιο εξετάσεων, στο οποίο οι γενικές κατευθύνσεις συναρθρώνονται με τις επιλογές κάθε Προγράμματος Σπουδών και Θεματικής Ενότητας (ΘΕ). Στο Πρόγραμμα Μεταπτυχιακών Σπουδών «Εκπαίδευση & Τεχνολογίες σε Συστήματα Εξ Αποστάσεως Διδασκαλίας και Μάθησης – Επιστήμες της Αγωγής» (ΕΤΑ), το πλαίσιο αυτό αποτυπώνεται στη δυναμική αξιοποίηση των υποδομών, των λογισμικών και των μορφών αξιολόγησης με γνώμονα τη διασφάλιση ποιότητας και τη φοιτητοκεντρική υποστήριξη. Η διαδικασία εξετάσεων δεν αποτελεί μια στατική πρακτική, αλλά εξελίσσεται σε συνάρτηση με τις τεχνολογικές εξελίξεις και τις παιδαγωγικές προτεραιότητες. Στο πλαίσιο αυτό, αξιοποιείται μια σειρά πολυμορφικών τύπων αξιολόγησης: projects με προφορική υποστήριξη με ενδιάμεση καθοδήγηση και ανατροφοδότηση, γραπτές δοκιμασίες με ανοικτές σημειώσεις (open-book) με έμφαση στον κριτικό και αναστοχαστικό λόγο, καθώς και παραδοσιακά δοκίμια ή ερωτήσεις ανάπτυξης για την αποτίμηση της θεωρητικής εμβάθυνσης. Η ακεραιότητα των διαδικασιών ενισχύεται μέσω της χρήσης εργαλείων κειμενικής ομοιότητας (π.χ. Turnitin) και στοχευμένων πρακτικών επιτήρησης όπου αυτό κρίνεται αναγκαίο, με στόχο την εξισορρόπηση της αξιοπιστίας με τον σεβασμό στην αυτονομία των φοιτητών/τριών. Το πλαίσιο αυτό συνιστά το υπόβαθρο μέσα στο οποίο διερευνώνται οι στρατηγικές ανασχεδιασμού και οι προκλήσεις της αξιολόγησης την περίοδο 2020–2025.

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα έρευνα εντάσσεται στο πλαίσιο της μελέτης περίπτωσης, με σκοπό την κατανόηση των εξελίξεων και των προκλήσεων που συνοδεύουν τη διαμόρφωση εξ αποστάσεως εξετάσεων στο Ελληνικό Ανοικτό Πανεπιστήμιο. Ακολουθώντας τη λογική του Robson (2010), δόθηκε έμφαση σε μια «έρευνα του πραγματικού κόσμου» που συνδυάζει πολλαπλές πηγές και μεθόδους, ώστε να αποτυπωθεί η πολυπλοκότητα του θεσμικού και παιδαγωγικού πλαισίου.

Στην κατεύθυνση αυτή και προκειμένου να ακολουθηθούν αξιοποιήθηκαν αρχικά τα πρακτικά της Επιτροπής Προγράμματος Σπουδών (ΕΠΣ), τα οποία αποτυπώνουν τις επίσημες αποφάσεις και κατευθύνσεις. στο οποίο συμμετείχαν και θεσμικοί και ακαδημαϊκοί παράγοντες: ο Διευθυντής του Προγράμματος Μεταπτυχιακών Σπουδών (ΠΜΣ) ΕΤΑ, η βοηθός του, το μέλος ΔΕΠ με θέση στο συγκεκριμένο ΠΜΣ και μια από τις παλαιότερες ΣΕΠ στη «μητρική»[2] Θεματική Ενότητα (ΘΕ) ΕΚΠ65 και συντονίστρια σε ΘΕ του ΠΜΣ ΕΤΑ. Η σύνθεση αυτή επέτρεψε την αντιπροσώπευση διαφορετικών οπτικών, αλλά και τη σύνδεση της καθημερινής πρακτικής με τον στρατηγικό σχεδιασμό.

[2] Η ΘΕ ΕΚΠ65 «Ανοικτή και εξ Αποστάσεως Εκπαίδευση» είναι η ΘΕ του ΠΜΣ «Επιστήμες της Αγωγής» (Πρώην «Σπουδές στην Εκπαίδευση») από την οποία προήλθε το ΠΜΣ ΕΤΑ. Σε αυτήν υπηρέτησαν για περισσότερα από 20 χρόνια κάποιοι ΣΕΠ, η εμπειρία των οποία είναι πολύτιμη σε πολλά επίπεδα.

Παράλληλα, συγκροτήθηκε ομάδα εστίασης (focus group) με τη συμμετοχή συντονιστών/τριών διαφορετικών Θεματικών Ενοτήτων, όπου καταγράφηκαν οι προβληματισμοί των συμμετεχόντων σε σχέση με τα πλεονεκτήματα και τα μειονεκτήματα κάθε μορφής αξιολόγησης (προφορικές εξετάσεις, projects, μικτά μοντέλα). Κάθε συντονιστής/τρια κατέθεσε την προσωπική του θέση – θετική ή αρνητική – συμβάλλοντας έτσι σε μια πολυφωνική χαρτογράφηση στάσεων. Μέσα από αυτές τις τοποθετήσεις αναδείχθηκαν και τα βασικά ερευνητικά ερωτήματα: πώς διασφαλίζεται η ισοτιμία και η ακεραιότητα, πώς ενισχύεται η εγκυρότητα και η αυθεντικότητα, ποιες μορφές θεωρούνται πιο βιώσιμες για το μέλλον.

Για την ανάλυση των δεδομένων ακολουθήθηκε θεματική προσέγγιση, με ομαδοποίηση των απόψεων σε κατηγορίες όπως αξιοπιστία, κριτική σκέψη, τεχνικές και χρονικές απαιτήσεις. Η τριγωνοποίηση πηγών και μεθόδων (πρακτικά επιτροπής, συζητήσεις, focus group) ενίσχυσε την εγκυρότητα των ευρημάτων, καθώς επέτρεψε τη σύγκριση επίσημων κειμένων με βιωμένες εμπειρίες και προσωπικές θέσεις.

Η διαδικασία συλλογής και ανάλυσης βρίσκεται ακόμη σε εξέλιξη, γεγονός που προσδίδει στην έρευνα έναν δυναμικό χαρακτήρα. Αναμένεται να συνεχιστεί με διαχρονική παρακολούθηση (longitudinal study), ώστε να εξεταστεί πώς μεταβάλλονται οι επιλογές και οι στάσεις των συντονιστών/τριών στο μέλλον, υπό το φως θεσμικών αλλαγών, τεχνολογικών εξελίξεων – ιδίως της Τεχνητής Νοημοσύνης – και νέων παιδαγωγικών κατευθύνσεων.

Στάδια μετασχηματισμούΟ μετασχηματισμός των εξεταστικών πρακτικών στην εξ αποστάσεως εκπαίδευση μπορεί να αποτυπωθεί σε τρία διακριτά στάδια (Πίνακας 1), τα οποία αντανακλούν τις ανάγκες, τις προτεραιότητες και τις παιδαγωγικές στοχεύσεις κάθε περιόδου ως εξής:

ΑΠΟΤΕΛΕΣΜΑΤΑ ΚΑΙ ΣΥΖΗΤΗΣΗ

Η ΘΕ ΕΚΠ65 «Ανοικτή και εξ Αποστάσεως Εκπαίδευση» είναι η ΘΕ του ΠΜΣ «Επιστήμες της Αγωγής» (Πρώην «Σπουδές στην Εκπαίδευση») από την οποία προήλθε το ΠΜΣ ΕΤΑ. Σε αυτήν υπηρέτησαν για περισσότερα από 20 χρόνια κάποιοι ΣΕΠ, η εμπειρία των οποία είναι πολύτιμη σε πολλά επίπεδα.

Α΄ Στάδιο (2020–2021). Κατά την πρώτη φάση, που συνέπεσε με την αιφνίδια μετάβαση σε εξ αποστάσεως εξετάσεις λόγω της πανδημίας, οι διαδικασίες αξιολόγησης χαρακτηρίστηκαν από μια ταχεία προσαρμογή στις νέες συνθήκες. Ο συνδυασμός ανοικτών θεμάτων με στοιχεία αντικειμενικού τύπου αποτέλεσε την κύρια πρακτική, με στόχο να εξασφαλιστεί αφενός η ακαδημαϊκή ακεραιότητα και αφετέρου η λειτουργικότητα του νέου μοντέλου. Οι εξετάσεις με ανοικτά βιβλία ως διαδικασία επέτρεψαν μια σχετική ευελιξία, ενώ η χρήση αντικειμενικών ερωτήσεων λειτούργησε ως αντιστάθμισμα στην ανάγκη για γρήγορη και μαζική υλοποίηση. Η φάση αυτή ήταν κυρίως προσανατολισμένη στην άμεση προσαρμογή και στην αντιμετώπιση των πρακτικών δυσκολιών.

Β΄ Στάδιο (2022–2025). Στη δεύτερη φάση καταγράφεται μια διαφορετική προσέγγιση. Οι εξ αποστάσεως εξετάσεις οργανώθηκαν γύρω από δύο κύριους άξονες που αφορούσαν ο μεν πρώτος τέσσερις ΘΕ με έμφαση στην ανάπτυξη θεμάτων με ανοικτά βιβλία και ο δεύτερος τέσσερις ΘΕ που στηρίχθηκαν σε projects, τα οποία συνοδεύονταν από υποστηρικτικές συνεδρίες. Η επιλογή αυτή στόχευε στην ενίσχυση της κριτικής σκέψης και στην καλλιέργεια πολυεπίπεδων δεξιοτήτων, απομακρυνόμενη από την απλή απομνημόνευση. Σε αυτό το στάδιο ενισχύθηκε η διάσταση της μαθησιακής υποστήριξης, με παράλληλες δράσεις που στόχευαν στη βελτίωση της φοιτητικής εμπειρίας και στην ανάπτυξη δεξιοτήτων που ανταποκρίνονται στις απαιτήσεις της σύγχρονης εκπαιδευτικής πραγματικότητας, της επαγγελματικής ανάπτυξης και της κοινωνίας.

Πίνακας 1
Χρονογραμμή μεταβολών τύπων εξέτασης (2020–2025)

Περίοδος	Βασικές επιλογές	Στόχευση
2020–2021	Ανοικτά βιβλία + αντικειμενικού τύπου	Ταχεία προσαρμογή, βασική ακεραιότητα
2022–2025	4 ΘΕ ανάπτυξης, 4 ΘΕ projects	Κριτική σκέψη, αυθεντικότητα, υποστήριξη
2026→	Επανασχεδιασμός	Εγκυρότητα/αξιοπιστία

Γ΄ Στάδιο (υπό σχεδίαση). Η τρίτη φάση, η οποία βρίσκεται σε διαδικασία σχεδιασμού, στοχεύει στον εξορθολογισμό και στον συνδυασμό εξεταστικών μορφών. Προβλέπεται η δημιουργία τράπεζας θεμάτων με στοχευμένες παραλλαγές, ώστε να ενισχυθεί η ποικιλία αλλά και η ισοτιμία στην αξιολόγηση. Παράλληλα, σχεδιάζεται η διεύρυνση της χρήσης των προφορικών εξετάσεων, κυρίως σε περιπτώσεις όπου αυτές μπορούν να ενισχύσουν την εγκυρότητα και την αξιοπιστία των αποτελεσμάτων. Η έμφαση μετατοπίζεται πλέον στην ισορροπία ανάμεσα στη διαφάνεια, την παιδαγωγική ευελιξία και την ακαδημαϊκή ποιότητα.

ΤΥΠΟΙ ΕΞΕΤΑΣΗΣ

Η αποτίμηση των διαφορετικών τύπων εξέτασης αναδεικνύει τα ιδιαίτερα πλεονεκτήματα αλλά και τις προκλήσεις που τους συνοδεύουν (Πίνακας 2 & 3). Οι προφορικές εξετάσεις ξεχωρίζουν για την αυξημένη αυθεντικότητα που προσφέρουν, καθώς μειώνουν σημαντικά την πιθανότητα μη γνήσιας παραγωγής απαντήσεων και επιτρέπουν τόσο την εμβάθυνση στις απαντήσεις όσο και την επαναδιατύπωση όπου χρειάζεται. Ωστόσο, συνοδεύονται από σημαντικές δυσκολίες, όπως η εξασφάλιση ισοδυναμίας των θεμάτων μεταξύ των εξεταζομένων, η διασφάλιση συνέπειας και αντικειμενικότητας στα κριτήρια βαθμολόγησης, καθώς και τα τεχνικά και χρονικά κόστη που συνεπάγονται.

Τα projects με υποστήριξη προσφέρουν μια άλλη διάσταση, καθώς ενθαρρύνουν την εφαρμογή της θεωρίας σε πρακτικά σενάρια, την αιτιολόγηση των επιλογών, τον αναστοχασμό και την ανάπτυξη πολύπλευρων επαγγελματικών δεξιοτήτων. Η εμβάθυνση αυτή καθιστά τα projects ιδιαίτερα χρήσιμα στην εξ αποστάσεως εκπαίδευση, όμως αναδεικνύονται παράλληλα προκλήσεις όπως η ανάγκη επαρκούς διαχείρισης χρόνου και πόρων, η πιθανότητα υποκειμενικότητας στην αξιολόγηση, καθώς και η απαίτηση για τη διαμόρφωση σαφών και διαφανών αξόνων και κριτηρίων για τη βαθμολόγησή τους, με τη μορφή ρουμπρικών.

Οι εξετάσεις με ανοικτά βιβλία με έμφαση στην κριτική σκέψη προβάλλουν ως ένα ακόμη εργαλείο που συνδέει τη μάθηση με πραγματικές συνθήκες εργασίας. Τα πλεονεκτήματά τους περιλαμβάνουν την έμφαση στον έλεγχο της ικανότητας μεταφοράς και σύνθεσης γνώσεων, την αποθάρρυνση της στείρας αποστήθισης και την εναρμόνιση με τις πρακτικές που συναντώνται σε επαγγελματικά περιβάλλοντα. Παρά ταύτα, προϋποθέτουν ιδιαίτερα προσεκτικό σχεδιασμό θεμάτων, τα οποία πρέπει να είναι κατά βάση μελέτες περίπτωσης, (case-based ή data-informed), ώστε να διασφαλίζεται η εγκυρότητα. Επιπλέον, η αξιοπιστία στη βαθμολόγηση απαιτεί σαφή κριτήρια και κατάλληλη επιμόρφωση των διδασκόντων/ουσών.

Για την ενίσχυση της ακεραιότητας στις εξετάσεις, τα ιδρύματα καταφεύγουν σε πολλαπλά μέτρα. Στα σημαντικότερα συγκαταλέγονται η χρήση εργαλείων ελέγχου ομοιότητας κειμένου, η τεκμηρίωση του ατομικού αποτυπώματος συμβολής στις ομαδικές εργασίες, η προσθήκη προφορικής υποστήριξης ή διευκρινίσεων όπου απαιτείται, καθώς και η σαφής τεκμηρίωση πηγών και ροών εργασίας από τους φοιτητές/τριες. Οι στρατηγικές αυτές λειτουργούν συμπληρωματικά προς τους επιμέρους τύπους αξιολόγησης, ενισχύοντας την αξιοπιστία και τη διαφάνεια της διαδικασίας.

Πίνακας 2.
SWOT Προφορικών Εξετάσεων

Δυνατά σημεία	Αδυναμίες	Ευκαιρίες	Απειλές
Αυθεντικότητα, άμεση διάδραση	Ισοδυναμία/συνέπεια	Εξατομίκευση, διερεύνηση σκέψης	Τεχνικά/χρόνος, πιθανή μεροληψία

Πίνακας 3.
SWOT Projects

Δυνατά σημεία	Αδυναμίες	Ευκαιρίες	Απειλές
Εφαρμογή, αναστοχασμός	Πόροι/υποκειμενικότητα	Ανάπτυξη δεξιοτήτων	Υπέρμετρη επιβάρυνση, άνιση πρόσβαση

Στρατηγική Μετατόπιση προς την Αυθεντική Αξιολόγηση: Η ανάλυση της μελέτης περίπτωσης του ΠΜΣ ΕΤΑ αποκαλύπτει μια συστηματική μετάβαση από τη διαχείριση της πανδημικής κρίσης προς έναν ώριμο παιδαγωγικό ανασχεδιασμό. Η τριγωνοποίηση των πηγών επιβεβαιώνει ότι η επιλογή των εξετάσεων με «ανοικτά βιβλία» και η χρήση projects δεν υπήρξε μια απλή τεχνική λύση, αλλά μια βαθιά εκπαιδευτική επιλογή που μειώνει τη συναλλακτική απόσταση (Lionarakis, 2001). Τα ευρήματα από τα Focus Groups των Επιτροπών Προγραμμάτων Σπουδών (ΕΠΣ ΕΤΑ και ΕΠΣ ΕΚΠ) συγκλίνουν στο ότι η απομάκρυνση από την απομνημόνευση και η στροφή σε θέματα που απαιτούν σύνθεση και εφαρμογή της θεωρίας αποτελεί τη μόνη βιώσιμη απάντηση στις προκλήσεις της εξ αποστάσεως εκπαίδευσης. Η κατεύθυνση αυτή εναρμονίζεται πλήρως με τη διεθνή βιβλιογραφία, η οποία αναδεικνύει την πανδημία

ως καταλύτη για την αναθεώρηση της αξιολόγησης προς όφελος της ακαδημαϊκής ακεραιότητας (Cross et al., 2023; Ioakeimidou et al., 2023).

Κριτική Σκέψη ως Μηχανισμός Διασφάλισης Ακεραιότητας: Κεντρικό εύρημα της έρευνας αποτελεί η ανάδειξη της κριτικής σκέψης ως του ισχυρότερου αναχώματος απέναντι στη μη γνήσια παραγωγή έργου. Η μελέτη περίπτωσης έδειξε ότι οι δραστηριότητες που απαιτούν προσωπικό αποτύπωμα και αναστοχασμό καθιστούν τη χρήση Τεχνητής Νοημοσύνης (ΤΝ) λιγότερο ελκυστική ως υποκατάστατο σκέψης. Η άποψη αυτή ενισχύθηκε από το Focus Group της ΕΠΣ ΕΤΑ, το οποίο υπογράμμισε ότι η αυθεντική αξιολόγηση είναι ο αποτελεσματικότερος τρόπος αντιμετώπισης των γενετικών μοντέλων ΤΝ. Παράλληλα, η ΕΠΣ ΕΚΠ επιβεβαίωσε ότι η καλλιέργεια ανώτερων γνωστικών λειτουργιών μειώνει τα περιστατικά λογοκλοπής, εύρημα που τεκμηριώνεται βιβλιογραφικά από τη θέση ότι οι αυθεντικές μορφές αξιολόγησης ενισχύουν τη βαθιά μάθηση (Vlachopoulos & Makri, 2024; Manousou, 2025).

Η Τεχνητή Νοημοσύνη από Απειλή σε Αφορμή Ανασχεδιασμού: Η τριγωνοποίηση αναδεικνύει έναν αμφίσημο αλλά δημιουργικό ρόλο για την Τεχνητή Νοημοσύνη. Ενώ η μελέτη περίπτωσης κατέγραψε την ανάγκη για εργαλεία ελέγχου ομοιότητας, τα Focus Groups πρόταξαν την παιδαγωγική θωράκιση έναντι της αστυνόμευσης. Συγκεκριμένα, η ΕΠΣ ΕΤΑ αναγνώρισε ότι η ΤΝ επιβάλλει την αναθεώρηση της θεματολογίας των εξετάσεων, ενώ η ΕΠΣ ΕΚΠ προειδοποίησε για τους κινδύνους της υπερβολικής τεχνολογικής επιτήρησης. Η σύγκλιση των απόψεων αυτών με τη βιβλιογραφία οδηγεί στο συμπέρασμα ότι η ΤΝ λειτουργεί ως επιταχυντής για τον εξορθολογισμό των εξετάσεων, επιβάλλοντας τη χρήση μικτών μορφών αξιολόγησης και προφορικών δοκιμασιών όπου απαιτείται αυξημένη εγκυρότητα (Bozkurt et al., 2024; Fang et al., 2023)

Θεσμική Θωράκιση και Ποιοτική Ανατροφοδότηση Η τριγωνοποίηση των δεδομένων αναδεικνύει ότι η διασφάλιση της αξιολόγησης υπερβαίνει την τεχνική επιτήρηση, εστιάζοντας στη λειτουργική ισορροπία μεταξύ ενός σταθερού θεσμικού πλαισίου και της παιδαγωγικής ευελιξίας. Ενώ η ανάλυση της πλατφόρμας exams.eap.gr και των κανονισμών σπουδών (Ελληνικό Ανοικτό Πανεπιστήμιο, 2023) υπογραμμίζει την ανάγκη για επιχειρησιακή συνέπεια και ισοτιμία, οι απόψεις των ΕΠΣ μετατοπίζουν την έμφαση από την τεχνολογική «ασφάλεια» στη διαφάνεια των κριτηρίων και την ποιότητα της ερμηνευτικής ανατροφοδότησης.

Υπό αυτό το πρίσμα, η εξ αποστάσεως αξιολόγηση μετεξελίσσεται σε μια ανθρωποκεντρική διαδικασία, όπου η τεχνολογία υπηρετεί την παιδαγωγική στοχοθεσία (Mayer, 2021) και την ακαδημαϊκή ποιότητα. Η υιοθέτηση μικτών εξεταστικών διαδρομών —όπως ο συνδυασμός ανοικτών βιβλίων, projects και προφορικών δοκιμασιών— δεν αποτελεί απλώς τεχνική επιλογή, αλλά μια συνειδητή στροφή προς μια εκπαιδευτική κουλτούρα δημοκρατίας και ισότητας ευκαιριών. Σε αυτόν τον ανασχεδιασμό, η ηθική δεοντολογία και η ποιοτική αλληλεπίδραση αναδεικνύονται σε εξίσου κρίσιμες παραμέτρους με την αξιοπιστία της διαδικασίας.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η παρούσα εργασία ολοκληρώνεται ανακεφαλαιώνοντας τα ευρήματα γύρω από τους τρεις κεντρικούς άξονες της έρευνας, προσφέροντας μια ολοκληρωμένη εικόνα για το μετασχηματισμό της αξιολόγησης στο ΠΜΣ ΕΤΑ του ΕΑΠ.

Η Επίδραση της ΤΝ στη Διαδικασία των Εξετάσεων (2020–2025) Η έρευνα κατέδειξε ότι η ΤΝ λειτούργησε ως επιταχυντής για τη μετάβαση από την «ψηφιακή μεταφορά» παραδοσιακών εξετάσεων σε έναν βαθύ παιδαγωγικό ανασχεδιασμό. Ενώ η πρώτη φάση (2020-2021) εστίασε στην επιβίωση του συστήματος μέσω της ταχείας προσαρμογής, η ανάδυση της γενετικής ΤΝ μετά το 2022 επέβαλε τη σταδιακή εγκατάλειψη θεμάτων που βασίζονται στην ανάκληση πληροφοριών. Η μελέτη περίπτωσης, σε σύγκλιση με τις απόψεις των ΕΠΣ, αναδεικνύει ότι η ΤΝ δεν επηρέασε μόνο τα εργαλεία (π.χ. Turnitin), αλλά κυρίως τη φιλοσοφία των θεμάτων, οδηγώντας σε μορφές αξιολόγησης που απαιτούν προσωπικό αναστοχασμό και αυθεντική σύνθεση γνώσης. Η ΤΝ, επομένως, δεν μετασχημάτισε μόνο το «μέσο» της εξέτασης, αλλά επαναπροσδιόρισε το ίδιο το γνωστικό αντικείμενο, καθιστώντας την ικανότητα κριτικής αξιολόγησης των πηγών σημαντικότερη από τη συσσώρευση πληροφορίας.

Διασφάλιση Ισοτιμίας, Ακεραιότητας και Εγκυρότητας Η διασφάλιση της αξιοπιστίας στην εποχή της ΤΝ επιτυγχάνεται μέσα από ένα πολυεπίπεδο σχήμα θωράκισης. Η μελέτη αποκαλύπτει ότι η ακεραιότητα δεν διασφαλίζεται μόνο με την τεχνολογική επιτήρηση, η οποία αντιμετωπίζεται με επιφυλακτικότητα από την ακαδημαϊκή κοινότητα (ΕΠΣ ΕΚΠ), αλλά κυρίως μέσω του παιδαγωγικού σχεδιασμού. Η χρήση αναλυτικών ρουμπρικών, η χρονική οριοθέτηση και η σύνδεση των θεμάτων με το συγκεκριμένο εκπαιδευτικό υλικό της Θεματικής Ενότητας αποτελούν τις κρισιμότερες «ασφαλιστικές δικλείδες». Η ισοτιμία κατοχυρώνεται θεσμικά μέσω της πλατφόρμας exams.eap.gr (Ελληνικό Ανοικτό Πανεπιστήμιο, 2023), διασφαλίζοντας ότι η τεχνολογία παραμένει στην υπηρεσία της παιδαγωγικής στοχοθεσίας (Mayer, 2021). Αυτή η θεσμική εγρήγορση προάγει ένα περιβάλλον εμπιστοσύνης, όπου η ακαδημαϊκή δεοντολογία δεν επιβάλλεται μόνο μέσω ελέγχου, αλλά καλλιεργείται ως εσωτερικευμένη αξία του/της φοιτητή/-τριας.

Βιώσιμες Μορφές Αξιολόγησης για το Μέλλον Ως παιδαγωγικά βιώσιμα μοντέλα αναδεικνύονται οι μικτές εξεταστικές διαδρομές που συνδυάζουν αυθεντικά projects, εξετάσεις με ανοικτά βιβλία (case-based) και προφορικές δοκιμασιές. Η κατεύθυνση αυτή, όπως επιβεβαιώνεται από τη διεθνή εμπειρία (Kinley, 2023; Hatzipanagos et al., 2024), επιτρέπει την αξιολόγηση δεξιοτήτων ανώτερης τάξης που η ΤΝ αδυνατεί να υποκαταστήσει πλήρως. Η μελέτη προκρίνει τη χρήση τράπεζας θεμάτων με στοχευμένες παραλλαγές και την ενσωμάτωση της τεκμηριωμένης ροής εργασίας (process-based assessment) ως εργαλεία που ενισχύουν την εμπιστοσύνη και τη διαφάνεια. Η εστίαση στη «διαδρομή» της μάθησης και όχι μόνο στο τελικό αποτέλεσμα, προσφέρει μια πιο δίκαιη και συμπεριληπτική αποτίμηση της φοιτητικής προσπάθειας.

Συμβολή της Εργασίας και Διεθνής Προοπτική Η παρούσα εργασία συμβάλλει στη διεθνή συζήτηση προσφέροντας μια διαχρονική μελέτη περίπτωσης που αποτυπώνει την εξέλιξη των εξετάσεων σε ένα πραγματικό, μεγάλης κλίμακας πρόγραμμα σπουδών. Πέρα από τη χαρτογράφηση εργαλείων και στρατηγικών, η μελέτη προτείνει ένα πλαίσιο κατευθύνσεων για τη βιώσιμη ενσωμάτωση της ΤΝ, συνδέοντας τη θεωρητική τεκμηρίωση με τις θεσμικές ανάγκες των ΑΕΙ. Το τελικό συμπέρασμα υπογραμμίζει ότι η μετάβαση στην εποχή της ΤΝ απαιτεί μια ανθρωποκεντρική κουλτούρα αξιολόγησης, όπου η κριτική σκέψη και η ακαδημαϊκή δεοντολογία αποτελούν τον πυρήνα της εκπαιδευτικής διαδικασίας, καθιστώντας την αξιολόγηση μια πράξη μάθησης και όχι απλώς ελέγχου. Η μελέτη φιλοδοξεί να αποτελέσει έναυσμα για έναν ευρύτερο διάλογο σχετικά με τον επαναπροσδιορισμό της ακαδημαϊκής εγκυρότητας σε έναν κόσμο όπου η ανθρώπινη και η τεχνητή νοημοσύνη καλούνται να συνυπάρξουν δημιουργικά.

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ΨΗΦΙΑΚΑ ΜΕΣΑ ΚΑΙ ΕΙΔΙΚΕΣ ΜΑΘΗΣΙΑΚΕΣ ΔΥΣΚΟΛΙΕΣ (ΕΜΔ): ΕΥΚΑΙΡΙΕΣ, ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΠΡΟΟΠΤΙΚΕΣ ΓΙΑ ΜΙΑ ΙΣΟΤΙΜΗ ΕΚΠΑΙΔΕΥΣΗ

Τσίτσικας Ευθύμιος
Υποψήφιος Διδάκτορας Πανεπιστημίου Αιγαίου
Τμήμα Μεσογειακών Σπουδών: Αρχαιολογία, Γλωσσολογία, Διεθνείς Σχέσεις
Εκπαιδευτικός, Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού
Ρόδος & Άρτα, Ελλάδα
msd21007@aegean.gr

Φραντζή Κατερίνα Θ.
Καθηγήτρια Πανεπιστήμιου Αιγαίου
Τμήμα Μεσογειακών Σπουδών:Αρχαιολογία, Γλωσσολογία, Διεθνείς Σχέσεις
Ρόδος, Ελλάδα
frantzi@aegean.gr

Τριβιζά Χρυσούλα
Εκπαιδευτικός, Υπουργείο Παιδείας, Θρησκευμάτων και Αθλητισμού
Πύργος, Ελλάδα
siliatrv@gmail.com

ΠΕΡΙΛΗΨΗ

Οι Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ) αποτελούν νευροαναπτυξιακές διαταραχές που επηρεάζουν βασικές ακαδημαϊκές δεξιότητες, καθιστώντας αναγκαία την εφαρμογή εξατομικευμένων και συμπεριληπτικών εκπαιδευτικών προσεγγίσεων. Η ενσωμάτωση των ψηφιακών τεχνολογιών στη σύγχρονη εκπαιδευτική πραγματικότητα, ιδιαίτερα κατά και μετά την πανδημία COVID-19, ανέδειξε νέες δυνατότητες υποστήριξης των μαθητών/τριών με ΕΜΔ, αλλά παράλληλα κατέστησε εμφανείς υφιστάμενες ανισότητες ως προς την πρόσβαση και την παιδαγωγική αξιοποίηση των τεχνολογικών μέσων.

Σκοπός της παρούσας μελέτης είναι η διερεύνηση της αποτελεσματικότητας των ψηφιακών εργαλείων στην υποστήριξη μαθητών/τριών με ΕΜΔ, καθώς και η κριτική αποτίμηση των προκλήσεων που σχετίζονται με την ψηφιακή προσβασιμότητα και την εκπαιδευτική συμπερίληψη. Σε μεθοδολογικό επίπεδο, η έρευνα βασίζεται σε συστηματική επισκόπηση και δευτερογενή ανάλυση δεδομένων από διεθνείς εκθέσεις οργανισμών, όπως η UNESCO, ο OECD και η Ευρωπαϊκή Επιτροπή, για την περίοδο 2020–2023, με έμφαση στη συγκριτική ανάλυση της χρήσης ψηφιακών τεχνολογιών ανά κατηγορία ΕΜΔ.

Τα ευρήματα της μελέτης καταδεικνύουν υψηλότερα επίπεδα υιοθέτησης και τεχνολογικής ωριμότητας για παρεμβάσεις που αφορούν τη δυσλεξία, σε σύγκριση με άλλες μαθησιακές δυσκολίες, όπως η δυσαριθμησία. Παράλληλα, αναδεικνύεται η ύπαρξη σημαντικού ψηφιακού χάσματος και ελλείψεων στην εξειδικευμένη επιμόρφωση των εκπαιδευτικών στην Ελλάδα σε σύγκριση με άλλες χώρες του δυτικού κόσμου. Η μελέτη καταλήγει στην ανάγκη διαμόρφωσης μιας ολιστικής ψηφιακής στρατηγικής που θα στηρίζεται στις αρχές της Καθολικής Σχεδίασης για τη Μάθηση, με στόχο τη διασφάλιση της ισότιμης πρόσβασης και της ουσιαστικής εκπαιδευτικής συμπερίληψης όλων των μαθητών/τριών με ΕΜΔ.

Λέξεις-κλειδιά: Ειδικές Μαθησιακές Δυσκολίες, ψηφιακά μέσα, ψηφιακό χάσμα, εξ αποστάσεως εκπαίδευση, συμπερίληψη

ΕΙΣΑΓΩΓΗ

Η ραγδαία ενσωμάτωση των ψηφιακών τεχνολογιών στην εκπαίδευση, η οποία επιταχύνθηκε σημαντικά κατά την περίοδο της πανδημίας COVID-19, ανέδειξε νέες δυνατότητες αλλά και ουσιώδεις προκλήσεις για τα εκπαιδευτικά συστήματα διεθνώς. Ιδιαίτερα για τους μαθητές και τις μαθήτριες με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ), όπως η δυσλεξία, η δυσαριθμησία, η Διαταραχή Ελλειμματικής Προσοχής/Υπερκινητικότητας (ΔΕΠ-Υ) και οι Διαταραχές Αυτιστικού Φάσματος (ΔΑΦ), η ψηφιακή μετάβαση δεν συνιστά απλώς μια τεχνολογική αλλαγή, αλλά μια σύνθετη παιδαγωγική διαδικασία με άμεσες επιπτώσεις στη μαθησιακή ισότητα και τη συμπερίληψη (UNESCO, 2020). Παρότι αναδυόμενες τεχνολογίες, όπως η τεχνητή νοημοσύνη και η εικονική πραγματικότητα, προσφέρουν δυνατότητες εξατομίκευσης της μάθησης, η διεθνής βιβλιογραφία καταγράφει σημαντικές αποκλίσεις ως προς τον βαθμό υιοθέτησης και την παιδαγωγική τους αξιοποίηση, ιδίως σε ευάλωτες μαθητικές ομάδες (European Agency for Special Needs and Inclusive Education, 2022).

Παρά τον αυξανόμενο όγκο ερευνών που εξετάζουν τη χρήση των Τεχνολογιών Πληροφορίας και Επικοινωνιών στην ειδική αγωγή, εντοπίζεται ένα σαφές ερευνητικό έλλειμμα όσον αφορά τη συγκριτική αποτίμηση της αποτελεσματικότητας συγκεκριμένων ψηφιακών εργαλείων σε σχέση με διαφορετικές κατηγορίες ΕΜΔ. Οι περισσότερες μελέτες εστιάζουν είτε στη γενική παιδαγωγική αξία των ψηφιακών μέσων είτε στην περιγραφή μεμονωμένων τεχνολογικών εφαρμογών, χωρίς να εξετάζουν συστηματικά ποια εργαλεία ανταποκρίνονται αποτελεσματικότερα στις ιδιαίτερες ανάγκες κάθε μαθησιακής δυσκολίας. Επιπλέον, η σύνδεση των διεθνών ερευνητικών ευρημάτων με το εθνικό εκπαιδευτικό πλαίσιο παραμένει περιορισμένη, γεγονός που δυσχεραίνει τη διαμόρφωση τεκμηριωμένων πολιτικών ένταξης της εκπαιδευτικής τεχνολογίας σε χώρες όπως η Ελλάδα, όπου καταγράφονται δομικές ανισότητες στην ψηφιακή ετοιμότητα και στην επιμόρφωση των εκπαιδευτικών.

Παρά τη ραγδαία αύξηση της χρήσης ψηφιακών εργαλείων στην εκπαίδευση, παραμένει περιορισμένη η συγκριτική αποτίμηση της υιοθέτησής τους ανά κατηγορία Ειδικών Μαθησιακών Δυσκολιών, ιδιαίτερα στο ελληνικό εκπαιδευτικό πλαίσιο. Η παρούσα μελέτη επιχειρεί να καλύψει αυτό το κενό, εξετάζοντας συγκριτικά τη χρήση και την αποτελεσματικότητα ψηφιακών εργαλείων ανά κατηγορία Ειδικών Μαθησιακών Δυσκολιών, σε συνδυασμό με το επίπεδο ψηφιακής ετοιμότητας του ελληνικού εκπαιδευτικού συστήματος σε αντιπαραβολή με διεθνή δεδομένα. Μέσα από τη δευτερογενή ανάλυση στοιχείων διεθνών οργανισμών και πρόσφατων επιστημονικών ερευνών, η εργασία διερευνά τις δομικές αποκλίσεις που επηρεάζουν την εκπαιδευτική πρόσβαση και την αποτελεσματική αξιοποίηση των ψηφιακών μέσων από μαθητές/τριες με ΕΜΔ. Η συμβολή της μελέτης έγκειται στην ανάδειξη διαφοροποιημένων προτύπων υιοθέτησης τεχνολογιών ανά τύπο μαθησιακής δυσκολίας, καθώς και στον εντοπισμό των βασικών παραγόντων που περιορίζουν ή ενισχύουν τη συμπεριληπτική λειτουργία της εκπαιδευτικής τεχνολογίας στο ελληνικό σχολείο. Με τον τρόπο αυτό, η έρευνα φιλοδοξεί να συνεισφέρει στον επιστημονικό διάλογο γύρω από τον ψηφιακό μετασχηματισμό της ειδικής αγωγής, υποστηρίζοντας την ανάγκη για στοχευμένες και παιδαγωγικά τεκμηριωμένες στρατηγικές ένταξης των ψηφιακών μέσων.

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα μελέτη υιοθετεί ποιοτική ερευνητική προσέγγιση, βασισμένη στη συστηματική βιβλιογραφική επισκόπηση και στη δευτερογενή ανάλυση δεδομένων. Η επιλογή της συγκεκριμένης μεθοδολογίας θεωρείται κατάλληλη για μελέτες που αποσκοπούν στη σύνθεση και ερμηνεία υφιστάμενων ερευνητικών ευρημάτων και θεσμικών δεδομένων, ιδίως σε πεδία όπου η πρωτογενής συλλογή δεδομένων παρουσιάζει πρακτικούς και δεοντολογικούς περιορισμούς, όπως η ειδική αγωγή και η εκπαιδευτική τεχνολογία (Creswell & Poth, 2018·Komis, 2020). Τα δεδομένα αντλήθηκαν από επίσημες εκθέσεις και βάσεις δεδομένων διεθνών οργανισμών, επιλεγμένες με κριτήρια εγκυρότητας, επικαιρότητας και θεσμικής αξιοπιστίας.

Η συλλογή του ερευνητικού υλικού πραγματοποιήθηκε σε δύο συμπληρωματικούς άξονες. Στον πρώτο άξονα αναλύθηκαν επίσημες εκθέσεις και στατιστικά δεδομένα διεθνών και ευρωπαϊκών οργανισμών, όπως η UNESCO, ο OECD, η Ευρωπαϊκή Επιτροπή και η European Agency for Special Needs and Inclusive Education, καθώς και εθνικά θεσμικά κείμενα του Ελληνικού Υπουργείου Παιδείας και του Ινστιτούτου Εκπαιδευτικής Πολιτικής. Η αξιοποίηση θεσμικών πηγών κρίνεται μεθοδολογικά έγκυρη, καθώς προσφέρει αξιόπιστα συγκρίσιμα δεδομένα και αποτυπώνει τις κυρίαρχες πολιτικές και πρακτικές σε διακρατικό επίπεδο (OECD, 2021· IEP, 2021).

Το χρονικό εύρος της ανάλυσης περιορίστηκε στην περίοδο 2020–2023, προκειμένου να καταγραφούν οι επιπτώσεις της επιτάχυνσης της ψηφιακής εκπαίδευσης κατά την πανδημία COVID-19 και στη μεταπανδημική φάση. Η επιλογή αυτής της περιόδου ευθυγραμμίζεται με σχετικές μελέτες που επισημαίνουν ότι η συγκεκριμένη συγκυρία αποτέλεσε κρίσιμο σημείο καμπής για την ενσωμάτωση των ψηφιακών τεχνολογιών στην εκπαίδευση και ειδικότερα στην ειδική αγωγή (UNESCO, 2020· Borup & Archambault, 2023).

Στον δεύτερο άξονα πραγματοποιήθηκε συστηματική επισκόπηση της διεθνούς επιστημονικής βιβλιογραφίας σε έγκριτα περιοδικά, με έμφαση σε μελέτες που εξετάζουν την αποτελεσματικότητα ψηφιακών εργαλείων ανά κατηγορία Ειδικών Μαθησιακών Δυσκολιών, όπως η δυσλεξία, η δυσαριθμησία, η Διαταραχή Ελλειμματικής Προσοχής/Υπερκινητικότητας και οι Διαταραχές Αυτιστικού Φάσματος. Η συστηματική βιβλιογραφική επισκόπηση αποτελεί αναγνωρισμένη μεθοδολογική πρακτική για τη χαρτογράφηση ερευνητικών τάσεων και την ανάδειξη ερευνητικών κενών σε σύνθετα διεπιστημονικά πεδία (Kitchenham & Charters, 2007· Voultsiou & Moussiades, 2025).

Η επιλογή των μελετών βασίστηκε σε κριτήρια συνάφειας με το ερευνητικό αντικείμενο, επιστημονικής εγκυρότητας και επικαιρότητας, με προτεραιότητα σε δημοσιεύσεις της τελευταίας πενταετίας. Αντίστοιχη προσέγγιση προτείνεται στη διεθνή βιβλιογραφία για ανασκοπήσεις που αφορούν ταχέως εξελισσόμενες τεχνολογικές εφαρμογές στην εκπαίδευση (Holmes et al., 2021).

Αναφορικά με τα ποσοτικά στοιχεία που παρουσιάζονται στους πίνακες της μελέτης, διευκρινίζεται ότι δεν προέρχονται από πρωτογενή δειγματοληψία, αλλά αποτελούν συνθετικές εκτιμήσεις που προκύπτουν από τη συγκριτική σύνθεση των ευρημάτων των επιλεγμένων πηγών. Η πρακτική αυτή είναι σύμφωνη με τη μεθοδολογία της δευτερογενούς ανάλυσης δεδομένων, η οποία επιτρέπει τη διερεύνηση γενικών προτύπων και ανισοτήτων χωρίς τη διεκδίκηση στατιστικής γενίκευσης (Johnston, 2017).

Τέλος, η ανάλυση των δεδομένων πραγματοποιήθηκε με συγκριτική και ερμηνευτική λογική, εστιάζοντας στις διαφοροποιήσεις μεταξύ τύπων ΕΜΔ και μεταξύ της ελληνικής και της διεθνούς εκπαιδευτικής πραγματικότητας. Η συγκριτική αυτή προσέγγιση θεωρείται ιδιαίτερα κατάλληλη για μελέτες εκπαιδευτικής πολιτικής και συμπερίληψης, καθώς επιτρέπει την ανάδειξη δομικών παραγόντων που επηρεάζουν την αποτελεσματική αξιοποίηση των ψηφιακών μέσων (Phillips & Schweisfurth, 2014· Stasinos, 2020).

ΠΑΡΟΥΣΙΑΣΗ ΚΑΙ ΑΝΑΛΥΣΗ ΕΡΕΥΝΗΤΙΚΩΝ ΔΕΔΟΜΕΝΩΝ

Στην παρούσα ενότητα παρουσιάζονται συγκριτικά δεδομένα που αποτυπώνουν βασικές πτυχές της ψηφιακής εκπαίδευσης μαθητών/τριών με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ) κατά την περίοδο της πανδημίας COVID-19. Η ανάλυση βασίζεται σε δευτερογενή στοιχεία διεθνών και εθνικών οργανισμών και εστιάζει στην πρόσβαση σε τεχνολογικό εξοπλισμό, στο επίπεδο επιμόρφωσης των εκπαιδευτικών και στη σχετική ακαδημαϊκή πρόοδο των μαθητών/τριών.

Πίνακας 1
Στατιστικά Δεδομένα: Ελλάδα και Διεθνής Πραγματικότητα
Χρήση Τεχνολογιών στην Εκπαίδευση Παιδιών με ΕΜΔ κατά τη Διάρκεια της Πανδημίας

Χώρα	Ποσοστό Παιδιών με Πρόσβαση σε Τεχνολογία (%)	Ποσοστό Εκπαιδευτικών με Εκπαίδευση σε Τεχνολογίες (%)	Ποσοστό Παιδιών που Βελτιώθηκαν Ακαδημαϊκά (%)
Ελλάδα	65	40	55
ΗΠΑ	85	70	75
Γερμανία	80	65	70
Ηνωμένο Βασίλειο	75	60	65

Πηγή: UNESCO (2021), European Commission (2022), Ελληνικό Υπουργείο Παιδείας (2021)

Ο Πίνακας 1 παρουσιάζει συγκριτικά δεδομένα μεταξύ της Ελλάδας και επιλεγμένων χωρών του δυτικού κόσμου αναφορικά με τρεις κρίσιμες παραμέτρους της ψηφιακής εκπαίδευσης μαθητών/τριών με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ): (α) την πρόσβαση σε ψηφιακό εξοπλισμό, (β) το επίπεδο επιμόρφωσης των εκπαιδευτικών στη χρήση τεχνολογιών και (γ) την αναφερόμενη ακαδημαϊκή βελτίωση των μαθητών/τριών κατά την περίοδο της πανδημίας COVID-19. Θα πρέπει να επισημανθεί στο σημείο αυτό ότι τα ποσοστά του Πίνακα 1 λειτουργούν ενδεικτικά και δεν επιτρέπουν αιτιώδεις συσχετίσεις, αλλά αποτυπώνουν συγκριτικές τάσεις ψηφιακής ετοιμότητας σε διαφορετικά εκπαιδευτικά συστήματα.

Πιο συγκεκριμένα, στην ελληνική περίπτωση, το ποσοστό πρόσβασης σε τεχνολογικό εξοπλισμό ανέρχεται στο 65%, ενώ μόλις το 40% των εκπαιδευτικών δηλώνει ότι έχει λάβει σχετική επιμόρφωση. Το ποσοστό ακαδημαϊκής βελτίωσης των μαθητών/τριών με ΕΜΔ περιορίζεται στο 55%, στοιχείο που υποδηλώνει ότι η ψηφιακή μετάβαση δεν

συνοδεύτηκε από επαρκείς παιδαγωγικές και οργανωτικές προϋποθέσεις. Τα δεδομένα αυτά αποτυπώνουν έναν συστημικό περιορισμό στην αποτελεσματική ενσωμάτωση των ψηφιακών μέσων στην εκπαιδευτική πράξη, ο οποίος ενδέχεται να επηρεάζει δυσανάλογα ευάλωτες ομάδες μαθητών, όπως εκείνους με ΕΜΔ.

Αντιθέτως, στις Ηνωμένες Πολιτείες καταγράφονται σημαντικά υψηλότερα ποσοστά τόσο πρόσβασης (85%) όσο και επιμόρφωσης των εκπαιδευτικών (70%), με αντίστοιχη αύξηση του ποσοστού ακαδημαϊκής βελτίωσης των μαθητών/τριών (75%). Το εύρημα αυτό ενισχύει την άποψη ότι η ψηφιακή ένταξη δεν περιορίζεται στην υλικοτεχνική υποδομή, αλλά προϋποθέτει τη συστηματική επένδυση στο ανθρώπινο δυναμικό και την παιδαγωγική αξιοποίηση των τεχνολογιών. Παρόμοια εικόνα παρουσιάζει και η Γερμανία, όπου τα υψηλά επίπεδα πρόσβασης (80%) και επιμόρφωσης (65%) συνοδεύονται από αυξημένη ακαδημαϊκή πρόοδο (70%), γεγονός που υποδηλώνει θετικό συσχετισμό μεταξύ ψηφιακής ετοιμότητας και μαθησιακών αποτελεσμάτων.

Στο Ηνωμένο Βασίλειο, τα ποσοστά πρόσβασης (75%) και επιμόρφωσης (60%) κινούνται σε ενδιάμεσα επίπεδα σε σχέση με τις υπόλοιπες χώρες, ενώ το ποσοστό ακαδημαϊκής βελτίωσης ανέρχεται στο 65%. Παρότι τα αποτελέσματα υπολείπονται εκείνων των ΗΠΑ, η συνολική εικόνα καταδεικνύει ότι η συνδυαστική ενίσχυση υποδομών και επιμόρφωσης δύναται να έχει ουσιαστικό αντίκτυπο στην εκπαιδευτική επίδοση των μαθητών/τριών με ΕΜΔ.

Συνολικά, τα δεδομένα του Πίνακα 1 υποστηρίζουν την υπόθεση ότι η αποτελεσματικότητα της ψηφιακής εκπαίδευσης για μαθητές/τριες με ΕΜΔ συνδέεται άμεσα με το επίπεδο ψηφιακής ετοιμότητας των εκπαιδευτικών συστημάτων. Η απλή παροχή τεχνολογικού εξοπλισμού δεν επαρκεί, εάν δεν συνοδεύεται από στοχευμένη επιμόρφωση και παιδαγωγικό σχεδιασμό, γεγονός που αποκτά ιδιαίτερη σημασία για χώρες όπως η Ελλάδα, όπου καταγράφονται διαρθρωτικές αδυναμίες στον ψηφιακό μετασχηματισμό της ειδικής αγωγής.

ΕΙΔΙΚΕΣ ΜΑΘΗΣΙΑΚΕΣ ΔΥΣΚΟΛΙΕΣ ΚΑΙ ΨΗΦΙΑΚΗ ΥΠΟΣΤΗΡΙΞΗ

Οι Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ) αποτελούν νευροαναπτυξιακές διαταραχές που επηρεάζουν βασικές ακαδημαϊκές δεξιότητες, όπως η ανάγνωση, η γραφή και τα μαθηματικά, χωρίς να συνδέονται με μειωμένη γενική νοημοσύνη (American Psychiatric Association, 2022). Η σύγχρονη ερευνητική προσέγγιση αναγνωρίζει ότι οι δυσκολίες αυτές δεν απορρέουν από έλλειψη ικανοτήτων, αλλά από διαφοροποιήσεις στον τρόπο επεξεργασίας των πληροφοριών, γεγονός που καθιστά αναγκαία την υιοθέτηση ευέλικτων και εξατομικευμένων εκπαιδευτικών πρακτικών (Stasinos, 2020· OECD, 2021). Στο πλαίσιο της ψηφιακής εκπαίδευσης, οι διαφοροποιήσεις αυτές αποκτούν ιδιαίτερη σημασία, καθώς τα ψηφιακά περιβάλλοντα μάθησης δύνανται να λειτουργήσουν τόσο ως μηχανισμοί ενίσχυσης όσο και ως παράγοντες αποκλεισμού, εάν δεν σχεδιαστούν με όρους προσβασιμότητας και συμπερίληψης (UNESCO, 2020).

Η βιβλιογραφία καταγράφει ότι οι ΕΜΔ περιλαμβάνουν ετερογενείς κατηγορίες, οι οποίες παρουσιάζουν διαφορετικά μαθησιακά προφίλ και, κατ' επέκταση, διαφοροποιημένες ανάγκες εκπαιδευτικής και τεχνολογικής υποστήριξης. Η δυσλεξία, ως η συχνότερα μελετημένη μορφή ΕΜΔ, έχει αποτελέσει πεδίο ανάπτυξης πληθώρας ψηφιακών εργαλείων, όπως εφαρμογές μετατροπής κειμένου σε ομιλία, λογισμικά υποστήριξης ανάγνωσης και πλατφόρμες εξατομικευμένης διδασκαλίας (International Dyslexia Association, 2021· Holmes et al., 2021). Αντίθετα, η δυσαριθμησία παραμένει λιγότερο υποστηριζόμενη σε επίπεδο ψηφιακών παρεμβάσεων, παρά το γεγονός ότι επηρεάζει σημαντικό ποσοστό μαθητών και συνδέεται με μακροπρόθεσμες ακαδημαϊκές και επαγγελματικές επιπτώσεις (Butterworth et al., 2011).

Παράλληλα, οι μαθητές/τριες με Διαταραχή Ελλειμματικής Προσοχής/Υπερκινητικότητας και Διαταραχές Αυτιστικού Φάσματος παρουσιάζουν αυξημένες ανάγκες για δομημένα, προβλέψιμα και οπτικοποιημένα μαθησιακά περιβάλλοντα. Η διεθνής έρευνα υποδεικνύει ότι ψηφιακά εργαλεία, όπως εφαρμογές ενίσχυσης εκτελεστικών λειτουργιών, συστήματα διαχείρισης μάθησης και τεχνολογίες εικονικής πραγματικότητας, μπορούν να υποστηρίξουν την αυτορρύθμιση και την κοινωνική αλληλεπίδραση, υπό την προϋπόθεση ότι εντάσσονται σε παιδαγωγικά σχεδιασμένες παρεμβάσεις (European Agency for Special Needs and Inclusive Education, 2022· Borup & Archambault, 2023).

Η διαφοροποιημένη φύση των ΕΜΔ καθιστά σαφές ότι η αποτελεσματικότητα των ψηφιακών μέσων δεν μπορεί να εξετάζεται ενιαία ή ομοιόμορφα. Αντιθέτως, απαιτείται συγκριτική προσέγγιση που λαμβάνει υπόψη τόσο τον τύπο της μαθησιακής δυσκολίας όσο και το ευρύτερο εκπαιδευτικό και θεσμικό πλαίσιο εντός του οποίου εφαρμόζονται οι ψηφιακές παρεμβάσεις (Phillips & Schweisfurth, 2014·Komis, 2020). Στην ελληνική πραγματικότητα, οι περιορισμοί σε επίπεδο επιμόρφωσης εκπαιδευτικών και ψηφιακής υποδομής ενδέχεται να επηρεάζουν δυσανάλογα μαθητές/τριες με ΕΜΔ, γεγονός που καθιστά αναγκαία τη συστηματική διερεύνηση των υφιστάμενων πρακτικών (Institute of Educational Policy, 2021).

Στο πλαίσιο αυτό, η παρούσα μελέτη υιοθετεί συγκριτική οπτική, εξετάζοντας πρότυπα χρήσης και αποτελεσματικότητας ψηφιακών εργαλείων ανά κατηγορία Ειδικών Μαθησιακών Δυσκολιών. Η προσέγγιση αυτή επιτρέπει την ανάδειξη διαφοροποιήσεων και ελλειμμάτων ψηφιακής υποστήριξης, συμβάλλοντας στη συζήτηση γύρω από τον σχεδιασμό συμπεριληπτικών ψηφιακών μαθησιακών περιβαλλόντων και τη διαμόρφωση τεκμηριωμένων εκπαιδευτικών πολιτικών.

ΨΗΦΙΑΚΑ ΜΕΣΑ ΣΤΗ ΣΥΓΧΡΟΝΗ ΕΚΠΑΙΔΕΥΤΙΚΗ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ

Η αξιοποίηση των ψηφιακών μέσων στη σύγχρονη εκπαιδευτική πραγματικότητα έχει αναδειχθεί ως κρίσιμος παράγοντας υποστήριξης μαθητών/τριών με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ), ιδιαίτερα στο πλαίσιο της εξ αποστάσεως και της μικτής μάθησης. Τα ψηφιακά μαθησιακά περιβάλλοντα παρέχουν αυξημένη ευελιξία και δυνατότητες εξατομίκευσης, επιτρέποντας την προσαρμογή του ρυθμού, του τρόπου παρουσίασης και του περιεχομένου της διδασκαλίας στις ανάγκες κάθε μαθητή (European Commission, 2022). Τεχνολογίες υποστηρικτικής μάθησης, όπως εφαρμογές μετατροπής κειμένου σε ομιλία, οπτικοποιημένα μαθησιακά αντικείμενα και διαδραστικά πολυμεσικά υλικά, έχουν αναφερθεί ως ιδιαίτερα ωφέλιμες για μαθητές με δυσλεξία, δυσαριθμησία και Διαταραχές Αυτιστικού Φάσματος, ενισχύοντας την κατανόηση και τη μαθησιακή εμπλοκή (Smith & Hattingh, 2020).

Παράλληλα, η χρήση πολυτροπικών ψηφιακών υλικών συμβάλλει στη μείωση γνωστικών φραγμών, επιτρέποντας την προσέγγιση της γνώσης μέσω πολλαπλών αισθητηριακών καναλιών. Ωστόσο, η αποτελεσματικότητα των ψηφιακών μέσων δεν είναι δεδομένη και εξαρτάται σε μεγάλο βαθμό από το ευρύτερο κοινωνικό και θεσμικό πλαίσιο εντός του οποίου εφαρμόζονται. Η διεθνής και ελληνική βιβλιογραφία επισημαίνει την ύπαρξη έντονων ανισοτήτων πρόσβασης σε τεχνολογικό εξοπλισμό και αξιόπιστη διαδικτυακή σύνδεση, γεγονός που εντείνει το ψηφιακό χάσμα και επηρεάζει δυσανάλογα μαθητές/τριες με ΕΜΔ (Hellenic Ministry of Education and Religious Affairs, 2021).

Επιπλέον, η εξ αποστάσεως εκπαιδευτική διαδικασία ενδέχεται να περιορίσει τις ευκαιρίες κοινωνικής αλληλεπίδρασης, στοιχείο ιδιαίτερα κρίσιμο για μαθητές με αυξημένες κοινωνικοσυναισθηματικές ανάγκες. Έρευνες έχουν δείξει ότι η μειωμένη άμεση επικοινωνία με συνομηλίκους και εκπαιδευτικούς μπορεί να επηρεάσει αρνητικά την ψυχολογική ευημερία και το αίσθημα σχολικής ένταξης των μαθητών, εάν δεν συνοδεύεται από στοχευμένες παιδαγωγικές παρεμβάσεις (Mazurek & Wenstrup, 2022· UNICEF, 2021).

Κεντρικό ρόλο στην αποτελεσματική αξιοποίηση των ψηφιακών μέσων διαδραματίζει η επιμόρφωση των εκπαιδευτικών. Η έλλειψη επαρκούς παιδαγωγικής κατάρτισης στη χρήση ψηφιακών εργαλείων για την υποστήριξη μαθητών με ΕΜΔ αποτελεί διαχρονική πρόκληση, ιδιαίτερα στο ελληνικό εκπαιδευτικό σύστημα (Hellenic Ministry of Education and Religious Affairs, 2021). Η διεθνής εμπειρία καταδεικνύει ότι η επαγγελματική ανάπτυξη των εκπαιδευτικών συνδέεται άμεσα με την ποιότητα των ψηφιακών παρεμβάσεων και τα μαθησιακά αποτελέσματα.

Παρά τις προκλήσεις αυτές, οι σύγχρονες τεχνολογικές εξελίξεις δημιουργούν νέες προοπτικές για τη συμπεριληπτική εκπαίδευση. Εφαρμογές τεχνητής νοημοσύνης και εικονικής πραγματικότητας προσφέρουν δυνατότητες δυναμικής προσαρμογής του μαθησιακού περιεχομένου και ενίσχυσης της αυτορρύθμισης, ενώ η συνεργασία μεταξύ σχολείου, οικογένειας και ειδικών επιστημόνων δύναται να ενισχύσει τη συνολική αποτελεσματικότητα των ψηφιακών παρεμβάσεων (Clark et al., 2022· Voultsiou & Moussiades, 2025). Υπό αυτές τις συνθήκες, τα ψηφιακά μέσα μπορούν να λειτουργήσουν όχι μόνο ως τεχνολογικά εργαλεία, αλλά ως καταλύτες για τον ανασχεδιασμό πιο ισότιμων και προσβάσιμων εκπαιδευτικών πρακτικών.

ΚΑΤΗΓΟΡΙΕΣ ΨΗΦΙΑΚΩΝ ΠΑΡΕΜΒΑΣΕΩΝ ΓΙΑ ΜΑΘΗΤΕΣ/ΤΡΙΕΣ ΜΕ ΕΙΔΙΚΕΣ ΜΑΘΗΣΙΑΚΕΣ ΔΥΣΚΟΛΙΕΣ

Η διεθνής βιβλιογραφία καταδεικνύει ότι τα ψηφιακά εργαλεία που αξιοποιούνται για την υποστήριξη μαθητών/τριών με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ) μπορούν να ομαδοποιηθούν σε διακριτές λειτουργικές κατηγορίες, ανάλογα με τον τύπο της μαθησιακής δυσκολίας και τις εκπαιδευτικές ανάγκες που εξυπηρετούν. Οι κατηγορίες αυτές περιλαμβάνουν εργαλεία υποστηρικτικής ανάγνωσης και γραφής, διαδραστικά μαθηματικά περιβάλλοντα, εφαρμογές ενίσχυσης εκτελεστικών λειτουργιών, τεχνολογίες κοινωνικής μάθησης και γενικές πλατφόρμες διαχείρισης μάθησης. Η διαφοροποιημένη υιοθέτηση των παραπάνω κατηγοριών αποτυπώνει τόσο τις ιδιαίτερες ανάγκες των μαθητών/τριών με ΕΜΔ όσο και το επίπεδο ωρίμανσης των αντίστοιχων τεχνολογικών λύσεων σε διεθνές επίπεδο.

Στον Πίνακα 2 παρουσιάζονται ενδεικτικά ποσοστά χρήσης ψηφιακών εργαλείων ανά κατηγορία Ειδικών Μαθησιακών Δυσκολιών, όπως αυτά καταγράφονται στη διεθνή βιβλιογραφία.

Πίνακας 2
Ποσοστά χρήσης ψηφιακών εργαλείων από μαθητές/τριες με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ) σε διεθνές επίπεδο

Κατηγορία ΕΜΔ	Τύπος Ψηφιακού Εργαλείου	Αναφερόμενο Ποσοστό Χρήσης (%)	Πηγή Δεδομένων
Δυσλεξία	Εφαρμογές μετατροπής κειμένου σε ομιλία (π.χ. NaturalReader)	65% (ΗΠΑ)	International Dyslexia Association (2021)
Δυσλεξία	Λογισμικό ορθογραφικού και γλωσσικού ελέγχου (π.χ. Grammarly)	50% (Ευρώπη)	European Agency for Special Needs and Inclusive Education (2022)
Δυσαριθμησία	Διαδραστικά μαθηματικά λογισμικά (π.χ. Mathway)	40% (Χώρες OECD)	OECD (2021)
Δυσαριθμησία	Εφαρμογές διαχείρισης χρόνου (π.χ. Time Timer)	30% (Παγκόσμιο δείγμα)	UNESCO (2021)
Διαταραχές Αυτιστικού Φάσματος (ΔΑΦ)	Εφαρμογές κοινωνικής μάθησης και προσομοίωσης (π.χ. ψηφιακές κοινωνικές ιστορίες)	35% (Παγκόσμιο δείγμα)	Autism Speaks (2021)
Διαταραχές Αυτιστικού Φάσματος (ΔΑΦ)	Τεχνολογίες εικονικής πραγματικότητας για κοινωνικές δεξιότητες	25% (ΗΠΑ)	Smith & Hattingh (2020)
Διαταραχή Ελλειμματικής Προσοχής / Υπερκινητικότητας (ΔΕΠ-Υ)	Εφαρμογές εστίασης προσοχής και αυτορρύθμισης (π.χ. Focus@Will)	45% (ΗΠΑ)	Zheng et al. (2021)
Διαταραχή Ελλειμματικής Προσοχής / Υπερκινητικότητας (ΔΕΠ-Υ)	Ψηφιακά εργαλεία οργάνωσης μαθησιακών εργασιών (π.χ. Trello)	30% (Ευρώπη)	European Commission (2022)
Γενική κατηγορία ΕΜΔ	Πλατφόρμες Διαχείρισης Μάθησης (LMS)	70% (Παγκόσμιο δείγμα)	UNESCO (2021)
Γενική κατηγορία ΕΜΔ	Εφαρμογές παιγνιώδους μάθησης (gamification)	50% (ΗΠΑ)	Clark et al. (2022)
Γονείς & Εκπαιδευτικοί	Εφαρμογές επικοινωνίας σχολείου–οικογένειας	60% (Χώρες OECD)	OECD (2021)

Σημείωση: Τα αναγραφόμενα ποσοστά δεν αποτελούν προϊόν πρωτογενούς έρευνας της παρούσας μελέτης, αλλά προέρχονται από δευτερογενή ανάλυση ευρημάτων της διεθνούς βιβλιογραφίας για τους αντίστοιχους πληθυσμούς αναφοράς (π.χ. ΗΠΑ, Ευρώπη, χώρες OECD) κατά την περίοδο 2020–2023.

Στην περίπτωση της δυσλεξίας, καταγράφεται η υψηλότερη ενσωμάτωση ψηφιακών παρεμβάσεων, με έμφαση σε εργαλεία υποστηρικτικής ανάγνωσης και γραφής, όπως εφαρμογές μετατροπής κειμένου σε ομιλία και λογισμικά ορθογραφικής και γλωσσικής υποστήριξης. Η εκτεταμένη χρήση αυτών των εργαλείων αποδίδεται αφενός στη συχνότητα εμφάνισης της δυσλεξίας και αφετέρου στη μακρόχρονη ερευνητική ενασχόληση με τη συγκεκριμένη μαθησιακή δυσκολία, η οποία έχει οδηγήσει στην ανάπτυξη ώριμων και ευρέως διαθέσιμων τεχνολογικών λύσεων (International Dyslexia Association, 2021· European Agency for Special Needs and Inclusive Education, 2022).

Αντίθετα, για τη δυσαριθμησία παρατηρούνται χαμηλότερα ποσοστά χρήσης ψηφιακών εργαλείων, τα οποία επικεντρώνονται κυρίως σε διαδραστικά μαθηματικά περιβάλλοντα και εφαρμογές οπτικοποίησης αριθμητικών εννοιών. Παρά τη δυνατότητα των εργαλείων αυτών να υποστηρίξουν την κατανόηση βασικών μαθηματικών δομών, η περιορισμένη υιοθέτησή τους υποδηλώνει ελλείμματα τόσο στη διαθεσιμότητα εξειδικευμένων εφαρμογών όσο και στην επιμόρφωση των εκπαιδευτικών ως προς την παιδαγωγική τους αξιοποίηση (OECD, 2021· UNESCO, 2021).

Για τους μαθητές/τριες με Διαταραχές Αυτιστικού Φάσματος, οι ψηφιακές παρεμβάσεις εστιάζουν κυρίως στην ενίσχυση κοινωνικών και επικοινωνιακών δεξιοτήτων μέσω τεχνολογιών κοινωνικής μάθησης και εφαρμογών προσομοίωσης. Ιδιαίτερο ενδιαφέρον παρουσιάζουν τεχνολογίες εικονικής πραγματικότητας και ψηφιακές κοινωνικές

ιστορίες, οι οποίες προσφέρουν δομημένα και προβλέψιμα μαθησιακά περιβάλλοντα. Ωστόσο, τα σχετικά ποσοστά χρήσης παραμένουν συγκριτικά χαμηλότερα, γεγονός που αποδίδεται σε παράγοντες όπως το αυξημένο κόστος, η τεχνική πολυπλοκότητα και η ανάγκη εξειδικευμένης καθοδήγησης για την αποτελεσματική εφαρμογή τους (Smith & Hattingh, 2020).

Στην περίπτωση της Διαταραχής Ελλειμματικής Προσοχής/Υπερκινητικότητας (ΔΕΠ-Υ), τα ψηφιακά εργαλεία επικεντρώνονται κυρίως στην υποστήριξη των εκτελεστικών λειτουργιών, όπως η διαχείριση προσοχής, οργάνωσης και χρόνου. Τα υψηλότερα ποσοστά χρήσης τέτοιων εφαρμογών υποδηλώνουν ότι οι τεχνολογικές παρεμβάσεις που στοχεύουν άμεσα στα βασικά συμπτώματα της διαταραχής θεωρούνται περισσότερο λειτουργικές και άμεσα αξιοποιήσιμες στην εκπαιδευτική πράξη (Zheng et al., 2021· European Commission, 2022).

Ιδιαίτερα σημαντική είναι η εκτεταμένη χρήση γενικών εκπαιδευτικών πλατφορμών και εργαλείων παιγνιώδους μάθησης από μαθητές/τριες με ΕΜΔ. Τα υψηλά ποσοστά υιοθέτησης πλατφορμών διαχείρισης μάθησης και εφαρμογών gamification υπογραμμίζουν τη σημασία της καθολικής σχεδίασης για τη μάθηση, καθώς τα εργαλεία γενικής χρήσης, όταν ενσωματώνουν αρχές προσβασιμότητας και ευελιξίας, μπορούν να λειτουργήσουν υποστηρικτικά για ευρύ φάσμα μαθησιακών αναγκών (UNESCO, 2021).

Παράλληλα, η αξιοποίηση ψηφιακών εργαλείων επικοινωνίας μεταξύ σχολείου και οικογένειας αναδεικνύεται ως κρίσιμος παράγοντας υποστήριξης των μαθητών/τριών με ΕΜΔ. Η ενίσχυση της συνεργασίας μεταξύ εκπαιδευτικών, γονέων και ειδικών επιστημόνων συμβάλλει στη συστηματική παρακολούθηση της μαθησιακής προόδου και στη διαμόρφωση συνεκτικών παρεμβάσεων, γεγονός που αποτυπώνεται στα αυξημένα ποσοστά χρήσης σχετικών εφαρμογών (OECD, 2021).

Ο Πίνακας 2 συνοψίζει τα αναφερόμενα ποσοστά χρήσης ψηφιακών εργαλείων ανά κατηγορία Ειδικών Μαθησιακών Δυσκολιών, όπως αυτά καταγράφονται στη διεθνή βιβλιογραφία. Τα ποσοστά αυτά δεν αποσκοπούν σε άμεση συγκριτική αξιολόγηση μεταξύ χωρών, αλλά λειτουργούν ενδεικτικά, αποτυπώνοντας τάσεις υιοθέτησης ψηφιακών παρεμβάσεων σε διαφορετικά θεσμικά και γεωγραφικά πλαίσια. Συνολικά, τα ευρήματα αναδεικνύουν σημαντική διακύμανση στον βαθμό ωρίμανσης και αξιοποίησης των ψηφιακών εργαλείων ανά τύπο ΕΜΔ, υπογραμμίζοντας την ανάγκη για περαιτέρω ανάπτυξη εξειδικευμένων παρεμβάσεων, ενίσχυση της επιμόρφωσης των εκπαιδευτικών και συστηματική αξιολόγηση της παιδαγωγικής αποτελεσματικότητας των ψηφιακών τεχνολογιών στην ειδική αγωγή. Η εννοιολογική αυτή προσέγγιση αναδεικνύει την ανάγκη μετάβασης από γενικευμένες τεχνολογικές λύσεις σε στοχευμένες ψηφιακές παρεμβάσεις, στοιχείο που αποτελεί βασικό άξονα της ανάλυσης που ακολουθεί.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η παρούσα μελέτη ανέδειξε τον κρίσιμο ρόλο των ψηφιακών τεχνολογιών στην εκπαίδευση μαθητών/τριών με Ειδικές Μαθησιακές Δυσκολίες (ΕΜΔ), συμβάλλοντας στη συζήτηση γύρω από τη συγκριτική αποτελεσματικότητα των ψηφιακών παρεμβάσεων σε διαφορετικά εκπαιδευτικά πλαίσια. Μέσα από την ανάλυση δευτερογενών δεδομένων, προέκυψαν ευρήματα που απαντούν στα ερευνητικά ερωτήματα και φωτίζουν τόσο τις δυνατότητες όσο και τους περιορισμούς του ψηφιακού μετασχηματισμού στην ειδική αγωγή.

Σε σχέση με το πρώτο ερευνητικό ερώτημα, τα αποτελέσματα κατέδειξαν σημαντική απόκλιση μεταξύ της ελληνικής και της διεθνούς πραγματικότητας ως προς τον βαθμό ψηφιακής ετοιμότητας. Παρότι σε χώρες όπως οι Ηνωμένες Πολιτείες και η Γερμανία καταγράφονται υψηλά επίπεδα ψηφιακής πρόσβασης και ενσωμάτωσης, η ελληνική περίπτωση χαρακτηρίζεται από υστέρηση, η οποία δεν αφορά τόσο τη διαθεσιμότητα εξοπλισμού όσο την παιδαγωγική αξιοποίησή του. Το εύρημα αυτό ενισχύει την άποψη ότι η ψηφιακή ένταξη συνιστά μια πολυδιάστατη διαδικασία και ότι η τεχνολογία από μόνη της δεν αρκεί για τη βελτίωση των μαθησιακών αποτελεσμάτων, εάν δεν συνοδεύεται από θεσμικές και παιδαγωγικές μεταβολές. Παράλληλα, αναδεικνύεται η ανάγκη προσεκτικής διαχείρισης κινδύνων, όπως η κοινωνική απομόνωση και η περιορισμένη διαπροσωπική αλληλεπίδραση, ιδιαίτερα για ορισμένους τύπους ΕΜΔ.

Αναφορικά με το δεύτερο ερευνητικό ερώτημα, η ανάλυση αποκάλυψε σαφή ανισομέρεια στην ωριμότητα και τη διάδοση των ψηφιακών εργαλείων ανά κατηγορία ΕΜΔ. Οι παρεμβάσεις για τη δυσλεξία εμφανίζουν υψηλά επίπεδα υιοθέτησης, γεγονός που συνδέεται με τη μακροχρόνια ερευνητική εστίαση στη συγκεκριμένη μαθησιακή δυσκολία. Αντιθέτως, κατηγορίες όπως η δυσαριθμησία παραμένουν λιγότερο υποστηριζόμενες τεχνολογικά, με αποτέλεσμα χαμηλότερα ποσοστά χρήσης ψηφιακών εργαλείων. Το εύρημα αυτό υπογραμμίζει την ανάγκη αναπροσανατολισμού του ερευνητικού και σχεδιαστικού ενδιαφέροντος προς λιγότερο προβεβλημένες μαθησιακές δυσκολίες, προκειμένου να περιοριστούν οι ανισότητες στην εκπαίδευση.

Τέλος, σε σχέση με τα εμπόδια ενσωμάτωσης των ψηφιακών μέσων, τα αποτελέσματα δείχνουν ότι ο σημαντικότερος ανασταλτικός παράγοντας δεν είναι η ίδια η τεχνολογία, αλλά η ανεπαρκής επιμόρφωση του ανθρώπινου δυναμικού. Το χαμηλό ποσοστό καταρτισμένων εκπαιδευτικών, σε συνδυασμό με τα μέτρια επίπεδα ακαδημαϊκής βελτίωσης των μαθητών/τριών, υποδεικνύει ότι η επένδυση στο ανθρώπινο κεφάλαιο αποτελεί βασική προϋπόθεση για έναν ουσιαστικό ψηφιακό μετασχηματισμό. Συνεπώς, η δημιουργία ενός συμπεριληπτικού σχολείου στην ψηφιακή εποχή προϋποθέτει μια ολιστική στρατηγική που συνδυάζει την Καθολική Σχεδίαση για τη Μάθηση με τη συνεχή επαγγελματική ανάπτυξη των εκπαιδευτικών.

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ΘΠ18: Κοινωνικά δίκτυα και εκπαίδευση

ΚΟΙΝΩΝΙΚΑ ΔΙΚΤΥΑ ΚΑΙ ΕΚΠΑΙΔΕΥΣΗ

Κούλης Ιωάννης
Διευθυντής 9ου Δημοτικού Σχολείου Άρτας
Διεύθυνση Πρωτοβάθμιας Εκπαιδευσης Άρτας
Ελλάδα
e-mail: janniskoulis@gmail.com

ΠΕΡΙΛΗΨΗ

Τα κοινωνικά δίκτυα έχουν γίνει αναπόσπαστο κομμάτι της σύγχρονης ζωής, επηρεάζοντας σχεδόν όλους τους τομείς, συμπεριλαμβανομένης και της εκπαίδευσης. Η χρήση τους στην εκπαιδευτική διαδικασία έχει ανοίξει νέους ορίζοντες, αλλά ταυτόχρονα θέτει και σημαντικές προκλήσεις. Η παρούσα εργασία αποσκοπεί στο να εξετάσει τη σχέση αυτή, να αναλύσει τη σχετική νομοθεσία και να προτείνει κατευθύνσεις για την ορθή χρήση των κοινωνικών δικτύων στο εκπαιδευτικό περιβάλλον. Αναλυτικότερα, τα κοινωνικά δίκτυα έχουν γίνει αναπόσπαστο κομμάτι της σύγχρονης ζωής, επηρεάζοντας σχεδόν όλους τους τομείς, συμπεριλαμβανομένης και της εκπαίδευσης. Η ραγδαία εξέλιξη της τεχνολογίας και η διείσδυση των ψηφιακών πλατφορμών στην καθημερινότητά μας, έχουν μεταβάλει τον τρόπο με τον οποίο μαθαίνουμε, επικοινωνούμε και συνεργαζόμαστε. Στο πλαίσιο της εκπαίδευσης, τα κοινωνικά δίκτυα έχουν ανοίξει νέους ορίζοντες, προσφέροντας ευκαιρίες για διαδραστική μάθηση, συνεργασία και πρόσβαση σε πλούσιους εκπαιδευτικούς πόρους. Ωστόσο, η χρήση τους δεν υφίσταται χωρίς προκλήσεις. Ζητήματα όπως η προστασία της ιδιωτικής ζωής, η ασφάλεια των δεδομένων, ο κυβερνοεκφοβισμός και η ανάγκη για ψηφιακή παιδεία αποτελούν σημαντικές ανησυχίες που απαιτούν προσοχή και αντιμετώπιση. Για τούτο, θα προσπαθήσουμε να εξετάσουμε τη σχέση αυτή, αναλύοντας τόσο τις ευκαιρίες όσο και τις προκλήσεις που προκύπτουν από τη χρήση των κοινωνικών δικτύων στο εκπαιδευτικό περιβάλλον. Στόχος είναι να κατανοήσουμε πώς αυτές οι πλατφόρμες μπορούν να ενισχύσουν την εκπαιδευτική διαδικασία, να διευκολύνουν την επικοινωνία μεταξύ μαθητών και εκπαιδευτικών και να προωθήσουν την καινοτομία στη διδασκαλία. Παράλληλα, θα εξεταστούν οι νομικές και ηθικές διαστάσεις της χρήσης των κοινωνικών δικτύων, με έμφαση στην προστασία των δεδομένων και των δικαιωμάτων των μαθητών. Η συζήτηση θα επικεντρωθεί και στην ορθή χρήση των κοινωνικών δικτύων, προτείνοντας κατευθύνσεις και καλές πρακτικές που μπορούν να υιοθετηθούν από εκπαιδευτικούς και εκπαιδευτικούς φορείς. Θα αναλυθούν τα πλεονεκτήματα της ψηφιακής παιδείας, η σημασία της ευαισθητοποίησης των μαθητών για τους κινδύνους του διαδικτύου και ο ρόλος των εκπαιδευτικών ως μεντόρων στην ψηφιακή εποχή. Επιπλέον, θα διερευνηθεί πώς τα κοινωνικά δίκτυα μπορούν να συμβάλλουν στη δημιουργία ενός πιο συμπεριληπτικού και δίκαιου εκπαιδευτικού συστήματος, παρέχοντας πρόσβαση σε γνώση και πόρους σε μαθητές από διαφορετικά κοινωνικά και γεωγραφικά πλαίσια.

Τέλος η παρούσα εργασία στοχεύει να προσφέρει μια ολοκληρωμένη προσέγγιση στη σχέση μεταξύ κοινωνικών δικτύων και εκπαίδευσης, συνδυάζοντας θεωρητική ανάλυση, πρακτικές εφαρμογές και νομικές προοπτικές. Μέσα από τη συλλογική συζήτηση και την ανταλλαγή ιδεών, επιδιώκεται να διαμορφωθεί ένας οδικός χάρτης για την ασφαλή, υπεύθυνη και αποτελεσματική χρήση των κοινωνικών δικτύων στην εκπαίδευση, προς όφελος τόσο των μαθητών όσο και της εκπαιδευτικής κοινότητας στο σύνολό της.

Λέξεις – κλειδιά: Κοινωνικά δίκτυα, εκπαίδευση, διδασκαλία, συμπερίληψη.

ΕΙΣΑΓΩΓΗ

Στην εποχή της ραγδαίας ψηφιακής εξέλιξης και της συνεχούς διαδικτυακής διασύνδεσης, τα κοινωνικά δίκτυα δεν αποτελούν πλέον απλά μέσα κοινωνικής αλληλεπίδρασης ή ψυχαγωγίας. Έχουν εξελιχθεί σε πολύπλευρα εργαλεία που επηρεάζουν κάθε πτυχή της καθημερινής ζωής, από την πολιτική και την οικονομία έως – και κυρίως – την εκπαίδευση. Πλατφόρμες όπως το Facebook, το Instagram, το YouTube, το TikTok, αλλά και ειδικά σχεδιασμένα δίκτυα όπως το Edmodo, δεν περιορίζονται μόνο στη διάδοση περιεχομένου. Λειτουργούν ως κόμβοι πληροφόρησης, συνεργασίας και δημιουργικής έκφρασης, επαναπροσδιορίζοντας τον τρόπο με τον οποίο οι μαθητές αλληλεπιδρούν, οι εκπαιδευτικοί διδάσκουν και οι κοινότητες μαθαίνουν.

Ωστόσο, πίσω από τα likes, τα shares και τα hashtags, αναδύονται εύλογες ανησυχίες: Πόσο ασφαλής είναι η συμμετοχή των μαθητών σε τέτοιες πλατφόρμες; Ποια είναι τα όρια ανάμεσα στην προσωπική έκφραση και στην παραβίαση της ιδιωτικότητας; Πώς διασφαλίζεται ότι τα δεδομένα των παιδιών και εφήβων προστατεύονται επαρκώς; Και, το πιο σημαντικό, είναι πράγματι τα κοινωνικά δίκτυα σύμμαχος της εκπαίδευσης ή ένας ψηφιακός αντιπερισπασμός που θολώνει τα όρια ανάμεσα στο ουσιώδες και στο επιφανειακό;

Η παρούσα εργασία επιχειρεί να προσεγγίσει ολιστικά το ζήτημα της σχέσης μεταξύ κοινωνικών δικτύων και εκπαίδευσης. Αρχικά, αναλύονται οι τρόποι με τους οποίους τα δίκτυα μπορούν να ενισχύσουν τη μαθησιακή διαδικασία, προσφέροντας διαδραστικά περιβάλλοντα, δυνατότητες συνεργασίας και πρόσβαση σε ποικίλους εκπαιδευτικούς πόρους. Στη συνέχεια, εξετάζονται οι προκλήσεις και οι κίνδυνοι που ενέχει η χρήση τους – από τον κυβερνοεκφοβισμό και την υπερπληροφόρηση μέχρι την έκθεση σε ακατάλληλο περιεχόμενο και την εξάρτηση από την ψηφιακή παρουσία. Ιδιαίτερη έμφαση δίδεται στην έννοια της ψηφιακής παιδείας και στον ρόλο του εκπαιδευτικού ως καθοδηγητή, μέντορα και διαχειριστή του ψηφιακού οικοσυστήματος. Παράλληλα, παρουσιάζονται νομικά και ηθικά ζητήματα που σχετίζονται με την προστασία των προσωπικών δεδομένων, την εφαρμογή της νομοθεσίας και τη διαμόρφωση ενός ασφαλούς και υποστηρικτικού ψηφιακού περιβάλλοντος.

Τέλος, διατυπώνονται συγκεκριμένες προτάσεις πολιτικής και καλές πρακτικές για την ενσωμάτωση των κοινωνικών δικτύων στην εκπαιδευτική διαδικασία, με στόχο τη διαμόρφωση ενός σχολείου που όχι μόνο παρακολουθεί τις τεχνολογικές εξελίξεις, αλλά τις αξιοποιεί υπεύθυνα προς όφελος όλων των μαθητών – ανεξαρτήτως κοινωνικού, γεωγραφικού ή πολιτισμικού υπόβαθρου.

ΣΚΟΠΟΣ ΚΑΙ ΔΟΜΗ ΤΗΣ ΕΡΓΑΣΙΑΣ

Ο σκοπός της παρούσας εργασίας είναι να διερευνήσει εις βάθος τον ρόλο των κοινωνικών δικτύων στο εκπαιδευτικό περιβάλλον, τόσο από τη σκοπιά των δυνατοτήτων που προσφέρουν, όσο και των προκλήσεων που ενέχουν. Ιδιαίτερη έμφαση δίδεται στη μελέτη του τρόπου με τον οποίο τα κοινωνικά δίκτυα μπορούν να ενισχύσουν τη μαθησιακή διαδικασία, να ενθαρρύνουν τη συνεργατική μάθηση και να καλλιεργήσουν ψηφιακές δεξιότητες, ενώ παράλληλα επισημαίνονται οι κίνδυνοι που σχετίζονται με την ασφάλεια, την ιδιωτικότητα και την ορθή χρήση της τεχνολογίας από τους μαθητές. Η εργασία επιδιώκει επίσης να καλύψει το νομικό και ηθικό πλαίσιο που διέπει τη χρήση των κοινωνικών δικτύων στην εκπαίδευση, παρουσιάζοντας σχετικές ρυθμίσεις, οδηγίες και κανονισμούς, τόσο σε εθνικό όσο και σε ευρωπαϊκό επίπεδο. Η ανάγκη για ψηφιακή παιδεία αναδεικνύεται ως κρίσιμος παράγοντας για την επιτυχία οποιασδήποτε εκπαιδευτικής ενσωμάτωσης κοινωνικών μέσων.

Η δομή της εργασίας έχει οργανωθεί ως εξής:

Στο πρώτο κεφάλαιο, αναλύεται ο ρόλος των κοινωνικών δικτύων στην εκπαίδευση, εστιάζοντας στα πλεονεκτήματα και τις εκπαιδευτικές ευκαιρίες που προσφέρουν.

Στο δεύτερο κεφάλαιο, εξετάζονται οι προκλήσεις και οι κίνδυνοι που ενδέχεται να προκύψουν από τη χρήση τους από μαθητές και εκπαιδευτικούς.

Στο τρίτο κεφάλαιο, παρουσιάζεται η έννοια της ψηφιακής παιδείας και η σημασία της για τη διαμόρφωση υπεύθυνων ψηφιακών πολιτών.

Στο τέταρτο κεφάλαιο, εστιάζουμε στον ρόλο του εκπαιδευτικού ως διαμεσολαβητή και καθοδηγητή στη χρήση των κοινωνικών δικτύων.

Στο πέμπτο κεφάλαιο, προσεγγίζονται οι νομικές και ηθικές διαστάσεις, με αναφορά στη σχετική νομοθεσία και τα δικαιώματα των μαθητών.

Στο έκτο κεφάλαιο, διατυπώνονται καλές πρακτικές και προτάσεις πολιτικής για την ενσωμάτωση των κοινωνικών δικτύων στο σχολείο με ασφαλή και αποτελεσματικό τρόπο.

Το έβδομο κεφάλαιο, αναλύει τις δυνατότητες πρόσβασης και συμπερίληψης στα κοινωνικά δίκτυα.

Το όγδοο και τελευταίο κεφάλαιο ολοκληρώνει την εργασία με αποτελεσματική και ασφαλή ένταξη των κοινωνικών δικτύων στην εκπαιδευτική διαδικασία για μελλοντική έρευνα και δράση στον τομέα της ψηφιακής εκπαίδευσης.

Μέσα από αυτή τη δομημένη προσέγγιση, η εργασία στοχεύει να συμβάλει στην καλλιέργεια ενός γόνιμου διαλόγου γύρω από την υπεύθυνη αξιοποίηση των κοινωνικών δικτύων στην εκπαιδευτική κοινότητα.

Ο ΡΟΛΟΣ ΤΩΝ ΚΟΙΝΩΝΙΚΩΝ ΔΙΚΤΥΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Τα κοινωνικά δίκτυα, με παιδαγωγικά κριτήρια και υπεύθυνη καθοδήγηση, μπορούν να λειτουργήσουν ως πολύτιμοι σύμμαχοι στην εκπαιδευτική διαδικασία. Δεν πρόκειται μόνο για τεχνολογικά εργαλεία, αλλά για διαδραστικά περιβάλλοντα που ενισχύουν τη μάθηση, την επικοινωνία και τη συνεργασία, κυρίως στους μαθητές της δευτεροβάθμιας εκπαίδευσης που ήδη είναι εξοικειωμένοι με τις ψηφιακές πλατφόρμες.

Συνεργατική μάθηση και ανταλλαγή ιδεών

Οι πλατφόρμες κοινωνικής δικτύωσης διευκολύνουν τη δημιουργία συνεργατικών μαθησιακών εμπειριών. Μαθητές μπορούν να εργάζονται μαζί σε ομαδικές εργασίες, ακόμα κι αν βρίσκονται σε διαφορετικά φυσικά σημεία, ανταλλάσσοντας απόψεις, ιδέες και υλικό. Συγκεκριμένα, σε Λύκειο της Αθήνας, μαθητές δημιούργησαν ομάδα στο Facebook για να συνεργαστούν σε project Ιστορίας με θέμα «Η Κατοχή στην Ελλάδα». Εκεί αντάλλασσαν πηγές, συζητούσαν για την κατανομή ρόλων και μοιράζονταν προσχέδια. Η εργασία παρουσιάστηκε τελικά δημόσια ως διαδραστικό Padlet, ενισχυμένο με βίντεο και αφηγήσεις. Επομένως μέσα από τα κοινωνικά δίκτυα, δημιουργούνται εικονικές κοινότητες μάθησης, όπου συμμετέχουν όχι μόνο οι μαθητές, αλλά και οι εκπαιδευτικοί, οι γονείς ή ακόμη και εξωτερικοί συνεργάτες. Αυτές οι κοινότητες ενισχύουν το αίσθημα του «ανήκειν» και προωθούν τη διαμοίραση της γνώσης. Συγκεκριμένα, σχολείο στην Καλαμάτα αξιοποίησε την πλατφόρμα Edmodo, δημιουργώντας τάξη για το μάθημα των Αγγλικών. Οι μαθητές ανέβαζαν εργασίες, συζητούσαν τις απαντήσεις όλων και συμμετείχαν σε ψηφιακές συζητήσεις που προωθούσαν την κατανόηση γραμματικών φαινομένων μέσα από πραγματικά παραδείγματα.

Εξ αποστάσεως εκπαίδευση

Η περίοδος της πανδημίας κατέδειξε με σαφήνεια πόσο κρίσιμη είναι η τεχνολογική υποδομή στην εκπαίδευση. Πέρα από τις επίσημες πλατφόρμες (όπως το e-class ή το Webex), πολλοί εκπαιδευτικοί στράφηκαν στα κοινωνικά δίκτυα για να διατηρήσουν ζωντανή την επικοινωνία και τη ροή της μάθησης. Συγκεκριμένα, καθηγήτρια Φιλολογίας σε ΕΠΑΛ δημιούργησε εκπαιδευτικό κανάλι στο YouTube, όπου ανέβαζε επεξηγηματικά βίντεο για τη Νεοελληνική Γλώσσα και τη Λογοτεχνία. Οι μαθητές παρακολουθούσαν το περιεχόμενο ασύγχρονα και ακολουθούσε συζήτηση σε κλειστή ομάδα στο Messenger.

Ενίσχυση της κριτικής σκέψης και των ψηφιακών δεξιοτήτων

Η καθοδηγούμενη χρήση κοινωνικών δικτύων δίνει την ευκαιρία στους μαθητές να καλλιεργήσουν την κριτική τους σκέψη μέσα από την ανάλυση και την αξιολόγηση των πληροφοριών που προσλαμβάνουν καθημερινά. Παράλληλα, αναπτύσσουν δεξιότητες όπως η υπεύθυνη αναζήτηση, η τεκμηρίωση απόψεων και η ψηφιακή δημιουργικότητα. Για παράδειγμα, μαθητές Γυμνασίου κλήθηκαν να δημιουργήσουν ένα εκπαιδευτικό podcast με τίτλο «Μύθοι και Αλήθειες για τα Social Media», το οποίο διανεμήθηκε μέσω Spotify και Instagram. Η δράση αυτή ενίσχυσε την κατανόηση των μαθητών σχετικά με τη διάδοση της παραπληροφόρησης και τους ώθησε να αξιολογούν πιο προσεκτικά τα διαδικτυακά δεδομένα.

ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΚΙΝΔΥΝΟΙ

Η χρήση των κοινωνικών δικτύων στο πλαίσιο της εκπαίδευσης, αν και συνοδεύεται από σημαντικές ευκαιρίες, ενέχει και σοβαρές προκλήσεις που επηρεάζουν τόσο το μαθησιακό αποτέλεσμα όσο και τη ψυχοκοινωνική ανάπτυξη των μαθητών. Οι κίνδυνοι που προκύπτουν δεν είναι θεωρητικοί ούτε ακραία σενάρια· είναι παρόντες στη σχολική καθημερινότητα και, σε αρκετές περιπτώσεις, επιφέρουν συνέπειες δύσκολα αναστρέψιμες.

Κυβερνοεκφοβισμός (Cyberbullying)

Η διαδικτυακή παρενόχληση αποτελεί μία από τις πιο συχνές και ύπουλες μορφές βίας στη σχολική κοινότητα. Μέσω πλατφορμών όπως Instagram, WhatsApp, TikTok ή Snapchat, μαθητές γίνονται στόχοι προσβολών, χλευασμού ή

απομόνωσης. Το φαινόμενο αυτό έχει επιπτώσεις στην ψυχοσυναισθηματική ισορροπία των παιδιών, οδηγώντας σε άγχος, απομόνωση, ακόμη και εγκατάλειψη του σχολείου (Kowalski et al., 2014). Ενδεικτικό περιστατικό αποτελεί το γεγονός ότι μαθητής Γυμνασίου έγινε στόχος σχολίων για την εξωτερική του εμφάνιση σε σχολική ομαδική συνομιλία στο Messenger. Η κατάσταση κλιμακώθηκε, με αποτέλεσμα την εμπλοκή ψυχολόγου και κοινωνικού λειτουργού της σχολικής μονάδας.

Έκθεση σε ακατάλληλο περιεχόμενο

Οι μαθητές, ιδίως οι μικρότεροι, συχνά εκτίθενται σε περιεχόμενο που δεν είναι κατάλληλο για την ηλικία τους: βία, ρατσιστικός λόγος, σεξουαλικά υπονοούμενα ή επικίνδυνες «προκλήσεις». Οι αλγόριθμοι προβολής περιεχομένου δεν διαχωρίζουν εκπαιδευτικούς από μη εκπαιδευτικούς χρήστες, με αποτέλεσμα η έκθεση να είναι ανεξέλεγκτη. Σχολική συνθήκη: ενδεικτικά αναφέρουμε τάξη δημοτικού σχολείου, όπου οι ίδιοι οι μαθητές ανέφεραν ότι παρακολούθησαν βίντεο στο TikTok που υποκινούσαν επικίνδυνες συμπεριφορές, όπως η πρόκληση ασφυξίας για «δοκιμή αντοχής». Η σχολική κοινότητα κινητοποιήθηκε άμεσα για να ενημερώσει και να ευαισθητοποιήσει, ώστε να αποφευχθούν τέτοια ακραία φαινόμενα.

Παραβίαση προσωπικών δεδομένων

Η ανάρτηση φωτογραφιών, η κοινοποίηση τοποθεσίας ή η απρόσεκτη αποδοχή όρων χρήσης είναι πράξεις που συχνά γίνονται από μαθητές χωρίς επίγνωση των συνεπειών. Η ανυπαρξία ορίων και η έλλειψη ενημέρωσης μπορεί να οδηγήσουν σε κατάχρηση δεδομένων, διαδικτυακή παρενόχληση ή ακόμη και εκβιασμό. Σύμφωνα με τη Livingstone & Haddon (2009), τα παιδιά συχνά δεν αντιλαμβάνονται το εύρος του ψηφιακού αποτυπώματός τους, ούτε τις νομικές συνέπειες που ενδέχεται να επιφέρει η δημοσιοποίηση ευαίσθητων πληροφοριών.

Ψευδείς ειδήσεις και παραπληροφόρηση

Η ευκολία αναπαραγωγής και διασποράς πληροφοριών στα κοινωνικά δίκτυα συνιστά ένα πεδίο υψηλού ρίσκου. Οι μαθητές, χωρίς επαρκή κριτική ικανότητα, γίνονται δέκτες παραπλανητικού ή ψευδούς περιεχομένου, το οποίο μπορεί να επηρεάσει τις αντιλήψεις τους, την εμπιστοσύνη στους θεσμούς ή ακόμα και την ψυχική τους υγεία. Ενδεικτικά αναφέρουμε μαθητική συζήτηση σε Λύκειο για τον πόλεμο στην Ουκρανία, όπου έγινε χρήση βίντεο από YouTube με αποδεδειγμένα παραποιημένες εικόνες. Το συμβάν στάθηκε αφορμή για εργαστήριο κριτικής ανάλυσης πηγών, υπό την καθοδήγηση φιλολόγου.

Εθισμός και διάσπαση προσοχής

Ο συνεχής καταιγισμός ερεθισμάτων, ειδοποιήσεων και ψηφιακής αλληλεπίδρασης, αποσπά την προσοχή των μαθητών και επηρεάζει τη συγκέντρωση και την αποδοτικότητά τους. Η εξάρτηση από τα social media μπορεί να οδηγήσει σε μείωση των ωρών μελέτης, διαταραχές ύπνου και μειωμένη σχολική επίδοση (Anderson & Jiang, 2018). Ενδεικτικά αναφέρουμε ότι σε ερωτηματολόγιο που διανεμήθηκε σε μαθητές Λυκείου, το 64% παραδέχτηκε ότι χρησιμοποιεί τα κοινωνικά δίκτυα κατά τη διάρκεια της μελέτης, με αποτέλεσμα να καθυστερεί την ολοκλήρωση των εργασιών τους.

Διακρίνοντας την ανάγκη για ψηφιακή εκπαίδευση και καθοδήγηση, καθίσταται σαφές ότι οι παραπάνω προκλήσεις δεν μπορούν να αντιμετωπιστούν με απαγορεύσεις ή δαιμονοποίηση των μέσων κοινωνικής δικτύωσης. Αντιθέτως, απαιτούν στοχευμένη παρέμβαση και ενεργή καθοδήγηση. Οι εκπαιδευτικοί οφείλουν να λειτουργούν ως πλοηγοί στη διαδικτυακή ζωή των μαθητών, να καλλιεργούν τη συνείδηση του ψηφιακού πολίτη και να ενσωματώνουν δραστηριότητες που ενδυναμώνουν τη λογική, την ηθική και την αυτορρύθμιση.

ΨΗΦΙΑΚΗ ΠΑΙΔΕΙΑ: ΜΙΑ ΑΝΑΓΚΑΙΟΤΗΤΑ

Στο σύγχρονο κοινωνικό και εκπαιδευτικό περιβάλλον, η έννοια της ψηφιακής παιδείας δεν μπορεί πλέον να θεωρείται συμπληρωματική ή εθελοντική. Αντιθέτως, αποτελεί θεμελιώδη δεξιότητα ζωής – στο ίδιο επίπεδο με τη γλωσσική κατανόηση, τη μαθηματική λογική και την κοινωνική συνείδηση. Ο πολίτης του 21ου αιώνα, και κατ' επέκταση ο μαθητής, οφείλει να είναι σε θέση όχι μόνο να χειρίζεται τεχνολογικά εργαλεία, αλλά να τα κατανοεί, να τα αξιολογεί και να τα χρησιμοποιεί με κριτικό πνεύμα και υπευθυνότητα (UNESCO, 2021).

Η ψηφιακή παιδεία (digital literacy) δεν ταυτίζεται με την τεχνολογική δεξιότητα. Δεν αρκεί η ικανότητα χρήσης ενός εργαλείου· απαιτείται επίγνωση των συνεπειών της χρήσης του. Πρόκειται για έναν συνδυασμό γνώσης, στάσεων

και ικανοτήτων, που επιτρέπει στους μαθητές να συμμετέχουν ενεργά και κριτικά στο ψηφιακό περιβάλλον, χωρίς να γίνονται θύματα παραπληροφόρησης ή κατάχρησης της τεχνολογίας (Hobbs, 2010).

Εκπαίδευση στην κριτική αξιολόγηση των πηγών

Η διαδικτυακή πληροφορία βρίσκεται σε μοναδική για τον αιώνα μας αφθονία, όμως η αξιοπιστία της παραμένει ζήτημα αμφισβήτησης. Οι μαθητές συχνά αντιμετωπίζουν ιστότοπους, βίντεο ή αναρτήσεις στα κοινωνικά δίκτυα χωρίς τα απαραίτητα εργαλεία για να διακρίνουν την πηγή, την πρόθεση και την ακρίβεια του περιεχομένου. Μια δυνατότητα υπερπήδησης αυτού του φαινομένου αποτελεί τοΝΠΣ και συγκεκριμένα το πρόγραμμα φιλαναγνωσίας, όπου οι μαθητές καλούνται να συγκρίνουν διαφορετικά άρθρα για το ίδιο γεγονός (π.χ. μια οικολογική καταστροφή) και να εντοπίσουν διαφορές στην παρουσίαση, τις πηγές, το λεξιλόγιο και τις εικόνες. Επιπροσθέτως, σύμφωνα με έρευνα του Stanford History Education Group (2016), η πλειονότητα των μαθητών Λυκείου στις ΗΠΑ αδυνατεί να ξεχωρίσει αν μια είδηση είναι διαφημιστική καταχώρηση ή έγκυρο ρεπορτάζ.

Ανάπτυξη δεξιοτήτων ψηφιακής ασφάλειας

Η προστασία από ιούς, κακόβουλο λογισμικό, ψεύτικους λογαριασμούς και διαδικτυακές απάτες είναι μέρος της καθημερινότητας ενός ενεργού χρήστη του διαδικτύου. Οι μαθητές συχνά δεν γνωρίζουν βασικές λειτουργίες ασφαλείας: πώς να δημιουργούν ισχυρούς κωδικούς, να αναγνωρίζουν phising links ή να προσαρμόζουν ρυθμίσεις απορρήτου. Σε μάθημα Πληροφορικής της Α' Γυμνασίου, γίνεται χρήση σεναρίων κινδύνου όπου οι μαθητές καλούνται να αντιδράσουν σε προσομοιωμένες απειλές (π.χ. απρόσκλητο μήνυμα, ψεύτικη προσφορά). Επίσης, η μελέτη του Livingstone & Helsper (2007) δείχνει ότι η πλειονότητα των εφήβων στην Ευρώπη αγνοεί βασικές πρακτικές κυβερνοασφάλειας, αν και είναι εξοικειωμένοι με τις ψηφιακές πλατφόρμες.

Ευαισθητοποίηση για την προστασία της ιδιωτικότητας

Η ανάρτηση προσωπικών φωτογραφιών, η συμμετοχή σε δημόσιες ομάδες ή ακόμη και η απλή συμπλήρωση προφίλ, μπορεί να εμπεριέχει ρίσκα όταν δεν υπάρχει ενημέρωση και συνειδητή χρήση. Η καλλιέργεια ενός «ψηφιακού ήθους» είναι απαραίτητη, ώστε οι μαθητές να σέβονται όχι μόνο τα δικά τους δεδομένα, αλλά και των άλλων. Ως εκπαιδευτική παρέμβαση, θα μπορούσε να χρησιμοποιηθεί εργαστήριο Ψηφιακού Αποτυπώματος, όπου οι μαθητές θα κληθούν να εντοπίσουν τις δημόσιες πληροφορίες που είναι προσβάσιμες μέσω απλής αναζήτησης Google, και να συζητήσουν τρόπους περιορισμού της έκθεσής τους. Η Boyd (2014) επισημαίνει ότι οι έφηβοι δεν αδιαφορούν για την ιδιωτικότητά τους, αλλά έχουν συχνά εσφαλμένη αντίληψη για το ποιος έχει πρόσβαση στο περιεχόμενό τους.

Κατανόηση του ψηφιακού αποτυπώματος

Ό,τι δημοσιεύεται στο διαδίκτυο μένει, και οι μαθητές οφείλουν αυτό το γεγονός να το γνωρίζουν. Η κάθε ανάρτηση, το κάθε σχόλιο, ακόμη και τα likes, διαμορφώνουν μια δημόσια εικόνα που ενδέχεται να τους ακολουθήσει στην ακαδημαϊκή ή επαγγελματική τους πορεία. Η καλλιέργεια της ψηφιακής συνείδησης είναι εξίσου σημαντική με τη γνώση των ίδιων των εργαλείων. Για παράδειγμα, εκπαιδευτικός Οικονομίας ζητά από τους μαθητές να δημιουργήσουν ένα υποθετικό «προφίλ υποψηφίου για εργασία», βασισμένο σε δημοσιεύσεις κοινωνικών μέσων. Σκοπός είναι να κατανοήσουν πώς το ψηφιακό αποτύπωμα μπορεί να επηρεάσει τη δημόσια εικόνα ενός ανθρώπου.

Επομένως, η ψηφιακή παιδεία δεν αποτελεί μια πολυτελή δεξιότητα για «προχωρημένους» χρήστες, αλλά βασικό θεμέλιο μιας δημοκρατικής, ασφαλούς και συνειδητής συμμετοχής στον ψηφιακό κόσμο, λαμβάνοντας υπόψη το ηθικό ζήτημα του ψηφιακού σεβασμού, της ενσυναίσθησης και της ισότητας πρόσβασης σε τεχνολογία. Το σχολείο έχει την ηθική υποχρέωση να δώσει στους μαθητές τα εργαλεία να σταθούν απέναντι στην πληροφορία με κριτικό πνεύμα, να προστατεύουν τον εαυτό τους και τους άλλους, και να αναπτύξουν μια υπεύθυνη, ανθρώπινη και ώριμη σχέση με την τεχνολογία.

Ο ΡΟΛΟΣ ΤΟΥ ΕΚΠΑΙΔΕΥΤΙΚΟΥ

Σε ένα περιβάλλον όπου η τεχνολογία εξελίσσεται ταχύτερα από τις εκπαιδευτικές πολιτικές, ο ρόλος του εκπαιδευτικού καθίσταται κρίσιμος. Ο σύγχρονος δάσκαλος δεν είναι απλώς μεταδότης γνώσεων, αλλά ενεργός καθοδηγητής, μέντορας και πρότυπο υπεύθυνης ψηφιακής συμπεριφοράς. Η παρουσία του στον χώρο των κοινωνικών δικτύων πρέπει να είναι στρατηγική, με στόχο τη διαμόρφωση ενός κριτικού και ασφαλούς μαθησιακού πλαισίου (Ribble, 2011).

Ο εκπαιδευτικός ως μέντορας

Ο εκπαιδευτικός καλείται να ερμηνεύσει το ψηφιακό περιβάλλον για τους μαθητές, να τους δείξει πώς να διαχειρίζονται τις πλατφόρμες με υπευθυνότητα και πώς να αποφεύγουν διαδικτυακές παγίδες. Δεν αρκεί η παροχή πληροφοριών· χρειάζεται διάλογος, παρατήρηση και διακριτική καθοδήγηση. Καθηγητής Πληροφορικής σε Γυμνάσιο υλοποίησε πρόγραμμα mentoring, όπου οι μαθητές δούλεψαν πάνω σε πραγματικά «ψηφιακά διλήμματα» (π.χ. bullying σε stories, δημόσια έκθεση προσωπικών στιγμών), προσεγγίζοντας τα με συλλογική συζήτηση.

Το κοινωνικό δίκτυο ως εργαλείο, όχι αυτοσκοπός

Η εκπαιδευτική αξιοποίηση των κοινωνικών μέσων πρέπει να υπηρετεί μαθησιακούς στόχους. Η χρήση μιας πλατφόρμας δεν εγγυάται από μόνη της ποιότητα ή ενδιαφέρον. Ο εκπαιδευτικός είναι εκείνος που σχεδιάζει το πλαίσιο, θέτει σκοπούς και καθοδηγεί τη χρήση. Ενδεικτικά αναφέρουμε καθηγητή φιλόλογο που ενσωμάτωσε το Instagram σε μάθημα Νεοελληνικής Λογοτεχνίας, ζητώντας από τους μαθητές να δημιουργήσουν προφίλ ηρώων από το έργο του Παπαδιαμάντη, με stories και σχόλια που να αντανακλούν τις προσωπικότητές τους.

Θέσπιση κανόνων και ορίων

Η εκπαιδευτική διαδικασία σε ψηφιακό περιβάλλον οφείλει να λειτουργεί εντός ορίων. Οι κανόνες δεν επιβάλλονται αυθαίρετα, αλλά συνδιαμορφώνονται, εξηγούνται και εφαρμόζονται με συνέπεια. Αυτό ενισχύει την υπευθυνότητα και τη συνεργασία. Μια καλή πρακτική αποτελεί σχολική μονάδα στη Θεσσαλονίκη, η οποία καθιέρωσε «Συμβόλαιο Ψηφιακής Συμπεριφοράς» για όλα τα μέλη της τάξης, το οποίο υπογράφεται από μαθητές, γονείς και εκπαιδευτικούς στην αρχή κάθε σχολικού έτους.

Συνεργασία με γονείς και θεσμούς

Η αγωγή στη χρήση των κοινωνικών μέσων δεν μπορεί να γίνεται απομονωμένα μέσα στην τάξη. Απαιτεί ευρύτερη συνέργεια με γονείς, ψυχολόγους, κοινωνικούς λειτουργούς και θεσμικούς φορείς. Ο εκπαιδευτικός μπορεί να διαδραματίσει καταλυτικό ρόλο ως συνδετικός κρίκος. Σε σχολείο της Λάρισας, για παράδειγμα, διοργανώθηκε διαδικτυακό σεμινάριο με τη συμμετοχή γονέων και ειδικών από τη Δίωξη Ηλεκτρονικού Εγκλήματος για ζητήματα ασφάλειας στα social media.

ΝΟΜΙΚΕΣ ΚΑΙ ΗΘΙΚΕΣ ΠΡΟΕΚΤΑΣΕΙΣ

Η ένταξη των κοινωνικών δικτύων στην εκπαιδευτική πράξη δεν είναι μόνο παιδαγωγικό ή τεχνολογικό ζήτημα· είναι και νομικό. Η προστασία των μαθητών και η ορθή διαχείριση των δεδομένων τους επιβάλλουν τη συμμόρφωση με συγκεκριμένα θεσμικά πλαίσια, τόσο σε εθνικό όσο και σε ευρωπαϊκό επίπεδο.

Γενικός Κανονισμός Προστασίας Δεδομένων (GDPR)

Ο Κανονισμός 2016/679 της ΕΕ (γνωστός ως GDPR) θέτει αυστηρές προδιαγραφές για τη συλλογή, αποθήκευση και επεξεργασία προσωπικών δεδομένων, ιδιαίτερα όταν πρόκειται για ανηλίκους. Η συγκατάθεση πρέπει να είναι σαφής, ενημερωμένη και, όπου απαιτείται, να παρέχεται από τον γονέα ή κηδεμόνα. Η Ελληνική Αρχή Προστασίας Δεδομένων (HDPA,n.d.) έχει εκδώσει ειδικές οδηγίες για τα σχολεία, επισημαίνοντας ότι ακόμη και η απλή ανάρτηση φωτογραφιών από σχολικές εκδηλώσεις μπορεί να δημιουργεί νομικές ευθύνες.

Νομοθεσία για την προστασία ανηλίκων

Ο Ποινικός Κώδικας (άρθρο 348Α) και η σχετική νομολογία προστατεύουν τους ανηλίκους από εκμετάλλευση, προσβολή της γενετήσιας αξιοπρέπειας και έκθεση σε επιβλαβές περιεχόμενο. Οι εκπαιδευτικοί φέρουν ευθύνη εποπτείας όταν τα σχολικά μέσα ή οι σχολικές δραστηριότητες σχετίζονται με τα social media. Σε σχολείο της Αθήνας για παράδειγμα, αναρτήθηκε βίντεο μαθητή σε TikTok με περιεχόμενο που εμπεριείχε προσβλητικά σχόλια από άλλους. Το σχολείο υποχρεώθηκε να κινηθεί νομικά, ενώ έγινε ενημέρωση από την Εισαγγελία Ανηλίκων.

Οδηγίες Υπουργείου Παιδείας

Το Υπουργείο Παιδείας έχει εκδώσει κατευθυντήριες γραμμές για τη χρήση τεχνολογιών πληροφορίας και επικοινωνιών στην εκπαίδευση (Hellenic Ministry of Education and Religious Affairs, n.d.). Αν και δεν απαγορεύει τη

χρήση κοινωνικών δικτύων, συνιστά προσεκτική χρήση, εντός καθορισμένων πλαισίων, και με σεβασμό στην ιδιωτικότητα των μαθητών.

Ηθικά ζητήματα και αξιακές αρχές

Ωστόσο, πέρα από τις νομικές δεσμεύσεις, υπάρχει το ηθικό καθήκον της καλλιέργειας αξιών: σεβασμός, ενσυναίσθηση, αλληλεγγύη. Οι μαθητές πρέπει να μάθουν όχι απλώς «τι επιτρέπεται», αλλά «τι είναι ορθό». Αυτό προϋποθέτει την ανάδειξη του κοινωνικού ρόλου της τεχνολογίας και τη συνειδητή στάση απέναντι στην ισότητα πρόσβασης. Ο Freire (1970) υποστήριζε ότι η εκπαίδευση δεν είναι ουδέτερη· είτε απελευθερώνει είτε καταπιέζει. Η στάση μας απέναντι στα social media μπορεί να ενισχύσει ή να περιορίσει τη δυνατότητα των μαθητών να εκφραστούν ισότιμα και υπεύθυνα.

ΚΑΛΕΣ ΠΡΑΚΤΙΚΕΣ ΧΡΗΣΗΣ ΚΟΙΝΩΝΙΚΩΝ ΔΙΚΤΥΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ

Η ορθή χρήση των κοινωνικών δικτύων στην εκπαίδευση απαιτεί σχεδιασμό, επίγνωση και θεσμοθετημένες πρακτικές. Δεν πρόκειται απλώς για την υιοθέτηση «νέων μέσων», αλλά για μια παιδαγωγική επιλογή που ενισχύει τη μάθηση μόνο όταν εντάσσεται σε κατάλληλο πλαίσιο, με καθαρούς κανόνες και σαφείς στόχους.

Εκπαιδευτικοί λογαριασμοί αποκλειστικά για σχολική χρήση

Η δημιουργία ειδικών λογαριασμών που προορίζονται αποκλειστικά για εκπαιδευτικές αλληλεπιδράσεις συμβάλλει στη διατήρηση ορίων μεταξύ προσωπικού και σχολικού περιεχομένου. Οι εκπαιδευτικοί που χρησιμοποιούν τέτοιους λογαριασμούς αποφεύγουν τις παγίδες της υπερέκθεσης ή των «παρεξηγήσιμων» διαδικτυακών σχέσεων. Δάσκαλος της ΣΤ’ τάξης Δημοτικού διαχειρίζεται κλειστή ομάδα στο Facebook με όνομα «Η Τάξη μας 2024», όπου αναρτώνται ασκήσεις, εργασίες, και ανακοινώσεις — χωρίς καμία προσωπική αλληλεπίδραση ή περιεχόμενο.

Ενσωμάτωση εργαλείων ασφαλείας και ιδιωτικότητας

Η χρήση φίλτρων, ρυθμίσεων απορρήτου και εποπτευόμενων συζητήσεων είναι απαραίτητη προϋπόθεση για την προστασία των μαθητών. Πλατφόρμες όπως το YouTube ή το Padlet προσφέρουν δυνατότητες περιορισμένης πρόσβασης και εποπτείας περιεχομένου. Μια καλή πρακτική αποτελεί Δημοτικό σχολείο στην Κρήτη που χρησιμοποιεί το YouTube με λειτουργία «unlisted» (μη καταχωρημένα βίντεο), ώστε οι παρουσιάσεις μαθητών να είναι διαθέσιμες μόνο μέσω συνδέσμου που διαχειρίζεται ο εκπαιδευτικός.

Συνδυασμός κοινωνικών δικτύων με πλατφόρμες LMS

Η συμπληρωματική χρήση κοινωνικών μέσων και πλατφορμών διαχείρισης μάθησης (Learning Management Systems – LMS), όπως το Moodle ή το e-class, προσφέρει ευελιξία, τεκμηρίωση, και αναλυτική παρακολούθηση της προόδου των μαθητών. Μελέτες (Tang & Hew, 2017) δείχνουν ότι ο συνδυασμός κοινωνικών δικτύων με LMS αυξάνει τη συμμετοχή των μαθητών και τη διατήρηση της γνώσης, καθώς τα πρώτα ενισχύουν την προσβασιμότητα και τα δεύτερα διασφαλίζουν την παιδαγωγική δομή.

Συμμετοχή μαθητών στη δημιουργία περιεχομένου

Η ενεργή εμπλοκή των μαθητών στη δημιουργία εκπαιδευτικού περιεχομένου (π.χ. βίντεο, ψηφιακά κόμικ, podcasts) τους μετατρέπει από παθητικούς καταναλωτές σε συνειδητούς παραγωγούς γνώσης. Αυτή η διαδικασία ενισχύει την αυτοπεποίθηση, τη συνεργατικότητα και την αίσθηση σκοπού. Σχολική μονάδα στη Χίο οργάνωσε project όπου οι μαθητές δημιούργησαν λογαριασμό στο TikTok για να ανεβάζουν σύντομα εκπαιδευτικά βίντεο γραμματικής και λεξιλογίου. Οι εκπαιδευτικοί συντόνιζαν το περιεχόμενο, εξασφαλίζοντας την ορθότητα και ασφάλεια.

ΠΡΟΣΒΑΣΗ ΚΑΙ ΣΥΜΠΕΡΙΛΗΨΗ

Ένα από τα μεγαλύτερα πλεονεκτήματα των κοινωνικών δικτύων είναι η δυνατότητα να γεφυρώνουν ανισότητες — τόσο γεωγραφικές όσο και κοινωνικές. Όταν αξιοποιούνται με προσοχή, μπορούν να γίνουν εργαλείο συμπερίληψης, ισότητας και διαπολιτισμικής κατανόησης.

Μαθητές από απομακρυσμένες περιοχές

Σε περιοχές με γεωγραφική απομόνωση ή περιορισμένη πρόσβαση σε εξειδικευμένο προσωπικό, τα κοινωνικά δίκτυα λειτουργούν ως δίαυλοι επικοινωνίας με τον υπόλοιπο κόσμο. Μέσα από ψηφιακές τάξεις και κοινωνικές πλατφόρμες, οι μαθητές μπορούν να συμμετέχουν σε προγράμματα που αλλιώς δεν θα ήταν διαθέσιμα. Σχολείο σε νησί των Δωδεκανήσων συμμετείχε σε πρόγραμμα eTwinning όπου οι μαθητές συνεργάστηκαν με τάξεις από τη Σουηδία και την Ιταλία μέσω Facebook Groups και Zoom, δημιουργώντας από κοινού παρουσιάσεις για την πολιτιστική κληρονομιά της κάθε χώρας.

Μαθητές με ειδικές ανάγκες

Η προσαρμογή του εκπαιδευτικού περιβάλλοντος στις ανάγκες των ΑμεΑ αποτελεί θεμελιώδη όρο ισότητας. Τα κοινωνικά δίκτυα, σε συνδυασμό με εργαλεία προσβασιμότητας (όπως υπότιτλοι, φωνητική ανάγνωση, gesture control), επιτρέπουν την ενεργή συμμετοχή μαθητών με δυσκολίες επικοινωνίας ή κινητικότητας. Μαθητής με δυσλεξία συμμετείχε στην ψηφιακή σχολική εφημερίδα χρησιμοποιώντας βίντεο-log με φωνητικά σχόλια, τα οποία ανέβαζε με τη βοήθεια συμμαθητών στο YouTube. Το μέσο δεν τον περιόρισε, αντιθέτως τον απελευθέρωσε.

Διαπολιτισμική επικοινωνία και αλληλεπίδραση

Τα κοινωνικά δίκτυα επιτρέπουν στους μαθητές να έρχονται σε επαφή με πολιτισμούς, γλώσσες και απόψεις διαφορετικές από τις δικές τους. Αυτή η επικοινωνία ενισχύει την ανεκτικότητα, την ενσυναίσθηση και την κοινωνική συνείδηση, λειτουργώντας ως πρακτική εφαρμογή της εκπαίδευσης για την παγκόσμια πολιτειότητα (global citizenship education). Η χρήση πλατφορμών όπως το Facebook και το TwinSpace στο πλαίσιο διακρατικών σχολικών συμπράξεων έχει θετική επίδραση στην καλλιέργεια της διαπολιτισμικής συνείδησης (UNESCO, 2021).

ΠΡΟΤΑΣΕΙΣ / ΠΟΛΙΤΙΚΗ / ΟΔΙΚΟΣ ΧΑΡΤΗΣ

Η αποτελεσματική και ασφαλής ένταξη των κοινωνικών δικτύων στην εκπαιδευτική διαδικασία δεν μπορεί να βασίζεται αποκλειστικά στην ατομική πρωτοβουλία των εκπαιδευτικών ή στην ευκαιριακή αξιοποίησή τους από μαθητές. Απαιτείται θεσμική υποστήριξη, παιδαγωγικός σχεδιασμός και διαρκής επιμόρφωση. Ένας οδικός χάρτης, με συγκεκριμένες προτάσεις πολιτικής και στρατηγική, αποτελεί αναγκαίο εργαλείο για τη διαμόρφωση ενός σύγχρονου και συμπεριληπτικού ψηφιακού σχολείου.

Επιμόρφωση εκπαιδευτικών

Η ενίσχυση της ψηφιακής επάρκειας των εκπαιδευτικών αποτελεί βασική προϋπόθεση για την αποτελεσματική ενσωμάτωση των κοινωνικών δικτύων. Η επιμόρφωση δεν πρέπει να περιορίζεται σε τεχνικές γνώσεις, αλλά να επεκτείνεται σε ζητήματα παιδαγωγικής χρήσης, προστασίας προσωπικών δεδομένων, δεοντολογίας και σχεδιασμού ψηφιακού εκπαιδευτικού περιεχομένου. Ως πρόταση καταθέτουμε τη δημιουργία ετήσιων σεμιναρίων και μικτών μαθημάτων (διά ζώσης και διαδικτυακών) με πιστοποίηση στην «Ψηφιακή Παιδαγωγική και Κοινωνικά Δίκτυα». Οπότε το θεσμικό πλαίσιο σε επίπεδο σχολικής μονάδας θα δώσει τη δυνατότητα σε κάθε σχολείο να υιοθετεί εσωτερικούς κανόνες (π.χ. ψηφιακός κανονισμός σχολικής ζωής), που να ρυθμίζουν τη χρήση των κοινωνικών δικτύων σε σχολικό πλαίσιο. Αυτοί οι κανόνες θα πρέπει να συν- διαμορφώνονται με μαθητές, γονείς και εκπαιδευτικούς και να είναι σαφείς, δημοσιευμένοι και αξιολογήσιμοι. Θα μπορούσε για παράδειγμα να καθιερωθεί μια «Χάρτας Ψηφιακής Συμπεριφοράς» για κάθε τάξη ή σχολείο, υπογεγραμμένη από όλα τα μέλη της κοινότητας.

Εισαγωγή της Ψηφιακής Παιδείας ως διακριτό μάθημα

Παρότι στοιχεία ψηφιακής εκπαίδευσης υπάρχουν ήδη σε μαθήματα όπως η Πληροφορική, δεν επαρκούν. Χρειάζεται διακριτό μάθημα – με διαθεματική προσέγγιση – που να εστιάζει σε ψηφιακές δεξιότητες, στην ανάλυση περιεχομένου, στις νομικές πτυχές της διαδικτυακής παρουσίας και στην ανάπτυξη της ψηφιακής ηθικής. Ως πρόταση καταθέτουμε την εισαγωγή του μαθήματος «Ψηφιακός Πολίτης» από την Ε΄τάξη του Δημοτικού σχολείου, με εφαρμοσμένα σενάρια βασισμένα σε πραγματικά δεδομένα. Όμως η ενημέρωση και ενεργοποίηση των γονέων μετατρέπει τους γονείς σε συμμέτοχους, όχι απλώς παρατηρητές, στην εκπαιδευτική χρήση των κοινωνικών μέσων. Η ενδυνάμωσή τους μέσω ενημερωτικών δράσεων και σεμιναρίων μπορεί να συμβάλει καθοριστικά στην πρόληψη διαδικτυακών κινδύνων και στην ενίσχυση της οικιακής καθοδήγησης. Ως πρόταση καταθέτουμε την καθιέρωση μηνιαίων ενημερωτικών συναντήσεων σε κάθε σχολική μονάδα, με συμμετοχή ειδικών από τον χώρο της ψηφιακής

ασφάλειας και της ψυχικής υγείας. Ωστόσο προκειμένου να είναι δίκαιη η ψηφιακή εκπαίδευση, πρέπει να είναι προσβάσιμη σε όλους. Η χρήση κοινωνικών δικτύων οφείλει να συνδυάζεται με παρεμβάσεις που εξασφαλίζουν τεχνολογικό εξοπλισμό, διαδίκτυο και ψηφιακή υποστήριξη σε μαθητές από ευάλωτες ομάδες. Ως πρόταση καταθέτουμε τη δημιουργία εθνικού δικτύου «Ψηφιακών Μεντόρων», με σκοπό την υποστήριξη σχολικών μονάδων και τη διάχυση καλών πρακτικών. Ωστόσο, ο ρόλος των κοινωνικών δικτύων στην εκπαίδευση είναι διττός: είναι εργαλείο και ταυτόχρονα πρόκληση. Η αποτελεσματική ενσωμάτωσή τους απαιτεί διαρκή επαγρύπνηση, παιδαγωγική οξυδέρκεια και συλλογική δέσμευση. Μέσα από συντονισμένες πολιτικές, επιμορφωτικές δράσεις και θεσμικά κατοχυρωμένη κουλτούρα ασφάλειας, μπορούμε να αξιοποιήσουμε στο έπακρο τις δυνατότητες που προσφέρουν – προς όφελος ενός σχολείου πιο ανοιχτού, πιο δίκαιου και πιο προσαρμοσμένου στις ανάγκες της εποχής μας.

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ΘΠ19: Διαδικτυακές Κοινότητες Μάθησης

ΘΠ20: Ηλεκτρονική Μάθηση Δεύτερης Γενιάς (Learning 2.0)

ΘΠ21: Κινητή Μάθηση (Mobile learning, BYOD)

ΘΠ22: Ανοικτοί εκπαιδευτικοί πόροι

ΘΠ23: Ελεύθερος και ανοικτός κώδικας λογισμικού για την εκπαίδευση

ΑΝΑΛΥΣΗ ΚΕΙΜΕΝΩΝ ΜΕ ΕΡΓΑΛΕΙΑ ΑΝΟΙΚΤΟΥ ΛΟΓΙΣΜΙΚΟΥ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΣΥΜΒΟΥΛΕΥΤΙΚΗ: ΜΕΛΕΤΗ ΣΥΝΕΔΡΙΩΝ ΜΑΘΗΤΩΝ-ΣΥΜΒΟΥΛΩΝ

Κουτσουπιάς Νικόλαος
Καθηγητής, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
nk@uom.edu.gr

Νόσιος Μάριος
Υπ. Διδάκτωρ, Πανεπιστήμιο Μακεδονίας
Θεσσαλονίκη, Ελλάδα
mnosios@uom.edu.gr

Χαλιώτου Αικατερίνη
ΠΕ Διοικητικού-Οικονομικού
D.E.A. Ανθρωπιστικών και Κοινωνικών Επιστημών
Universite Paris 8
haliotou@gmail.com

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει την εφαρμογή του RQDA, ενός λογισμικού ανοιχτού κώδικα για ποιοτική ανάλυση κειμένων, στη συστηματική ανάλυση συνεδριών εκπαιδευτικής συμβουλευτικής. Οκτώ ηχογραφημένες συνεδρίες, διάρκειας περίπου μίας ώρας η καθεμία, απομαγνητοφωνήθηκαν, εισήχθησαν στο RQDA και οργανώθηκαν μέσω του περιβάλλοντος εργασίας που παρέχει. Η επαγωγική θεματική κωδικοποίηση παρήγαγε πέντε τύπους οπτικοποιήσεων: ραβδογράμματα συχνότητας κωδικών, θεματικούς χάρτες, δίκτυα συνύπαρξης κωδικών, λεκτικά δενδροδιαγράμματα και συννεφόλεξα. Από την ποιοτική θεματική ανάλυση προέκυψε ότι τα τμήματα που αφορούσαν την εφαρμογή σχεδίου δράσης, την παροχή πληροφοριών και την έγκαιρη ανταπόκριση αντιστοιχούσαν σε πάνω από το 85% του συνόλου των κωδικοποιήσεων, αναδεικνύοντας την κυρίαρχη έμφαση στην πρακτική καθοδήγηση και την υποστήριξη σε πραγματικό χρόνο. Κωδικοί με μικρότερη συχνότητα, όπως οι δεξιότητες ακρόασης, η οικοδόμηση σχέσεων και η συναισθηματική καθησύχαση, ανέδειξαν δευτερεύουσες συναισθηματικές διαστάσεις. Τα δίκτυα συνύπαρξης επιβεβαίωσαν ισχυρές σχέσεις μεταξύ του σχεδιασμού δράσης και της ανταλλαγής πληροφοριών, ενώ οι οπτικοποιήσεις λέξεων αποκάλυψαν επαναλαμβανόμενα γλωσσικά μοτίβα συνεργατικής λήψης αποφάσεων. Τα αποτελέσματα αναδεικνύουν τη συμβολή του RQDA στην ενίσχυση της διαφάνειας και της επαναληψιμότητας της ποιοτικής ανάλυσης, καθώς και στη λειτουργική του ένταξη σε ποσοτικές διαδικασίες στο πλαίσιο σύνθετων ερευνητικών σχεδιασμών. Εφεξής, η αξιοποίηση συνδυαστικών μεθοδολογιών που ενσωματώνουν ποιοτικά δεδομένα σε ποσοτικά μοντέλα δύναται να προσφέρει βαθύτερη κατανόηση των συμβουλευτικών διεργασιών και να ενισχύσει τη συνολική μεθοδολογική εγκυρότητα.

Λέξεις-κλειδιά: RQDA, Ποιοτική Ανάλυση, Εργαλεία Λογισμικού Ανοιχτού Κώδικα, Εκπαιδευτική Συμβουλευτική

ΕΙΣΑΓΩΓΗ

Η εκπαιδευτική συμβουλευτική είναι ένας κρίσιμος τομέας του ευρύτερου επιστημονικού πεδίου της εκπαίδευσης, ο οποίος επικεντρώνεται στην υποστήριξη των μαθητών στη λήψη ακαδημαϊκών αποφάσεων, στην προσωπική ανάπτυξη και στην κοινωνική ένταξη (Hussaini & Jamshaid, 2025). Οι ποιοτικές ερευνητικές μέθοδοι χρησιμοποιούνται συχνά στην εκπαιδευτική συμβουλευτική για τη διερεύνηση πολύπλοκων διαδικασιών, όπως οι αλληλεπιδράσεις μεταξύ συμβούλων και μαθητών, οι αντιλήψεις για τις υπηρεσίες συμβουλευτικής και οι εξελισσόμενες ανάγκες των μαθητών (Raju et al., 2025). Η ανάλυση κειμενικών δεδομένων, όπως πρακτικά συνεντεύξεων, ερωτηματολόγια ανοικτού τύπου και ημερολόγια αναστοχασμού, αποτελεί απαραίτητο εργαλείο για την ανάπτυξη τεκμηριωμένων προσεγγίσεων και την εις βάθος κατανόηση των αποχρώσεων των συμβουλευτικών πρακτικών (Brailas et al., 2023; Bazeley & Jackson, 2013).

Κατά τα τελευταία χρόνια, η ερευνητική δραστηριότητα στον τομέα της εκπαιδευτικής συμβουλευτικής αξιοποιεί ολοένα και συχνότερα λογισμικά CAQDAS για την οργάνωση και ερμηνεία εκτεταμένων ποιοτικών δεδομένων (Kumar Kar & Panigrahi, 2023). Τα εργαλεία CAQDAS επιτρέπουν στους ερευνητές να διαχειρίζονται συστηματικά τα σχήματα κωδικοποίησης, να βελτιώνουν την ανάκτηση σχετικών αποσπασμάτων δεδομένων και να υποστηρίζουν την επαναληπτική διερεύνηση του ποιοτικού υλικού, αυξάνοντας έτσι τόσο το εύρος όσο και τη διαφάνεια των αναλυτικών διαδικασιών (García-Horta & Guerra-Ramos, 2009). Επιπλέον, σύμφωνα με τους Paulus και Lester (2015), τα λογισμικά CAQDAS ενισχύουν τη διαφάνεια της ποιοτικής ανάλυσης μέσω της δυνατότητας δημιουργίας πλήρους *audit trail*, δηλαδή αναλυτικής καταγραφής των ερευνητικών διαδικασιών και αποφάσεων, στοιχείο κρίσιμο για τη διασφάλιση της αξιοπιστίας και της εγκυρότητας της μελέτης. Εντούτοις, μολονότι τα τεχνολογικά εργαλεία ανάλυσης δεδομένων προσφέρουν σημαντική βοήθεια, είναι σαφές ότι η ερμηνευτική εργασία και η κριτική σκέψη του ερευνητή παραμένουν αναντικατάστατες. Μολονότι τα CAQDAS διευκολύνουν σημαντικά την ανάλυση, σημειώνονται δύο βασικοί περιορισμοί: η αρχική καμπύλη μάθησης για τους νέους χρήστες και η ενδεχόμενη απόσταση από τα πρωτογενή δεδομένα όταν η διεργασία πραγματοποιείται κυρίως μέσω λογισμικού (Paulus & Lester, 2015).

Η αυξανόμενη διαθεσιμότητα λογισμικού ανοικτού κώδικα έχει εμπλουτίσει τη μεθοδολογική εργαλειοθήκη των ερευνητών στον συγκεκριμένο τομέα. Μεταξύ των εν λόγω εργαλείων, το RQDA (R Qualitative Data Analysis) παρέχει μια έγκριτη λύση για την ποιοτική ανάλυση κειμένου. Το RQDA αναπτύχθηκε ως πακέτο στο στατιστικό περιβάλλον της R και επιτρέπει στους χρήστες να εισάγουν, να κωδικοποιούν και να οργανώνουν μεγάλους όγκους δεδομένων κειμένου, υποστηρίζοντας την αυστηρή θεματική ανάλυση (Koutsoupias, 2022). Τα χαρακτηριστικά του περιλαμβάνουν την κωδικοποίηση σε επίπεδο χαρακτήρα, τη σύνταξη υπομνημάτων και την κατηγοριοποίηση των κωδικών, καθώς και την απρόσκοπτη ενσωμάτωση με ροές εργασίας ποσοτικής ανάλυσης μέσω της R (Huang, 2016). Αυτή η ενσωμάτωση επιτρέπει την έρευνα μεικτών μεθόδων, προσφέροντας ευελιξία για τη διερεύνηση ποιοτικών ευρημάτων παράλληλα με στατιστικά δεδομένα (Chandra & Shang, 2019).

Η υιοθέτηση του RQDA έχει καταγραφεί σε ευρύ φάσμα εκπαιδευτικών και συμβουλευτικών ερευνητικών πλαισίων. Επι παραδείγματι, οι Nason et al. (2022) αναδεικνύουν το RQDA ως μία προσιτή και λειτουργικά επαρκή λύση ανοικτού κώδικα για την ανάλυση ποιοτικών δεδομένων, υπογραμμίζοντας τη φιλικότητα προς τον χρήστη, τη δυνατότητα ενσωμάτωσης στατιστικών αναλύσεων μέσω του περιβάλλοντος R, καθώς και την αποτελεσματικότητά του στην υποστήριξη σύνθετων συστημάτων κωδικοποίησης. Στη μελέτη τους περιλαμβάνεται λεπτομερής, βήμα προς βήμα παρουσίαση των βασικών λειτουργιών του λογισμικού, ενώ παράλληλα αναλύονται διεξοδικά τα πλεονεκτήματα και οι δυνητικοί περιορισμοί που συνοδεύουν τη χρήση του συγκεκριμένου εργαλείου (Nason et al., 2022). Στο ίδιο πνεύμα, οι Chandra και Shang (2019) εξετάζουν τη χρήση του RQDA ως μέσου ενίσχυσης της μεθοδολογικής αυστηρότητας και διαφάνειας στην ποιοτική έρευνα, αναδεικνύοντας τη συμβολή του όχι μόνο στη διαδικασία κωδικοποίησης, αλλά και ως παιδαγωγικού εργαλείου για την κατάρτιση μεταπτυχιακών φοιτητών στη μεθοδολογία.

Εν κατακλείδι, η αυξανόμενη αξιοποίηση εργαλείων ποιοτικής ανάλυσης ανοικτού κώδικα, όπως το RQDA, προσφέρει στους ερευνητές της εκπαιδευτικής συμβουλευτικής ένα έγκυρο και συστηματικό πλαίσιο ανάλυσης κειμενικών δεδομένων. Οι εν λόγω πλατφόρμες ενισχύουν τη διαφάνεια της διαδικασίας κωδικοποίησης, διευκολύνουν την ανταλλαγή προτύπων και πρακτικών ανάλυσης, και επιτρέπουν την ενσωμάτωση ποσοτικών προσεγγίσεων όπου αυτό είναι μεθοδολογικά σκόπιμο. Παράλληλα, απελευθερώνοντας την ποιοτική έρευνα από τους οικονομικούς περιορισμούς των εμπορικών λογισμικών, οι λύσεις ανοικτού κώδικα συμβάλλουν στη διαμόρφωση ενός πιο περιεκτικού και αναπαραγώγιμου επιστημονικού περιβάλλοντος.

ΜΕΘΟΔΟΛΟΓΙΑ

Η υλοποίηση της παρούσας ποιοτικής μελέτης στηρίχθηκε στη συστηματική ανάλυση καταγεγραμμένων πρακτικών αλληλεπιδράσεων στο πλαίσιο της εκπαιδευτικής συμβουλευτικής, με το συγκεκριμένο υλικό να αποτελεί το κεντρικό και αποκλειστικό ερευνητικό corpus (Zourna et al., 2021). Τα δεδομένα περιλαμβάνουν ηχογραφημένες συνεντεύξεις και εκτενείς σημειώσεις συνεδριών, παρέχοντας μια ολοκληρωμένη και πολυδιάστατη χαρτογράφηση της αλληλεπίδρασης μαθητών-συμβούλων στο περιβάλλον της σχολικής συμβουλευτικής. Για τη διατήρηση των γλωσσικών λεπτομερειών και την εξασφάλιση της γνησιότητας των λεκτικών αλληλεπιδράσεων, οι πηγές απομαγνητοφωνήθηκαν πιστά αυτολεξεί (Thomos et al., 2023).

Η έρευνα βασίστηκε στις αρχές της θεματικής ανάλυσης, μέσω της συστηματικής εισαγωγής των πρακτικών στο περιβάλλον RQDA (Koutsoupias & Nosios, 2025; Chandra & Shang, 2017). Τα δεδομένα εισήχθησαν στο περιβάλλον του RQDA και υποβλήθηκαν σε διερευνητική ποιοτική ανάλυση, με σκοπό την ανάδειξη επαναλαμβανόμενων θεμάτων και την αναγνώριση προτύπων σχετικών με τα ερευνητικά ερωτήματα (Bitzenis et al., 2025A; Bitzenis & Koutsoupias, 2023B). Η κωδικοποίηση πραγματοποιήθηκε απευθείας στο κειμενικό υλικό, επιτρέποντας την κατηγοριοποίηση ουσιαστικών μονάδων και την επαγωγική ανάδειξη επαναλαμβανόμενων θεμάτων (Chandra & Shang, 2019). Καθ' όλη τη διάρκεια της διαδικασίας τηρήθηκαν αναλυτικές σημειώσεις, στις οποίες καταγράφονταν αναδυόμενες ιδέες, θεωρητικές συλλήψεις και ερμηνευτικές αναπροσαρμογές, ενισχύοντας τη διαφάνεια και τη δυνατότητα ελέγχου της ερευνητικής διαδικασίας (Bitzenis & Koutsoupias, 2023A; Bitzenis et al., 2023).

Η διαδικασία κωδικοποίησης υποστηρίχθηκε από πρακτικές που προάγουν τη μεθοδολογική συνέπεια και ενισχύουν τη διαφάνεια της ποιοτικής ανάλυσης, όπως η επαναλαμβανόμενη ανασκόπηση του υλικού σε διακριτά χρονικά διαστήματα (intra-coder consistency), η συστηματική τήρηση αναλυτικών υπομνημάτων, καθώς και η τεκμηρίωση ενδεχόμενων θεωρητικών μετατοπίσεων μέσω της δημιουργίας ενός audit trail (O'Connor & Joffe, 2020; Syed & Nelson, 2015). Η ενσωμάτωση αυτών των πρακτικών ευθυγραμμίζεται με καθιερωμένες μεθοδολογικές παραδόσεις, οι οποίες αναδεικνύουν τη σημασία της τεκμηριωμένης, αναστοχαστικής και θεωρητικά ενσυνείδητης ερμηνευτικής διαδικασίας. Τέτοιες προσεγγίσεις αποκτούν ιδιαίτερη σημασία σε ερευνητικά συμφραζόμενα που δίνουν έμφαση στην εις βάθος ανάλυση των δεδομένων και επιδιώκουν εννοιολογική συνοχή σε όλα τα στάδια της έρευνας (Cypress, 2017; MacPhail et al., 2015).

Εν τέλει, η ενσωμάτωση της R παρείχε πρόσθετη ικανότητα για προηγμένη διαχείριση και οπτικοποίηση των ευρημάτων (Bitzenis & Koutsoupias, 2024A; Bitzenis & Koutsoupias, 2024B). Παρήχθησαν γραφικές αναπαραστάσεις, όπως διαγράμματα συχνότητας κωδικών και θεματικοί χάρτες, με στόχο την ενίσχυση τόσο της ερμηνευτικής εμβάθυνσης όσο και της επικοινωνιακής σαφήνειας των ευρημάτων (Bitzenis et al., 2025B; Bitzenis et al., 2025C). Τα οπτικά αποτελέσματα παρείχαν συγκροτημένη απεικόνιση της κατανομής και των διασυνδέσεων των κεντρικών θεμάτων στο σύνολο των δεδομένων. Συνολικά, η οπτικοποίηση διευκόλυνε τόσο την παρουσίαση όσο και την ερμηνεία των ευρημάτων, ολοκληρώνοντας το μεθοδολογικό πλαίσιο της μελέτης.

ΑΠΟΤΕΛΕΣΜΑΤΑ

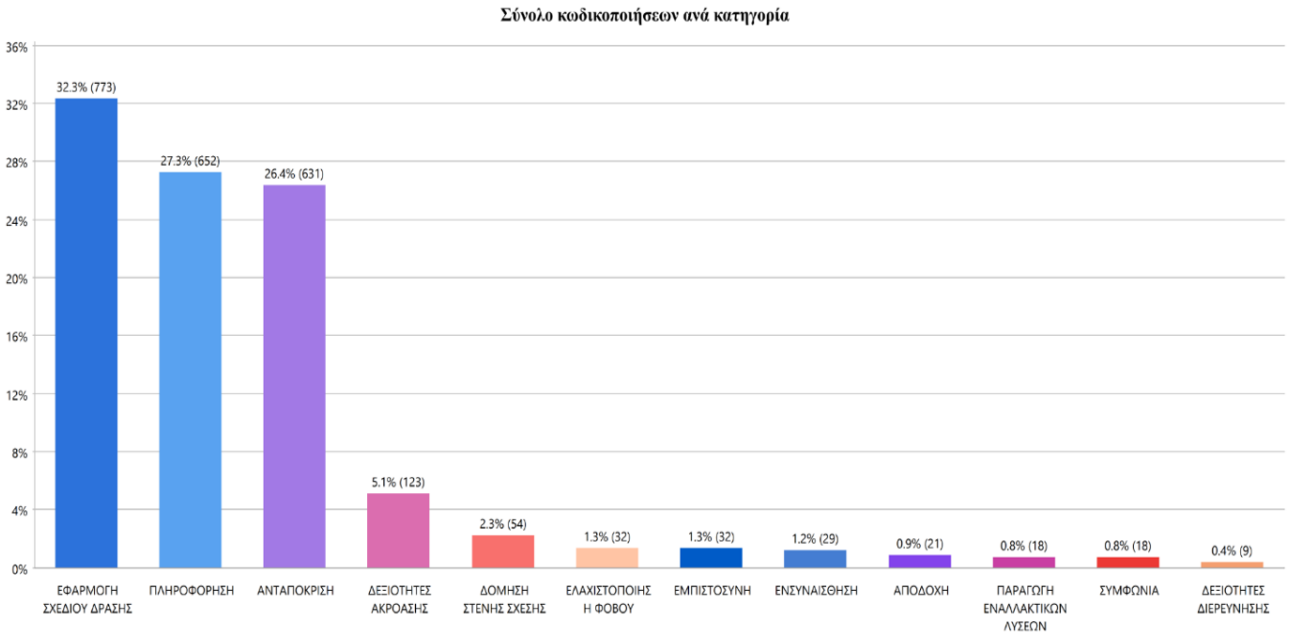
Στην παρούσα ενότητα παρουσιάζονται τα βασικά ευρήματα της ποιοτικής ανάλυσης των συνεδριών εκπαιδευτικής συμβουλευτικής, όπως προέκυψαν από τη συστηματική κωδικοποίηση και οπτικοποίηση των δεδομένων μέσω του λογισμικού RQDA. Η ανάλυση επικεντρώνεται αφενός στην κατανομή των θεματικών κωδικών και αφετέρου στη διερεύνηση των εννοιολογικών σχέσεων και γλωσσικών μοτίβων που αναδύονται εντός των συμβουλευτικών αλληλεπιδράσεων, αναδεικνύοντας τα δομικά στοιχεία που συγκροτούν το περιεχόμενο και τη δυναμική των συνεδριών.

Το ραβδόγραμμα στην Εικόνα 1 παρουσιάζει τη συνολική κατανομή των κωδικοποιημένων αναφορών ανά θεματική κατηγορία, με βάση το πλήρες σύνολο των απομαγνητοφωνημένων πρακτικών των συνεδριών μαθητών-συμβούλων. Κάθε ράβδος αντιστοιχεί σε έναν συγκεκριμένο θεματικό κωδικό, με τις τιμές να παρουσιάζονται τόσο αριθμητικά όσο και ως ποσοστά του συνολικού συνόλου δεδομένων. Στον οριζόντιο άξονα απαριθμούνται οι κατηγορίες, ενώ ο κάθετος άξονας αντικατοπτρίζει την αναλογική συχνότητά τους στο σώμα κειμένων.

Στην κατανομή κυριαρχούν τρεις κωδικοί, *ΕΦΑΡΜΟΓΗ ΣΧΕΔΙΟΥ ΔΡΑΣΗΣ* (32,3%), *ΠΛΗΡΟΦΟΡΗΣΗ* (27,3%) και *ΑΝΤΑΠΟΚΡΙΣΗ* (26,4%), οι οποίοι μαζί αντιπροσωπεύουν πάνω από το 85% του συνόλου του κωδικοποιημένου περιεχομένου. Η εν λόγω συγκέντρωση αναδεικνύει τον πρωταρχικό λειτουργικό προσανατολισμό των συνεδριών, όπου οι σύμβουλοι έθεσαν ως προτεραιότητα τον προγραμματισμό δράσης, την παροχή πληροφοριών και την προσαρμοστική ανταπόκριση στις ανησυχίες των μαθητών. Τα τρία αυτά θέματα αποτελούν το δομικό θεμέλιο των

αλληλεπιδράσεων, υποδηλώνοντας ένα συμβουλευτικό πλαίσιο που επικεντρώνεται στην πρακτική καθοδήγηση, τις συμβουλές για την κατάσταση και την εμπλοκή σε πραγματικό χρόνο με τις ανάγκες των μαθητών.

Εικόνα 1
Σύνολο κωδικοποιήσεων ανά κατηγορία



Αντιθέτως, σημαντικά χαμηλότερες συχνότητες παρατηρούνται σε κωδικούς όπως *ΔΕΞΙΟΤΗΤΕΣ ΑΚΡΟΑΣΗΣ* (5,1%) και *ΔΟΜΗΣΗ ΣΤΕΝΗΣ ΣΧΕΣΗΣ* (2,3%), υποδεικνύοντας ότι μολονότι οι επικοινωνιακές δεξιότητες και η οικοδόμηση σχέσεων ήταν παρούσες, ήταν πολύ λιγότερο κεντρικές στις συζητήσεις. Τα θέματα συναισθηματικής υποστήριξης, *ΕΛΑΧΙΣΤΟΠΟΙΗΣΗ ΦΟΒΟΥ* και *ΕΜΠΙΣΤΟΣΥΝΗ* καταγράφουν μόλις 1,3% το καθένα, υποδεικνύοντας μια περιορισμένη αλλά όχι αμελητέα εστίαση στην καθησυχαστική υποστήριξη και την εμπιστοσύνη. Τα θέματα αυτά εμφανίζονται να διαδραματίζουν υποστηρικτικό ρόλο, να ενσωματώνονται όταν είναι αναγκαία, αλλά να μην καθορίζουν τη συνολική πορεία του διαλόγου.

Οι υπόλοιποι κωδικοί, όπως: *ΕΝΣΥΝΑΙΣΘΗΣΗ, ΑΠΟΔΟΧΗ, ΠΑΡΑΓΩΓΗ ΕΝΑΛΛΑΚΤΙΚΩΝ ΛΥΣΕΩΝ, ΣΥΜΦΩΝΙΑ* και *ΔΕΞΙΟΤΗΤΕΣ ΔΙΕΡΕΥΝΗΣΗΣ*, αντιπροσωπεύουν ο καθένας λιγότερο από το 1,2% των δεδομένων. Η χαμηλή τους συχνότητα υποδηλώνει ότι οι πιο αφηρημένες ή διερευνητικές διαστάσεις, όπως η ενσυναίσθηση, η εναλλακτική σκέψη ή η αμοιβαία συμφωνία, σπάνια τονίζονταν. Τα αποτελέσματα αυτά ενδέχεται να αντικατοπτρίζουν είτε τον περιορισμένο διαθέσιμο χρόνο κατά τη διάρκεια των συνεδριών, είτε τη στρατηγική εστίαση σε πρακτικά εφαρμόσιμο και πληροφοριακό περιεχόμενο έναντι της συναισθηματικής ή γνωστικής ανάπτυξης.

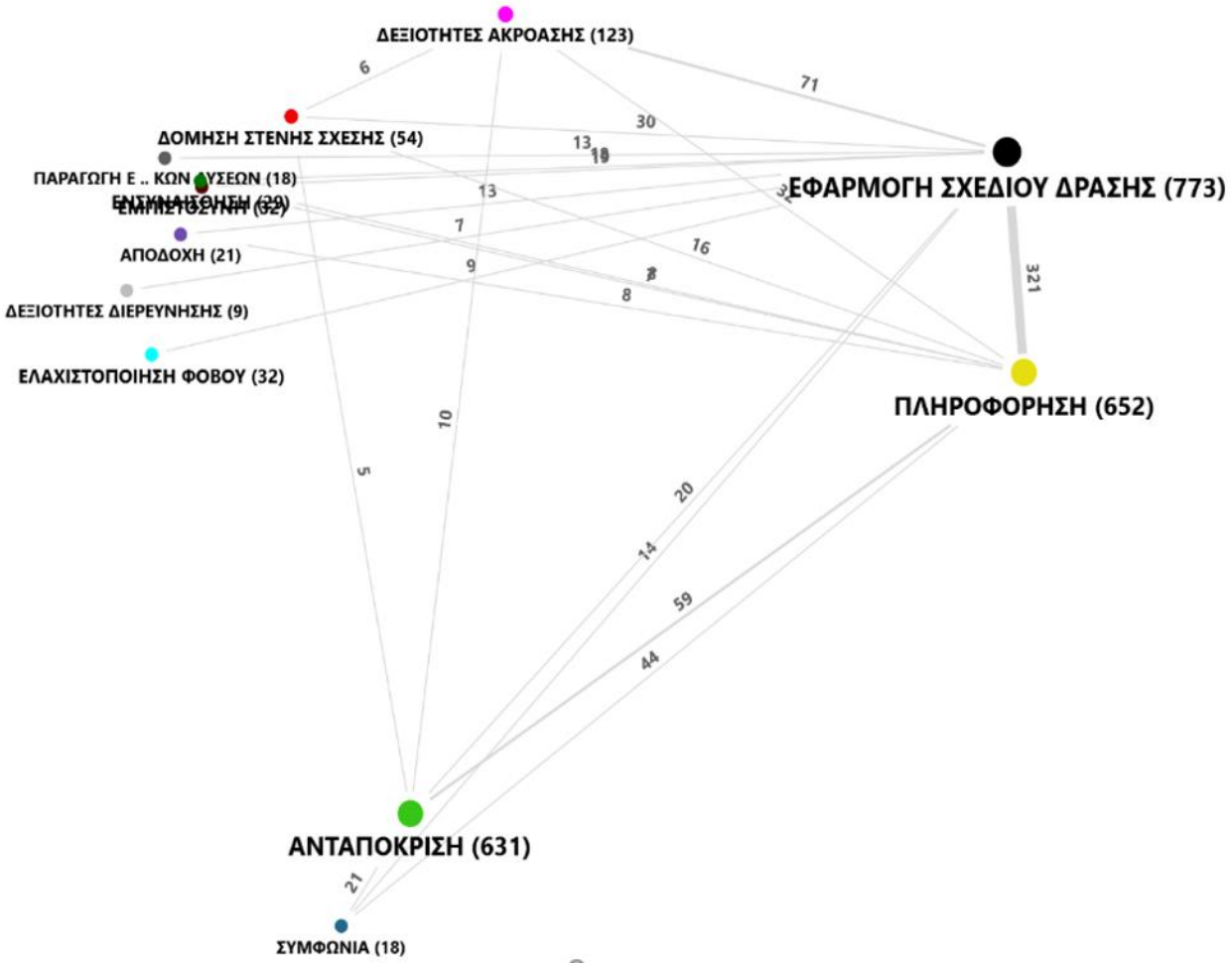
Συνολικά, το ραβδόγραμμα αναδεικνύει την έμφαση σε συμβουλευτικές στρατηγικές που επικεντρώνονται στη λήψη αποφάσεων και στη χρήση εργαλείων δράσης. Τονίζεται ότι η θεματική κατανομή επικεντρώνεται κυρίως σε λειτουργίες εκτέλεσης, υποστήριξης και διευκρίνισης, ενώ οι διαπροσωπικές και συναισθηματικές διαστάσεις φαίνεται να διαδραματίζουν έναν περισσότερο δευτερεύοντα ή συμφραζόμενα προσδιορισμένο ρόλο (βλ. Εικόνα 1).

Η Εικόνα 2 παρέχει ένα χάρτη συνεμφάνισης κωδικών, ο οποίος απεικονίζει τις θεματικές διασυνδέσεις μεταξύ ποιοτικών κωδικών που αντλήθηκαν από τα πρακτικά των συνεδριών μαθητών-συμβούλων. Κάθε κόμβος απεικονίζει μία θεματική κατηγορία, ενώ το μέγεθός του καθορίζεται από τη συνολική της συχνότητα στο σύνολο των δεδομένων. Οι γραμμές που συνδέουν τους κόμβους υποδηλώνουν τη συνύπαρξη μεταξύ των κωδικών, με το πάχος της γραμμής και τους αριθμούς που τη συνοδεύουν να αντικατοπτρίζουν τη σθεναρότητα και τη συχνότητα της συσχέτισής τους.

Η εμφανέστερη σύνδεση προκύπτει μεταξύ του *ΕΦΑΡΜΟΓΗ ΣΧΕΔΙΟΥ ΔΡΑΣΗΣ* (773) και του *ΠΛΗΡΟΦΟΡΗΣΗ* (652), η οποία χαρακτηρίζεται από την πιο έντονη γραμμή και μια τιμή συνύπαρξης 321. Η υψηλή συσχέτιση υπογραμμίζει την ενσωμάτωση της πρακτικής καθοδήγησης με την παροχή σχετικών πληροφοριών, υποδηλώνοντας ότι ο σχεδιασμός δράσης ήταν στενά συνδεδεμένος με την επικοινωνία του περιεχομένου που σχετίζεται με την εκπαίδευση ή τη σταδιοδρομία. Η συχνή διασταύρωση αυτών των δύο θεμάτων υποδηλώνει ένα συμβουλευτικό

μοντέλο στο οποίο οι ενημερωμένες επιλογές υποστηρίζουν σε σημαντικό βαθμό τις αποφάσεις σχεδιασμού. Μια αντίστοιχη αξιοσημείωτη σύνδεση παρατηρείται μεταξύ του *ΕΦΑΡΜΟΓΗ ΣΧΕΔΙΟΥ ΔΡΑΣΗΣ* και του *ΔΕΞΙΟΤΗΤΕΣ ΑΚΡΟΑΣΗΣ* (123), με τιμή συνύπαρξης 71, υποδηλώνοντας ότι η αποτελεσματική ακρόαση εκ μέρους του συμβούλου συνέβαλε σημαντικά στη διαμόρφωση εξατομικευμένων σχεδίων δράσης.

Εικόνα 2
Χάρτης συνεμφάνισης κωδικών



Η *ΑΝΤΑΠΟΚΡΙΣΗ* (631) παρουσιάζει επίσης μέτρια συνδεσιμότητα, ιδίως με την *ΠΛΗΡΟΦΟΡΗΣΗ* (59) και την *ΕΦΑΡΜΟΓΗ ΣΧΕΔΙΟΥ ΔΡΑΣΗΣ* (44). Το εν λόγω μοτίβο αντικατοπτρίζει τη δυναμική φύση των απαντήσεων των συμβούλων, οι οποίες συνδέονται άμεσα τόσο με την παροχή πληροφοριών όσο και με την υποστήριξη εφαρμόσιμων στρατηγικών δράσης. Επιπλέον, ορισμένες συν-εμφανίσεις, μολονότι αριθμητικά λιγότερες, υποδεικνύουν συμπληρωματικούς ρόλους μέσω κωδικών που εμφανίζονται σπανιότερα αλλά παραμένουν εννοιολογικά ουσιώδεις, όπως *ΕΜΠΙΣΤΟΣΥΝΗ* (32), *ΔΟΜΗΣΗ ΣΤΕΝΗΣ ΣΧΕΣΗΣ* (54) και *ΑΠΟΔΟΧΗ* (21). Οι συσχετισμοί αυτοί υποδεικνύουν ότι, παρά τη συγκριτικά χαμηλή συχνότητά τους, οι συναισθηματικές και διαπροσωπικές διαστάσεις διατηρούν λειτουργικές αλληλεξαρτήσεις με τους κυρίαρχους θεματικούς άξονες.

Εν τέλει, κωδικοί όπως *ΔΕΞΙΟΤΗΤΕΣ ΔΙΕΡΕΥΝΗΣΗΣ* (9) και *ΣΥΜΦΩΝΙΑ* (18) εμφανίζονται πιο περιφερειακά, με ελάχιστους δεσμούς συνύπαρξης. Η περιορισμένη εμπλοκή ενδέχεται να αντανακλά μειωμένη έμφαση στη συνεργατική διερεύνηση ή τη διαπραγματευτική συναίνεση, σε αντιδιαστολή προς το περισσότερο κατευθυντικό και υποστηρικτικό ύφος που αναδεικνύεται από τους κυρίαρχους θεματικούς κωδικούς. Συνολικά, η οπτική αναπαράσταση του χάρτη αναδεικνύει τη στενή διασύνδεση μεταξύ ακρόασης, παροχής πληροφοριών και σχεδιασμού δράσης, ενισχύοντας τη δεδομενοκεντρική διαπίστωση ότι οι τρεις αυτές λειτουργίες συγκροτούν τον πυρήνα της συμβουλευτικής διαδικασίας. Τα λιγότερο συχνά συναισθηματικά και σχεσιακά θέματα συμβάλλουν σε μια συμπληρωματική ιδιότητα, προσφέροντας πλαισιακή υποστήριξη στις βασικές στρατηγικές αλληλεπιδράσεις (βλ. Εικόνα 2).

Εικόνα 3
Συννεφόλεξο



Το συννεφόλεξο στην Εικόνα 3 οπτικοποιεί τις πιο συχνές φράσεις που βρέθηκαν σε όλα τα πρακτικά των συνεντεύξεων, εφιστώντας την προσοχή στις κυρίαρχες εκφράσεις και τα γλωσσικά μοτίβα που χρησιμοποιήθηκαν κατά τη διάρκεια των συμβουλευτικών συνεδριών. Οι μεγαλύτερες φράσεις εμφανίζονται συχνότερα, ενώ οι διαφοροποιήσεις στο μέγεθος και το χρώμα της γραμματοσειράς αντικατοπτρίζουν τη σχετική επικράτηση αντί της θεματικής κατηγοριοποίησης.

Στο κέντρο του νέφους, φράσεις όπως *είναι πάρα πολύ*, *είναι πολύ πιο* και *το θέμα είναι ότι* αναδεικνύονται ως ιδιαίτερα εμφανείς, αποκαλύπτοντας μια γλωσσική τάση προς την έμφαση και τον αξιολογικό σχολιασμό. Οι εν λόγω εκφράσεις χρησιμεύουν συχνά ως λεκτικές ενδείξεις για την εκδήλωση ανησυχίας, κρίσης ή διευκρίνισης, γεγονός που υποδηλώνει ότι τόσο οι μαθητές όσο και οι σύμβουλοι τις χρησιμοποιούν όταν επεξηγούν επιλογές, προκλήσεις ή αβεβαιότητες. Ομοίως, φράσεις υψηλής συχνότητας όπως *μαθήματα γενικής παιδείας*, *αρχές οικονομικής θεωρίας*, και *στην αγορά εργασίας* υποδεικνύουν τους βασικούς τομείς περιεχομένου και τα πλαίσια εντός των συνεδριών, ενισχύοντας την κεντρική σημασία των ακαδημαϊκών επιλογών και των εκτιμήσεων για την αγορά εργασίας στις συζητήσεις για τη σταδιοδρομία.

Ένα αξιοσημείωτο χαρακτηριστικό είναι η επανάληψη εκφράσεων που αντανακλούν καθησυχασμό ή διαπραγμάτευση, όπως το *δεν έχουμε πρόβλημα, δεν σημαίνει ότι* και το *δεν είναι μόνο*. Οι φράσεις αυτές, που συχνά αποτελούν μέρος του λόγου του συμβούλου, φαίνεται ότι αποσκοπούν στη μείωση του άγχους των μαθητών, στη διόρθωση παρανοήσεων ή στο άνοιγμα εναλλακτικών ερμηνειών. Η συχνή χρήση του *δεν* (άρνηση) σε πολλές φράσεις υπογραμμίζει περαιτέρω την επικράτηση των αντιρροπιστικών σκέψεων, οι οποίες μπορεί να αποσκοπούν στην αμφισβήτηση άκαμπτων πεποιθήσεων ή στην αντιμετώπιση φόβων σχετικά με μελλοντικά αποτελέσματα. Επιπροσθέτως, φράσεις όπως *δεν ξέρει ποτέ*, *δεν θα σου πω* και *δεν έχει βγει* αναδεικνύουν την αβεβαιότητα ως επαναλαμβανόμενο θέμα, αντανακλώντας ενδεχομένως τόσο τις ανασφάλειες των μαθητών, όσο και το εγγενές απρόβλεπτο της εκπαιδευτικής πορείας (βλ. Εικόνα 3).

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η παρούσα μελέτη τεκμηριώνει τη μεθοδολογική αξία των εργαλείων ανοικτού λογισμικού, όπως του RQDA, ως μέσα ανάλυσης κειμενικών δεδομένων στο πεδίο της εκπαιδευτικής συμβουλευτικής. Τα ευρήματα καταδεικνύουν μια διακριτή προτεραιοποίηση της πρακτικής καθοδήγησης, της πληροφόρησης και της άμεσης ανταπόκρισης στις ανάγκες των μαθητών, όπως αυτό αποτυπώθηκε στην ανάλυση των απομαγνητοφωνημένων συνεδριών. Οι κωδικοί *ΕΦΑΡΜΟΓΗ ΣΧΕΔΙΟΥ ΔΡΑΣΗΣ*, *ΠΛΗΡΟΦΟΡΗΣΗ* και *ΑΝΤΑΠΟΚΡΙΣΗ* εμφανίζονται με ιδιαίτερη συχνότητα, συγκεντρώνοντας άνω του 85% των συνολικών δεδομένων· στοιχείο που αποτυπώνει μια στρατηγική σαφώς προσανατολισμένη στην άμεση υποστήριξη και καθοδήγηση των μαθητών κατά τη διαδικασία λήψης αποφάσεων.

Η περιορισμένη καταγραφή κωδικών όπως *ΔΕΞΙΟΤΗΤΕΣ ΑΚΡΟΑΣΗΣ*, *ΕΜΠΙΣΤΟΣΥΝΗ* και *ΔΟΜΗΣΗ ΣΤΕΝΗΣ ΣΧΕΣΗΣ* υποδηλώνει ότι οι συνεδρίες τείνουν να δίνουν μειωμένη έμφαση στις συναισθηματικές και

διαπροσωπικές διαστάσεις, παρά τη θεμελιώδη συμβολή τους στην οικοδόμηση αποτελεσματικού συμβουλευτικού πλαισίο. Παράλληλα, η περιορισμένη παρουσία πρακτικών, όπως η σχεδίαση εναλλακτικών λύσεων και η ενίσχυση διερευνητικού τρόπου σκέψης, ενδέχεται να αποδίδεται είτε σε περιορισμούς του χρονοδιαγράμματος, είτε σε προτεραιοποίηση της άμεσης εφαρμοσμένης στήριξης των μαθητών. Σε επίπεδο γλωσσικής ανάλυσης, οι συνεδρίες διακρίνονται για τον διάλογο που διαμορφώνεται σε καθοδηγητικό και διαπραγματευτικό ύφος, γεγονός που τεκμηριώνεται από τη συχνότητα συγκεκριμένων γλωσσικών μοτίβων. Εκφράσεις επιβεβαίωσης, αξιολόγησης και καθησύχασης, όπως για παράδειγμα *είναι πάρα πολύ* και *δεν έχουμε πρόβλημα*, συνθέτουν ένα επικοινωνιακό περιβάλλον όπου η συμβουλευτική καθοδήγηση συνυπάρχει με τη συστηματική προσπάθεια μείωσης της αβεβαιότητας εκ μέρους των μαθητών.

Η αξιοποίηση του RQDA ως εργαλείου ποιοτικής ανάλυσης παρέχει ένα οργανωμένο, διαφανές και μεθοδολογικά συνεπές πλαίσιο επεξεργασίας των δεδομένων, ενισχύοντας την ανάδειξη και ερμηνεία των κυρίαρχων θεματικών (Chandra & Shang, 2017). Ενώ το εργαλείο παρέχει ουσιώδη οφέλη, όπως την αποτελεσματική διαχείριση μεγάλου όγκου δεδομένων και την ενσωμάτωση στατιστικών μεθόδων, καταγράφονται ταυτόχρονα ορισμένοι περιορισμοί, ιδίως όσον αφορά την αρχική εξοικείωση των χρηστών και τη δυνητική αποστασιοποίηση του ερευνητή από την πρωτογενή εμπειρία του ερευνητικού υλικού (Gilbert, 2002).

Στο πλαίσιο μελλοντικής ερευνητικής δραστηριότητας, προτείνεται η υιοθέτηση μεικτών μεθόδων που συνδυάζουν ερμηνευτικές προσεγγίσεις με συστηματικές ποσοτικές μετρήσεις, με στόχο μια πιο ολιστική αξιολόγηση των συμβουλευτικών πρακτικών. Η διεύρυνση αυτή δύναται να ενισχύσει την αξιοπιστία και την επάρκεια των ευρημάτων, συμβάλλοντας στη συγκρότηση τεκμηριωμένων αναλυτικών πλαισίων. «Παράλληλα, αναδεικνύεται η ανάγκη για συμπληρωματική έρευνα σχετικά με την επίδραση των τεχνολογικών εργαλείων στην ποιότητα των συμβουλευτικών αλληλεπιδράσεων, με έμφαση στις συναισθηματικές και διαπροσωπικές τους διαστάσεις, ώστε να διαμορφωθούν πιο λεπτομερή θεωρητικά και εφαρμοσμένα υποδείγματα εκπαιδευτικής συμβουλευτικής.

Συνοψίζοντας, τα ευρήματα της παρούσας μελέτης αναδεικνύουν τη χρησιμότητα των εργαλείων ανοικτού λογισμικού στην ποιοτική ανάλυση συνεδριών εκπαιδευτικής συμβουλευτικής, ιδίως ως προς την ενίσχυση της αναλυτικής συνέπειας και της τεκμηρίωσης της ερευνητικής πορείας. Η εφαρμογή του RQDA ανέδειξε τη λειτουργική σύνδεση μεταξύ κωδικοποίησης, θεματικής χαρτογράφησης και οπτικοποίησης των δεδομένων, υποστηρίζοντας τόσο την ερμηνευτική εμβάθυνση όσο και τη βελτίωση των συμβουλευτικών παρεμβάσεων. Τέλος, η μελέτη σκιαγραφεί τις προϋποθέσεις για μια διεπιστημονική προσέγγιση στην εκπαιδευτική συμβουλευτική, η οποία συνδυάζει τεχνολογικά εργαλεία με ερμηνευτικά σχήματα, ενισχύοντας την αναπαραγωγιμότητα και την τεκμηριωμένη λήψη αποφάσεων.

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ΘΠ24: Διδασκαλία και ψηφιακά μέσα

ΔΙΔΑΣΚΑΛΙΑ ΤΟΥ ΜΑΘΗΜΑΤΟΣ ΤΗΣ ΙΣΤΟΡΙΑΣ ΜΕ ΤΗ ΧΡΗΣΗ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ: ΠΑΡΟΥΣΙΑΣΗ ΣΧΕΔΙΟΥ ΔΙΔΑΣΚΑΛΙΑΣ

Ζιάγκου Μάνθα
Εκπαιδευτικός ΠΕ 71
Δημοτικό Σχολείο Ξηρολόφου – Αρχαία Ελέα
mziagkoy@gmail.com

Μακάριος Λάμπρος
Εκπαιδευτικός ΠΕ 70
Δημοτικό Σχολείο Ξηρολόφου – Αρχαία Ελέα
lamprosmakarios88@gmail.com

ΠΕΡΙΛΗΨΗ

Η διδασκαλία της Ιστορίας αποτελεί μία ιδιαίτερη παιδαγωγική πρόκληση, απαιτώντας την ενεργοποίηση της κριτικής σκέψης, την ερμηνεία ιστορικών πηγών και τη σύνδεση παρελθόντος και παρόντος. Η αξιοποίηση των ψηφιακών μέσων παρέχει νέες δυνατότητες προς αυτή την κατεύθυνση, καθιστώντας την ιστορική γνώση περισσότερο διαδραστική και προσιτή στους μαθητές.

Η ενσωμάτωση της τεχνολογίας στην ιστορική εκπαίδευση περιλαμβάνει τη χρήση διαδραστικών χαρτών, εικονικών αναπαραστάσεων, πολυμεσικού υλικού, ψηφιακών αρχείων και εκπαιδευτικών πλατφορμών. Τα εργαλεία αυτά επιτρέπουν στους μαθητές να εξερευνούν ιστορικά γεγονότα μέσω οπτικοποιημένων δεδομένων, να αναλύουν πρωτογενείς πηγές και να συμμετέχουν σε βιωματικές δραστηριότητες. Για παράδειγμα, οι γεωγραφικά πληροφοριακά συστήματα (GIS) και εφαρμογές όπως το Google Earth επιτρέπουν την ιστορική χαρτογράφηση, διευκολύνοντας την κατανόηση του χωροχρονικού πλαισίου των γεγονότων. Επιπλέον, οι τεχνολογίες εικονικής και επαυξημένης πραγματικότητας (VR/AR) δίνουν τη δυνατότητα «ψηφιακών επισκέψεων» σε ιστορικούς χώρους, ενισχύοντας την εμπειρική προσέγγιση της Ιστορίας.

Το πολυμεσικό υλικό, όπως ντοκιμαντέρ, διαδραστικά βίντεο και ιστορικά αρχεία, προσφέρει μια πολυτροπική διδακτική προσέγγιση που ανταποκρίνεται στις διαφοροποιημένες μαθησιακές ανάγκες. Παράλληλα, η ψηφιακή αφήγηση (digital storytelling) ενισχύει τη δημιουργική συμμετοχή των μαθητών, επιτρέποντάς τους να κατασκευάζουν τις δικές τους ιστορικές αφηγήσεις, συνδυάζοντας πηγές, εικόνες και βίντεο.

Η παιγνιοποίηση (gamification) αποτελεί έναν ακόμη καινοτόμο διδακτικό μηχανισμό, καθώς ενσωματώνει στοιχεία πρόκλησης, ανταμοιβής και συνεργασίας. Πλατφόρμες όπως το Kahoot!, το Quizizz και το Mission US επιτρέπουν την αφομοίωση ιστορικών γνώσεων μέσω διαδραστικών δραστηριοτήτων, αυξάνοντας το ενδιαφέρον των μαθητών.

Παρά τις δυνατότητες που προσφέρει η τεχνολογία, προκύπτουν προκλήσεις που απαιτούν προσεκτική διαχείριση. Η αξιοπιστία των ψηφιακών πηγών, η ανάπτυξη κριτικής προσέγγισης στην πληροφορία και η επιμόρφωση των εκπαιδευτικών στη χρήση ψηφιακών εργαλείων συνιστούν βασικούς παράγοντες επιτυχούς ενσωμάτωσης της τεχνολογίας στην ιστορική διδασκαλία.

Συμπερασματικά, η αξιοποίηση των ψηφιακών μέσων στη διδασκαλία της Ιστορίας δεν αποτελεί απλώς έναν τεχνολογικό εκσυγχρονισμό, αλλά μια παιδαγωγική αναβάθμιση που ενισχύει την κριτική σκέψη, τη βιωματική μάθηση και τη βαθύτερη κατανόηση του ιστορικού παρελθόντος. Με τη σωστή χρήση των εργαλείων αυτών, η Ιστορία καθίσταται πιο προσιτή και ελκυστική, διαμορφώνοντας ενεργούς και συνειδητοποιημένους πολίτες.

Η παρούσα εργασία εξετάζει τον ρόλο των ψηφιακών τεχνολογιών στη διδασκαλία της Ιστορίας, εστιάζοντας σε σύγχρονες μεθόδους που αξιοποιούν διαδραστικούς χάρτες, εικονικές αναπαραστάσεις, πολυμεσικό υλικό και εργαλεία παιχνιδοποίησης μέσα από την παρουσίαση ενός σχεδίου διδασκαλίας δύο ωρών, στο μάθημα της Ιστορίας της Στ΄ τάξης, στην ενότητα: «Η δεύτερη πολιορκία και η έξοδος του Μεσολογγίου».

Η ενσωμάτωση ψηφιακών τεχνολογιών στη διδασκαλία της ενότητας συνέβαλε καθοριστικά στην ενίσχυση της ιστορικής σκέψης και της ενεργού συμμετοχής των μαθητών. Η χρήση διαδραστικών χαρτών και εικονικών αναπαραστάσεων διευκόλυνε την κατανόηση του χωροχρονικού πλαισίου των γεγονότων, ενώ το πολυμεσικό υλικό και

η ψηφιακή αφήγηση προήγαγαν τη βιωματική και δημιουργική μάθηση. Επιπλέον, η αξιοποίηση παιχνιδοποιημένων δραστηριοτήτων ενίσχυσε το ενδιαφέρον και την αφομοίωση του περιεχομένου. Παράλληλα, οι μαθητές ανέπτυξαν δεξιότητες κριτικής ανάλυσης ψηφιακών πηγών. Ωστόσο, αναδείχθηκαν προκλήσεις σχετικές με τη διαχείριση του διδακτικού χρόνου και την ανάγκη συστηματικής επιμόρφωσης των εκπαιδευτικών στη χρήση ψηφιακών μέσων.

Λέξεις - κλειδιά: διδασκαλία Ιστορίας, ψηφιακά μέσα, διαδραστική μάθηση, εικονικές αναπαραστάσεις, παιχνιδοποίηση, τεχνολογία στην εκπαίδευση

ΕΙΣΑΓΩΓΗ

Η διδασκαλία της Ιστορίας στο σύγχρονο σχολείο συνιστά ένα σύνθετο παιδαγωγικό εγχείρημα, το οποίο υπερβαίνει την απλή απομνημόνευση γεγονότων. Ο βασικός στόχος της ιστορικής εκπαίδευσης είναι η καλλιέργεια της ιστορικής σκέψης, δηλαδή η ικανότητα των μαθητών να ερμηνεύουν ιστορικές πηγές, να κατανοούν τις συνθήκες υπό τις οποίες διαμορφώθηκαν τα γεγονότα, να εντοπίζουν αιτίες και συνέπειες και να εντάσσουν τα γεγονότα σε ένα ευρύτερο χωροχρονικό και νοηματικό πλαίσιο. Η σύνδεση παρελθόντος και παρόντος, η καλλιέργεια της κριτικής σκέψης και η ανάπτυξη ιστορικής ενσυναίσθησης αποτελούν θεμελιώδεις διαστάσεις αυτής της διαδικασίας (Wineburg, 2010).

Τα τελευταία χρόνια, η ένταξη των ψηφιακών τεχνολογιών στην εκπαιδευτική πράξη μετασχηματίζει τους τρόπους με τους οποίους προσεγγίζεται η ιστορική γνώση. Η ψηφιακή παιδαγωγική, ως θεωρητικό και πρακτικό πλαίσιο, εστιάζει στη δημιουργική, πολυτροπική και διαδραστική μάθηση, όπου οι μαθητές δεν είναι παθητικοί δέκτες πληροφορίας, αλλά ενεργοί συμμετέχοντες στη διαδικασία οικοδόμησης της γνώσης (Selwyn, 2011). Η αξιοποίηση ψηφιακών εργαλείων στη διδασκαλία της Ιστορίας προάγει τη βιωματική εμπλοκή, την αναστοχαστική ενασχόληση με το παρελθόν και την ανάπτυξη δεξιοτήτων του 21ου αιώνα, όπως η πληροφοριακή παιδεία και ο ψηφιακός γραμματισμός (Slekar, 2009).

Η τεχνολογία προσφέρει τη δυνατότητα οπτικοποίησης ιστορικών δεδομένων, σύνδεσης με ψηφιακές πρωτογενείς πηγές, εικονικών περιηγήσεων σε ιστορικούς τόπους και ανασύνθεσης ιστορικών αφηγήσεων. Οι διαδραστικοί χάρτες, οι εφαρμογές εικονικής και επαυξημένης πραγματικότητας (VR/AR), τα πολυμεσικά ντοκιμαντέρ, οι προσομοιώσεις και τα ψηφιακά αρχεία αποτελούν εργαλεία που μπορούν να μεταμορφώσουν την ιστορική αφήγηση σε μια εμπειρία προσβάσιμη, πολυαισθητηριακή και ουσιαστική για τους μαθητές (Lee & Hammer, 2011, Hübner, 2023). Σύγχρονες μελέτες επιβεβαιώνουν ότι η χρήση εικονικών τεχνολογιών ενισχύει τη μαθησιακή εμπλοκή, τη συγκέντρωση και τη χωροχρονική κατανόηση της ιστορικής πραγματικότητας (Serrano, 2025).

Στο πλαίσιο αυτό, η ψηφιακή αφήγηση (digital storytelling) αναδεικνύεται ως μια ιδιαίτερα αποτελεσματική μέθοδος, καθώς επιτρέπει στους μαθητές να συνδυάζουν πηγές, εικόνες, βίντεο και ήχο για να δημιουργήσουν τις δικές τους ιστορικές αφηγήσεις. Μέσα από αυτή τη διαδικασία ενισχύεται όχι μόνο η δημιουργικότητά τους, αλλά και η κατανόηση της πολλαπλότητας των ιστορικών φωνών και οπτικών (Robin, 2008, Robin, 2016). Η δυνατότητα οπτικοποίησης και ανακατασκευής της ιστορίας μέσω ψηφιακών εργαλείων καλλιεργεί δεξιότητες αφηγηματικής σύνθεσης και ιστορικής ενσυναίσθησης (Oskoz & Elola, 2014).

Αντίστοιχα, η παιγνιοποίηση (gamification) εισάγει τη διάσταση του παιχνιδιού, προσφέροντας ένα περιβάλλον αλληλεπίδρασης και κινήτρων, το οποίο ενισχύει τη μνήμη, την προσοχή και την ενεργή συμμετοχή των μαθητών. Πλατφόρμες όπως το Kahoot!, το Quizizz και ιστορικά παιχνίδια ρόλων, όπως το Mission US, έχουν αποδειχθεί αποτελεσματικά εργαλεία κινητοποίησης μαθητών σε περιβάλλοντα διδασκαλίας Ιστορίας (Gee, 2003, Dicheva et al., 2015).

Παρά τα πολλαπλά πλεονεκτήματα, η ενσωμάτωση της τεχνολογίας στην ιστορική εκπαίδευση συνεπάγεται και σημαντικές προκλήσεις. Οφείλει να λαμβάνει υπόψη την αξιοπιστία των ψηφιακών πηγών, την ανάγκη για κριτική αξιολόγηση της πληροφορίας από τους μαθητές και, κυρίως, την επιμόρφωση των εκπαιδευτικών στην ουσιαστική και παιδαγωγικά στοχευμένη χρήση των τεχνολογικών εργαλείων (Dicheva et al., 2015). Η τεχνολογία δεν αποτελεί αυτοσκοπό, αλλά εργαλείο που όταν αξιοποιηθεί με σχέδιο και γνώση, μπορεί να συμβάλει ουσιαστικά στη δημιουργία ενός πιο ανοιχτού, συνεργατικού και νοηματοδοτημένου μαθήματος Ιστορίας (Selwyn, 2011).

ΘΕΩΡΗΤΙΚΟ ΠΛΑΙΣΙΟ

Η αξιοποίηση ψηφιακών εργαλείων στη διδασκαλία της Ιστορίας προσφέρει νέες δυνατότητες εμπλουτισμού της μαθησιακής διαδικασίας, ενισχύοντας τη βιωματικότητα, τη διαδραστικότητα και την ενεργό εμπλοκή των μαθητών. Ένα από τα πλέον χρήσιμα μέσα αποτελεί η χρήση διαδραστικών χαρτών και γεωγραφικών πληροφοριακών συστημάτων (GIS), όπως το Google Earth. Μέσα από αυτά, οι μαθητές έχουν τη δυνατότητα να χαρτογραφήσουν ιστορικά γεγονότα, να εντοπίσουν γεωγραφικές μετατοπίσεις πληθυσμών, να εξετάσουν τη στρατηγική σημασία περιοχών και να κατανοήσουν την πολυπλοκότητα του χωροχρονικού πλαισίου στο οποίο εκτυλίχθηκαν τα γεγονότα. Η οπτικοποίηση της γεωγραφικής διάστασης της Ιστορίας διευκολύνει τη βαθύτερη κατανόηση των γεγονότων, ενισχύοντας τη συνδετική ικανότητα των μαθητών ανάμεσα στον χώρο και το ιστορικό αφήγημα (Trepal, et al., 2020).

Παράλληλα, οι τεχνολογίες εικονικής και επαυξημένης πραγματικότητας (VR και AR) προσφέρουν μοναδικές δυνατότητες εμπλοκής των μαθητών με το ιστορικό παρελθόν. Μέσα από εργαλεία όπως το Google Expeditions ή

εφαρμογές VR σε πλατφόρμες όπως το HistoryView VR, οι μαθητές μπορούν να βιώσουν «ψηφιακές επισκέψεις» σε ιστορικούς τόπους, να περιηγηθούν σε αναπαραστάσεις μαχών, να εισέλθουν σε ψηφιακά μουσεία ή να «συνομιλήσουν» με τρισδιάστατα μοντέλα ιστορικών αντικειμένων. Αυτή η προσέγγιση όχι μόνο προκαλεί το ενδιαφέρον, αλλά καλλιεργεί και τη συναισθηματική εμπλοκή με το ιστορικό αντικείμενο, ενισχύοντας την ιστορική ενσυναίσθηση (Huang, 2022).

Η χρήση πολυμεσικού υλικού, όπως ντοκιμαντέρ, ιστορικά αρχεία, ηχητικά αποσπάσματα και διαδραστικά βίντεο, αποτελεί έναν άλλο πυλώνα της ψηφιακής ιστορικής εκπαίδευσης. Τα μέσα αυτά επιτρέπουν την πρόσβαση σε πρωτογενείς ή δευτερογενείς πηγές σε μορφή που ανταποκρίνεται στις ανάγκες διαφορετικών μαθησιακών τύπων. Για παράδειγμα, ένα ντοκιμαντέρ για την Έξοδο του Μεσολογγίου μπορεί να συνοδεύεται από διαδραστικές ερωτήσεις, πηγές και χάρτες, δημιουργώντας ένα ενιαίο, πολυτροπικό μαθησιακό περιβάλλον (González & Carretero, 2013).

Η ψηφιακή αφήγηση (digital storytelling) συνιστά μια δημιουργική εκπαιδευτική προσέγγιση που ενισχύει τη συμμετοχή των μαθητών στη διαδικασία της ιστορικής ερμηνείας. Μέσω εργαλείων όπως το Canva, το Adobe Express ή το WeVideo, οι μαθητές μπορούν να δημιουργήσουν τις δικές τους ιστορικές αφηγήσεις, συνδυάζοντας πηγές, εικόνες, ήχους και προσωπική ερμηνεία. Αυτή η μέθοδος όχι μόνο καλλιεργεί τη δημιουργική έκφραση, αλλά διδάσκει και τη σύνθεση πληροφοριών από πολλαπλές πηγές, αναπτύσσοντας δεξιότητες ιστορικής σκέψης και ψηφιακού γραμματισμού (Robin, 2016, Petousi, et al., (2022).

Η παιγνιοποίηση (gamification) έρχεται να ενισχύσει την εμπλοκή και το ενδιαφέρον των μαθητών μέσω στοιχείων πρόκλησης, ανταμοιβής και συνεργασίας. Πλατφόρμες όπως το Kahoot! και το Quizizz, μέσω ερωτήσεων κλειστού τύπου και δυναμικής αξιολόγησης, μετατρέπουν την ανατροφοδότηση σε παιχνίδι, δίνοντας κίνητρα για επανάληψη και εμπέδωση. Πιο σύνθετες εφαρμογές, όπως το Mission US, επιτρέπουν στους μαθητές να βιώσουν εικονικά ιστορικά σενάρια, αναλαμβάνοντας ρόλους ιστορικών προσώπων και λαμβάνοντας αποφάσεις στο πλαίσιο ιστορικών περιόδων. Η παιγνιοποίηση συμβάλλει ιδιαίτερα στην ανάπτυξη της ιστορικής ενσυναίσθησης, της κριτικής σκέψης και της συνεργατικότητας (Dicheva et al., 2015, Lee & Hammer, 2011).

Στο πλαίσιο καλών πρακτικών, αξίζει να αναφερθεί ένα εκπαιδευτικό σχέδιο στο οποίο οι μαθητές της Στ΄ τάξης μελέτησαν την Έξοδο του Μεσολογγίου με συνδυασμό εργαλείων: παρακολούθησαν ένα ντοκιμαντέρ με ενσωματωμένα ερωτήματα, περιηγήθηκαν εικονικά στον Κήπο των Ηρώων μέσω Google Earth, δημιούργησαν ψηφιακές αφηγήσεις με εικόνες και αποσπάσματα πηγών, και συμμετείχαν σε ένα παιχνίδι γνώσεων στο Kahoot! ως τελική αξιολόγηση. Οι μαθητές έδειξαν αυξημένη κατανόηση του ιστορικού πλαισίου και ενεργή συμμετοχή σε όλη τη διαδικασία.

Συνολικά, τα ψηφιακά εργαλεία μετασχηματίζουν τη διδασκαλία της Ιστορίας σε ένα δυναμικό και πολυδιάστατο περιβάλλον, ευνοώντας την εμβάθυνση, τη δημιουργική έκφραση και τη βιωματική μάθηση. Η ουσιαστική ενσωμάτωσή τους, με κατάλληλη παιδαγωγική καθοδήγηση, μπορεί να ενισχύσει την ιστορική σκέψη και τη σχέση των μαθητών με το παρελθόν (Selwyn, 2011).

ΔΙΔΑΚΤΙΚΟ ΣΧΕΔΙΟ

Η διδακτική πρόταση που παρουσιάζεται έχει ως αντικείμενο τη διδασκαλία της ενότητας «Η δεύτερη πολιορκία και η έξοδος του Μεσολογγίου» στο πλαίσιο του μαθήματος της Ιστορίας της Στ΄ Δημοτικού, διάρκειας δύο διδακτικών ωρών. Βασικός στόχος του σχεδίου είναι η ενίσχυση της ιστορικής σκέψης, της ενεργούς συμμετοχής και της βιωματικής μάθησης των μαθητών μέσω της δημιουργικής αξιοποίησης ψηφιακών εργαλείων. Οι επιμέρους διδακτικοί στόχοι αφορούν τόσο το γνωστικό επίπεδο (κατανόηση των αιτίων, της πορείας και των συνεπειών της πολιορκίας), όσο και την ανάπτυξη δεξιοτήτων (ανάλυση πρωτογενών πηγών, χρήση ψηφιακών μέσων, ιστορικός γραμματισμός), αλλά και τη διαμόρφωση στάσεων (σεβασμός στην ιστορική μνήμη, καλλιέργεια ενσυναίσθησης, ενεργός συμμετοχή στη συλλογική μάθηση).

Η διδακτική διαδικασία ξεκινά με την ενεργοποίηση του ενδιαφέροντος των μαθητών μέσω πολυμεσικού υλικού. Ειδικότερα, οι μαθητές παρακολουθούν ένα σύντομο ντοκιμαντέρ ή δραματοποιημένο απόσπασμα για τα γεγονότα του Μεσολογγίου, συνοδευόμενο από εικόνες της εποχής και μουσική επένδυση, προκειμένου να δημιουργηθεί ένα συναισθηματικά φορτισμένο πλαίσιο που ευνοεί τη σύνδεση με το περιεχόμενο. Η πρώτη δραστηριότητα επικεντρώνεται στην ανασύνθεση του ιστορικού πλαισίου της πολιορκίας. Με τη βοήθεια της εφαρμογής Google Earth, οι μαθητές εντοπίζουν το Μεσολόγγι στον χάρτη, αναλύουν τη γεωγραφική του θέση και επιχειρούν μια ψηφιακή αναπαράσταση των στρατοπέδων και των διαδρομών της εξόδου. Η δραστηριότητα αυτή διευκολύνει την κατανόηση του χωροχρονικού πλαισίου των γεγονότων, καθιστώντας τα πιο προσιτά και οπτικά κατανοητά.

Στη συνέχεια, αξιοποιούνται ψηφιακές πηγές (κειμενικά και ηχητικά αποσπάσματα από μαρτυρίες μαχητών ή περιηγητών της εποχής) τις οποίες οι μαθητές διαβάζουν ή ακούν μέσα από την εκπαιδευτική πλατφόρμα ή μέσω κατάλληλα διαμορφωμένου PowerPoint. Η δραστηριότητα αυτή προάγει την εξοικείωση με πρωτογενείς πηγές και την εξάσκηση στην ερμηνεία πολλαπλών οπτικών γωνιών, ενώ παράλληλα ενισχύει την ενσυναίσθηση, καθώς οι μαθητές «συνομιλούν» με βιώματα ανθρώπων της εποχής. Ακολουθεί δημιουργική εργασία με την τεχνική της ψηφιακής αφήγησης (digital storytelling). Οι μαθητές, σε ομάδες, επιλέγουν ένα ιστορικό πρόσωπο ή μια πλευρά της εξόδου (π.χ. οι πολιορκημένοι, οι γυναίκες, οι στρατιώτες, οι Φιλέλληνες), και δημιουργούν τη δική τους αφήγηση, αξιοποιώντας εργαλεία όπως το Canva ή το Adobe Express. Ενσωματώνουν εικόνες, αποσπάσματα πηγών και μουσική υπόκρουση, προκειμένου να ανασυνθέσουν ένα ιστορικό αφήγημα βασισμένο σε τεκμήρια και δημιουργική έκφραση. Η δραστηριότητα αυτή επιτρέπει τη σύνθεση και παρουσίαση ιστορικών πληροφοριών μέσα από προσωπική προοπτική και ενισχύει τον γραμματισμό στην Ιστορία.

Ως μορφή ανατροφοδότησης και επανάληψης, αξιοποιείται η πλατφόρμα Kahoot!, μέσω της οποίας οι μαθητές συμμετέχουν σε ένα διαδραστικό παιχνίδι γνώσεων, που περιλαμβάνει ερωτήσεις κατανόησης, χρονική σειρά γεγονότων και συσχέτιση αιτίας-αποτελέσματος. Η παιγνιώδης μορφή ενισχύει τη συμμετοχικότητα και επιτρέπει στον εκπαιδευτικό να ελέγξει άμεσα τον βαθμό εμπέδωσης του περιεχομένου. Κατά τη διάρκεια της όλης διδακτικής διαδικασίας, η εμπλοκή των μαθητών ενισχύεται με την εναλλαγή δραστηριοτήτων, την εργασία σε ομάδες, τη χρήση πολυτροπικών υλικών και την ενσωμάτωση δημιουργικών μέσων. Οι μαθητές λειτουργούν ως ερευνητές, αφηγητές και αναλυτές, καλλιεργώντας ιστορικές, κοινωνικές και ψηφιακές δεξιότητες.

Η αξιολόγηση είναι διαμορφωτική και συνεχής, στηριζόμενη στην παρατήρηση της συμμετοχής, την ποιότητα των παραγόμενων αφηγήσεων, την αλληλεπίδραση στην ομαδική εργασία και την επίδοση στο διαδραστικό παιχνίδι. Παράλληλα, ενσωματώνεται και αυτοαξιολόγηση, μέσω σύντομου ερωτηματολογίου στο τέλος της διδακτικής ενότητας, όπου οι μαθητές αποτυπώνουν τις εντυπώσεις, τις δυσκολίες και όσα έμαθαν. Συμπερασματικά, το συγκεκριμένο σχέδιο διδασκαλίας αξιοποιεί στοχευμένα τις δυνατότητες της τεχνολογίας, δημιουργώντας ένα μαθητοκεντρικό, βιωματικό και κριτικά στοχαστικό περιβάλλον μάθησης, που φέρνει τους μαθητές σε ουσιαστική επαφή με το ιστορικό παρελθόν μέσα από σύγχρονες παιδαγωγικές πρακτικές.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η εφαρμογή του διδακτικού σχεδίου ανέδειξε σημαντικά παιδαγωγικά οφέλη που συνδέονται με την ενίσχυση της ιστορικής σκέψης, την ενεργή συμμετοχή των μαθητών και την ουσιαστική αξιοποίηση των ψηφιακών τεχνολογιών στην ιστορική εκπαίδευση. Οι μαθητές ανταποκρίθηκαν θετικά στο ψηφιακά εμπλουτισμένο περιβάλλον μάθησης, παρουσιάζοντας αυξημένο ενδιαφέρον και ενεργή εμπλοκή καθ’ όλη τη διάρκεια των δραστηριοτήτων. Μέσω της οπτικοποίησης των ιστορικών γεγονότων με εργαλεία όπως το Google Earth και η χρήση πολυμεσικού υλικού, διευκολύνθηκε η κατανόηση της χωροχρονικής διάστασης των γεγονότων, ενισχύοντας την ιστορική ενσυναίσθηση και την κριτική προσέγγιση του παρελθόντος.

Παράλληλα, η χρήση πρωτογενών πηγών και η δημιουργία ψηφιακής αφήγησης επέτρεψαν στους μαθητές να κινητοποιήσουν δεξιότητες ανάλυσης, σύνθεσης και ερμηνείας ιστορικών τεκμηρίων, αναπτύσσοντας βασικά στοιχεία ιστορικού και ψηφιακού γραμματισμού. Η εργασία σε ομάδες για την παραγωγή των αφηγήσεων ενίσχυσε την ανάπτυξη συνεργατικού πνεύματος και την ικανότητα διαμοιρασμού ρόλων και ευθυνών. Οι μαθητές επέδειξαν ιδιαίτερο ενθουσιασμό στη χρήση δημιουργικών εφαρμογών (π.χ. Canva), γεγονός που ενίσχυσε τη φαντασία και την προσωπική έκφραση. Η παιγνιώδης αξιολόγηση μέσω του Kahoot! λειτούργησε τόσο ως εργαλείο ανατροφοδότησης, όσο και ως κίνητρο για τη διατήρηση της προσοχής και της συμμετοχής. Τα αποτελέσματα του κουίζ ανέδειξαν σημαντικό βαθμό κατανόησης των ιστορικών γεγονότων, ενώ οι προφορικές και γραπτές παρατηρήσεις των μαθητών κατά τη διάρκεια και στο τέλος του μαθήματος κατέδειξαν εσωτερίκευση του περιεχομένου και προσωπική σύνδεση με το υλικό.

Ωστόσο, καταγράφηκαν και ορισμένες παιδαγωγικές προκλήσεις, όπως η ανάγκη προσεκτικής διαχείρισης του χρόνου ώστε να ολοκληρωθούν οι δραστηριότητες χωρίς βιασύνη, καθώς και η διαφοροποίηση της υποστήριξης για μαθητές με περιορισμένη εξοικείωση με τα ψηφιακά εργαλεία. Σε γενικές γραμμές, η εφαρμογή του σχεδίου επιβεβαίωσε ότι η δημιουργική ενσωμάτωση της τεχνολογίας μπορεί να αναβαθμίσει ποιοτικά τη διδασκαλία της Ιστορίας, ενισχύοντας την κατανόηση, τη βιωματική εμπλοκή και την ενεργό συμμετοχή των μαθητών σε νοηματοδοτημένες μαθησιακές εμπειρίες.

ΠΡΟΒΛΗΜΑΤΙΣΜΟΙ ΚΑΙ ΠΡΟΚΛΗΣΕΙΣ

Η εφαρμογή του διδακτικού σχεδίου ανέδειξε ορισμένες κρίσιμες προκλήσεις, οι οποίες πρέπει να ληφθούν υπόψη για την αποτελεσματική ενσωμάτωση των ψηφιακών τεχνολογιών στη διδασκαλία της Ιστορίας. Πρώτο και βασικό ζήτημα αποτελεί η διαχείριση του διδακτικού χρόνου. Η ένταξη ποικίλων δραστηριοτήτων, κυρίως όταν αυτές περιλαμβάνουν δημιουργικές ή τεχνολογικά απαιτητικές διαδικασίες (όπως η ψηφιακή αφήγηση), συχνά υπερβαίνει τα χρονικά όρια μιας τυπικής διδακτικής ώρας. Απαιτείται, συνεπώς, προσεκτικός σχεδιασμός με εναλλακτικά σενάρια και ευελιξία κατά την υλοποίηση. Παράλληλα, προέκυψε η ανάγκη για ουσιαστική και συνεχόμενη επιμόρφωση των εκπαιδευτικών, όχι μόνο στη χρήση των ψηφιακών εργαλείων αλλά και στην παιδαγωγική αξιοποίησή τους, ώστε να αποφεύγεται η τεχνολογική χρήση χωρίς διδακτική σκοπιμότητα.

Ένα ακόμη σημείο προβληματισμού αφορά την ικανότητα των μαθητών να προσεγγίζουν με κριτικό τρόπο τις ψηφιακές πηγές. Η αυξημένη προσβασιμότητα στο διαδίκτυο δεν συνεπάγεται και ικανότητα αξιολόγησης της εγκυρότητας ή της ιστορικής αξιοπιστίας των πληροφοριών. Η καλλιέργεια αυτής της δεξιότητας απαιτεί καθοδηγούμενη εξάσκηση και ενίσχυση του ψηφιακού και ιστορικού γραμματισμού. Επιπλέον, σε αρκετές σχολικές μονάδες καταγράφονται τεχνικά ζητήματα, όπως προβλήματα σύνδεσης στο διαδίκτυο, ελλείψεις σε εξοπλισμό ή περιορισμένος αριθμός διαθέσιμων υπολογιστών και ταμπλετών, τα οποία δυσχεραίνουν τη συστηματική αξιοποίηση των προτεινόμενων τεχνολογιών. Οι παράγοντες αυτοί υπογραμμίζουν την ανάγκη για θεσμική στήριξη και μακροπρόθεσμη στρατηγική ένταξης των ψηφιακών εργαλείων στη σχολική πράξη, προκειμένου να μεταβούμε από αποσπασματικές εφαρμογές σε οργανωμένες παιδαγωγικές πρακτικές.

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΕΚΤΑΣΕΙΣ

Η παρούσα μελέτη επιβεβαιώνει ότι η ενσωμάτωση των ψηφιακών τεχνολογιών στη διδασκαλία της Ιστορίας δεν λειτουργεί ως υποκατάστατο της διδασκαλίας, αλλά ως ενισχυτικός και μετασχηματιστικός παράγοντας. Τα ψηφιακά μέσα, όταν αξιοποιούνται με παιδαγωγικά κριτήρια, εμπλουτίζουν τη μαθησιακή διαδικασία, υποστηρίζοντας την πολυτροπική προσέγγιση της γνώσης και προσφέροντας δυνατότητες βιωματικής, διερευνητικής και συνεργατικής μάθησης. Μέσα από δραστηριότητες όπως η ψηφιακή αφήγηση, η χαρτογράφηση και η ανάλυση πηγών, οι μαθητές αναπτύσσουν ιστορική σκέψη, ψηφιακές δεξιότητες και κριτικό πνεύμα.

Η μετάβαση προς ένα σύγχρονο, ανθρωποκεντρικό μάθημα Ιστορίας, που καλλιεργεί τη δημιουργικότητα και ενισχύει τη σύνδεση του μαθητή με το παρελθόν, προϋποθέτει την αξιοποίηση της τεχνολογίας ως εργαλείου κατανόησης και ερμηνείας και όχι ως αυτοσκοπό. Η παιδαγωγική αναβάθμιση της διδασκαλίας της Ιστορίας μέσα από τα ψηφιακά μέσα συνιστά μια αναγκαία εξέλιξη για τη σύγχρονη σχολική πραγματικότητα, θέτοντας τις βάσεις για την ανάπτυξη ενεργών, σκεπτόμενων και ιστορικά εγγράμματων πολιτών.

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Η ΕΠΙΔΡΑΣΗ ΤΟΥ CHARLES BAUDELAIRE ΣΤΑ ΠΟΙΗΜΑΤΑ : «ΙΘΑΚΗ» ΤΟΥ Κ.Π. ΚΑΒΑΦΗ ΚΑΙ «ΤΑΞΙΔΙ ΣΤΑ ΚΥΘΗΡΑ» ΤΟΥ ΚΩΣΤΑ ΟΥΡΑΝΗ ΜΕΣΩ ΤΗΣ ΨΗΦΙΑΚΗΣ ΑΦΗΓΗΣΗΣ

Δρ. Κοψάρης Κοσμάς
Διευθυντής 2ου Γυμνασίου Πρέβεζας
e-mail: kkopsaris@hotmail.com

ΠΕΡΙΛΗΨΗ

Στόχος της συγκεκριμένης εισήγησης αποτελεί η ανίχνευση και η αποτύπωση των διακειμενικών όψεων της μπωντλαιρικής ποίησης σε επιγενόμενους Έλληνες ποιητές μέσω της ψηφιακής αφήγησης. Αρχικά, θα αποδοθεί η σημασία της αφήγησης, η συμβολή της στην εκπαιδευτική διαδικασία, καθώς και τα βασικά στοιχεία που διέπουν την αφηγηματολογία. Θα εξεταστούν οι βασικές αρχές της ψηφιακής αφήγησης, τα στάδια δημιουργίας της σε συσχέτιση με τα μαθησιακά οφέλη σε επίπεδο πρόσληψης. Θα παρατεθούν μεθοδολογικά εργαλεία αξιοποίησης της ψηφιακής αφήγησης με βασικότερο στόχο οι μαθητές να αποκτήσουν μια διασταλτική οπτική και αντίληψη της λογοτεχνίας σε συγκριτολογικό και σε διακειμενικό επίπεδο. Θα δοθεί έμφαση στην επιλογή των κατάλληλων ψηφιακών εργαλείων που να αναδεικνύουν την ιδέα του ταξιδιού στην ουτοπία ως ένα βασικό μέσο εικονοπλαστικής αφήγησης με έντονες κινηματογραφικές συνηχήσεις. Η έννοια του ταξιδιού είναι καταλυτική ως μοτίβο ενεργοποίησης της δημιουργικής φαντασίας. Σε αυτή τη βάση, η μπωντλαιρική ποίηση εξαπέλυσε ανιχνευτές εδάφους στην ενεργοποίηση των αόρατων μηχανισμών που συνέχουν την κοσμική τάξη. Ο σταθερός απόηχος του Μπωντλαίρ είναι εμφανής στην μοντέρνα και στην μεταμοντέρνα νεοελληνική ποίηση σε ζητήματα που σχετίζονται με την απόδραση στο επέκεινα ως ένα μη-τόπο, συνιστώντας ένα δυνητικό πεδίο εναλλακτικής βίωσης του είναι. Ο Μπωνλαίρ σηματοδότησε ποιητικά την αέναη μετάβαση μέσα στο πλήθος. Επικαθόρισε το πεπρωμένο του σύγχρονου ανθρώπου, καταδικασμένου μέσα στην σθεναρή πάλη αντίρροπων δυνάμεων, στο μεταίχμιο ανάμεσα στο φως και στο σκοτάδι, στην αναζήτηση της εσωτερικής πληρότητας και του κενού, στη διεκδίκηση ενός λειασμένου αύριο που να αντιπαρέρχεται την καταβαράθρωση στα έγκατα της ύπαρξης. Μέσω της ψηφιακής αφήγησης στην λογοτεχνία, οι μαθητές θα είναι σε θέση να αφομοιώσουν με άκρως δημιουργικό τρόπο τη σημασία του ταξιδιού ως μέσου εσωτερικής αναζήτησης και παράλληλα εξοικείωσης σε επίπεδο εξωτερικής πραγματικότητας με αδιερεύνητα μέχρι στιγμής πεδία. Η επενέργεια της ψηφιακής αφήγησης στην ποίηση σηματοδοτεί την ενεργοποίηση στο έπακρο της μαγείας των ποιητικών εικόνων δημιουργώντας μια ιδιοσύστατη ποιητική της τεχνολογίας. Οι προσδοκώμενοι στόχοι της συγκεκριμένης εισήγησης σχετίζονται με την καλλιέργεια μιας ευρυγώνιας οπτικής των μαθητών και παράλληλα με την εξοικείωσή τους με την ποίηση ως διαχρονικό πεδίο έμπνευσης.

Λέξεις – κλειδιά: ψηφιακή αφήγηση, αφηγηματολογία, εικονοπλαστική αφήγηση.

ΕΙΣΑΓΩΓΗ

Στόχος της συγκεκριμένης εισήγησης είναι η αποτύπωση των όψεων του Καβαφικού ταξιδιού στην Ιθάκη σε συγκερασμό με την μπωντλαιρική πλεύση στα Κύθηρα όσο και το αντίστοιχο «ταξίδι στα Κύθηρα» του Κώστα Ουράνη, με εργαλείο προσέγγισης όσο και απόδοσης την ψηφιακή αφήγηση. Εφάρμοσα το συγκεκριμένο διδακτικό σενάριο κατά το σχολικό έτος 2022-2023 όταν δίδασκα το μάθημα της Νέας Ελληνικής Λογοτεχνίας στην Α΄ τάξη στο 2ο ΓΕΛ Πρέβεζας. Η καβαφική Ιθάκη είναι ένα οικείο σύμβολο στους μαθητές το οποίο ήθελα να διδαχθεί με ένα σύγχρονο και καινοτόμο τρόπο, ιδωμένο μέσα από την ερμηνευτική πολυσημία και την πολυτροπικότητα που συνεπάγεται η ψηφιακή αφήγηση (Γκουτσιουκώστα, 2020:50-75). Το συγκεκριμένο ποίημα έχει ένα διαχρονικό ενδιαφέρον για τον άνθρωπο της κάθε ηλικίας και εποχής καθώς κινείται στα αμφίδρομα πλαίσια του μέσου και του σκοπού. Ενίοτε να μην φτάσεις ποτέ στον τελικό προορισμό αλλά η διαδρομή να είναι αυτή που έχει να σου προσφέρει πολλά, σηματοδοτεί την άσκηση του νου, την απόκτηση βαθιάς εμπειρίας και σοφίας.

Η Ιλίνσκαγια για το συγκεκριμένο ποίημα αναφέρει χαρακτηριστικά ότι συνιστά μια μετάβαση: «από την προσωπική πείρα του ενός στην πείρα του έθνους, στη διανοητική εμπειρία που η εποχή υπαγορεύει στην ανθρωπότητα ολόκληρη. Γεγονός της προσωπικής εμπειρίας του ποιητή γίνεται η ίδια η ιστορία» (Ιλίνσκαγια, 1983: 197). Ο ίδιος ο ποιητής το θεωρεί ως ένα από τα πιο υποβλητικά ποιήματά του: «Υπάρχει μια τάξις ποιημάτων που ο ρόλος των είναι να "υποβάλλουν". Το ποίημά μου υπάγεται σ' αυτή την κατηγορία. Σ' έναν καλλιεργημένο αναγνώστη με συμπαθητική διάθεση, που θα στοχασθή λίγο πάνω στο ποίημα, οι στίχοι μου, είμαι βέβαιος, θα υποβάλλουν μιαν εικόνα της βαθειάς κι ατέλειωτης απελπισίας που περιέχουν αλλά δεν μπορούν ν' αποκαλύψουν [πλήρως] (Λεχωνίτης, 1942: 26)». Η «Ιθάκη» γίνεται μετωνυμία της ανθρώπινης ύπαρξης (Savvidis, 1987: 190). Ο οξυδερκής κριτικός Τέλλος Άγρας διαβλέπει το βαθύ ψυχογραφικό υπόστρωμα του ποιήματος (Agras, 1980: 97 και 99). Το πιο σπουδαίο που συνεπάγεται μια τέτοια καβαφικη διαδρομή είναι η απόκτηση με το χρόνο μιας βαθιάς πνευματικότητας που αντιπαρέρχεται την όποια υπέρμετρη επιδίωξη υλικότητας. Σε αυτή την προοπτική συντελεί και η απροσδιοριστία του χρόνου ως δυνάμει βιωμένη εμπειρία για τον ταξιδευτή της κάθε εποχής. Οι διδακτικοί τόνοι του ποιήματος επιβεβαιώνονται από την απεύθυνση στον αναγνώστη στο β΄ ενικό πρόσωπο σε συνδυασμό με το βαθύ φιλοσοφικό του υπόστρωμα.

ΕΦΑΡΜΟΓΗ ΤΟΥ ΔΙΔΑΚΤΙΚΟΥ ΣΕΝΑΡΙΟΥ

Το συγκεκριμένο ποίημα είναι κατάλληλο ώστε να εξοικειωθούν οι μαθητές με την έννοια του ταξιδιού ως βάση για κάθε μορφή αναζήτησης, εσωτερική ή στην εξωτερική πραγματικότητα. Στόχος μου, επίσης, μέσα από την συγκεκριμένη διδακτική πρόταση είναι η εξοικείωση των μαθητών με τα ψηφιακά περιβάλλοντα και εργαλεία. Η ψηφιακή αφήγηση προσφέρεται ως μια δημιουργική διαδικασία μετασχηματισμού επενεργώντας καταλυτικά στην ενεργή εμπλοκή των μαθητών, στην καλλιέργεια της δημιουργικής τους φαντασίας και στην απόκτηση μιας όλο και περισσότερο ανοιχτής πρόσληψης των κειμένων. Η διδασκαλία του συγκεκριμένου ποιήματος σε συνδυασμό με τα άλλα δύο υπό εξέταση ποιήματα με συγγενική θεματική, του Μπωντλαίρ και του Ουράνη διήρκεσε τέσσερις ώρες.

Στην πρώτη διδακτική ώρα οι μαθητές μετέβησαν στην αίθουσα των πολυμέσων του σχολείου. Αρχικά, έβαλα τους μαθητές να ακούσουν από το youtube τη θεατρική απαγγελία της καβαφικής «Ιθάκης» από την Έλλη Λαμπέτη και τους ζήτησα να μοιραστούν κάποιες σκέψεις για την πολυπόθητη ομηρική Ιθάκη, όπως την θυμούνται από το Γυμνάσιο ως ιδεατό τόπο προορισμού του Οδυσσέα. Ο χώρος έχει σχέση με τη μνήμη και την επάνοδο. Αυτή η βασική ιδέα του καβαφικού ποιήματος το φέρνει κοντά στον ποιητικό μύθο των Κυθήρων ως χώρο της αιώνιας επιστροφής, όπως αξιοποιείται στην περίπτωση του Μπωντλαίρ από την γαλλική ποίηση και στο χαρακτηριστικό παράδειγμα του Κώστα Ουράνη από την ελληνική ποίηση.

Σε αυτή τη βάση, και στην δεύτερη διδακτική ώρα έγινε μια απόπειρα εμπέδωσης από τους μαθητές της σημασίας της Ιθάκης στη λογοτεχνία ως ιδανικός προορισμός και καταφύγιο. Από την άλλη, τα Κύθηρα συμβολοποιοιούν έναν αιώνιο όσο και αινιγματικό προορισμό. Οι μαθητές χωρίστηκαν σε ομάδες προκειμένου να συγκεντρώσουν πληροφορίες σχετικά με την πορεία των Κυθήρων σε ιστορικό επίπεδο και τη σχέση του νησιού με την θεά Αφροδίτη σε επίπεδο μύθου αλλά και ως λογοτεχνικού συμβόλου. Τα Κύθηρα παράλληλα είναι το νησί που προστατεύεται από την συγκεκριμένη θεά του έρωτα, άρα για πολλούς περιηγητές του πνεύματος και της ύπαρξης θα μπορούσε να είναι το εξιδανικευμένο μέρος, όπως και η καβαφική Ιθάκη.

Τα Κύθηρα, ωστόσο, στον Μπωντλαίρ έχουν μια άλλη διάσταση, μετατρέπονται σε ένα άγονο μέρος, αποτροπιαστικό που ενεργοποιεί τις έντονες υπαρξιακές ανησυχίες του ποιητή για το φόβο ενός επικείμενου τέλους, τη μοναξιά και την εσωτερική φθορά ενός καταραμένου ποιητή που δεν μπορεί να βρει ανταπόκριση στην εποχή του. Ο ,Μπωντλαίρ «εισήγαγε μέσα στην τρικυμισμένη μάζα μιας τέτοιας παλίρροιας την κατάθλιψη μιας καταραμένης ποίησης, που δεν έφερε πια καμιά ευθύνη και που υφίστατο ανυπεράσπιστη μια γοητεία ανίκανη να ικανοποιήσει, μια γοητεία που κατέστρεφε. Έτσι η ποίηση απομακρυνόταν από απαιτήσεις δοσμένες σ' αυτήν από τα έξω, από απαιτήσεις της θέλησης,

για να ανταποκριθεί σε μια μόνο εσωτερική απαίτηση, η οποία τη συνέδεε με ό,τι γοητεύει, η οποία τη μετέβαλε στο αντίθετο της θέλησης» (Bataille, 1979:50). Καίρια η παρακάτω επισήμανση για το βαθύτερο νόημα του συγκεκριμένου μπωντλαιρικού ποιήματος: «Αν η ζωή του Μπωντλαίρ αξίζει να μελετηθεί σε ένα γραπτό κείμενο που στοχεύει, πριν απ' όλα, να προβάλει το νόημα και την επικαιρότητα των βιβλίων του, αυτό συμβαίνει μόνο στο μέτρο που η θεώρηση αυτή επιτρέπει να ανακαλύψουμε πως το έργο υπερβαίνει και, κατά κάποιον τρόπο, σβήνει την ύπαρξη, από την οποία επήγασε. Κάθε άνθρωπος αγαπά απελπισμένα τη ζωή του, ωσάν το μοναδικό και αναντικατάστατο αγαθό του. Εννοεί, λοιπόν, πάντα να τη δικαιώνει. Κι όμως δεν αξίζει τίποτε, θα καταργηθεί από τον θάνατο. Και μόνο ένα θα παραμείνει: η λάμψη, με την οποία η ζωή θα έχει μπορέσει να κυκλωθεί, μια λάμψη που τελικά της γίνεται ξένη» (Rigetti, 2005:3,5).

Το «ταξίδι στα Κύθηρα» του Ουράνη εκφράζει μια διαφορετική διαδρομή, όχι τόσο ζοφερή όσο του Γάλλου ομότεχνού του. Στον Ουράνη τα Κύθηρα συμβολίζουν την ουτοπία, τον ιδανικό τόπο στον οποίο κανείς ποτέ δεν θα μπορέσει να φτάσει (Stergiopoulos, 2000: 40-45, 58, 286-289). Όλα αυτοί οι κατευθυντήριοι θεματικοί άξονες τέθηκαν από τον καθηγητή, για να επακολουθήσει στις δύο επόμενες διδακτικές ώρες στο εργαστήρι της πληροφορικής του σχολείου μαζί με τις επιμέρους ομάδες μαθητών ένας καταιγισμός ιδεών και ψηφιακής απόδοσής τους εκφράζοντας έτσι την επιθυμία να αποδώσουν την προσωπική τους Ιθάκη, τα δικά τους Κύθηρα μέσα από τις συνθέσεις ομαδοσυνεργατικών ψηφιακών αφηγήσεων.

Κάθε μια είχε και ένα διαφορετικό οδοδείκτη και ένα συμβολικά διαφορετικό προορισμό. Οι μαθητές, με το τέλος της τρίτης διδακτικής ώρας, επέλεγαν ανάλογα με την περίπτωση τις εικόνες. Το μπωντλαιρικό ταξίδι στα Κύθηρα ήταν σκοτεινό, μέσα στη ζοφερή νύχτα, δίχως φεγγάρι, με καταιγίδες και θύελλες να ταλανίζουν τους θαλασσοπόρους, υποδηλώνοντας την εναγώνια επιθυμία του ατόμου να ξεπεράσει τα προσωπικά τούνελ και να βρει την αυτοέκφραση ως πυξίδα για την αυτοπραγμάτωση. Το ποιητικό ταξίδι του Ουράνη στα Κύθηρα οι μαθητές το φαντάστηκαν μέσα στη βροχή, την ώρα του δειλινού, με περίσσια τη διάθεση περισυλλογής, αναπόλησης και αναστοχασμού για τα περασμένα ή για τα ανείπωτα. Συμβολίζει την απατηλότητα μιας ζωής που ποτέ δεν θα βιωθεί με τον τρόπο που προσδοκάται ή αναμένεται, κάτι που φαντάζει μελαγχολικό και άκρως πεσιμιστικό αλλά κατά βάση δεν είναι, γιατί το τέλος σηματοδοτεί ένα νέο ξεκίνημα προς άλλη πλεύση.

Για την Καβαφική Ιθάκη οι μαθητές επέλεξαν εικόνες της ανατολής, των πρώτων ωρών της μέρας, με τον ελπιδοφόρο ήλιο να ανατέλλει εκπέμποντας ευοίωνα σήματα σε πολλαπλές συχνότητες. Οι δύο ομάδες μαθητών σχετικά με την καβαφική Ιθάκη έθεσαν δύο εντελώς διαφορετικές πορείες, ένα καράβι να ξεκινά από την Ανατολή στη Δύση και τανάπαλιν. Και τα δύο καράβια δεν θα συναντηθούν ποτέ, θα φτάσουν, όμως μέσα από την φαντασία των μαθητών κάποτε στους προορισμούς τους που είναι η Σίκινος, ένα από τα πιο μικρά νησιά των Κυκλάδων και το Bishop Rock, το πιο μικρό νησί του κόσμου, μόλις 46 τετραγωνικών μέτρων. Όταν τους ρώτησα γιατί επέλεξαν αυτά τα μέρη ως τη δική τους Ιθάκη μού απάντησαν ότι και αυτοί οι τόσο μικροί τόποι δικαιούνται τον δικό τους επισκέπτη, για να αποτελέσουν το προσωπικό καταφύγιο κάποιου. Η σχέση είναι πάντα αμφίδρομη τόσο του επισκέπτη ως ταξιδιώτη του παντός όσο και του τέρματος του ταξιδιού ως μια νέα αφετηρία. Ακόμη και αν ένα ταξίδι δεν έχει τέλος, έχει, ωστόσο, πάντα κάποιο σκοπό και αυτό το εμπέδωσαν οι μαθητές. Αξιοποιήθηκαν ως ψηφιακά εργαλεία το photostory 3 και Windows movie maker, αξιοσημείωτο είναι ότι οι μαθητές επέλεγαν κατά περίπτωση ανάλογα με τον ρυθμό, τον επιτονισμό, το συναίσθημα, την εκάστοτε οπτική στην παρουσίαση των ιστοριών τους, κατά την τέταρτη διδακτική ώρα, και από ένα διαφορετικό είδος μουσικής που κυμαινόταν από κλασική μουσική έως εναλλακτική ροκ μουσική.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Συνεπώς, προέκυψαν τέσσερις ψηφιακές ιστορίες στις οποίες συμπεριλαμβάνονται οι στίχοι των ποιημάτων του Μπωντλαίρ, του Ουράνη και του Καβάφη σε συνδυασμό με διαφορετικές κατά περίπτωση οπτικές αναπαραστάσεις μέσα από τις κατάλληλες εικόνες και μουσική. Παράλληλα, με τη χρήση της εφαρμογής show me είχα τη δυνατότητα να προβάλλω οπτικά, την τέταρτη διδακτική ώρα έχοντας προηγηθεί η βιωματική προσέγγιση, το βασικό μας ποίημα προς εξέταση, την «Ιθάκη» του Καβάφη, δίνοντας έμφαση στα σχήματα λόγου που ήταν απαραίτητα για την εμπέδωση όλων των ερμηνευτικών επιπέδων του ποιήματος, τις επιμέρους θεματικές ενότητες και τα βαθύτερα νοήματα που συνέχουν την καβαφική φιλοσοφική θεωρία.

Το δεύτερο μισό της τέταρτης ώρας, αφού προβλήθηκαν οι ψηφιακές ιστορίες με βιωματικές εκδοχές των περιγραφόμενων ποιημάτων, συζητήσαμε για μια ακόμη ανίχνευση του θέματος από μια άλλη οπτική την οποία και την ολοκληρώσαμε στο πρώτο εικοσάλεπτο της πέμπτης ώρας όπου και τυπικά τελείωσε το προσωπικό μας ταξίδι στην καβαφική «Ιθάκη». Οι μαθητές εξέφρασαν την επιθυμία να ακούσουν σε μια ενιαία ιστορία ανάμεικτους κάθε φορά στίχους από το κάθε ποίημα έτσι ώστε και οι τρεις ποιητές να συνυπάρχουν, Μπωντλαίρ, Ουράνης, Καβάφης, αλλά κάθε φορά να καταλήγουμε στην «Ιθάκη» του Καβάφη, με διαφορετικό, όμως, συναίσθημα. Ήθελαν οι απαγγελίες να γίνουν από ποιητές, πράγμα που έγινε. Αξιοσημείωτο είναι ότι προέκυπταν από τις εκάστοτε απαγγελίες νέα συναισθήματα, διαφορετικοί καταιγισμοί ιδεών, αλλά πάντα συνυφασμένοι με την νοσταλγία για τα παρελθοντικά.

Τα βίντεο προβλήθηκαν εντός του εικοσαλέπτου της πέμπτης διδακτικής ώρας. Ήταν σαν οι ποιητές που απήγγειλαν ποιητές σε αυτά τα τέσσερα νέα βίντεο μέσω του movie maker να είχαν βρει ήδη την προσωπική τους «Ιθάκη», γεγονός που διαπίστωσαν και οι μαθητές με σημαντικές παρατηρήσεις. Η συζήτηση έκλεισε με την επιθυμία τους να κάνουν ένα νέο βίντεο μελλοντικά, όταν θα νιώσουν έτοιμοι, με ένα δικό τους ποίημα που να αφηγείται την δική τους «Ιθάκη», μια «Ιθάκη», όπως ανέφεραν αρκετοί, όχι πλέον απόκοσμη, μακρινή, ομιχλώδη, αλλά κοντινή και οικεία, όχι ένα μη τόπο, αλλά τον δικό τους ξεχωριστό χώρο, εκείνον της διπλανής πόρτας. Ως εκ τούτου, εκείνο που κατά βάση αποκομίστηκε από την ψηφιακή προσέγγιση των συγκεκριμένων ποιημάτων είναι το να ψάχνουμε να βρούμε την ευτυχία όχι σε μακρινά μέρη, αλλά δίπλα μας, σε όσα δεν μπορέσαμε ακόμη να αποκρυπτογραφήσουμε, να αποτυπώσουμε, να εσωτερικεύσουμε.

Είναι σημαντικό να θεάται κανείς τον καθημερινό του μικρόκοσμο ως μεγάκοσμο, τότε θα καταλάβει ότι ορισμένες φορές το ταξίδι μπορεί να μην διαρκέσει πολύ, μπορεί να μην συναντήσει Κύκλωπες και Λαιστρυγόνες αλλά πρόσωπα οικεία, ασκώντας καταλυτική επιρροή μέσα από τη μαγεία μιας εναλλακτικής δημιουργικής αλληλεπίδρασης. Οι μαθητές ένιωσαν τα σύμβολα της «Ιθάκης», όσο και των «Κυθήρων» εντός τους σαν μια δυνατή όσμωση, σαν μια συμπαντική έκρηξη που να ελευθερώνει στοιχεία για να τα ανασυνθέτει κανείς διαρκώς μέσα από μια νέα κάθε φορά διάσταση και προοπτική. Κάθε ταξίδι αφήνει στον καθένα μας ένα ισχυρό αποτύπωμα συναισθημάτων και ιδεών, άρα η μετωνυμία της «Ιθάκης» και των «Κυθήρων» στη ζωή μας συνιστούν ζήτημα προσωπικής δημιουργίας.

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Η ΣΟΦΟΚΛΕΙΑ ΑΝΤΙΓΟΝΗ ΣΤΗΝ ΠΡΟΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ: ΨΗΦΙΑΚΑ ΕΡΓΑΛΕΙΑ ΚΑΙ ΠΑΙΔΑΓΩΓΙΚΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ.

Παπαγεωργίου Φωτεινή
Παιδαγωγός Πρώιμης Παιδικής Ηλικίας, MSc
Όγδοος βρεφονηπιακό σταθμός Ιωαννίνων

Νταμάνη Αικατερίνη
Εκπαιδευτικός ΠΕ 60, MSc, Phd
Σύμβουλος Εκπαίδευσης Πρωτοβάθμιας Άρτας

ΠΕΡΙΛΗΨΗ

Οι Αρχαίες Τραγωδίες στην προσχολική εκπαίδευση δύνανται να αποτελέσουν σημαντικό εργαλείο διδασκαλίας. Οι εκπαιδευτικοί οφείλουν να τις εντάξουν στην εκπαιδευτική καθημερινότητα και να τις ενσωματώσουν στο πρόγραμμα σπουδών. Τα οφέλη του Δράματος, ως μεθόδου διδασκαλίας, είναι πολλαπλά. Πρωτίστως, το Δράμα μπορεί να προσφέρει τη δυνατότητα στους εκπαιδευτικούς να προσεγγίσουν μαθητές, οι οποίοι δυσκολεύονται να παρακολουθήσουν την εκπαιδευτική διαδικασία, η οποία στηρίζεται σε παραδοσιακές μεθόδους, αυξάνοντας το ενδιαφέρον τους για όσα διαδραματίζονται εντός της σχολικής τάξης. Επιπλέον, έχει αναδειχθεί ότι συνδέει τους μαθητές με τον εαυτόν τους και τους άλλους, μεταμορφώνει το παραδοσιακό περιβάλλον μάθησης και προκαλεί τους μαθητές να προσεγγίσουν και εκείνοι τις γνώσεις με έναν διαφορετικό τρόπο, πολυαισθητηριακό, ο οποίος εντάσσει τους μαθητές ως ολότητα εντός της εκπαιδευτικής διαδικασίας και αξιοποιεί γνώσεις, εμπειρίες, βιώματα και συναισθήματα σε όλη τη διαδικασία. Το συναίσθημα, το οποίο βρίσκεται στην καρδιά του δράματος, συχνά αγνοείται στην εκπαίδευση. Ωστόσο μια εκπαιδευτική διαδικασία, η οποία στηρίζεται μόνο στη λογική και απομονώνει το συναίσθημα, δεν μπορεί να προσφέρει στους μαθητές μια ολιστική γνωστική πράξη και κατ' επέκταση ολιστική μόρφωση.

Η παρούσα εργασία εστιάζει στη διερεύνηση του ρόλου που μπορεί να διαδραματίσει η προσέγγιση της Σοφόκλειας Αντιγόνης στην Προσχολική Εκπαίδευση, αξιοποιώντας ψηφιακά εργαλεία για την ενίσχυση της μαθησιακής εμπειρίας. Στόχος είναι η ανάδειξη των αξιών του έργου – Ελεύθερη Βούληση, Θρησκεία και η σχέση της με την Πόλη, Άγραφοι Θεϊκοί Νόμοι, Δικαιοσύνη, Καθήκον, Αγάπη – και η αναζήτηση διδακτικών πρακτικών για τη διδασκαλία τους σε παιδιά προσχολικής ηλικίας. Η μεθοδολογία της εργασίας βασίζεται στη χρήση ψηφιακών εργαλείων, όπως διαδραστικές παρουσιάσεις με εικόνες, βίντεο και ήχο, ψηφιακά παιχνίδια που ενισχύουν την κατανόηση των αξιών του έργου, καθώς και εφαρμογές όπως το Puppet Pals και το Toontastic, οι οποίες επιτρέπουν στα παιδιά να δημιουργήσουν και να αφηγηθούν δικές τους εκδοχές της ιστορίας. Επιπλέον, η ψηφιακή σχεδίαση αξιοποιείται ως εργαλείο έκφρασης και αναστοχασμού, δίνοντας στα παιδιά τη δυνατότητα να αποτυπώσουν εικαστικά τις ιδέες και τα συναισθήματά τους. Τα ευρήματα της εργασίας δείχνουν ότι η ενσωμάτωση ψηφιακών εργαλείων στη διδασκαλία της Αντιγόνης στην προσχολική εκπαίδευση ενισχύει την ενεργό συμμετοχή των παιδιών, προάγει τη δημιουργική σκέψη και διευκολύνει την κατανόηση αφηρημένων εννοιών. Τα αποτελέσματα υπογραμμίζουν τη σημασία της διαδραστικής μάθησης και της αξιοποίησης της τεχνολογίας στη διαμόρφωση ενός ελκυστικού και παιδαγωγικά αποτελεσματικού περιβάλλοντος διδασκαλίας.

Λέξεις κλειδιά: Δράμα, Σοφοκλής, Αντιγόνη, Αξίες, Προσχολική Εκπαίδευση, Ψηφιακά εργαλεία, Παιδαγωγικές Προσεγγίσεις.

Η ΔΙΔΑΚΤΙΚΗ ΑΞΙΑ ΤΟΥ ΜΥΘΟΥ

Οι μύθοι αποτελούν σημαντικό μέρος της πολιτιστικής κληρονομιάς και παρέχουν σημαντική γνώση σχετικά με τη σχέση των Ανθρώπων με τη Φύση και τον τρόπο αντίληψης του Κόσμου. Σύμφωνα με τον Siikala (2002, σ. 18) οι μυθικές παραδόσεις φέρουν στοιχεία από το παρελθόν και είναι σε θέση να μιλήσουν για αυτό, επανατοποθετώντας το παρελθόν στο παρόν. Την εποχή των μύθων η σχέση με τη φύση ήταν πνευματική, με στόχο να βρει και να διατηρήσει μια ισορροπία μεταξύ ανθρώπου και φύσης. Η επιβίωση της ζωής των ανθρώπων, κατά την εποχή των μύθων και στη αρχαιότητα, εξαρτιόταν από τη φύση και η ισορροπία μεταξύ ανθρώπων και φύσης ήταν πολύ σημαντική για την εξέλιξη της ανθρωπότητας. Ειδικότερα στην αρχαιότητα υπήρχε σταθερή αλληλεπίδραση τόσο με τις ορατές, όσο και με τις αόρατες δυνάμεις της φύσης, ενώ μέσω της φύσης έρχονταν σε επαφή με τα πνεύματα και τις θεϊκές δυνάμεις αυτής (Alhonen, 2012). Για παράδειγμα, για τους αρχαίους Φιλανδούς όλα στη φύση είχαν τη δική τους αόρατη Ψυχή, η οποία κατά κάποιον τρόπο ήταν συνδεδεμένη με το φυσικό φαινόμενο, το οποίο γίνεται αντιληπτό από τις αισθήσεις. Το δάσος και άλλα στοιχεία της φύσης, όπως τα δέντρα, το νερό, οι πέτρες, η φωτιά, τα ζώα και τα φυτά ελέγχονταν από πνεύματα στη φύση, ενώ σε μεγάλο βαθμό η μυθική τους παράδοση διέθετε ξωτικά ή νεράιδες. Όλα τα πράγματα, είτε έμψυχα είτε άψυχα, ανθρώπινα ή μη, είχαν το δικό τους Πνεύμα, ενώ το καθήκον των πνευμάτων ήταν να προστατεύει και να υπερασπίζεται πολλά πράγματα και μερικές φορές, επίσης,να τα ελέγχει. (Hyry et al., 1995; Alhonen 2012.)

Στη σύγχρονη εποχή, οι μύθοι είναι σημαντικοί, καθώς δημιουργούν μια σύνδεση με αμετάβλητα κύρια γεγονότα του παρελθόντος. Οι μύθοι επίσης καθιερώνουν ένα κοινωνικό σύνολο ενωμένο με έννοιες κοινής προέλευσης. Αντιμετωπίζοντας τόσο πολιτισμικά όσο και υπαρξιακά τους μύθους, αποδεικνύεται ότι αποτελούν βάση για τον αυτοπροσδιορισμό και τις εθνικές ταυτότητες. (Siikala 2002.) Μέσω των μύθων τα παιδιά είναι σε θέση να γνωρίσουν το παρελθόν και να πάρουν δάνεια πολύτιμα από αυτό, ενώ σε μικρότερες ηλικίες οι μύθοι, συνδεδεμένοι με τη δράση των παιδιών, τους παρέχουν τη δυνατότητα να προσεγγίσουν με έναν βιωματικό τρόπο το παρελθόν και να λάβουν γνώσεις σχετικά με αυτό, στηριζόμενα στη φαντασία τους (Kumpulainen, 2018). Αυτό δίνει επίσης τη δυνατότητα στα παιδιά να συμμετέχουν σε σχεδιασμό, δημιουργία και αξιολόγηση των δικών τους δραστηριοτήτων και περιβαλλόντων μάθησης (Kumpulainen, 2018.) Επίσης, μια εκπαιδευτική διαδικασία, που στηρίζεται στους μύθους, δημιουργεί πιο ελεύθερα περιβάλλοντα μάθησης, όπου οι ίδιοι οι μαθητές είναι σε θέση να σχεδιάσουν τις εκπαιδευτικές δραστηριότητες, ζωντανεύοντας ιστορίες και συσχετίζοντας τη δική τους πραγματικότητα με το παρελθόν. Επιπλέον, μέσω των μύθων, δημιουργείται ένα *παιγνιώδες* περιβάλλον μάθησης, προσφέροντας στους μαθητές προσχολικής ηλικίας τη δυνατότητα να προσεγγίσουν ολιστικά το παρελθόν. Η *παιγνιώδης* αυτή φύση, την οποία διαθέτουν οι μύθοι, αποτελεί και τον βασικό τρόπο εκπαίδευσης στην προσχολική ηλικία, καθώς το παιχνίδι συνιστά από μόνο του μια διαδικασία μάθησης (Pramling Samuelson & Asplund Carlson, 2008)

ΤΟ ΔΡΑΜΑ ΩΣ ΠΑΙΔΕΥΤΙΚΟ ΕΡΓΑΛΕΙΟ

Το αρχαίο δράμα όμως, που στηρίζεται στον μύθο και θέτει τα παιδιά μετόχους σε ένα φανταστικό περιβάλλον, επιτρέπει σε όλα τα παιδιά να εξετάσουν με τη δική τους οπτική και με τον δικό τους τρόπο σημαντικά για την ανθρωπότητα ζητήματα (Papadopoulos, 2010).

Η Παιδαγωγική Αξία του Αρχαίου Δράματος διαφαίνεται, επίσης, και στην χρήση όλων των γνώσεων και εμπειριών από τα παιδιά, για να προσεγγίσουν τα όσα ο τραγικός Υποκριτής τους παρουσιάζει, παροτρύνοντάς τα να συμμετέχουν στην ανακατασκευή της πραγματικότητας και στην διαφορετική της προσέγγιση. Όπως επισημαίνει η Karamitrou (2004:47) αυτό συμβαίνει διότι «*Το Θέατρο δεν αντανακλά τη στατικότητα μιας καθιερωμένης πραγματικότητας, αλλά αναζωπυρώνει καταλυτικά σε μιαν εγγραφή, που είναι ανεπανάληπτη και την μετάθεση σε μιαν άλλη αρχέτυπη κι επικίνδυνη πραγματικότητα*». Μέσα από την παρακολούθηση έργων του Αρχαίου Θεάτρου ο σύγχρονος θεατής καλείται να επαναπροσεγγίσει τα ζητήματα, τα οποία απασχολούσαν στην αρχαιότητα τους πολίτες, και να τα επανατοποθετήσει στη σύγχρονη εποχή, διερευνώντας κατά πόσο οι αξίες, οι οποίες προβάλλονται, υφίστανται και σήμερα και καθορίζουν και τη δική του πραγματικότητα (Walton, 2009). Η πνευματική του κληρονομιά, μάλιστα, αποτυπώνεται και στα χρόνια τα οποία το Αρχαίο Δράμα αποτελεί ύψιστη μορφή καλλιτεχνικής *αποτύπωσης*, με αποτέλεσμα η κληρονομιά αυτή να κρίνεται αναγκαίο, με *παιγνιώδη* πάντα τρόπο και σύμφωνα με τη φύση τους και τα αναπτυξιακά τους στάδια, να προσεγγίζεται από τα παιδιά. Όπως τονίζει η Karamitrou (2004:58) «η Δραματική Τέχνη είναι Καθολική…. Της Τραγωδίας λοιπόν ο χαρακτήρας είναι Ανθρωποκεντρικός και Πανευρωπαϊκός…», διασαφηνίζοντας ότι είναι σε θέση να προσεγγιστεί από όλους και όλοι να αποκομίσουν τα οφέλη της.

Ο ΜΥΘΟΣ ΤΗΣ ΣΟΦΟΚΛΕΙΑΣ *ΑΝΤΙΓΟΝΗΣ*

Ο Πολυνείκης και ο Ετεοκλής, προσπαθώντας να μοιράσουν την *κληρονομιά* του πατέρα τους, συμφώνησαν να βασιλεύουν ανά έτος στη Θήβα. Ο Ετεοκλής ήταν ο πρώτος που έγινε βασιλιάς, αλλά, όταν ήλθε η ώρα να παραδώσει τη βασιλεία στον Πολυνείκη, αρνήθηκε. Τότε ο Πολυνείκης έφυγε από τη Θήβα και κατέφυγε στο Άργος. Στο Άργος

παντρεύτηκε την κόρη του βασιλιά Άδραστου και μαζί με πέντε ηγεμόνες του Άργους εκστράτευσε εναντίον της Θήβας, με στόχο να εκδικηθεί τον αδελφό του για την αδικία που βίωσε. Μαζί με τον Πολυνείκη και τους ηγεμόνες πήγε και ο πεθερός του Πολυνείκη. Έτσι οι επτά Αργείοι στρατηγοί αντιμετώπισαν τους επτά ήρωες των Θηβών,οι οποίοι υπερασπίζονταν την Πόλη. Η τελική μονομαχία ήταν ανάμεσα στον Ετεοκλή και στον Πολυνείκη, η οποία και έληξε με τον Θάνατο τον δύο αδελφών. Η πόλη σώθηκε και στη συνέχεια έπρεπε να ληφθούν αποφάσεις σχετικά με τα Σώματα των Νεκρών.

Έπειτα από τον Θάνατο του Ετεοκλέους, άρχοντας της πόλης γίνεται ο Κρέων, ο οποίος ήταν αδελφός της Ιοκάστης και θείος των παιδιών. Η Αντιγόνη ήταν αρραβωνιασμένη με τον γιο του, Αίμωνα, και επρόκειτο σύντομα να τον παντρευτεί. Ο Κρέοντας, ανακοινώνοντας ότι ο Πολυνείκης ευθύνεται για την τραγωδία, εξέδωσε διαταγή να ταφεί το Σώμα του Ετεοκλέους με τις αντίστοιχες τιμές, ενώ για το Σώμα του Πολυνείκη διάταξε να παραμείνει άταφο, για να αποδείξει σε όλους την *προδοσία* του. Η διαταγή αυτή αποτελεί και το βασικό σημείο έναρξης του έργου, καθώς η Αντιγόνη, παρακινημένη από την Αγάπη της για τον αδελφό της, αποφασίζει να τον θάψει. Η ίδια ενημερώνει για την απόφασή της αυτή, μόνον, την αδελφή της Ισμήνη, η οποία και προσπαθεί να τη μεταπείσει, γιατί η εντολή του Κρέοντος ήταν ρητή και ανέφερε ότι όποιος τολμήσει να παραβεί τη διαταγή και να θάψει τον Πολυνείκη θα θανατωθεί. Η Αντιγόνη ανένδοτη αποφασίζει να θάψει το Σώμα του Πολυνείκη και να του αποδώσει τις κατάλληλες τιμές, αδιαφορώντας για τις συνέπειες που θα της επιβάλλονταν.

Κατά τη διάρκεια της πράξης της ταφής, οι στρατιώτες του Κρέοντα συλλαμβάνουν την Αντιγόνη και την οδηγούν στον Κρέοντα, ο οποίος, μένοντας πιστός στις αρχές τους και στην αρχική του διαταγή, δίνει την εντολή να θανατωθεί η Αντιγόνη. Το έργο στηρίζεται και περιγράφει την αντιπαράθεση ανάμεσα στον Κρέοντα και στην Αντιγόνη, η οποία δε μετανοιώνει για την πράξη της και την υπερασπίζεται σθεναρά, με αποτέλεσμα ο Κρέοντας να την κλείσει ζωντανή σε έναν υπόγειο θάλαμο με σκοπό να πεθάνει. Τελικά η Αντιγόνη πεθαίνει και ο Αίμων, μόλις μαθαίνει τον χαμό της, αυτοκτονεί. Μετά την αυτοκτονία του Αίμονα ακολουθεί ένα ακόμη τραγικό γεγονός καθώς και η Ευρυδίκη, η μητέρα του και γυναίκα του Κρέοντα, αυτοκτονεί από την αγάπη της για το παιδί της. Το τέλος του έργου δεν αναδεικνύει κάποιον νικητή ανάμεσα στη σύγκρουση που είχε αρχίσει στον Κρέοντα και στην Αντιγόνη, καθώς και οι δύο εν τέλει βγαίνουν χαμένοι από τις αποφάσεις που έλαβαν, στοιχείο που το αναγνωρίζει και ο ίδιος ο Κρέοντας στο τέλος του έργου.

ΠΑΙΔΑΓΩΓΙΚΕΣ ΑΞΙΕΣ ΣΤΗΝ *ΑΝΤΙΓΟΝΗ* ΤΟΥ ΣΟΦΟΚΛΕΟΥΣ

Οι Αξίες της Σοφόκλειας *Αντιγόνης* προσφέρουν στα παιδιά τη δυνατότητα να χτίσουν ένα σύστημα Αξιών.

Η ΕΝΝΟΙΑ ΤΟΥ «ΝΟΜΟΥ» ΣΤΗΝ *ΑΝΤΙΓΟΝΗ*

Η βασική έννοια στο έργο *Αντιγόνη* του Σοφοκλέους είναι η έννοια του Νόμου, η οποία και προκαλεί τη διαμάχη μεταξύ του Κρέοντος και της *Αντιγόνης*. Ειδικότερα, ο Κρέων υπερασπιζόταν με σθένος τους Νόμους του Κράτους, οι οποίοι και απαγόρευαν σε έναν προδότη της πατρίδας του να ταφεί, ενώ αντίθετα, η *Αντιγόνη* αψήφησε τους Νόμους των Ανθρώπων και παράκουσε τις εντολές του Κρέοντος, υπερασπιζόμενη με αυταπάρνηση τους Νόμους των θεών.

Η ΑΞΙΑ ΤΗΣ ΘΡΗΣΚΕΙΑΣ ΚΑΙ Η ΣΧΕΣΗ ΤΗΣ ΜΕ ΤΗΝ ΠΟΛΗ

Η αντιπαράθεση της *Αντιγόνης* και του Κρέωντος σε όλο το έργο αποτυπώνει την αξία της Θρησκείας στη Ζωή των πολιτών της εποχής. Οι Θεοί αποτελούν τα πρόσωπα εκείνα που έχουν θέσει εξαρχής τον τρόπο με τον οποίο πρέπει να ζουν οι άνθρωποι και η *ανυπακοή* τους απέναντι στα όσα έχουν προστάξει δύναται να επιφέρει την *καταστροφή*. Το *δίκαιο* και το *άδικο* καθορίζεται από τους Θεούς και εν τέλει Εκείνοι μπορούν να αποφασίσουν πότε ένας άνθρωπος πρέπει να καταστραφεί και πότε να σωθεί. Οι δίκαιοι νόμοι, τους οποίους έχουν προσφέρει στους ανθρώπους, αποτελούν τα στοιχεία εκείνα που έχουν καθορίσει τη λειτουργία των πόλεων και για τον λόγο αυτό οι νόμοι και οι αποφάσεις των ανθρώπων δεν μπορούν να υπερβούν τη δική τους *βούληση*.

Η ΑΞΙΑ ΤΗΣ ΔΙΚΑΙΟΣΥΝΗΣ ΚΑΙ ΤΟΥ ΚΑΘΗΚΟΝΤΟΣ

Η Δικαιοσύνη και ο τρόπος με τον οποίο εκφραζόταν την εποχή εκείνη αποτυπώνεται στο έργο ως μια βασική αξία. Για την *Αντιγόνη* η αξία αυτή απορρέει από τους Θεϊκούς νόμους, ενώ για τον Κρέοντα η Δικαιοσύνη απορρέει από τον ίδιο και από τον ρόλο που κατέχει στην Πόλη.

Η ΑΞΙΑ ΤΗΣ ΑΓΑΠΗΣ

Η αδελφική Αγάπη της *Αντιγόνης* την παρακινεί να παραβιάσει τις διαταγές του Κρέοντος και να αψηφήσει τον Θάνατο, θέτοντας ανώτερους τους Θεϊκούς Νόμους και αποφασίζει με κίνδυνο της ζωή της να του προσφέρει τις πρέπουσες *τιμές*. Η ίδια, μάλιστα, υποστηρίζει ότι *δεν γεννήθηκε για να μισεί, αλλά για να αγαπά* (*ουτοι συνέχθειν αλλά συμφιλείν έφυν*).

Η ΑΞΙΑ ΤΗΣ ΙΚΑΝΟΤΗΤΑΣ ΤΟΥ ΑΝΘΡΩΠΟΥ ΝΑ ΑΝΤΙΔΡΑ ΣΤΙΣ ΑΠΟΦΑΣΕΙΣ ΤΗΣ ΕΞΟΥΣΙΑΣ

Η *Αντιγόνη* αποτελεί μια ηρωίδα με ανθρώπινη διάσταση, μια κοινή θνητή, η οποία αποφασίζει να δράσει ενάντια στους νόμους της τότε κοινωνίας και να ακολουθήσει πιστά τις δικές της Απαρασάλευτες Αρχές και Αξίες.

Η ΑΞΙΟΠΟΙΗΣΗ ΤΩΝ ΨΗΦΙΑΚΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΣΤΗ ΔΙΔΑΣΚΑΛΙΑ ΤΗΣ ΑΝΤΙΓΟΝΗΣ ΣΤΗΝ ΠΡΟΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Η διδασκαλία του Μύθου έγινε με εικονική αναπαράσταση, για να γίνει διαδραστικότερη και κατανοητότερη στα παιδιά. Οι εικονικές αναπαραστάσεις είναι ένα πολύτιμο εργαλείο στη διδακτική πράξη της προσχολικής εκπαίδευσης, ειδικά στη διδασκαλία μύθων όπως της Αντιγόνης. Τα παιδιά μπορούν να κατανοήσουν καλύτερα την πλοκή, τους χαρακτήρες και τα συναισθήματα του μύθου, μέσα από εικόνες. Η οπτική προσέγγιση ενισχύει την αφηγηματική κατανόηση, καθώς τα παιδιά συνδέουν το λόγο με την εικόνα, διευκολύνοντας την απομνημόνευση και τη συσχέτιση. Επιπλέον, οι εικόνες καλλιεργούν τη φαντασία και τη δημιουργικότητα, ενώ ενθαρρύνουν τη συναισθηματική εμπλοκή, βοηθώντας τα παιδιά να ταυτιστούν με τους ήρωες και να κατανοήσουν αξίες, όπως η αυτοθυσία και η αγάπη. Τέλος, η εικονική προσέγγιση καθιστά τη μάθηση πιο ευχάριστη και προσιτή.

Για την αφήγηση της ιστορίας χρησιμοποιήθηκαν οι κούκλες-ήρωες, δίνοντας έμφαση στους βασικούς χαρακτήρες και τα συναισθήματά τους. Οι μαθητές χρησιμοποιώντας τις μαριονέτες, υποδύθηκαν τους ρόλους της *Αντιγόνης*, του Κρέοντα, της Ισμήνης και έτσι πυροδοτήθηκε συζήτηση για τα μηνύματα του μύθου, όπως η σημασία της αυτοθυσίας και της αγάπης.

Έγινε χρήση του ψηφιακού εργαλείου Puppet Pals, προσφέροντας μια σύγχρονη και συναρπαστική διάσταση στη διδασκαλία μύθων. Τα παιδιά ανέλαβαν ενεργό ρόλο στην αφήγηση, δημιουργώντας τις δικές τους θεατρικές παραστάσεις με χαρακτήρες-κούκλες. Οι μαθητές επέλεξαν τους χαρακτήρες, σχεδίασαν σκηνικά και συνέθεσαν διαλόγους, αναπαριστώντας την ιστορία με τρόπο που αντανακλά τη φαντασία και τη δημιουργικότητά τους. Το Puppet Pals μετατρέπει την παραδοσιακή αφήγηση σε διαδραστικό παιχνίδι, προσφέροντας στα παιδιά την ευκαιρία να πειραματιστούν με διαφορετικά σενάρια και εκδοχές της ιστορίας. Οι μαθητές, ως σκηνοθέτες και ηθοποιοί ταυτόχρονα, χειρίζονται ψηφιακές κούκλες που κινούνται στην οθόνη, ζωντανεύοντας τους χαρακτήρες του μύθου. Έτσι, η αφήγηση μεταμορφώνεται σε ένα διασκεδαστικό θεατρικό έργο, που ενισχύει τη φαντασία και τη συναισθηματική εμπλοκή. Ταυτόχρονα η χρήση της εφαρμογής καλλιεργεί σημαντικές δεξιότητες, όπως η συνεργασία, η επικοινωνία και η επίλυση προβλημάτων. Τα παιδιά όχι μόνο μαθαίνουν την ιστορία της *Αντιγόνης*, αλλά αναπτύσσουν κριτική σκέψη, εκφραστικότητα και δημιουργική αυτοέκφραση. Το Puppet Pals καθιστά τη μάθηση ευχάριστη και καινοτόμα, ενσωματώνοντας την τεχνολογία σε ένα περιβάλλον που εμπνέει δημιουργικότητα και ενθουσιασμό.

Χρησιμοποιήθηκαν και άλλα ψηφιακά εργαλεία, όπως το Toontastic. Το Toontastic είναι μια διαδραστική ψηφιακή εφαρμογή, η οποία επιτρέπει στα παιδιά να δημιουργούν και να αφηγούνται τις δικές τους ιστορίες μέσω κινουμένων σχεδίων. Στη διδασκαλία του μύθου της *Αντιγόνης* η εφαρμογή αξιοποιήθηκε δημιουργικά**,** προσφέροντας έναν ελκυστικό τρόπο μάθησης.

Καθώς η ιστορία περιέχει έννοιες όπως η αυτοθυσία, η αγάπη και η οικογένεια, το Toontastic επιτρέπει στους μαθητές να κατανοήσουν αυτές τις ιδέες μέσα από τη δική τους ενεργό συμμετοχή. Οι εκπαιδευτικοί παρουσίασαν την ιστορία μέσα από απλά λόγια και να ζήτησαν από τα παιδιά να δημιουργήσουν σκηνές που να αποτυπώνουν βασικές στιγμές, όπως την απόφαση της *Αντιγόνης* να θυσιαστεί για την ταφή του αδερφού της.

Η χρήση χαρακτήρων και φωνών, τα οποία προσφέρονται στην εφαρμογή, ενίσχυσαν την κατανόηση και την ενσυναίσθηση, ενώ τα παιδιά είχαν την ευκαιρία να συμμετάσχουν στη διαδικασία δημιουργίας, ενισχύοντας τη φαντασία και την αυτοέκφραση. Με τη βοήθεια του Toontastic τα παιδιά συνεργάστηκαν, δημιούργησαν οπτικοποιημένες αφηγήσεις και παρουσίασαν τις δικές τους εκδοχές του μύθου, ενισχύοντας τη γλωσσική ανάπτυξη, τη δημιουργικότητα και την ομαδικότητα. Η εφαρμογή προσέφερε έναν ευχάριστο τρόπο εισαγωγής της μυθολογίας στην τάξη, συνδυάζοντας τη μάθηση με το παιχνίδι.

Επιπλέον, χρησιμοποιήθηκαν για την καλύτερη κατανόηση του κειμένου εικονογραφημένα βιβλία. Η αφήγηση με εικονογραφημένα βιβλία ή παρουσιάσεις αποτελεί έναν ιδανικό τρόπο διδασκαλίας του μύθου στην προσχολική ηλικία, καθώς ενισχύει την κατανόηση και την αλληλεπίδραση των παιδιών με την ιστορία. Ακόμα, όπου ήταν δυνατό έγιναν παρουσιάσεις με υλικό από βιβλία όπως «Αρχαίες Ελληνικές Τραγωδίες σε διασκευή για παιδιά» Η δημιουργία παρουσιάσεων με απλές, ζωντανές και χρωματιστές εικόνες βοήθησε τα παιδιά να οπτικοποιήσουν τα γεγονότα και να συνδεθούν συναισθηματικά με τους χαρακτήρες.

Η αφήγηση συνοδεύτηκε από απλά κείμενα ή διαλόγους, ώστε να είναι πιο κατανοητά στα παιδιά. Ταυτόχρονα συμμετείχαν ενεργά στην αφήγηση προσθέτοντας τα δικά τους σχόλια, διαλόγους, ενισχύοντας τη φαντασία και τη γλωσσική τους ανάπτυξη. Επίσης οι μικροί μαθητές ζωγράφισαν εικόνες της ιστορίας, οι οποίες στη συνέχεια θα ενσωματώθηκαν στην παρουσίαση. Αυτό καλλιέργησε την αυτοέκφραση και ενίσχυσε το αίσθημα της συμμετοχής τους στη διαδικασία. Με αυτόν τον τρόπο η ιστορία της *Αντιγόνης* γίνεται πιο κατανοητή και βιωματική, προσφέροντας στα παιδιά την ευκαιρία να αναπτύξουν τόσο τη δημιουργικότητά τους, όσο και την ενσυναίσθησή τους για τις αξίες που πρεσβεύει ο μύθος.

Η δραματοποίηση μέσω της ανάληψης ρόλων είναι σημαντική για την κατανόηση και την εμπέδωση του μύθου. Έτσι, τα παιδιά ανέλαβαν ρόλους από την τραγωδία της *Αντιγόνης* και ζωντάνεψαν την ιστορία με δραματοποιημένη προσέγγιση, συνδυάζοντας δημιουργικότητα και φαντασία. Φόρεσαν απλά κοστούμια και αξεσουάρ που ενίσχυσαν την ατμόσφαιρα, ενώ το σκηνικό τους πλαισιώθηκε από μουσική και ηχητικά εφέ, τα οποία προστέθηκαν ψηφιακά. Οι ήχοι τόνισαν τις συναισθηματικές στιγμές της ιστορίας, δημιουργώντας μια συναρπαστική εμπειρία, τόσο για τους συμμετέχοντες όσο και για τους θεατές. Η δραστηριότητα ανέδειξε το θεατρικό ταλέντο των παιδιών, προάγοντας την ομαδικότητα, την έκφραση και τη σύνδεση με τον αρχαίο ελληνικό πολιτισμό μέσω μιας διαδραστικής και σύγχρονης προσέγγισης.

Επιπλέον χρησιμοποιήθηκαν και άλλες ψηφιακές εφαρμογές στη διδασκαλία του μύθου. Η εφαρμογή Επαυξημένης Πραγματικότητας (AR) Quiver προσέφερε μια συναρπαστική διάσταση στη διδασκαλία του μύθου της *Αντιγόνης*, ενισχύοντας τη φαντασία και τη συμμετοχή των μαθητών. Μέσω της εφαρμογής οι μαθητές χρωμάτισαν ειδικά σχεδιασμένα πρότυπα, τα οποία απεικόνιζαν σκηνές και χαρακτήρες από την τραγωδία. Σαρώνοντας τα σχέδια με την κάμερα του κινητού ή του tablet, οι εικόνες ζωντάνεψαν τρισδιάστατα μπροστά τους, δημιουργώντας έναν αλληλεπιδραστικό κόσμο. Στη συγκεκριμένη περίπτωση οι μαθητές χρωμάτισαν και «ζωντάνεψαν» την *Αντιγόνη*, τον Κρέοντα, την Ισμήνη, παρακολουθώντας τους να εκτελούν βασικές σκηνές της ιστορίας, όπως η αυτοθυσία της *Αντιγόνης*. Με τα τρισδιάστατα μοντέλα οι μαθητές απέκτησαν μια πιο ζωντανή εικόνα της αφήγησης, ενώ μπόρεσαν να εξερευνήσουν τις λεπτομέρειες κάθε χαρακτήρα. Επιπλέον η εφαρμογή ενσωματώθηκε σε δραματοποιήσεις ή αναπαραστάσεις σκηνών. Τα παιδιά χρησιμοποίησαν τις AR εικόνες ως εικονικά σκηνικά, δημιουργώντας μια μοναδική θεατρική εμπειρία. Αυτή η προσέγγιση εμπλούτισε τη διδασκαλία, προσέφερε κίνητρα για μάθηση και συνέδεσε την αρχαία ελληνική μυθολογία με σύγχρονες τεχνολογίες.

Τέλος το ψηφιακό πάζλ αγαπήθηκε ιδιαίτερα από τα παιδιά, μέσω της ψηφιακής εφαρμογής Jigsaw Planet (διαδικτυακή πλατφόρμα για δημιουργία ψηφιακών παζλ). Δημιουργήθηκε ένα ψηφιακό παζλ με εικόνες από την ιστορία. Τα παιδιά κλήθηκαν να συναρμολογήσουν το παζλ και μόλις ολοκληρώθηκε η εικόνα εντόπισαν τη σκηνή που τους θύμιζε από την τραγωδία.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η διδασκαλία του μύθου της *Αντιγόνης* στην προσχολική εκπαίδευση με ψηφιακά εργαλεία αποτελεί μια πολυδιάστατη προσέγγιση, η οποία ενισχύει την ενεργή συμμετοχή των παιδιών και προάγει τη μαθησιακή διαδικασία. Προϋποθέτει φυσικά ο ο εκπαιδευτικός να έχει δομήσει ορθά τις διαδικασίες, τις οποίες θα εφαρμόσει και τον τρόπο με τον οποίο θα παρουσιαστεί ο μύθος, ώστε να μπορούν οι μαθητές να παρακολουθούν την εξέλιξη του.

Ο συνδυασμός παραδοσιακών και σύγχρονων μεθόδων προσφέρει μια ολιστική προσέγγιση στη διδασκαλία, ενθαρρύνοντας τη συμμετοχή, την κατανόηση και την αγάπη για τη μάθηση, αναδεικνύοντας την αξία της δημιουργικότητας και της καινοτομίας στη σύγχρονη εκπαίδευση. Επίσης τα παιδιά έρχονται σε επαφή με την αρχαία ελληνική μυθολογία, καθιστώντας τον μύθο προσιτό και ελκυστικό για τα παιδιά του σήμερα.

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ΘΠ25: Η ψηφιακή αφήγηση στη διδακτική πράξη

Η ΣΥΜΒΟΛΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΑΦΗΓΗΣΗΣ ΣΤΗΝ ΛΟΓΟΤΕΧΝΙΑ ΣΤΗΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑ ΕΚΠΑΙΔΕΥΣΗ: Η ΠΕΡΙΠΤΩΣΗ ΤΗΣ ΠΛΑΤΩΝΙΚΗΣ ΑΛΛΗΓΟΡΙΑΣ ΤΟΥ ΣΠΗΛΑΙΟΥ

Δρ. Κοψάρης Κοσμάς
Διευθυντής 2ου Γυμνασίου Πρέβεζας
e-mail: kkopsaris@hotmail.com

ΠΕΡΙΛΗΨΗ

Στόχος της συγκεκριμένης εισήγησης αποτελεί η απόδοση των καταλυτικών εννοιών που συνέχουν την αλληγορία του σπηλαίου μέσω της ψηφιακής αφήγησης. Αρχικά, θα γίνει μια επισκόπηση της σημασίας της λογοτεχνικής εκπαίδευσης κατά τον 21ο αιώνα, καθώς και της βαρύτητας της λογοτεχνίας στην σύγχρονη εποχή ως μέσο αξιοποίησης των νέων γραμματισμών. Θα γίνει αναφορά στο κατά πόσο η ψηφιακή αφήγηση μπορεί να συντελέσει καταλυτικά στην εξοικείωση, στη δημιουργική εμβάθυνση και στην αφομοίωση θεματικών που διέπονται από έντονες εννοιολογικές διχοστασίες, όπως γνώση-άγνοια, φως-σκοτάδι, δεσμά-ελευθερία, θεωρητικός βίος στον αντίποδα του ενεργού-πρακτικού βίου. Θα τονιστεί ο ρόλος των μαθητών στο σχεδιασμό και στην επιτυχή πραγμάτωση του συγκεκριμένου εκπαιδευτικού σεναρίου. Ο πλατωνικός μύθος του σπηλαίου συνιστά μια αστείρευτη δεξαμενή έμπνευσης για τους σύγχρονους δημιουργούς. Μεθοδολογικά, γίνεται εφαρμογή της ψηφιακής αφήγησης κατά την φάση της ανάγνωσης της αλληγορίας και σε ένα δεύτερο επίπεδο στην φάση ύστερα από την ανάγνωση ώστε να προβούν οι μαθητές σε σύνθετους κριτικούς συσχετισμούς και σε διακειμενικές προσεγγίσεις. Για μια διαγνωστική προσέγγιση μέσω της ψηφιακής αφήγησης, ανατέθηκαν εργασίες στους μαθητές, όπως για παράδειγμα η κατασκευή μιας χρονογραμμής αποτύπωσης των σταδίων αποδέσμευσης με τη χρήση του διαδικτυακού εργαλείου timerime ή της δημιουργίας μιας πολυμεσικής αφίσας με τη χρήση των διαδικτυακών εργαλείων popplet ή glogster.

Σε αυτή τη βάση, η εξιστόρηση της πλατωνικής αλληγορίας του σπηλαίου μέσω των εργαλείων της ψηφιακής αφήγησης συνέβαλε σημαντικά στην κατανόηση των δύσκολων φιλοσοφικών εννοιών της από τους μαθητές, καθιστώντας την φιλοσοφική αφήγηση περισσότερο εύληπτη και συντελώντας ώστε να εμπεδωθεί η έννοια της αναπαράστασης στη λογοτεχνία, καθώς και των ειδικότερων αφηγηματικών μέσων και τεχνικών, όπως ο διάλογος ή η μίμηση.

Παράλληλα, η ψηφιακή αξιοποίηση μέσα από τη συγκεκριμένη περίπτωση είναι χρήσιμη για την κατανόηση των βαθύτερων και συμπαντικών νοημάτων που ενέχει η αλληγορία του σπηλαίου του Πλάτωνα ως λογοτεχνικό είδος που επικοινωνεί με πλήθος έργων της σύγχρονης λογοτεχνίας. Ως εκ τούτου, ο πλατωνικός απόηχος σχετίζεται με τη δυνατότητα της αυτοπραγμάτωσης όταν η εκάστοτε τρέχουσα πραγματικότητα συνθλίβει την αυτενέργεια και ετεροκαθορίζει το άτομο. Μέσω μιας ψηφιακής αφήγησης οι μαθητές, όπως και κάθε αναγνώστης, έχουν τη δυνατότητα να μυηθούν στα άδυτα του πλατωνικού σπηλαίου, ακολουθώντας τους δεσμώτες στον ανηφορικό δρόμο προς την ελευθερία της ύπαρξης. Αυτό συνεπάγεται ότι μέσω μιας ψηφιακής αποτύπωσης οι μαθητές είναι σε θέση να εσωτερικεύσουν και να εμπεδώσουν πλήρως ένα θεωρητικό μοντέλο που μπορεί να τους φανεί ιδιαίτερα δύσκολο και απρόσιτο.

Συνοψίζοντας, μέσω των ψηφιακών εργαλείων οι μαθητές γίνονται ενεργοί δείκτες μιας αναπαριστώμενης ιστορίας, προσλαμβάνουν βιωματικά την πλατωνική αλληγορία, έχοντας την αίσθηση μιας προσωπικής συμβολής στην μετάβαση των δεσμωτών από το σκοτάδι στο φως. Το φιλοσοφικό ταξίδι έτσι τρέπεται σε ένα προσωπικό οδοιπορικό στην πλήρη γνώση του κοσμικού μηχανισμού ως ελλείπον σημείο και συνάμα απώτερος στόχος της πλατωνικής αλληγορίας του σπηλαίου.

Λέξεις – κλειδιά: ψηφιακή αφήγηση, πλατωνική αλληγορία

ΕΙΣΑΓΩΓΗ

Το συγκεκριμένο κείμενο αποβλέπει στην απόδοση όψεων της αξιοποίησης της ψηφιακής αφήγησης για την αναπαράσταση της πλατωνικής αλληγορίας του σπηλαίου, μιας ιδιαίτερης ενότητας στην ύλη των αρχαίων προσανατολισμού της θεωρητικής κατεύθυνσης για την Γ Λυκείου. Διαμόρφωσα το παρουσιαζόμενο διδακτικό σενάριο κατά το διάστημα που δίδασκα το συγκεκριμένο μάθημα στο Γενικό Λύκειο. Αξίζει να επισημανθεί ότι: «η ψηφιακή αφήγηση είναι ο συνδυασμός της παραδοσιακής, προφορικής αφήγησης με σύγχρονα εργαλεία τεχνολογίας και πολυμέσων του 21ου αιώνα, ενώ θα μπορούσαμε να πούμε ότι αποτελεί και μία νέα μορφή έκφρασης που χρησιμοποιεί την εικόνα, τη μουσική, τον ήχο, το βίντεο και την αφήγηση.

Σύμφωνα με τον Πασχαλίδη, η λογοτεχνική εκπαίδευση συνδέεται με τον λογοτεχνικό γραμματισμό (Paschalidis, 2018:37-39). Η λογοτεχνία βοηθά τον εκάστοτε δέκτη να έχει μια διασταλτική οπτική (Langer, 2018:28-29), συμβάλλοντας καταλυτικά στην «οικοδόμηση αναπαραστάσεων» (Langer, 28-29). Η αναγνωστική εμπειρία συντελεί ουσιαστικά στον έφηβο-αναγνώστη στην όξυνση της κριτικής του ικανότητας (Frydaki, 2006: 170). Η δημιουργικότητα στην λογοτεχνία συνδέεται με τη δημιουργική γραφή (Souliotis, 1995:18). Στη σύγχρονη εποχή ο γραμματισμός δεν έχει σχέση μόνο με το λόγο αλλά διέπεται από πολυτροπικότητα. (Koutsogiannis 2011: 18, 21, 44-46). Σε αυτό το πλαίσιο, επιτυγχάνεται η διαμεσολάβηση που είναι βασικό εργαλείο της διερευνητικής μάθησης (Siegel, 1995: 473). Η ψηφιακή αφήγηση αναδιαμορφώνει τη χρήση της τεχνολογίας σε νέα δεδομένα δημιουργικής συμμετοχής των εμπλεκόμενων (Ohler, 2008:15-16).

Οι ιστορίες που κατασκευάζει ο ψηφιακός δημιουργός, βασίζονται στην εικόνα και τον ήχο, μέσω των οποίων μεταφέρεται το μήνυμα που επιθυμεί να μεταδώσει. Πρόκειται για μία διαδικασία σύνθετη και ουσιώδη, η οποία δεν μεταφέρει απλώς ένα μήνυμα, αλλά δίνει ταυτόχρονα στον δημιουργό ένα ισχυρό μέσο προσωπικής έκφρασης και τη δυνατότητα να μπορέσει ανεξαρτήτως τόπου και χρόνου, να ακουστεί και να προβληθεί αυτό που θέλει μέσω της ιστορίας του» (Terzaki, 2023:6). Ορθά επισημαίνεται ότι: «ο κριτικός ψηφιακός γραμματισμός δεν εξαντλείται στην κριτική ανάγνωση της ψηφιακής πραγματικότητας, αλλά ολοκληρώνεται μέσα από τη δημιουργία και την κατασκευή προϊόντων ΤΠΕ και ηλεκτρονικών ΜΜΕ, δίνοντας στους μαθητές την αναντικατάστατη μαθησιακή ευκαιρία για πρόσβαση σε επίμαχο περιεχόμενο, συγκρουσιακές ιδέες και αντιλήψεις, αντιφατικές αξίες και ιδεολογίες και για δημιουργία, παραγωγή και διάδοση προσωπικών περιεχομένων, γνωστικών κατασκευών και 'προβολών' του κόσμου, επιτρέποντας την ανάληψη δράσης προς την οικοδόμηση ενός δημοκρατικότερου τεχνολογικού μέλλοντος και την ενεργοποίηση της συμμετοχής όλων στην κοινή ζωή και στην παραγωγή γνώσης και πολιτισμού» (Goutsioukosta, 2020:50).

Εξάλλου, «η μορφή και η έκταση της μάθησης καθορίζεται από τις πολιτισμικές συνθήκες υπό τις οποίες εμφανίζεται. Δύο συνθήκες, ιδιαίτερα, έχουν επίπτωση στη μάθηση: αφενός, αν η ταυτότητα ενός ατόμου, η υποκειμενικότητά του ή η αίσθηση του εαυτού του έχουν αναδειχθεί/ εμπλακεί επαρκώς στη μαθησιακή διαδικασία. Και, δεύτερον, αν η δέσμευση είναι τέτοια, ώστε να μπορούν να διευρύνουν τους ορίζοντες της γνώσης και της ικανότητάς τους. Για να μάθουν, οι μαθητές πρέπει να αισθάνονται ότι η μάθηση είναι για αυτούς. Θα πρέπει να αισθάνονται ότι ανήκουν στη διαμόρφωση περιεχομένου, αλλά και στην κοινότητα μάθησης ή στο μαθησιακό περιβάλλον. Πρέπει επίσης να αισθάνονται οικεία με το είδος της μάθησης ή με τον τρόπο που προτίθενται να γνωρίσουν τον κόσμο. Οι εκπαιδευόμενοι πρέπει να κινητοποιούνται από αυτό που μαθαίνουν και θα πρέπει να συμμετέχουν ως ενδιαφερόμενα μέρη/μέτοχοι στη διαδικασία μάθησης. Η διαδικασία μάθησης πρέπει να τους συμπεριλαμβάνει. Όσο πιο πολύ ένας εκπαιδευόμενος 'ανήκει' σε όλα αυτά τα επίπεδα πραγμάτωσης της μάθησης τόσο περισσότερο είναι πιθανό να μαθαίνει με παραγωγικό τρόπο» (Goutsioukosta, 2020:50, Kalantzis, Cope, & Arvanitis: 27-58).

Σε αυτό το πλαίσιο, η «διαμεσολάβηση μπορεί να αποδειχθεί ένα πολύ σπουδαίο εργαλείο για την άσκηση των γραμματισμών στο μάθημα της λογοτεχνίας, καθώς μπορεί να διευρύνει τις ερμηνευτικές δυνατότητες που παρέχουν στους μαθητές τα γραπτά κείμενα, τα οποία συνιστούν το βασικό τύπο σημειωτικού αντικειμένου […]: Πρώτον, ενεργοποιώντας πολλαπλές εναλλακτικές ερμηνείες και οπτικές. Δεύτερον, επιτρέποντας στους μαθητές να αναδιατυπώσουν τα κείμενα χρησιμοποιώντας τροπικότητες και γραμματισμούς με τους οποίους είναι εξοικειωμένοι και έχουν νόημα γι' αυτούς. Άλλωστε, οι καθημερινές τους πρακτικές περιλαμβάνουν μια διαρκή μετακίνηση από σημειωτικό σύστημα σε σημειωτικό σύστημα, καθώς γεμίζουν τα γραπτά μηνύματά τους με emoticons, gifs, memes και στιγμιότυπα βίντεο από το youtube. Η διαμεσολάβηση, λοιπόν, επιτρέπει στους μαθητές να εκφράσουν τις γνώσεις τους και τις ιδέες τους, ενώ συντελεί στην έκφραση νέων ιδεών δυνητικά μη διαθέσιμων σε κάποια άλλα σημειωτικά συστήματα» (Goutsioukosta, 2020:63).

Προσδιορίζοντας περαιτέρω εννοιολογικά την ψηφιακή αφήγηση, αξίζει να ειπωθεί ότι: «ο όρος ψηφιακή αφήγηση αποτελεί μετάφραση του αγγλικού όρου digital storytelling, ο οποίος απαντά συχνότερα στην ξενόγλωσση βιβλιογραφία, χωρίς, ωστόσο, να αποκλείονται και άλλοι όροι όπως digital story, digitale, new media narrative, transmedia storytelling, computer based narratives, digital essays, electronic memoirs κ.α. Στην ελληνική βιβλιογραφία

απαντά συχνά και ο όρος ψηφιακή ιστορία (μετάφραση του αγγλικού όρου digital story), ωστόσο, ο όρος ψηφιακή αφήγηση είναι επικρατέστερος, κυρίως στο διαδίκτυο. Καθώς ο όρος ψηφιακή αφήγηση αποτελεί σύνθεση δύο επιμέρους όρων (digital & storytelling), που ούτως ή άλλως κουβαλούν πολλαπλά σημασιολογικά φορτία και μακρόχρονη ακαδημαϊκή πορεία, είναι εύλογο ο νέος όρος που προκύπτει από τον συνδυασμό των προηγούμενων να καλύπτει ένα ευρύτατο πεδίο και να συσκοτίζει περισσότερο παρά να διαφωτίζει την ορολογία. Αρκετές φορές, λοιπόν, ο όρος ψηφιακή αφήγηση χρησιμοποιείται στη βιβλιογραφία με μια πολύ ευρεία έννοια περικλείοντας οποιαδήποτε αφηγηματική εφαρμογή σε ψηφιακή μορφή, από τα αφηγήματα των ηλεκτρονικών παιχνιδιών (video games), τις διαδραστικές ιστορίες (interactive stories) και τα υπερκείμενα (hypertexts), μέχρι τις ιστο-ιστορίες (web-based stories) και τις προσωπικές αναπαραστάσεις στα μέσα κοινωνικής δικτύωσης»(Goutsioukosta, 2020:68). Επιπλέον, «Οι περισσότερες ψηφιακές αφηγήσεις εστιάζουν σε ένα συγκεκριμένο θέμα το οποίο προσεγγίζεται από μία ιδιαίτερη οπτική» (Xesternou, 2013:42).

Σύμφωνα με τον Sheneman, «ψηφιακή αφήγηση είναι η πρακτική συγκερασμού αφηγηματικού και ψηφιακού περιεχομένου, συμπεριλαμβανομένων εικόνων, ήχου και βίντεο, ώστε να δημιουργηθεί μία μικρού μήκους ταινία με δυνατό συγκινησιακό συστατικό» (Sheneman, 2010:40-42& Xesternou, 2013:41).

ΜΕΘΟΔΟΛΟΓΙΑ

Αξιοποιήθηκε το μοντέλο της Frazel σε συνδυασμό με εκείνο του Lambert (2010) από τα οποία προκύπτουν τελικά τέσσερα στάδια επεξεργασίας του υλικού: της προ-παραγωγής, της παραγωγής, της μετά-παραγωγής και της δημοσίευσης. Στην όλη διαδικασία συμμετέχει και ο εκπαιδευτικός ο οποίος βοηθά τους μαθητές προκειμένου να τεθεί μια ασφαλής στοχοθεσία και η υλοποίησή της. (Kay, 1996). Επιπλέον, μεθοδολογικά, εφαρμόστηκε η μελέτη περίπτωσης, η οποία ως ερευνητική προσέγγιση βοηθά τον ερευνητή να εστιάζει στην κάθε ομάδα, να παρατηρεί, να αναλύει και να ερμηνεύει τα εκάστοτε πορίσματα σε συνδυασμό με την ομαδοσυνεργατική μέθοδο μέσω της οποίας συμπεριλαμβάνονται συζητήσεις μέσα από τον καταιγισμό ιδεών.

ΕΦΑΡΜΟΓΗ ΤΟΥ ΔΙΔΑΚΤΙΚΟΥ ΣΕΝΑΡΙΟΥ

Ειδικότερα, ως προς το συγκεκριμένο διδακτικό σενάριο, αξίζει να αναφερθεί ότι η πλατωνική αλληγορία του σπηλαίου από μόνη της σηματοδοτεί μια αυτή καθαυτή αναπαράσταση. Ο ίδιος ο περιγραφικός λόγος στην αφήγηση της ιστορίας έχει μια έντονη απεικονιστική διάσταση. Με δυο λόγια, είναι ένα παιχνίδι συμβόλων. Πρόκειται για ανθρώπους εγκλωβισμένους στα άδυτα ενός σπηλαίου, καθηλωμένους στα δεσμά τους, χωρίς να έχουν τη δυνατότητα να στρέψουν το κεφάλι τους αριστερά ή δεξιά ούτε να δουν πίσω τους. Το τραγικό είναι ότι δεν έχουν εμπεδώσει ποτέ ότι είναι σκλάβοι στα δεσμά τους, για αυτούς η συγκεκριμένη πραγματικότητα είναι νόρμα, συνεπώς δεν υφίσταται ζήτημα αντίδρασης, αμφισβήτησης, επανάστασης (Taylor,2009).

Η ελευθερία για εκείνους στην πραγματική της διάσταση αποτελεί ένα σκοτεινό χωνευτήρι ψυχών πνευματικά ναρκοθετημένων, αγκυλωμένων. Εδώ, αναφύεται ο δύσκολος ρόλος των πνευματικών ανθρώπων που καλούνται να ενεργοποιήσουν στους δεσμώτες τον αόρατο μηχανισμό προς την ελευθερία. Η αποδέσμευση είναι δύσκολη υπόθεση, θα πρέπει σταδιακά να βγουν από το σκοτάδι στο φως που και αυτό με τη σειρά του διαφοροποιείται σε φως του εντός σπηλαίου και του φωτός του ήλιου. Οι αναβαθμοί αυτοί συμβολοποιούν την πορεία από το απατηλό των αισθήσεων στην μήτρα της γνώσης που ενέχεται στην ιδέα του αγαθού. Βγαίνοντας από τον σκοτεινό κόσμο του σπηλαίου, οι δεσμώτες αρχίζουν μια νέα φωτεινή διαδρομή, όχι πια μέσω των πραγμάτων που συλλαμβάνονται από τις αισθήσεις αλλά μέσω των ιδεών.

Η συγκεκριμένη μετάβαση είναι μια πρόκληση για τους ίδιους τους μαθητές, μια δοκιμασία εμβάθυνσης σε βαθιά φιλοσοφικά νοήματα που διαπερνούν την αλληγορία, συνιστώντας παράλληλα μέρος της εξεταστέας ύλης τους για τις πανελλαδικές εξετάσεις. Σε αυτή τη βάση, παιδαγωγικός και διδακτικός μου στόχος κατά κύριο λόγο ήταν να μεταδοθεί η συγκεκριμένη γνώση στους μαθητές άκρως δημιουργικά, πρωτότυπα και κατά μια έννοια βιωματικά μέσω της ψηφιακής αφήγησης, αξιοποιώντας εκλεκτικές συγγένειες και διακείμενα, όπως για παράδειγμα την καβαφική ποίηση.

Η έννοια της αφήγησης και της μάθησης είναι άρρηκτα συνυφασμένες. Η ψηφιακή αφήγηση συμβάλλει στην γνωστική, συναισθηματική και στην κοινωνική καλλιέργεια των μαθητών, μέσω της διεύρυνσης της κριτικής τους σκέψης. Στηρίζεται στην προφορική αφήγηση αξιοποιώντας τα σύγχρονα εργαλεία της τεχνολογίας και των πολυμέσων του 21ου αιώνα. Ο ψηφιακός δημιουργός αξιοποιεί ιστορίες βασιζόμενος στην εικόνα, στον ήχο, στην μουσική, το βίντεο.

Με τον τρόπο αυτό, πραγματώνεται η προσωπική αυτοέκφραση. Για το συγκεκριμένο διδακτικό σενάριο που υλοποιήθηκε κατά το σχολικό έτος 2020-2021 στο 2 ΓΕΛ Πρέβεζας αφιερώθηκαν 7 διδακτικές ώρες, κατά τις οποίες οι μαθητές οικειοποιήθηκαν την πλατωνική φιλοσοφία με έναν άκρως δημιουργικό και σύγχρονο τρόπο. Κατά τις δύο

πρώτες διδακτικές ώρες, στην αίθουσα των πολυμέσων του σχολείου παρακολούθησαν ένα εισαγωγικό βίντεο σχετικά με την σημασία της Πλατωνικής *Πολιτείας*.

Στο εισαγωγικό αυτό μέρος, άρχισαν να κινούνται διερευνητικά στην κατεύθυνση του τι σημαίνει πολίτευμα, πως επιτυγχάνεται η δικαιοσύνη. Κάπου από αυτό το σημείο, αρχίσαμε να ξετυλίγουμε το νήμα, να μπαίνουμε στην υπόθεση του έργου. Αυτή συνίσταται στη συζήτηση του Σωκράτη και ορισμένων εξεχόντων Αθηναίων σχετικά με τη σημασία της δικαιοσύνης. Σε αυτή τη βάση, στο έργο εξετάζεται το κατά πόσο είναι πιο ευτυχισμένος ένας δίκαιος άνθρωπος από έναν άδικο, κατασκευάζοντας μια ουτοπική πολιτεία, την "Καλλίπολη", με κυβερνώντες τους φιλόσοφους-βασιλείς. Στο έργο γίνεται απόπειρα να προσδιοριστεί εννοιολογικά η δικαιοσύνη από τα πρόσωπα που συμμετέχουν στη συζήτηση.

Αφού οι μαθητές αποτύπωσαν το πλήθος των διαφορετικών απόψεων, ακολούθησε στην τάξη μια εκτεταμένη συνομιλία σχετικά με το ποια άποψη περί δικαιοσύνης από όσες διατυπώθηκαν στο έργο θεωρούν ότι είναι η επικρατέστερη. Αφού δόθηκαν στους μαθητές ορισμένες ασκήσεις και ερωτήσεις εμβάθυνσης τέθηκε προς περαιτέρω διερεύνηση το γιατί χρειάζεται η φιλοσοφία προκειμένου να κατασταλάξει κανείς στο τι είναι δίκαιο και σε ένα δεύτερο επίπεδο αυτό να συνδεθεί με το ιδανικό πολίτευμα.

Όσο προχωρούσε η ώρα, οι μαθητές στο συγκεκριμένο δίωρο ένιωθαν μέρος της δραματικής αναπαράστασης της *Πολιτείας*, βίωναν ενεργά τον ρόλο τους. Για τον συγκεκριμένο ρόλο τους ζητήθηκε να κατασκευάσουν ένα ψηφιακό κόμικ μέσω του διαδικτυακού εργαλείου ψηφιακής αφήγησης pixton στο οποίο να επιλέξουν να αφηγηθούν τη συγκεκριμένη συζήτηση περί δικαιοσύνης, όντας κάποιος από τους ομιλητές. Όπως αναφέρεται χαρακτηριστικά στην εισαγωγή του σχολικού βιβλίου: «Στην αρχή του διαλόγου διατυπώνονται διάφορες απόψεις περί του τι είναι δικαιοσύνη. Ο Κέφαλος που εκπροσωπεί την παλιά γενιά νομίζει ότι δικαιοσύνη είναι η εντιμότητα στις συναλλαγές.

Έτσι, ο πλούσιος έχει τη δυνατότητα να είναι δίκαιος, επειδή μπορεί να εξοφλεί τα χρέη του. Ο Πολέμαρχος διισχυρίζεται ότι δικαιοσύνη είναι να αποδίδεις τα ίσα, καλό στον φίλο, κακό στον εχθρό. Παραβλέπει όμως το γεγονός ότι ο φίλος ενδέχεται να είναι άδικος και ο εχθρός δίκαιος. Ο σοφιστής Θρασύμαχος είναι ωμός· το συμφέρον του ισχυρού καθορίζει το τι είναι δίκαιο. Ο Γλαύκων, που είναι κατά κάποιο τρόπο το φερέφωνο της αριστοκρατικής ηθικής, θεωρεί τη δικαιοσύνη ως μια υποκριτική κοινωνική σύμβαση που επιβάλλεται από τους πολλούς και αδύνατους για την αυτοπροστασία τους. Όλοι αυτοί οι ορισμοί εμπεριέχουν ένα κόκκο αλήθειας, αλλά αποδεκτός τελικά γίνεται ο ορισμός του Σωκράτη: "τὸ τὰ αὑτοῦ πράττειν", με άλλα λόγια: ο καθένας οφείλει να πράττει για το κοινωνικό σύνολο εκείνο "εἰς ὃ αὐτοῦ ἡ φύσις ἐπιτηδειοτάτη πεφυκυῖα εἴη"(Kopidakis et al., 2024:83-93).

Οι μαθητές, στην πορεία, κλήθηκαν να αποδώσουν μέσω μια νέας ψηφιακής ιστορίας κομικ τον σχετικό διάλογο με την διαφορά ότι τώρα θα έπρεπε να ενισχύσουν την επιχειρηματολογία εκάστου ομιλητή με δικές τους προσωπικές απόψεις, αν αυτές θα μπορούσαν να ευδοκιμήσουν χωρίς να συγκρουστούν με το συγκείμενο ούτε να οδηγηθούν σε κάποιο σόφισμα ή παραλογισμό στα επιχειρήματά τους. Με το τέλος του πρώτου διδακτικού δίωρου, τούς ζητήθηκε, χωριζόμενοι σε ομάδες, να καταγράψουν την πληθώρα των απόψεων που ακούστηκαν βασιζόμενοι στην ανωτέρω συζήτηση και να τις καταγράψουν μέσω ενός ψηφιακού πίνακα αξιοποιώντας το ψηφιακό εργαλείο padlet.

Στην αρχή της τρίτης διδακτικής ώρας, παρουσίασα σε power point τις σχετικές ενότητες από την πλατωνική αλληγορία του σπηλαίου υπογραμμίζοντας με bold τις λέξεις κλειδιά στις οποίες οι μαθητές θα πρέπει να εστιάσουν. Στη συνέχεια, έγινε απόπειρα απόδοσης στα νέα ελληνικά του κειμένου από τους μαθητές με την βοήθεια του καθηγητή. Εκείνοι άρχισαν ήδη να εσωτερικεύουν την ιστορία, να εντυπώνουν τις λέξεις του σπηλαίου, της φωτιάς, των δεσμών, του φωτός, του ανηφορικού δρόμου, των απελευθερωμένων δεσμωτών, του φιλοσόφου βασιλέα, της ιδέας του αγαθού. Η τρίτη διδακτική ώρα έκλεισε με ένα κριτικό προβληματισμό από την πλευρά των μαθητών σχετικά με τη δυσκολία κατάκτησης της αληθινής γνώσης όσο και των βαθμίδων τους, τις οποίες κλήθηκαν να αποδώσουν ιεραρχικά και αξιολογικά σε ένα ψηφιακό πίνακα με την βοήθεια πάντα του εκπαιδευτικού.

Την 4η και την 5η διδακτική ώρα κατανοήθηκε πλήρως η σημασία της γνώσης, της παιδείας και του ρόλου του φιλοσόφου βασιλέα, έχοντας εμβαθύνει στις σχετικές ενότητες και ολοκληρώσει την λεξιλογική και την νοηματική επεξεργασία, αναλύοντας τα σχετικά κείμενα. Στο τέλος της 5ης ώρας τέθηκαν οι εξής εργασίες στους μαθητές, έχοντας χωριστεί σε τρεις ομάδες. Να παρουσιάσουν τμηματικά όλη την αλληγορία του σπηλαίου, το ζήτημα της απροθυμίας των φιλοσόφων να κυβερνήσουν και του σχετικού διαλόγου του Σωκράτη και του Γλαύκωνα περί παιδείας μέσα από τέσσερις διαφορετικές ψηφιακές ιστορίες, αξιοποιώντας αυτή τη φορά τα διαδικτυακά εργαλείο storyboardthat, storify, καθώς και το λογισμικό Microsoft Photostory 3.

Για τον συγκεκριμένο λόγο, τόσο στο συγκεκριμένο δίωρο όσο και στο τελευταίο το μάθημα έγινε στο εργαστήριο πληροφορικής του σχολείου για την πλήρη εξοικείωση των μαθητών με τα συγκεκριμένα ψηφιακά εργαλεία,

την ολοκλήρωση των ιστοριών τους ή για την επίλυση απορίων. Στην τελική σύνθεση για την κάθε ομάδα στόχος ήταν να αποδώσουν διαφορετικές οπτικές της αλληγορίας στηριζόμενοι σε ήδη υπάρχουσες εικόνες απόδοσής της ή σε σχετικά βίντεο στο διαδίκτυο. Με τον τρόπο αυτό, διαμορφώθηκε ένα κολάζ στηριζόμενο σε διαφορετικές οπτικές. Η μια στον χρόνο που απαιτείται για την άνοδο και στις δυσκολίες που διέπουν την ανάβαση, όπως και την εκ νέου κατάβαση των απελεύθερων δεσμωτών. Υπήρχαν πολλές εικόνες στη διάθεσή τους στο διαδίκτυο, οι μαθητές επέλεξαν αυτές που οι ίδιοι ήθελαν να προσδώσουν μεγαλύτερη έμφαση ανάλογα με το στοιχείο του σπηλαίου που τους εντυπωσίασε περισσότερο στη ροή της εξέλιξης.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Δημιουργήθηκαν συνολικά τέσσερις ψηφιακές ιστορίες που ενείχαν τα επιμέρους συμπεράσματα κατά περίπτωση. Η πρώτη αφορούσε το εύρος της διαδρομής, τα επίπεδα της ανόδου και την τελική έξοδο από το σπήλαιο, η δεύτερη την αντίθεση φωτός και σκοταδιού στην απεικόνιση, η τρίτη την απόδοση σε κομικ του διαλόγου Σωκράτη και Γλαύκωνα περί παιδείας και του ηθικού εξαναγκασμού των φιλοσόφων και η τέταρτη, η πιο γοητευτική ίσως, την απαγγελία με την παρουσίαση των σχετικών στίχων από τα «Τείχη» και τα «Παράθυρα» του Καβάφη που συνομιλούν άμεσα νοηματικά με την πλατωνική αλληγορία του σπηλαίου.

Για την τελευταία περίπτωση, αξιοποιήθηκε το λογισμικό Format Factory. Από τα βίντεο που αποδίδουν οπτικά τους στίχους αφαιρέθηκαν οι αρχικοί ήχοι και εισήχθησαν ως ένθετοι ήχοι που εμπεριέχουν τμηματικά απαγγελίες των ποιημάτων τόσο από γνωστούς καλλιτέχνες, από άλλους ποιητές όσο και από τον ίδιο τον καθηγητή. Τα μέλη της κάθε ομάδας συνεργατικά βοήθησαν στο άρτιο αποτέλεσμα ως προς την απαιτούμενη τεχνογνωσία κατά περίπτωση.

Για τις τρεις πρώτες περιπτώσεις ψηφιακής αφήγησης έγιναν φωνητικές εγγραφές με τη φωνή του διδάσκοντα στους μονολόγους των αφηγήσεων, ενώ στους διαλόγους συνεργάστηκε στην ηχογράφηση ο καθηγητής της πληροφορικής του σχολείου. Τα αποτελέσματα ήταν θεαματικά γιατί οι μαθητές απέδρασαν για λίγο από τον μηχανισμό των εξετάσεων, εμπέδωσαν πολυεπίπεδα, πολυδιάστατα και πολυτροπικά τη σημασία της αλληγορίας, συνεργάστηκαν αναδεικνύοντας στο έπακρο τη δημιουργικότητά τους, ένιωσαν τόσο ως σκηνοθέτες που γυρίζουν ένα ντοκιμαντέρ όσο και ως ηθοποιοί. Προέβησαν σε μια βιωματική πρόσληψη της διδακτέας ύλης, μοιράστηκαν συναισθήματα, εμβάθυναν σε ένα καταιγισμό ιδεών και εικόνων που βοηθά ιδιαίτερα σε μια ευρυγώνια, διασταλτική, οπτική και σε ένα αφυπνισμένο κριτικό αισθητήρα. Αισθάνθηκαν ότι κατέκτησαν το φως του αγαθού με την συνάλληλη εσωτερίκευση του ηθικού χρέους της μεταλαμπάδευσης της αληθινής γνώσης στους δεσμώτες, δίχως καμία αίσθηση ηθικού εξαναγκασμού. Εισήλθαν πλέον στο φως του ιδεατού πλατωνικού κόσμου της γνώσης όσο και της μεταλαμπάδευσής της.

Στο τέλος, οι μαθητές κλήθηκαν να αξιολογήσουν το βαθμό σαφήνειας του περιεχομένου των ψηφιακών τους αφηγήσεων λειτουργώντας ως βασικό μέσο ανατροφοδότησής τους για ανάλογο εγχείρημα μελλοντικά. Το 76.2% των μαθητών κατά μέσο όρο απάντησε ότι το περιεχόμενο των ιστοριών που δημιουργήθηκαν ήταν σαφές ως προς το μήνυμα, ενώ το υπόλοιπο ποσοστό έθεσε το ζήτημα ότι στην κάθε ιστορία θα έπρεπε να υπήρχε μια πιο ελεύθερη διασκευή από τα στοιχεία της *αλληγορίας του Σπηλαίου* που αξιοποιήθηκαν. Επίσης, όσον αφορά τη συνοχή του σεναρίου της κάθε ιστορίας, η πρώτη ομάδα βαθμολογήθηκε από τους συμμαθητές της με άριστα κατά ποσοστό 88.9%, η δεύτερη σε ποσοστό 66.8%, η τρίτη σε ποσοστό 74.7% και η τέταρτη σε ποσοστό 97.7 %.

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Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΩΣ ΚΡΙΣΙΜΟ ΠΑΙΔΑΓΩΓΙΚΟ ΠΛΑΙΣΙΟ ΑΝΑΔΕΙΞΗΣ ΤΗΣ ΛΕΙΤΟΥΡΓΙΚΗΣ ΔΙΑΧΕΙΡΙΣΗΣ ΦΙΛΙΚΩΝ ΣΧΕΣΕΩΝ ΣΕ ΜΑΘΗΤΕΣ ΕΙΔΙΚΟΥ ΔΗΜΟΤΙΚΟΥ ΣΧΟΛΕΙΟΥ

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
email: alexmastr@yahoo.gr

Τσακίρη Γεωργία
``Εκπαιδευτικός ΠΕ70.50
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
email: gogoulini17@windowslive.com

Κατσιώπη Παρασκευή
Δ/ντρια Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
email: voulakats@gmail.com

ΠΕΡΙΛΗΨΗ

Η αφήγηση αποτελεί κρίσιμη διάσταση του ανθρώπινου πολιτισμού. Είναι ένας φυσικός τρόπος επικοινωνίας και οργάνωσης των εμπειριών σε βάθος χρόνου. Η ισχύς της συνίσταται στο συναισθηματικό αποτέλεσμα, επειδή εμπνέει τη φαντασία, προσελκύοντας περισσότερο και καλύτερα το ενδιαφέρον από οποιαδήποτε άλλη μορφή πληροφοριών. Ιδιαίτερα στο εκπαιδευτικό συγκείμενο, οι ιστορίες βοηθούν τους μαθητές να εκφραστούν καλύτερα, να αναπτύξουν τη φαντασία και το λεξιλόγιό τους, αλλά και να εξωτερικεύουν τα συναισθήματα τους, να βελτιώσουν την ενσυναίσθηση, την κριτική σκέψη και τις κοινωνικές τους δεξιότητες.

Η ψηφιακή αφήγηση χρησιμοποιεί εφαρμογές πολυμέσων, όπως κείμενο, ήχους, μουσική, κόμικς και βίντεο. Στο χρονικό διάστημα των τελευταίων τουλάχιστον 25 ετών, έχει εξελιχθεί σε ένα εξαιρετικά ισχυρό γνωστικό εργαλείο και μέσο διδασκαλίας. Αξιοποιώντας την πανάρχαια τέχνη της αφήγησης και συνδέοντάς την με την τεχνολογία, η ψηφιακή αφήγηση παρέχει ένα πολυαισθητηριακό περιβάλλον μάθησης. Ειδικά, στην Ειδική Αγωγή, η ψηφιακή αφήγηση συμβάλλει στην ενεργοποίηση του ενδιαφέροντος και στη διευκόλυνση της επίτευξης των μαθησιακών στόχων, αποτελώντας μια σημαντική διδακτική και μαθησιακή εξάρτυση, ιδίως στα γλωσσικά μαθήματα.

Η παρούσα εργασία επικεντρώνεται σε μια διδακτική πρόταση βασισμένη σε ένα ψηφιακό παραμύθι με τίτλο «Δύο φίλοι μα τι φίλοι!», το οποίο σχεδιάστηκε και γράφτηκε από εκπαιδευτικό Ειδικού Σχολείου, για μαθητές με αναπηρία ή/και ειδικές εκπαιδευτικές ανάγκες. Μέσω της μελέτης της συγκεκριμένης ιστορίας, οι μαθητές μπορεί να αναπτύξουν τη γλωσσική και την κοινωνική τους συναίσθηση, αλλά και να μάθουν για τον αληθινό ανθρώπινο πλούτο, με την ανάδειξη των υψηλών αξιών της φιλίας, της αποδοχής και της αλληλοϋποστήριξης. Δεδομένου ότι οι μαθητές Ειδικών Σχολείων δυσκολεύονται να κάνουν φίλους, τέτοιες παρεμβάσεις θεωρούνται απαραίτητες για την ένταξή τους, την υγιή κοινωνική τους εξέλιξη, καθώς και για τη συνολική τους ανάπτυξη ως ενεργών και ισότιμων πολιτών.

Λέξεις – κλειδιά: Ψηφιακή αφήγηση, φιλία, Ειδικό Σχολείο

ΕΙΣΑΓΩΓΗ

Η αφήγηση ιστοριών ήταν πάντα μια βασική ανάγκη, η οποία υπηρέτησε, διαχρονικά, την ανθρώπινη επικοινωνία. Από τις προφορικές παραδόσεις μέχρι την «περιποιημένη» λογοτεχνική έκφραση, οι ιστορίες διαμορφώνουν τον τρόπο με τον οποίο ένα άτομο αντιλαμβάνεται την πραγματικότητα, οργανώνει τις εμπειρίες μέσα στον χρόνο και συνδέεται με άλλους ανθρώπους. Όμως, πέραν της μακρόχρονης γοητείας και σαγήνης της, έχει αποδειχθεί ότι η αφήγηση επηρεάζει έντονα τόσο τη σκέψη όσο και το συναίσθημα, και ως εκ τούτου την καθιστά μιαν από τις καλύτερες διόδους μέσω της οποίας σφυρηλατούνται γνώσεις, αρχές, ιδανικά και αξίες. Στον εκπαιδευτικό χώρο, η παιδαγωγική δύναμη της αφήγησης αποτελεί ένα ισχυρό ενθουσιαστικό μέσο που χρησιμοποιείται στις τάξεις, για να οικοδομηθούν γόνιμα περιβάλλοντα ανάπτυξης της ενσυναίσθησης, της αποδοχής της διαφορετικότητας, της αναγνώρισης και του σεβασμού των ατομικών διαφορών αλλά και βελτίωσης των γλωσσικών δεξιοτήτων. Η σύγχρονη ψηφιακή τεχνολογία χάραξε νέους δρόμους και ανέπτυξε καινούργιες δυνατότητες διδασκαλίας, προσδίδοντας στην αφήγηση μιαν αλληλεπιδραστική πολυμεσική πολυτροπικότητα, ενσωματώνοντας εικόνες, ήχους, ομιλία και βίντεο, δημιουργώντας, έτσι, ένα δυναμικό και συναρπαστικό μαθησιακό περιβάλλον. Η ψηφιακή αφήγηση είναι πολύ περισσότερο από μια απλή τεχνολογική τάση, δεδομένου ότι μπορεί, υπό προϋποθέσεις, να αποτελέσει ένα «μαγικό ραβδί» για να ενισχύει τη συμμετοχή, την επικοινωνία και το ενδιαφέρον των μαθητών, για να ενθαρρύνει τη επινοητικότητά τους, καθώς και για να δημιουργεί έναν ατείχιστο χώρο προσωπικής τους έκφρασης και συνεργασίας. Ιδιαίτερα στην Ειδική Αγωγή, η ψηφιακή αφήγηση μοιάζει πολλά υποσχόμενη. Παρέχει ένα ευέλικτο, μαγνητικό και παρωθητικό περιβάλλον μάθησης, ιδανικό για μαθητές με αναπηρίες ή/και ειδικές εκπαιδευτικές ανάγκες. Υπό αυτό το αβανταδόρικο παιδαγωγικό πλαίσιο, η παρούσα εργασία παρουσιάζει μια διδακτική προσέγγιση που αξιοποιεί τα πλεονεκτήματα της ψηφιακής αφήγησης, με σκοπό να βοηθήσει τους μαθητές να αναπτύξουν κοινωνικές και γλωσσικές ικανότητες, υποστηρίζοντας και προωθώντας, ταυτόχρονα, την κοινωνική ένταξη και ενδυνάμωσή τους.

Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΩΣ ΚΡΙΣΙΜΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΕΠΟΙΚΟΔΟΜΙΣΤΙΚΟ ΜΕΣΟ

Στον ανθρώπινο πολιτισμό, η αφήγηση έχει μια μακρόχρονη παράδοση, καθώς οι άνθρωποι αρέσκονται να αφηγούνται ιστορίες, οι οποίες, μάλιστα, αποτελούν μιαν από τις κύριες μορφές επικοινωνίας μεταξύ τους (McDowell, 2021; Lugmayr et al., 2017; Maggio, 2014; Worth, 2008). Είναι μια μακραίωνη ανθρώπινη συνήθεια και πρακτική, μέσω της οποίας οι άνθρωποι εκφράζονται και μεταδίδουν προσωπικές εμπειρίες και πολιτιστικά στοιχεία, με ιδιαίτερους και ξεχωριστούς τρόπους. Επιπλέον, αποτελεί τον κυρίαρχο μηχανισμό με τον οποίο οργανώνονται και κατανοούνται οι ανθρώπινες εμπειρίες μέσα στον χρόνο (Alameen, 2011; Wort, 2008). Οι ιστορίες (Intelliminds, 2025; Srivastava, Oberoi & Gupta, 2023; Quah & Ng, 2022; Brockington et al., 2021; Riga, Ioannidi & Papayiannis, 2021; Armstrong, 2020; Zak, 2015; 2014; Hoopes, 2013) έχουν, μάλιστα, ισχυρό πνευματικό αντίκτυπο, αφού το φυσικό και συναισθηματικό ίχνος που παράγεται στον εγκέφαλο, κατά τη διάρκεια των αφηγήσεων, είναι τερπνό, αναζωογονητικό και δημιουργικό. Επιπροσθέτως, οι αφηγήσεις επηρεάζουν τη στάση και τη συμπεριφορά των ακροατών, αλλά και βελτιώνουν τη μνήμη. Μάλιστα, μέσω των ιστοριών, καθένας μπορεί να μάθει από τις εμπειρίες των άλλων, διαμορφώνοντας έτσι το σύστημα αξιών του, είτε συμφωνώντας με αυτά που ακούει είτε αμφισβητώντας τα (Gupta & Jha, 2022). Για αυτόν τον λόγο, οι ιστορίες προσελκύουν, καλύτερα και περισσότερο, την προσοχή από άλλου είδους πληροφορίες (Rodríguez, 2023; Srivastava, Oberoi & Gupta, 2023; Quah & Ng, 2022).

Στην εκπαίδευση είναι επιβεβαιωμένα τα οφέλη των αφηγήσεων ακόμη και στα Μαθηματικά, επειδή παρέχονται ευκαιρίες συνδέσεων μεταξύ εικόνων και λέξεων, αυτοέκφρασης, διέγερσης της φαντασίας των μαθητών, αιχμαλώτισης του ενδιαφέροντός τους, εμπλουτισμού του λεξιλογίου τους αλλά και ενθάρρυνσης και υποστήριξης, τόσο λεκτικά όσο και οπτικά, με την ανάπτυξη δεξιοτήτων ομιλίας και γραφής (Irmayanti, Chou & Anuar, 2025; Mbachi, Ogechukwu & Apiti, 2025; Sugiharti, 2024; Riga, Ioannidi & Papayiannis, 2021; Lemonidis & Kaiafa, 2019). Επιπλέον (Ramamurthy et al., 2024; Gupta & Jha, 2022; Beck & Neil, 2021; Satriani, 2019; Hibbin,2016), η ενσυναίσθηση, η αναζήτηση της ηθικής αξίας της ιστορίας ως εργαλείου αξιολόγησης, οι νύξεις για κοινωνικά κατάλληλες στάσεις και φιλοκοινωνικές συμπεριφορές, η παρότρυνση για αναστοχασμό, η κατανόηση του εαυτού και των άλλων, η ανάπτυξη κριτικής σκέψης και δημιουργικότητας, η ταύτιση με τους χαρακτήρες της ιστορίας, αλλά και η αμφίδρομη επικοινωνία και η συνεργασία αποτελούν μερικές ακόμη περιπτώσεις προστιθέμενης μαθησιακής αξίας που προσφέρουν οι αφηγήσεις, ως μέσα διδασκαλίας και ως αξιόλογα γνωστικά εργαλεία.

Προς αυτή τη ζηλευτή παιδαγωγική κατεύθυνση που αναδεικνύει τον αφηγηματικό λόγο, η ψηφιακή αφήγηση, εδώ και τουλάχιστον είκοσι πέντε χρόνια (ειδικά μετά την ευκολία της προσβασιμότητας στο γρήγορο-ευρυζωνικό Διαδίκτυο), έχει εξελιχθεί σε ένα σημαντικό μέσο μάθησης, χρήσιμο τόσο για τους μαθητές όσο και για τους δασκάλους, αποτελώντας ένα δυναμικό και εποικοδομιστικό γνωστικό εργαλείο που ενεργοποιεί και παροτρύνει τους μαθητές, συμβάλλοντας στη δημιουργία πιο ελκυστικών και ενδιαφερουσών μαθησιακών εμπειριών (Bouchrika, 2025; Nair & Yunus, 2021; Alismail, 2015; Robin, 2008; 2006; Ohler, 2006). Η ψηφιακή αφήγηση, που είναι μια σύντομη, ευχάριστη και συγκινητική ιστορία, γεμάτη ένταση, με δυνατότητα κάλυψης ευρέος φάσματος θεμάτων, αναφέρεται σε ένα

οπτικοακουστικό κλιπ διάρκειας μερικών λεπτών, το οποίο συνδυάζει φωτογραφίες, εικόνες, μουσική, φωνητική αφήγηση και άλλους ήχους (Logie al., 2025; Kalkanoğlu, 2024; De Jager et al., 2017; Christiansen & Koelzer, 2016). Είναι, δηλαδή, μια μορφή καλλιτεχνικής έκφρασης που αξιοποιεί τα ψηφιακά πολυμεσικά μέσα και εργαλεία, για τη δημιουργία και παρουσίαση ιστοριών. Πρόκειται για μια σύνθετη και πολυμορφική διαδικασία, η οποία περιλαμβάνει ποικίλα μέσα, όπως κείμενο, εικόνες, ιστολόγια, ηχητικά αρχεία (podcast), βίντεο και διαδραστικές εφαρμογές ή παιχνίδια, παρέχοντας ευκαιρίες στους μαθητές, για να συνδυάσουν τις σκέψεις τους, οπτικά, ακουστικά και κιναισθητικά (Smith, 2024; Quah & Ng, 2022; Michalski, Hodges & Banister, 2005). Ο πυρήνας της ψηφιακής αφήγησης βρίσκεται στην ικανότητά της να γεφυρώνει την παραδοσιακή μορφή αφήγησης με τις δυνατότητες που προσφέρει η σύγχρονη τεχνολογία, με αποτέλεσμα (Rahiem, 2021) η αφήγηση να αποκτά περισσότερη διασκεδαστική, σαγηνευτική, ελκυστική, επικοινωνιακή και θεατρική διάσταση.

Επιπλέον, μια βασική πλεονεκτούσα πτυχή της ψηφιακής αφήγησης μπορεί να αποτελέσει και η διαδραστικότητα (Riga, Ioannidi & Papayiannis, 2021; Dalod, 2020; Alameen, 2011), η οποία επιτρέπει στους χρήστες να συμμετέχουν ενεργά στη δημιουργία και εξέλιξη των ιστοριών, αφαιρώντας, τροποποιώντας και προσθέτοντας πολυμεσικές εφαρμογές. Οι συμμετέχοντες ενσωματώνονται ενεργά στην ιστορία, αναλαμβάνοντας κάποιο ρόλο που τους επιτρέπει να διαμορφώσουν την πλοκή, αλλά, ακόμη, και να δημιουργήσουν δικό τους ψηφιακό περιεχόμενο, αφήνοντας, έτσι, το προσωπικό τους αποτύπωμα και ρυθμό στη ροή της αφήγησης. Αυτό είναι δυνατό να γίνει, μέσω αμφίδρομων αλληλεπιδράσεων, όπου οι μαθητές μπορούν να μοιραστούν εύκολα τις ιστορίες τους με ένα ευρύ κοινό, είτε ανεβάζοντας τις δημιουργίες τους σε διαδικτυακές πλατφόρμες Web 2.0, είτε χρησιμοποιώντας εφαρμογές Web 2.0 για να δημιουργήσουν τις δικές τους ψηφιακές ιστορίες.

Τα αποτελέσματα πολλών ερευνών και μελετών (Benabbes & Taleb, 2024; Belda-Medina & Goddard 2024; Ginting et al., 2024; Gkoutsioukosta & Apostolidou, 2023; Purnama et al., 2022; Nair & Yunus, 2021; Bratitsis & Ziannas, 2015; Di Blas & Paolini, 2013) υπογραμμίζουν ότι η ψηφιακή αφήγηση χρησιμοποιείται με επιτυχία, ως μια σημαντική παιδαγωγική μέθοδος και ως ένα διαμεσολαβητικό μέσο και γνωστικό εργαλείο, που βοηθά τους μαθητές, για παράδειγμα, να αποκτήσουν γνώσεις, να εξελίξουν τις δεξιότητες ομιλίας (και κατά την εκμάθηση ξένων γλωσσών), να εγγραμματιστούν στα μέσα ενημέρωσης, να ενισχύσουν την ενσυναίσθησή τους, να βελτιώσουν τις στάσεις και τις συμπεριφορές τους και, γενικά να έχουν ευχάριστες και συναρπαστικές μαθησιακές εμπειρίες. Είναι πολύ πιθανό η τεχνολογία να βελτιώσει μια ιστορία ή ένα παραμύθι, καθιστώντας το πιο διασκεδαστικό, ενδιαφέρον και επικοινωνιακό. Ειδικότερα, η ενσωμάτωση της διαδικασίας της ψηφιακής αφήγησης σε τάξεις Ειδικής Αγωγής, κυρίως στα γλωσσικά μαθήματα, αποφέρει πολλά μαθησιακά οφέλη (Barua, 2023; Riga, Ioannidi & Papayiannis 2017; Michalski, Hodges & Banister, 2005).

Πράγματι, η εφαρμογή της ψηφιακής αφήγησης στην Ειδική Αγωγή είναι πολλά υποσχόμενη και γεννά ελπίδες (Kritsotaki, Castro–Kemp & Kamenopoulou, 2025; Yasar-Akyar et al., 2024; di Furia, Guarini & Finestrone, 2022). Τα οπτικά ερεθίσματα δημιουργούν καλύτερες συνθήκες μάθησης σε μαθητές Ειδικών Σχολείων, επειδή αυτοί παρουσιάζουν βελτιωμένη απόκριση όταν η πληροφόρηση παρουσιάζεται οπτικά (Diasse & Kawai, 2024). Επίσης, βελτιώνουν τη στοχοκεντρωμένη συμπεριφορά μαθητών με ειδικές ανάγκες, βελτιώνοντας την επικοινωνιακή και αφηγηματική ικανότητά τους, καθώς και τη συμμετοχή και τη διαδικασία ολοκλήρωσης των δραστηριοτήτων (Manganello & Baldacci, 2024; Liang et al., 2024). Γενικά, παρέχουν ένα εξαιρετικά προσαρμόσιμο περιβάλλον, το οποίο προσφέρει τη δυνατότητα να υλοποιούνται ποιοτικότερα οι διδακτικές παρεμβάσεις (Sakellariou & Sakellariou, 2022), αλλά και να δημιουργούνται συνθήκες αιχμαλώτισης της προσοχής των μαθητών και της προσέλκυσης του ενδιαφέροντός τους.

Η παρούσα εργασία θα παρουσιάσει μια δομημένη δραστηριότητα ψηφιακής αφήγησης, μέσω της διδακτικής αξιοποίησης σχετικού κλιπ με τίτλο «Δύο φίλοι μα τι φίλοι!», δημιουργία εκπαιδευτικού ενός τμήματος με μαθητές με αναπηρία ή/και ειδικές εκπαιδευτικές ανάγκες. Το κλιπ εξυπηρετεί μια πληθώρα στόχων, που σχετίζονται με την ανάπτυξη γλωσσικών και κοινωνικών δεξιοτήτων των μαθητών, και μπορεί να αξιοποιηθεί στο μάθημα της Γλώσσας. Η παρούσα ψηφιακή αφήγηση είναι δυνατό να αποτελέσει έναν πλούσιο στοχευμένο πόρο, καθώς μπορεί να προσφέρει στα παιδιά τη δυνατότητα να εξερευνήσουν την αξία της φιλίας και της αποδοχής, υπό το σενάριο μιας χαριτωμένης και συγκινητικής-συγκινησιακής ιστορίας. Τα παιδιά, επίσης, είναι πιθανό να αναγνωρίσουν και τη σημασία της αλληλοϋποστήριξης και της αντιμετώπισης των προκαταλήψεων, εννοιών, δηλαδή, που είναι ουσιαστικές για την κοινωνική τους ανάπτυξη. Τα παιδιά είναι επίσης πιθανό να εκτιμήσουν τη σημασία της αλληλοβοήθειας και την ανάγκη για καταπολέμηση στερεοτύπων, ρατσισμού και αρνητικών προδιαθέσεων, ώστε η κοινωνική τους ανάπτυξη να διαπλάθεται υγιώς και ολοκληρωμένα.

Ας σημειωθεί ότι τα παιδιά με αναπηρία ή/και ειδικές εκπαιδευτικές ανάγκες είναι δύσκολο να αναπτύξουν φιλίες με συνομηλίκους τους και να συμμετέχουν, ενεργά, σε κοινωνικές αλληλεπιδράσεις (Lin et al., 2025; Athamanah et al., 2019; Harris, 2014; Guralnick et al., 2007). Για αυτό, με σκοπό να υπάρξουν θετικά αποτελέσματα, όσον αφορά

στην κοινωνική τους ανάπτυξη και εξέλιξη, απαιτούνται οργανωμένες πρωτοβουλίες και καθοδήγηση από εκπαιδευτικούς, αλλά και να δίνονται σε αυτά τα παιδιά ευκαιρίες στην τάξη, ώστε να αναπτύσσουν κοινωνικές δεξιότητες ενός ενεργού πολίτη και να καλλιεργούν συναισθηματικό υπόβαθρο, για τη δημιουργία και διατήρηση νέων φιλιών (Amadi et al., 2022; Harris, 2014; Carter, Asmus & Moss, 2013; Wilkerson, Perzigian & Schurr, 2013).

Η ΔΙΔΑΚΤΙΚΗ ΠΑΡΕΜΒΑΣΗ

Η συγκεκριμένη διδακτική παρέμβαση εντάσσεται στο μάθημα της Γλώσσας, σύμφωνα με το Αναλυτικό Πρόγραμμα Σπουδών για την Πρωτοβάθμια Εκπαίδευση. Η διδακτική αξιοποίηση του παιδικού βιβλίου «Δύο φίλοι μα τι φίλοι!» συνδυάζει την ανάγνωση, τη γραφή, τη συζήτηση και την καλλιέργεια γλωσσικών και κοινωνικών δεξιοτήτων, που αποτελούν βασικά στοιχεία του Αναλυτικού Προγράμματος Σπουδών για την Πρώτη Δημοτικού, εξυπηρετώντας μια πληθώρα στόχων οι οποίοι κατέχουν κεντρική θέση στο μάθημα της Γλώσσας. Το βιβλίο «Δύο φίλοι μα τι φίλοι!» αποτελεί έναν θαυμάσιο πόρο για την εκπαίδευση σε παιδιά Πρωτοβάθμιας Εκπαίδευσης, καθώς προσφέρει τη δυνατότητα να εξερευνήσουν την αξία της φιλίας και της αποδοχής, αλλά και να κατανοήσουν τη σημασία της αναγνώρισης, της αντίληψης και της λειτουργικής διαχείρισης των φιλικών σχέσεων, μέσα από μια χαριτωμένη και γοητευτική ιστορία. Τα παιδιά δύνανται, επίσης, μέσω της διδακτικής αξιοποίησης του συγκεκριμένου βιντεοβιβλίου να αναγνωρίσουν την αξία της αλληλοϋποστήριξης και της αντιμετώπισης των προκαταλήψεων, έννοιες που είναι ουσιώδεις για την κοινωνική τους ανάπτυξη.

Το γεγονός ότι οι μαθητές με ειδικές εκπαιδευτικές ανάγκες, και ιδιαίτερα αυτοί που ανήκουν στο φάσμα του Αυτισμού, αντιμετωπίζουν ιδιαίτερη δυσκολία ως προς την έκφραση και τη διαχείριση των συναισθημάτων τους, ανάγει την ανάπτυξη της συναισθηματικής τους νοημοσύνης σε στοιχείο κρίσιμης σημασίας για τον καθημερινό βίο τους. Για τον λόγο αυτό, δίνεται έμφαση στη διαθεματική προσέγγιση της γνώσης, καθώς οι σχετικές δραστηριότητες που θα πραγματοποιηθούν συνδέονται με διαφορετικά γνωστικά αντικείμενα (προφορικός λόγος, νοητικές ικανότητες, ψυχοκινητικότητα, και βασικές σχολικές δεξιότητες στη γλώσσα και τις προμαθηματικές δεξιότητες). Με αυτόν τον τρόπο, το ενδιαφέρον των μαθητών μπορεί να ενισχυθεί, με την προσφορά μιας σφαιρικής διάστασης της γνώσης, μέσω της γενίκευσης.

Ο εκπαιδευτικός Ειδικής Αγωγής προσαρμόζει το διδακτικό υλικό, σύμφωνα με τις ιδιαίτερες ανάγκες και τις δυσκολίες των μαθητών, το κοινωνικο-οικονομικό και πολιτισμικό τους πλαίσιο και τα ενδιαφέροντά τους, οικοδομεί ένα μαθησιακό περιβάλλον με σαφείς κανόνες και δομημένες διδακτικές δραστηριότητες, που είναι ασφαλές, υποστηρικτικό και ενθαρρυντικό για το σύνολο των μαθητών του. Τέλος, ο εκπαιδευτικός Ειδικής Αγωγής, με τη δημιουργική αξιοποίηση των ιδιαίτερων στοιχείων κάθε μαθητή, παρέχει υποστήριξη για την ανάπτυξη των κοινωνικών και συναισθηματικών δεξιοτήτων των μαθητών, μέσω της ενθάρρυνσης της ενεργής εμπλοκής τους στη διδασκαλία, καθώς και της επιβράβευσης έπειτα από κάθε μαθησιακή επίτευξη.

Μέσω της διαδικτυακής εκπαιδευτικής πλατφόρμας Nearpod, επιχειρείται η αξιοποίηση όλων των δυνατοτήτων που παρέχονται για τη δημιουργία ενός διαδραστικού μαθήματος συμπεριλαμβανομένων αναδρομικών ερωτήσεων κατανόησης και εμβάθυνσης της ψηφιακής αφήγησης, πρόσθετο υλικό και άλλες διαδραστικές δραστηριότητες που θα ενισχύσουν την κατανόηση και το ενδιαφέρον των μαθητών. Καθ' όλη τη διάρκεια της παρέμβασης είναι διδακτικό ορθό να αξιοποιείται η μέθοδος της διαμορφωτικής αξιολόγησης, με ερωτήσεις ανοικτού τύπου ή δημοσκοπήσεις, οι οποίες εκτός της αξιολόγησης των γνώσεων των μαθητών αποσκοπούν και στην παροχή ανατροφοδότησης, σχετικά με το είδος των διδακτικών δραστηριοτήτων που «ταιριάζουν» στους μαθητές, στοιχείο αρκετά πολύτιμο για τον σχεδιασμό μελλοντικών σεναρίων διδασκαλίας προσαρμοσμένων στις ανάγκες και τα ιδιαίτερα χαρακτηριστικά τους. Το μάθημα συνολικά προσφέρει έναν διασκεδαστικό τρόπο για να κατανοήσουν οι μαθητές περισσότερα για την έννοια της φιλίας, τη σημασία της αποδοχής του διαφορετικού, του κατάλληλου τρόπου έκφρασής τους αλλά και της λειτουργικής διαχείρισης των προκαταλήψεων στη ζωή τους.

ΔΟΜΗ – ΥΛΙΚΑ

Η διδακτική παρέμβαση απαρτίζεται από δραστηριότητες τριών ειδών: α) Δραστηριότητες Προθέρμανσης, β) Κεντρικές δραστηριότητες και γ) Δραστηριότητες Αξιολόγησης και Ολοκλήρωσης. Ειδικότερα αποτελείται από πέντε διαδραστικές διδακτικές δραστηριότητες, οι οποίες δημιουργήθηκαν κατά κύριο λόγο μέσω του ψηφιακού εργαλείου e-me content και του Audacity. Συγκεκριμένα, αξιοποιήθηκαν οι λειτουργίες E-me content: Course Presentation, Iframe Embedder, Image Slider, Audio Recorder, Single Choice Set, False/Wrong Question. Αξιοποιήθηκε, επίσης, και το ψηφιακό εργαλείο Genial.ly, το οποίο ενσωματώθηκε στη διδασκαλία μέσω της λειτουργίας Iframe Embedder του Eme-Content. Για την επεξεργασία των εικόνων της διδασκαλίας αξιοποιήθηκε το ψηφιακό εργαλείο Paint.net. Οι εικόνες αντλήθηκαν από την ιστοσελίδα Pixabay, η οποία επιτρέπει την ελεύθερη χρήση εικόνων, καθώς και από το εικονόλεξο της εκπαιδευτικής σελίδας «Προσβάσιμο» του ΙΕΠ.

Οι φάσεις της διδασκαλίας ήταν οι εξής:

- Εισαγωγή - Καλωσόρισμα στην ψηφιακή τάξη
- Μαθησιακό Συμβόλαιο - Οι κανόνες μας
- Δραστηριότητα 1: Διερεύνηση Προηγούμενων Γνώσεων των Μαθητών
- Δραστηριότητα 2: Ψηφιακή Ανάγνωση ιστορίας «Δύο φίλοι μα τι φίλοι!»
- Δραστηριότητα 3: Ερωτήσεις κατανόησης και εμβάθυνσης
- Δραστηριότητα 4: Κατασκευή Μάσκας Χαρακτήρων
- Δραστηριότητα 5: Αναστοχασμός - Συζήτηση σε ομάδες

Οι στόχοι ήταν οι παρακάτω:

- Κατανόηση της φιλίας: Οι μαθητές θα γνωρίσουν την έννοια της φιλίας και τον τρόπο με τον οποίο οι πραγματικοί φίλοι στηρίζουν ο ένας τον άλλον, ανεξάρτητα από τις διαφορές τους.
- Αντιμετώπιση και λειτουργική διαχείριση των προκαταλήψεων: Συζήτηση και πρόκληση διαλόγου, σχετικά με τον τρόπο με τον οποίο οι προκαταλήψεις επηρεάζουν τις σχέσεις, αλλά και πώς μπορούν οι μαθητές να τις εξαλείψουν και να τις υπερβούν.
- Ενίσχυση της Συναισθηματικής Νοημοσύνης: Ενθάρρυνση των παιδιών να εκφράζουν τα συναισθήματά τους και τη συμπάθειά τους στους άλλους.
- Προβληματισμός: Αναστοχασμός και πρόκληση προβληματισμού σχετικά με τον τρόπο δράσης των μαθητών σε παρόμοιες καταστάσεις.

Εποπτικά Μέσα και Υλικά για τη διδακτική παρέμβαση:

- Βιβλίο «Δύο φίλοι μα τι φίλοι!»
- Το φυσικό βιβλίο για ανάγνωση στην τάξη μέσω ψηφιακής αφήγησης
- Διαδραστικός πίνακας για προβολή του ψηφιακού περιεχομένου και χρήση εφαρμογών, όπως το Kahoot & Nearpod, για τη δημιουργία και την υλοποίηση του κουίζ
- Χαρτόνια και χαρτιά, για την κατασκευή μάσκας των χαρακτήρων.
- Χρώματα, μαρκαδόροι, κολλητική ταινία και ψαλίδια, για τη δημιουργία των χειροτεχνιών και των σκηνικών
- Κάρτες συναισθημάτων, με εικόνες που απεικονίζουν διάφορα συναισθήματα για την ανάλυση των συναισθημάτων των χαρακτήρων
- Κάρτες με σκηνές από την ιστορία, με εικόνες από την ιστορία για την αναπαράσταση σκηνών και την αφήγηση
- Κούκλες ή μαριονέτες, για την αναπαράσταση της ιστορίας και την ενίσχυση της κατανόησης
- Μουσικά όργανα και ηχητικά εφέ, κατά την αφήγηση της ιστορίας (π.χ. κρουστά όργανα)
- Εφαρμογή StoryJumper, για τη δημιουργία ψηφιακών ιστοριών από τους μαθητές
- Πλατφόρμα Padlet, για τη διαδραστική συζήτηση και ανταλλαγή ιδεών
- Εφαρμογή Tux Paint, για τη δημιουργία ψηφιακών σχεδίων και κατασκευών
- Εφαρμογή Voki, για τη δημιουργία άβαταρ και την αναπαράσταση σκηνών από το βιβλίο.

ΠΕΡΙΓΡΑΦΗ ΦΑΣΕΩΝ ΤΗΣ ΔΙΔΑΚΤΙΚΗΣ ΠΑΡΕΜΒΑΣΗΣ

Η εκπαιδευτικός παρουσιάζει το θέμα, τον σκοπό του μαθήματος και τους στόχους μέσω ψηφιακής παρουσίασης με προβολή και επισήμανση των κανόνων του μαθήματος με οπτικοποιημένη μορφή προκειμένου να γίνουν κατανοητοί από το σύνολο των μαθητών (Εικόνα 1).

Στη συνέχεια, οι μαθητές παρακολουθούν ένα εκπαιδευτικό διαδραστικό βίντεο για τα συναισθήματα που έχει ετοιμάσει η εκπαιδευτικός. Το βίντεο είναι εμπλουτισμένο με διαγνωστικές ερωτήσεις πολλαπλής επιλογής και Σωστού-Λάθους, για την αυτοαξιολόγηση και τη διερεύνηση των προϋπαρχουσών γνώσεων των μαθητών. Στη συνέχεια, μετά το πέρας του βίντεο και των δραστηριοτήτων που εμπεριέχονται σε αυτό, η εκπαιδευτικός λαμβάνει ανατροφοδότηση για τις πρότερες γνώσεις των μαθητών σχετικά με τα συναισθήματα. Η παρουσίαση του βιβλίου (ψηφιακής αφήγησης) θα ακολουθήσει τα στάδια που προτείνονται για την επεξεργασία ενός παραμυθιού στο πλαίσιο της μεθόδου CLIL (Συνδυασμένη Εκμάθηση Επιστημονικού Αντικειμένου και Ξένης Γλώσσας). Ειδικότερα, κατά την πρώτη φάση της εισαγωγής, η οποία αποσκοπεί στην προετοιμασία των μαθητών για την κατανόηση και την παρακολούθηση της ιστορίας, πριν από την έναρξη της αφήγησης θα πραγματοποιηθεί εισαγωγή του βιβλίου με επίδειξη του εξωφύλλου από την εκπαιδευτικό προκειμένου να αναδυθούν οι απόψεις των μαθητών σχετικές με το τι παρατηρούν. Εν συνεχεία, η εκπαιδευτικός θα απευθύνει στους μαθητές ερώτηση σχετικά με το τι πιστεύουν ότι σημαίνει ο τίτλος της ιστορίας που

πρόκειται να διδαχθούν, καθώς και με το πώς φαντάζονται την εξέλιξη της ιστορίας. Ακολούθως, θα πραγματοποιηθεί σύντομη περιγραφή των βασικών χαρακτήρων και του πλαισίου της ιστορίας. Τέλος, η εκπαιδευτικός θα απευθύνει στους μαθητές ερώτηση σχετικά με το πώς αντιλαμβάνονται την έννοια της φιλίας στην οποία καθένας μαθητής θα δώσει την προσωπική ερμηνεία του.

Εικόνα 1
Μια από τις διαφάνειες που αναφέρονται στους στόχους της παρέμβασης



Μέσω της συζήτησης με τους μαθητές, που θα προκληθεί από την εκπαιδευτικό, στόχο θα αποτελέσει η εκμαίευση του κεντρικού μηνύματος του παραμυθιού το οποίο θα παρουσιαστεί ως εξής: «Για εμένα, φιλία σημαίνει να έχω κάποιον δίπλα μου σε κάθε κατάσταση, είτε καλή είτε δύσκολη. Σημαίνει να στηρίζουμε ο ένας τον άλλον, να γελάμε και να κλαίμε μαζί, να παραπονιόμαστε, αλλά και να συζητάμε ανοιχτά για να ξεπερνάμε τις παρεξηγήσεις. Δε χρειάζεται ο φίλος μου να μοιάζει μαζί μου για να έχουμε αυτή τη σχέση· αρκεί να αισθάνομαι καλά και ασφαλής μαζί του». Το ψηφιακό βιβλίο (Εικόνα 2), που είναι αναρτημένο στη διαδικτυακή διεύθυνση https://youtu.be/_vPU5UzL_pM, αξιοποιεί διαφορετικές φωνές για κάθε χαρακτήρα-πρωταγωνιστή, ηχητικά εφέ, όπως για παράδειγμα προσθήκη ήχου κατά την εναλλαγή σελίδας, ήχους εισαγωγής και κλεισίματος της ανάγνωσης, όπως και ηχητικά εφέ με κάποια από τα ζώα που εμφανίζονται στο βιβλίο, προκειμένου να ενισχυθεί η διατήρηση της προσοχής των μαθητών κατά τη διαδικασία της ανάγνωσης, να κινητοποιηθεί το ενδιαφέρον τους για ενεργή εμπλοκή στη μαθησιακή διαδικασία και να αναχθεί η ανάγνωση σε ελκυστική και ευχάριστη διαδικασία. Κατά τη διάρκεια της ανάγνωσης, είναι ευεργετική η πραγματοποίηση σύντομων παύσεων για την επεξήγηση δύσκολων λέξεων ή για τη διευκρίνιση διάφορων σκέψεων ή τυχόν απορίων των μαθητών.

Εικόνα 2
Το εξώφυλλο το ψηφιακού βιβλίου



Το παραμύθι - ψηφιακό βιβλίο «Δύο φίλοι μα τι φίλοι!» της Emily Gravett αφηγείται την ιστορία δύο απροσδόκητων φίλων, του Ρος του σκίουρου και ενός αρουραίου, οι οποίοι παρότι είναι διαφορετικοί σε εμφάνιση και συνήθειες, καταφέρνουν να ξεπεράσουν τις δυσκολίες και τις διαφορές τους μέσα από την αλληλοκατανόηση και την αποδοχή. Ο Ρος, το σκιουράκι της ιστορίας μας, ένιωθε μεγάλη μοναξιά, ώσπου γνώρισε τον Ρέο, έναν αρουραίο με τον οποίο περνούσαν υπέροχα. Ωστόσο, ο Ρέος, ως αρουραίος, φάνταζε παράταιρος στα μάτια των άλλων, με αποτέλεσμα να επηρεαστεί και ο Ρος από όσα άκουγε για τον φίλο του και να απομακρυνθεί από κοντά του, μένοντας και πάλι μόνος του. Στη δύσκολη στιγμή του, ωστόσο, ο Ρος ήταν εκείνος που ήρθε δίπλα του να τον βοηθήσει....παρότι ήταν διαφορετικός. Η ιστορία αναδεικνύει τις αξίες της φιλίας, της συνεργασίας και της συγχώρεσης, δίνοντας στα παιδιά ένα ισχυρό μήνυμα για τη δύναμη των ανθρώπινων σχέσεων και την ομορφιά τού να είμαστε διαφορετικοί αλλά ενωμένοι.

Τέλος, κάποιες ενδεικτικές ερωτήσεις κατανόησης και προβληματισμού κλειστού και ανοιχτού τύπου μπορεί να είναι οι παρακάτω:

- Ποιοι είναι οι δύο κεντρικοί ήρωες και φίλοι στη σημερινή μας ιστορία;
- Γιατί πιστεύετε ότι ο Ρος ένιωσε λυπημένος σε αυτό το σημείο;
- Τι θα κάνατε αν βρισκόσασταν στη θέση του Ρος;
- Τι θα κάνατε, αν εσείς ή κάποιος φίλος σας ήταν διαφορετικός από εσάς;
- Πώς πιστεύετε ότι ένιωσε ο αρουραίος, όταν το σκιουράκι σταμάτησε να τον κάνει παρέα;
- Πώς πιστεύετε ότι ένιωσε το σκιουράκι, όταν ο αρουραίος το βοήθησε;

Μετά την προβολή του βίντεο, η εκπαιδευτικός θα κινητοποιήσει μια αναστοχαστική συζήτηση με ερωτήσεις οι οποίες θα ενθαρρύνουν τους μαθητές να εκφράσουν τις σκέψεις και τα συναισθήματά τους σχετικά με τη φιλία. Προτείνεται η αξιοποίηση κινούμενων εικόνων (π.χ. εικόνες από το βίντεο) για να ενισχυθεί η συζήτηση και να βοηθηθούν οι μαθητές να εκφραστούν καλύτερα. Παραδείγματα ερωτήσεων:

- Τι σημαίνει για εσάς η φιλία;
- Ποια χαρακτηριστικά πρέπει να έχει ένας καλός φίλος;
- Μπορείτε να μοιραστείτε μια ιστορία όπου εσείς ή κάποιος φίλος σας έκανε κάτι καλό για εσάς;

Ακολούθως στο πλαίσιο της μικροομαδικής διδασκαλίας και υπό το παροτρυντικό δίχτυ της διαφοροποιημένης διδασκαλίας, οι μαθητές, για ενίσχυση της κατανόησής τους σχετικά με τους χαρακτήρες της ιστορίας, παίζουν ένα ζωντανό ψηφιακό παιχνίδι μνήμης πολλαπλής επιλογής που ονομάζεται «Time to Climb», το οποίο αυξάνει τη συμμετοχή μέσω του φιλικού ανταγωνισμού (Εικόνα 3).

Εικόνα 3
Ένα στιγμιότυπο από το παιχνίδι μνήμης



Στη συνέχεια, η εκπαιδευτικός, σύμφωνα με τα αποτελέσματα των απαντήσεων των μαθητών, τους ομαδοποιεί σε ζευγάρια και εφαρμόζει διαφοροποιημένες πρακτικές. Αναθέτει στους μαθητές που απάντησαν λιγότερες από 4 σωστές απαντήσεις μια εύκολη δραστηριότητα περιγραφής εικόνων που απεικονίζουν δραστηριότητες μεταξύ φίλων, ενώ σε όσους βρίσκονται σε πιο ανεπτυγμένο γνωστικό επίπεδο μια δυσκολότερη δραστηριότητα παραγωγής γραπτού λόγου.

Κατόπιν, οι μαθητές συμπληρώνουν διάφορα φύλλα αξιολόγησης-ανατροφοδότησης, απαντώντας σε διάφορες έρευνες και δημοσκοπήσεις, όπου δίνουν τη γνώμη τους για τον βαθμό δυσκολίας των δραστηριοτήτων του μαθήματος και τον βαθμό στον οποίο προσέλκυσαν το ενδιαφέρον τους. Απαντούν στο τέλος σε μία γενική ερώτηση αναστοχασμού σχετικά με τη φιλία. Τέλος, καρφιτσώνουν σε έναν ψηφιακό συνεργατικό πίνακα είτε με μια εικόνα ή με κείμενο ή με ηχογράφηση φωνής απαντήσεις στην ερώτηση «Πώς μπορεί ένας καλός φίλος να αντιμετωπίσει κάποιον που είναι διαφορετικός από εκείνον». Τέλος, μετά από την παρουσίαση της σύνοψης του μαθήματος, μέσω μιας διαδραστικής παρουσίασης από την εκπαιδευτικό, το μάθημα ολοκληρώνεται με μια αναστοχαστική συζήτηση μεταξύ της εκπαιδευτικού και των μαθητών.

Για δραστηριότητες επέκτασης τα παιδιά μπορούν να κατασκευάσουν μάσκες των κεντρικών χαρακτήρων της ιστορίας, του σκίουρου και του αρουραίου, για να ενισχύσουν τις δεξιότητες της αναγνώρισης και της εκφραστικότητας. Επιλπέον, μπορεί να πραγματοποιηθεί αναπαράσταση ορισμένων σκηνών του βιβλίου, προκειμένου να βιώσουν οι μαθητές τις καταστάσεις και να εξασκήσουν τις δεξιότητες του διαλόγου και της συμφιλίωσης μεταξύ τους. Ακόμη, μπορεί να δοθεί η ευκαιρία στα παιδιά να διαμοιραστούν σε ομάδες, ώστε να συζητήσουν σχετικά με τον τρόπο με τον οποίο μπορούν να είναι καλοί φίλοι, καθώς και για τον τρόπο με οποίο οφείλουν να αντιμετωπίζουν όσους είναι διαφορετικοί από τους ίδιους. Με αυτές τις δραστηριότητες, το βιβλίο «Δύο φίλοι μα τι φίλοι!» μπορεί να μετατραπεί σε μια πλούσια εμπειρία ανάγνωσης που θα βοηθήσει τα παιδιά να εξελίξουν κοινωνικές και συναισθηματικές τους δεξιότητες, μαθαίνοντας παράλληλα να σέβονται και να διαχειρίζονται αποτελεσματικά τη διαφορετικότητα.

Στην παρούσα παρέμβαση (αλλά και γενικά), ο εκπαιδευτικός δρα ως εμψυχωτής, καθοδηγητής και διαμεσολαβητής, εφαρμόζοντας διδακτικές προσεγγίσεις ενεργής μάθησης που επιτρέπουν στον μαθητή να αναπτύξει τις προσδοκώμενες δεξιότητες, βελτιώνοντας τη δέσμευση των μαθητών στην πορεία της μάθησής τους και προωθώντας παράλληλα την ενεργό συμμετοχή τους στη διδασκαλία. Ο μαθητής βρίσκεται στο κέντρο της εκπαιδευτικής διαδικασίας και κατασκευάζει τη δική του γνώση, ενσωματώνοντάς τη στο προϋπάρχον γνωστικό του υπόβαθρο από την πραγματική καθημερινή του ζωή. Συμμετέχει σε ομαδικές δραστηριότητες που προάγουν την επίλυση προβλημάτων, την επικοινωνία, την κριτική σκέψη, τη συνεργασία και τη δημιουργικότητα.

ΣΥΖΗΤΗΣΗ, ΣΥΜΠΕΡΑΣΜΑΤΑ, ΠΡΟΤΑΣΕΙΣ

Η παρούσα εργασία επιχείρησε να καταδείξει τη μετασχηματιστική δυναμική και τη σημασία της ψηφιακής αφήγησης ως ενός πολυτροπικού και πολυαισθητηριακού εργαλείου μάθησης στο πλαίσιο της Ειδικής Αγωγής. Μέσα από την εφαρμογή μιας στοχευμένης διδακτικής παρέμβασης, βασισμένης στο ψηφιακό παραμύθι «Δύο φίλοι μα τι φίλοι!», υπό τη μορφή ενός διαδραστικού βίντεο Ψηφιακής Δομημένης Αφήγησης πιθανόν να αναδείχθηκε η εκπαιδευτική αξία της αφήγησης, ως μέσου ενίσχυσης της γλωσσικής έκφρασης, της συναισθηματικής νοημοσύνης και της κοινωνικής αλληλεπίδρασης μαθητών με αναπηρία ή/και ειδικές εκπαιδευτικές ανάγκες. Αυτή η εκπαιδευτική παρέμβαση αποπειράθηκε να μετατραπεί σε μια πλούσια αφηγηματική εμπειρία, ώστε να λειτουργήσει ως καταλύτης για την ευδοκίμηση των κοινωνικών και συναισθηματικών δεξιοτήτων των μαθητών αλλά και ως μοχλός για την ανάπτυξη του σεβασμού προς τους άλλους, καθώς για την αποτελεσματικότερη διαχείριση της διαφορετικότητας.

Η παρούσα ψηφιακή ιστορία μοιράζεται βασικές ανθρώπινες αξίες, όπως η φιλία, η υποστήριξη, ο αλληλοσεβασμός και η κατανόηση της διαφορετικότητας, οι οποίες μπορούν να αναπτυχθούν ουσιαστικότερα, υπό το παιδαγωγικό ενδιαίτημα της ψηφιακής αφήγησης. Η οικοδόμηση του αξιακού κώδικα των μαθητών με τέτοια ανθρωπιστική διάσταση είναι πολύ σημαντική για την καλλιέργεια και εδραίωση της αυτογνωσίας, της κοινωνικής ταυτότητας και της συνείδησής τους, ως ενεργών και ισότιμων μελών-πολιτών του σχολικού περιβάλλοντος-κοινότητας και της κοινωνίας γενικότερα. Η ψηφιακή αφήγηση μπορεί να αποτελέσει καθοριστικό μέσο ενδυνάμωσης, καλλιέργειας και ανάπτυξης βασικών δεξιοτήτων, πέρα από τις γνωστικές, για εκείνους τους μαθητές που πολύ συχνά αντιμετωπίζουν φραγμούς κατά την καθολική ένταξή τους στην εκπαιδευτική διαδικασία. Η αξιοποίηση της ψηφιακής αφήγησης, αδιαμφισβήτητα, μπορεί να οδηγήσει σε ενταξιακά, γόνιμα και παροτρυντικά περιβάλλοντα μάθησης. Εξάλλου, η ψηφιακή αλλά και η παραδοσιακή αφήγηση ήταν ανέκαθεν δίαυλοι επικοινωνίας, ενσυναίσθησης συνεργασίας και αυτενέργειας. Γενικά, η αφήγηση δεν είναι μόνο μια ριζοσπαστική, καινοτόμος πρακτική, αλλά κυρίως αποτελεί μια ουσιώδη παιδαγωγική επιλογή, που υποστηρίζει τη διαφοροποίηση στη διδασκαλία, την ενεργητική συμμετοχή και τον ενθουσιασμό των μαθητών, καθώς και τη βιωματική μάθηση, με τη δημιουργία πλούσιων συναρπαστικών, χειραφετικών, συμπεριληπτικών και αλληλεπιδραστικών περιβαλλόντων μάθησης.

Η συστηματική ενσωμάτωση εργαλείων Web 2.0 στην καθημερινή διδακτική πρακτική μπορεί να δημιουργήσει συνθήκες προσέλκυσης της προσοχής των μαθητών με ειδικές εκπαιδευτικές ανάγκες, αυξάνοντας το ενδιαφέρον τους, την προσήλωση και τη συμμετοχή τους. Για την πλήρη αξιοποίηση της ψηφιακής αφήγησης απαιτείται διεύρυνση της χρήσης της σε ποικίλα θέματα και γνωστικά αντικείμενα και σε διάφορα ηλικιακά επίπεδα, με θεμιτή επιδίωξη μια ολιστική και διεπιστημονική γνωστική προσέγγιση. Παράλληλα, είναι απαραίτητα και συστηματικά, οργανωμένα και

περιοδικά προγράμματα επιμόρφωσης για εκπαιδευτικούς που θα ενισχύσουν σταδιακά τις πρακτικές δεξιότητές τους στη μελέτη, τον σχεδιασμό και την εφαρμογή ψηφιακών αφηγηματικών, διαφοροποιημένων διαμεσολαβήσεων, με γνώμονα την κάλυψη των αναγκών των μαθητών τους. Τα επιμορφωτικά προγράμματα θα πρέπει οπωσδήποτε να περιλαμβάνουν τόσο θεωρητικές αρχές όσο και ανάπτυξη τεχνικών δεξιοτήτων που είναι κρίσιμες για τη δημιουργία ψηφιακών αφηγήσεων υψηλής προστιθέμενης μαθησιακής αξίας.

Ένας άλλος βασικός πυλώνας παιδαγωγικής αποτελεσματικότητας είναι η ενίσχυση της μαθησιακής ένταξης, μέσω της σύνθεσης ψηφιακού περιεχομένου με εστίαση στην ατομική έκφραση, τη συνεργατική μάθηση και τη διαφοροποίηση, με τους ίδιους τους μαθητές στον ρόλο του κατασκευαστή, όπως και η θεωρία του κονστρουκτιονισμού του Seymour Papert (1928 - 2016) προτείνει. Επιπλέον, μια ισχυρή σχέση μεταξύ σχολικού περιβάλλοντος, οικογένειας και ευρύτερης σχολικής κοινότητας δεν μπορεί να μη σηματοδοτηθεί. Τα προϊόντα ψηφιακής αφήγησης μπορούν να χρησιμοποιηθούν ως επαυξημένα εργαλεία για τη μετάδοση αρχών και αξιών, ενισχύοντας έτσι την αποδοχή της διαφορετικότητας και βελτιώνοντας τη σχολική κουλτούρα. Αυτή η συνεργασία με γονείς και άλλους σχετικούς φορείς μπορεί να οδηγήσει στην ανάπτυξη κοινωνικών δεξιοτήτων στο οικογενειακό και κοινοτικό περιβάλλον, κεφαλαιοποιώντας τη σύνδεση σχολείου, οικογένειας και κοινότητας και αυξάνοντας την ευαισθητοποίηση σε θέματα συνεκπαίδευσης, συμπερίληψης και γενικότερα σε ζητήματα ενταξιακής εκπαίδευσης.

Τέλος, κομβική θεωρείται και η διεξαγωγή σχετικών ποιοτικών και ποσοτικών ερευνών, με σκοπό να κατανοηθούν πληρέστερα όχι μόνο οι γνωστικοί μηχανισμοί της ψηφιακής αφήγησης αλλά και ο βαθμός του αντικτύπου τους, όσον αφορά στις γλωσσικές, κοινωνικές και νοητικές δεξιότητες των μαθητών, ειδικά των Ειδικών Σχολείων. Μια τέτοια ερευνητική προσέγγιση είναι δυνατό να παράσχει έναν πυρήνα απαραίτητων «αποδείξεων», ώστε να δρομολογηθούν διαδικασίες για μια πληρέστερη ένταξη της ψηφιακής αφήγησης στη σχολική καθημερινότητα. Η επαγόμενη ανάπτυξη μαθητοκεντρικών, διερευνητικών αναστοχαστικών και μεταγνωστικών περιβαλλόντων μάθησης θα αποτελέσουν εγγυητές εξατομίκευσης της μαθησιακής επιτυχίας, για την πλειονότητα των ηλικιακών και γνωστικών επιπέδων. Ωστόσο, ιδιαίτερη προσοχή χρειάζεται, καθώς μόνο μια καλή ιστορία γίνεται με την αξιοποίηση της τεχνολογίας καλύτερη, μια κακή όχι, τουναντίον μάλιστα. Ο Jason Ohler, ειδικός στην ψηφιακή αφήγηση, το είπε ξεκάθαρα αλλά και πολύ επιτυχημένα και εύστοχα (Bhalla, 2020): «Το να λες αδύναμες ιστορίες με την τεχνολογία είναι σαν να δίνεις σε έναν κακό κιθαρίστα έναν μεγαλύτερο ενισχυτή».

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Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΩΣ ΕΡΓΑΛΕΙΟ ΚΑΛΛΙΕΡΓΕΙΑΣ ΚΡΙΤΙΚΗΣ ΣΚΕΨΗΣ ΣΤΟΥΣ ΜΑΘΗΤΕΣ

Δρ Ντόκα Αγλαΐα
Επόπτρια Ποιότητας της Εκπαίδευσης ΔΙ.Π.Ε. Άρτας, Σύμβουλος Εκπαίδευσης ΠΕ70 Ιωαννίνων
Διεύθυνση Πρωτοβάθμιας Εκπαίδευσης Άρτας
Άρτα, Ελλάδα
email: tepopt-peart@sch.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα βιβλιογραφική ανασκόπηση εξετάζει διεξοδικά τη σχέση ανάμεσα στην ψηφιακή αφήγηση και την ανάπτυξη της κριτικής σκέψης στους μαθητές. Στόχος της παρούσας μελέτης είναι να αναδείξει πώς η δημιουργία, η ανάλυση και η αξιολόγηση ψηφιακών αφηγήσεων μπορούν να ενισχύσουν ουσιαστικά την ικανότητα των μαθητών/-τριών να αξιολογούν πληροφορίες με κριτικό πνεύμα, να διατυπώνουν έγκυρα επιχειρήματα και να επιλύουν σύνθετα προβλήματα με δημιουργικό τρόπο.

Η μεθοδολογία που ακολουθήθηκε βασίζεται σε συστηματική βιβλιογραφική ανασκόπηση, με κριτήρια επιλογής που περιλαμβάνουν τη συνάφεια με το αντικείμενο της ψηφιακής αφήγησης και της κριτικής σκέψης, τη δημοσίευση σε έγκριτα επιστημονικά περιοδικά και τη χρονολογική εγγύτητα των ερευνών (τελευταία δεκαετία). Οι πηγές περιλαμβάνουν θεωρητικά άρθρα, εμπειρικές μελέτες και μετα-αναλύσεις που εστιάζουν στις εκπαιδευτικές εφαρμογές της ψηφιακής αφήγησης.

Η ανασκόπηση αυτή καλύπτει ένα ευρύ φάσμα ερευνητικών εργασιών και εξετάζει τις εφαρμογές της ψηφιακής αφήγησης σε διάφορα εκπαιδευτικά πλαίσια, από την Πρωτοβάθμια έως την Τριτοβάθμια εκπαίδευση. Εμβαθύνει στις προκλήσεις και τις ευκαιρίες που αναδύονται κατά την ενσωμάτωση της ψηφιακής αφήγησης στην εκπαιδευτική πρακτική, καθώς και στις επιπτώσεις της στην ανάπτυξη Δεξιοτήτων του 21ου αιώνα, όπως η συνεργασία, η επικοινωνία και η δημιουργικότητα.

Μεταξύ των κύριων θεματικών ενοτήτων που αναλύονται, περιλαμβάνονται ο ακριβής ορισμός και τα βασικά χαρακτηριστικά της ψηφιακής αφήγησης, τα θεωρητικά πλαίσια που συνδέουν την αφήγηση με την κριτική σκέψη, οι συγκεκριμένες εφαρμογές της ψηφιακής αφήγησης στην εκπαίδευση, τα εργαλεία και οι τεχνικές που χρησιμοποιούνται για τη δημιουργία και την ανάλυση ψηφιακών ιστοριών, καθώς και τα αποτελέσματα της ψηφιακής αφήγησης στην ανάπτυξη δεξιοτήτων κριτικής σκέψης. Επιπλέον, διερευνώνται οι προκλήσεις και οι προτάσεις για την αποτελεσματική ενσωμάτωση της ψηφιακής αφήγησης στην εκπαιδευτική διαδικασία.

Η συμβολή της παρούσας ανασκόπησης έγκειται στην ανάδειξη τόσο των κύριων ευρημάτων της υπάρχουσας έρευνας όσο και των υφιστάμενων κενών. Ειδικότερα, διαπιστώνεται ότι η ψηφιακή αφήγηση έχει θετική επίδραση στην κριτική σκέψη, αλλά απαιτούνται περισσότερες εμπειρικές μελέτες που να εξετάζουν τη μακροπρόθεσμη επίδρασή της και την προσαρμογή της σε διαφορετικά εκπαιδευτικά περιβάλλοντα.

Συνοψίζοντας, η βιβλιογραφική ανασκόπηση καταλήγει ότι η ψηφιακή αφήγηση αποτελεί ένα πολλά υποσχόμενο εργαλείο για την καλλιέργεια της κριτικής σκέψης στους μαθητές. Η δημιουργία και η ανάλυση ψηφιακών ιστοριών μπορούν να ενισχύσουν σημαντικά την ενεργό μάθηση, την συνεργασία και την ανάπτυξη δεξιοτήτων που είναι απαραίτητες για την επιτυχία στον σύγχρονο ψηφιακό κόσμο. Η αποτελεσματική ενσωμάτωση της ψηφιακής αφήγησης στην εκπαίδευση απαιτεί την κατάλληλη εκπαίδευση και υποστήριξη των εκπαιδευτικών, την πρόσβαση σε σύγχρονα τεχνολογικά εργαλεία και τη δημιουργία ενός υποστηρικτικού μαθησιακού περιβάλλοντος που ενθαρρύνει την καινοτομία και τη δημιουργικότητα.

Λέξεις – κλειδιά: Ψηφιακή αφήγηση, κριτική σκέψη, ανάπτυξη δεξιοτήτων

ΕΙΣΑΓΩΓΗ

Η εκπαίδευση στον 21ο αιώνα χαρακτηρίζεται από την ανάγκη ενσωμάτωσης καινοτόμων παιδαγωγικών προσεγγίσεων που αξιοποιούν τις δυνατότητες της ψηφιακής τεχνολογίας και ταυτόχρονα προάγουν τις δεξιότητες του 21ου αιώνα. Η ψηφιακή αφήγηση (digital storytelling), ως μία μορφή πολυτροπικού και πολυμεσικού λόγου, αναδύεται τα τελευταία χρόνια ως ένα δυναμικό εκπαιδευτικό εργαλείο, καθώς συνδυάζει τη δύναμη της αφήγησης με τις δυνατότητες των νέων τεχνολογιών. Παράλληλα, η ανάπτυξη της κριτικής σκέψης θεωρείται μία από τις βασικότερες επιδιώξεις της σύγχρονης εκπαίδευσης, καθώς συμβάλλει στην αυτόνομη μάθηση, στη λήψη αποφάσεων και στην κοινωνική ενσυναίσθηση. Στην παρούσα εργασία εξετάζεται η αξιοποίηση της ψηφιακής αφήγησης ως μέσου καλλιέργειας της κριτικής σκέψης στους/στις μαθητές/-τριες, αναδεικνύοντας τις θεωρητικές βάσεις, τα πλεονεκτήματα και τις παιδαγωγικές εφαρμογές της.

Η έννοια της κριτικής σκέψης δεν περιορίζεται μόνο στην ικανότητα αξιολόγησης πληροφοριών, αλλά περιλαμβάνει επίσης δεξιότητες όπως η ανάλυση, η σύνθεση, η επιχειρηματολογία και η επίλυση προβλημάτων. Στο σχολικό πλαίσιο, η καλλιέργεια της κριτικής σκέψης καθίσταται απαραίτητη για την προώθηση της ενεργού συμμετοχής των μαθητών/-τριών, την ενίσχυση της αυτονομίας τους και την κατανόηση πολύπλοκων κοινωνικών ζητημάτων. Η ενσωμάτωση αυτής της δεξιότητας στη διδακτική πράξη απαιτεί μεθόδους που ξεπερνούν τη συμβατική διδασκαλία και δημιουργούν συνθήκες αυθεντικής μάθησης. Σε αυτό το πλαίσιο, η ψηφιακή αφήγηση προσφέρει ένα περιβάλλον πλούσιο σε ερεθίσματα και προκλήσεις.

Η ψηφιακή αφήγηση, ως διδακτική πρακτική, εστιάζει στην προσωπική έκφραση και δημιουργικότητα των μαθητών/-τριών, παρέχοντας τους τη δυνατότητα να συνθέσουν τις δικές τους αφηγήσεις μέσα από τη χρήση εικόνων, ήχου, βίντεο και γραπτού λόγου. Καθώς οι μαθητές/-τριες εμπλέκονται ενεργά στη δημιουργία περιεχομένου, αναπτύσσουν δεξιότητες όπως η αναζήτηση και αξιολόγηση πληροφοριών, η οργάνωση και παρουσίαση επιχειρημάτων, καθώς και η συνεργατική επίλυση προβλημάτων. Αυτές οι διαδικασίες ενεργοποιούν ταυτόχρονα γνωστικές και μεταγνωστικές λειτουργίες, συμβάλλοντας στη βαθύτερη κατανόηση και στην καλλιέργεια της κριτικής σκέψης.

Επιπλέον, η ψηφιακή αφήγηση ευνοεί τη διαφοροποιημένη διδασκαλία, επιτρέποντας την προσαρμογή του μαθησιακού περιεχομένου στις ανάγκες, τα ενδιαφέροντα και το επίπεδο των μαθητών/-τριών. Η πολυτροπικότητα του εργαλείου ενισχύει τη συμμετοχή μαθητών/-τριών με διαφορετικά μαθησιακά προφίλ, δίνοντας φωνή και σε εκείνους που δυσκολεύονται να εκφραστούν με τον παραδοσιακό γραπτό λόγο. Η συνεργατική φύση των δραστηριοτήτων ψηφιακής αφήγησης ενδυναμώνει τη διαπραγμάτευση απόψεων, την επιχειρηματολογία και την αποδοχή της διαφορετικότητας, στοιχεία που ενισχύουν τόσο τη γνωστική όσο και τη συναισθηματική διάσταση της κριτικής σκέψης.

Η παρούσα εργασία επιχειρεί να αναδείξει τη συμβολή της ψηφιακής αφήγησης στην καλλιέργεια της κριτικής σκέψης, αξιοποιώντας τη σχετική βιβλιογραφία και τεκμηριωμένες παιδαγωγικές προσεγγίσεις. Αφού παρουσιαστεί το θεωρητικό υπόβαθρο των δύο εννοιών (ψηφιακή αφήγηση και κριτική σκέψη), θα ακολουθήσει ανάλυση της δυναμικής τους αλληλεπίδρασης στο εκπαιδευτικό περιβάλλον. Τέλος, θα εξεταστούν τρόποι εφαρμογής της ψηφιακής αφήγησης στην τάξη και προτάσεις αξιοποίησής της στο ελληνικό σχολείο, με βάση τις αρχές της σύγχρονης παιδαγωγικής.

Η αξιοποίηση της ψηφιακής αφήγησης στην εκπαίδευση μπορεί να προσφέρει σημαντικά πλεονεκτήματα για τη διδασκαλία και την ανάπτυξη των μαθητών/-τριων. Η διαδικασία της ψηφιακής αφήγησης είναι πολυδιάστατη και ενσωματώνει μέσα μαζικής ενημέρωσης, διαδραστικότητα και δημιουργική γραφή. Αυτά τα χαρακτηριστικά επιτρέπουν στους/στις μαθητές/-τριες να εμπλακούν ενεργά στη διαδικασία μάθησης και να δημιουργήσουν έργα που συνδυάζουν την προσωπική τους έκφραση με τη συλλογική γνώση. Η χρήση των ψηφιακών εργαλείων στην τάξη επιτρέπει στους μαθητές να αποκτήσουν δεξιότητες που είναι απαραίτητες για τον 21ο αιώνα, όπως η ψηφιακή εγγραμματοσύνη, η αναλυτική σκέψη, η συνεργασία και η επικοινωνία.

Η έννοια της κριτικής σκέψης, ως μία ικανότητα που προϋποθέτει την ικανότητα αξιολόγησης, ερμηνείας και εφαρμογής πληροφοριών, έχει αυξηθεί στον σύγχρονο κόσμο, καθώς οι μαθητές/-τριες καλούνται να κατανοήσουν και να αναλύσουν σύνθετες καταστάσεις, να συνθέσουν και να αξιολογήσουν πληροφορίες από διάφορες πηγές και να αναπτύξουν στρατηγικές για την επίλυση προβλημάτων. Μέσα από την ψηφιακή αφήγηση, οι μαθητές/-τριες έχουν την ευκαιρία να εξασκήσουν αυτές τις δεξιότητες σε ένα ασφαλές και υποστηρικτικό περιβάλλον, όπου η μάθηση είναι ενεργητική και αλληλεπιδραστική.

Η παιδαγωγική αξία της ψηφιακής αφήγησης έγκειται στο γεγονός ότι ενθαρρύνει τη διατύπωση ερωτημάτων, την αναζήτηση πληροφοριών και τη διαπραγμάτευση απόψεων, δημιουργώντας έτσι ευκαιρίες για βαθύτερη κατανόηση και κριτική σκέψη. Επιπλέον, η χρήση των ΤΠΕ στην τάξη προσφέρει στους/στις μαθητές/-τριες τη δυνατότητα να αναπτύξουν δεξιότητες ικανές να τους εξοπλίσουν για την κοινωνία του 21ου αιώνα, δίνοντάς τους εργαλεία για την

αντιμετώπιση των προκλήσεων του σύγχρονου κόσμου. Η σύνδεση της ψηφιακής αφήγησης με την τοπική ιστορία, για παράδειγμα, ενισχύει την αίσθηση του τόπου και της κοινότητας στους/στις μαθητές/-τριες, ενώ ταυτόχρονα τους βοηθά να αντιληφθούν τη σημασία της κριτικής αξιολόγησης των ιστορικών δεδομένων και της αξιοποίησης ποικίλων πηγών πληροφόρησης.

Η διαδικασία της ψηφιακής αφήγησης δεν είναι απλώς μια αναπαραγωγή γεγονότων, αλλά μία ενεργή διαδικασία επεξεργασίας και αναστοχασμού. Οι μαθητές/-τριες καλούνται να ενσωματώσουν τη δική τους προσωπική αίσθηση και κατανόηση στα έργα τους, επεξεργαζόμενοι και αξιολογώντας πληροφορίες για να δημιουργήσουν κάτι καινούριο και ενδιαφέρον. Αυτό προάγει την ικανότητά τους να σκέφτονται κριτικά, να αμφισβητούν δεδομένα και να αναγνωρίζουν την πολυπλοκότητα του κόσμου γύρω τους.

Η δυνατότητα συνεργασίας και αλληλεπίδρασης μέσω της ψηφιακής αφήγησης δημιουργεί έναν κοινοτικό χαρακτήρα στην μάθηση. Η συνεργασία είναι ουσιαστική στην ανάπτυξη της κριτικής σκέψης, καθώς οι μαθητές/-τριες καλούνται να ανταλλάξουν απόψεις, να προτείνουν λύσεις και να εξετάσουν διαφορετικές οπτικές γωνίες σε σχέση με το ίδιο θέμα. Αυτή η διαδικασία ενισχύει την αναλυτική σκέψη τους και τους βοηθά να αναγνωρίζουν τις δυνατότητες και τα όρια των απόψεων που εκφράζονται από άλλους.

Η εφαρμογή της ψηφιακής αφήγησης μπορεί να προσφέρει επίσης μια σημαντική ευκαιρία για την ανάπτυξη της ενσυναίσθησης, καθώς οι μαθητές/-τριες καλούνται να αντιληφθούν και να εκφράσουν τις εμπειρίες άλλων ατόμων ή ομάδων μέσω των αφηγημάτων τους. Η ενσυναίσθηση είναι απαραίτητη για την ανάπτυξη μιας κριτικής σκέψης που λαμβάνει υπόψη τις διαφορετικές ανάγκες, πεποιθήσεις και καταστάσεις των άλλων. Μέσω της ψηφιακής αφήγησης, οι μαθητές/-τριες ενθαρρύνονται να διαμορφώσουν μια κριτική και συναισθηματική σύνδεση με τα θέματα που εξετάζουν, γεγονός που ενδυναμώνει την ηθική τους ανάπτυξη και την κοινωνική τους ευαισθησία.

Αξιοποιώντας τη δύναμη της ψηφιακής αφήγησης, οι δάσκαλοι μπορούν να προσφέρουν στους μαθητές μια εξατομικευμένη και διαδραστική εμπειρία μάθησης, η οποία ενισχύει την προσωπική τους ανάπτυξη και την κοινωνική τους συνείδηση. Η συνύπαρξη των παραδοσιακών και ψηφιακών μορφών μάθησης μπορεί να επιφέρει μια πιο ολοκληρωμένη και ποικιλόμορφη μαθησιακή εμπειρία, όπου οι μαθητές/-τριες είναι σε θέση να αναπτύξουν πλήρως τις ικανότητές τους και να ανταποκριθούν στις προκλήσεις του σύγχρονου κόσμου.

Συνολικά, η ψηφιακή αφήγηση μπορεί να αποτελέσει έναν πολύτιμο σύμμαχο για τη διδασκαλία της κριτικής σκέψης στους/στις μαθητές/-τριες, προσφέροντας όχι μόνο εργαλεία για την ανάπτυξή τους αλλά και μια ευκαιρία να συνδεθούν με τη γνώση με έναν πιο δημιουργικό και συμμετοχικό τρόπο. Η επιτυχής ενσωμάτωσή της στην εκπαιδευτική διαδικασία προϋποθέτει τη συνεργασία όλων των εμπλεκόμενων φορέων, ώστε να δημιουργηθεί ένα υποστηρικτικό και ερευνών περιβάλλον που ενθαρρύνει τη συνεχιζόμενη μάθηση, την αναστοχαστική σκέψη και την κοινωνική συμμετοχή των μαθητών/-τριών.

Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΣΤΗ ΣΥΓΧΡΟΝΗ ΕΚΠΑΙΔΕΥΣΗ

Η ψηφιακή αφήγηση συνδυάζει τη δύναμη της προσωπικής ή συλλογικής αφήγησης με τη χρήση πολυμέσων όπως εικόνες, ήχος, βίντεο και κείμενο. Πρόκειται για μια διαδικασία δημιουργίας ενός αφηγήματος, το οποίο μπορεί να είναι αφηγηματικό, πληροφοριακό, περιγραφικό ή και ερμηνευτικό, με τη χρήση εργαλείων ΤΠΕ (Robin, 2008).

Στο εκπαιδευτικό πλαίσιο, η ψηφιακή αφήγηση δεν αξιοποιείται μόνο για την ενίσχυση των τεχνολογικών δεξιοτήτων των μαθητών/-τριών αλλά, κυρίως, για την ανάπτυξη της δημιουργικότητας, της κριτικής σκέψης, της ενσυναίσθησης και της συνεργατικότητας. Ενισχύει τη διαθεματική προσέγγιση της γνώσης και προάγει την ενεργητική και βιωματική μάθηση (Sadik, 2008). Εφαρμόζεται σε όλα τα γνωστικά αντικείμενα και σε όλες τις βαθμίδες εκπαίδευσης, προσαρμοζόμενη στις ανάγκες και τα ενδιαφέροντα των μαθητών.

Η ψηφιακή αφήγηση, ως μέσο εκπαίδευσης, υπερβαίνει το παραδοσιακό μοντέλο της διδακτικής προσέγγισης, όπου η έμφαση δίνεται κυρίως στην απομνημόνευση και την παθητική αποδοχή πληροφοριών. Αντίθετα, ενισχύει τη συμμετοχική μάθηση, επιτρέποντας στους/στις μαθητές/-τριες να δημιουργήσουν και να μοιραστούν τη δική τους γνώση μέσω της αφήγησης προσωπικών ή συλλογικών ιστοριών. Με τη χρήση ΤΠΕ, οι μαθητές/-τριών έχουν τη δυνατότητα να ενσωματώσουν διάφορα μέσα (όπως φωτογραφίες, βίντεο, ήχο, κείμενα), κάτι που καθιστά τη διαδικασία μάθησης πιο δυναμική και ελκυστική. Μέσα από τη δημιουργία ψηφιακών αφηγήσεων, οι μαθητές/-τριες συνδέουν τη θεωρία με την πράξη και αποκτούν ενεργό ρόλο στην παραγωγή και κατανόηση του εκπαιδευτικού περιεχομένου.

Η ψηφιακή αφήγηση ενσωματώνει και ενδυναμώνει τις δεξιότητες του 21ου αιώνα, με έμφαση στην ανάπτυξη της κριτικής σκέψης, της δημιουργικότητας και της συνεργασίας. Σύμφωνα με τον Robin (2008), η δημιουργία ψηφιακών

αφηγήσεων βοηθά τους μαθητές να αναπτύξουν τη δυνατότητα να σκέφτονται κριτικά, να αναλύουν πληροφορίες και να οργανώνουν ιδέες με σαφήνεια και συνέπεια. Κατά τη διάρκεια της διαδικασίας, οι μαθητές/-τριες καλούνται να αξιολογήσουν τις πηγές που χρησιμοποιούν, να επιλέξουν τα πιο κατάλληλα εργαλεία για την παρουσίαση του περιεχομένου τους και να αναπτύξουν επιχειρηματολογία που υποστηρίζει την αφήγησή τους. Αυτή η διαδικασία συνδέεται άμεσα με τη δυνατότητα ανάπτυξης κριτικής σκέψης, καθώς οι μαθητές/-τριες αναγκάζονται να προβληματιστούν για την εγκυρότητα των πληροφοριών που επιλέγουν και για τον τρόπο με τον οποίο αυτές θα παρουσιαστούν στο κοινό τους.

Επιπλέον, η ψηφιακή αφήγηση προάγει την ενσυναίσθηση, καθώς οι μαθητές/-τριες καλούνται να ενσωματώσουν προσωπικά στοιχεία ή να υιοθετήσουν διαφορετικές οπτικές γωνίες, αναπτύσσοντας έτσι κατανόηση για τις εμπειρίες των άλλων. Μέσω της αφήγησης ιστοριών, μπορούν να εξετάσουν διάφορα κοινωνικά, ηθικά και πολιτιστικά ζητήματα, προάγοντας τη συναισθηματική νοημοσύνη και ενισχύοντας τη σύνδεση τους με τον κόσμο γύρω τους. Η διαδικασία αυτή ευνοεί την αυτοεκτίμηση και την ενίσχυση της προσωπικής έκφρασης, καθώς οι μαθητές/-τριες μπορούν να μοιραστούν τις σκέψεις και τα συναισθήματά τους με το κοινό, ενώ ταυτόχρονα ενθαρρύνεται η αποδοχή και η σεβαστή διαχείριση των διαφορετικών απόψεων.

Η ψηφιακή αφήγηση ενσωματώνει, επίσης, τη συνεργασία, καθώς πολλές φορές οι μαθητές/-τριες καλούνται να δουλέψουν σε ομάδες για τη δημιουργία κοινών έργων. Αυτή η συνεργατική διαδικασία ενισχύει την ικανότητα των μαθητών/-τριών να επικοινωνούν και να συνεργάζονται, να διαπραγματεύονται ιδέες και να ενσωματώνουν τη γνώμη των άλλων. Η συνεργασία αυτή είναι κρίσιμη για την ανάπτυξη κοινωνικών δεξιοτήτων και την καλλιέργεια μιας θετικής σχολικής κουλτούρας. Επιπλέον, οι μαθητές/-τριες αποκτούν εμπειρία στην αξιολόγηση και στη συστηματική βελτίωση της δουλειάς τους, καθώς συνήθως το έργο της ψηφιακής αφήγησης ενσωματώνει διαδικασίες ανατροφοδότησης και επεξεργασίας.

Η εφαρμογή της ψηφιακής αφήγησης σε όλα τα γνωστικά αντικείμενα, από τη γλώσσα και τη λογοτεχνία μέχρι τις φυσικές επιστήμες και την τοπική ιστορία, επιτρέπει στους/στις μαθητές/-τριες να εμπλέκονται με τη γνώση με έναν πιο ενεργό και προσωπικό τρόπο. Η ψηφιακή αφήγηση μπορεί να ενσωματωθεί και σε διαθεματικά προγράμματα, ενθαρρύνοντας τη σύνδεση διαφορετικών γνωστικών περιοχών και προάγοντας την ολοκληρωμένη κατανόηση του κόσμου γύρω μας. Για παράδειγμα, στην κοινωνική και πολιτιστική ιστορία, οι μαθητές/-τριες μπορούν να δημιουργήσουν αφηγήσεις για ιστορικά γεγονότα ή να εξετάσουν την επίδραση του παρελθόντος στην κοινωνία του σήμερα, συνδυάζοντας ιστορικά δεδομένα με προσωπικές μαρτυρίες ή δημιουργικές απεικονίσεις του παρελθόντος.

Η εφαρμογή της ψηφιακής αφήγησης στις τάξεις δημιουργεί ένα περιβάλλον όπου οι μαθητές/-τριες δεν είναι απλώς θεατές της μάθησης, αλλά ενεργοί δημιουργοί περιεχομένου. Αντί να περιμένουν τη μετάδοση πληροφοριών από τον δάσκαλο, αναλαμβάνουν την ευθύνη για τη μάθησή τους, αναπτύσσοντας δεξιότητες επίλυσης προβλημάτων και αναπτύσσοντας την ικανότητα να προσαρμόζονται σε νέες τεχνολογίες και νέες προκλήσεις. Με αυτόν τον τρόπο, η ψηφιακή αφήγηση προάγει την αναγνώριση της αξίας της προσωπικής μάθησης και ενθαρρύνει τους/τις μαθητές/-τριες να σκέφτονται κριτικά και δημιουργικά για τον κόσμο που τους περιβάλλει.

Αξιοσημείωτο είναι το γεγονός ότι, εκτός από την ενίσχυση των γνωστικών και συναισθηματικών δεξιοτήτων, η ψηφιακή αφήγηση έχει τη δυνατότητα να ενσωματώνει μια ευρύτερη διαθεματική και βιωματική προσέγγιση της μάθησης, επιτρέποντας στους/στις μαθητές/-τριες να συνδέσουν την προσωπική τους εμπειρία με τη μάθηση στο σχολείο. Η μαθησιακή αυτή διαδικασία ενθαρρύνει την προσωπική έκφραση και την ατομική ανάπτυξη, ενώ ταυτόχρονα ενισχύει τη συνεργασία και τη συλλογική μάθηση, στοιχεία απαραίτητα για τον 21ο αιώνα.

Η ανάπτυξη της κριτικής σκέψης είναι από τα πιο σημαντικά παιδαγωγικά επιτεύγματα της σύγχρονης εκπαίδευσης. Η κριτική σκέψη δεν περιορίζεται μόνο στην ικανότητα αξιολόγησης ή ανάλυσης δεδομένων, αλλά απαιτεί από τους/τις μαθητές/-τριες να αναπτύξουν μια συνειδητή στάση απέναντι στην πληροφορία, τη διαδικασία της μάθησης και την ίδια τη ζωή. Εδώ ακριβώς έρχεται η ψηφιακή αφήγηση, προσφέροντας ένα αποτελεσματικό μέσο για την ανάπτυξή της.

Η δημιουργία ψηφιακών αφηγήσεων απαιτεί από τους/τις μαθητές/-τριες να εμπλακούν ενεργά στην αξιολόγηση της πληροφορίας, να αναλύσουν δεδομένα, να συνθέσουν διαφορετικές απόψεις και να επιλέξουν τα κατάλληλα εργαλεία και μέσα για την παρουσίαση των επιχειρημάτων τους. Όλες αυτές οι διαδικασίες ενισχύουν τη διαδικασία της κριτικής σκέψης. Επιπλέον, καθώς οι μαθητές/-τριες καλούνται να δημιουργήσουν μια αφήγηση, αναπτύσσουν τη δυνατότητα να σκεφτούν όχι μόνο το "τι" αλλά και το "πώς" και το "γιατί" ενός θέματος, αξιολογώντας ταυτόχρονα τα αποτελέσματα της σκέψης τους.

Μία από τις πιο σημαντικές πτυχές της ψηφιακής αφήγησης είναι η ικανότητά της να ενσωματώνει την αναστοχαστική σκέψη. Μέσα από την παραγωγή και παρουσίαση των ιστοριών τους, οι μαθητές/-τριες καλούνται να εξετάσουν και να επανεξετάσουν τις ιδέες τους, να συγκρίνουν τα επιχειρήματά τους και να σκεφτούν κριτικά την αντίκρουση ή τη συμφωνία με τις θέσεις των άλλων. Αυτή η αναστοχαστική διαδικασία τους βοηθά να ενισχύσουν την ικανότητά τους να παίρνουν συνειδητές αποφάσεις και να δημιουργούν επιχειρήματα με βάση τα δεδομένα.

Η κριτική σκέψη που αναπτύσσεται μέσα από τη διαδικασία της ψηφιακής αφήγησης δεν είναι μόνο ακαδημαϊκή, αλλά επηρεάζει και τη ζωή των μαθητών/-τριών σε προσωπικό επίπεδο. Η ικανότητα να αναλύουν τις κοινωνικές, ηθικές και πολιτιστικές πτυχές των θεμάτων τους και να εξετάζουν τις διαφορετικές οπτικές γωνίες τους βοηθά να αναπτύξουν την κοινωνική ενσυναίσθηση και να ενδυναμώσουν τις ηθικές τους αξίες. Η διαδικασία της αφήγησης δημιουργεί ένα ασφαλές περιβάλλον για την εξερεύνηση δύσκολων ή συναισθηματικά φορτισμένων θεμάτων, χωρίς φόβο για κρίσεις ή επικρίσεις, κάτι που προάγει τη συναισθηματική νοημοσύνη και την ενσυναίσθηση.

Η πολυτροπικότητα αποτελεί βασικό χαρακτηριστικό της ψηφιακής αφήγησης και της διαφοροποιημένης διδασκαλίας. Ειδικότερα, η ψηφιακή αφήγηση επιτρέπει στους/στις μαθητές/-τριες να εκφράσουν τη γνώση τους μέσω διαφορετικών μορφών και μέσων. Η χρήση εικόνας, ήχου, βίντεο και γραπτού λόγου προσφέρει μια μοναδική ευκαιρία για να επικοινωνήσουν πιο δημιουργικά και να προσεγγίσουν τις έννοιες με ποικίλους τρόπους.

Η πολυτροπικότητα ενισχύει τη μαθησιακή εμπειρία, κάνοντάς τη πιο ελκυστική και κατανοητή. Οι μαθητές/-τριες έχουν την ευκαιρία να αναπτύξουν νέες δεξιότητες, όπως η δημιουργία πολυμεσικών παρουσιάσεων, η ανάπτυξη ιστοριών με χρήση ήχου και εικόνας, και η χρήση της τεχνολογίας για να ενσωματώσουν τον γραπτό λόγο σε διάφορες μορφές πολυμέσων. Αυτές οι δεξιότητες είναι πολύτιμες, καθώς ενδυναμώνουν τους/τις μαθητές/-τριες σε όλα τα επίπεδα του μαθησιακού τους ταξιδιού και τους προετοιμάζουν για την ενεργό συμμετοχή τους στην κοινωνία του 21ου αιώνα.

Συγχρόνως, η πολυτροπικότητα της ψηφιακής αφήγησης επιτρέπει στους/στις μαθητές/-τριες να επιλέξουν και να προσαρμόσουν τα μέσα παρουσίασης σύμφωνα με τις προσωπικές τους προτιμήσεις και τις μαθησιακές τους ανάγκες. Για παράδειγμα, ένας/μια μαθητής/-τρια με δυσκολίες στον γραπτό λόγο μπορεί να επιλέξει να επικεντρωθεί περισσότερο στην εικόνα ή στο βίντεο, ενώ ένας/μια μαθητής/-τρια με ισχυρές δεξιότητες γραφής μπορεί να επιλέξει να αναπτύξει περισσότερο τον κειμενικό λόγο. Αυτή η δυνατότητα προσαρμογής ενισχύει την αίσθηση της προσωπικής ευθύνης και της ατομικής μάθησης, ενώ παράλληλα διατηρεί την κοινή μαθησιακή εμπειρία.

Επιπλέον, η πολυτροπικότητα ενισχύει τη δυνατότητα εφαρμογής της ψηφιακής αφήγησης σε διαθεματικά προγράμματα. Ο συνδυασμός διαφόρων μορφών έκφρασης δημιουργεί συνθήκες για την ενσωμάτωση γνώσεων από διάφορα γνωστικά πεδία. Για παράδειγμα, σε ένα διαθεματικό έργο για την τοπική ιστορία, οι μαθητές μπορούν να χρησιμοποιήσουν ιστορικά δεδομένα, εικόνες και βίντεο από την τοπική κοινωνία, συνδυάζοντας έτσι τη γνώση της ιστορίας με την προσωπική τους εμπειρία και δημιουργώντας μια μοναδική αφήγηση.

Αν και η ψηφιακή αφήγηση προσφέρει μια πληθώρα πλεονεκτημάτων για τη μαθησιακή διαδικασία, υπάρχουν και κάποιες προκλήσεις και περιορισμοί που πρέπει να ληφθούν υπόψη. Ένα από τα κύρια προβλήματα που αντιμετωπίζουν οι δάσκαλοι είναι η διαθεσιμότητα των τεχνολογικών πόρων. Η έλλειψη εξοπλισμού, όπως υπολογιστές ή tablet, αλλά και η περιορισμένη πρόσβαση στο διαδίκτυο μπορούν να αποτελέσουν σημαντικό εμπόδιο στην εφαρμογή της ψηφιακής αφήγησης στην τάξη. Επιπλέον, η χρήση πολυμέσων απαιτεί ορισμένες τεχνικές γνώσεις από τους/τις μαθητές/-τριες και τους δασκάλους, οι οποίες δεν είναι πάντα διαθέσιμες ή εύκολα προσβάσιμες.

Μια άλλη πρόκληση αφορά την εκπαιδευτική διαδικασία που περιλαμβάνει τη δημιουργία και αξιολόγηση ψηφιακών αφηγήσεων. Η διαδικασία αυτή μπορεί να είναι χρονοβόρα και απαιτεί μεγάλη προετοιμασία από τους δασκάλους και τους μαθητές, ενώ η αξιολόγηση των έργων τους μπορεί να είναι περίπλοκη, καθώς οι ψηφιακές αφηγήσεις ενσωματώνουν πολλές διαστάσεις, όπως την τεχνική ποιότητα, τη δημιουργικότητα και την εκπαιδευτική αξία του περιεχομένου.

Τέλος, ορισμένοι μαθητές/-τριες μπορεί να δυσκολεύονται με την αξιολόγηση των πηγών ή να βρίσκουν την τεχνολογία αποπροσανατολιστική, γεγονός που μπορεί να επηρεάσει την ποιότητα των ψηφιακών αφηγήσεων τους. Σε αυτές τις περιπτώσεις, είναι σημαντικό οι δάσκαλοι να προσφέρουν καθοδήγηση για την αξιολόγηση των πληροφοριών και τη σωστή χρήση των τεχνολογικών εργαλείων.

Η ψηφιακή αφήγηση αποτελεί ένα ισχυρό εργαλείο για την καλλιέργεια κριτικής σκέψης στους/στις μαθητές/-τριες, καθώς τους επιτρέπει να αναπτύξουν δεξιότητες όπως η ανάλυση, η σύνθεση και η επιχειρηματολογία. Παράλληλα, προάγει τη συνεργασία, την ενσυναίσθηση και τη δημιουργικότητα, ενσωματώνοντας ταυτόχρονα τη χρήση τεχνολογικών εργαλείων. Αν και υπάρχουν προκλήσεις στην εφαρμογή της ψηφιακής αφήγησης, οι δυνατότητες που

προσφέρει για την ανάπτυξη του/της μαθητή/-τριας και την ενίσχυση της μαθησιακής εμπειρίας καθιστούν την ψηφιακή αφήγηση ένα ουσιαστικό εργαλείο στην εκπαίδευση του 21ου αιώνα.

Η ΚΡΙΤΙΚΗ ΣΚΕΨΗ ΩΣ ΔΕΞΙΟΤΗΤΑ ΖΩΗΣ

Η κριτική σκέψη ορίζεται ως η ικανότητα ανάλυσης, αξιολόγησης, σύνθεσης και ερμηνείας πληροφοριών με σκοπό τη λήψη τεκμηριωμένων αποφάσεων και την επίλυση προβλημάτων (Facione, 1990). Περιλαμβάνει τη διατύπωση ερωτημάτων, τη συλλογή στοιχείων, τη στάθμιση δεδομένων, την κατανόηση διαφορετικών οπτικών και την ανάπτυξη επιχειρηματολογίας.

Η καλλιέργεια της κριτικής σκέψης στο σχολείο συμβάλλει στη διαμόρφωση ενεργών, υπεύθυνων και συμμετοχικών πολιτών. Αποτελεί θεμέλιο λίθο της δημοκρατικής παιδείας και προϋποθέτει ένα παιδαγωγικό περιβάλλον που ενθαρρύνει τη διερεύνηση, την αμφισβήτηση, τον διάλογο και τον στοχασμό (Ennis, 1985).

Η κριτική σκέψη είναι μια δεξιότητα ζωής που αποκτά ολοένα και μεγαλύτερη σημασία στον σύγχρονο κόσμο, ο οποίος χαρακτηρίζεται από την υπερπληθώρα πληροφοριών και τις συνεχείς αλλαγές. Η ικανότητα να αναλύουμε, να αξιολογούμε και να συνθέτουμε πληροφορίες με βάση τεκμηριωμένα δεδομένα και λογικά επιχειρήματα, είναι ουσιαστική για την ανάπτυξη ενεργών και υπεύθυνων πολιτών. Ο Facione (1990) τονίζει ότι η κριτική σκέψη δεν είναι απλώς μια ακαδημαϊκή ικανότητα, αλλά μια ζωτική δεξιότητα για την καθημερινή ζωή, καθώς βοηθά τα άτομα να παίρνουν τεκμηριωμένες αποφάσεις και να επιλύουν προβλήματα με πιο αποτελεσματικό και δημιουργικό τρόπο.

Η καλλιέργεια της κριτικής σκέψης στο σχολείο αποτελεί ένα από τα βασικά στοιχεία για την προετοιμασία των μαθητών για τη ζωή στο 21ο αιώνα. Στη σύγχρονη κοινωνία, όπου η πληροφορία είναι άμεσα διαθέσιμη και συνεχώς εξελίσσεται, η ικανότητα να κρίνουμε και να αξιολογούμε τις πληροφορίες με βάση τη λογική και τις αποδείξεις είναι πιο σημαντική από ποτέ. Οι μαθητές/-τριες που καλλιεργούν την κριτική σκέψη μαθαίνουν να διακρίνουν τη βασιμότητα των ισχυρισμών, να αναγνωρίζουν προκαταλήψεις και να προσεγγίζουν τα θέματα από πολλές οπτικές γωνίες. Αυτές οι δεξιότητες είναι κρίσιμες για την ανάπτυξη μιας δημοκρατικής συνείδησης και την ενεργό συμμετοχή στην κοινωνία.

Η κριτική σκέψη είναι άρρηκτα συνδεδεμένη με την ανάπτυξη της δημοκρατικής παιδείας, καθώς προάγει την ικανότητα των μαθητών/-τριών να σκέφτονται ανεξάρτητα και να συμμετέχουν σε διαδικασίες διαλόγου και αμφισβήτησης. Ο Ennis (1985) αναφέρει ότι η κριτική σκέψη προϋποθέτει ένα παιδαγωγικό περιβάλλον που ενθαρρύνει τη διερεύνηση και την αμφισβήτηση, το οποίο βοηθά τους/τις μαθητές/-τριες να αναπτύξουν μια στάση ανοιχτότητας και προθυμίας για αναθεώρηση των απόψεών τους, όταν τους προσφέρονται νέα δεδομένα ή διαφορετικές οπτικές. Με αυτόν τον τρόπο, η κριτική σκέψη δεν αποτελεί μόνο μια τεχνική για την επίλυση προβλημάτων, αλλά και μια στάση ζωής που επιτρέπει στα άτομα να αμφισβητούν και να αναθεωρούν τις πεποιθήσεις τους με στόχο τη συνεχιζόμενη βελτίωση και εξέλιξή τους.

Η ανάπτυξη της κριτικής σκέψης ενισχύει την ικανότητα των μαθητών/-τριών να σκέφτονται λογικά και αναλυτικά. Η διαδικασία αυτή περιλαμβάνει τη διατύπωση ερωτημάτων, τη συλλογή δεδομένων, την αξιολόγηση των πληροφοριών και τη σύνθεση επιχειρημάτων. Όταν οι μαθητές/-τριες αναλαμβάνουν το ρόλο του «ερευνητή» και του «κριτικού», μαθαίνουν να αμφισβητούν τις καθιερωμένες αλήθειες και να προσεγγίζουν τα θέματα με τη δέουσα προσοχή και αντικειμενικότητα. Στο πλαίσιο της ψηφιακής εποχής, η ικανότητα αυτή αποκτά επιπλέον σημασία, καθώς οι μαθητές/-τριες καλούνται να κρίνουν τις πηγές και να διαχειριστούν ένα τεράστιο όγκο δεδομένων, ενδεχομένως αμφιλεγόμενων ή ανακριβών.

Η κριτική σκέψη ενισχύεται μέσα από τη συνεργασία και τη συζήτηση με τους άλλους. Ο διάλογος και η αλληλεπίδραση με τους συνομηλίκους ή τους δασκάλους επιτρέπουν στους/στις μαθητές/-τριες να εκφράσουν και να αναπτύξουν τις απόψεις τους, να ακούσουν τις αντιφάσεις και τα επιχειρήματα των άλλων και να προσαρμόσουν τις δικές τους σκέψεις. Οι μαθητές/-τριες που συμμετέχουν σε συνεργατικές δραστηριότητες μαθαίνουν να εκτιμούν τις διαφορετικές απόψεις και να αναπτύσσουν την ικανότητα να επιχειρηματολογούν με βάση τεκμηριωμένα στοιχεία. Αυτή η διαδικασία δημιουργεί ένα περιβάλλον όπου η κριτική σκέψη δεν είναι μόνο ατομική, αλλά και συλλογική, καθώς όλοι συμμετέχουν στην οικοδόμηση και στην αμφισβήτηση της γνώσης.

Η κριτική σκέψη συμβάλλει επίσης στην ενίσχυση της αυτονομίας των μαθητών/-τριών, καθώς τους επιτρέπει να αναλάβουν την ευθύνη για τη δική τους μάθηση. Αντί να εξαρτώνται από εξωτερικές πληροφορίες ή απόλυτες αλήθειες, οι μαθητές/-τριες που καλλιεργούν την κριτική σκέψη αναπτύσσουν την ικανότητα να αναγνωρίζουν τις δικές τους αδυναμίες και τις προτιμήσεις τους, να διαμορφώνουν τις δικές τους απόψεις και να κατανοούν τη διαδικασία της σκέψης τους. Αυτή η αυτογνωσία ενισχύει την ικανότητα για αυτοκαθοδήγηση και βοηθά τους μαθητές να αναπτύξουν μια πιο αποτελεσματική στρατηγική για την επίλυση προβλημάτων και τη λήψη αποφάσεων.

Η ενίσχυση της κριτικής σκέψης απαιτεί τη δημιουργία ενός υποστηρικτικού και ενθαρρυντικού περιβάλλοντος στο σχολείο, το οποίο επιτρέπει στους μαθητές να εκφράζουν ελεύθερα τις απόψεις τους, να αναλαμβάνουν πρωτοβουλίες και να προσεγγίζουν τα προβλήματα με δημιουργικότητα και ανεξαρτησία. Αυτό το περιβάλλον ενισχύει την αίσθηση της ευθύνης και της συνειδητής συμμετοχής στην κοινωνία, κάτι που είναι θεμελιώδες για την ανάπτυξη δημοκρατικών αξιών και την καλλιέργεια ενεργών πολιτών.

Η εκπαίδευση για την κριτική σκέψη δεν περιορίζεται μόνο στην ανάπτυξη γνωστικών δεξιοτήτων, αλλά επεκτείνεται και στην καλλιέργεια συναισθηματικών και κοινωνικών ικανοτήτων. Οι μαθητές/-τριες που καλλιεργούν την κριτική σκέψη μαθαίνουν να σκέφτονται με σαφήνεια, να εκφράζουν τις σκέψεις τους με σεβασμό στους άλλους και να αμφισβητούν με υπευθυνότητα τις διάφορες ιδέες και αξίες που συναντούν στον κόσμο τους. Μέσω αυτής της διαδικασίας, αποκτούν τις δεξιότητες που είναι απαραίτητες για την επίλυση σύνθετων προβλημάτων και την προώθηση της κοινωνικής συνοχής σε έναν πολύπλοκο και συνεχώς εξελισσόμενο κόσμο.

Η καλλιέργεια της κριτικής σκέψης στο σχολείο συμβάλλει, επομένως, στη δημιουργία ατόμων ικανά να συμμετέχουν ενεργά και υπεύθυνα στην κοινωνία τους, να λαμβάνουν ενημερωμένες αποφάσεις και να συνεισφέρουν στην επίλυση των προκλήσεων του σύγχρονου κόσμου.

ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΚΑΙ ΚΡΙΤΙΚΗ ΣΚΕΨΗ

Η δημιουργία μιας ψηφιακής αφήγησης εμπλέκει τους/τις μαθητές/-τριες σε μια σειρά γνωστικών και μεταγνωστικών διαδικασιών που ενισχύουν την κριτική σκέψη. Καθώς σχεδιάζουν την ιστορία τους, επιλέγουν και οργανώνουν τις πληροφορίες, αξιολογούν τις πηγές, αναπτύσσουν ερωτήματα, λαμβάνουν αποφάσεις σχετικά με την παρουσίαση και αναστοχάζονται πάνω στο τελικό προϊόν (Ohler, 2013).

Η διαδικασία αυτή ενθαρρύνει τη σύνθεση πληροφοριών από πολλαπλές πηγές, την αποδόμηση στερεοτύπων, την κατανόηση κοινωνικών φαινομένων και την ανάπτυξη πολυτροπικού γραμματισμού. Οι μαθητές/-τριες γίνονται δημιουργοί περιεχομένου, διαμορφώνοντας τη δική τους φωνή και θέση για τα θέματα που τους απασχολούν.

Η δημιουργία μιας ψηφιακής αφήγησης εμπλέκει τους μαθητές σε μια σειρά γνωστικών και μεταγνωστικών διαδικασιών που ενισχύουν την κριτική σκέψη. Καθώς οι μαθητές/-τριες σχεδιάζουν την ιστορία τους, επιλέγουν και οργανώνουν τις πληροφορίες, αξιολογούν τις πηγές, αναπτύσσουν ερωτήματα, λαμβάνουν αποφάσεις σχετικά με την παρουσίαση και αναστοχάζονται πάνω στο τελικό προϊόν (Ohler, 2013). Η διαδικασία αυτή προσφέρει στους/στις μαθητές/-τριες μια ολοκληρωμένη μαθησιακή εμπειρία, καθώς τους επιτρέπει να επεξεργαστούν τις πληροφορίες από διάφορες οπτικές γωνίες, να κατανοήσουν τη σημασία των πηγών και να διαμορφώσουν λογικά επιχειρήματα.

Η διαδικασία της ψηφιακής αφήγησης ενισχύει τη σύνθεση πληροφοριών από πολλαπλές πηγές και τις διευκολύνει στην κατανόηση και αξιολόγηση διαφορετικών απόψεων. Στη διάρκεια αυτής της διαδικασίας, οι μαθητές/-τριες καλούνται να «διαβάσουν» και να αναλύσουν όχι μόνο το κείμενο, αλλά και τα πολυμεσικά μέσα (εικόνες, ήχους, βίντεο) που χρησιμοποιούν για να ενισχύσουν την αφήγησή τους. Αυτή η πολλαπλή ανάλυση ενισχύει τις ικανότητες κριτικής σκέψης τους, καθώς μαθαίνουν να διακρίνουν την αλήθεια από την παραπληροφόρηση, να κατανοούν τις δυναμικές της εξουσίας και των κοινωνικών κατασκευών και να αποδομούν στερεότυπα που ενδέχεται να υπάρχουν στις διάφορες πηγές.

Η ανάπτυξη της κριτικής σκέψης μέσω της ψηφιακής αφήγησης δεν περιορίζεται μόνο στην επεξεργασία των πληροφοριών, αλλά επεκτείνεται στην ανάπτυξη πολυτροπικού γραμματισμού. Οι μαθητές/-τριες καλούνται να χρησιμοποιήσουν διαφορετικά μέσα και τεχνικές για να αποδώσουν το μήνυμά τους, όπως γραφικά, μουσική, ήχο, βίντεο και κείμενο. Αυτό τους επιτρέπει να κατανοήσουν τη σύνθετη φύση της επικοινωνίας στον ψηφιακό κόσμο και να διαμορφώσουν το προσωπικό τους στυλ στην παρουσίαση των ιδεών τους. Μέσω αυτής της διαδικασίας, οι μαθητές/-τριες αναπτύσσουν τη δυνατότητα να ερμηνεύουν και να δημιουργούν πολυτροπικά μηνύματα, ενισχύοντας τη διαπολιτισμική τους αντίληψη και την κοινωνική τους συνείδηση.

Επιπλέον, οι μαθητές/-τριες που δημιουργούν ψηφιακές αφηγήσεις συχνά καλούνται να εξετάσουν κοινωνικά φαινόμενα και να αναπτύξουν κριτική σκέψη γύρω από αυτά. Παράδειγμα αποτελεί η εξερεύνηση κοινωνικών προβλημάτων, όπως η φτώχεια, η εκπαίδευση, η ισότητα ή η κλιματική αλλαγή, όπου οι μαθητές/-τριες καλούνται να αναγνωρίσουν την αιτία του προβλήματος, να συλλέξουν δεδομένα από αξιόπιστες πηγές και να αναπτύξουν προτάσεις λύσεων. Κατά την παρουσίαση αυτών των θεμάτων, η χρήση της ψηφιακής αφήγησης τους επιτρέπει να «ζωντανέψουν» τις αφηγήσεις με εικόνες και ήχους, δημιουργώντας μια συναισθηματική σύνδεση με το κοινό τους και ενισχύοντας την ικανότητά τους να διαχειρίζονται το συναισθηματικό και το λογικό περιεχόμενο ενός θέματος.

Αυτή η διαδικασία της δημιουργίας ψηφιακής αφήγησης βοηθά τους/τις μαθητές/-τριες να γίνουν δημιουργοί περιεχομένου, διαμορφώνοντας τη δική τους φωνή και θέση για τα θέματα που τους απασχολούν. Η ικανότητα αυτή ενισχύει την αίσθηση της προσωπικής ευθύνης και της κοινωνικής συνείδησης. Όταν οι μαθητές/-τριες δημιουργούν περιεχόμενο με ψηφιακά εργαλεία, ενδυναμώνονται με τη γνώση ότι είναι μέρος μιας ευρύτερης κοινότητας δημιουργών και επικοινωνούν τις ιδέες τους σε ένα παγκόσμιο κοινό. Αυτή η διάσταση της ψηφιακής αφήγησης δεν περιορίζεται μόνο στην ατομική δημιουργία, αλλά ενθαρρύνει τη συνεργασία και την ανταλλαγή ιδεών, αφού οι μαθητές/-τριες συχνά εργάζονται σε ομάδες, ανταλλάσσουν απόψεις και βελτιώνουν τις ιστορίες τους μέσα από την αλληλεπίδραση με άλλους.

Η κριτική σκέψη που αναπτύσσεται μέσω της ψηφιακής αφήγησης έχει και ένα κοινωνικό αντίκτυπο. Καθώς οι μαθητές/-τριες δημιουργούν ιστορίες που σχετίζονται με κοινωνικά ζητήματα, συχνά αναπτύσσουν μια βαθύτερη κατανόηση των προβλημάτων που αντιμετωπίζουν οι κοινότητες και τα άτομα γύρω τους. Αυτή η αναγνώριση ενθαρρύνει τη συνεργασία και την ενσυναίσθηση, καθώς οι μαθητές/-τριες αναγνωρίζουν την αξία της ποικιλομορφίας και της διαφορετικότητας στην κοινωνία. Μέσω αυτής της διαδικασίας, οι μαθητές/-τριες δεν αναπτύσσουν μόνο κριτική σκέψη, αλλά και συναισθηματική νοημοσύνη, η οποία είναι εξίσου σημαντική για την ενίσχυση της κοινωνικής αλληλεγγύης.

Η ψηφιακή αφήγηση παρέχει, λοιπόν, στους/στις μαθητές/-τριες μια πλατφόρμα για να εκφράσουν τις απόψεις τους και να συνειδητοποιήσουν τη δύναμη των λόγων και των εικόνων. Αυτή η συνειδητοποίηση ενισχύει τη συμμετοχική τους στάση και την ευθύνη τους ως πολίτες σε έναν παγκόσμιο και ψηφιακό κόσμο. Ενισχύοντας τη σχέση της κριτικής σκέψης με τη δημιουργία περιεχομένου, η ψηφιακή αφήγηση συμβάλλει όχι μόνο στην ανάπτυξη των γνωστικών και επικοινωνιακών δεξιοτήτων των μαθητών/-τριών, αλλά και στην κοινωνική τους εξέλιξη και τη συνειδητοποίηση του ρόλου τους στην κοινωνία.

Η δημιουργία ψηφιακής αφήγησης, με τη χρήση νέων τεχνολογιών και πολυμέσων, δεν είναι απλώς μια εκπαιδευτική δραστηριότητα, αλλά και ένα μέσο για την ανάπτυξη κοινωνικών δεξιοτήτων, δημιουργικότητας και συναισθηματικής νοημοσύνης, που είναι θεμελιώδη για τη διαμόρφωση της προσωπικότητας και του χαρακτήρα των μαθητών/-τριών.

ΜΕΘΟΔΟΛΟΓΙΑ -ΠΑΙΔΑΓΩΓΙΚΗ ΑΞΙΟΠΟΙΗΣΗ ΣΤΟ ΠΛΑΙΣΙΟ ΤΗΣ ΤΟΠΙΚΗΣ ΙΣΤΟΡΙΑΣ

Στο πλαίσιο της τοπικής ιστορίας, η ψηφιακή αφήγηση μπορεί να αξιοποιηθεί ως εργαλείο ενεργού μάθησης και κριτικής ενασχόλησης των μαθητών/-τριών με ιστορικά τεκμήρια και αφηγήσεις. Οι μαθητές/-τριες ενθαρρύνονται να διερευνούν πηγές, να συλλέγουν πληροφορίες από προφορικές μαρτυρίες, φωτογραφίες ή χάρτες και να ερμηνεύουν τα δεδομένα με βάση την προσωπική και συλλογική τους εμπειρία. Μέσω της δημιουργίας ψηφιακών αφηγημάτων, αποκτούν τη δυνατότητα να αναστοχαστούν πάνω σε ερωτήματα όπως: Πώς διαμορφώνεται η ιστορική μνήμη; Ποιες πηγές θεωρούνται αξιόπιστες; Πώς συνδέεται η τοπική ιστορία με τη σημερινή κοινωνική πραγματικότητα;

Δείγμα και πλαίσιο εφαρμογής: Η διδακτική παρέμβαση υλοποιήθηκε σε τμήμα της Ε΄ Δημοτικού και συμμετείχαν 22 μαθητές/-τριες, ηλικίας 10–11 ετών. Η εφαρμογή πραγματοποιήθηκε στο πλαίσιο του μαθήματος της Γλώσσας και είχε διάρκεια τέσσερις διδακτικές εβδομάδες.

Περιγραφή της παρέμβασης: Οι μαθητές/-τριες εργάστηκαν σε μικρές ομάδες και κλήθηκαν να δημιουργήσουν μια ψηφιακή αφήγηση με θεματικό άξονα τα συναισθήματα, τη διαφορετικότητα και τη συνεργασία. Η διαδικασία περιλάμβανε: συζήτηση και καταιγισμό ιδεών, συγγραφή σεναρίου, επιλογή πολυμεσικού υλικού, δημιουργία ψηφιακής ιστορίας, παρουσίαση και αναστοχασμό.

Μέθοδοι αξιολόγησης: Η αξιολόγηση της παρέμβασης πραγματοποιήθηκε με ποιοτικές μεθόδους και περιλάμβανε: συστηματική παρατήρηση της συμμετοχής και της αλληλεπίδρασης των μαθητών/-τριών, ανάλυση των παραγόμενων ψηφιακών έργων, σύντομη γραπτή ανατροφοδότηση των μαθητών/-τριών.

Η όλη διαδικασία προάγει την ερευνητική διάθεση, την καλλιέργεια της ενσυναίσθησης και της δημιουργικής έκφρασης, ενώ αναπτύσσει την ικανότητα των μαθητών/-τριών να αξιολογούν, να συγκρίνουν και να συνθέτουν πληροφορίες από διαφορετικές πηγές. Επιπλέον, μέσω της συνεργατικής δημιουργίας του ψηφιακού υλικού, ενισχύεται η κοινωνική μάθηση και η ενεργός συμμετοχή όλων των μαθητών/-τριών, συμβάλλοντας έτσι σε ένα πιο δημοκρατικό και συμπεριληπτικό σχολικό περιβάλλον.

Η ψηφιακή αφήγηση, ως εργαλείο διδασκαλίας και μάθησης, ενσωματώνει τεχνολογίες αιχμής και πολυμεσικές προσεγγίσεις που ενισχύουν τη μάθηση και την κριτική σκέψη. Στο πλαίσιο της τοπικής ιστορίας, η ψηφιακή αφήγηση προσφέρει μοναδικές δυνατότητες στους/στις μαθητές/-τριες να συνδεθούν με την ιστορία του τόπου τους, να

εμβαθύνουν στην κατανόηση της τοπικής κληρονομιάς και να εμπλακούν ενεργά στη διαδικασία της μάθησης. Με την αξιοποίηση αυτής της προσέγγισης, οι μαθητές/-τριες έχουν την ευκαιρία να ερευνήσουν, να συγκεντρώσουν πληροφορίες από διαφορετικές πηγές, να αναλύσουν ιστορικά δεδομένα και να συνθέσουν τα δικά τους ψηφιακά αφηγήματα, δίνοντάς τους την ευκαιρία να αποτυπώσουν τη δική τους οπτική για την τοπική ιστορία.

Η διαδικασία της ψηφιακής αφήγησης στο πλαίσιο της τοπικής ιστορίας αναπτύσσει τις ικανότητες των μαθητών/-τριών να σκέφτονται κριτικά, να αξιολογούν και να συγκρίνουν πληροφορίες από διάφορες ιστορικές πηγές. Οι μαθητές/-τριες έχουν τη δυνατότητα να συνεργάζονται με άλλους, να ανταλλάσσουν απόψεις, να συζητούν και να αναπτύσσουν κοινές θέσεις για την ερμηνεία των ιστορικών γεγονότων. Επιπλέον, ενθαρρύνονται να συλλέγουν δεδομένα από ποικιλία πηγών, όπως προφορικές μαρτυρίες, φωτογραφίες, χάρτες και άλλα ιστορικά τεκμήρια που σχετίζονται με την τοπική τους κοινότητα. Αυτή η διαδικασία ενδυναμώνει την κατανόηση της τοπικής ιστορίας, προσφέροντας μια προσωπική διάσταση στην έρευνα και στην παρουσίαση των αποτελεσμάτων τους.

Η τοπική ιστορία έχει μια μοναδική θέση στην εκπαιδευτική διαδικασία, καθώς συνδέει τους μαθητές με τη δική τους κοινότητα και τους βοηθά να αντιληφθούν τις ιστορικές ρίζες των κοινωνικών δομών και των πολιτιστικών τους χαρακτηριστικών. Μέσω της ψηφιακής αφήγησης, οι μαθητές/-τριες αποκτούν τη δυνατότητα να αναστοχαστούν και να αμφισβητήσουν την ιστορική μνήμη, εστιάζοντας σε ερωτήματα όπως: Πώς διαμορφώνεται η ιστορική μνήμη; Ποιες πηγές θεωρούνται αξιόπιστες και ποιοι παράγοντες ενδέχεται να τις διαστρεβλώσουν; Ποιες είναι οι σύγχρονες ερμηνείες των τοπικών ιστορικών γεγονότων και πώς επηρεάζουν αυτές τις κοινωνίες;

Η ψηφιακή αφήγηση προάγει την ερευνητική διάθεση των μαθητών/-τριών, καθώς τους δίνει τη δυνατότητα να συμμετέχουν ενεργά στη διαδικασία της ιστορικής έρευνας και να βρουν το δικό τους τρόπο έκφρασης. Η συνεργασία με άλλους/ες μαθητές/-τριες και δασκάλους ενισχύει την κοινωνική μάθηση, επιτρέποντας στους/στις μαθητές/-τριες να μάθουν ο ένας από τον άλλο, να ανταλλάξουν ιδέες και να συμβάλουν στην κοινή δημιουργία του τελικού ψηφιακού προϊόντος. Αυτή η συνεργατική προσέγγιση προάγει την ενσυναίσθηση, καθώς οι μαθητές/-τριες καλούνται να κατανοήσουν τις απόψεις και τις εμπειρίες των άλλων, να ακούσουν τις ιστορίες των άλλων και να αναπτύξουν μια βαθύτερη αντίληψη για τις διαφορετικές κοινωνικές και ιστορικές πραγματικότητες.

Η διαδικασία της ψηφιακής αφήγησης συνιστά, επίσης, ένα μέσο για την ενίσχυση της δημιουργικής έκφρασης. Καθώς οι μαθητές/-τριες καλούνται να δημιουργήσουν ιστορίες που συνδέονται με την τοπική ιστορία, έχουν την ευκαιρία να επιλέξουν τα πολυμεσικά εργαλεία που θα χρησιμοποιήσουν για να αναδείξουν το ιστορικό τους αφήγημα, όπως εικόνες, βίντεο, ήχο και κείμενο. Αυτή η ελευθερία δημιουργίας ενθαρρύνει τη φαντασία των μαθητών/-τριών και τους επιτρέπει να εκφράσουν τις ιδέες τους με έναν πρωτότυπο και καινοτόμο τρόπο.

Το ψηφιακό αφήγημα που προκύπτει από αυτή τη διαδικασία λειτουργεί ως ένα διαδραστικό μέσο για τη διάδοση της τοπικής ιστορίας και την ανάπτυξη της τοπικής ταυτότητας. Το ψηφιακό υλικό που δημιουργούν οι μαθητές/-τριες μπορεί να αποτελέσει έναν πολύτιμο πόρο για την κοινότητα, προσφέροντας νέες προσεγγίσεις στην εκπαίδευση της τοπικής ιστορίας. Οι μαθητές/-τριες, μέσω της ψηφιακής αφήγησης, αναπτύσσουν τη συνειδητοποίηση ότι η τοπική ιστορία είναι ένα ζωντανό, εξελισσόμενο κομμάτι της καθημερινής τους ζωής και ότι τα δικά τους βιώματα, οι ιστορίες τους και οι απόψεις τους έχουν αξία για την κατανόηση της ιστορικής πορείας της κοινότητας.

Η ψηφιακή αφήγηση ενισχύει την κοινωνική διάσταση της μάθησης, καθώς ενθαρρύνει τη συμμετοχή όλων των μαθητών/-τριών, ανεξαρτήτως των διαφορετικών ικανοτήτων τους. Μέσω της συνεργασίας, οι μαθητές/-τριες έχουν την ευκαιρία να αναπτύξουν δεξιότητες επικοινωνίας, ομαδικής δουλειάς και επίλυσης διαφορών, ενώ ταυτόχρονα ενισχύεται η κοινωνική ενσωμάτωσή τους στο σχολικό περιβάλλον. Η δημιουργία ενός κοινού ψηφιακού αφηγήματος ενισχύει το αίσθημα της κοινότητας και της αλληλεγγύης μεταξύ των μαθητών/-τριών, ενώ ενθαρρύνει την ανταλλαγή ιδεών και την αποδοχή της διαφορετικότητας. Στη διάρκεια αυτής της διαδικασίας, οι μαθητές/-τριες όχι μόνο μαθαίνουν για την τοπική τους ιστορία, αλλά και αναπτύσσουν τη συνείδηση ότι η ιστορία είναι κάτι που συνεχώς εξελίσσεται και ότι έχουν την ευθύνη να τη διατηρήσουν και να τη μεταδώσουν στις επόμενες γενιές.

Η ψηφιακή αφήγηση προάγει την ενεργό συμμετοχή των μαθητών/-τριών στη μαθησιακή διαδικασία, προσφέροντάς τους μια ευκαιρία να συνδέσουν τη θεωρία με την πράξη. Καθώς οι μαθητές/-τριες εμβαθύνουν στην τοπική ιστορία και συνδέουν τις γνώσεις τους με τη σύγχρονη κοινωνική πραγματικότητα, αναπτύσσουν σημαντικές δεξιότητες, όπως η κριτική σκέψη, η αναλυτική σκέψη, η δημιουργικότητα και η συνεργασία. Το γεγονός ότι οι μαθητές/-τριες καλούνται να διαμορφώσουν το περιεχόμενο ενός ψηφιακού αφηγήματος τους επιτρέπει να κατανοήσουν την αξία της έρευνας, της ανάλυσης και της σύνθεσης πληροφοριών, ενώ τους ενθαρρύνει να αναπτύξουν ένα ενεργό ενδιαφέρον για τα ιστορικά και κοινωνικά ζητήματα που τους αφορούν.

Επιπλέον, μέσω της ψηφιακής αφήγησης, οι μαθητές/-τριες μαθαίνουν να αναγνωρίζουν τη σημασία των ιστορικών πηγών και της ακρίβειας στην παρουσίαση της ιστορίας. Αντιλαμβάνονται τη δύναμη της αφήγησης ως μέσο ερμηνείας της πραγματικότητας και τις ευθύνες που συνεπάγεται η παρουσίαση και η διάδοση ιστορικών γεγονότων. Στο πλαίσιο αυτό, οι μαθητές/-τριες αναπτύσσουν μια ώριμη και κριτική στάση απέναντι στις πηγές, αναγνωρίζοντας τις αδυναμίες τους και μαθαίνοντας να αξιολογούν τη βασιμότητά τους.

ΣΥΖΗΤΗΣΗ - ΣΥΜΠΕΡΑΣΜΑΤΑ

Τα ποιοτικά δεδομένα έδειξαν αυξημένη εμπλοκή των μαθητών/-τριών στη μαθησιακή διαδικασία, βελτίωση της συνεργασίας και ενίσχυση της ικανότητάς τους να εκφράζουν συναισθήματα και σκέψεις. Ενδεικτικά, μαθητές ανέφεραν ότι «δουλέψαμε καλύτερα ως ομάδα» και ότι «ήταν πιο εύκολο να καταλάβουμε πώς νιώθουν οι άλλοι μέσα από την ιστορία».

Επιπλέον, τα ψηφιακά παραδοτέα παρουσίασαν στοιχεία κριτικής σκέψης, όπως αιτιολόγηση επιλογών και σύνδεση της ιστορίας με προσωπικά βιώματα.

Τα ευρήματα της παρέμβασης συνάδουν με τη διεθνή βιβλιογραφία, η οποία αναδεικνύει την ψηφιακή αφήγηση ως αποτελεσματικό μέσο καλλιέργειας της κριτικής σκέψης και της συναισθηματικής μάθησης. Ωστόσο, προέκυψαν και προκλήσεις, όπως ο αυξημένος απαιτούμενος χρόνος και οι διαφοροποιήσεις στο επίπεδο ψηφιακών δεξιοτήτων των μαθητών/-τριών.

Η κριτική αποτίμηση της εφαρμογής υπογραμμίζει την ανάγκη παιδαγωγικής καθοδήγησης και σαφών κριτηρίων αξιολόγησης.

Η ψηφιακή αφήγηση αποτελεί μια δημιουργική και αποτελεσματική παιδαγωγική πρακτική που ευνοεί την καλλιέργεια της κριτικής σκέψης στους/στις μαθητές/-τριες. Μέσα από τη διαδικασία σύλληψης, σχεδιασμού και παρουσίασης της αφήγησης, οι μαθητές/-τριες ενεργοποιούν πλήθος γνωστικών και κοινωνικοσυναισθηματικών δεξιοτήτων. Η αξιοποίησή της, ειδικά στο πλαίσιο της τοπικής ιστορίας ή της διαθεματικής διδασκαλίας, μπορεί να ενισχύσει την ενεργό συμμετοχή, την ενσυναίσθηση και τον μετασχηματισμό της μάθησης σε ένα προσωπικά και κοινωνικά σημαντικό γεγονός.

Η υιοθέτηση της ψηφιακής αφήγησης απαιτεί την υποστήριξη του εκπαιδευτικού, τον κατάλληλο παιδαγωγικό σχεδιασμό και την ενσωμάτωσή της σε ένα μαθητοκεντρικό και ερευνητικό μοντέλο μάθησης. Όταν αυτά εξασφαλίζονται, τότε η αφήγηση με τη βοήθεια των ΤΠΕ μετατρέπεται σε ένα ουσιαστικό εργαλείο προσωπικής έκφρασης, αναστοχασμού και κοινωνικής δράσης.

Η ψηφιακή αφήγηση αποδεικνύεται μια ισχυρή παιδαγωγική μέθοδος που προσφέρει στους/στις μαθητές/-τριες τη δυνατότητα να αναπτύξουν σημαντικές δεξιότητες για τη ζωή τους, και κυρίως την κριτική σκέψη. Μέσω της δημιουργικής διαδικασίας, οι μαθητές/-τριες όχι μόνο κατανοούν και επεξεργάζονται πληροφορίες, αλλά ταυτόχρονα ενθαρρύνονται να αναλύσουν, να ερμηνεύσουν και να αμφισβητήσουν τα δεδομένα που συλλέγουν. Το γεγονός ότι οι μαθητές/-τριες συμμετέχουν ενεργά στη διαμόρφωση του περιεχομένου της αφήγησής τους, τους επιτρέπει να αναπτύξουν μια προσωπική και υπεύθυνη στάση απέναντι στις πληροφορίες και τα ιστορικά γεγονότα που παρουσιάζουν.

Στο πλαίσιο της τοπικής ιστορίας, η ψηφιακή αφήγηση αναδεικνύει τη σχέση των μαθητών/-τριών με τον τόπο τους και την ιστορική τους κληρονομιά. Η διαδικασία αυτή καθιστά την τοπική ιστορία ένα ζωντανό και δυναμικό πεδίο μάθησης, καθώς οι μαθητές/-τριες έχουν την ευκαιρία να ανακαλύψουν και να ερμηνεύσουν τα ιστορικά γεγονότα με τρόπο που συνδέεται άμεσα με την καθημερινότητά τους. Επιπλέον, η ψηφιακή αφήγηση ενισχύει την ενεργό συμμετοχή των μαθητών/-τριών, καθώς τους ενθαρρύνει να συνεργάζονται, να επικοινωνούν και να ανταλλάσσουν απόψεις, κάτι που ενδυναμώνει τις κοινωνικές τους δεξιότητες και την ικανότητα συνεργασίας.

Η χρήση των ΤΠΕ (Τεχνολογίες Πληροφορίας και Επικοινωνίας) στην εκπαιδευτική διαδικασία της ψηφιακής αφήγησης είναι καθοριστική, καθώς διευρύνει τις δυνατότητες δημιουργίας, προσφέροντας μια ποικιλία εργαλείων και μέσων, όπως εικόνες, ήχο, βίντεο και κείμενο. Αυτή η πολυτροπική προσέγγιση επιτρέπει στους/στις μαθητές/-τριες να εκφράσουν τις ιδέες τους με ποικιλία τρόπων και να δημιουργήσουν αφηγήματα που συνδυάζουν διαφορετικές μορφές έκφρασης, κάνοντάς τα πιο ενδιαφέροντα και ελκυστικά. Επιπλέον, η ενσωμάτωσή της στο μαθητοκεντρικό μοντέλο μάθησης ενισχύει τη συμμετοχή των μαθητών/-τριών στη διαδικασία και προάγει την προσωπική τους έκφραση.

Η επιτυχής ενσωμάτωση της ψηφιακής αφήγησης στο σχολικό περιβάλλον προϋποθέτει την υποστήριξη των δασκάλων μέσω κατάλληλης επιμόρφωσης και παιδαγωγικής καθοδήγησης. Ο εκπαιδευτικός, ως καθοδηγητής της

διαδικασίας, πρέπει να ενσωματώσει στρατηγικές που ενθαρρύνουν τη διερεύνηση, την κριτική σκέψη και τη συνεργασία, ενώ παράλληλα πρέπει να δημιουργήσει ένα υποστηρικτικό περιβάλλον όπου οι μαθητές/-τριες νιώθουν ασφαλείς να εκφράσουν τις απόψεις και τις ιδέες τους. Το εκπαιδευτικό περιβάλλον πρέπει να είναι ανοιχτό στην καινοτομία και να παρέχει τα κατάλληλα εργαλεία για να υλοποιηθούν οι στόχοι του μαθήματος.

Η ψηφιακή αφήγηση δεν είναι απλώς ένα μέσο διδασκαλίας, αλλά ένα εργαλείο ενδυνάμωσης της μαθησιακής διαδικασίας. Προάγει τη βιωματική μάθηση, καθώς οι μαθητές/-τριες αναλαμβάνουν ενεργό ρόλο στη δημιουργία του περιεχομένου, συνδέοντας τις μαθησιακές τους εμπειρίες με την καθημερινή τους ζωή και τα κοινωνικά τους βιώματα. Μέσα από την ενεργό συμμετοχή τους στη διαδικασία της αφήγησης, οι μαθητές/-τριες αναπτύσσουν τις δεξιότητες του αναστοχασμού και της κριτικής αξιολόγησης, κάτι που αποτελεί απαραίτητη προϋπόθεση για την ανάπτυξη της κριτικής σκέψης.

Επιπλέον, η ψηφιακή αφήγηση ενισχύει την αυτοεκτίμηση των μαθητών/-τριών, καθώς τους επιτρέπει να παράγουν κάτι μοναδικό και προσωπικό, το οποίο μπορεί να παρουσιαστεί στους άλλους. Αυτό το στοιχείο της αναγνώρισης της προσωπικής τους δουλειάς και της δυνατότητας να μοιραστούν τα αποτελέσματά τους με τους υπόλοιπους, αυξάνει την αίσθηση της ολοκλήρωσης και της επιτυχίας.

Συνολικά, η ψηφιακή αφήγηση ως εργαλείο εκπαίδευσης προσφέρει πληθώρα ευκαιριών για την ενίσχυση της μάθησης και την καλλιέργεια δεξιοτήτων που είναι απαραίτητες για την προσωπική και κοινωνική ανάπτυξη των μαθητών/-τριών. Η υιοθέτησή της στο εκπαιδευτικό σύστημα, εάν συνδυαστεί με τον κατάλληλο παιδαγωγικό σχεδιασμό και τη σωστή υποστήριξη, έχει τη δυνατότητα να μεταμορφώσει τη μαθησιακή εμπειρία, καθιστώντας την πιο προσωπική, εντατική και συνδεδεμένη με τον πραγματικό κόσμο.

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Η ΨΗΦΙΑΚΗ ΑΦΗΓΗΣΗ ΣΤΗΝ ΠΡΟΣΧΟΛΙΚΗ ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΤΗΝ ΕΙΔΙΚΗ ΑΓΩΓΗ. ΤΑ ΠΑΙΔΙΑ ΔΗΜΙΟΥΡΓΟΥΝ ΨΗΦΙΑΚΕΣ ΙΣΤΟΡΙΕΣ.

Παναγιωτίδου Ευαγγελία
Νηπιαγωγός ΠΕ 60
Μ. Δ. Ε. : «Εκπαίδευση στη Διαπολιτισμική Ετοιμότητα», ΔΠΘ
litspan@hotmail.com

Βέλλιος Λάμπρος
Εκπαιδευτικός Τμήματος Ένταξης ΠΕ 70
Μ.Β.Α: « Διοίκηση Επιχειρήσεων & Οργανισμών», Π.Ι
vellioslam@yahoo.gr

Μανούση Μαριάνθη
Εκπαιδευτικός Ειδικής Αγωγής ΠΕ71
Μ. Δ. Ε. : «Εκπαίδευση στη Διαπολιτισμική Ετοιμότητα», ΔΠΘ
maniaman246@gmail.com

Μανούση Δήμητρα Παναγιώτα
Εκπαιδευτικός ΠΕ60ΕΑΕ
Μ.Δ.Ε.: «Ειδική Αγωγή και Εκπαίδευση», Πανεπιστήμιο Λευκωσίας
Dimitra2man@gmail.com

ΠΕΡΙΛΗΨΗ

Τα σημερινά παιδιά ζουν σ' έναν ψηφιακό κόσμο και οι νέες τεχνολογίες αποτελούν ένα σημαντικό στοιχείο της παιδικής κουλτούρας. Ο Prensky (2006) χρησιμοποίησε τον όρο «ψηφιακοί αυτόχθονες»(digital natives), για να αναφερθεί στα σημερινά παιδιά που μιλούν την ψηφιακή γλώσσα των υπολογιστών, των βιντεοπαιχνιδιών και του διαδικτύου. Σε αντίθεση, εκείνοι που δεν γεννήθηκαν στην ψηφιακή εποχή θεωρούνται «ψηφιακοί μετανάστες» (digital immigrants), επειδή έχουν υιοθετήσει πολλές πλευρές των ΤΠΕ, ακριβώς όπως όσοι μαθαίνουν μια δεύτερη γλώσσα αργότερα στη ζωή τους .(Nikolopoulou, 2018).

Στο πλαίσιο της εκπαίδευσης τονίζονται ιδιαίτερα τα οφέλη της ψηφιακής τεχνολογίας, καθώς οι υπολογιστές προσφέρουν στα παιδιά πρόσβαση σε νέους, άγνωρους κόσμους και διεγείρουν τη δίψα τους για μάθηση.

Μια ιδιαίτερη θέση στον τομέα της προσχολικής εκπαίδευσης και της Ειδικής Αγωγής κατέχει η αφήγηση, η οποία συμβάλλει αποτελεσματικά στη μάθηση. Άλλωστε η μάθηση είναι αποτελεσματική, όταν προσφέρεται στα παιδιά πολυτροπικά, με έναν ευχάριστο και διασκεδαστικό τρόπο.

Με την εμφάνιση των νέων τεχνολογιών δημιουργήθηκε μια νέα μορφή αφήγησης, η ψηφιακή αφήγηση (Digital Story telling), από την οποία τα παιδιά αποκομίζουν πολλά οφέλη, αποκτούν περαιτέρω δεξιότητες και όχι μόνο μια απλή γνωριμία κι εξοικείωση με τους ηλεκτρονικούς υπολογιστές. Αλληλοεπιδρούν με τους συμμαθητές τους, δημιουργώντας σχέσεις οικειότητας κι εμπιστοσύνης, εκφράζονται δημιουργικά και αποκτούν ψηφιακές δεξιότητες.

Λέξεις κλειδιά: Νέες Τεχνολογίες, Ψηφιακή Αφήγηση, Προσχολική Εκπαίδευση, Ειδική Αγωγή

ΕΙΣΑΓΩΓΗ

Ψηφιακή αφήγηση ιστοριών ονομάζεται η σύγχρονη έκφραση της αρχαίας τέχνης της αφήγησης στο περιβάλλον της ψηφιακής τεχνολογίας, αντλώντας τη δύναμή της από την αρμονία μεταξύ εικόνας, μουσικής, αφήγησης και φωνής, μετουσιώνοντάς τη με ζωηρά χρώματα χαρακτήρες, καταστάσεις, εμπειρίες και ιδέες (Lowenthal ,2008). Πρόκειται για μια δημιουργική διαδικασία, κατά την οποία η παραδοσιακή αφήγηση, μετατρέπεται σε ψηφιακή, συνδυάζοντας τα πολυμέσα του 21ου αι. και τα εργαλεία της τηλεπικοινωνίας (Ohler, 2008).

Όπως αναφέρουν οι Κοτρωνίδου, Τόζιου (Kotronidou & Toziou, 2011), *ουσιαστικά, οι ψηφιακές αφηγήσεις είναι μικρής διάρκειας (2-5 λεπτά) αφηγηματικές ιστορίες που περιέχουν ήχο, βίντεο, κείμενο.*

Παρόλο που η αφήγηση ιστοριών στην προσχολική εκπαίδευση και την ειδική αγωγή για την ανάπτυξη της προφορικότητας , δεν είναι μια καινούρια πρακτική, η εφαρμογή της ψηφιακής αφήγησης είναι μια νέα μορφή αφήγησης που προσδίδει πολλά οφέλη στην εκπαιδευτική διαδικασία. Με την χρήση των ψηφιακών μέσων, η παραδοσιακή αφήγηση εμπλουτίζεται και αποκτά μια πολυμεσική διάσταση.

«Οι ψηφιακές ιστορίες μπορούν να ενταχθούν στην εκπαίδευση, προσελκύοντας το ενδιαφέρον των παιδιών και προσφέροντας κίνητρα για τη συμμετοχή τους σε μαθησιακές δραστηριότητες» (Prentzas, 2017).

Η συμμετοχή των παιδιών στη λήψη αποφάσεων, που αποτελεί τη βάση εξέλιξης της μεθόδου, εναρμονίζεται με την «παιδαγωγική της ακρόασης». Η Rinaldi (2005),διευθύντρια των διεθνώς αναγνωρισμένων μονάδων προσχολικής εκπαίδευσης του Ρέτζιο Εμίλιο, ορίζει ως «ακρόαση», μια μεταφορά της ανοιχτοσύνης και της ενσυναίσθησης να ακούσουμε ,όχι μόνο με την ακοή μας ,αλλά και με όλες μας τις αισθήσεις ,τις μύριες γλώσσες των παιδιών. Η «ψηφιακή αφήγηση» ,τεκμηριώνει παιδαγωγικά ,τους ορατούς τρόπους που μαθαίνουν τα παιδιά.

Σήμερα οι εκπαιδευτικοί έχουν στα χέρια τους πολλά αξιόλογα λογισμικά, τα οποία μπορούν να αξιοποιήσουν για τη δημιουργία ψηφιακών αφηγήσεων, τόσο στην διά ζώσης, όσο και στην εξ αποστάσεως εκπαίδευση. Η εμπλοκή των παιδιών με τα λογισμικά αυτά τα εμπνέει να καλλιεργήσουν τη δημιουργική τους έκφραση, να αποκτήσουν ποικίλες ψηφιακές δεξιότητες και να ανακαλύψουν διαφορετικούς τρόπους για να εκφράσουν τις ιδέες και τα συναισθήματα τους. Οι ψηφιακές αφηγήσεις τους μπορούν να αναρτηθούν σε ιστοσελίδες, διαχέοντας και γνωστοποιώντας την καλή πρακτική, σε γονείς, μαθητές άλλων τάξεων, αλλά και στην ευρύτερη κοινότητα, κάτι που προσφέρει κίνητρα στα παιδιά και προσελκύει το ενδιαφέρον τους.

Τα παιδιά συμμετέχουν εξ ολοκλήρου στην δημιουργία του υλικού που απαιτείται, προκειμένου να δημιουργηθεί μια ψηφιακή ιστορία με τη χρήση ενός λογισμικού. Η προσθήκη κειμένου, φωνής ή μουσικής, κάνει την ιστορία ακόμη πιο ενδιαφέρουσα. Ο εκπαιδευτικός μπορεί να δημιουργήσει τις κατάλληλες συνθήκες, ενθαρρύνοντας τα παιδιά να συμμετέχουν ενεργά και συνεργατικά σε δραστηριότητες και σχέδια εργασίας που τα εμπλέκουν στην οπτικοποίηση του υλικού που δημιούργησαν αλλά και να εξοικειωθούν με τα λογισμικά ψηφιακής αφήγησης.

Οι μαθητές του 1ου Νηπιαγωγείου Φερών, που το παράδειγμα χρήσης τους θα παρουσιάσουμε, όντας εξοικειωμένοι με την δημιουργία ψηφιακών ιστοριών, είτε δημιουργούν δικά τους σενάρια τα οποία παίρνουν τη μορφή ψηφιακής αφήγησης, είτε εικονογραφούν ιστορίες που προηγουμένως έχουν διαβαστεί μέσα στην τάξη, οι οποίες ψηφιοποιούνται. Στην παρούσα εργασία περιγράφεται η δημιουργία μιας ψηφιακής ιστορίας με τίτλο: **«Η Μόνα σε καινούριο Σχολείο»** η οποία δημιουργήθηκε στα πλαίσια της ημέρας για την Σχολική Βία.

Η ψηφιακή αφήγηση έχει αναγνωριστεί διεθνώς ως ένα ισχυρό παιδαγωγικό εργαλείο που υποστηρίζει την ενεργό μάθηση, τον ψηφιακό γραμματισμό και τη γλωσσική ανάπτυξη των παιδιών (Robin, 2016; Sadik, 2008). Έρευνες δείχνουν ότι, όταν τα παιδιά δημιουργούν τις δικές τους ψηφιακές ιστορίες, εμπλέκονται σε αυθεντικές μαθησιακές καταστάσεις που ενισχύουν τη δημιουργικότητα, την κριτική σκέψη και το ενδιαφέρον για μάθηση (Yang & Wu, 2012; Niemi et al., 2014). Στην προσχολική ηλικία, η ψηφιακή αφήγηση συνδέεται άμεσα με την πρώιμη παιδική γραμματιστική ανάπτυξη, καθώς τα παιδιά συνδυάζουν εικόνα, προφορικό λόγο και αφήγηση, οικοδομώντας νόημα μέσα από πολυτροπικές εμπειρίες (Flewitt et al., 2015; Kervin & Mantei, 2017).

ΜΕΘΟΔΟΛΟΓΙΑ-ΠΛΑΙΣΙΟ ΚΑΙ ΔΕΙΓΜΑ

Στην παρούσα εφαρμογή συμμετείχαν δεκαπέντε (15) νήπια, εκ των οποίων επτά (7) αγόρια και οκτώ (8) κορίτσια, ηλικίας 4–6 ετών, τα οποία φοιτούσαν στο ολοήμερο τμήμα του 1ου Νηπιαγωγείου Φερών. Στην ομάδα υπήρχαν παιδιά τυπικής ανάπτυξης και παιδιά με μαθησιακές δυσκολίες. Η εκπαιδευτική παρέμβαση υλοποιήθηκε κατά τη διάρκεια μίας εβδομάδας και εντάχθηκε στο πλαίσιο σχεδίου εργασίας για τη σχολική βία.

ΕΦΑΡΜΟΓΗ

Σχεδιασμός εκπαιδευτικού σεναρίου

Αρχικά σχεδιάσαμε ένα εκπαιδευτικό σενάριο με τη δημιουργία μιας ψηφιακής ιστορίας από τα παιδιά, προσπαθώντας να ακολουθήσουμε τα βήματα δημιουργίας μιας ψηφιακής αφήγησης. Τέθηκαν σε πρώτη φάση ο σκοπός και οι στόχοι του σεναρίου, ενώ καθ' όλη τη διάρκεια της υλοποίησης πραγματοποιούνταν «διαλείμματα» αξιολόγησης κι ανατροφοδότησης για να αποφασιστεί η πορεία του έργου και να εντοπιστούν πιθανές αδυναμίες που έχρηζαν διόρθωσης.

Γενικός σκοπός

Σκοπός του συγκεκριμένου σεναρίου ήταν η καλλιέργεια του προφορικού και γραπτού λόγου των μαθητών κι αφετέρου η εκπαίδευση τους στην αξιοποίηση των δυνατοτήτων του υπολογιστή με την εξοικείωσή τους στο λογισμικό Clipchamp, το οποίο ενδείκνυται για την δημιουργία ψηφιακών ιστοριών.

Ειδικοί στόχοι

Οι στόχοι που τέθηκαν είναι οι εξής:
- Να καλλιεργήσουν τα παιδιά τον προφορικό τους λόγο, δημιουργώντας τις δικές τους ιστορίες
- Να αντιγράφουν κείμενα στα πλαίσια των δυνατοτήτων τους
- Να καλλιεργούν τη φαντασία και τη δημιουργικότητά τους
- Να διατυπώνουν προτάσεις, να κάνουν υποθέσεις, να βρίσκουν λύσεις σε προβλήματα.
- Να αναγνωρίζουν τα στοιχεία που είναι απαραίτητα για τη δημιουργία μιας ιστορίας, απαντώντας στα ερωτήματα πραγματολογικού επιπέδου (Πώς ,Πού, Πότε, Ποιος, Πόσο, Τι)
- Να γνωρίσουν ένα νέο είδος αφήγησης, αυτό της ψηφιακής αφήγησης και να τους κεντρίσει το ενδιαφέρον η δημιουργία ψηφιακών ιστοριών.
- Να εξοικειωθούν με την χρήση του Η/Υ
- Να εξοικειωθούν με τη χρήση του συγκεκριμένου λογισμικού
- Να δουλεύουν ομαδικά και συνεργατικά για τη δημιουργία μιας ψηφιακής ιστορίας

Μεθοδολογία

Ο χρόνος υλοποίησης του προγράμματος ήταν μία εβδομάδα, καθώς τα παιδιά εργάζονταν μ' αυτό παράλληλα με τις άλλες δραστηριότητες του ημερήσιου προγράμματος. Το συγκεκριμένο πρόγραμμα πραγματοποιήθηκε στο ολοήμερο τμήμα του νηπιαγωγείου και πήρε την μορφή ενός project. Τα νήπια δούλευαν σε ομάδες. Οι ομάδες ήταν μεικτής ηλικίας και ικανότητας, ώστε να ενισχυθεί η αλληλεπίδραση μεταξύ των νηπίων. Στα παιδιά δόθηκε ο απαραίτητος χρόνος, ώστε να εξοικειωθούν με κάποιες βασικές λειτουργίες του υπολογιστή και τη λειτουργία του Scanner, ιδιαίτερα τα παιδιά που δυσκολεύονταν περισσότερο, καθώς στόχος μας ήταν να συμμετέχουν ισότιμα όλα τα παιδιά. Επίσης δόθηκε αρκετός χρόνος, ώστε να εξοικειωθούν με το λογισμικό Clipchamp και να καταλάβουν τον τρόπο χρήσης του.

Γενικότερα η προσέγγισή μας διαπνέεται από τις πέντε θεμελιώδεις αρχές του πλαισίου RAMPS:
RECOGNIZING, Αναγνωρίζοντας τις πολλές γλώσσες των παιδιών
ASSIGNING, Εκχώρηση χώρων επικοινωνίας
MAKING , Δημιουργία χρόνου
PROVIDING , παραχώρηση δυνατότητας στα παιδιά να επιλέγουν
SUBSCRIBING,Έκφραση μιας αναστοχαστικής πρακτικής (Lancaster & Kirby 2010)

Δημιουργία του σεναρίου

Σ' αυτήν τη φάση τα παιδιά κλήθηκαν να φτιάξουν την δική τους ψηφιακή ιστορία. Τα νήπια αρχικά ρωτήθηκαν
- Από ποια στοιχεία αποτελείται μια ιστορία;
- Που μπορούμε να βρούμε ιστορίες ώστε να δούμε τα συστατικά στοιχεία τους;

Τα παιδιά ανέτρεξαν στη βιβλιοθήκη της τάξης τους, ξεφύλλισαν βιβλία και ξεκίνησε ένας καταιγισμός ιδεών σχετικά με το τι θα ήθελαν να γράψουν, τι θα τους ενδιέφερε να λέει η ιστορία τους. Τελικά αποφασίστηκε να

επεξεργαστούν και να εικονογραφήσουν την ιστορία «Τα μπαλόνια της φιλίας και η Μόνα σε καινούριο σχολείο» που είχαν διαβάσει στα πλαίσια της Πανελλήνιας Ημέρας κατά της Σχολικής Βίας

Αρχικά τα παιδιά επεξεργάστηκαν το σενάριο της δικής τους ιστορίας κι επέλεξαν ποιες σκηνές θα ήθελαν να συμπεριλάβουν σ' αυτήν. Έτσι δημιουργήθηκε μια νέα απλοποιημένη έκδοση της ιστορίας «Τα μπαλόνια της Φιλίας και η Μόνα σε καινούριο σχολείο».

Εικονογράφηση

Στη συνέχεια, κάθε ομάδα ανέλαβε να εικονογραφήσει από ένα τμήμα της ιστορίας. Όταν ολοκληρώθηκε αυτό το στάδιο, η ιστορία ξαναδιαβάστηκε παράλληλα με τις ζωγραφιές των παιδιών. Σ' αυτήν την φάση διαπίστωσαν τα νήπια κάποια κενά που υπήρχαν στην εικονογράφηση και έκαναν τις απαραίτητες συμπληρωματικές ζωγραφιές.

Σάρωση των εικόνων

Για την σάρωση των εικόνων υπήρχαν δύο επιλογές:
- Σάρωση με την εφαρμογή cam scan στη συσκευή του κινητού τηλεφώνου (μεταφέροντας τη δεξιότητα κι εκτός σχολείου)
- Σάρωση με τον εκτυπωτή της τάξης.

Τα παιδιά χρησιμοποίησαν και τους δύο τρόπους. Οι δύο πρώτες ομάδες προτίμησαν τη σάρωση με τη βοήθεια του εκτυπωτή και η τρίτη ομάδα με την βοήθεια του κινητού τηλεφώνου. Δόθηκαν οι απαραίτητες οδηγίες στα παιδιά και χρειάστηκε να επαναληφθεί η διαδικασία της σάρωσης αρκετές φορές, ώστε τα παιδιά να εξοικειωθούν με τη χρήση της. Τα παιδιά εργάστηκαν ομαδικά, σαρώνοντας τις ζωγραφιές τους, οι οποίες αποθηκεύτηκαν με την βοήθειά μας στην επιφάνεια εργασίας του υπολογιστή. Σταδιακά τα νήπια γίνονταν ολοένα και πιο ανεξάρτητα και απέδιδαν περισσότερο, με λιγότερη βοήθεια από την εκπαιδευτικό.

Ηχογράφηση

Για την σύνθεση της ψηφιακής ιστορίας αξιοποιήθηκε το λογισμικό Clipchamp το οποίο είναι πολύ εύχρηστο και ιδιαίτερα προσιτό σε παιδιά προσχολικής ηλικίας. Τα νήπια επέλεγαν τις εικόνες από τον φάκελο που υπήρχε στην επιφάνεια εργασίας του Η/Υ και τις τοποθετούσαν στη θέση που έπρεπε, ώστε να συμπληρωθεί η ιστορία. Ακολούθησε η ηχογράφηση της ιστορίας. Το λογισμικό δίνει τη δυνατότητα ηχογράφησης φωνής, οπότε δεν χρειάστηκε η χρήση κάποιου άλλου λογισμικού (πχ audacity)

Σχήμα 1: Το περιβάλλον του Clipchamp



Αναπαραγωγή της ιστορίας

Η δημιουργία της ιστορίας ολοκληρώθηκε κι ήρθε η ώρα για την αναπαραγωγή της, η οποία ενθουσίασε τα παιδιά, καθώς είδαν όλη την δουλειά τους να ξετυλίγεται μπροστά στα μάτια τους.

Η Μόνα η μικρή χελώνα αλλάζει σχολικό περιβάλλον και γίνεται θύμα σχολικού εκφοβισμού από μια ομάδα ζώων. Τα ζώα αυτά της δημιουργούν πολλά προβλήματα με αποτέλεσμα να προφασίζεται διάφορους λόγους για να μην

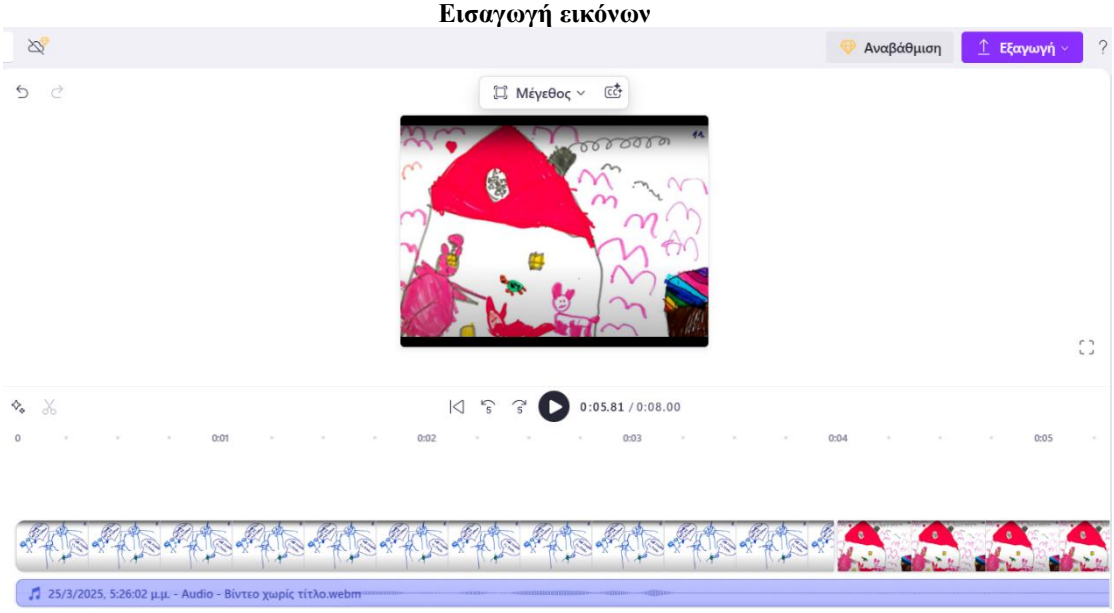
πάει σχολείο. Με τη βοηθεια της δασκάλας τα πράγματα πήραν μια άλλη τροπή, επικράτησε η ηρεμία στο σχολείο και όλα τα ζωάκια έγιναν φίλοι.

Η ψηφιακή ιστορία αναρτήθηκε στην ιστοσελίδα του νηπιαγωγείου (https://blogs.sch.gr/1nipfer/2023/03/06/panellinia-imera-kata-tis-scholikis-vias/), για να έχουν πρόσβαση σ' αυτήν τα υπόλοιπα παιδιά του σχολείου, αλλά και οι γονείς. Η διαδικτυακή δημοσίευση της ιστορίας δίνει τη δυνατότητα σε μαθητές άλλων σχολείων να δουν και να αξιολογήσουν την δουλειά των δημιουργών. Με τον τρόπο αυτό οι μικροί δημιουργοί, αξιολογούνται, αξιολογούν κι ανταλλάσσουν ιδέες.

Εικόνα 1
Εισαγωγή εικόνων



Εικόνα 2
Εισαγωγή εικόνων



Αξιολόγηση

Η αξιολόγηση της χρήσης της ψηφιακής αφήγησης στη συγκεκριμένη μελέτη βασίστηκε σε μια ολοκληρωμένη προσέγγιση που περιλάμβανε την ανάλυση της εκπαιδευτικής διαδικασίας, την παρατήρηση της αλληλεπίδρασης των μαθητών με τα ψηφιακά εργαλεία και την αποτίμηση των μαθησιακών αποτελεσμάτων.

Η διαδικασία αξιολόγησης πραγματοποιήθηκε μέσω:

- Παρατήρησης της διδακτικής πρακτικής: Η αλληλεπίδραση των μαθητών με το ψηφιακό εργαλείο και η εμπλοκή τους στις δραστηριότητες παρακολουθήθηκε από την εκπαιδευτικό.
- Ανάλυσης της συμμετοχής των μαθητών: Καταγράφηκε το επίπεδο εμπλοκής των παιδιών, η διάθεσή τους να συνεργαστούν και να δημιουργήσουν ιστορίες.
- Ανατροφοδότησης από τους μαθητές: Οι εκπαιδευτικοί κατέγραψαν τις αντιδράσεις των παιδιών και την ικανοποίησή τους από τη διαδικασία.
- Αξιολόγησης του παραγόμενου υλικού: Οι δημιουργημένες ψηφιακές ιστορίες αναλύθηκαν ως προς τη συνοχή, τη φαντασία και την ορθότητα στη χρήση του ψηφιακού εργαλείου.
- Η επιτυχία της εφαρμογής της ψηφιακής αφήγησης αξιολογήθηκε βάσει των εξής κριτηρίων:
- Ενεργός συμμετοχή των μαθητών: Καταγράφηκε το ποσοστό των μαθητών που συμμετείχαν ενεργά στη διαδικασία.
- Ανάπτυξη ψηφιακών δεξιοτήτων: Εξετάστηκε η ικανότητα των μαθητών να χρησιμοποιούν το λογισμικό για τη δημιουργία ιστοριών.
- Καλλιέργεια προφορικού και γραπτού λόγου: Αξιολογήθηκε η ικανότητα των μαθητών να δημιουργούν αφηγηματικές ιστορίες και να τις εκφράζουν λεκτικά.
- Δημιουργικότητα και φαντασία: Αναλύθηκε η πρωτοτυπία και η ποικιλομορφία των ιστοριών που δημιούργησαν τα παιδιά.
- Ομαδική συνεργασία: Παρατηρήθηκε η αλληλεπίδραση των μαθητών στις ομάδες τους και η δυνατότητα συνεργασίας.

Αξιολογώντας το πρόγραμμα, θεωρούμε ότι οι αρχικοί στόχοι επιτεύχθηκαν σε μεγάλο βαθμό. Τα παιδιά εκφράστηκαν δημιουργικά, χρησιμοποίησαν τη φαντασία τους για να δημιουργήσουν την ιστορία, ανέπτυξαν τον προφορικό τους λόγο, δημιουργήθηκαν οι ευκαιρίες για την πολυαισθητηριακή εμπλοκή τους, αλληλεπίδρασαν .

Ως προς την χρήση των ΤΠΕ, το πρόγραμμα συνέβαλε στην ανάπτυξη του τεχνολογικού και ψηφιακού γραμματισμού των παιδιών και την αναγνώριση του Η/Υ ως ενός πολύ χρήσιμου και δημιουργικού εργαλείου μάθησης.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Κατά την εφαρμογή του προγράμματος παρατηρήθηκε υψηλός βαθμός συμμετοχής, ενθουσιασμού και ενεργού εμπλοκής των νηπίων σε όλα τα στάδια της διαδικασίας. Τα παιδιά συμμετείχαν με προθυμία, τόσο στη διαμόρφωση του σεναρίου, όσο και στην εικονογράφηση, στη σάρωση των εικόνων και στην ηχογράφηση της ιστορίας. Ιδιαίτερα σημαντική ήταν η σταδιακή αυτονόμησή τους στη χρήση των ψηφιακών εργαλείων, καθώς, μετά τις πρώτες καθοδηγούμενες προσπάθειες, αρκετά νήπια ήταν σε θέση να επιλέγουν αρχεία, να τα τοποθετούν στη σωστή σειρά και να συμμετέχουν ενεργά στη διαδικασία της ψηφιακής σύνθεσης.

Από τα δεκαπέντε (15) παιδιά, τα δεκατρία (13) εξέφρασαν αυθόρμητα την επιθυμία να επαναληφθεί η δραστηριότητα και να δημιουργήσουν νέες ψηφιακές ιστορίες. Χαρακτηριστικές φράσεις που καταγράφηκαν ήταν: «Κυρία, είναι σαν να φτιάχνουμε ταινία!», «Μπορούμε να κάνουμε κι άλλη ιστορία;» και «Θέλω να πω κι εγώ ένα κομμάτι». Οι λεκτικές αυτές αναφορές, σε συνδυασμό με τη διαρκή ενασχόληση των παιδιών με το έργο, καταδεικνύουν το υψηλό επίπεδο κινήτρου και εσωτερικής παρακίνησης.

Σε επίπεδο κοινωνικής αλληλεπίδρασης, παρατηρήθηκε ενίσχυση της συνεργασίας, της ανάληψης ρόλων και της αμοιβαίας υποστήριξης μεταξύ των νηπίων. Τα παιδιά διαπραγματεύονταν τη σειρά των εικόνων, πρότειναν ιδέες για την εξέλιξη της ιστορίας και βοηθούσαν συμμαθητές τους που δυσκολεύονταν, ιδιαίτερα στη χρήση του εξοπλισμού. Παράλληλα, καταγράφηκε βελτίωση στην προφορική έκφραση, καθώς τα νήπια επιχειρούσαν να αφηγηθούν πιο ολοκληρωμένες προτάσεις, να περιγράψουν συναισθήματα των ηρώων και να αιτιολογήσουν τις επιλογές τους στο σενάριο.

Τέλος, ως προς τον ψηφιακό γραμματισμό, διαπιστώθηκε πρόοδος στη βασική χρήση του υπολογιστή και του λογισμικού Clipchamp (επιλογή αρχείων, αλληλουχία εικόνων, ηχογράφηση), ενώ τα παιδιά ανέπτυξαν μεγαλύτερη αυτοπεποίθηση και εξοικείωση με τις ψηφιακές διαδικασίες.

ΣΥΖΗΤΗΣΗ – ΣΥΝΔΕΣΗ ΜΕ ΤΗ ΘΕΩΡΙΑ

Τα αποτελέσματα της εφαρμογής επιβεβαιώνουν τη διεθνή βιβλιογραφία που αναδεικνύει την ψηφιακή αφήγηση ως ένα ισχυρό παιδαγωγικό εργαλείο για την ενίσχυση της γλωσσικής ανάπτυξης, της ενεργού συμμετοχής και του ψηφιακού γραμματισμού των παιδιών προσχολικής ηλικίας (Robin, 2016; Sadik, 2008; Flewitt et al., 2015). Η αυξημένη

εμπλοκή, το ενδιαφέρον και η επιθυμία των παιδιών να επαναλάβουν τη δραστηριότητα συνάδουν με έρευνες που δείχνουν ότι η ψηφιακή αφήγηση ενισχύει την εσωτερική παρακίνηση και τη βιωματική μάθηση (Yang & Wu, 2012; Niemi et al., 2014).

Η βελτίωση της προφορικής έκφρασης και της αφηγηματικής ικανότητας των νηπίων συμφωνεί με μελέτες που υποστηρίζουν ότι η ψηφιακή αφήγηση συμβάλλει ουσιαστικά στην ανάπτυξη του πρώιμου γραμματισμού, καθώς τα παιδιά λειτουργούν ως δημιουργοί και όχι ως παθητικοί δέκτες περιεχομένου (Kervin & Mantei, 2017; Hull & Katz, 2006). Παράλληλα, η ενίσχυση της συνεργασίας και της κοινωνικής αλληλεπίδρασης επιβεβαιώνει κοινωνικοπολιτισμικές προσεγγίσεις της μάθησης, σύμφωνα με τις οποίες η γνώση οικοδομείται μέσα από τη συμμετοχή σε αυθεντικές κοινωνικές πρακτικές (Vygotsky, 1978).

Ιδιαίτερη σημασία έχει το γεγονός ότι η δράση λειτούργησε ως πλαίσιο έκφρασης συναισθημάτων και επεξεργασίας κοινωνικών ζητημάτων, όπως ο σχολικός εκφοβισμός, στοιχείο που συνδέεται με έρευνες οι οποίες τονίζουν τη συμβολή της ψηφιακής αφήγησης στην κοινωνικοσυναισθηματική μάθηση και την ενσυναίσθηση (Sadik, 2008; Robin, 2016).

Τέλος, η ενεργός συμμετοχή των παιδιών στη λήψη αποφάσεων και στη διαμόρφωση του τελικού προϊόντος επιβεβαιώνει τις αρχές της «παιδαγωγικής της ακρόασης» (Rinaldi, 2005), καθώς η φωνή των παιδιών αποτέλεσε κεντρικό άξονα της μαθησιακής διαδικασίας.

ΣΥΝΟΠΤΙΚΟ ΜΟΝΤΕΛΟ ΥΛΟΠΟΙΗΣΗΣ

(Η ψηφιακή αφήγηση ως καλή πρακτική στην προσχολική εκπαίδευση)

Για την υποστήριξη της αναπαραγωγής της δράσης σε άλλα εκπαιδευτικά πλαίσια, προτείνεται το ακόλουθο συνοπτικό μοντέλο υλοποίησης:

Επιλογή παιδαγωγικού θέματος και στόχων

Ο/η εκπαιδευτικός, σε συνεργασία με τα παιδιά, επιλέγει ένα θέμα που συνδέεται με τα ενδιαφέροντά τους ή με κοινωνικά ζητήματα της σχολικής ζωής και διαμορφώνει σαφείς γλωσσικούς, κοινωνικούς και ψηφιακούς στόχους.

Δημιουργία σεναρίου με τα παιδιά

Μέσα από συζήτηση, καταιγισμό ιδεών και επεξεργασία ιστοριών, τα παιδιά συνδιαμορφώνουν την πλοκή, τους χαρακτήρες και τις βασικές σκηνές της ιστορίας.

Εικονογράφηση και παραγωγή υλικού

Τα νήπια δημιουργούν τις εικόνες, τις μακέτες ή τα αντικείμενα που θα αξιοποιηθούν στην ιστορία, αναπτύσσοντας τη φαντασία και τη δημιουργική τους έκφραση.

Ψηφιοποίηση και σύνθεση ιστορίας

Το υλικό σαρώνεται ή φωτογραφίζεται και εισάγεται σε λογισμικό ψηφιακής αφήγησης. Τα παιδιά, με την υποστήριξη του/της εκπαιδευτικού, οργανώνουν τη σειρά των εικόνων, ηχογραφούν την αφήγηση και επιλέγουν ήχους ή μουσική

Αξιολόγηση και αναστοχασμός

Πραγματοποιείται συζήτηση με τα παιδιά για τη διαδικασία και το τελικό προϊόν, καταγραφή παρατηρήσεων και ανατροφοδότηση σχετικά με τη συνεργασία, τη μάθηση και τις δυσκολίες.

Δημοσίευση και διάχυση

Η ψηφιακή ιστορία παρουσιάζεται στην τάξη, αναρτάται στην ιστοσελίδα του σχολείου ή κοινοποιείται στην εκπαιδευτική κοινότητα, ενισχύοντας το κίνητρο, την αυτοεκτίμηση και τη διάχυση της καλής πρακτικής.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Ο Η/Υ αποτελεί μέρος της εκπαιδευτικής διαδικασίας και συμβάλλει στην αποτελεσματικότερη και ουσιαστική προσέγγιση της γνώσης, βοηθώντας τα παιδιά να την προσεγγίσουν αποτελεσματικά (δημιουργική μάθηση), γιατί αυτή αποκτάται με δραστηριότητες που ανταποκρίνονται στα ενδιαφέροντά τους και έχουν νόημα γι'αυτά.

Όταν η χρήση του Η/Υ ανταποκρίνεται στις ανάγκες των παιδιών, αποτελεί μια μοναδική πηγή μάθησης.

Ένα λογισμικό όταν είναι αναπτυξιακά κατάλληλο, δίνει τη δυνατότητα στα παιδιά να πειραματιστούν, να ανακαλύψουν, να μάθουν.

Ο εκπαιδευτικός θα βοηθήσει τα παιδιά σ' αυτή τη διαδικασία ανακάλυψης και μάθησης.

Η μέθοδος της ψηφιακής αφήγησης αποτελεί μια ατραπό δημιουργικής ανακάλυψης αφού είναι:
α) πολυμεθοδική ,καθώς αναγνωρίζει τις διαφορετικές φωνές των παιδιών ,β) συμμετοχική ,καθώς αντιμετωπίζει τα παιδιά ως ειδικούς , γ)στοχαστική ,εμπλέκοντας παιδιά και παιδαγωγούς στον στοχασμό,δ) προσαρμοστική ,καθώς μπορεί να εφαρμοστεί σε ποίκιλες προσχολικές δομές και ε) εστιασμένη στις εμπειρίες των παιδιών. (Sofou,2019:128-129)

Όμως οι εκπαιδευτικοί δεν αρκεί απλά να είναι γνώστες και καλοί χειριστές της τεχνολογίας, αλλά θα πρέπει να είναι ενημερωμένοι σχετικά με τα εκπαιδευτικά λογισμικά που απευθύνονται στα παιδιά, να επιλέγουν αυτά που είναι αναπτυξιακά κατάλληλα και να τα χρησιμοποιούν με εποικοδομητικό τρόπο. Γι' αυτό θα πρέπει να επιμορφώνονται συνεχώς πάνω στην εκπαιδευτική αξιοποίηση των νέων τεχνολογιών.

Αν η ενασχόληση γίνεται με μέτρο και υπό την επίβλεψη του εκπαιδευτικού, τα παιδιά θα αποκομίσουν από τη χρήση της ψηφιακής τεχνολογίας τα μέγιστα δυνατά οφέλη.

Εν κατακλείδι, η επιθυμία να ακούσεις και να εμπλέξεις τα παιδιά είναι ζήτημα κουλτούρας.

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ΘΠ26: Εκπαιδευτική αξιολόγηση με τη χρήση ψηφιακών μέσων και εργαλείων

Η ΧΡΗΣΗ ΤΕΧΝΟΛΟΓΙΑΣ EYE-TRACKING ΓΙΑ ΤΗΝ ΑΞΙΟΛΟΓΗΣΗ ΠΡΑΓΜΑΤΟΛΟΓΙΚΩΝ ΔΕΞΙΟΤΗΤΩΝ ΣΕ ΠΑΙΔΙΑ: ΣΥΣΤΗΜΑΤΙΚΗ ΑΝΑΣΚΟΠΗΣΗ

Γαργάλα Βασιλεία
Υποψήφια Διδάκτωρ,
Τμήμα Λογοθεραπείας,
Πανεπιστήμιο Ιωαννίνων
Πανεπιστημιούπολη Β', 45500, Ιωάννινα, Ελλάδα
e-mail: v.gargala@uoi.gr

Τόκη Ευγενία
Καθηγήτρια,
Τμήμα Λογοθεραπείας,
Πανεπιστήμιο Ιωαννίνων,
Πανεπιστημιούπολη Β', 45500, Ιωάννινα, Ελλάδα
e-mail: toki@uoi.gr

ΠΕΡΙΛΗΨΗ

Η πραγματολογική ικανότητα αποτελεί κρίσιμο στοιχείο της κοινωνικής επικοινωνίας, ιδίως κατά την παιδική ηλικία. Παιδιά με Πραγματολογική Διαταραχή (ΠΔ) ή άλλες Νευροαναπτυξιακές Διαταραχές (ΝαΔ) συχνά εμφανίζουν ελλείμματα που επηρεάζουν την κοινωνική τους ενσωμάτωση. Η τεχνολογία eye-tracking προσφέρει ένα καινοτόμο και αντικειμενικό εργαλείο αξιολόγησης, που επιτρέπει την καταγραφή και ανάλυση των οφθαλμικών κινήσεων και της εστίασης της προσοχής κατά την επικοινωνία. Η παρούσα συστηματική ανασκόπηση, βάσει PRISMA 2020, αναλύει 43 σχετικές μελέτες (2019–2025) από την PubMed, με στόχο την αξιολόγηση της εφαρμογής του eye-tracking στην ανίχνευση πρώιμων πραγματολογικών δεικτών. Τα αποτελέσματα αυτής της εργασίας δείχνουν ότι η τεχνολογία eye-tracking μπορεί να ανιχνεύσει πρώιμες διαφοροποιήσεις στις κοινωνικές-επικοινωνιακές δεξιότητες των παιδιών, συμβάλλοντας στην έγκαιρη διάγνωση. Η μειωμένη διάρκεια κοινωνικού βλέμματος και η περιορισμένη χρήση χαμόγελου κατά την κοινωνική αλληλεπίδραση συνδέονται με αυξημένα συμπτώματα σε παιδιά με αυτισμό και δυσκολίες επεξεργασίας κοινωνικών μηνυμάτων. Η χρήση eye-tracking ενισχύει την εγκυρότητα των διαγνώσεων, υποστηρίζει την πρώιμη παρέμβαση και προτείνεται ως εργαλείο ενσωματωμένο σε θεραπευτικά και εκπαιδευτικά προγράμματα. Η τεχνολογία αυτή δίνει νέες προοπτικές στη βελτίωση της ποιότητας ζωής παιδιών με ΝαΔ μέσω στοχευμένης και τεκμηριωμένης παρέμβασης.

Λέξεις – κλειδιά: eye-tracking, πραγματολογικές δεξιότητες, νευροαναπτυξιακές διαταραχές, πρώιμη διάγνωση, λογοθεραπεία, εκπαιδευτική παρέμβαση

ΕΙΣΑΓΩΓΗ

Η πραγματολογική ικανότητα, δηλαδή η ικανότητα χρήσης της γλώσσας με τρόπο κατάλληλο στα εκάστοτε κοινωνικά συμφραζόμενα, αποτελεί θεμελιώδη παράγοντα για την επικοινωνιακή και ακαδημαϊκή ανάπτυξη των παιδιών (Helland et al., 2024). Παιδιά που διαγιγνώσκονται με ΝαΔ, όπως η ΠΔ, η Ειδική Γλωσσική Διαταραχή (ΕΓΔ), η Διαταραχή Ελλειμματικής Προσοχής-Υπερκινητικότητας (ΔΕΠΥ) και η Διαταραχή Αυτιστικού Φάσματος (ΔΑΦ), παρουσιάζουν σημαντικά ελλείμματα σε αυτές τις δεξιότητες, γεγονός που επηρεάζει αρνητικά την κοινωνική τους προσαρμογή (Saul et al., 2023; Guerra et al., 2024; Carruthers et al., 2021).

Πιο συγκεκριμένα, παιδιά με ΔΑΦ συχνά δυσκολεύονται να αναγνωρίσουν κοινωνικές ενδείξεις και να προσαρμόσουν τον λόγο τους στο επικοινωνιακό πλαίσιο, με τα ελλείμματα να σχετίζονται με ελλείμματα Θεωρίας του Νου και χαμηλή απόδοση στη μνήμη εργασίας (Baixauli-Fortea et al., 2019; Hilviu et al., 2023). Αντίστοιχες προκλήσεις εμφανίζουν και παιδιά με ΔΕΠΥ, τα οποία αντιμετωπίζουν δυσκολίες στην έναρξη και διατήρηση συνομιλιών, στην αφήγηση και στη χρονολογικά κατάλληλη λεκτική απόκριση (Vassiliu et al., 2023).

Παραδοσιακά, η αξιολόγηση πραγματολογικών δεξιοτήτων βασιζόταν κυρίως σε ερωτηματολόγια και κλινική παρατήρηση, μεθόδους που συχνά υστερούν σε αντικειμενικότητα και εγκυρότητα (Adams, 2002). Η είσοδος των σύγχρονων τεχνολογιών στον χώρο της αξιολόγησης έχει επιφέρει σημαντική αλλαγή, με το eye-tracking να ξεχωρίζει ως μια αξιόπιστη, ακριβής και ποσοτικοποιημένη μέθοδο καταγραφής της οπτικής προσοχής σε κοινωνικά και γλωσσικά ερεθίσματα (Rudling et al., 2024; Toki, 2024). Η τεχνολογία eye-tracking, αξιοποιώντας ειδικούς αισθητήρες ή κάμερες, καταγράφει με μεγάλη ακρίβεια πού και για πόσο χρόνο εστιάζει το βλέμμα ενός ατόμου, με τη βοήθεια υπέρυθρου φωτός που ανιχνεύει μικρές αλλαγές στις κινήσεις των ματιών (Rudling et al., 2024; Toki, 2024; Zhou et al., 2020). Η εφαρμογή της είναι ιδιαίτερα χρήσιμη σε παιδιά, καθώς μπορεί να συνδυαστεί με κατάλληλα οπτικοακουστικά ερεθίσματα, ενώ η επιλογή του κατάλληλου eye-tracker προσαρμόζεται στις ανάγκες κάθε ερευνητικού πρωτοκόλλου και πληθυσμού (Franco et al., 2023; Vargas-Cuentas et al., 2017).

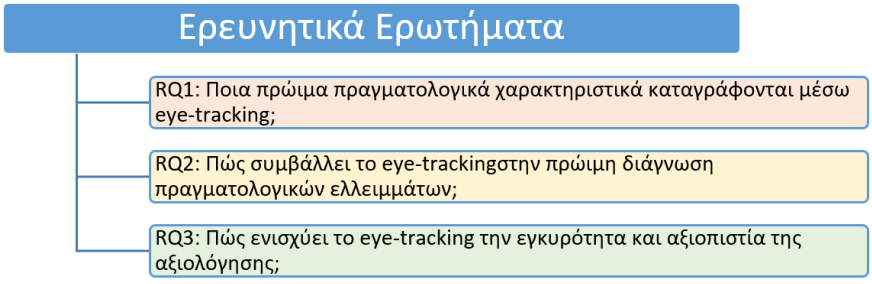
Επιπλέον, το eye-tracking επιτρέπει την εις βάθος μελέτη της οπτικής προσοχής σε πραγματικές κοινωνικές αλληλεπιδράσεις, δίνοντας τη δυνατότητα στους ερευνητές να αξιολογήσουν εάν τα παιδιά εστιάζουν στα κατάλληλα κοινωνικά σήματα, όπως το βλέμμα, τις εκφράσεις προσώπου ή άλλα κοινωνικά ερεθίσματα. Αυτό το στοιχείο θεωρείται κρίσιμο για την ανάπτυξη αποτελεσματικών πραγματολογικών δεξιοτήτων (Wang et al., 2025; Zhou et al., 2024).

Παρά τα σημαντικά πλεονεκτήματα της τεχνολογίας, η χρήση του eye-tracking για την αξιολόγηση των πραγματολογικών δεξιοτήτων σε παιδιά με ΔΑΦ και ΔΕΠΥ είναι ακόμη περιορισμένη, ενώ οι υπάρχουσες μελέτες χαρακτηρίζονται από μεθοδολογική ποικιλομορφία (Ioannou et al., 2020; Liu et al., 2021). Ειδικά σε μικρότερες ηλικίες, παρατηρείται η απουσία ενοποιημένων προσεγγίσεων για την ανίχνευση πρώιμων κοινωνικών δυσκολιών, αναδεικνύοντας την ανάγκη για συστηματική ανασκόπηση της σχετικής βιβλιογραφίας. Σε αυτό το πλαίσιο, η παρούσα εργασία εστιάζει συστηματικά στη χρήση της τεχνολογίας eye-tracking για την πρώιμη ανίχνευση ελλειμμάτων πραγματολογικών δεξιοτήτων σε παιδιά με ΝαΔ.

ΥΛΙΚΟ & ΜΕΘΟΔΟΣ

Τα κύρια ερευνητικά ερωτήματα αυτής της εργασίας αποτυπώνονται ακολούθως στην Εικόνα 1.

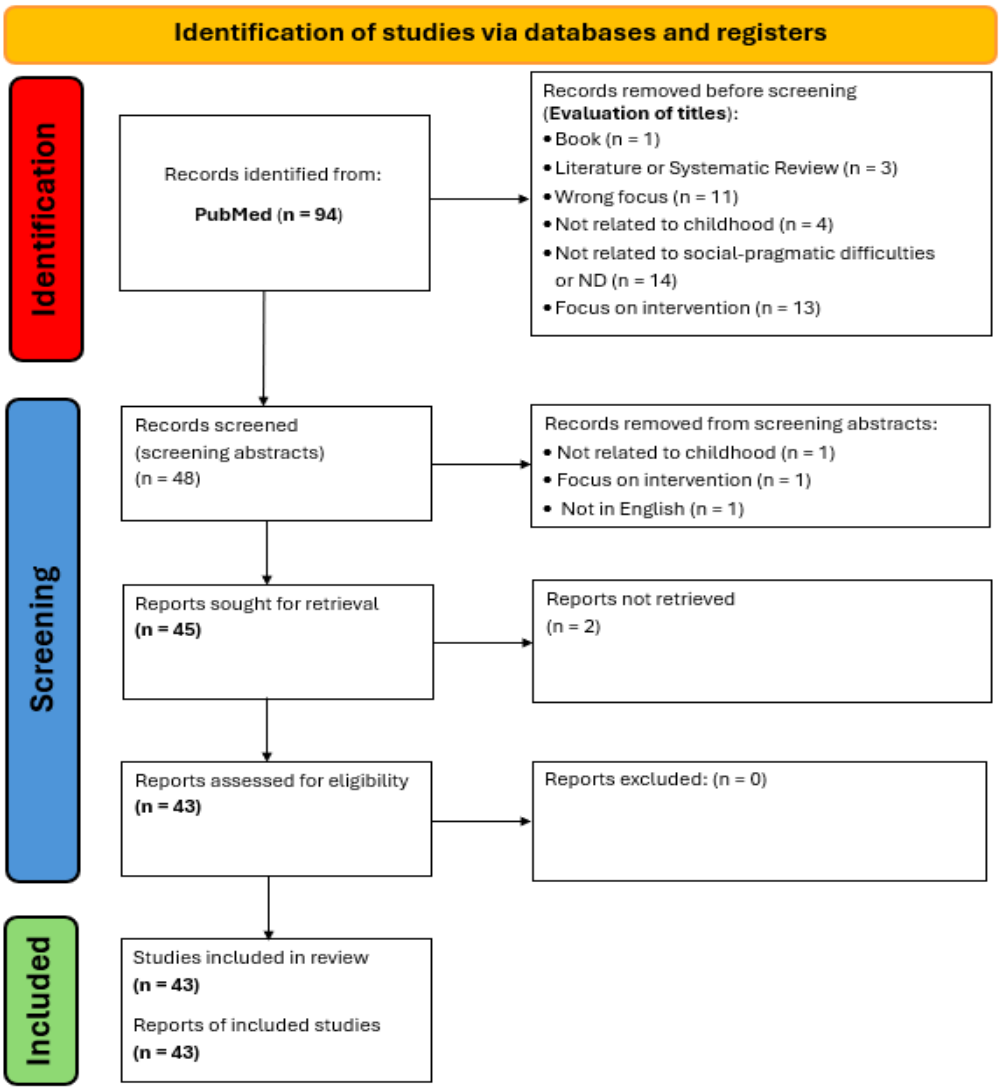
Εικόνα 1
Κύρια Ερευνητικά Ερωτήματα της εργασίας



Η συστηματική ανασκόπηση ακολουθεί τις κατευθυντήριες οδηγίες Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020, παρέχοντας βασικά στοιχεία αναφοράς για τη διεξαγωγή ανασκοπήσεων και μετα-αναλύσεων (Page et al., 2021).

Η αναζήτηση πραγματοποιήθηκε στη βάση δεδομένων PubMed[3], με επίκεντρο μελέτες που εξετάζουν την Πραγματολογική Διαταραχή στο πλαίσιο της ΔΑΦ και άλλων ΝαΔ, σε παιδιά, κατά το διάστημα 2019-2025 με τελευταία ημερομηνία αναζήτησης την 26η Μαρτίου 2025. Η περίοδος αυτή επελέγη καθώς καλύπτει την πιο πρόσφατη και μεθοδολογικά προηγμένη βιβλιογραφία, ιδίως μετά την αυξημένη χρήση eye-tracking στην λογοθεραπεία για παιδιά κατά τα τελευταία χρόνια.

Εικόνα 2
Διάγραμμα ροής PRISMA 2020 – Συστηματική Ανασκόπηση



Τα κριτήρια ένταξης περιλάμβαναν πρωτότυπες, αγγλόφωνες μελέτες, δημοσιευμένες σε περιοδικά με κριτές (peer-reviewed), που χρησιμοποιούν την τεχνολογία eye-tracking είτε ως βασική μέθοδο είτε ως συμπληρωματικό εργαλείο αξιολόγησης, σε δραστηριότητες οπτικής παρατήρησης κοινωνικών προσώπων, εικόνων ή σκηνών σε φυσικές ή εργαστηριακές συνθήκες. Οι όροι για τη διαμόρφωση του ερωτήματος αναζήτησης ήταν: *"pragmatic disorder", "pragmatic communication disorder", "neurodevelopmental disorder", "autis*", "eye-tracking", "screen", "assess", "diagnosis", "child*", "preschool", "infant", "baby"*.

Αρχικά εντοπίστηκαν 94 μελέτες, απομακρύνθηκαν οι μη επιλέξιμες μελέτες. Εξαιρέθηκαν μελέτες που επικεντρώνονταν αποκλειστικά σε γνωστικά ή γλωσσικά ελλείμματα χωρίς ανάλυση πραγματολογικών δεικτών, καθώς

[3] Η επιλογή της συγκεκριμένης βάσης οφείλεται στην πληρότητα και εγκυρότητα της σε θέματα νευροαναπτυξιακών διαταραχών και παιδιατρικής έρευνας.

και ερευνητικές εργασίες που δεν τεκμηρίωναν επαρκώς τη χρήση eye-tracking. Εξετάστηκαν τίτλοι και περιλήψεις, εκ των οποίων 45 κρίθηκαν κατάλληλοι για πλήρη ανάγνωση. Τελικά, 43 μελέτες πληρούσαν τα κριτήρια συμπερίληψης και εντάχθηκαν στην παρούσα ανασκόπηση. Η Εικόνα 2 παρουσιάζει το διάγραμμα ροής PRISMA, απεικονίζοντας τη διαδικασία επιλογής των μελετών.

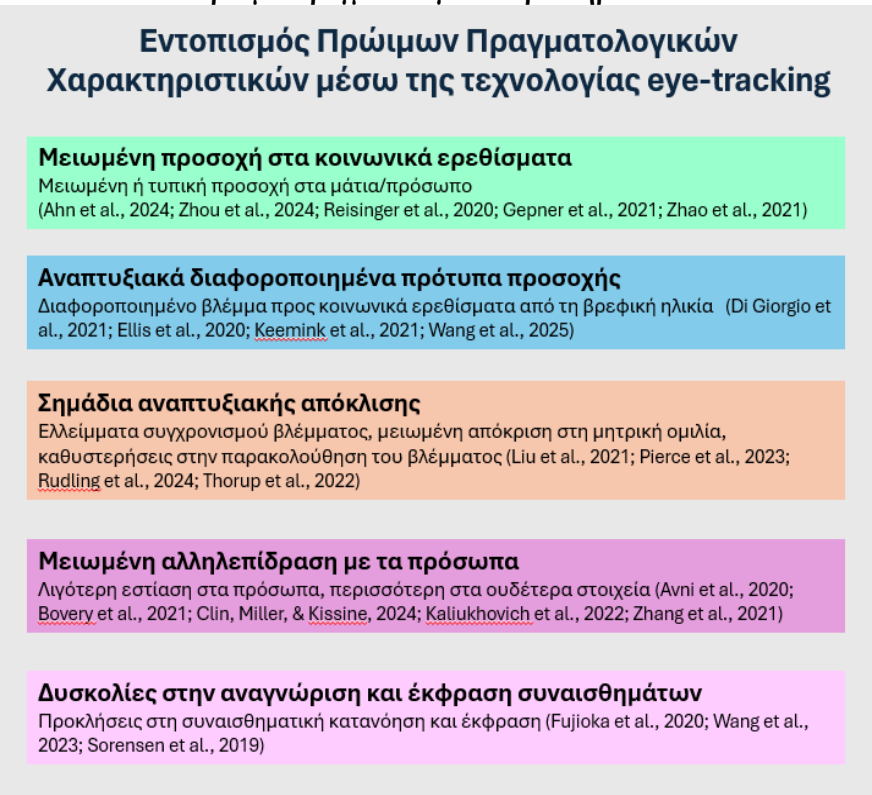
ΑΠΟΤΕΛΕΣΜΑΤΑ

Η ανασκόπηση αυτή βασίστηκε σε 43 πρωτογενείς μελέτες που αξιολόγησαν την κοινωνική και πραγματολογική συμπεριφορά παιδιών με αναπτυξιακές διαταραχές μέσω της τεχνολογίας eye-tracking. Οι εργασίες αυτές, που καλύπτουν διαφορετικές ηλικιακές ομάδες, μεθοδολογίες και τύπους οφθαλμοκίνησης, προσφέρουν ένα πλούσιο ερευνητικό υπόβαθρο για την κατανόηση των πρώιμων κοινωνικών ενδείξεων (βλ. Ahn et al., 2024; Avni et al., 2020, 2021; Bochet et al., 2021; Bovery et al., 2021; Bozkurt et al., 2024; Bradshaw et al., 2021; Chang et al., 2021; Clin et al., 2024; Costanzo et al., 2022; Di Giorgio et al., 2021; Dow et al., 2020; Ellis et al., 2020; Frazier et al., 2021; Fujioka et al., 2020; Gepner et al., 2021; Harrop et al., 2019; Ioannou et al., 2020; Kaliukhovich et al., 2022; Keemink et al., 2021; Kochhar et al., 2024; Kou et al., 2019; Król et al., 2019; Lauttia et al., 2019; Liu et al., 2021; Mori et al., 2023; Nayar et al., 2022; Nyström et al., 2019; Pierce et al., 2023; Plesa Skwerer et al., 2019; Reisinger et al., 2020; Rudling et al., 2024; Shic et al., 2023; Sorensen et al., 2019; Thorup et al., 2022; Tsang et al., 2023; Van Der Donck et al., 2021; Viktorsson et al., 2024; Wang et al., 2023, 2025; Zhang et al., 2021; Zhao et al., 2021; Zhou et al., 2024 Τα κύρια ευρήματα παρουσιάζονται στις επόμενες ενότητες, με βάση τα βασικά ερευνητικά ερωτήματα της μελέτης..

Πρώιμα πραγματολογικά χαρακτηριστικά που καταγράφονται μέσω eye-tracking

Η συστηματική βιβλιογραφική ανασκόπηση ανέδειξε πρώιμα πραγματολογικά χαρακτηριστικά που μπορούν να εντοπιστούν μέσω της τεχνολογίας eye-tracking, ιδίως σε παιδιά με ΔΑΦ. Ενδεικτικά, η μελέτη των Ioannou et al. (2020) αποκάλυψε διακριτά πρότυπα κοινωνικής οπτικής προσοχής μεταξύ παιδιών με ΔΑΦ, ΔΕΠΥ και συννοσηρότητα των δύο διαταραχών, υπογραμμίζοντας τη σημασία της τεχνολογίας αυτής για την κατανόηση πρώιμων κοινωνικών αποκλίσεων. Η εστίαση του βλέμματος στην περιοχή των ματιών σχετίζεται με κρίσιμες πρώιμες πραγματολογικές δεξιότητες, όπως η κοινή προσοχή, η αναγνώριση συναισθημάτων και η κοινωνική ανταπόκριση (Bradshaw et al., 2021; Liu et al., 2021; Nyström et al., 2019). Ακόμα και σε βρέφη μόλις 4 μηνών με αυξημένο κίνδυνο για ΔΑΦ, καταγράφονται διαφοροποιημένα πρότυπα οπτικής προσήλωσης, όπως μειωμένη προσοχή στα μάτια και μεγαλύτερη προσήλωση σε αντικείμενα.

Εικόνα 3
Πρώιμα Πραγματολογικά Χαρακτηριστικά



Επιπλέον, δείκτες όπως η δυσκολία στον συγχρονισμό του βλέμματος, η μειωμένη ανταπόκριση στη μητρική ομιλία, και η καθυστέρηση στην παρακολούθηση βλέμματος, λειτουργούν ως πρώιμες ενδείξεις αναπτυξιακής διαφοροποίησης. Παράλληλα, νευροφυσιολογικά δεδομένα (Lauttia et al., 2019) δείχνουν διαφοροποιημένη εγκεφαλική δραστηριότητα κατά τη διάρκεια της άμεσης βλεμματικής επαφής. Ενδιαφέρον παρουσιάζει και η διαπίστωση ότι ακόμη και αδέλφια παιδιών με ΔΑΦ παρουσιάζουν ανάλογα μοτίβα προσοχής (Costanzo et al., 2022).

Μελέτες που αξιοποίησαν στατικές ή δυναμικές κοινωνικές σκηνές έδειξαν πως τα παιδιά με ΔΑΦ εστιάζουν λιγότερο σε πρόσωπα και περισσότερο σε ουδέτερα στοιχεία. Οι Bochet et al. (2021) εντόπισαν ταχύτερη εξοικείωση με συναισθηματικά πρόσωπα και μεγαλύτερη προσήλωση σε ουδέτερα ερεθίσματα. Οι Avni et al. (2020; 2021), δεν κατέγραψαν διαφοροποιήσεις στις βασικές οφθαλμοκινητικές λειτουργίες, γεγονός που υποδηλώνει πως οι δυσκολίες εδράζονται κυρίως σε ανώτερες γνωστικές διεργασίες. Τα ευρήματα αυτά παραμένουν σταθερά διαπολιτισμικά (Frazier et al., 2021) και παρατηρούνται ακόμη και σε παιδιά χωρίς λεκτική επικοινωνία (Plesa Skwerer et al., 2019).

Τα πρώιμα πραγματολογικά χαρακτηριστικά που μπορεί να ανιχνευτούν με τη χρήση των eye-trackers συνοψίζονται στις Εικόνα 3 και Εικόνα 4. Η έγκαιρη αναγνώριση αυτών των προτύπων αναδεικνύει τη διαγνωστική αξία του eye-tracking και δημιουργεί νέες δυνατότητες για πρώιμη παρέμβαση.

Εικόνα 4.
Πρώιμα Πραγματολογικά Χαρακτηριστικά – Αξιολόγηση με Χρήση Eye-Tracking



Συμβολή Eye-Tracking στην πρώιμη διάγνωση πραγματολογικών ελλειμμάτων

Η τεχνολογία eye-tracking αποτελεί ένα ισχυρό, μη επεμβατικό εργαλείο, που επιτρέπει την πρώιμη αναγνώριση των ΝαΔ, προσφέροντας ποσοτικά δεδομένα κοινωνικής προσοχής ήδη από τη βρεφική ηλικία (Bradshaw et al., 2021; Nyström et al., 2019). Μοτίβα όπως η μειωμένη προσήλωση στο στόμα ή στα μάτια (Mori et al., 2023) ή η προτίμηση σε μη κοινωνικά ερεθίσματα έχουν εντοπιστεί ήδη από τον πρώτο χρόνο ζωής (Di Giorgio et al., 2021; Pierce et al., 2023).

Οι eye-trackers έχουν εφαρμοστεί σε πληθυσμούς υψηλού κινδύνου, όπως αδέλφια παιδιών με ΔΑΦ (Costanzo et al., 2022; Rudling et al., 2024), προσφέροντας αξιόπιστη πρόγνωση. Παράλληλα, ενσωματώνονται σε υπολογιστικά μοντέλα και τεχνητή νοημοσύνη, αυξάνοντας τη διαγνωστική ακρίβεια (Kou et al., 2019; Zhao et al., 2021). Η τεχνολογία αυτή προσφέρει ευκαιρίες πρώιμης παρέμβασης, ακόμη και σε ηλικίες όπου δεν έχει αναπτυχθεί ο λόγος (Dow et al., 2020; Shic et al., 2023; Wang et al., 2025).

Eye-Tracking στην ενίσχυση εγκυρότητας και αξιοπιστίας στην αξιολόγηση

Η τεχνολογία eye-tracking έχει ενισχύσει την αξιοπιστία και εγκυρότητα της αξιολόγησης πραγματολογικών δεξιοτήτων. Οι Ahn et al. (2024) και Kochhar et al. (2024) τεκμηριώνουν τη χρήση της κατά την εφαρμογή της ADOS-

2, προσφέροντας αντικειμενικά δεδομένα για την κοινωνική προσήλωση. Οι Zhao et al. (2021) αξιοποίησαν την τεχνολογία αυτή σε φυσικές αλληλεπιδράσεις, ενισχύοντας τη διαγνωστική ακρίβεια μέσω μοντέλων μηχανικής μάθησης.

Συμπληρωματικά, οι Król & Król (2019) ανέδειξαν την εννοιολογική εγκυρότητα του eye-tracking, ενώ οι Gepner et al. (2021) έδειξαν ότι η ταχύτητα των κοινωνικών ερεθισμάτων επηρεάζει την προσήλωση σε παιδιά με αυτισμό. Η αξιοπιστία της μεθόδου ενισχύεται μέσω πολυπαραμετρικών αναλύσεων (Nayar et al., 2022), και οι συγκρίσεις μεταξύ διαφορετικών δοκιμασιών επιβεβαιώνουν τη σταθερότητα των ευρημάτων (Kou et al., 2019). Η διαπολιτισμική εγκυρότητα της τεχνολογίας τεκμηριώνεται περαιτέρω από τους Frazier et al. (2021).

Τέλος, μελέτες που συνδύασαν την οφθαλμοκίνηση με άλλες παραμέτρους, όπως εκφράσεις προσώπου, ανέδειξαν την ευρύτερη αξιοπιστία του εργαλείου στην αποτύπωση λεπτών διαφορών (Van Der Donck et al., 2021; Zhou et al., 2024). Συνολικά, το eye-tracking υπερβαίνει τους περιορισμούς της απλής παρατήρησης και αναδεικνύεται ως ένα ακριβές, επαναλήψιμο και επιστημονικά έγκυρο εργαλείο, με ουσιαστικές δυνατότητες για πρώιμη και εξατομικευμένη παρέμβαση.

ΣΥΖΗΤΗΣΗ

Η παρούσα συστηματική βιβλιογραφική ανασκόπηση επιβεβαιώνει τον καίριο ρόλο της τεχνολογίας eye-tracking στη διερεύνηση, αξιολόγηση και πρώιμη ανίχνευση πραγματολογικών δυσκολιών σε παιδιά με ΝαΔ. Τα ευρήματα της τελευταίας πενταετίας αναδεικνύουν τη μοναδική ικανότητα της τεχνολογίας οφθαλμοκίνησης να καταγράφει με ακρίβεια κρίσιμες πτυχές της κοινωνικής προσοχής και της επικοινωνιακής συμπεριφοράς.

Ένα από τα πλέον χαρακτηριστικά πρώιμα ευρήματα αφορά τη μειωμένη προσήλωση σε κοινωνικά ερεθίσματα, όπως τα μάτια ή το πρόσωπο του συνομιλητή (Ahn et al., 2024; Zhou et al., 2024). Αντίθετα, παρατηρείται αυξημένη εστίαση σε ουδέτερα αντικείμενα ή περιοχές του περιβάλλοντος χωρίς κοινωνική σημασία (Zhao et al., 2021; Gepner et al., 2021). Επιπλέον, οι δυσκολίες στην αναγνώριση συναισθημάτων και στην κατανόηση προθέσεων (Zhang et al., 2021; Van Der Donck et al., 2021), καθώς και η καθυστερημένη ή ανύπαρκτη εκδήλωση κοινής προσοχής (Liu et al., 2021; Nyström et al., 2019), συνιστούν βασικούς δείκτες πραγματολογικής διαφοροποίησης.

Τα πρότυπα οπτικής προσήλωσης φαίνεται να διαφοροποιούνται ήδη από τους πρώτους μήνες ζωής, όπως καταγράφεται σε βρέφη υψηλού κινδύνου για ΔΑΦ (Di Giorgio et al., 2021; Rudling et al., 2024). Η δυνατότητα εντοπισμού τέτοιων μοτίβων ακόμη και πριν την εμφάνιση κλινικών συμπτωμάτων ή την ανάπτυξη του λόγου, υποστηρίζει τη διαγνωστική χρησιμότητα της τεχνολογίας eye-tracking (Pierce et al., 2023; Shic et al., 2023). Επιπλέον, η αξιοποίηση υπολογιστικών μεθόδων, όπως η μηχανική μάθηση, ενισχύει περαιτέρω την ακρίβεια και την ταξινομητική ισχύ της μεθόδου (Król & Król, 2019; Kou et al., 2019).

Ιδιαίτερο ενδιαφέρον παρουσιάζει το γεγονός ότι ακόμη και τα αδέλφια παιδιών με ΔΑΦ παρουσιάζουν αντίστοιχα μοτίβα οπτικής προσοχής (Costanzo et al., 2022), γεγονός που προσδίδει στη μέθοδο και προγνωστική αξία. Παράλληλα, τα μοτίβα βλέμματος εμφανίζουν εντυπωσιακή διαχρονική σταθερότητα και πολιτισμική εγκυρότητα, όπως επιβεβαιώνεται από διαπολιτισμικές μελέτες (Frazier et al., 2021). Η αξιοπιστία των δεδομένων ενισχύεται περαιτέρω από τη δυνατότητα τυποποιημένης, μη επεμβατικής και επαναλήψιμης καταγραφής (Bovery et al., 2021; Zhao et al., 2021), ενισχύοντας έτσι την εφαρμοστικότητα του eye-tracking στην πρώιμη αξιολόγηση και παρέμβαση.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Συμπερασματικά, η τεχνολογία eye-tracking φαίνεται να είναι μια επιστημονικά τεκμηριωμένη και αντικειμενικά αξιόπιστη μέθοδος αξιολόγησης των πραγματολογικών δεξιοτήτων σε παιδιά με Νευροαναπτυξιακές Διαταραχές. Η συμβολή της εκτείνεται πέρα από την πρώιμη ανίχνευση, προσφέροντας δυνατότητες παρακολούθησης της προόδου κατά τη διάρκεια της κλινικής παρέμβασης και αξιολόγησης των κοινωνικών δεξιοτήτων με ακρίβεια και συνέπεια. Η ενσωμάτωσή της στο κλινικό και ερευνητικό πεδίο ανοίγει νέους ορίζοντες για έγκαιρη και στοχευμένη διάγνωση, ενώ ταυτόχρονα ενισχύει την ανάπτυξη εξατομικευμένων παρεμβάσεων. Η αξιοποίηση του eye-tracking μπορεί να συμβάλει ουσιαστικά στη βελτίωση της ποιότητας ζωής των παιδιών με ΝαΔ και των οικογενειών τους, αποτελώντας έναν σύγχρονο και καινοτόμο πυλώνα στην κατανόηση και υποστήριξη των κοινωνικών δεξιοτήτων.

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ΘΠ27: Διοίκηση Εκπαίδευσης και ψηφιακές τεχνολογίες

ΑΠΟΛΟΓΙΣΜΟΣ ΤΗΣ ΠΡΩΤΗΣ ΕΞΑΜΗΝΗΣ ΕΜΠΕΙΡΙΑΣ ΑΠΟ ΤΗΝ ΕΦΑΡΜΟΓΗ ΤΟΥ ΨΗΦΙΑΚΟΥ ΒΙΒΛΙΟΥ ΠΡΑΞΕΩΝ ΣΥΛΛΟΓΟΥ ΔΙΔΑΣΚΟΝΤΩΝ ΣΤΙΣ ΣΧΟΛΙΚΕΣ ΜΟΝΑΔΕΣ: ΑΠΟ ΤΙΣ ΠΑΓΙΩΜΕΝΕΣ ΔΙΟΙΚΗΤΙΚΕΣ ΣΧΕΣΕΙΣ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ, ΣΤΗΝ ΕΜΠΕΔΩΣΗ ΤΗΣ ΨΗΦΙΑΚΗΣ ΓΡΑΦΕΙΟΚΡΑΤΙΑΣ

Χρήστου Νικόλαος
Διευθυντής 1ου ΓΕΛ Άρτας, Πληροφορικός
ΔΙΔΕ Άρτας, Ελλάδα
email: nchristou@sch.gr

Κοτσιφάκος Δημήτριος
Διευθυντής 1ου Εργαστηριακού Κέντρου Αγίου Δημητρίου,
ΔΙΔΕ Δ΄ Αθήνας,
Post – Doc, τμήματος Διοίκησης Επιχειρήσεων,
Πανεπιστημίου Δυτικής Αττικής, Αθήνα, Ελλάδα,
email: dkotsifakos@uniwa.gr

Ψαρομήλιγκος Ιωάννης
Καθηγητής τμήματος Διοίκησης Επιχειρήσεων,
Πανεπιστημίου Δυτικής Αττικής, Αθήνα, Ελλάδα,
email: yannis.psaromiligkos@uniwa.gr

ΠΕΡΙΛΗΨΗ

Η ψήφιση του νόμου περί εισαγωγής του «Ψηφιακού Βιβλίου Πράξεων Συλλόγου Διδασκόντων» (Αριθμ. 3446/16-05-2024 – ΦΕΚ 2988/Β/28-05-2024) στις 28 Μαΐου του 2024, και η εφαρμογή τον Σεπτέμβριο του 2024 στις σχολικές μονάδες, σηματοδότησε σημαντικές ποιοτικές και ποσοτικές αλλαγές στη διοίκηση των σχολικών μονάδων. Για όσες σχολικές μονάδες υλοποίησαν και εφάρμοσαν τον νόμο, και τον ενσωμάτωσαν ως εργαλείο «ψηφιακής διαχείρισης» εντός των διοικητικών διαδικασιών, διαπίστωσαν υποβόσκουσες αντιθέσεις και συγκρούσεις χρόνων, αντιφάσεις κατά την υλοποίηση, αλλά και προκλήσεις από τα οφέλη. Η εφαρμογή του συγκεκριμένου νόμου σηματοδότησε μία μετάβαση από τις παγιωμένες τυποποιημένες πρακτικές των διαδικασιών των Συλλόγων σε μία νέα ρυθμιστική πραγματικότητα, η οποία εισήγαγε στοιχεία και χαρακτηριστικά ψηφιακού μετασχηματισμού στην σχολική μονάδα, τα οποία αναγνωρίστηκαν από όλους/-ες τους/τις εκπαιδευτικούς. Το παρόν άρθρο εντασσόμενο στον γόνιμο ακαδημαϊκό διάλογο του Συνεδρίου για μία δυναμική σχέση ψηφιακών μέσων, διοικητικής μέριμνας και εκπαιδευτικού έργου, κατατίθεται με την μορφή «απολογισμού» και αποτυπώνει εμπειρίες, δυσκολίες και προοπτικές από αυτήν την νέα πραγματικότητα. Η εισήγηση, από την πλευρά της διοίκησης και του διαχειριστικού ελέγχου των σχολικών μονάδων δεν αποσιωπά, ειδικά εκείνα τη σημεία της εφαρμογής του νόμου για το «Ψηφιακό Βιβλίο Πράξεων Συλλόγου Διδασκόντων», τα οποία λειτούργησαν ως εμπόδιο στην ομαλή υλοποίηση του διοικητικού έργου, αλλά ούτε και την δυσοίωνη προοπτική της εδραίωσης των συναδελφικών σχέσεων σε υπαγωγικές και ιεραρχικές σχέσεις που ενισχύουν την ψηφιακή γραφειοκρατία, αντί της διευκόλυνσης της άσκησης του διοικητικού έργου. Περισσότερο όμως από όλα δεν αποσιωπά ότι τελικά για τον ψηφιακό μετασχηματισμό των σχολικών μονάδων δεν αρκεί μία επίπλαστη πληροφοριακή ενημέρωση, αλλά απαιτείται μία επένδυση στον ψηφιακό εγγραμματισμό όλων των μελών της σχολικής μονάδας χωρίς αποκλεισμούς και χωρίς μονομέρειες. Αυτό όμως δεν είναι υπόθεση ενός νόμου αλλά μίας συνολικής αυθεντικής μετασχηματίζουσας διοικητικής πολιτικής για όλες τις σχολικές μονάδες.

Λέξεις – κλειδιά: Διοίκηση Εκπαίδευσης και ψηφιακές τεχνολογίες, Ψηφιακού βιβλίου πράξεων Συλλόγου Διδασκόντων, διοικητικές σχέσεις των εκπαιδευτικών, ψηφιακή γραφειοκρατία

ΕΙΣΑΓΩΓΗ

Η παρούσα εργασία ως μέρος μία σειρά άρθρων τα οποία αφορούν την διοίκηση των σχολικών μονάδων (Sarlis & Kotsifakos, 2024), εστιάζει στην εφαρμογή του Νόμου 3446/16-05-2024 για την καθιέρωση του «Ψηφιακού Βιβλίου Πράξεων Συλλόγου Διδασκόντων» στις σχολικές μονάδες από τον Σεπτέμβριο του 2024. Πραγματεύεται τις ποιοτικές και ποσοτικές αλλαγές (Zavlanos, 2003), αλλά και τον συνολικότερο αντίκτυπο που προκλήθηκε στη διοίκηση των σχολικών μονάδων, καταγράφοντας τις εμπειρίες, τις δυσκολίες, τις προοπτικές, καθώς και τις εσωτερικές αντιθέσεις και αντιφάσεις που αναδύθηκαν κατά τη διαδικασία υλοποίησης (Brinia, 2008). Επιπλέον, θίγει τον τρόπο με τον οποίο ο ψηφιακός μετασχηματισμός εντάσσεται και γίνεται αποδεκτός ή προκαλεί αντιδράσεις από μέλη της σχολικής κοινότητας, αναδεικνύοντας το ζήτημα της αυθεντικής διοικητικής αλλαγής έναντι της επιφανειακής ψηφιακής συμμόρφωσης (Ross, 2017).

Στόχος της παρούσας εργασίας είναι να διερευνήσει τις επιπτώσεις από την εφαρμογή του Νόμου 3446/16-05-2024 σχετικά με την καθιέρωση του «Ψηφιακού Βιβλίου Πράξεων Συλλόγου Διδασκόντων» στις σχολικές μονάδες, εστιάζοντας στις αλλαγές που προκλήθηκαν στο επίπεδο της σχολικής διοίκησης, στις σχέσεις μεταξύ των μελών του συλλόγου διδασκόντων, αλλά και στην αναδυόμενη κουλτούρα ψηφιακής διαχείρισης. Η εργασία επιχειρεί να αποτυπώσει όχι μόνο τις τεχνικές και γραφειοκρατικές διαστάσεις της εφαρμογής, αλλά και τον τρόπο με τον οποίο τα μέλη της σχολικής κοινότητας ερμηνεύουν και βιώνουν την ψηφιακή αυτή μετάβαση, προσαρμοζόμενοι στα επιβαλλόμενα διεθνή Ευρωπαϊκά πρότυπα (Outeda, 2024). Βασικά ερευνητικά ερωτήματα που καθοδηγούν την εργασία είναι τα εξής:

- Ποιες είναι οι βασικές ποιοτικές και ποσοτικές αλλαγές που επέφερε η εφαρμογή του Ψηφιακού βιβλίου πράξεων στις σχολικές μονάδες, όπως εφαρμόστηκε;
- Πώς αντιλήφθηκαν και πώς ερμήνευσαν οι διευθυντές/-τριες και οι εκπαιδευτικοί τη λειτουργία του νέου ψηφιακού διοικητικού μηχανισμού;
- Ποιες είναι οι δυσκολίες, οι εντάσεις ή και οι αντιφάσεις που προέκυψαν κατά την ενσωμάτωσή του στις διοικητικές διαδικασίες;
- Πώς διαμορφώθηκαν οι σχέσεις μεταξύ των μελών της σχολικής κοινότητας υπό το νέο καθεστώς ψηφιακής καταγραφής και διαφάνειας;
- Σε ποιο βαθμό η εφαρμογή του νόμου συνέβαλε ή ανέστειλε την αποτελεσματικότητα του διοικητικού έργου και την ανάπτυξη συνεργατικού κλίματος στο σχολείο;

Οι απαντήσεις στα παραπάνω ερωτήματα δεν είναι ευθύγραμμες, αλλά αντιμετωπίζονται ως πολυδύναμες, και στην παρούσα φάση, μπορούν να αποτυπωθούν μόνο αν αποσκοπούν στην ανάδειξη των προϋποθέσεων για έναν ουσιαστικό ψηφιακό μετασχηματισμό που θα στηρίζεται όχι μόνο στην τεχνολογική εφαρμογή, αλλά κυρίως στη συμμετοχική, παιδαγωγικά ευαίσθητη και διοικητικά βιώσιμη αξιοποίησή του (Matthaiou, 2007). Από πλευράς μεθοδολογίας η παρούσα εργασία εντάσσεται αφενός στο πλαίσιο των ερευνών των εκπαιδευτικών που μελετούν το έργο τους (Altrichter et al., 2001), και αφετέρου, στον πλαίσιο απολογισμού εφαρμογής μιας εκπαιδευτικής και διοικητικής πολιτικής, βασισμένη κυρίως σε εμπειρική καταγραφή δεδομένων (Liakopoulou et al., 2021). Από την στερεότυπη διαδικασία της ποσοτικής ή της ποιοτικής ερευνητικής μεθόδου (π.χ. συνεντεύξεις, ερωτηματολόγια), θεωρήσαμε ότι για τον διπλό μας ρόλο ως ερευνητές και ως διευθυντές θα πρέπει να καταγράψουμε και να δηλώσουμε την εμπειρική-αναστοχαστική προσέγγιση μας, έχοντας ως μελέτες περίπτωσης τις σχολικές μονάδες που εφάρμοσαν τον νόμο. Η εργασία μας σηματοδοτεί τις εφαρμογές της διαχείρισης γνώσης στην αύξηση της αποτελεσματικότητας στις δημόσιες υπηρεσίες και οργανισμούς εκπαίδευσης (Zygouris & Valcanos, 2019), και καταγράφοντας την πρακτική εμπειρία από την πλευρά της σχολικής διοίκησης, στο 1ο Εργαστηριακό Κέντρο Αγίου Δημητρίου στην Αττική, και στο 1ο Γενικό Λύκειο Άρτας, και λειτουργώντας ως μια σύνθεση παρατηρήσεων και βιωμάτων από την ίδια την διοικητική και την εκπαιδευτική πράξη.

Ανάμεσα στα κύρια ευρήματα, πέραν του ισχύοντος εφαρμοστικού πλαισίου (Κεφάλαιο 2), αναφέρονται σημαντικά στοιχεία για την μεθοδολογία της έρευνας (Κεφάλαιο 3), ενώ αναφέρονται σημαντικά συμπεράσματα από την εφαρμογή του νόμου για τον σύλλογο διδασκόντων και τον καθοριστικό ρόλο του διευθυντή της σχολικής μονάδας (Κεφάλαιο 4). Στο Κεφάλαιο 5 αναφέρονται διαπιστώσεις, αιτιάσεις και μαρτυρίες, σχετικά με την εισαγωγή του ψηφιακού βιβλίου στις σχολικές μονάδες. Η θεσμική εισαγωγή ανέδειξε χρόνιες συγκρούσεις και διοικητικές αντιφάσεις, αλλά και ότι λειτούργησε ως καταλύτης για τη μετάβαση σε μία νέα μορφή ψηφιακής διακυβέρνησης.

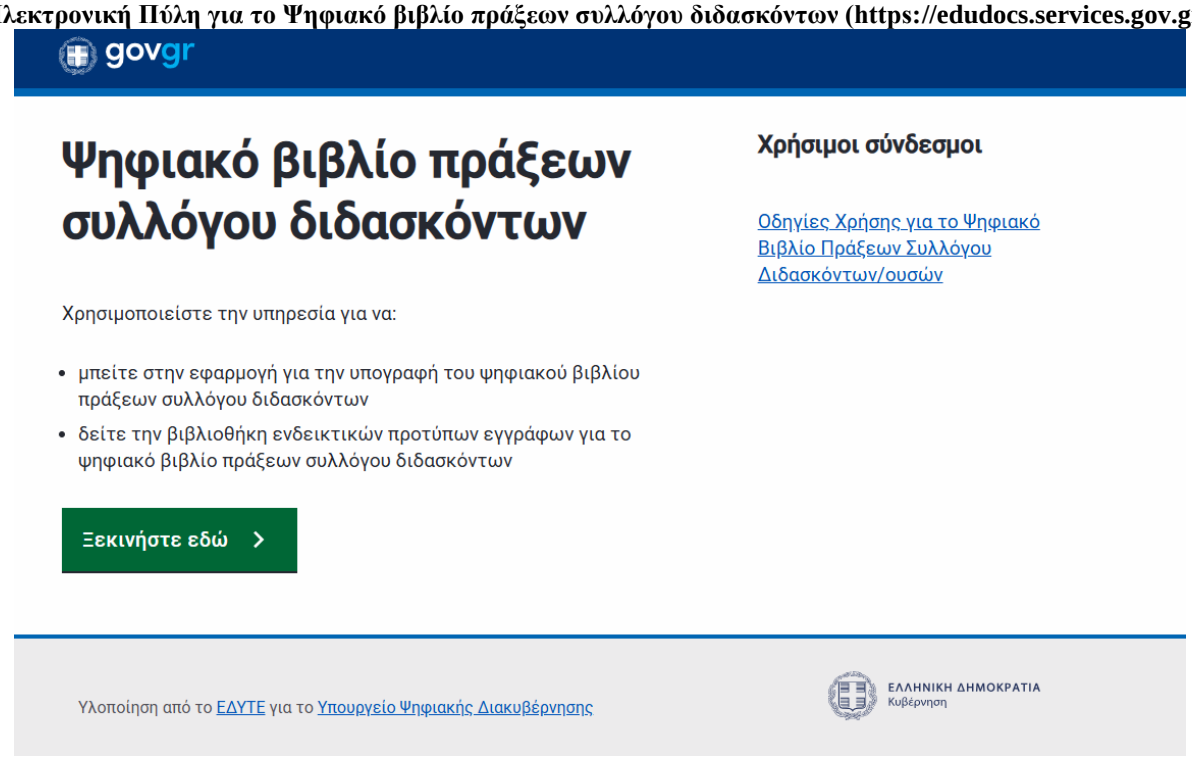
Στο παρόν άρθρο, ως προστιθέμενη επιστημονική αξία, αναδεικνύονται οι προκλήσεις ως προς την ενσωμάτωση των νέων πρακτικών μέσα από τους χώρους εργασίας, η αίσθηση επιβολής επιτελικών-γραφειοκρατικών λογικών, αντί για την υλοποίηση υποστηρικτικών δομών, καθώς και το συμπέρασμα ότι η επιτυχία της εφαρμογής εξαρτάται από την ουσιαστική ψηφιακή κατάρτιση των μελών της σχολικής μονάδας. Ακόμη και με δεδομένη την νομοθεσία η αναζήτηση προτύπων, οδηγών αποτελεσματικών εφαρμογών και κατάλληλων συμπεριφορών συμμόρφωσης (Abou-Zahra & Brewer,

2019), όχι μόνο δεν σταματά, αλλά είναι το ζητούμενο για την επόμενη ημέρα εφαρμογής ενός νομοθετικού πλαισίου. Και στις δύο εκδοχές διαχείρισης της ποιότητας στις σχολικές μονάδες (Goddard & Leask, 1992), τόσο ως διευθυντές, όσο και ως ερευνητές, καταλήγουμε στη θέση ότι η ανάπτυξη της ποιότητας στην εκπαίδευση (Creemers & Kyriakides, 2012), ο ψηφιακός μετασχηματισμός των σχολικών μονάδων δεν μπορεί να στηριχθεί αποκλειστικά σε νομικές ρυθμίσεις ή τεχνικές οδηγίες, αλλά προϋποθέτει μια γνήσια διοικητική πολιτική Διαχείρισης Ολικής Ποιότητας (ΔΟΠ), η οποία να επενδύει στον ψηφιακό εγγραμματισμό χωρίς αποκλεισμούς (Vlachos et al., 2007). Η θεσμική παρέμβαση του Ν. 3446/2024 αποτελεί μία αφετηρία, αλλά η αποτελεσματικότητα του εγχειρήματος εξαρτάται από το αν θα υπάρξει ολιστική συνέχεια και στήριξη σε επίπεδο εκπαίδευσης, παιδαγωγικών μοντέλων χειραφέτησης, και αποτελεσματικής διοικητικής κουλτούρας.

ΤΟ ΕΦΑΡΜΟΣΤΙΚΟ, ΝΟΜΙΚΟ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΟ ΠΛΑΙΣΙΟ, ΤΟΥ ΨΗΦΙΑΚΟΥ ΒΙΒΛΙΟΥ ΠΡΑΞΕΩΝ ΣΥΛΛΟΓΟΥ

Η διοίκηση της εκπαίδευσης, και όχι μόνο στις ημέρες μας, συνιστά ένα κρίσιμο πεδίο για την κατανόηση των μετασχηματισμών που επιφέρει ο ψηφιακός μετασχηματισμός, τόσο στη λειτουργία των σχολικών μονάδων όσο και στις σχέσεις εξουσίας εντός τους. Ο ψηφιακός μετασχηματισμός, ως καταγραφή μεγάλων δεδομένων (Ozga, 2009), επηρεάζει καθοριστικά τον τρόπο με τον οποίο οι εκπαιδευτικοί και τα διοικητικά στελέχη αλληλοεπιδρούν, επικοινωνούν, λαμβάνουν αποφάσεις και υλοποιούν διοικητικές πρακτικές. Παράλληλα, αναδύεται η ανάγκη για νέες δεξιότητες ψηφιακής διακυβέρνησης και διαχείρισης αυτών των δεδομένων (Williamson, 2017), τα οποία επαναπροσδιορίζουν όχι μόνο την μορφή αλλά και την ίδια την έννοια της ηγεσίας στην εκπαίδευση. Στην εποχή της ψηφιακής επιτάχυνσης, η εκπαιδευτική διοίκηση μετατοπίζεται από παραδοσιακές ιεραρχικές μορφές ελέγχου και επίβλεψης προς πιο αποκεντρωμένες, διασυνδεδεμένες και τεχνολογικά εξαρτώμενες μορφές οργάνωσης. Η χρήση Τεχνολογιών Πληροφορικής και Επικοινωνιών (ΤΠΕ) δεν περιορίζεται πλέον στη διδακτική διαδικασία, αλλά επεκτείνεται δυναμικά και στο επίπεδο της διοίκησης, με εργαλεία όπως το “myschool”, οι πλατφόρμες ηλεκτρονικής αλληλογραφίας, τα πληροφοριακά συστήματα καταγραφής επιδόσεων και παρουσιών, καθώς και με την αξιοποίηση ψηφιακών μορφών αξιολόγησης.

Εικόνα 1
Ηλεκτρονική Πύλη για το Ψηφιακό βιβλίο πράξεων συλλόγου διδασκόντων (https://edudocs.services.gov.gr/)



Η διαδικτυακή υπηρεσία “https://edudocs.services.gov.gr” αποτελεί την επίσημη πλατφόρμα παροχής ψηφιακών εγγράφων για εκπαιδευτικούς και διοικητικά στελέχη του Υπουργείου Παιδείας, Θρησκευμάτων και Αθλητισμού (ΥΠΑΙΘΑ). Μέσω αυτής, οι χρήστες μπορούν να αποκτούν πρόσβαση σε έγγραφα που εκδίδονται αυτόματα, όπως πράξεις ανάληψης υπηρεσίας, βεβαιώσεις τοποθέτησης ή υπηρεσιακής κατάστασης, συμβάλλοντας στον εκσυγχρονισμό και την απλοποίηση της εκπαιδευτικής γραφειοκρατίας. Η εφαρμογή του Ψηφιακού βιβλίου πράξεων συλλόγου

διδασκόντων θεσμοθετήθηκε στο πλαίσιο του εκσυγχρονισμού της διοίκησης των σχολικών μονάδων, με στόχο την ενίσχυση της διαφάνειας, της ιχνηλασιμότητας και της αποδοτικότητας των διαδικασιών. Η νομική βάση της πλατφόρμας ορίζεται στο ΦΕΚ Β' 4210/27.07.2023 και εντάσσεται στον ευρύτερο σχεδιασμό του Υπουργείου Παιδείας, Θρησκευμάτων και Αθλητισμού για τον ψηφιακό μετασχηματισμό της εκπαίδευσης. Η πλατφόρμα «Ψηφιακό βιβλίο πράξεων συλλόγου διδασκόντων» (Εικόνα 1) ενσωματώνεται στο myschool.gov.gr, αποτελώντας ένα «υποσύστημα», και διαμορφώνει ένα ενιαίο περιβάλλον τεκμηρίωσης των αποφάσεων του συλλογικού οργάνου των σχολείων. Παρέχει δυνατότητα δημιουργίας, υπογραφής, αποθήκευσης και ανάκτησης Πράξεων μέσω ψηφιακής διακίνησης εγγράφων, με χρήση των προσωπικών κωδικών των διευθυντών και των εκπαιδευτικών. Η πρόσβαση, ο χρόνος σύνδεσης και η δράση κάθε χρήστη καταγράφονται με ακρίβεια, εξασφαλίζοντας διαφάνεια και έλεγχο.

Ο κύριος στόχος του ΥΠΑΙΘΑ μέσω της συγκεκριμένης θεσμικής και τεχνολογικής παρέμβασης είναι η διοικητική αναβάθμιση των σχολικών μονάδων, η μείωση της γραφειοκρατίας, και η ψηφιακή τεκμηρίωση όλων των συλλογικών αποφάσεων. Το ΦΕΚ προβλέπει ότι όλες οι πράξεις του Συλλόγου Διδασκόντων καταχωρίζονται αποκλειστικά στο ψηφιακό περιβάλλον, με συγκεκριμένη διαδικασία σύνταξης, αποδοχής και υπογραφής από τα εμπλεκόμενα μέλη. Επισημαίνεται ότι καταργείται η χειρόγραφη τήρηση των βιβλίων Πράξεων, ενώ σε περιπτώσεις τεχνικής αδυναμίας προβλέπεται προσωρινή έντυπη καταγραφή με μεταγενέστερη ψηφιακή αποτύπωση. Η χρήση ψηφιακής υπογραφής και η δυνατότητα ταυτοποίησης κάθε ενέργειας αποτελούν κρίσιμες δικλίδες ασφαλείας. Το ΥΠΑΙΘΑ τονίζει τη σημασία του ψηφιακού αρχείου ως νόμιμου και δεσμευτικού τεκμηρίου, ενώ επιδιώκει μέσω της οριζόντιας αυτής δράσης την καθολική και ομοιόμορφη εφαρμογή διοικητικών διαδικασιών σε όλα τα σχολεία της χώρας.

Η συνολική εφαρμογή του ψηφιακού βιβλίου πράξεων διδασκόντων αντανακλά τη στρατηγική επιλογή για μετάβαση της εκπαίδευσης στην ψηφιακή εποχή, με την τεχνολογία να λειτουργεί όχι ως απλή υποστήριξη αλλά ως θεμελιώδες εργαλείο διακυβέρνησης. Παρά τις θετικές προσδοκίες, επισημαίνεται από την εκπαιδευτική κοινότητα η ανάγκη συνεχούς επιμόρφωσης των διευθυντών και των εκπαιδευτικών, καθώς και η διασφάλιση της τεχνικής υποστήριξης, ώστε να αποφευχθούν προβλήματα πρόσβασης και καθυστερήσεις. Επιπλέον, εγείρονται ερωτήματα για τη νομική ευθύνη και την ισχύ των Πράξεων σε περιπτώσεις δυσλειτουργίας ή σφάλματος στο σύστημα. Παρόλα αυτά, η θεσμοθέτηση του ψηφιακού περιβάλλοντος, όπως περιγράφεται στο ΦΕΚ, θα μπορούσε, υπό προϋποθέσεις να αποτελέσει ένα σημαντικό βήμα προς τον εκσυγχρονισμό της σχολικής διοίκησης, την ενίσχυση της λογοδοσίας και τη δημιουργία ενός διαφανούς και λειτουργικού πλαισίου συνεργασίας εντός των σχολικών μονάδων.

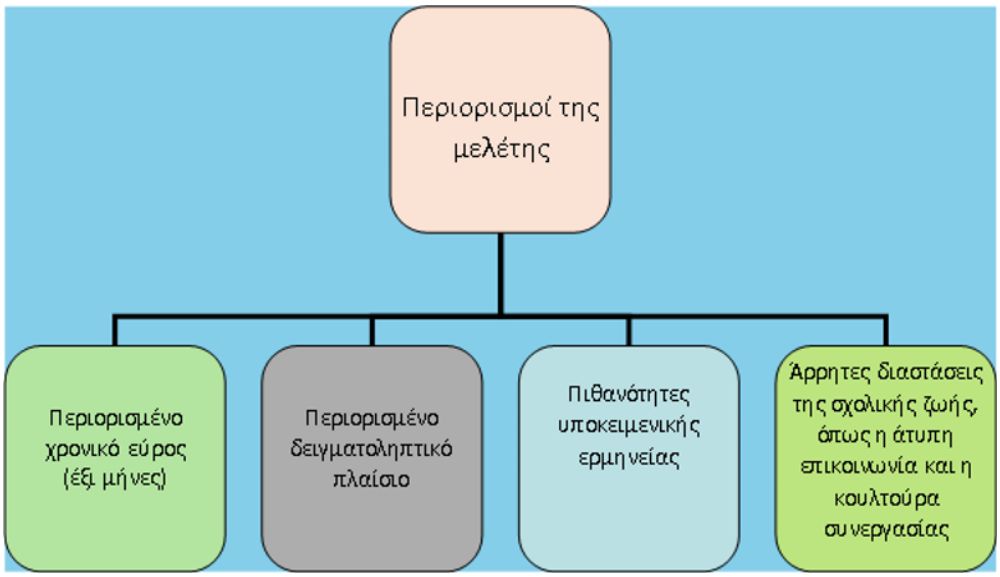
ΜΕΘΟΔΟΛΟΓΙΑ ΕΡΕΥΝΑΣ

Η παρούσα δημοσίευση από πλευράς μεθοδολογίας, βασίζεται σε μία απολογιστική – περιγραφική ερευνητική αποτύπωση, με στόχο να καταγράψει και να ερμηνεύσει εμπειρικά τις επιδράσεις που επέφερε η εισαγωγή της εν λόγω ψηφιακής διοικητικής πρότασης στην καθημερινή σχολική ζωή και στις εσωτερικές διοικητικές σχέσεις των εκπαιδευτικών. Ως πλαίσιο αναφοράς ενοποιεί το θεωρητικό μέρος των εννοιών της ψηφιακής διακυβέρνησης (e-governance) και της νέας δημόσιας διαχείρισης των εκπαιδευτικών οργανισμών, προσεγγίζοντας τον ψηφιακό μετασχηματισμό της σχολικής διοίκησης ως μια παράλληλη διαδικασία τεχνολογικής επιτήρησης και κανονιστικού ελέγχου. Η ψηφιακή διακυβέρνηση (e-governance) λειτουργεί ως εργαλείο εφαρμογής των αρχών της αποδοτικότητας, της λογοδοσίας και της τυποποίησης που προτάσσουν τα νέα πρότυπα για την δημόσια διοίκηση. Η συγκεκριμένη προσέγγιση ούτε στοχεύει, αλλά ούτε μπορεί να εξαγάγει γενικευμένα ποσοτικά συμπεράσματα, αλλά, αποτυπώνει συστηματικά εμπειρίες, στάσεις και αναδυόμενα πρότυπα συμπεριφοράς εντός των σχολικών μονάδων. Η ανάλυση βασίζεται μερικώς σε καταγραφή ποιοτικών δεδομένων, τα οποία προέρχονται κυρίως από αφηγήσεις και περιγραφές διευθυντών και εκπαιδευτικών, καθώς και από την εσωτερική τεκμηρίωση της σχολικής λειτουργίας (όπως Πράξεις Συλλόγου, ανακοινώσεις, και υπηρεσιακή αλληλογραφία), με στόχο να φωτιστούν οι τρόποι με τους οποίους η νέα ψηφιακή πρακτική αφομοιώνεται ή διαφοροποιεί τις καθιερωμένες ρουτίνες.

Οι επιλογές των περιπτώσεων μελέτης ακολούθησαν την σκοπούμενη δειγματοληψία με βάση κριτήρια λειτουργικής ετερογένειας. Συγκεκριμένα, επιλέχθηκαν σχολικές μονάδες δευτεροβάθμιας εκπαίδευσης από διαφορετικές γεωγραφικές και κοινωνικές περιοχές της χώρας (αστικά κέντρα, περιφέρεια, Εργαστηριακά Κέντρα και Γενικά Λύκεια), ώστε να αναδειχθεί η ποικιλομορφία στην εφαρμογή και αποδοχή του «Ψηφιακού Βιβλίου Πράξεων Συλλόγου Διδασκόντων» ως ψηφιακού εργαλείου για τις διοικητικές πράξεις. Το χρονικό πλαίσιο της έρευνας περιορίστηκε στο πρώτο εξάμηνο του σχολικού έτους 2024–2025, κατά το οποίο η χρήση του Ψηφιακού βιβλίου πράξεων έγινε υποχρεωτική σε όλα τα σχολεία. Το διάστημα αυτό αποτέλεσε το πρώτο πεδίο ωρίμανσης της εμπειρίας και προσέφερε επαρκή δεδομένα για την κατανόηση των αρχικών αντιδράσεων, προσαρμογών και δυσκολιών από την πλευρά των στελεχών και του συλλόγου διδασκόντων. Η αποτύπωση πραγματοποιήθηκε μέσω άτυπων ημιδομημένων προφορικών συνεντεύξεων με εκπαιδευτικούς Διευθυντές και Υποδιευθυντές, σε συνδυασμό με ανάλυση διοικητικών τεκμηρίων.

Η μεθοδολογία αξιοποίησε κυρίως την περιπτωσιολογική ανάλυση (case study), εστιάζοντας στις διαδικασίες λήψης αποφάσεων, καταγραφής, σύνταξης και επικύρωσης των Πράξεων Συλλόγου, καθώς και στους τρόπους με τους οποίους η χρήση της πλατφόρμας επέδρασσε στις σχέσεις μεταξύ Διευθυντή και εκπαιδευτικών. Ιδιαίτερη έμφαση δίνεται στην ανάδυση νέων μορφών «ψηφιακού ελέγχου» ή αντίστασης, όπως φάνηκαν από τις καθυστερήσεις υπογραφής, τις ανεπίσημες διαβουλεύσεις ή τις παρακάμψεις της τυπικής διαδικασίας. Εξετάζεται επίσης η αλληλεπίδραση μεταξύ τεχνικών προβλημάτων και του βαθμού αποδοχής από τα μέλη του Συλλόγου. Με τον τρόπο αυτό, επιχειρείται μια ολιστική προσέγγιση της εμπειρίας από τη σκοπιά των εκπαιδευτικών πρακτικών, της οργανωσιακής κουλτούρας και του διοικητικού φορτίου. Το πλαίσιο ανάλυσης δεν αποσκοπεί μόνο στην αξιολόγηση της λειτουργικότητας του ψηφιακού εργαλείου, αλλά κυρίως στην ανάδειξη των κοινωνικών, ιδεολογικών και οργανωτικών μετατοπίσεων που αυτό επιφέρει.

Διάγραμμα 1
Περιορισμοί της μελέτης



Ωστόσο, η παρούσα μελέτη περιλαμβάνει και σημαντικούς περιορισμούς (Διάγραμμα 1).

Πρώτον, το περιορισμένο χρονικό εύρος (έξι μήνες) δεν επιτρέπει την αποτίμηση της μακροπρόθεσμης επίδρασης του μέτρου.

Δεύτερον, το δειγματοληπτικό πλαίσιο, αν και επιλεκτικά διαφοροποιημένο, δεν καλύπτει το σύνολο της ποικιλίας των σχολικών μονάδων (π.χ. σχολεία με έντονα προβλήματα στελέχωσης, δυσπρόσιτα).

Τρίτον, υπάρχει η πιθανότητα υποκειμενικής ερμηνείας εκ μέρους των συμμετεχόντων, ειδικά σε ζητήματα που σχετίζονται με τον φόρτο εργασίας και τις σχέσεις εξουσίας.

Τέλος, η ερμηνεία των διοικητικών εγγράφων δεν μπορεί να αποδώσει πλήρως τις άρρητες διαστάσεις της σχολικής ζωής, όπως η άτυπη επικοινωνία και η κουλτούρα συνεργασίας.

Παρά ταύτα, η παρούσα ερευνητική προσέγγιση προσφέρει ως προστιθέμενη αξία, μια πρώτη ουσιαστική ποιοτική βάση για μελλοντική σύγκριση και για την ανάπτυξη εμπειρικών δεικτών αξιολόγησης του ψηφιακού μετασχηματισμού της σχολικής διοίκησης.

ΕΥΡΗΜΑΤΑ – ΕΜΠΕΙΡΙΕΣ ΑΠΟ ΤΗΝ ΕΦΑΡΜΟΓΗ, Ο ΣΥΛΛΟΓΟΣ ΔΙΔΑΣΚΟΝΤΩΝ ΚΑΙ Ο ΡΟΛΟΣ ΤΟΥ ΔΙΕΥΘΥΝΤΗ

Μια βασική αρνητική συνιστώσα του ψηφιακού μετασχηματισμού της εκπαίδευσης στις ημέρες μας είναι η ανάδυση της ψηφιακής γραφειοκρατίας μέσα από τις διοικητικές εργασίες του σχολείου. Πρόκειται για μια νέα μορφή διοικητικής λειτουργίας, η οποία διατηρεί την ορθολογικότητα και την τυποποίηση, όπως την περιέγραψε ο Max Weber (επ. 1978) για τη γραφειοκρατική οργάνωση, πολλούς αιώνες πριν τον ψηφιακό μετασχηματισμό του 21ου αιώνα. Η ψηφιακή γραφειοκρατία χαρακτηρίζεται από την αυτοματοποίηση των διαδικασιών, την ελαχιστοποίηση της φυσικής γραφής και της δια ζώσης επαφής, και την εξάρτηση από πλατφόρμες, εφαρμογές και ψηφιακά πρότυπα. Αν και στοχεύει

στη διαφάνεια, την ταχύτητα και την αποδοτικότητα, ενδέχεται να ενισχύσει νέες μορφές αδιαφάνειας ή εξάρτησης από την τεχνολογία, εφόσον δεν συνοδεύεται από κριτική προσέγγιση και διαφανή σχεδιασμό. Η έννοια της "ηλεκτρονικής διακυβέρνησης" στην εκπαίδευση (e-governance) αντικαθιστά σταδιακά τις παραδοσιακές μορφές διοικητικής επικοινωνίας με κωδικοποιημένες ροές πληροφοριών. Αυτό μπορεί να μετασχηματίσει την κουλτούρα της συνεργασίας και της εμπιστοσύνης μεταξύ των μελών της εκπαιδευτικής κοινότητας, μεταθέτοντας το βάρος από την ουσιαστική συζήτηση προς την τεχνική συμμόρφωση με διαδικαστικά πρότυπα. Όλα αυτά βέβαια εφαρμόζονται από ένα συλλογικό όργανο τον Σύλλογο Διδασκόντων.

Στο πλαίσιο των Συλλόγων Διδασκόντων, οι διοικητικές σχέσεις επηρεάζονται ουσιωδώς από τον τρόπο ενσωμάτωσης των ψηφιακών εργαλείων. Οι πολυεπίπεδες υποχρεωτικές δραστηριότητες που επιβάλλονται στους εκπαιδευτικούς της δευτεροβάθμιας εκπαίδευσης, από τη διοίκηση και τον κανονισμό λειτουργίας των σχολείων επηρεάζουν σημαντικά τις συναδελφικές σχέσεις. Η σωρευτική επιβάρυνση με εξωδιδακτικές ευθύνες, όπως η συμμετοχή σε επιτροπές, η διοργάνωση προγραμμάτων, η υποστήριξη δράσεων σχολικής ζωής και η συμβολή σε διαδικασίες αξιολόγησης, οδηγεί συχνά σε ανισοκατανομή του φόρτου εργασίας. Ειδικότερα στα Επαγγελματικά Λύκεια, και τα Εργαστηριακά Κέντρα οι υπεύθυνοι Εργαστηρίων και οι Τομεάρχες, οποία επιβαρύνονται και με την συντήρηση του εξοπλισμού των εργαστηρίων. Αυτό προκαλεί εντάσεις μεταξύ συναδέλφων, ιδίως όταν υπάρχει έντονος ψηφιακός αναλφαβητισμός σε συνδυασμό με την αποσπασματική ενημέρωση, και ταυτόχρονα δεν υπάρχουν σαφή και δίκαια κριτήρια ανάθεσης των καθηκόντων. Αυτό έχει ως συνέπεια κάποιοι εκπαιδευτικοί, ακόμη και οι Διευθυντές να αναλαμβάνουν συνεχώς περισσότερες ευθύνες, είτε από προσωπική διάθεση είτε λόγω διοικητικών πιέσεων. Σε αρκετές περιπτώσεις, η έλλειψη διαφάνειας και ουσιαστικής συμμετοχής του Συλλόγου Διδασκόντων στη λήψη αποφάσεων ενισχύει την αίσθηση αδικίας και διαβρώνει το αίσθημα εμπιστοσύνης μεταξύ των μελών του συλλόγου. Παράλληλα, η πίεση χρόνου και η επαγγελματική εξουθένωση περιορίζουν τον χώρο για αυθόρμητη συνεργασία και αλληλοϋποστήριξη. Συνεπώς, οι εν λόγω διοικητικές επιταγές, αντί να ενισχύουν το συλλογικό πνεύμα, συχνά υπονομεύουν τη συναδελφικότητα και την κουλτούρα συνεργασίας στο σχολείο.

Οι Σύλλογοι Διδασκόντων ως βασικά συλλογικά όργανα λήψης αποφάσεων εντός της σχολικής μονάδας, αντιμετωπίζουν προκλήσεις αλλά και ευκαιρίες από την ψηφιακή μετάβαση, τις οποίες αντιμετωπίσαμε κατά την εφαρμογή του Ψηφιακού βιβλίου πράξεων συλλόγου διδασκόντων στις σχολικές μονάδες την σχολική περίοδο 2024 – 2025. Από τη μία πλευρά, διευκολύνεται η πρόσβαση σε πληροφορίες, η οργάνωση συνεδριάσεων, η τήρηση πρακτικών και η διανομή εισηγήσεων. Από την άλλη, όμως, διακυβεύεται η ποιότητα του διαλόγου, και η ουσιαστική συμμετοχή, καθώς η διαδικασία «αποϋλοποιείται» ή αντικαθίσταται από την αλληλογραφία ή τις ψηφιακές φόρμες. Επιπλέον, η εξοικείωση των μελών με τα εργαλεία αυτά δεν είναι ομοιογενής, γεγονός που μπορεί να δημιουργήσει σχέσεις εξάρτησης ή αποκλεισμού. Η χρήση ψηφιακών μέσων μπορεί να επιφέρει μια «αποπροσωποποίηση» των σχέσεων, περιορίζοντας τις δυνατότητες ανάπτυξης παιδαγωγικής κοινότητας και συλλογικού στοχασμού. Σημαντική είναι επίσης η μετατόπιση εξουσίας που μπορεί να προκύψει, με τον Διευθυντή της σχολικής μονάδας ή τον υπεύθυνο ψηφιακής διαχείρισης, να αποκτά αυξημένο έλεγχο στην πληροφορία και στις ροές της.

Ο ρόλος του Διευθυντή σε ένα Λύκειο ως παιδαγωγικού και διοικητικού ηγέτη γίνεται ακόμη πιο κρίσιμος στην επίλυση των προβλημάτων τα οποία προκαλούνται από την υπερφόρτωση των εκπαιδευτικών με πολυεπίπεδες υποχρεωτικές δραστηριότητες. Πέρα από τη διαχείριση των διοικητικών απαιτήσεων, ο Διευθυντής οφείλει να λειτουργεί επιστημονικά, διοικητικά, και παιδαγωγικά υπεύθυνος του οργανισμού, και ως συντονιστής λειτουργεί ως διαμεσολαβητής και υπερασπιστής των αναγκών των εκπαιδευτικών και της έκφρασης της βούλησης του Συλλόγου Διδασκόντων. Ως Διευθυντής του οργανισμού χρειάζεται να αναγνωρίσει έγκαιρα τα σημάδια επαγγελματικής κόπωσης και ψυχολογικής επιβάρυνσης των εκπαιδευτικών και να λειτουργεί προληπτικά, διασφαλίζοντας την ισοκατανομή καθηκόντων με βάση διαφανή και συμφωνημένα κριτήρια. Πρέπει να προάγει ένα κλίμα εμπιστοσύνης και συλλογικότητας, ενισχύοντας τη συμμετοχή όλων στις αποφάσεις που αφορούν την κατανομή εργασιών, την επιλογή δράσεων και τον ετήσιο προγραμματισμό. Η καθιέρωση των τακτικών διαλόγων και εσωτερικής διαβούλευσης μέσα από παιδαγωγικές συνεδριάσεις με ενεργό ακρόαση και αναγνώριση των διαφορετικών φωνών και δυνατοτήτων κάθε συναδέλφου, ενισχύει τη συναδελφική κουλτούρα και αποτρέπει τις συγκρούσεις. Παράλληλα, ο Διευθυντής πρέπει να ενθαρρύνει την καλλιέργεια δεσμών μεταξύ των εκπαιδευτικών, δημιουργώντας ευκαιρίες για συνεργατική εργασία, ανταλλαγή καλών πρακτικών, και ανάδειξη της προσφοράς του καθενός στην κοινή σχολική ζωή. Η αναγνώριση και ηθική επιβράβευση της προσπάθειας, ακόμα και χωρίς υλική ανταμοιβή, αποτελεί βασικό κίνητρο για τη διατήρηση της δέσμευσης και της θετικής στάσης των εκπαιδευτικών. Τέλος, είναι απαραίτητο ο Διευθυντής να λειτουργεί και ως διαμεσολαβητής με την ανώτερη διοίκηση, μεταφέροντας τεκμηριωμένα τα όρια και τις δυνατότητες του ανθρώπινου δυναμικού του σχολείου, προασπίζοντας την ποιότητα της σχολικής ζωής και της διδασκαλίας. Όταν ο Διευθυντής λειτουργεί με παιδαγωγική ευαισθησία, οργανωτική δικαιοσύνη και ανθρωποκεντρική προσέγγιση, μπορεί να μετατρέψει τις διοικητικές προκλήσεις σε ευκαιρίες ενδυνάμωσης των συναδελφικών σχέσεων και σε μοχλό επαγγελματικής ανάπτυξης και συλλογικής ευημερίας στο σχολικό περιβάλλον.

Η ψηφιοποίηση, πέρα από εργαλειακή, έχει και θεσμικές και διαχειριστικές προεκτάσεις, καθώς επιφέρει μετατοπίσεις στον τρόπο με τον οποίο σχεδιάζεται, υλοποιείται και αξιολογείται η εκπαιδευτική πολιτική. Στόχος της εφαρμογής των ψηφιακών μηχανισμών και τεχνολογιών στην εκπαίδευση είναι να ενισχύουν τον κεντρικό έλεγχο μέσω της άμεσης διασύνδεσης των σχολικών μονάδων με το Υπουργείο Παιδείας, μειώνοντας τη σχετική αυτονομία τους και εντείνοντας την καταγραφική και ελεγκτική λειτουργία της διοίκησης. Οι εκπαιδευτικοί μετατρέπονται σταδιακά από επαγγελματίες με παιδαγωγική αυτονομία σε χρήστες συστημάτων που καταγράφουν, κωδικοποιούν και αναφέρουν. Αυτό συνδέεται με ευρύτερες τάσεις «νέας δημόσιας διοίκησης» (new public management), όπου η αποδοτικότητα, η λογοδοσία και οι δείκτες επίδοσης αποκτούν προτεραιότητα έναντι της συμμετοχής και του παιδαγωγικού στοχασμού (Kotsifakos, 2025). Παράλληλα, νέες θεσμικές πρακτικές εμφανίζονται, όπως η διαχείριση προσωπικών δεδομένων, η εφαρμογή ψηφιακών πρωτοκόλλων ασφάλειας, και η δημιουργία δεικτών παρακολούθησης της σχολικής ζωής. Σε αυτό το πλαίσιο, ο ρόλος του διευθυντή μετασχηματίζεται: από παιδαγωγικός ηγέτης καλείται να λειτουργεί και ως διαχειριστής ψηφιακών πληροφοριακών ροών, φέρνοντας στο προσκήνιο την ανάγκη για πολυεπίπεδη επαγγελματική ανάπτυξη. Κατά το πρώτο εξάμηνο εφαρμογής του, διαπιστώθηκαν διαφοροποιημένες στάσεις και αντιδράσεις από πλευράς εκπαιδευτικών. Ορισμένοι το υποδέχθηκαν θετικά ως εργαλείο εκσυγχρονισμού και διαφάνειας, ενώ άλλοι εξέφρασαν επιφυλάξεις, θεωρώντας ότι πρόκειται για έναν ακόμα διοικητικό μηχανισμό που επιβαρύνει την καθημερινότητά τους χωρίς ουσιαστική υποστήριξη.

ΣΥΖΗΤΗΣΗ – ΑΝΑΛΥΣΗ ΤΩΝ ΑΠΟΤΕΛΕΣΜΑΤΩΝ, ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΤΑΣΕΙΣ

Απαντώντας αναστοχαστικά τις αρχικές ερωτήσεις του άρθρου θα καταγράφαμε τα εξής:

- Η εφαρμογή του Ψηφιακού βιβλίου πράξεων συλλόγου στις σχολικές μονάδες επέφερε σημαντικές ποιοτικές και ποσοτικές αλλαγές στη λειτουργία της σχολικής διοίκησης. Ποσοτικά, μειώθηκε δραστικά η χρήση έντυπου υλικού και αναλώσιμων, συμβάλλοντας σε εξοικονόμηση πόρων και χρόνου. Οι πράξεις πλέον καταχωρούνται, αποθηκεύονται και ανακτώνται ψηφιακά, μειώνοντας τον διοικητικό φόρτο. Η πρόσβαση σε παλαιότερες πράξεις είναι άμεση, χωρίς φυσική αναζήτηση ή φθορά αρχείων. Οι εκπαιδευτικοί μπορούν να υπογράφουν εξ αποστάσεως, γεγονός που διευκολύνει τη λειτουργία των συλλογικών οργάνων. Ενισχύθηκε η διαφάνεια και η λογοδοσία, καθώς κάθε ενέργεια καταγράφεται ηλεκτρονικά με χρονοσήμανση. Παράλληλα, αυξήθηκε η ασφάλεια των δεδομένων μέσω συστημάτων ταυτοποίησης και ψηφιακών υπογραφών. Ποιοτικά, το Ψηφιακό βιβλίο πράξεων συλλόγου προώθησε μια πιο οργανωμένη και επαγγελματική εικόνα της σχολικής μονάδας. Διευκόλυνε τη συνεργασία μεταξύ των μελών του Συλλόγου Διδασκόντων, ιδίως σε περιπτώσεις απουσιών ή εξ αποστάσεως συμμετοχών. Καθιερώθηκε μια ενιαία μορφοποίηση και τεκμηρίωση των πράξεων, περιορίζοντας τα λάθη. Επιπλέον, ενισχύθηκε η συμμόρφωση με το θεσμικό πλαίσιο και τις προβλεπόμενες διαδικασίες. Η διαδικασία καταγραφής έγινε πιο αντικειμενική και λιγότερο επιρρεπής σε παρερμηνείες. Οι διευθυντές απέκτησαν ένα ευέλικτο εργαλείο για τη διοικητική τους λειτουργία. Η επιμόρφωση και η ενασχόληση του προσωπικού σε ψηφιακές δεξιότητες αποτέλεσε ένα θετικό αποτέλεσμα. Ενισχύθηκε η κουλτούρα ψηφιακού μετασχηματισμού στη σχολική κοινότητα. Η εφαρμογή διευκόλυνε την παρακολούθηση και αξιολόγηση της σχολικής λειτουργίας από ανώτερα διοικητικά όργανα. Αν και υπήρχαν αρχικά τεχνικά ή οργανωτικά προβλήματα, με την πάροδο του χρόνου υπερκεράστηκαν. Η διαλειτουργικότητα με άλλα πληροφοριακά συστήματα (π.χ. myschool) ενισχύθηκε. Το Ψηφιακό βιβλίο πράξεων συλλόγου διευκόλυνε την τεκμηρίωση δράσεων και την αποτύπωση των αποφάσεων για ιστορικούς και αξιολογικούς λόγους. Τέλος, αποτέλεσε παράδειγμα για τον εκσυγχρονισμό και άλλων διοικητικών πρακτικών στο σχολείο.
- Οι διευθυντές και οι εκπαιδευτικοί αντιλήφθηκαν τη λειτουργία του νέου ψηφιακού διοικητικού μηχανισμού ως βήμα προς τον εκσυγχρονισμό της σχολικής διοίκησης. Μέρος των εκπαιδευτικών εκφράστηκε αρνητικά, για ιδεολογικούς λόγους. Ένα μεγάλο μέρος όμως των εκπαιδευτικών ερμήνευσαν την αλλαγή ως αναγκαία προσαρμογή στις απαιτήσεις της ψηφιακής εποχής. Εκτίμησαν ιδιαίτερα τη μείωση της γραφειοκρατίας και την ευκολία πρόσβασης στις πράξεις. Η δυνατότητα εξ αποστάσεως συμμετοχής και υπογραφής θεωρήθηκε ιδιαίτερα χρήσιμη σε περιόδους απουσιών ή έκτακτων καταστάσεων. Αντιμετώπισαν όμως αρχικά προκλήσεις που σχετίζονταν με την τεχνική εξοικείωση και τη μετάβαση από τις έντυπες στις ψηφιακές διαδικασίες. Σταδιακά, υιοθέτησαν θετικότερη στάση, αναγνωρίζοντας την αποτελεσματικότητα και την ασφάλεια του συστήματος. Οι διευθυντές είδαν το εργαλείο ως ενίσχυση της οργανωτικής τους ικανότητας και της διαφάνειας στη λήψη αποφάσεων. Ορισμένοι εκπαιδευτικοί επεσήμαναν την ανάγκη για συνεχή επιμόρφωση και τεχνική υποστήριξη. Συνολικά, το ψηφιακό βιβλίο πράξεων ερμηνεύθηκε ως μια μεταρρύθμιση που εξυπηρετεί την αξιοπιστία και τη θεσμική τεκμηρίωση. Τελικά η συγκεκριμένη αλλαγή συνέβαλε στη διαμόρφωση μιας νέας κουλτούρας διοίκησης, περισσότερο συνεργατικής και τεχνολογικά υποστηριζόμενης.
- Παρ’ όλα αυτά κατά την ενσωμάτωση του Ψηφιακού βιβλίου πράξεων συλλόγου διδασκόντων στις διοικητικές διαδικασίες προέκυψαν αρκετές δυσκολίες, εντάσεις και αντιφάσεις. Ορισμένοι εκπαιδευτικοί αντιμετώπισαν τεχνικά προβλήματα ή έλλειψη ψηφιακών δεξιοτήτων, γεγονός που προκάλεσε ανασφάλεια και καθυστερήσεις. Παρατηρήθηκε ένταση ανάμεσα στην ανάγκη για άμεση προσαρμογή και την απουσία επαρκούς επιμόρφωσης ή υποστήριξης. Αντιφατικά, ενώ το σύστημα προωθεί τη διαφάνεια και την τυποποίηση, σε ορισμένες περιπτώσεις υπήρξε αμφιβολία για την ευελιξία και την παιδαγωγική διάσταση της σχολικής διοίκησης. Επιπλέον, η ψηφιακή

υπογραφή και η ηλεκτρονική τεκμηρίωση έφεραν στην επιφάνεια ερωτήματα για την ατομική ευθύνη και την πραγματική συμμετοχή στις συλλογικές αποφάσεις.

- Η εφαρμογή του νέου καθεστώτος ψηφιακής καταγραφής και διαφάνειας επηρέασε ουσιαστικά τις σχέσεις μεταξύ των μελών της σχολικής κοινότητας. Δημιουργήθηκε ένα πλαίσιο μεγαλύτερης λογοδοσίας, όπου κάθε ενέργεια καταγράφεται και είναι προσβάσιμη από όλα τα εμπλεκόμενα μέλη. Αυτό ενίσχυσε το αίσθημα ευθύνης και σοβαρότητας στη διατύπωση γνώμης και στη λήψη αποφάσεων. Οι συνεδριάσεις του συλλόγου διδασκόντων απέκτησαν πιο επίσημο και τεκμηριωμένο χαρακτήρα. Η διαφάνεια συνέβαλε στη μείωση παρασκηνιακών ή άτυπων διαδικασιών. Ορισμένα μέλη ένιωσαν μεγαλύτερη πίεση να ευθυγραμμιστούν με τις πλειοψηφικές αποφάσεις. Παράλληλα, ενισχύθηκε η εμπιστοσύνη στις διοικητικές πρακτικές της διεύθυνσης. Οι νέοι εκπαιδευτικοί είχαν την ευκαιρία να κατανοήσουν καλύτερα τις δομές και τους κανόνες λειτουργίας του σχολείου. Καθιερώθηκε μια πιο τυποποιημένη και αντικειμενική επικοινωνία. Ωστόσο, η επίσημη καταγραφή περιόρισε κάποιες φορές τον αυθορμητισμό και τη ζωντανή παιδαγωγική συζήτηση. Δημιουργήθηκε ένα νέο είδος "ψηφιακής πειθαρχίας", που άλλαξε τη δυναμική των συναδελφικών σχέσεων. Σε ορισμένες περιπτώσεις, υπήρξε δισταγμός στην έκφραση εναλλακτικών ή κριτικών απόψεων. Ταυτόχρονα, διαμορφώθηκαν συνθήκες ισότιμης πρόσβασης στην πληροφόρηση και στις αποφάσεις. Οι σχέσεις διευθυντών και εκπαιδευτικών απέκτησαν περισσότερο θεσμικό περιεχόμενο. Η διαθεσιμότητα των πράξεων ενίσχυσε τη διαγενεακή γνώση και τη συνέχεια της σχολικής μνήμης. Η τυποποίηση οδήγησε σε μια πιο επαγγελματική κουλτούρα συνεργασίας. Η εξ αποστάσεως συμμετοχή ενίσχυσε την ένταξη μελών που παλαιότερα απουσίαζαν. Η συντονισμένη χρήση του εργαλείου απαιτούσε αυξημένο επίπεδο εμπιστοσύνης και επικοινωνίας. Εντέλει, το νέο πλαίσιο καλλιέργησε μια κουλτούρα διαφάνειας και συλλογικής ευθύνης. Παρ' όλες τις προκλήσεις, οι σχέσεις εξελίχθηκαν προς ένα πιο θεσμικό, συντονισμένο και συνεκτικό μοντέλο συνεργασίας.
- Η εφαρμογή του νόμου για το Ψηφιακό Βιβλίο Πράξεων συνέβαλε ουσιαστικά στη βελτίωση της αποτελεσματικότητας του διοικητικού έργου και, σε αρκετές περιπτώσεις, στην ενίσχυση του συνεργατικού κλίματος στο σχολείο. Η τυποποίηση των διαδικασιών απλοποίησε τη διαχείριση των συνεδριάσεων και τον τρόπο λήψης αποφάσεων. Η δυνατότητα ψηφιακής καταγραφής και αρχειοθέτησης διευκόλυνε τον συντονισμό των δράσεων και την παρακολούθηση της πορείας τους. Η ηλεκτρονική πρόσβαση στις πράξεις επέτρεψε σε όλα τα μέλη της σχολικής κοινότητας να ενημερώνονται άμεσα και ισότιμα. Οι διευθυντές απέκτησαν ένα χρήσιμο εργαλείο που ενίσχυσε τη διαχειριστική τους επάρκεια. Παράλληλα, η χρήση της πλατφόρμας δημιούργησε προϋποθέσεις για ανάπτυξη μιας κουλτούρας διαφάνειας. Οι διαδικασίες έγιναν πιο θεσμικά καθαρές και καταγεγραμμένες, κάτι που ενίσχυσε τη συλλογική ευθύνη. Ο χρόνος συνεδριάσεων αξιοποιήθηκε πιο παραγωγικά, καθώς περιορίστηκαν οι παρεκκλίσεις από την ημερήσια διάταξη. Σε περιόδους κρίσης ή απουσιών, η εξ αποστάσεως συμμετοχή διασφάλισε τη συνέχεια της διοικητικής λειτουργίας. Τα μέλη ένιωσαν ότι η φωνή τους καταγράφεται επίσημα, γεγονός που αύξησε το αίσθημα συμμετοχής. Ωστόσο, η εφαρμογή του μέτρου δεν ήταν απολύτως ομαλή. Υπήρξαν αρχικά δυσκολίες στην εξοικείωση με την τεχνολογία, ιδιαίτερα σε μέλη με περιορισμένες ψηφιακές δεξιότητες. Σε κάποιες περιπτώσεις, η τυποποίηση προκάλεσε αίσθηση αποπροσωποποίησης ή και γραφειοκρατικής υπερφόρτωσης. Το στοιχείο της αυθόρμητης συζήτησης περιορίστηκε, γεγονός που επηρέασε την ελευθερία έκφρασης. Επίσης, ο φόβος για την επίσημη καταγραφή απόψεων οδήγησε σε πιο επιφυλακτικές τοποθετήσεις. Σε ορισμένα σχολεία παρατηρήθηκε συγκεντρωτισμός στην καταγραφή των πράξεων από τη διεύθυνση, με περιορισμένη ανάληψη ευθύνης από τα υπόλοιπα μέλη. Ωστόσο, με την πάροδο του χρόνου, αναπτύχθηκαν μηχανισμοί προσαρμογής. Οι εκπαιδευτικοί απέκτησαν μεγαλύτερη εξοικείωση και εμπιστοσύνη στο σύστημα. Οι σχολικές μονάδες αξιοποίησαν την τεχνολογία ως αφορμή για επιμόρφωση και αναστοχασμό πάνω στις διαδικασίες τους. Η καταγραφή πράξεων ενίσχυσε τη διαχρονικότητα και τη μνήμη του σχολείου. Οι νεοεισερχόμενοι εκπαιδευτικοί μπορούσαν να προσεγγίσουν το ιστορικό αποφάσεων και να ενταχθούν πιο αποτελεσματικά στο κλίμα του σχολείου. Η διεύθυνση είχε πλέον ένα σταθερό σημείο αναφοράς για την παρακολούθηση των αποφάσεων. Σε περιπτώσεις αλλαγής ηγεσίας, η μετάβαση γινόταν πιο ομαλά. Η αποτίμηση του διοικητικού έργου βασιζόταν σε τεκμηριωμένα δεδομένα. Το συνεργατικό κλίμα ενισχύθηκε όταν υπήρχε σαφής και ισότιμη κατανομή ρόλων στην παραγωγή των διοικητικών πράξεων. Το εργαλείο έγινε αφορμή για ανταλλαγή τεχνογνωσίας και καλών πρακτικών. Σε ορισμένα σχολεία, οι εκπαιδευτικοί πρότειναν βελτιώσεις στη χρήση του, ενισχύοντας τη συμμετοχικότητα. Η αίσθηση θεσμικής ισοτιμίας ενισχύθηκε όταν το εργαλείο χρησιμοποιήθηκε με διαφάνεια και χωρίς αποκλεισμούς. Οι εκπαιδευτικοί ένιωσαν μεγαλύτερη σύνδεση με τη σχολική μονάδα ως θεσμική οντότητα. Η ποιότητα της εσωτερικής επικοινωνίας ενισχύθηκε με την τακτική ανατροφοδότηση. Παρότι οι αρχικές προκλήσεις ήταν σημαντικές, η συνολική επίδραση του νόμου στην αποτελεσματικότητα και τη συνεργασία κρίθηκε θετική. Το ψηφιακό περιβάλλον, αν και αρχικά ξένο για κάποιους, λειτούργησε τελικά ως μοχλός επαγγελματικής ανάπτυξης και εσωτερικής συνοχής.

Συνολικά μιλώντας στην πράξη, η εφαρμογή του ψηφιακού βιβλίου ανέδειξε αρκετές διοικητικές αντινομίες και αντιφάσεις. Η περιορισμένη τεχνική κατάρτιση ορισμένων στελεχών και εκπαιδευτικών, η απουσία επαρκούς καθοδήγησης και τα ασυμβίβαστα μεταξύ ψηφιακών πλατφορμών οδήγησαν σε περιπτώσεις δυσλειτουργιών. Επιπλέον, η ανάγκη για απόλυτη τήρηση των βημάτων καταχώρισης και επικύρωσης ενίσχυσε μια λογική τυπικής συμμόρφωσης, σε βάρος της ουσίας της παιδαγωγικής συναπόφασης. Πώς θα μπορούσε, λόγου χάρη, να ελεγχθεί αν, κατά τον ετήσιο

προγραμματισμό, ένας διευθυντής εισήγαγε έτοιμο σχέδιο δράσης προς ψήφιση, χωρίς να προηγηθεί ουσιαστικός διάλογος στον σύλλογο διδασκόντων και ενώ η πράξη καταχωρείται ψηφιακά, η συμμετοχή των εκπαιδευτικών περιορίζεται στην τυπική συμμόρφωση, αντί μιας γνήσιας παιδαγωγικής συναπόφασης.

Ταυτόχρονα, η εμπειρία ανέδειξε πεδία αντιφάσεων και συγκρούσεων. Ορισμένοι διευθυντές σχολείων αντιλήφθηκαν το εργαλείο ως ενίσχυση της διοικητικής τους εξουσίας, ενώ άλλοι το είδαν ως απειλή για την παραδοσιακή, άτυπη διαχείριση των σχολικών πρακτικών. Οι εκπαιδευτικοί, από την πλευρά τους, βρέθηκαν συχνά σε διλήμματα μεταξύ του υπηρεσιακού καθήκοντος και της προσωπικής τους εκτίμησης για τη λειτουργικότητα του νέου συστήματος. Σε ορισμένες περιπτώσεις παρατηρήθηκε δυσλειτουργία στην καταγραφή αποφάσεων λόγω καθυστερήσεων, ασαφειών στις οδηγίες ή απροθυμίας εμπλοκής. Η ερμηνεία των ευρημάτων, με βάση το θεωρητικό πλαίσιο της επιτελικότητας και των υπαγωγικών σχέσεων, δείχνει το πώς η ψηφιοποίηση μπορεί να λειτουργήσει όχι ως εργαλείο διευκόλυνσης, αλλά και ως μηχανισμός εντατικοποίησης του ελέγχου. Αντί να προάγεται η αυτονομία της σχολικής μονάδας, ενισχύεται η κεντρική κανονιστική εποπτεία. Το αποτέλεσμα είναι η εμπέδωση μιας «ψηφιακής γραφειοκρατίας», που μεταφέρει τον έλεγχο από τις τυπικές πράξεις στις δομές δεδομένων και τις ροές πληροφοριών.

Το άμεσο συμπέρασμα που προκύπτει σε αυτή την φάση είναι ότι η μετάβαση στην ψηφιακή διοίκηση δεν μπορεί να βασίζεται αποκλειστικά στην τεχνολογική υποδομή ή στην ευμενή διάθεση κάποιων διευθυντών με ένα μέρος των εκπαιδευτικών. Απαιτείται σοβαρή επένδυση στον ψηφιακό εγγραμματισμό των εκπαιδευτικών, ουσιαστική παιδαγωγική επιμόρφωση και αναστοχαστική αξιολόγηση των εργαλείων, όχι μόνο ως τεχνικών λύσεων αλλά και ως πολιτικών πρακτικών. Μόνο έτσι μπορεί να διασφαλιστεί ότι η τεχνολογία δεν θα ενισχύσει τους ήδη υπάρχοντες μηχανισμούς ελέγχου, αλλά θα αποτελέσει πραγματικό μέσο συμμετοχής, συνεργασίας και ενδυνάμωσης της εκπαιδευτικής κοινότητας. Η εισαγωγή του Ψηφιακού βιβλίου πράξεων συλλόγου διδασκόντων στο πλαίσιο της διοίκησης των σχολικών μονάδων, κατ' εφαρμογή των σχετικών νομοθετικών προβλέψεων, σηματοδότησε μια σημαντική τομή στη γραφειοκρατική και οργανωτική λειτουργία των σχολικών μονάδων. Ωστόσο, για να αποδώσει καρπούς αυτή η αλλαγή, είναι απαραίτητο να ενταχθεί σε μια ευρύτερη στρατηγική ποιότητας. Η φιλοσοφία της ΔΟΠ εστιάζει στη συμμετοχική διοίκηση, στη διαρκή βελτίωση και στην ενεργή εμπλοκή όλων των μελών του οργανισμού, μπορεί να λειτουργήσει ως πλαίσιο ερμηνείας και εφαρμογής των νέων ψηφιακών εργαλείων. Η εφαρμογή του νόμου με διοικητικούς όρους συχνά οδηγεί σε μηχανιστική συμμόρφωση: οι εκπαιδευτικοί καλούνται να συμπληρώνουν το ψηφιακό βιβλίο ως διαδικαστική υποχρέωση, χωρίς να αναγνωρίζεται ο παιδαγωγικός ή αναστοχαστικός του χαρακτήρας. Η ΔΟΠ, αντίθετα, προτείνει την ανάδειξη της καταγραφής πράξεων ως ευκαιρία για εσωτερική αξιολόγηση, συλλογικό σχεδιασμό και τεκμηριωμένη λήψη αποφάσεων. Μέσω της ενεργού συμμετοχής του συνόλου του συλλόγου διδασκόντων, ενισχύεται η κουλτούρα συνεργασίας και ενδυναμώνεται η αίσθηση κοινού σκοπού. Βασική αρχή της ΔΟΠ αποτελεί η πρόληψη των προβλημάτων και όχι η καταστολή τους μέσω ελέγχου. Η απλή τήρηση του ψηφιακού βιβλίου δεν επαρκεί για να επιφέρει ποιοτική βελτίωση. Αντίθετα, όταν συνδέεται με εργαλεία αποτίμησης, όπως η αποτύπωση της αποτελεσματικότητας των δράσεων και η ανατροφοδότηση του συλλόγου, τότε μετατρέπεται σε εργαλείο αυτορρύθμισης και στρατηγικού σχεδιασμού. Επιπλέον, η ΔΟΠ τονίζει τη σημασία της επιμόρφωσης και της ενίσχυσης του ανθρώπινου δυναμικού (Kotsifakos, 2025).

Η εφαρμογή της νομοθεσίας χωρίς ουσιαστική κατάρτιση των εκπαιδευτικών στον ψηφιακό εγγραμματισμό και στη λειτουργία των νέων εργαλείων, εγκυμονεί κινδύνους επιφανειακής εφαρμογής ή και απονομιμοποίησης της ίδιας της διαδικασίας. Συμπερασματικά, η σύνδεση της ΔΟΠ με την εφαρμογή του του ψηφιακού βιβλίου πράξεων συλλόγου διδασκόντων στις σχολικές μονάδες προτείνει μια διαφορετική οπτική: το ψηφιακό πρακτικό να αποτελέσει όχι ένα ακόμη εργαλείο καταγραφής και ελέγχου, αλλά ένα μέσο στοχαστικής δράσης και ποιοτικής ανατροφοδότησης. Μόνο μέσα από αυτή την ολιστική προσέγγιση μπορεί να διασφαλιστεί ότι η διοικητική καινοτομία υπηρετεί τις ανάγκες της εκπαιδευτικής κοινότητας και συμβάλλει στη βελτίωση της σχολικής ζωής.

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ΕΚΠΑΙΔΕΥΤΙΚΗ ΗΓΕΣΙΑ ΣΤΗΝ ΨΗΦΙΑΚΗ ΕΠΟΧΗ: ΠΡΟΚΛΗΣΕΙΣ, ΚΑΙΝΟΤΟΜΙΕΣ ΚΑΙ ΜΕΤΑΣΧΗΜΑΤΙΣΤΙΚΕΣ ΠΡΑΚΤΙΚΕΣ

Μπούτσιου Ευαγγελία
Διευθύντρια Δημοτικού Σχολείου, Εκπαιδευτικός ΠΕ70
1ο Δημοτικό Σχολείο Σταυρούπολης, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: eboutsiou@gmail.com

Μαργαρίτης Γεώργιος
Διευθυντής Δημοτικού Σχολείου, Εκπαιδευτικός ΠΕ70
Δημοτικό Σχολείο Νέας Μεσημβρίας, ΔΠΕ Δυτικής Θεσσαλονίκης
Θεσσαλονίκη, Ελλάδα
email: gmarg43@hotmail.gr

ΠΕΡΙΛΗΨΗ

Η ψηφιακή μετάβαση στην εκπαίδευση έχει επαναπροσδιορίσει ριζικά τον ρόλο των εκπαιδευτικών ηγετών, οι οποίοι καλούνται να διαχειριστούν πολύπλοκες συνθήκες, να αναπτύξουν νέες δεξιότητες και να διαμορφώσουν στρατηγικές που ανταποκρίνονται στις απαιτήσεις του 21ου αιώνα. Η εργασία αυτή εξετάζει τις βασικές προκλήσεις, τις αναδυόμενες καινοτομίες και τις μετασχηματιστικές πρακτικές που επανακαθορίζουν την εκπαιδευτική ηγεσία στη σύγχρονη ψηφιακή εποχή.

Κεντρική πρόκληση αποτελεί το ψηφιακό χάσμα, που δημιουργεί ανισότητες στην πρόσβαση σε τεχνολογικές υποδομές και ψηφιακές ευκαιρίες μάθησης. Παράλληλα, οι αυξανόμενες ανησυχίες για την προστασία των προσωπικών δεδομένων απαιτούν την εφαρμογή αυστηρών πολιτικών και την ανάληψη ευθύνης από υπεύθυνους προστασίας δεδομένων εντός των σχολικών μονάδων. Η ανάγκη συνεχούς επαγγελματικής ανάπτυξης αναδεικνύεται ως κρίσιμος παράγοντας για την επιτυχή ενσωμάτωση της τεχνολογίας στη διδασκαλία, ενώ η αξιοποίηση νέων τεχνολογιών, όπως η τεχνητή νοημοσύνη, το cloud computing και τα μεγάλα δεδομένα, απαιτεί στρατηγικό σχεδιασμό και στοχοθετημένη επιμόρφωση.

Στην προσπάθεια αντιμετώπισης αυτών των προκλήσεων, οι εκπαιδευτικοί ηγέτες υιοθετούν καινοτόμες προσεγγίσεις, όπως η λήψη αποφάσεων βάσει δεδομένων, που ενισχύει την αποτελεσματικότητα των εκπαιδευτικών παρεμβάσεων και των πολιτικών. Η προσαρμοστική και μετασχηματιστική ηγεσία προωθεί την ευελιξία, τη συλλογικότητα και τη δημιουργία διαφανούς, συνεργατικού εκπαιδευτικού περιβάλλοντος. Παράλληλα, εργαλεία όπως οι διαδικτυακές πλατφόρμες μάθησης και τα μικρο-πιστοποιητικά αξιοποιούνται για την ενίσχυση του ψηφιακού γραμματισμού των εκπαιδευτικών και την υποστήριξη της επαγγελματικής τους ανέλιξης.

Ιδιαίτερη έμφαση δίνεται σε μετασχηματιστικές πρακτικές, όπως η εξατομικευμένη μάθηση, η οποία αξιοποιεί την τεχνολογία για να προσαρμόσει το μαθησιακό περιεχόμενο στις ανάγκες και τα ενδιαφέροντα των μαθητών, ενισχύοντας τη συμμετοχή και την επίδοσή τους. Εξίσου σημαντική είναι η συνεργατική λήψη αποφάσεων, η οποία προωθεί τη συμμετοχή όλων των εμπλεκόμενων μερών —εκπαιδευτικών, μαθητών, γονέων— στη διαμόρφωση της στρατηγικής του σχολείου, ενδυναμώνοντας το αίσθημα εμπιστοσύνης και συνιδιοκτησίας. Η εργασία αναδεικνύει παραδείγματα εφαρμογής καινοτόμων προσεγγίσεων σε σχολικές μονάδες και εκπαιδευτικά δίκτυα, αναδεικνύοντας τη δυναμική των σύγχρονων μοντέλων ηγεσίας.

Συμπερασματικά, η εκπαιδευτική ηγεσία στην ψηφιακή εποχή απαιτεί επαναπροσδιορισμό στρατηγικών, ενίσχυση του επαγγελματισμού και υιοθέτηση μιας κουλτούρας συνεχούς μάθησης και προσαρμογής. Οι εκπαιδευτικοί ηγέτες καλούνται να ηγηθούν με όραμα, συνδυάζοντας τεχνογνωσία, συνεργασία και τεχνολογική ενσωμάτωση, προκειμένου να ανταποκριθούν στις απαιτήσεις της σύγχρονης εκπαίδευσης. Η εργασία προσφέρει ένα εννοιολογικό πλαίσιο και ένα σύνολο πρακτικών εργαλείων που συμβάλλουν στον επιστημονικό και επαγγελματικό διάλογο για την εκπαίδευση στην εποχή της ψηφιακής μετάβασης.

Λέξεις – κλειδιά: Ηγεσία στην Εκπαίδευση, Ψηφιακός Μετασχηματισμός, Διοίκηση Σχολικών Μονάδων, Εκπαιδευτική Καινοτομία, Λήψη Αποφάσεων βάσει Δεδομένων, Επαγγελματική Ανάπτυξη

ΕΙΣΑΓΩΓΗ

Η ταχεία πρόοδος της ψηφιοποίησης και η αυξανόμενη πολυπλοκότητα των ψηφιακών εργαλείων καθιστούν αναγκαία την αναπροσαρμογή των ηγετικών προσεγγίσεων σε όλα τα επίπεδα της εκπαίδευσης, από τη σχολική έως την τριτοβάθμια. Οι εκπαιδευτικοί ηγέτες καλούνται να ανταποκριθούν στις νέες απαιτήσεις, ενσωματώνοντας την καινοτομία και την ψηφιακή τεχνολογία τόσο στις διοικητικές δομές όσο και στις μαθησιακές εμπειρίες.

Η αποτελεσματική ηγεσία αναδεικνύεται ως κρίσιμος παράγοντας σε αυτή τη μετάβαση, ανεξαρτήτως πολιτισμικού ή θεσμικού πλαισίου. Η καινοτόμος εκπαιδευτική ηγεσία δεν αποτελεί πλέον επιλογή αλλά επιτακτική ανάγκη, καθώς καλείται να συνδυάσει την προσωπική ενσυναίσθηση με την καθοδήγηση προς την αξιοποίηση της τεχνολογίας για την προώθηση της παιδαγωγικής ανανέωσης και της θεσμικής ευελιξίας.

Καθώς οι οργανισμοί και τα εκπαιδευτικά συστήματα εξελίσσονται για να ανταποκριθούν στις αυξανόμενες ανάγκες μάθησης, οι ηγέτες καλούνται να επαναπροσδιορίσουν το λεξιλόγιο και τη στρατηγική τους. Μια σύγχρονη, στοχαστική ηγεσία είναι απαραίτητη για την πλοήγηση στη σύνθετη πραγματικότητα της ψηφιακής εποχής, προωθώντας μετασχηματιστικές πρακτικές που ανταποκρίνονται στις προκλήσεις και τις δυνατότητες του σήμερα.

ΙΣΤΟΡΙΚΟ ΚΑΙ ΣΚΕΠΤΙΚΟ

Ο ρόλος και η πρακτική της εκπαιδευτικής ηγεσίας έχουν εξελιχθεί σημαντικά ως απόκριση σε κοινωνικές μεταβολές που απαιτούν μετασχηματιστικές αλλαγές. Αν και οι εξελίξεις αυτές εντάσσονται σε ένα συστημικό πλαίσιο, η κατανόηση των επιπτώσεων των ψηφιακών μετασχηματισμών στην εκπαιδευτική διαδικασία και, συνακόλουθα, στην ηγεσία παραμένει περιορισμένη. Οι τεχνολογίες πληροφορίας και επικοινωνίας (ΤΠΕ) αναδιαμορφώνουν τη μαθησιακή εμπειρία, αμφισβητώντας παραδοσιακές κατηγοριοποιήσεις και εντείνοντας τις προσδοκίες από τους εκπαιδευτικούς για την υιοθέτηση καινοτόμων ψηφιακών πρακτικών. Ωστόσο, οι παραδοσιακές ηγετικές μέθοδοι αποδεικνύονται συχνά ανεπαρκείς για την αντιμετώπιση των σύγχρονων πολιτισμικών, γλωσσικών και τεχνολογικών προκλήσεων. Οι ΤΠΕ, ως απαραίτητο στοιχείο των δεξιοτήτων του 21ου αιώνα, διαταράσσουν κατεστημένες δομές γνώσης και καθοδήγησης (Haleem et al., 2022).

Το παρόν κείμενο υποστηρίζει ότι μεγάλο μέρος των υπαρχόντων μοντέλων εκπαιδευτικής ηγεσίας βασίζεται σε παραδοχές ενός παρελθόντος που αποδιαρθρώνεται ταχύτατα και, ως εκ τούτου, δεν επαρκούν για την υποστήριξη των αναγκών της ψηφιακής εποχής. Η μετάβαση από ατομοκεντρικές και τεχνικές στρατηγικές σε ένα μοντέλο προσαρμοστικής και μετασχηματιστικής ηγεσίας, που δίνει έμφαση στη διασύνδεση και στη συλλογική δράση, κρίνεται αναγκαία. Αυτή η προσέγγιση βασίζεται στη συνδημιουργία λύσεων μέσα σε δικτυωμένα περιβάλλοντα, με ενεργή συμμετοχή όλων όσοι επιδιώκουν να συμβάλουν στην αλλαγή. Επιπλέον, εντοπίζεται ένα σημαντικό ερευνητικό κενό ως προς την τεκμηρίωση της πρακτικής της ηγεσίας στο πεδίο της ψηφιακής εκπαίδευσης. Απαιτείται συστηματική έρευνα που να καθοδηγεί την αποτελεσματική παιδαγωγική πρακτική και να υποστηρίζει την επαγγελματική προσαρμογή των εκπαιδευτικών στις εξελισσόμενες γνωστικές απαιτήσεις. Η τοποθέτηση της εκπαιδευτικής ηγεσίας στο πλαίσιο της ψηφιακής εκπαίδευσης προϋποθέτει νέες ερευνητικές προσεγγίσεις, ικανές να επαναπλαισιώσουν τα υφιστάμενα συστήματα ως απάντηση στους ψηφιακούς μετασχηματισμούς, ενισχύοντας τόσο την παρούσα όσο και τη μελλοντική πρακτική. Οι τεχνολογικές και κοινωνικοπολιτισμικές εξελίξεις επιβάλλουν διαρκή αναπροσαρμογή των εκπαιδευτικών συστημάτων. Ως κύριος καταλύτης αυτών των αλλαγών, οι ψηφιακές τεχνολογίες απαιτούν περαιτέρω έρευνα που θα ενισχύει παιδαγωγικές μεθόδους ευαίσθητες στις ανάγκες των μαθητών και τις κοινωνικές παραμέτρους της εκπαίδευσης (Ahmed et al., 2024).

Εστιάζοντας στην τεχνολογία, έρευνες δείχνουν ότι σημαντικό ποσοστό του εκπαιδευτικού προσωπικού αξιοποιεί ψηφιακούς πόρους στην καθημερινή διδακτική πρακτική. Οι τεχνολογίες αυτές, που περιλαμβάνουν οπτικές αναπαραστάσεις και πολυμέσα, ενισχύουν τη μαθητική συμμετοχή στις δραστηριότητες της τάξης, κυρίως μέσω της ενθάρρυνσης της δημιουργικής έκφρασης και της ενεργητικής εμπλοκής. Η ενσωμάτωση εργαλείων με ισχυρές απεικονιστικές δυνατότητες ανταποκρίνεται στις ανάγκες μιας γενιάς μαθητών που έχει διαμορφωθεί από την κυριαρχία της οπτικής πληροφορίας και την αμεσότητα στην πρόσβαση γνώσης. Στο πλαίσιο της τριτοβάθμιας εκπαίδευσης, αυτή η χρήση επεκτείνεται, εδραιώνοντας την προσδοκία ότι οι φοιτητές θα έχουν πρόσβαση σε πλούσιο θεματικό υλικό και διαφοροποιημένες μορφές μάθησης. Οι πανεπιστημιακοί ενθαρρύνονται να ενσωματώνουν πολυμεσικό περιεχόμενο για την παρουσίαση πληροφοριών, την υλοποίηση προσομοιώσεων και την εφαρμογή θεωρίας στην πράξη. Οι φοιτητές, αντίστοιχα, καλούνται να αλληλεπιδρούν με μαθησιακά αντικείμενα όπως προσομοιώσεις, διαγράμματα και γραφικά, συμμετέχοντας σε δραστηριότητες που περιλαμβάνουν ανάπτυξη σεναρίων, παιχνίδια ρόλων, γραπτές αναλύσεις, μελέτες περίπτωσης και αναστοχαστικές συζητήσεις. Οι ψηφιακές τεχνολογίες, ως υψηλής παιδαγωγικής αξίας εργαλεία,

προσφέρουν στους εκπαιδευτικούς ηγέτες ευέλικτες και δυναμικές πλατφόρμες για την υιοθέτηση καινοτόμων διδακτικών προσεγγίσεων (Saikkonen & Kaarakainen, 2021).

ΠΕΔΙΟ ΕΦΑΡΜΟΓΗΣ ΚΑΙ ΣΤΟΧΟΙ

Ερευνητές, επαγγελματίες και υπεύθυνοι χάραξης πολιτικής συγκλίνουν στην παραδοχή ότι οι κοινωνικές απαιτήσεις από την εκπαίδευση, καθώς και οι ρόλοι και οι ευθύνες των σχολείων, μεταβάλλονται διαρκώς. Παράλληλα, η ενσωμάτωση των ψηφιακών τεχνολογιών έχει οδηγήσει σε μια στροφή από αποσπασματικές σε περισσότερο ολιστικές προσεγγίσεις στην ηγεσία, επηρεάζοντας ουσιαστικά τις εκπαιδευτικές πρακτικές. Αυτή η αλλαγή αντικατοπτρίζει τη μετατόπιση της εστίασης από ατομικούς και τεχνικούς παράγοντες προς τη σχολική κουλτούρα, το κοινό όραμα και τη συμμετοχική ηγεσία. Οι μετασχηματιστικές αυτές διαδικασίες αναδιαμορφώνουν το πλαίσιο άσκησης της ηγεσίας και απαιτούν από τους εκπαιδευτικούς ηγέτες την αναθεώρηση των ρόλων και στρατηγικών τους. Η παρούσα εργασία εξετάζει τις βασικές προκλήσεις αυτής της μετάβασης και προτείνει εννοιολογικά εργαλεία που επιτρέπουν την επανερμηνεία της ηγεσίας στην ψηφιακή εποχή μέσα από ένα πρίσμα αναστοχασμού και μεταρρύθμισης.

Η σημασία της μελέτης εδράζεται στην αυξανόμενη αναγνώριση ότι η αποτελεσματικότητα των εκπαιδευτικών συστημάτων εξαρτάται σε μεγάλο βαθμό από την ποιότητα της ηγεσίας, η οποία απαιτεί συστηματική διερεύνηση στο πεδίο της έρευνας, της πολιτικής και της πρακτικής. Σε τοπικό επίπεδο, οι εκπαιδευτικοί ηγέτες και οι υπεύθυνοι χάραξης πολιτικής καλούνται να ενισχύσουν την κατανόησή τους για τις προκλήσεις που επιφέρει ο ψηφιακός μετασχηματισμός. Στο πλαίσιο αυτό, η παρούσα εργασία επιδιώκει, αφενός, την εις βάθος διερεύνηση των τομών μεταξύ ψηφιακής τεχνολογίας και εκπαιδευτικής ηγεσίας και, αφετέρου, την πρόταση καινοτόμων εννοιολογικών πλαισίων και μετασχηματιστικών πρακτικών, ικανών να εμπλουτίσουν τη θεωρητική συζήτηση και να επηρεάσουν τη μελλοντική έρευνα, τη χάραξη πολιτικής και την εκπαιδευτική πράξη. Το κοινό-στόχος περιλαμβάνει εκπαιδευτικούς ηγέτες, διευθυντές σχολείων, ερευνητές με προσανατολισμό στην εφαρμογή, καθώς και σχεδιαστές προγραμμάτων σπουδών.

ΚΑΤΑΝΟΗΣΗ ΤΗΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΗΓΕΣΙΑΣ ΣΤΗΝ ΨΗΦΙΑΚΗ ΕΠΟΧΗ

Στο σύγχρονο, ταχέως μεταβαλλόμενο τεχνολογικό περιβάλλον, κάθε πτυχή της ζωής επηρεάζεται από την ψηφιοποίηση, και η εκπαίδευση δεν αποτελεί εξαίρεση. Η ανάγκη επανεκτίμησης των παραδοσιακών πρακτικών είναι επιτακτική, ώστε να ανταποκρίνονται στις νέες συνθήκες. Η αυξημένη πολυπλοκότητα των εκπαιδευτικών απαιτήσεων προϋποθέτει την ενίσχυση των επαγγελματικών δεξιοτήτων και την υιοθέτηση καινοτόμων στρατηγικών διδασκαλίας και ηγεσίας. Παράλληλα, τα νέα οργανωτικά μοντέλα –όπως οι δικτυωμένοι ή μητροπολιτικοί οργανισμοί– καθιστούν αναγκαία την αναθεώρηση των παραδοσιακών αντιλήψεων για την ηγεσία. Η αποκέντρωση στη διοίκηση της εκπαίδευσης απαιτεί εναλλακτικές διαχειριστικές προσεγγίσεις και μεταρρυθμιστικές παρεμβάσεις εντός των υφιστάμενων δομών. Στο πλαίσιο αυτό, η παρούσα ανάλυση διερευνά πολιτικές και πρακτικές που προϋποθέτουν νέες μορφές ηγεσίας, σε μια κοινωνία διαμορφωμένη από τον ψηφιακό γραμματισμό και την καινοτομία (Kaur et al., 2024).

Υπό αυτές τις συνθήκες επιτάχυνσης και αυξανόμενης πολυπλοκότητας, καθίσταται κρίσιμη η κατανόηση των χαρακτηριστικών, των εννοιών και των πρακτικών που διέπουν την εκπαιδευτική ηγεσία στην ψηφιακή εποχή. Η διάκριση μεταξύ «ψηφιοποίησης» και «ψηφιακού» είναι καθοριστική: η πρώτη αφορά τη μετατροπή αναλογικών πληροφοριών σε ψηφιακή μορφή και την οργάνωσή τους μέσω δεδομένων, ενώ ο δεύτερος όρος παραπέμπει στη χρήση τεχνολογιών που επεξεργάζονται και αναδομούν τις πληροφορίες προς ενίσχυση της νοηματοδότησης. Επιπλέον, η έννοια του «ψηφιακού» εντάσσεται σε ένα ιστορικό πλαίσιο που διαχωρίζει τις σύγχρονες προσεγγίσεις από εκείνες προηγούμενων περιόδων (Philip & Gavrilova Aguilar, 2022).

Ο ορισμός της εκπαιδευτικής ηγεσίας παραμένει σύνθετος, καθώς δεν υπάρχει ευρεία συναίνεση μεταξύ ερευνητών και επαγγελματιών. Η ηγεσία περιλαμβάνει ενέργειες που προσφέρουν κατεύθυνση, προωθούν την αλλαγή, ενισχύουν την εμπιστοσύνη, αναπτύσσουν δεξιότητες και διαμορφώνουν υποστηρικτικά μαθησιακά περιβάλλοντα. Διάφορα εννοιολογικά πλαίσια έχουν προταθεί για την κατηγοριοποίηση των μορφών ηγεσίας στην ψηφιακή εποχή. Αντλώντας από θεωρίες ισχύος, βελτίωσης και συστημικής προσέγγισης, τα πλαίσια αυτά αναπτύχθηκαν παράλληλα με την ενσωμάτωση της τεχνολογίας σε σύνθετα μαθησιακά περιβάλλοντα. Μπορούν να αξιοποιηθούν για τη διάγνωση αναγκών ηγεσίας σε πολλαπλά επίπεδα, ενισχύοντας τη στελέχωση, την επαγγελματική ανάπτυξη και την κατανομή ρόλων σε πολυεπίπεδους μαθησιακούς οργανισμούς (Avidov-Ungar et al., 2022).

Την τελευταία δεκαετία, η ιστορική προσέγγιση απέκτησε αυξανόμενη σημασία, αναδεικνύοντας την εξέλιξη των κοινωνιών σε σχέση με τα οικονομικά και πολιτικά τους συστήματα και επιτρέποντας προβλέψεις για μελλοντικές ανάγκες ηγεσίας στην εκπαίδευση. Το ενδιαφέρον στράφηκε σε καινοτόμα οργανωτικά μοντέλα εκπαιδευτικών ιδρυμάτων, εμπλουτίζοντας τον διεθνή εκπαιδευτικό διάλογο. Η ανάγκη προσαρμογής στις ραγδαίες αλλαγές που επιφέρει η παγκοσμιοποίηση οδήγησε στην ανάδειξη νέων εννοιών όπως «οργάνωση μάθησης», «διαχείριση γνώσης»

και «συναισθηματική νοημοσύνη». Τα παραδοσιακά πρότυπα ηγεσίας καλούνται να ευθυγραμμιστούν με σύγχρονες στρατηγικές και παιδαγωγικούς στόχους. Νεότερα εννοιολογικά πλαίσια εστιάζουν στα χαρακτηριστικά και τις πρακτικές που απαιτούνται από τους σημερινούς σχολικούς ηγέτες στο ψηφιακό περιβάλλον, αναδεικνύοντας τη σύνδεση μεταξύ των δραστηριοτήτων, ικανοτήτων και αξιών του ηγέτη και των αναμενόμενων μεταβολών. Μέσα από τη μεθοδολογία της μελέτης περίπτωσης παρουσιάστηκε μία εφαρμογή σε δημοτικό σχολείο που συμμετέχει σε καινοτόμο δίκτυο ψηφιακής εκπαίδευσης και μία ακόμη σε σχολείο διοίκησης, όπου χρησιμοποιείται ηλεκτρονική μάθηση στο πλαίσιο μεταπτυχιακού προγράμματος για τη διαχείριση εκπαιδευτικών δικτύων (Andrin et al., 2023).

Οι ιδιότητες, τα χαρακτηριστικά και οι δεξιότητες που ορίζουν έναν αποτελεσματικό ηγέτη στον τομέα της ψηφιακής εκπαίδευσης μπορούν να ταξινομηθούν σε επιμέρους κατηγορίες, οι οποίες αναλύονται στη συνέχεια. Πρώτον, κεντρική σημασία αποδίδεται στην ικανότητα διαμόρφωσης ενός σαφούς και μακρόπνοου οράματος για το μέλλον της εξατομικευμένης και ψηφιακής μάθησης. Η ανάπτυξη ενός τέτοιου οράματος, που εκτείνεται από το επίπεδο της τάξης έως και το σύνολο του εκπαιδευτικού συστήματος, αποτελεί βασική προϋπόθεση για την αποτελεσματική άσκηση ηγεσίας στον ψηφιακό μετασχηματισμό (Sailer et al., 2021).

Δεύτερον, η κατανόηση της πολυπλοκότητας που διέπει τη σύγχρονη προσωπική και ψηφιακή μάθηση, καθώς και των μεταβολών που επηρεάζουν τόσο τα μικρο- όσο και τα μακρο-επίπεδα της εκπαιδευτικής λειτουργίας, ενισχύει την ικανότητα των ηγετών να εμπνέουν, να κινητοποιούν και να ενεργοποιούν όλα τα εμπλεκόμενα μέλη ενός οργανισμού. Η χάραξη αποτελεσματικής στρατηγικής και η ενίσχυση της συμμετοχής των ενδιαφερομένων —ιδίως των μαθητών, των οικογενειών και της τοπικής κοινότητας— συνιστούν θεμελιώδεις άξονες της ηγετικής πρακτικής (Pettersson, 2021).

Τρίτον, ιδιαίτερη έμφαση δίνεται στη βαθιά κατανόηση των στόχων —προσωπικών και θεσμικών— που συνδέονται με τον εκπαιδευτικό μετασχηματισμό. Η κατανόηση αυτή οφείλει να βασίζεται στην αναγνώριση υπαρκτών αναγκών, στην επίλυση εντοπισμένων προβλημάτων και στην αξιοποίηση των δυνατοτήτων τόσο των εκπαιδευτικών όσο και των μαθητών στο πλαίσιο του σχολείου. Στρατηγικές που ενισχύουν τη συνεργασία και προωθούν την ισότιμη πρόσβαση των μαθητών σε ευκαιρίες μάθησης αποτελούν κρίσιμα πεδία ηγετικής παρέμβασης (Sweet & Michaelsen, 2023).

Η εκπαιδευτική ηγεσία καλείται να ανταποκριθεί στις προκλήσεις που απορρέουν από τη διαρκώς αυξανόμενη σημασία της ψηφιακής επάρκειας στην εποχή των Τεχνολογιών Πληροφορίας και Επικοινωνίας. Οι εκπαιδευτικοί ηγέτες, μέσω του ρόλου τους, οφείλουν να ενισχύσουν την ανάπτυξη ψηφιακών δεξιοτήτων όχι μόνο στο διδακτικό προσωπικό, αλλά και στο διοικητικό και βοηθητικό προσωπικό, καθώς και στους μαθητές, προωθώντας τη συνεργασία, την καινοτομία και τη δημιουργία ενός υποστηρικτικού μαθησιακού περιβάλλοντος. Ο διευθυντής της σχολικής μονάδας διαδραματίζει καταλυτικό ρόλο στην καλλιέργεια του ψηφιακού γραμματισμού των εκπαιδευτικών, σχεδιάζοντας και υλοποιώντας ένα συνεκτικό όραμα βασισμένο στη διά βίου μάθηση. Η στρατηγική αυτή ενισχύει το σύνολο της σχολικής κοινότητας —μαθητές, γονείς και εκπαιδευτικούς— ώστε να αξιοποιούν δημιουργικά τις ψηφιακές τεχνολογίες, αναδεικνύοντας τις δεξιότητες και τις προσπάθειες κάθε μαθητή. Η εκπαιδευτική ηγεσία οφείλει να προσδιορίσει τις βασικές ικανότητες που πρέπει να ενταχθούν στις πολιτικές διά βίου μάθησης, αναγνωρίζοντας τις ψηφιακές δεξιότητες ως αναπόσπαστο μέρος του σύγχρονου εκπαιδευτικού σχεδιασμού (Cordova et al., 2024).

ΠΡΟΚΛΗΣΕΙΣ ΠΟΥ ΑΝΤΙΜΕΤΩΠΙΖΟΥΝ ΟΙ ΗΓΕΤΕΣ ΣΤΗΝ ΨΗΦΙΑΚΗ ΕΠΟΧΗ

Οι πρόσφατες εξελίξεις στην ευρυζωνική πρόσβαση και στα έξυπνα εργαλεία επικοινωνίας μετασχηματίζουν ριζικά την καθημερινότητα και την εκπαιδευτική διαδικασία. Οι εκπαιδευτικοί ηγέτες αναζητούν πρακτικές που ενισχύουν τη δημιουργική, συνεργατική και αυθεντική εμπλοκή των μαθητών, αξιοποιώντας το δυναμικό της τεχνολογίας. Όσοι διαμορφώνουν ένα σαφές ψηφιακό όραμα επιδιώκουν την ενσωμάτωση καινοτόμων τεχνολογιών για τη θεμελίωση ευέλικτων, διαφανών και λειτουργικών οργανωτικών δομών. Παράλληλα, όμως, έρχονται αντιμέτωποι με προκλήσεις που επηρεάζουν τις ηγετικές τους πρακτικές, καθώς και τις αντιλήψεις τους για τον ρόλο της εκπαίδευσης, τη χρήση της τεχνολογίας και τη θέση των εκπαιδευτικών. Η κριτική προσέγγιση αυτών των ζητημάτων είναι καθοριστική για την αξιοποίηση του μετασχηματιστικού δυναμικού της τεχνολογίας. Οι ηγέτες καλούνται να διαχειριστούν ζητήματα που σχετίζονται με την καλλιέργεια ψηφιακής νοοτροπίας, τις επιστημολογικές αντιλήψεις για την τεχνολογία, τις ψηφιακές ανισότητες, αλλά και τη διατήρηση ισορροπίας ανάμεσα στις μαθησιακές ανάγκες και στην ψυχαγωγική χρήση των ψηφιακών εργαλείων. Παράλληλα, οφείλουν να εστιάσουν στην οικοδόμηση ικανοτήτων εντός των ψηφιακών πλαισίων, διαμορφώνοντας τεχνολογικά ενισχυμένα μαθησιακά περιβάλλοντα που ανταποκρίνονται στις απαιτήσεις του διαρκώς μεταβαλλόμενου τεχνολογικού τοπίου (Andrin et al., 2024).

Η ενσωμάτωση της τεχνολογίας στη διδασκαλία ενισχύει τις γνώσεις, τις αξίες και τις δεξιότητες των μαθητών του 21ου αιώνα, μετατρέποντάς τους σε ενεργούς δημιουργούς γνώσης. Εκπαιδευτικό λογισμικό και ψηφιακές εφαρμογές διευκολύνουν την ανάπτυξη δεξιοτήτων ανώτερης τάξης, όπως η επίλυση προβλημάτων, η κριτική σκέψη και η δημιουργικότητα. Οι εκπαιδευτικοί αναλαμβάνουν ρόλο καθοδηγητή, ενισχύοντας την εξατομικευμένη μαθησιακή πορεία των μαθητών. Δεδομένης της εξοικείωσης των νέων με τις ψηφιακές συσκευές, η αξιοποίηση της τεχνολογίας στην εκπαίδευση εμφανίζει σημαντικά οφέλη, προωθώντας την υπευθυνότητα και παρέχοντας πρόσβαση σε πολλαπλούς πόρους — όπως podcast, προσομοιώσεις και μηχανές αναζήτησης — που διευκολύνουν την κατανόηση αφηρημένων εννοιών. Παρά τη δυναμική της εκπαιδευτικής τεχνολογίας, πολλοί θεωρούν ότι τα εκπαιδευτικά συστήματα υστερούν στην ουσιαστική ενσωμάτωσή της. Κρίσιμος παράγοντας επιτυχίας αποτελεί η ύπαρξη κατάλληλης τεχνολογικής υποδομής, ενώ οι εκπαιδευτικοί ηγέτες οφείλουν να ενισχύουν τη συνεχή επαγγελματική ανάπτυξη και να παρέχουν στοχευμένη υποστήριξη στο προσωπικό. Παράλληλα, απαιτούνται σαφείς πολιτικές και μηχανισμοί ασφαλούς πρόσβασης. Η συστηματική αξιολόγηση της ενσωμάτωσης της τεχνολογίας στη μαθησιακή διαδικασία είναι απαραίτητη, καθώς συμβάλλει στον εντοπισμό εμποδίων και στη διαμόρφωση στοχευμένων παρεμβάσεων για την αναβάθμιση της εκπαιδευτικής εμπειρίας (Cukurova et al., 2023).

Η αυξανόμενη χρήση εκπαιδευτικών τεχνολογιών έχει εγείρει σοβαρές ανησυχίες σχετικά με την προστασία του ψηφιακού απορρήτου και την ασφάλεια των δεδομένων, μεταξύ εκπαιδευτικών, παρόχων λογισμικού και κρατικών φορέων. Το ισχύον σύστημα ενδέχεται να εκθέσει προσωπικά δεδομένα μαθητών, να παραβιάσει δικαιώματα απορρήτου και να δημιουργήσει οικονομικές και νομικές υποχρεώσεις για τα εκπαιδευτικά ιδρύματα. Τρεις παράγοντες εντείνουν την ανάγκη για αυστηρότερο πλαίσιο προστασίας δεδομένων στο σχολικό περιβάλλον. Πρώτον, η διασφάλιση των ευαίσθητων πληροφοριών των μαθητών και η ισότιμη πρόσβαση στη μάθηση συνιστούν θεμελιώδεις αρχές του σύγχρονου εκπαιδευτικού παραδείγματος, που στοχεύει στη συμπερίληψη όλων των μαθητών, ιδιαίτερα των ευάλωτων ομάδων. Η ορθή διακυβέρνηση των δεδομένων και η συμμόρφωση με τις νομοθεσίες περί απορρήτου αποτελούν προϋπόθεση για την επίτευξη ψηφιακής δικαιοσύνης. Η επέκταση των συστημάτων ηλεκτρονικής διαχείρισης στα σχολεία έχει αυξήσει τη συλλογή, επεξεργασία και ανταλλαγή μεγάλου όγκου προσωπικών δεδομένων (Personally Identifiable Information – PII), τα οποία προστατεύονται από αυστηρό νομικό πλαίσιο. Δεύτερον, η δημοσίευση εκπαιδευτικών δραστηριοτήτων σε ιστολόγια και μέσα κοινωνικής δικτύωσης έχει εντείνει τους κινδύνους για τους εκπαιδευτικούς, συμπεριλαμβανομένων περιπτώσεων κλοπής ταυτότητας και επιθέσεων phishing, ιδίως όταν χρησιμοποιούνται λειτουργίες γεωεντοπισμού ή επισήμανσης εικόνων. Τρίτον, η μεταφορά δεδομένων μεταξύ σχολικών διοικητικών υπαλλήλων και μαθητών —συχνά στο πλαίσιο διακυβερνητικών οδηγιών— ενδέχεται να επιφέρει νομικές συνέπειες σε περιπτώσεις μη συμμόρφωσης. Η διαχείριση αυτών των δεδομένων πρέπει να εποπτεύεται από εξειδικευμένο υπεύθυνο προστασίας δεδομένων (Data Protection Officer), ώστε να διασφαλίζεται η νομιμότητα, η ασφάλεια και η υπεύθυνη αξιοποίησή τους (Quach et al., 2022).

ΚΑΙΝΟΤΟΜΙΕΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΗΓΕΣΙΑ

Η πρόοδος της τεχνολογίας έχει εισαγάγει καινοτόμα εργαλεία που ενισχύουν τις ηγετικές πρακτικές στον χώρο της εκπαίδευσης. Οι ηγέτες μπορούν πλέον να συλλέγουν, να οργανώνουν και να αναλύουν μεγάλα σύνολα δεδομένων, ενισχύοντας την τεκμηριωμένη λήψη αποφάσεων. Οι εκπαιδευτικοί ηγέτες αξιοποιούν δεδομένα και αναλύσεις συμπεριφοράς για την αναγνώριση προτύπων και την πρόβλεψη μαθησιακών αποτελεσμάτων, σχεδιάζοντας στοχευμένες παρεμβάσεις για διαφορετικές ομάδες μαθητών. Έτσι, συμβάλλουν ουσιαστικά στη βελτίωση των εκπαιδευτικών και επαγγελματικών διαδρομών. Μέσω στρατηγικού σχεδιασμού, τα εν λόγω εργαλεία υποστηρίζουν κρίσιμες αποφάσεις σχετικά με τη διαχείριση προσωπικού, την κατανομή πόρων και τον σχεδιασμό αναλυτικών προγραμμάτων. Παράλληλα, η διαρκής επαγγελματική ανάπτυξη αποτελεί βασικό στοιχείο ενός ποιοτικού εκπαιδευτικού συστήματος, με τις διαδικτυακές πλατφόρμες να προσφέρουν αξιόπιστους, ερευνητικά τεκμηριωμένους πόρους μάθησης (Wang, 2021).

Οι καινοτομίες που βασίζονται στα δεδομένα ενισχύουν ουσιαστικά την ηγεσία σε σχολικό και περιφερειακό επίπεδο. Ορισμένα εκπαιδευτικά συστήματα αναπτύσσουν ψηφιακές πλατφόρμες για την παρακολούθηση μικροδιαπιστευτηρίων, διευκολύνοντας τον σχεδιασμό κοινού οράματος, την ενίσχυση των ηγετικών δεξιοτήτων και την αξιοποίηση υπαρχόντων δυνατοτήτων. Σε συνδυασμό με εικονικές κοινότητες μάθησης, ενισχύουν τη συνεργασία με ειδικούς σε εθνικό επίπεδο. Εφόσον εφαρμοστούν ορθά, τα εργαλεία αυτά μπορούν να ξεπεράσουν παρωχημένα μοντέλα ηγεσίας, ενισχύοντας την εσωτερική επικοινωνία και καταργώντας γραφειοκρατικές δομές. Επιπλέον, προάγουν δυναμικά και ευέλικτα ηγετικά μοντέλα, ενδυναμώνοντας τους σχολικούς ηγέτες στον ρόλο του προσαρμοστικού διευθυντή και διευκολύνοντας τη διαχείριση πόρων και προτεραιοτήτων σε περιβάλλοντα βασισμένα σε έργα (Badawy & Alkaabi, 2023).

Η ραγδαία τεχνολογική πρόοδος προσφέρει σημαντικές ευκαιρίες για την αναβάθμιση των οργανωτικών δομών στην εκπαίδευση μέσω καινοτόμων προσεγγίσεων. Κρίσιμες τεχνολογίες όπως το cloud computing, τα big data και τα εικονικά περιβάλλοντα μάθησης διαμορφώνουν το τοπίο της εκπαιδευτικής ηγεσίας. Η παρούσα παρουσίαση εξετάζει

αυτές τις τεχνολογίες και προτείνει διδακτικές στρατηγικές που ανταποκρίνονται στις αναδυόμενες απαιτήσεις της ψηφιακής εποχής. Παρά τα οφέλη, η τεχνολογία δεν προσφέρει αυτόματα θετικό αντίκτυπο στην ηγεσία, εάν δεν ευθυγραμμίζεται με τις πραγματικές ανάγκες των σχολικών μονάδων, των ομοσπονδιών και των πολυακαδημαϊκών ομάδων (ΜΑΤ). Οι διευθυντές σχολείων συνεχίζουν να φέρουν την ευθύνη για τις ανθρώπινες σχέσεις και το φυσικό περιβάλλον, που παραμένουν θεμελιώδη. Παρουσιάζονται πέντε τρόποι με τους οποίους η τεχνολογία μπορεί να ενδυναμώσει την ηγεσία, μαζί με προτάσεις για μελλοντικές δράσεις. Οι εξελίξεις απαιτούν από τους οργανισμούς να προετοιμαστούν για ένα ψηφιακό μέλλον, ενσωματώνοντας τεχνολογίες που ενισχύουν τη μαθησιακή διαδικασία. Σε αντίθεση με τις επιχειρήσεις, τα σχολεία δεν προσανατολίζονται στη μείωση κόστους, αλλά στη βελτίωση των διοικητικών λειτουργιών και της λήψης αποφάσεων μέσω τεχνολογίας. Με την ευρεία υιοθέτηση των υπηρεσιών cloud, είναι απαραίτητη η επιλογή κατάλληλων λύσεων προσαρμοσμένων στις ανάγκες κάθε οργανισμού. Η στρατηγική χρήση τεχνολογίας σε θεσμικό επίπεδο απαιτεί επίγνωση της παρακολούθησης από μητρικούς φορείς και των πρακτικών διαχείρισης δεδομένων. Η ανάλυση εμπιστοσύνης, υποδομών και ροών δεδομένων από τα εμπλεκόμενα μέρη αποτελεί προϋπόθεση για την ανάπτυξη μιας αποτελεσματικής στρατηγικής, η οποία θα καθορίσει τη λειτουργία των σχολείων του μέλλοντος (Matthew et al., 2021; Tiwari & Fahrudin, 2024).

Στην ψηφιακή εποχή, πληθώρα συνεργατικών εργαλείων υποστηρίζει την ανάπτυξη της εκπαιδευτικής ηγεσίας. Διευθυντές και ηγέτες εκπαιδευτικών οργανώνουν συναντήσεις μάθησης, αναστοχασμού και επίλυσης προβλημάτων μέσω ψηφιακών εφαρμογών και πλατφορμών επικοινωνίας. Διαδικτυακά προγράμματα εκπαίδευσης και μαζικά ανοικτά διαδικτυακά μαθήματα (MOOC) προσφέρουν εξειδικευμένες θεματικές σε ηγεσία, διοίκηση και στρατηγική, επιτρέποντας την εξατομικευμένη εξέλιξη σύμφωνα με τις δεξιότητες και τις επαγγελματικές φιλοδοξίες των συμμετεχόντων. Επιπλέον, επαγγελματικοί οργανισμοί και συμβουλευτικές εταιρείες παρέχουν διαδικτυακά σεμινάρια, podcast, άρθρα και ερευνητικές αναφορές, ενισχύοντας τη διαρκή ενημέρωση σχετικά με τις εξελίξεις στην ηγεσία και τη διαχείριση αλλαγών (Laufer et al., 2021).

Παράλληλα, διαδικτυακά προγράμματα ανάπτυξης ηγεσίας, που απευθύνονται σε υφιστάμενους και αναδυόμενους ηγέτες, προσφέρουν ευέλικτη πρόσβαση μέσω καταγεγραμμένων διαλέξεων και πόρων. Παραδείγματα όπως η Leading Australia προωθούν τοπικά σεμινάρια για μέλη, ενθαρρύνοντας τη συμμετοχή σε δίκτυα ομοτίμων μέσω επαγγελματικών ενώσεων ή πλατφορμών καθοδήγησης. Η εύρεση μέντορα ή προπονητή, μέσω ειδικών ψηφιακών εργαλείων αντιστοίχισης, αποτελεί αποτελεσματική στρατηγική επαγγελματικής ανάπτυξης. Ωστόσο, η αποδοτική αξιοποίηση αυτών των ευκαιριών προϋποθέτει την ευθυγράμμισή τους με τους στόχους του ατομικού ή οργανωσιακού σχεδίου ανάπτυξης (Shah et al., 2021).

ΜΕΤΑΣΧΗΜΑΤΙΣΤΙΚΕΣ ΠΡΑΚΤΙΚΕΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΗΓΕΣΙΑ

Μια μετασχηματιστική πρακτική που μπορούν να υιοθετήσουν οι εκπαιδευτικοί ηγέτες για την ενίσχυση της εκπαιδευτικής διαδικασίας είναι η εξατομικευμένη μάθηση. Καθώς οι μαθητές διαφέρουν ως προς τα μαθησιακά τους προφίλ, τους ρυθμούς και τα ενδιαφέροντα, η προσέγγιση αυτή τούς προσφέρει αυξημένη αυτονομία, με παιδαγωγικές παρεμβάσεις προσαρμοσμένες στις ατομικές τους ανάγκες και φιλοδοξίες. Τεχνολογικά εργαλεία όπως προσαρμοστικό λογισμικό ή διαδικτυακές πλατφόρμες μάθησης διευκολύνουν αυτή τη διαφοροποίηση, ενισχύοντας την προσβασιμότητα και την ενεργή εμπλοκή των μαθητών (Bernacki et al., 2021).

Παράλληλα, η συλλογική λήψη αποφάσεων αποτελεί μια ακόμη μετασχηματιστική πρακτική, ενισχύοντας τη συμμετοχικότητα στη σχολική διοίκηση. Οι εκπαιδευτικοί ηγέτες ενθαρρύνουν τη συμμετοχή διαφόρων εμπλεκόμενων φορέων στη διαχείριση εκπαιδευτικών πόρων, προάγοντας την ανατροφοδότηση και τη συνευθύνη. Η καλλιέργεια μιας κουλτούρας εμπιστοσύνης και συνεργασίας απαιτεί χρόνο και συστηματικότητα. Μέσω τακτικών διαδικασιών, όπως η συνδιαμόρφωση οράματος, η κατανομή ρόλων και ο σχεδιασμός πολιτικών ασφάλειας, διαμορφώνονται ευέλικτα μοντέλα συμμετοχής. Ιδιαίτερα σημαντικά είναι τα «δίκτυα εμπιστοσύνης» —κοινότητες πρακτικής στις οποίες οι εκπαιδευτικοί ανταλλάσσουν εμπειρίες, πόρους και καινοτόμες ιδέες. Τέτοιες πρωτοβουλίες προωθούν τη συνεχή επαγγελματική εξέλιξη μέσω ενδοϋπηρεσιακής μάθησης, αυτόνομης επιμόρφωσης και αλληλοϋποστήριξης. Η αξιοποίηση ψηφιακών εργαλείων όπως «σελίδες συμβουλών» ενισχύει περαιτέρω την αυτοβελτίωση και την παρακολούθηση των προτεινόμενων βελτιώσεων (Barrane et al., 2021).

Η εξατομικευμένη μάθηση αποτελεί θεμελιώδη μετασχηματιστική πρακτική ηγεσίας, η οποία ενισχύεται σημαντικά από τις ψηφιακές τεχνολογίες. Οι σύγχρονες υπολογιστικές δυνατότητες επιτρέπουν την εφαρμογή διαφοροποιημένης διδασκαλίας, αν και απαιτούνται προσεκτικός σχεδιασμός και στρατηγική παιδαγωγική προσέγγιση. Η εξατομίκευση αφορά την προσαρμογή της διδασκαλίας, του αναλυτικού προγράμματος και των παρεχόμενων υποστηρικτικών μηχανισμών, ώστε να ανταποκρίνονται στις ετερογενείς ανάγκες των μαθητών. Με την ενεργή συμμετοχή των μαθητών στον σχεδιασμό της μαθησιακής τους εμπειρίας, παρατηρείται αύξηση του κινήτρου, της

επιμονής και της δέσμευσής τους. Ωστόσο, οι εκπαιδευτικοί ηγέτες καλούνται να αντιμετωπίσουν σημαντικές προκλήσεις, όπως οι διαφοροποιήσεις στο κοινωνικοπολιτισμικό υπόβαθρο, στις μαθησιακές ικανότητες και στους στόχους των μαθητών. Η προσαρμογή του αναλυτικού προγράμματος στο πλαίσιο μιας εκπαίδευσης χωρίς αποκλεισμούς αποτελεί πρόκληση, αλλά και αναγκαιότητα για τους ηγέτες που επιδιώκουν την εφαρμογή ουσιαστικής εξατομικευμένης μάθησης. Η προσέγγιση αυτή απαιτεί την υπέρβαση προκαταλήψεων και την κατοχύρωση ίσων ευκαιριών πρόσβασης, ανεξάρτητα από το επίπεδο προηγούμενης γνώσης ή εμπειρίας των μαθητών. Δεδομένου ότι η εξατομικευμένη μάθηση συνδέεται άρρηκτα με την προσαρμοσμένη διδασκαλία, οι εκπαιδευτικοί καλούνται να προσαρμόζουν συνεχώς τις διδακτικές τους πρακτικές, με βάση την ανατροφοδότηση, την αξιολόγηση και τις επιδόσεις των μαθητών. Η εφαρμογή πολιτικών που συνδέουν τις μαθησιακές δραστηριότητες και τα παραγόμενα μαθητικά προϊόντα με τους στόχους του προγράμματος σπουδών είναι καίριας σημασίας για την υποστήριξη αυτής της προσέγγισης (Habib et al., 2021).

Η εκπαιδευτική ηγεσία ενισχύει τη συμμετοχικότητα, επιτρέποντας στους ηγέτες των σχολικών μονάδων να μοιράζονται διαδικασίες και αρμοδιότητες λήψης αποφάσεων με τους εμπλεκόμενους φορείς, ενθαρρύνοντας τη συλλογική λήψη αποφάσεων ως θεμελιώδη αρχή στην εκπαιδευτική κοινότητα. Αυτή η πρακτική ενισχύει τη διαρκή ανταλλαγή πεποιθήσεων σχετικά με την επιτυχία των μαθητών, η οποία είναι κρίσιμη για τη διαμόρφωση στρατηγικών που βελτιώνουν τη διδακτική ποιότητα. Ως αποτέλεσμα, οι σχολικές κοινότητες μετασχηματίζονται σε κοινότητες μάθησης με στόχο τη συνεχή βελτίωση. Επιπλέον, το σχολικό προσωπικό, αλληλεπιδρώντας καθημερινά με μαθητές που επιδιώκουν αλλαγές, ενσαρκώνει τη δημοκρατική πεποίθηση ότι η συμμετοχή πολλαπλών φωνών συμβάλλει σε θετικές και αποτελεσματικές εξελίξεις μέσω μιας χωρίς αποκλεισμούς ηγετικής προσέγγισης. Η έννοια της «συνεργασίας» προέρχεται από τα λατινικά και δηλώνει τη συλλογική εργασία σε κοινό πλαίσιο. Στο επιχειρηματικό περιβάλλον υποδηλώνει συνεργατική δράση, αντανακλώντας τη σοφία και τον σκοπό που ενυπάρχουν στις διαπροσωπικές σχέσεις. Παρότι οι οργανισμοί αναγνωρίζουν τη σημασία της συνεργασίας, η ερμηνεία και η εφαρμογή της συχνά διαφέρουν. Για την πληρέστερη κατανόηση της συνεργασίας στην εκπαίδευση, προτείνεται η θεώρησή της ως ηθικής πρακτικής που ενσωματώνει ενεργά τους πολίτες ή ωφελούμενους ως εταίρους στη λήψη αποφάσεων. Η προσέγγιση αυτή βασίζεται σε ηθικές αρχές και σε συμμετοχικές μεθοδολογίες που αποσκοπούν στην επίτευξη αμοιβαία επωφελών λύσεων για όλους τους εμπλεκόμενους, πέραν των ορίων του ίδιου του οργανισμού (Dumlao, 2023; Stout & Keast, 2021).

ΣΥΜΠΕΡΑΣΜΑ

Η ραγδαία πρόοδος της ψηφιοποίησης και η αυξανόμενη πολυπλοκότητα των ψηφιακών εργαλείων απαιτούν από τους εκπαιδευτικούς ηγέτες – από τη σχολική εκπαίδευση έως την τριτοβάθμια – να αναπροσαρμόσουν τις ηγετικές τους προσεγγίσεις ώστε να ανταποκρίνονται στις απαιτήσεις του νέου ψηφιακού περιβάλλοντος. Τα πανεπιστήμια αποτελούν χαρακτηριστικά παραδείγματα αυτής της μετάβασης, προωθώντας περιβάλλοντα όπου η καινοτομία και η ψηφιοποίηση ενσωματώνονται τόσο στις θεσμικές δομές όσο και στις μαθησιακές εμπειρίες των φοιτητών. Παράλληλα, καθίσταται σαφές ότι η αποτελεσματική ηγεσία είναι καθοριστικής σημασίας σε όλα τα επίπεδα του εκπαιδευτικού συστήματος, ιδίως στη σημερινή περίοδο παγκόσμιας μετάβασης που διαμορφώνεται από τις τεχνολογικές εξελίξεις. Η ανάγκη για αναπροσαρμογή των ηγετικών προσεγγίσεων υπερβαίνει πολιτισμικά και εθνικά πλαίσια, αποκτώντας παγκόσμια διάσταση.

Η καινοτόμος ηγεσία δεν αποτελεί απλώς απαίτηση των καιρών, αλλά αναγκαιότητα για την εδραίωση μιας συνεκτικής προσωπικής και επαγγελματικής ταυτότητας των ηγετών στο δυναμικό και συνεχώς μεταβαλλόμενο διεθνές πλαίσιο. Η ηγεσία στην ψηφιακή εποχή προϋποθέτει ισορροπία μεταξύ αυτοκαθοδήγησης και υποστήριξης της συλλογικής μετάβασης σε τεχνολογικά προηγμένες πρακτικές, που προάγουν τη φυσική εξέλιξη, τον μετασχηματισμό και την παιδαγωγική καινοτομία. Η κοινωνική και οργανωσιακή μετάβαση καθιστά αναγκαία την ικανότητα των ηγετών να ανταποκρίνονται ευέλικτα και αποτελεσματικά στις αυξημένες απαιτήσεις για γνώση, μάθηση και εκπαιδευτικά αποτελέσματα.

Μέσα σε αυτό το πλαίσιο, μια από τις θεμελιώδεις ευθύνες των εκπαιδευτικών ηγετών είναι η διαμόρφωση νέων εννοιολογικών πλαισίων και λεξιλογίου που αποτυπώνουν πώς μπορεί να ασκηθεί αποτελεσματική ηγεσία στη σύγχρονη, σύνθετη και διαρκώς μεταβαλλόμενη ψηφιακή εποχή. Μέσω της υιοθέτησης προσαρμοστικών προτύπων ηγεσίας, της αξιοποίησης δεδομένων για τη λήψη αποφάσεων και της ενίσχυσης της διαρκούς επαγγελματικής ανάπτυξης, οι εκπαιδευτικοί ηγέτες μπορούν να επιφέρουν ουσιαστικές αλλαγές, διασφαλίζοντας ότι ο ψηφιακός μετασχηματισμός ενδυναμώνει τις μαθησιακές εμπειρίες και ενισχύει τη θεσμική αποτελεσματικότητα.

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ΨΗΦΙΑΚΑ ΜΕΣΑ ΚΑΙ ΔΙΟΙΚΗΣΗ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΜΟΝΑΔΩΝ

Χαλβαντζής Βασίλειος, ΠΕ79.01
Διευθυντής Μουσικού Σχολείου Πρέβεζας
Πρέβεζα, Ελλάδα
email: billchalv@gmail.com

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση των ψηφιακών μέσων στη διαχείριση εκπαιδευτικών μονάδων έχει αλλάξει σημαντικά τον τρόπο λειτουργίας των σχολείων και των ακαδημαϊκών ιδρυμάτων. Με την ταχεία πρόοδο της τεχνολογίας, τα ψηφιακά εργαλεία έχουν γίνει απαραίτητα για τους διευθυντές σχολείων, τους δασκάλους και το διοικητικό προσωπικό, ενισχύοντας την επικοινωνία, τη λήψη αποφάσεων και τη συνολική αποτελεσματικότητα. Αυτή η εισήγηση διερευνά τον ρόλο των ψηφιακών μέσων στη διαχείριση εκπαιδευτικών μονάδων, επισημαίνοντας τα οφέλη, τις προκλήσεις και τις βέλτιστες πρακτικές για αποτελεσματική εφαρμογή.

Τα ψηφιακά μέσα περιλαμβάνουν ένα ευρύ φάσμα τεχνολογικών εργαλείων, όπως οι πλατφόρμες κοινωνικών μέσων, τα συστήματα διαχείρισης μάθησης (LMS), τα εργαλεία συνεργασίας που βασίζονται σε σύννεφο και το λογισμικό ανάλυσης δεδομένων. Πλατφόρμες όπως το Google Workspace for Education και το Microsoft 365 Education επιτρέπουν τη συνεργασία σε πραγματικό χρόνο, τη διαχείριση εγγράφων και την οργάνωση εργασιών, προσφέροντας μια ολοκληρωμένη λύση για τη διοίκηση των σχολικών μονάδων.

Ένα από τα βασικά πλεονεκτήματα των ψηφιακών μέσων στη διαχείριση του σχολείου είναι η ικανότητά τους να διευκολύνουν την άμεση και διαφανή επικοινωνία. Εφαρμογές όπως το Zoom, Microsoft Teams και Google Meet υποστηρίζουν διαδικτυακές συναντήσεις, διασφαλίζοντας την απρόσκοπτη αλληλεπίδραση μεταξύ σχολικού προσωπικού, μαθητών και γονέων. Επιπλέον, πλατφόρμες κοινωνικής δικτύωσης, όπως το Facebook, Twitter και LinkedIn, βοηθούν τα εκπαιδευτικά ιδρύματα να επικοινωνούν με τις κοινότητές τους, να μοιράζονται ενημερώσεις και να προωθούν τις δραστηριότητές τους.

Τα συστήματα διαχείρισης μάθησης (LMS), όπως το Moodle, Google Classroom και Blackboard, έχουν φέρει επανάσταση στη διαχείριση της εκπαίδευσης απλοποιώντας τη διαχείριση μαθημάτων, την παρακολούθηση και την κοινή χρήση πόρων. Οι εκπαιδευτικοί μπορούν να οργανώνουν σχέδια μαθημάτων, να διανέμουν εργασίες και να παρακολουθούν την πρόοδο των μαθητών μέσω αυτών των εργαλείων, καθιστώντας τη διαδικασία πιο διαφανή και αποδοτική.

Η ανάλυση δεδομένων παίζει καθοριστικό ρόλο στη σύγχρονη εκπαιδευτική διαχείριση. Εργαλεία όπως το Google Forms, Microsoft Forms και Power BI επιτρέπουν στους διαχειριστές να συλλέγουν και να αναλύουν δεδομένα που σχετίζονται με την απόδοση των μαθητών, τη συμμετοχή, την αποτελεσματικότητα των εκπαιδευτικών και την κατανομή των πόρων. Χρησιμοποιώντας προγνωστικά αναλυτικά στοιχεία, οι διευθυντές σχολείων μπορούν να εντοπίσουν τάσεις, να αντιμετωπίσουν προληπτικά προκλήσεις και να βελτιώσουν τα ακαδημαϊκά αποτελέσματα.

Επιπλέον, τα ψηφιακά μέσα υποστηρίζουν τη συμμετοχική διακυβέρνηση ενθαρρύνοντας τη συνεργασία μεταξύ εκπαιδευτικών, μαθητών και ενδιαφερόμενων μερών. Εργαλεία όπως το Slack, Trello και Asana προσφέρουν πλατφόρμες για αποτελεσματική διαχείριση έργων, συντονισμό εργασιών και βελτίωση της ομαδικής εργασίας.

Παρά τα πολυάριθμα πλεονεκτήματά τους, η υιοθέτηση των ψηφιακών μέσων στη διαχείριση εκπαιδευτικών μονάδων παρουσιάζει αρκετές προκλήσεις. Η ασφάλεια των δεδομένων και το απόρρητο αποτελούν σημαντικές ανησυχίες, γι' αυτό απαιτούνται λύσεις όπως τα GDPR Compliance Tools (OneTrust, TrustArc) για τη διαχείριση προσωπικών δεδομένων. Επιπλέον, το ψηφιακό χάσμα αποτελεί πρόβλημα, καθώς δεν έχουν όλα τα εκπαιδευτικά ιδρύματα ίση πρόσβαση σε τεχνολογικούς πόρους. Η αντίσταση στην αλλαγή μεταξύ των εκπαιδευτικών και των διαχειριστών μπορεί επίσης να εμποδίσει την επιτυχή εφαρμογή των ψηφιακών εργαλείων.

Η παροχή επαρκούς κατάρτισης και προγραμμάτων επαγγελματικής ανάπτυξης είναι ζωτικής σημασίας για να ξεπεραστούν αυτά τα εμπόδια. Επενδύοντας σε προγράμματα επιμόρφωσης και τεχνολογικές λύσεις, οι εκπαιδευτικές μονάδες μπορούν να αξιοποιήσουν πλήρως τα ψηφιακά μέσα, διασφαλίζοντας την αποτελεσματική και βιώσιμη ενσωμάτωσή τους στη σχολική διοίκηση.

Συμπερασματικά, τα ψηφιακά μέσα έχουν φέρει επανάσταση στη διαχείριση εκπαιδευτικών μονάδων βελτιώνοντας την επικοινωνία, ενισχύοντας τη λήψη αποφάσεων και εξορθολογίζοντας τα διοικητικά καθήκοντα. Ενώ εξακολουθούν να υπάρχουν προκλήσεις όπως η ασφάλεια των δεδομένων, το ψηφιακό χάσμα και η αντίσταση στην αλλαγή, η υιοθέτηση στρατηγικών πολιτικών και η επένδυση στην επαγγελματική ανάπτυξη μπορούν να εξασφαλίσουν την επιτυχή ενσωμάτωση των ψηφιακών εργαλείων στην εκπαίδευση. Καθώς η τεχνολογία συνεχίζει να εξελίσσεται, τα εκπαιδευτικά ιδρύματα πρέπει να αγκαλιάσουν τον ψηφιακό μετασχηματισμό για να δημιουργήσουν πιο αποτελεσματικά, περιεκτικά και προσαρμοστικά περιβάλλοντα μάθησης.

Λέξεις – κλειδιά: Ψηφιακά μέσα, διοίκηση εκπαιδευτικών μονάδων.

ΕΙΣΑΓΩΓΗ

Η ραγδαία πρόοδος της τεχνολογίας και η ευρεία διάδοση των ψηφιακών μέσων έχουν επιφέρει σημαντικές αλλαγές στον τρόπο με τον οποίο οργανώνονται και διοικούνται οι εκπαιδευτικές μονάδες παγκοσμίως. Η μεταμόρφωση αυτή δεν αφορά μόνο τη διδασκαλία και τη μάθηση, αλλά και τις διοικητικές λειτουργίες που υποστηρίζουν το εκπαιδευτικό έργο, όπως η επικοινωνία μεταξύ των μελών της σχολικής κοινότητας, η διαχείριση ανθρώπινου δυναμικού, η λήψη αποφάσεων, καθώς και η αξιολόγηση και ανάλυση δεδομένων. Οι σύγχρονες τεχνολογικές λύσεις, που περιλαμβάνουν πλατφόρμες διαχείρισης μάθησης, εργαλεία συνεργασίας και προγράμματα επεξεργασίας και ανάλυσης δεδομένων, συμβάλλουν καθοριστικά στη βελτίωση της αποτελεσματικότητας, της διαφάνειας και της ευελιξίας στη διοίκηση των σχολικών μονάδων (Selwyn, 2016).

Το ενδιαφέρον για τον ρόλο των ψηφιακών μέσων στην εκπαιδευτική διοίκηση έχει ενισχυθεί ιδιαίτερα μετά την πανδημία COVID-19, η οποία κατέδειξε την ανάγκη για άμεση και αποτελεσματική προσαρμογή των εκπαιδευτικών συστημάτων στις νέες απαιτήσεις της εξ αποστάσεως εκπαίδευσης και της ψηφιακής διακυβέρνησης (Reimers & Schleicher, 2020). Η εμπειρία αυτή οδήγησε πολλούς εκπαιδευτικούς οργανισμούς στην αναθεώρηση των πρακτικών τους, αναγνωρίζοντας πλέον την τεχνολογία ως εργαλείο στρατηγικής σημασίας και όχι ως απλό υποστηρικτικό μέσο.

Η ενσωμάτωση των ψηφιακών μέσων δεν είναι, ωστόσο, μια διαδικασία απλή ή μονοδιάστατη. Συνοδεύεται από προκλήσεις, όπως η ανάγκη για επαρκή επιμόρφωση του προσωπικού, η ύπαρξη ψηφιακού χάσματος μεταξύ σχολείων, η προστασία των προσωπικών δεδομένων και η ενδεχόμενη αντίσταση στην αλλαγή. Παράλληλα, γεννώνται ζητήματα ηγεσίας, στρατηγικού σχεδιασμού και διαχείρισης αλλαγής, που απαιτούν τη διαμόρφωση μιας συνεκτικής ψηφιακής πολιτικής εκ μέρους της διοίκησης (Leithwood et al., 2020).

Στόχος του παρόντος άρθρου είναι η διερεύνηση του ρόλου των ψηφιακών μέσων στη διοίκηση των εκπαιδευτικών μονάδων, με έμφαση στα εργαλεία που χρησιμοποιούνται, στα οφέλη που απορρέουν από τη χρήση τους, στις προκλήσεις που αντιμετωπίζουν οι διευθυντές και το προσωπικό, καθώς και στις βέλτιστες πρακτικές που ενδείκνυνται για μια αποτελεσματική και βιώσιμη ενσωμάτωσή τους. Η ανάλυση βασίζεται σε σύγχρονη βιβλιογραφία και επιδιώκει να προσφέρει μια εμπεριστατωμένη και πρακτικά χρήσιμη προσέγγιση για ερευνητές, εκπαιδευτικούς ηγέτες και φορείς εκπαιδευτικής πολιτικής.

Ο ΡΟΛΟΣ ΤΩΝ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ ΣΤΗΝ ΕΚΠΑΙΔΕΥΤΙΚΗ ΔΙΟΙΚΗΣΗ

Η διοίκηση μιας σύγχρονης εκπαιδευτικής μονάδας προϋποθέτει τη συντονισμένη και συστηματική διαχείριση πολλαπλών παραμέτρων, όπως η οργάνωση του ανθρώπινου δυναμικού, η αξιολόγηση του εκπαιδευτικού έργου, η αποτελεσματική επικοινωνία με τους γονείς και η σύνδεση με την ευρύτερη κοινότητα. Στο πλαίσιο αυτό, τα ψηφιακά μέσα αποτελούν κρίσιμα εργαλεία για τον εκπαιδευτικό ηγέτη, διευκολύνοντας όχι μόνο την καθημερινή λειτουργία του σχολείου, αλλά και τη χάραξη στρατηγικής με βάση δεδομένα και τεκμήρια (Mandinach & Gummer, 2016).

Ένα από τα βασικότερα πλεονεκτήματα της ενσωμάτωσης ψηφιακών εργαλείων είναι η βελτίωση της επικοινωνίας εντός και εκτός της σχολικής μονάδας. Η χρήση εφαρμογών όπως το Microsoft Teams, το Zoom και το Google Meet έχει καταστήσει εφικτή τη διεξαγωγή συναντήσεων σε πραγματικό χρόνο, ανεξαρτήτως φυσικής παρουσίας. Οι διευθυντές μπορούν να οργανώνουν τακτικές ενημερώσεις του προσωπικού, να συντονίζουν επιτροπές, αλλά και να διατηρούν στενή επαφή με τους γονείς (Trust & Whalen, 2020). Επιπλέον, τα μέσα κοινωνικής δικτύωσης, όπως το Facebook, το Twitter και το Instagram, χρησιμοποιούνται συχνά για την εξωστρέφεια των σχολικών μονάδων. Μέσα από αυτές τις πλατφόρμες, προβάλλονται δράσεις, δημοσιεύονται ανακοινώσεις και καλλιεργείται ένα θετικό δημόσιο προφίλ του σχολείου, που ενισχύει την εμπιστοσύνη της κοινότητας (Greenhow & Lewin, 2016).

Τα Συστήματα Διαχείρισης Μάθησης (Learning Management Systems – LMS), όπως τα Moodle, Google Classroom και Blackboard, προσφέρουν ένα ψηφιακό περιβάλλον στο οποίο οργανώνεται και παρακολουθείται ολόκληρη η εκπαιδευτική διαδικασία. Μέσω αυτών, οι εκπαιδευτικοί μπορούν να αναρτούν εκπαιδευτικό υλικό, να ορίζουν εργασίες, να λαμβάνουν ανατροφοδότηση από τους μαθητές και να παρακολουθούν την πρόοδό τους. Για τη διοίκηση, τα LMS λειτουργούν ως πλατφόρμες παρακολούθησης της λειτουργικότητας των τμημάτων, της συνέπειας των διδασκόντων και των επιπέδων εμπλοκής των μαθητών. Η διαχείριση μαθημάτων σε συνδυασμό με αναλυτικές αναφορές παρέχει τη δυνατότητα στους διευθυντές να στηρίξουν αποφάσεις για την πορεία της σχολικής μονάδας και να εφαρμόσουν στοχευμένες παρεμβάσεις (Al-Fraihat et al., 2020). Η διοίκηση σχολικών μονάδων συνεπάγεται συνεργασία μεταξύ πολλών ομάδων: διευθυντών, εκπαιδευτικών, συμβούλων, μαθητών και γονέων. Η χρήση εργαλείων διαχείρισης έργων, όπως το Trello, το Asana και το Slack, επιτρέπει την αποτελεσματική κατανομή αρμοδιοτήτων, τον χρονοπρογραμματισμό εργασιών και την άμεση ανατροφοδότηση μεταξύ των μελών της ομάδας.

Παράλληλα, η δημιουργία κοινών εγγράφων μέσω του Google Workspace for Education ή του Microsoft 365 Education ενισχύει τη συνεργασία σε πραγματικό χρόνο. Οι εκπαιδευτικοί μπορούν να δουλεύουν από κοινού πάνω σε σχέδια μαθήματος, η διοίκηση μπορεί να αναπτύσσει σχέδια δράσης, ενώ όλα τα εμπλεκόμενα μέρη έχουν πρόσβαση σε κοινά αρχεία, ενισχύοντας τη διαφάνεια και την αλληλεπίδραση (Manca, 2020). Ένα από τα πιο καινοτόμα χαρακτηριστικά της ψηφιακής διοίκησης είναι η χρήση εργαλείων ανάλυσης δεδομένων για τη λήψη στρατηγικών αποφάσεων. Εφαρμογές όπως τα Google Forms, Microsoft Forms, Power BI και Tableau επιτρέπουν στους διευθυντές να συλλέγουν ποσοτικά και ποιοτικά δεδομένα από μαθητές, εκπαιδευτικούς και γονείς. Τα δεδομένα αυτά, όταν οργανώνονται και αναλύονται σωστά, συμβάλλουν στον εντοπισμό προβλημάτων (π.χ. πτώση επίδοσης, μειωμένη συμμετοχή, αυξημένα περιστατικά απουσιών) και στη διαμόρφωση πολιτικών βελτίωσης. Ειδικότερα, τα εργαλεία αυτά υποστηρίζουν τη χρήση προγνωστικών αναλύσεων (predictive analytics), μέσω των οποίων μπορούν να προβλεφθούν μελλοντικές τάσεις και να διαμορφωθούν προληπτικά μέτρα (Williamson & Hogan, 2020).

Τα ψηφιακά μέσα υποστηρίζουν επίσης τη μετάβαση από την παραδοσιακή ιεραρχική διοίκηση στη συμμετοχική και διαμοιρασμένη ηγεσία, όπου τα μέλη της σχολικής κοινότητας έχουν ενεργό ρόλο στις αποφάσεις. Μέσω κοινών ψηφιακών πλατφορμών, επιτροπών, συνεργατικών εγγράφων και ανοιχτών φόρουμ, οι εκπαιδευτικοί συμμετέχουν πιο ενεργά στον σχεδιασμό και την εφαρμογή πολιτικών.

Αυτό το μοντέλο ηγεσίας δεν μόνο αυξάνει τη δέσμευση των εκπαιδευτικών και τη συναίσθηση ευθύνης, αλλά ενισχύει και τη συνοχή της σχολικής κοινότητας, στοιχείο ζωτικής σημασίας για την επιτυχή εφαρμογή ψηφιακών μεταρρυθμίσεων (Leithwood et al., 2020).

Η ΑΝΑΛΥΣΗ ΔΕΔΟΜΕΝΩΝ ΩΣ ΜΗΧΑΝΙΣΜΟΣ ΛΗΨΗΣ ΑΠΟΦΑΣΕΩΝ

Στο πλαίσιο της σύγχρονης εκπαιδευτικής διοίκησης, η ανάγκη για τεκμηριωμένη λήψη αποφάσεων αποτελεί βασική προϋπόθεση για την αποτελεσματική λειτουργία των σχολικών μονάδων. Η αξιοποίηση των ψηφιακών τεχνολογιών για τη συλλογή, επεξεργασία και ανάλυση δεδομένων προσφέρει στους εκπαιδευτικούς ηγέτες τη δυνατότητα να λαμβάνουν αποφάσεις που βασίζονται σε αποδείξεις (evidence-based decision making) και όχι σε προσωπικές εκτιμήσεις ή διοικητικά στερεότυπα (Mandinach & Gummer, 2016).

Η έννοια της ηγεσίας με βάση τα δεδομένα (data-informed leadership) περιγράφει μια προσέγγιση διοίκησης όπου οι εκπαιδευτικοί ηγέτες αντλούν πληροφορίες από πολλαπλές πηγές — όπως επιδόσεις μαθητών, ποιοτικά δεδομένα από συνεντεύξεις, ερωτηματολόγια, αναφορές αξιολόγησης και αναλύσεις συμμετοχής — προκειμένου να χαράξουν στρατηγικές και να καθορίσουν προτεραιότητες (Datnow & Park, 2019). Ο ρόλος του διευθυντή, σε αυτή την προσέγγιση, μετασχηματίζεται από διαχειριστικός σε στρατηγικός, καθώς βασίζεται στη συνεχή ερμηνεία και αξιολόγηση δεδομένων.

Οι πιο συνηθισμένες μορφές δεδομένων που χρησιμοποιούνται στη σχολική διοίκηση περιλαμβάνουν:

- Ακαδημαϊκά δεδομένα: βαθμολογίες, αποτελέσματα εξετάσεων, επιδόσεις κατά την αξιολόγηση.
- Δεδομένα συμμετοχής: αριθμός απουσιών, καθυστερήσεις, δείκτες εμπλοκής μαθητών.
- Δεδομένα συμπεριφοράς: περιστατικά πειθαρχίας, κοινωνική αλληλεπίδραση.
- Δεδομένα εκπαιδευτικών: αυτοαξιολογήσεις, ανατροφοδότηση, επιμορφώσεις.

Για τη συλλογή αυτών των δεδομένων, χρησιμοποιούνται ψηφιακά εργαλεία όπως τα Google Forms, Microsoft Forms, SurveyMonkey και Qualtrics. Αυτά τα εργαλεία επιτρέπουν τη δημιουργία προσαρμοσμένων ερωτηματολογίων, την αυτόματη καταγραφή των απαντήσεων και την εξαγωγή στατιστικών. Η απλή συλλογή δεδομένων δεν επαρκεί. Απαραίτητο είναι να ακολουθείται από ανάλυση και ερμηνεία, μέσω λογισμικών όπως το Power BI, το Google Data Studio, το Excel, ή πιο σύνθετα στατιστικά πακέτα (π.χ., SPSS, Tableau). Η οπτικοποίηση των αποτελεσμάτων βοηθά τη διοίκηση και τους εκπαιδευτικούς να κατανοούν ευκολότερα τις τάσεις και να εντοπίζουν ευκαιρίες παρέμβασης (Williamson & Hogan, 2020). Για παράδειγμα, η ανάλυση δεδομένων παρουσιών μπορεί να αποκαλύψει πρότυπα αποχής συγκεκριμένων ομάδων μαθητών, οδηγώντας σε στοχευμένες παρεμβάσεις. Αντίστοιχα, η αξιολόγηση των επιδόσεων μπορεί να συνδυαστεί με κοινωνικοσυναισθηματικά δεδομένα, προσφέροντας μια ολιστική εικόνα του μαθητικού πληθυσμού. Η τεχνολογία προσφέρει πλέον τη δυνατότητα προγνωστικής ανάλυσης (predictive analytics), μέσω της οποίας μπορούν να εντοπιστούν ενδείξεις για μελλοντικά προβλήματα, όπως πτώση επίδοσης ή πρόωρη εγκατάλειψη του σχολείου. Τα προγνωστικά μοντέλα βασίζονται σε ιστορικά δεδομένα και αλγόριθμους μηχανικής μάθησης, δίνοντας στους διευθυντές τη δυνατότητα να σχεδιάσουν προληπτικές στρατηγικές (Luckin, 2017).

Αυτό το είδος λήψης αποφάσεων είναι ιδιαίτερα χρήσιμο για τον σχεδιασμό προγραμμάτων υποστήριξης μαθητών, την κατανομή πόρων και την επιλογή επιμορφωτικών δράσεων για τους εκπαιδευτικούς.

Η ικανότητα ερμηνείας και αξιοποίησης δεδομένων (data literacy) δεν είναι αυτονόητη. Αρκετοί διευθυντές ενδέχεται να διαθέτουν περιορισμένη εξοικείωση με τη χρήση εργαλείων ανάλυσης ή να αντιμετωπίζουν δυσκολία στην κατανόηση στατιστικών εννοιών (Mandinach & Gummer, 2016). Για τον λόγο αυτό, είναι κρίσιμο τα προγράμματα επιμόρφωσης των εκπαιδευτικών ηγετών να περιλαμβάνουν βασικές δεξιότητες ανάλυσης δεδομένων, σε συνδυασμό με την ικανότητα λήψης αποφάσεων που βασίζονται σε τεκμηριωμένες πληροφορίες.

Αν και η αξιοποίηση των δεδομένων προσφέρει σημαντικά πλεονεκτήματα, εγείρει και ηθικά ζητήματα. Η υπερβολική εξάρτηση από αριθμούς μπορεί να οδηγήσει σε απλοϊκές ερμηνείες, αγνοώντας τις ποιοτικές και ανθρώπινες διαστάσεις της εκπαίδευσης. Επιπλέον, είναι κρίσιμο να προστατεύονται τα προσωπικά δεδομένα μαθητών και εκπαιδευτικών, σύμφωνα με τις απαιτήσεις του Γενικού Κανονισμού Προστασίας Δεδομένων (GDPR) (European Union, 2016).

Η εκπαιδευτική διοίκηση οφείλει να προσεγγίζει την ανάλυση δεδομένων με κριτική παιδαγωγική ματιά, ως εργαλείο υποστήριξης και ενδυνάμωσης, όχι ως μηχανισμό ελέγχου και τιμωρίας.

ΟΦΕΛΗ ΑΠΟ ΤΗΝ ΕΝΣΩΜΑΤΩΣΗ ΤΩΝ ΨΗΦΙΑΚΩΝ ΜΕΣΩΝ

Η αξιοποίηση των ψηφιακών μέσων στη διοίκηση των εκπαιδευτικών μονάδων έχει αναδείξει πολυάριθμα οφέλη σε επίπεδο λειτουργίας, επικοινωνίας, λήψης αποφάσεων και μαθησιακών αποτελεσμάτων. Η τεχνολογία, όταν ενσωματώνεται στρατηγικά, ενισχύει όχι μόνο την αποδοτικότητα των διοικητικών διαδικασιών, αλλά και την κουλτούρα της συνεργασίας και της καινοτομίας εντός της σχολικής κοινότητας (Selwyn, 2016). Παρακάτω παρουσιάζονται οι σημαντικότεροι τομείς στους οποίους η χρήση των ψηφιακών εργαλείων επιφέρει θετικές αλλαγές.

Η αυτοματοποίηση διαδικασιών όπως η καταγραφή απουσιών, η τήρηση αρχείων, η επικοινωνία με γονείς και η σύνταξη αναφορών οδηγεί σε σημαντική εξοικονόμηση χρόνου και ανθρώπινων πόρων. Οι διευθυντές μπορούν να οργανώνουν ημερολόγια, να αναθέτουν αρμοδιότητες και να παρακολουθούν έργα μέσω ψηφιακών πλατφορμών (π.χ. Google Workspace, Microsoft 365), μειώνοντας τον φόρτο ρουτίνας και επιτρέποντας τη συγκέντρωση σε στρατηγικά ζητήματα (Means et al., 2014).

Η ψηφιακή διαχείριση εγγράφων συμβάλλει επίσης στην οικολογική συνείδηση και στην ασφάλεια των δεδομένων, καθώς οι έντυπες φόρμες αντικαθίστανται από ηλεκτρονικά αρχεία που είναι ευκολότερο να διατηρηθούν, να ταξινομηθούν και να ανακτηθούν.

Τα ψηφιακά μέσα καθιστούν την επικοινωνία μεταξύ των εμπλεκόμενων μερών ταχύτερη, αμεσότερη και πιο δομημένη. Οι διευθυντές μπορούν να ενημερώνουν μαζικά εκπαιδευτικούς, μαθητές και γονείς, να διοργανώνουν τηλεδιασκέψεις και να δημιουργούν ψηφιακά newsletters. Η αυξημένη διαφάνεια που προκύπτει από την ανοικτή πρόσβαση σε πληροφορίες ενισχύει το κλίμα εμπιστοσύνης και τη συμμετοχική κουλτούρα (Greenhow & Lewin, 2016).

Επιπλέον, τα μέσα κοινωνικής δικτύωσης διευκολύνουν την εξωστρέφεια της σχολικής μονάδας, ενισχύοντας τη σύνδεσή της με την τοπική κοινότητα και προβάλλοντας τις καινοτόμες δράσεις της. Η επικοινωνία παύει να είναι γραφειοκρατική και αποκτά πιο συμμετοχικό και διαδραστικό χαρακτήρα. Η δυνατότητα συνεργασίας σε πραγματικό χρόνο μέσω ψηφιακών εργαλείων (όπως Google Docs, Trello, Asana) καλλιεργεί μια πιο ομαδική και δημοκρατική προσέγγιση στη λήψη αποφάσεων και στον σχεδιασμό εκπαιδευτικών δράσεων. Οι εκπαιδευτικοί μπορούν να συν-δημιουργούν υλικό, να συντονίζουν προγράμματα και να ανταλλάσσουν ιδέες άμεσα, ανεξαρτήτως φυσικής παρουσίας (Manca, 2020). Η ενδυνάμωση της συνεργασίας εντός της σχολικής μονάδας έχει θετικό αντίκτυπο και στους μαθητές, καθώς δημιουργείται ένα συνεκτικό και συνεπές μαθησιακό περιβάλλον, όπου όλοι οι εκπαιδευτικοί λειτουργούν με κοινή στοχοθεσία.

Τα ψηφιακά εργαλεία επιτρέπουν την προσαρμογή των διοικητικών και εκπαιδευτικών διαδικασιών στις ιδιαίτερες συνθήκες κάθε περιόδου. Ειδικά κατά τη διάρκεια της πανδημίας COVID-19, η δυνατότητα λειτουργίας μέσω τηλεργασίας και τηλεκπαίδευσης διασφάλισε τη συνέχεια της εκπαίδευσης και της διοίκησης (Reimers & Schleicher, 2020). Οι διευθυντές κλήθηκαν να αναπτύξουν στρατηγικές κρίσης και να επιδείξουν ψηφιακή ηγεσία, αξιοποιώντας τις τεχνολογίες με ευελιξία. Η εμπειρία αυτή ανέδειξε τη σημασία της τεχνολογικής ετοιμότητας ως βασικό στοιχείο εκπαιδευτικής ανθεκτικότητας απέναντι σε απρόβλεπτες καταστάσεις.

Η χρήση ψηφιακών εργαλείων από τους εκπαιδευτικούς στην καθημερινή τους πρακτική συμβάλλει όχι μόνο στην ενίσχυση της διδακτικής αποτελεσματικότητας, αλλά και στην αυτονομία και τον επαγγελματικό τους ρόλο. Μέσω

της πρόσβασης σε κοινόχρηστους πόρους, στατιστικά δεδομένα και ανατροφοδότηση, οι εκπαιδευτικοί αποκτούν σαφέστερη εικόνα των αναγκών των μαθητών τους και της αποδοτικότητας των πρακτικών τους (Darling-Hammond et al., 2017).

Ταυτόχρονα, ενισχύεται η συμμετοχή τους στη διαμόρφωση στρατηγικών και πολιτικών της σχολικής μονάδας, γεγονός που οδηγεί σε υψηλότερη ικανοποίηση και δέσμευση στο επαγγελματικό τους έργο (Leithwood et al., 2020).

Τέλος, η χρήση ψηφιακών μέσων ενισχύει τον ρόλο του διευθυντή ως ηγέτη μετασχηματισμού, που υιοθετεί και προωθεί καινοτόμες πρακτικές, ενθαρρύνει τη διαρκή βελτίωση και λειτουργεί ως φορέας αλλαγής (Fullan, 2016). Η αποτελεσματική χρήση της τεχνολογίας αποτελεί εργαλείο διαφοροποίησης του ηγέτη που δεν αρκείται στη διαχείριση της καθημερινότητας, αλλά οραματίζεται και υλοποιεί την εξέλιξη της σχολικής μονάδας.

ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΠΕΡΙΟΡΙΣΜΟΙ

Παρά τα αδιαμφισβήτητα οφέλη που προσφέρει η ενσωμάτωση των ψηφιακών μέσων στη σχολική διοίκηση, η πορεία προς τον ψηφιακό μετασχηματισμό δεν είναι απαλλαγμένη από εμπόδια. Οι εκπαιδευτικές μονάδες καλούνται να διαχειριστούν ένα ευρύ φάσμα προκλήσεων που σχετίζονται με θεσμικές, τεχνικές, κοινωνικές και παιδαγωγικές παραμέτρους. Η επιτυχής μετάβαση σε ένα ψηφιακά υποστηριζόμενο διοικητικό μοντέλο απαιτεί αναγνώριση αυτών των δυσκολιών και ανάπτυξη στρατηγικών αντιμετώπισης.

Μία από τις σημαντικότερες προκλήσεις αφορά το ψηφιακό χάσμα, δηλαδή τις ανισότητες στην πρόσβαση σε τεχνολογικούς πόρους μεταξύ σχολείων, περιοχών ή κοινωνικών ομάδων. Σχολικές μονάδες σε αγροτικές ή απομακρυσμένες περιοχές συχνά αντιμετωπίζουν ελλείψεις σε εξοπλισμό, ταχύτητα διαδικτύου ή τεχνική υποστήριξη (van Dijk, 2020). Αυτό έχει ως αποτέλεσμα τη δημιουργία ενός άνισου περιβάλλοντος, όπου οι δυνατότητες για καινοτομία περιορίζονται σημαντικά.

Επιπλέον, οι κοινωνικοοικονομικές ανισότητες μεταξύ των οικογενειών των μαθητών μπορούν να οδηγήσουν σε περιορισμένη συμμετοχή σε ψηφιακές δράσεις του σχολείου, ιδίως όταν η επικοινωνία ή η μάθηση προϋποθέτουν χρήση συσκευών στο σπίτι.

Ένας άλλος σημαντικός περιορισμός είναι η αντίσταση στην αλλαγή από πλευράς διευθυντών, εκπαιδευτικών και διοικητικού προσωπικού. Η ενσωμάτωση ψηφιακών μέσων απαιτεί αλλαγή στον τρόπο σκέψης, την αναδιοργάνωση ρόλων και την αμφισβήτηση καθιερωμένων πρακτικών. Όπως υποστηρίζουν οι Ertmer και Ottenbreit-Leftwich (2013), η αποδοχή της τεχνολογίας συνδέεται άμεσα με τις πεποιθήσεις των εκπαιδευτικών, την αυτοπεποίθησή τους και την κουλτούρα του οργανισμού στον οποίο ανήκουν.

Σε περιβάλλοντα όπου επικρατεί γραφειοκρατική ή αυταρχική διοίκηση, η πρωτοβουλία, η καινοτομία και η συνεργατικότητα υποχωρούν, περιορίζοντας την ουσιαστική ενσωμάτωση των ψηφιακών εργαλείων. Η χρήση ψηφιακών μέσων απαιτεί την κατοχή συγκεκριμένων δεξιοτήτων από το διοικητικό και εκπαιδευτικό προσωπικό. Όταν οι εμπλεκόμενοι δεν έχουν επαρκή εξοικείωση με τις τεχνολογίες, είναι πιθανό να τις χρησιμοποιούν επιφανειακά ή αποσπασματικά, χωρίς να αξιοποιούν τις πλήρεις δυνατότητές τους (Mandinach & Gummer, 2016). Η έλλειψη επιμόρφωσης, είτε σε επίπεδο τεχνικών γνώσεων είτε σε στρατηγικές ηγεσίας, αποτελεί έναν από τους βασικούς παράγοντες αποτυχίας υλοποίησης ψηφιακών σχεδίων.

Παρά τις πολιτικές επιμόρφωσης που προωθούνται σε πολλές χώρες, παρατηρείται συχνά η απουσία συνεκτικού, βιώσιμου και διαφοροποιημένου σχεδιασμού, που να ανταποκρίνεται στις πραγματικές ανάγκες των σχολικών μονάδων. Η χρήση ψηφιακών μέσων στην εκπαιδευτική διοίκηση συνεπάγεται τη διαχείριση μεγάλου όγκου προσωπικών δεδομένων, τόσο μαθητών όσο και εκπαιδευτικών. Η συμμόρφωση με τον Γενικό Κανονισμό Προστασίας Δεδομένων (GDPR) αποτελεί όχι μόνο νομική υποχρέωση, αλλά και ηθική δέσμευση των σχολικών μονάδων (European Union, 2016).

Η αποθήκευση και μεταφορά δεδομένων μέσω cloud εφαρμογών, η χρήση κοινωνικών μέσων και η ανάλυση ευαίσθητων πληροφοριών (π.χ. ακαδημαϊκές επιδόσεις, ψυχοκοινωνικά χαρακτηριστικά) απαιτούν υψηλό επίπεδο προστασίας και υπεύθυνης διαχείρισης. Η έλλειψη τεχνικής γνώσης ή η απουσία πρωτοκόλλων ασφαλείας αυξάνουν τον κίνδυνο παραβίασης της ιδιωτικότητας.

Η έντονη παρουσία ψηφιακών εργαλείων μπορεί επίσης να οδηγήσει σε υπερφόρτωση πληροφορίας, με αποτέλεσμα την αδυναμία προτεραιοποίησης και τη μείωση της συγκέντρωσης. Ιδιαίτερα για τους διευθυντές που

δέχονται συνεχείς ειδοποιήσεις, μηνύματα και δεδομένα, υπάρχει ο κίνδυνος της «τεχνολογικής κόπωσης» (technology fatigue), η οποία επιδρά αρνητικά στην ψυχική ευεξία και την αποτελεσματικότητα (Trust & Whalen, 2020).

Είναι απαραίτητο να αναπτυχθούν στρατηγικές ψηφιακής ισορροπίας (digital balance) και σαφή όρια χρήσης των μέσων, ώστε να διασφαλιστεί η αποδοτικότητα χωρίς εξουθένωση.

Η επιτυχής ενσωμάτωση των ψηφιακών μέσων προϋποθέτει και την υποστήριξη από το θεσμικό πλαίσιο. Όταν οι εκπαιδευτικές πολιτικές είναι αποσπασματικές, ελλιπώς χρηματοδοτούμενες ή ασαφείς ως προς τις τεχνολογικές κατευθύνσεις, η εφαρμογή των εργαλείων στη σχολική πράξη καθίσταται επισφαλής (Williamson & Hogan, 2020). Είναι απαραίτητο τα υπουργεία παιδείας και οι αρμόδιοι φορείς να παρέχουν σταθερή υποστήριξη, σαφείς οδηγίες, ψηφιακές υποδομές και συνεχή καθοδήγηση.

ΒΕΛΤΙΣΤΕΣ ΠΡΑΚΤΙΚΕΣ ΕΦΑΡΜΟΓΗΣ

Η αποτελεσματική και βιώσιμη ενσωμάτωση των ψηφιακών μέσων στη διοίκηση των σχολικών μονάδων δεν προκύπτει αυτόματα με την απόκτηση τεχνολογικού εξοπλισμού. Απαιτείται στρατηγικός σχεδιασμός, ηγεσία με όραμα, επιμόρφωση, συνεργατικό πνεύμα και συνεκτικές πολιτικές. Οι βέλτιστες πρακτικές που έχουν καταγραφεί σε σχετική βιβλιογραφία και διεθνή παραδείγματα δείχνουν ότι η επιτυχία εδράζεται σε μια πολύπλευρη και συμμετοχική προσέγγιση (Fullan, 2016).

Κάθε εκπαιδευτική μονάδα που επιθυμεί να ενσωματώσει την τεχνολογία στη διοικητική της λειτουργία πρέπει να διαμορφώσει ένα ψηφιακό όραμα, το οποίο να είναι συνδεδεμένο με τις αξίες, τις ανάγκες και τους στόχους της σχολικής κοινότητας. Ο ρόλος του διευθυντή είναι κρίσιμος στη φάση αυτή, καθώς καλείται να εμπνεύσει, να επικοινωνήσει το όραμα και να σχεδιάσει ένα πλάνο με σαφές χρονοδιάγραμμα και μετρήσιμους δείκτες επιτυχίας (Leithwood et al., 2020).

Η ένταξη των ψηφιακών μέσων δεν πρέπει να προσεγγίζεται αποσπασματικά ή τεχνοκρατικά, αλλά ως μέρος μιας ευρύτερης πολιτικής εκπαιδευτικής μεταρρύθμισης, με στόχο την ενδυνάμωση της σχολικής μονάδας ως κοινότητας μάθησης. Η συνεχής και στοχευμένη επιμόρφωση του προσωπικού αποτελεί θεμέλιο για τη βιωσιμότητα της ψηφιακής καινοτομίας. Τα προγράμματα επαγγελματικής ανάπτυξης οφείλουν να εστιάζουν τόσο στις τεχνικές δεξιότητες όσο και στις παιδαγωγικές και ηγετικές διαστάσεις της χρήσης της τεχνολογίας (Darling-Hammond et al., 2017).

Ιδιαίτερα αποτελεσματικές θεωρούνται οι μορφές συνεργατικής επιμόρφωσης (peer learning, coaching, learning communities), στις οποίες οι εκπαιδευτικοί μοιράζονται πρακτικές, ανταλλάσσουν εμπειρίες και στηρίζονται μεταξύ τους στην επίλυση προβλημάτων που σχετίζονται με την τεχνολογία. Ο ρόλος του διευθυντή ως υποστηρικτή και συντονιστή της επιμόρφωσης είναι καθοριστικός για την επιτυχία αυτών των διαδικασιών.

Μια από τις πιο επιτυχημένες πρακτικές για την ενσωμάτωση ψηφιακών μέσων είναι η πιλοτική εφαρμογή σε μικρή κλίμακα, με σκοπό τον έλεγχο λειτουργικότητας, την αναγνώριση τεχνικών και οργανωτικών προβλημάτων και τη σταδιακή εξοικείωση του προσωπικού. Η πιλοτική φάση πρέπει να συνοδεύεται από μηχανισμούς ανατροφοδότησης και αξιολόγησης, ώστε να προσαρμόζονται οι στρατηγικές πριν τη γενίκευση (Selwyn, 2016).

Η συνεχής αξιολόγηση δεν αφορά μόνο τεχνικές παραμέτρους, αλλά και τον βαθμό αποδοχής από την κοινότητα, την αποτελεσματικότητα των διαδικασιών και τον αντίκτυπο στα μαθησιακά αποτελέσματα και στην ποιότητα του εκπαιδευτικού έργου.

Η διαμοιρασμένη ηγεσία (distributed leadership) αποτελεί κρίσιμη παράμετρο για τη διατήρηση της καινοτομίας. Όταν εκπαιδευτικοί, μαθητές, γονείς και λοιπά μέλη της σχολικής κοινότητας έχουν ενεργό ρόλο στον σχεδιασμό, την υλοποίηση και την αξιολόγηση των ψηφιακών παρεμβάσεων, τότε αυξάνεται η αίσθηση του ανήκειν και η δέσμευση όλων προς την επιτυχία (Spillane, 2006).

Η διοίκηση οφείλει να δημιουργεί ευκαιρίες για ουσιαστικό διάλογο, να ενισχύει τις οριζόντιες συνεργασίες και να δίνει χώρο στις φωνές της κοινότητας να επηρεάσουν τις αποφάσεις.

Η τεχνολογική υποδομή είναι βασική προϋπόθεση για την επιτυχή εφαρμογή ψηφιακών εργαλείων. Η σχολική μονάδα χρειάζεται επαρκή εξοπλισμό, σταθερή σύνδεση στο διαδίκτυο, τεχνική υποστήριξη και ασφαλείς πλατφόρμες. Παράλληλα, απαιτείται οργάνωση του ψηφιακού περιβάλλοντος με κριτήρια ασφάλειας, προσβασιμότητας και απλότητας στη χρήση (European Union, 2016).

Η συνεργασία με τεχνικούς συμβούλους, η δημιουργία εσωτερικών ομάδων τεχνολογικής υποστήριξης και η καθιέρωση πολιτικών διαχείρισης ψηφιακών πόρων είναι πρακτικές που διευκολύνουν την καθημερινή λειτουργία και μειώνουν τα εμπόδια.

Η επιτυχία των τοπικών ψηφιακών πρωτοβουλιών εξαρτάται και από την ευρύτερη πολιτική υποστήριξη. Οι σχολικές μονάδες χρειάζονται καθοδήγηση, θεσμικά εργαλεία και χρηματοδότηση από τα υπουργεία παιδείας, ώστε να αναπτύξουν μακροπρόθεσμες στρατηγικές ενσωμάτωσης των ψηφιακών μέσων (Williamson & Hogan, 2020).

Οι βέλτιστες πρακτικές προτείνουν τη σύσταση εθνικών πλαισίων ψηφιακής ηγεσίας, την αναγνώριση των επιτυχημένων σχολικών εγχειρημάτων και την ανταλλαγή καλών πρακτικών μεταξύ σχολείων, προωθώντας έτσι μια κουλτούρα καινοτομίας και συνεργασίας σε ευρύτερη κλίμακα.

ΜΕΛΛΟΝΤΙΚΕΣ ΠΡΟΟΠΤΙΚΕΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΕΣ

Καθώς η τεχνολογία εξελίσσεται με εκθετικό ρυθμό, οι προοπτικές για τη μελλοντική εφαρμογή των ψηφιακών μέσων στην εκπαιδευτική διοίκηση διαγράφονται εξαιρετικά δυναμικές. Η είσοδος νέων τεχνολογικών εργαλείων όπως η τεχνητή νοημοσύνη (Artificial Intelligence – AI), η μηχανική μάθηση (Machine Learning) και το Internet of Things (IoT) υπόσχεται ένα νέο κύμα καινοτομίας, που επεκτείνεται πέρα από τα παραδοσιακά ψηφιακά εργαλεία και εισέρχεται σε πεδία αυξημένης αυτοματοποίησης, προσωποποίησης και έξυπνης υποστήριξης της διοίκησης (Luckin, 2017).

Η τεχνητή νοημοσύνη μπορεί να υποστηρίξει την εκπαιδευτική διοίκηση μέσα από συστήματα πρόβλεψης μαθητικής επίδοσης, αναγνώριση μαθητών σε κίνδυνο εγκατάλειψης και αυτόματη δημιουργία προσωποποιημένων παρεμβάσεων. Οι διευθυντές θα μπορούν να λαμβάνουν ειδοποιήσεις για συγκεκριμένα μοτίβα συμπεριφοράς ή επίδοσης και να εφαρμόζουν άμεσες ενέργειες πρόληψης.

Παράλληλα, εργαλεία AI μπορούν να διευκολύνουν την ανάλυση δεδομένων, τη διαχείριση προσωπικού και την παραγωγή αναφορών, μειώνοντας σημαντικά τον διοικητικό φόρτο.

Η χρήση τεχνολογιών εικονικής (VR) και επαυξημένης πραγματικότητας (AR) αναμένεται να επηρεάσει και την εκπαιδευτική διοίκηση, καθώς θα προσφέρει νέους τρόπους προσομοίωσης καταστάσεων, εκπαίδευσης προσωπικού και οργάνωσης διαδικασιών. Οι διευθυντές θα μπορούν να αξιολογούν την εφαρμογή πολιτικών μέσα από εικονικά σενάρια, ενώ οι εκπαιδευτικοί θα επιμορφώνονται σε προσομοιωμένα ψηφιακά περιβάλλοντα.

Το blockchain μπορεί να χρησιμοποιηθεί για τη δημιουργία αδιάβλητων συστημάτων διαχείρισης αρχείων, πιστοποιητικών, αξιολογήσεων και αποφάσεων, ενισχύοντας τη διαφάνεια και τη λογοδοσία στην εκπαιδευτική διοίκηση. Οι μαθητές, γονείς και εκπαιδευτικοί θα έχουν ασφαλή και αποκεντρωμένη πρόσβαση στα δεδομένα που τους αφορούν, χωρίς την ανάγκη μεσολάβησης τρίτων.

Στο μέλλον, οι εκπαιδευτικοί ηγέτες θα κληθούν να αναπτύξουν ένα νέο προφίλ, αυτό του ψηφιακά εγγράμματου ηγέτη (digitally literate leader), ικανού να αναγνωρίζει τις ευκαιρίες που προσφέρει η τεχνολογία, να καθοδηγεί την κοινότητα στην αλλαγή και να στοχεύει στη συμπερίληψη, την καινοτομία και την κοινωνική δικαιοσύνη (Dexter, 2018).

Οι επόμενες δεκαετίες προβλέπεται να είναι περίοδος ριζικών μετασχηματισμών. Η διοίκηση των σχολείων δεν θα είναι απλώς πιο ψηφιακή, αλλά πιο έξυπνη, ευέλικτη και προσαρμοστική, σε ένα διαρκώς μεταβαλλόμενο κοινωνικό και τεχνολογικό περιβάλλον.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η ενσωμάτωση των ψηφιακών μέσων στη διοίκηση των εκπαιδευτικών μονάδων δεν αποτελεί απλώς μια τεχνολογική εξέλιξη, αλλά μια βαθιά εκπαιδευτική και διοικητική μεταρρύθμιση. Μέσα από εργαλεία επικοινωνίας, ανάλυσης δεδομένων, συνεργασίας και διαχείρισης μάθησης, οι σχολικές μονάδες μπορούν να λειτουργούν πιο αποτελεσματικά, διαφανώς και με επίκεντρο τις ανάγκες των μαθητών και της κοινότητας.

Παρότι η πορεία αυτή συνοδεύεται από προκλήσεις, όπως το ψηφιακό χάσμα, η αντίσταση στην αλλαγή και οι ανησυχίες για την προστασία των προσωπικών δεδομένων, η εμπειρία και η έρευνα δείχνουν ότι οι βέλτιστες πρακτικές —όπως η επιμόρφωση του προσωπικού, η διαμοιρασμένη ηγεσία, ο στρατηγικός σχεδιασμός και η συνεχής αξιολόγηση— μπορούν να εξασφαλίσουν τη βιώσιμη εφαρμογή της ψηφιακής διοίκησης.

Καθώς οι τεχνολογικές και κοινωνικές εξελίξεις συνεχίζονται, τα εκπαιδευτικά ιδρύματα καλούνται να ηγηθούν του μετασχηματισμού, αξιοποιώντας τα ψηφιακά μέσα όχι μόνο για την καλύτερη οργάνωση, αλλά και για τη δημιουργία πιο συμμετοχικών, προσαρμοστικών και δίκαιων εκπαιδευτικών περιβαλλόντων. Το σχολείο του μέλλοντος είναι ήδη εδώ — και η ψηφιακή διοίκηση είναι η γέφυρα που οδηγεί σε αυτό.

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ΘΠ28: Επαγγελματική ανάπτυξη εκπαιδευτικών με την αξιοποίηση νέων τεχνολογιών

ΑΥΤΟΕΠΙΜΟΡΦΩΣΗ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΜΕ ΑΞΙΟΠΟΙΗΣΗ ΤΟΥ E- LEARNING - LAMAP ΣΤΟ ΓΑΛΛΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΣΥΣΤΗΜΑ

Γριβόπουλος Κωνσταντίνος
Φυσικός, Δρ. Διδακτικής Φυσικών Επιστημών
Γενικό Λύκειο Νεοχωρίου Δήμου Ι.Π. Μεσολογγίου
Μεσολόγγι, Ελλάδα
e-mail: kgrivop@gmail.com

ΠΕΡΙΛΗΨΗ

Για τις επιμορφωτικές ανάγκες των Γάλλων εκπαιδευτικών στη διδασκαλία των φυσικών επιστημών δημιουργήθηκε το ψηφιακό μέσο e-learning-Lamap. Οι διαχειριστές και οι επιμορφωτές της πλατφόρμας προσφέρουν σε νηπιαγωγούς, δασκάλους και καθηγητές Γυμνασίων μια σειρά ωριαίων βιντεοπαρουσιάσεων (tutoriels) για την εκμάθηση και εμπέδωση της επιστημονικής - διερευνητικής μεθόδου. Ωστόσο, σε αυτόν τον ψηφιακό πόρο προσεγγίζεται και θεματολογία ευρύτερου ενδιαφέροντος, προσαρμοσμένη στη σχολική βαθμίδα για την οποία κάθε χρήστης - εκπαιδευτικός ενδιαφέρεται. Ειδικότερα, η σελίδα για την ψηφιακή αυτοεπιμόρφωση « démarches d'investigation » συμβάλλει στην προετοιμασία των εκπαιδευτικών στη μαθητοκεντρική διδασκαλία των φυσικών επιστημών με εφαρμογή της διερευνητικής μεθόδου, εξοικειώνοντάς τους με τα επιμέρους στάδια αυτής. Οι χρήστες της πλατφόρμας έχουν τη δυνατότητα ελεύθερης πρόσβασης σε επιστημονικό και παιδαγωγικό υλικό. Επιπρόσθετα, αλληλεπιδρούν με συναδέλφους τους για ανταλλαγή εμπειριών, απόψεων, ιδεών κλπ., μέσα από προβλεπόμενα φόρουμ που οργανώνονται ανά θεματολογία. Έτσι, οι εκπαιδευτικοί καλλιεργούν εξ' αποστάσεως επαγγελματικές δεξιότητες σε χρόνο της δικής τους επιλογής και με τους προσωπικούς τους ρυθμούς.

Το κείμενο διαρθρώνεται ως εξής: η εισαγωγή ακολουθείται από τη διασάφηση των εννοιών αυτοεπιμόρφωση, κοινότητες μάθησης και επιστημονική - διερευνητική μέθοδος διδασκαλίας. Κατόπιν, παρουσιάζεται η αρχιτεκτονική της πλατφόρμας e - learning - Lamap και ο τρόπος λειτουργίας της στην αυτοεπιμόρφωση και διάδραση των εκπαιδευτικών.

Λέξεις-κλειδιά: Αυτοεπιμόρφωση, επιστημονική - διερευνητική μέθοδος διδασκαλίας, ψηφιακό μέσο e-learning-Lamap.

ΕΙΣΑΓΩΓΗ

Στο πλαίσιο της επαγγελματικής ανάπτυξης των εκπαιδευτικών στο γαλλικό εκπαιδευτικό σύστημα, η πλατφόρμα e-learning-Lamap αξιοποιεί τις νέες τεχνολογίες για την επιμόρφωση των εκπαιδευτικών στη διδασκαλία των φυσικών επιστημών.

Στην παρούσα μελέτη περίπτωσης, επικεντρώνουμε το ενδιαφέρον μας στην εξ' αποστάσεως αυτοεπιμόρφωση εκπαιδευτικών και επιμορφωτών των εκπαιδευτικών στην παιδαγωγική διερευνητική μέθοδο (démarches d'investigation), που ακολουθείται στη διδασκαλία των πειραματικών επιστημών και της τεχνολογίας. Προϊόν του Ιδρύματος «La main à la pâte», το οποίο επικουρεί το Υπουργείο Παιδείας στην προώθηση της επιστημονικής παιδείας στο σχολείο, αυτό το ανοιχτό διαδικτυακό και διαδραστικό μέσο προσφέρει μια σειρά βιντεοσκοπημένων ωριαίων σεμιναρίων (tutoriels) για την εκμάθηση και εμπέδωση της διερευνητικής μεθόδου σε εκπαιδευτικούς της Πρωτοβάθμιας εκπαίδευσης και του Γυμνασίου. Οι σχεδιαστές της πλατφόρμας πραγματεύονται ποικίλες θεματικές, όπως «φαινόμενο θερμοκηπίου», «ενέργεια και ανθρώπινο σώμα» κλπ., οι οποίες είναι προσαρμοσμένες στη σχολική βαθμίδα για την οποία προορίζονται.

Αντικειμενικός σκοπός αυτής της ψηφιακής αυτοεπιμόρφωσης είναι για, μεν, τους εκπαιδευτικούς η προετοιμασία τους στη μαθητοκεντρική διδασκαλία των φυσικών επιστημών με εφαρμογή της διερευνητικής μεθόδου και, παράλληλα, στην ανάπτυξη επιστημονικού και κριτικού πνεύματος στους μαθητές. Για, δε, τους επιμορφωτές, η πλατφόρμα e-learning-Lamap προσφέρει υποστήριξη στο επιμορφωτικό έργο τους. Οι χρήστες της πλατφόρμας έχουν τη δυνατότητα α) της εξοικείωσης με δραστηριότητες που προορίζονται να εκτελούνται στην τάξη, καθώς και της a posteriori ανάλυσης των αποτελεσμάτων που προκύπτουν από τις υλοποιημένες διδασκαλίες, β) της πρόσβασης σε επιστημονικό και παιδαγωγικό υλικό και, γ) της αλληλεπίδρασης με συναδέλφους για ανταλλαγή εμπειριών, απόψεων, ιδεών κλπ., μέσα από προβλεπόμενα φόρουμ που οργανώνονται ανά σεμινάριο και θεματολογία.

Αναφορικά στην εκμάθηση της διερευνητικής μεθόδου, οι επιμορφούμενοι μπορούν να παρακολουθήσουν τα επιμέρους στάδια, εκκινώντας από την παρατήρηση ενός φυσικού φαινομένου και τη συνακόλουθη αφόρμηση και περνώντας, σταδιακά, στον καθορισμό του προβλήματος, στη διατύπωση υποθέσεων, στον σχεδιασμό ενός διερευνητικού πειραματικού πρωτοκόλλου για την επαλήθευση ή διάψευσή τους με αποσαφήνιση των ρόλων του εκπαιδευτικού και των μαθητών. Ακόμη, επιμορφώνονται στις φάσεις της εξαγωγής νομοτελειακών συμπερασμάτων (φυσικών νόμων) και της εφαρμογής αυτών σε άλλες καταστάσεις. Επίσης, οι επιμορφούμενοι εκπαιδεύονται στις μεταγνωστικές δραστηριότητες των μαθητών. Παράλληλα, το εν λόγω ψηφιακό μέσο προτείνει στους διδάσκοντες διάφορες ενεργητικές δραστηριότητες, σχετικές με τους διδακτικούς στόχους κάθε θεματικής, για την ανάπτυξη των κιναισθητικών ικανοτήτων των μαθητών. Έτσι, οι εκπαιδευτικοί καλλιεργούν επαγγελματικές δεξιότητες σε χρόνο της επιλογής τους και με τους προσωπικούς τους ρυθμούς.

ΑΥΤΟΕΠΙΜΟΡΦΩΣΗ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΚΑΙ ΚΟΙΝΟΤΗΤΕΣ ΜΑΘΗΣΗΣ

Η έννοια της επιμόρφωσης προσδιορίζεται ως «ένα σύνολο από ειδικά προγράμματα μέσω των οποίων ο εκπαιδευόμενος επιτυγχάνει τη βελτίωση, την ενδυνάμωση και εν τέλει την ανάπτυξη των ήδη κατεκτημένων ακαδημαϊκών ή πρακτικών ικανοτήτων, δεξιοτήτων και γνώσεών του κατά την επαγγελματική του πορεία.» (Μαυρογιώργος, 2005, όπως αναφέρεται στο Chourdaki, 2023). Αναφορικά στον κλάδο της εκπαίδευσης, ο Ματσαγγούρας (2005) προσθέτει στον ορισμό αυτόν το στοιχείο της αυτοκριτικής των εκπαιδευτικών για την ίδια τη διδασκαλία τους, η έκβαση της οποίας τους υποδεικνύει, ενδεχομένως, την ανάγκη πρόσθετης και αυτόνομης επιμόρφωσης, σε επαγγελματικό και ακαδημαϊκό επίπεδο (Giannouli, 2017). Επομένως, ένας ακόμη όρος, η αυτοεπιμόρφωση, αποτελεί ερευνητικό αντικείμενο για το οποίο αναπτύσσεται σχετική βιβλιογραφία.

Στο πλαίσιο της διά βίου εκπαίδευσης, η αυτοεπιμόρφωση ορίζεται ως μια διαδικασία επιμόρφωσης στην οποία ο επιμορφούμενος αναλαμβάνει πρωτοβουλίες, κατά τρόπο αυτόνομο, για την επιλογή των μέσων, των μεθόδων και των μαθησιακών στόχων που θα του επιτρέψουν να αποκτήσει γνώσεις και δεξιότητες (Tremblay, 2003). Ωστόσο, η έννοια της αυτοεπιμόρφωσης διευρύνεται, ώστε να συμπεριλάβει την υποστήριξη, κατά την επιμόρφωση του υποκειμένου, από εικονικές κοινότητες. Ένα παράδειγμα αποτελούν οι δικτυακές κοινότητες μάθησης της πράξης (on-line communities of practice), τα μέλη των οποίων έχουν κοινή εργασιακή ενασχόληση και συμμετέχουν μέσα από άτυπες σχέσεις για να επιλύσουν ή να μοιραστούν ένα πρόβλημα ή μία κατάσταση που θα έχει απήχηση στην επαγγελματική τους ανάπτυξη (Bowels, 2002, όπως αναφέρεται στο Papadakis et al., 2005). Οι εικονικές κοινότητες υποστηρίζονται από τις τεχνολογίες πληροφορίας και επικοινωνιών (ΤΠΕ).

Σε ό,τι αφορά στα κίνητρα ενεργού συμμετοχής του επιμορφούμενου σε μια κοινότητα μάθησης, αναφέρουμε (Papadakis et al., 2005):

- τη συνεργατική μάθηση μέσω αλληλεπίδρασης και αξιοποίησης των πόρων της κοινότητας
- την ανατροφοδότηση από τα άλλα μέλη της κοινότητας
- τη διεπιστημονική προσέγγιση με συνεισφορά ανθρώπων με διαφορετικές εμπειρίες και γνώσεις
- την κάλυψη προσωπικών, κοινωνικών και επαγγελματικών αναγκών
- την ενίσχυση της αυτοεκτίμησης μέσα από την επίτευξη γνωστικών και άλλων κοινών στόχων της κοινότητας

Οι μαθησιακές κοινότητες, με τα τεχνολογικά εργαλεία που διαθέτουν, μπορούν να υποστηρίζουν τόσο την ενεργητική και συνεργατική μάθηση όσο και την αυτοεπιμόρφωση μεταξύ των μελών της κοινότητας.

ΕΠΙΣΤΗΜΟΝΙΚΗ - ΔΙΕΡΕΥΝΗΤΙΚΗ ΜΕΘΟΔΟΣ ΔΙΔΑΣΚΑΛΙΑΣ

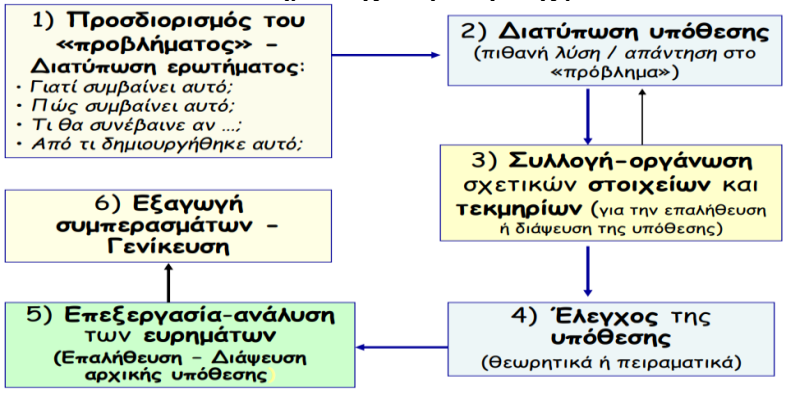
Με τον όρο επιστημονική - διερευνητική μέθοδος διδασκαλίας ή επιστημονική - εκπαιδευτική μέθοδος με διερεύνηση αποδίδεται στην ελληνική ο όρος Inquiry-Based Science Education ή Démarches d'investigation (στη γαλλική βιβλιογραφία). Πρόκειται για μαθητοκεντρική προσέγγιση όπου επιδιώκεται οι μαθητές να γνωρίσουν την ερευνητική μέθοδο παραγωγής της γνώσης και να είναι ικανοί να την εφαρμόζουν για την επαλήθευση εννοιών και ιδεών (Massialas, 1989). Ο επιθετικός προσδιορισμός «επιστημονική» για τη μέθοδο αυτή θέλει, ακριβώς, να σηματοδοτήσει παιδαγωγικά τον παραλληλισμό στον τρόπο εργασίας μεταξύ του επιστήμονα και του μαθητή με προοπτική τη γνώση (Kokkotas, 2002). Ακόμη, η μέθοδος χαρακτηρίζεται ως υποθετικο-επαγωγική, καθόσον οδηγεί σε γενικευμένα συμπεράσματα, νόμους ή θεωρίες για την εξήγηση των φυσικών φαινομένων (Kokkotas, 1999). Φυσικά, αυτά τα συμπεράσματα και οι φυσικοί νόμοι συνιστούν τη διδακτέα ύλη, την οποία οι μαθητές καλούνται να οικοδομήσουν, μέσω της αξιοποίησης της στρατηγικής των γνωστικών συγκρούσεων (Mathé et al., 2008) και της ενεργοποίησης της μάθησης στη Ζώνη Επικείμενης Ανάπτυξης (Vygotsky, 1978; Salvaras, 2013). Κατά συνέπεια, η μέθοδος της επιστημονικής διερεύνησης εντάσσεται στο κοινωνικο-εποικοδομιστικό παιδαγωγικό επιστημολογικό παράδειγμα.

Αναφερόμενοι στα χαρακτηριστικά της διερευνητικής μεθόδου, οι Vainas et al. (2007) σημειώνουν ότι βασίζεται στην αναλυτική σκέψη με εξοικείωση με τους κανόνες της λογικής, ενώ απαιτεί λογική ακολουθία βημάτων με επίγνωση του σκοπού εκτέλεσης κάθε βήματος. Στις οδηγίες για τον εκπαιδευτικό στο σχολικό βιβλίο της Φυσικής Α΄ Γυμνασίου, οι Kalkanis et al (2013) σταχυολογούν τα στάδια της επιστημονικής διερεύνησης, δίνοντας ταυτόχρονα ενδεικτικά ενεργητικά ρήματα που περιγράφουν τις ακολουθούμενες από τους μαθητές διαδικασίες:

- παρατήρηση και οριοθέτηση προβλήματος ή κατάστασης με όρους ποσοτικής διερεύνησης μέσω ανεξάρτητων και εξαρτημένων μεταβλητών → παρατηρώ, πληροφορούμαι, ενδιαφέρομαι
- διατύπωση υποθέσεων → συζητώ, αναρωτιέμαι, υποθέτω
- σχεδιασμός πειραματικού πρωτοκόλλου → ενεργώ, πειραματίζομαι, μετρώ
- εξαγωγή συμπερασμάτων και φυσικών νόμων → συμπεραίνω, καταγράφω
- αξιολόγηση, μοντελοποίηση, μεταγνώση → εφαρμόζω, εξηγώ, γενικεύω.

Η ακόλουθη εικόνα 1 σχηματοποιεί τα στάδια στα οποία αναλύεται η επιστημονική - διερευνητική μέθοδος διδασκαλίας (Pavlatou, 2015):

Εικόνα 1
Στάδια επιστημονικής- διερευνητικής μεθόδου



Όπως παρατηρούμε, πρόκειται ουσιαστικά για την ίδια μεθοδολογική πορεία που παραθέσαμε πιο πάνω, με την επιπλέον ρητή προσθήκη του ενεργήματος συλλογής πληροφοριών και στοιχείων που σχετίζονται με το προς διερεύνηση αφετηριακό πρόβλημα / κατάσταση. Μάλιστα, αυτό το βήμα τροφοδοτεί το στάδιο της διατύπωσης υποθέσεων με το οποίο συνδυάζεται κατά τρόπο αμφίδρομο, όπως το απεικονίζει το διπλό βέλος της εικόνας.

Στο γαλλικό συγκείμενο, πραγματοποιήθηκε μια εκτεταμένη έρευνα με θέμα τις αντιλήψεις (représentations) εκπαιδευτικών για την επιστημονική - διερευνητική μέθοδο διδασκαλίας, σε δείγμα 2606 διδασκόντων θετικών επιστημών, εκ των οποίων 771 ήταν καθηγητές φυσικής - χημείας και 702 βιολογίας - γεωλογίας, που δίδασκαν σε Γυμνάσια και Λύκεια της Γαλλίας. Διευκρινιστικά, στο γαλλικό εκπαιδευτικό σύστημα, η φυσική και η χημεία διδάσκονται ως ένα μάθημα υπό τον τίτλο « sciences physiques et chimiques », με ενιαίο αναλυτικό πρόγραμμα σπουδών, ενιαίο σχολικό εγχειρίδιο, ενιαία αξιολόγηση, τον ίδιο διδάσκοντα κλπ. Ομοίως, για τη βιολογία και τη γεωλογία (« sciences de la vie et de la Terre »). Μεταξύ των ευρημάτων της έρευνας, σημειώνουμε πολύ συνοπτικά πως για τους διδάσκοντες φυσικής - χημείας και βιολογίας - γεωλογίας, ένα από τα σημαντικότερα οφέλη της διερευνητικής μεθόδου είναι ότι ευνοεί την ανάπτυξη δεξιοτήτων, καθώς και τη σταδιακή ικανότητα των μαθητών για αυτόνομη εργασία. Επίσης, οι φυσικοί - χημικοί, πρωτίστως, θέτουν ως κύριο διδακτικό στόχο την ανάδειξη των πρότερων ιδεών των μαθητών (Driver κ.ά., 1993), βάσει των οποίων δίνουν τη δική τους εξήγηση – προτού διδαχθούν την επιστημονική – στα φυσικά φαινόμενα που παρατηρούν. Επίσης, οι εκπαιδευτικοί αναγνωρίζουν την παιδαγωγική αξία της εμπειρίας που βιώνουν οι μαθητές, ενόσω εργάζονται με την επιστημονική - διερευνητική μέθοδο, και ειδικότερα όταν δοκιμάζεται η ανθεκτικότητα των εναλλακτικών ιδεών τους (Monod-Ansaldi and Prieur, 2011).

ΠΛΑΤΦΟΡΜΑ E – LEARNING - LAMAP

Το ίδρυμα « La main à la pâte» (Lamap) – «τα χέρια στη ζύμη», ή σε ελεύθερη απόδοση, «δουλεύουμε χειραπτικά» –, που ιδρύθηκε με πρωτοβουλία του Georges Charpak (Νόμπελ Φυσικής, 1992) και τη συνδρομή της Ακαδημίας Επιστημών της Γαλλίας, φιλοδοξεί να καλλιεργήσει μια αντίληψη της επιστήμης περισσότερο ως μεθόδου αντιμετώπισης και επίλυσης προβλημάτων, παρά ως θεωρητικού συστήματος παγιωμένων και ετοιμοπαράδοτων γνώσεων. Σε όλη τη γαλλική επικράτεια, τα πιλοτικά κέντρα Lamap σχηματίζουν ένα επικουρικό προς τους εκπαιδευτικούς δίκτυο προωθώντας τη μαθητοκεντρική διδασκαλία της επιστήμης και της τεχνολογίας.

Μεταξύ άλλων υποστηρικτικών δομών, οι εκπαιδευτικοί διαθέτουν ένα εκπαιδευτικό αποθετήριο, απ' όπου μπορούν να αντλούν εκπαιδευτικούς πόρους για τη διδασκαλία τους, αλλά και για τις ανάγκες της δικής τους επιμόρφωσης. Στην ψηφιακή πλατφόρμα L@map (https://elearning-lamap.org/) έχουν ελεύθερη πρόσβαση, κατόπιν δημιουργίας λογαριασμού χρήστη, εκπαιδευτικοί Δημοτικών σχολείων και Γυμνασίων. Αυτό το ψηφιακό μέσο περιλαμβάνει πλήθος βιντεοπαρουσιάσεων (tutoriels) σχετικών με ποικίλες επιστημονικές θεματικές, όπως βιώσιμη ανάπτυξη, πράσινη χημεία, βιοποικιλότητα, υλικότητα του αέρα, ύλη και ενέργεια, θερμοπυρηνικά εργοστάσια κλπ. Παράλληλα, ο χρήστης μπορεί να παρακολουθήσει βιντεοπαρουσιάσεις πάνω στην επιστημονική - διερευνητική μέθοδο, οι οποίες συμβάλλουν στην αυτοεπιμόρφωσή του και επικουρούν το διδακτικό έργο του.

Η συλλογή αυτών των βιντεομαθημάτων αυτοεπιμόρφωσης εμπλουτίζονται συνεχώς, αφού δίνεται η δυνατότητα στους χρήστες να παρεμβαίνουν στην πλατφόρμα για να αναρτούν, παραδείγματος χάρη, βιντεοσκοπημένες διδασκαλίες από την τάξη τους τις οποίες αναλύουν μεταξύ τους. Μάλιστα, οι ίδιοι οι διαχειριστές της πλατφόρμας παρακινούν κάθε χρήστη να δηλώσει τις προσδοκίες του και τους ειδικότερους στόχους στους οποίους προσβλέπει μέσω της αυτοεπιμόρφωσης. Οι επιμορφωτές των εκπαιδευτικών, επίσης μέλη της διαδικτυακής κοινότητας, αναλαμβάνουν να συγκεντρώνουν υλικό, να οργανώνουν ομοειδείς ομάδες εκπαιδευτικών, να τους συντονίζουν και να ανατροφοδοτούν τον προβληματισμό και τις αλληλεπιδράσεις μεταξύ των επιμορφούμενων. Φυσικά, προσφέρεται πάντα και η δυνατότητα ασύγχρονης επιμόρφωσης, που λαμβάνει υπόψη τα προσωπικά κριτήρια και τους ρυθμούς κάθε εκπαιδευτικού.

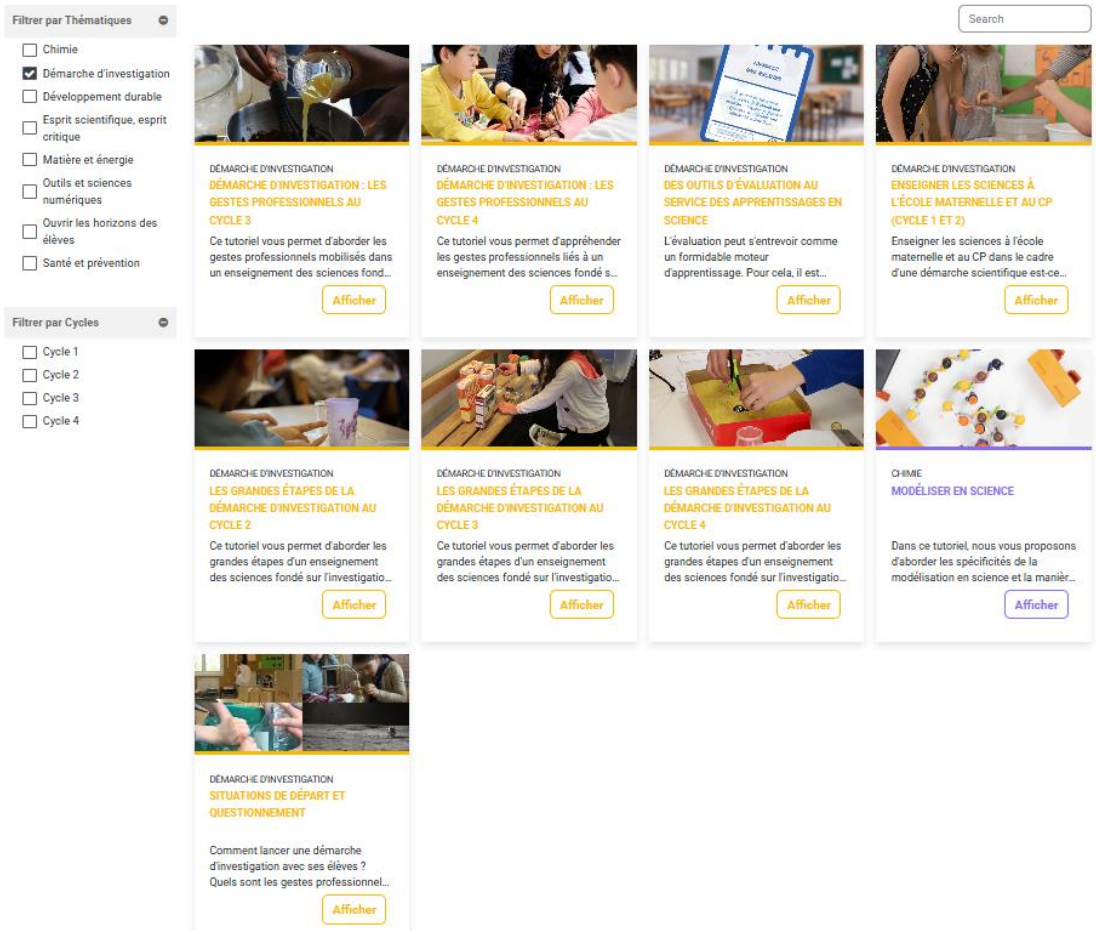
ΑΥΤΟΕΠΙΜΟΡΦΩΣΗ ΣΤΗΝ ΕΠΙΣΤΗΜΟΝΙΚΗ - ΔΙΕΡΕΥΝΗΤΙΚΗ ΜΕΘΟΔΟ ΔΙΔΑΣΚΑΛΙΑΣ ΜΕΣΩ ΤΟΥ E – LEARNING - LAMAP

Ανάμεσα στις θεματικές που εμφανίζονται στο μενού της πλατφόρμας, εντοπίζουμε την ιστοσελίδα που περιγράφει την επιστημονική - διερευνητική μέθοδο. Η εξερεύνησή της από τους χρήστες - εκπαιδευτικούς συμβάλλει στην αυτοεπιμόρφωσή τους, επικουρώντας έτσι το διδακτικό έργο τους. Στην ακόλουθη εικόνα 2 φαίνεται η εν λόγω σελίδα:

Τα περιεχόμενα της σελίδας επιτρέπουν στον χρήστη να επιλέξει το σχολικό επίπεδο που τον ενδιαφέρει, από το Νηπιαγωγείο μέχρι το Γυμνάσιο. Οι προσφερόμενες βιντεοπαρουσιάσεις αναλύουν τη διεξαγωγή ενός μαθήματος σχεδιασμένου με την επιστημονική - διερευνητική μέθοδο, τόσο από την άποψη των επαγγελματικών χειρισμών του

διδάσκοντα, π.χ. κατά τη διάρκεια υλοποίησης των σταδίων της μεθόδου, όσο και από γνωστική άποψη, όπως είναι οι διεργασίες μοντελοποίησης στη φυσική.

Εικόνα 2
Βιντεοπαρουσιάσεις για την επιστημονική - διερευνητική μέθοδο



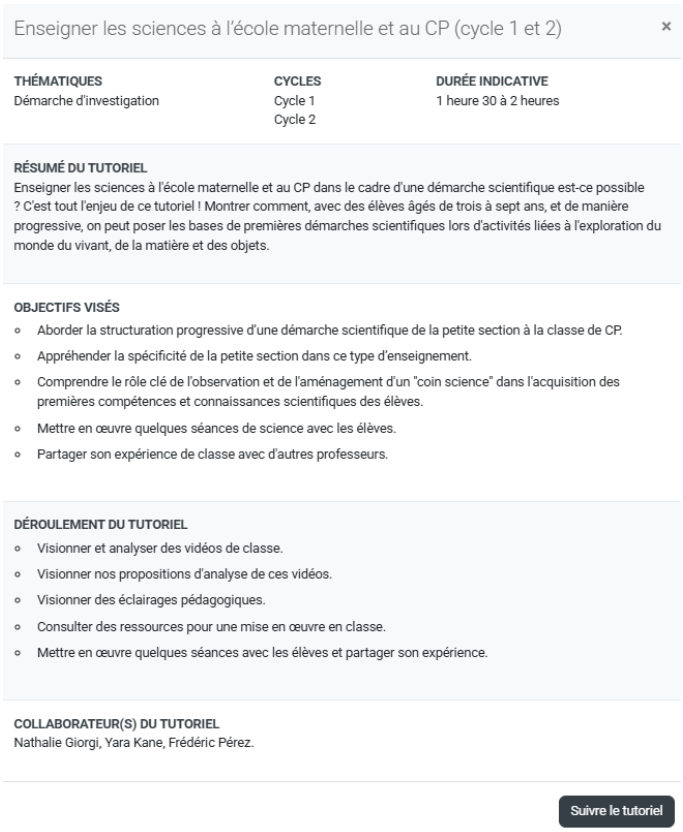
Όταν ο χρήστης-εκπαιδευτικός επιλέξει κάποιο από τα εικονιζόμενα θέματα, θα ανοίξει μια νέα σελίδα. Αν, λόγου χάρη, ένας/μία νηπιαγωγός ενδιαφερθεί για το 4ο εικονίδιο (Πρβλ. εικόνα 2), θα μεταφερθεί στην παρακάτω ιστοσελίδα:

Περιληπτικά, αυτή η υποσελίδα δομείται από έναν τίτλο, όπου προσδιορίζεται το αντίστοιχο σχολικό επίπεδο και η ενδεικτική διάρκεια για την εξατομικευμένη μελέτη από τον χρήστη. Ακολουθεί μια σύνοψη και ορίζονται οι διδακτικοί στόχοι της βιντεοπαρουσίασης, τους οποίους αναμένεται να επιτύχουν οι χρήστες μετά την παρακολούθησή της. Για το υλικό που έχουν τη δυνατότητα να παρακολουθήσουν δίνονται οδηγίες, ενώ παρακινούνται να μοιραστούν τις εμπειρίες από τη διδασκαλία στην τάξη με άλλους επιμορφούμενους, μέσω σχετικού forum. Τέλος, αναφέρονται οι δημιουργοί της συγκεκριμένης υποσελίδας.

Οι διαχειριστές του e-learning-Lamap έχουν σχεδιάσει την εφαρμογή MapEval μέσω της οποίας οι χρήστες έχουν την ευχέρεια να αξιολογούν το ψηφιακό εργαλείο, στο τέλος κάποιας αυτοεπιμόρφωσης. Η εφαρμογή μπορεί να εγκατασταθεί ακόμη και στο κινητό τους τηλέφωνο. Πιο συγκεκριμένα, ο χρήστης:

- εισάγει τα αποτελέσματα της αξιολόγησης των δεξιοτήτων που σχετίζονται με τις δραστηριότητες που αναπτύχθηκαν σε μια βιντεοπαρουσίαση
- εκτιμά τον βαθμό προόδου των γνώσεων και δεξιοτήτων του, πριν και μετά τη δραστηριότητα που παρακολούθησε
- πληροφορείται για τις αξιολογήσεις των υπολοίπων χρηστών της ομάδας του
- σχολιάζει τα συγκεντρωτικά αποτελέσματα, ανταλλάσσοντας απόψεις σχετικά με τις δραστηριότητες και τις επαγγελματικές ενέργειες των επιμορφούμενων.

Εικόνα 3
Η υποσελίδα για την Προδημοτική και Πρωτοδημοτική βαθμίδα



Στην εικόνα 4 προβάλλεται η οθόνη από ενδεικτική αξιολογική ανατροφοδότηση ενός χρήστη:

Εικόνα 4
Ενδεικτική οθόνη από αξιολόγηση χρήστη, στην εφαρμογή MapEval



Η απόδοση των εικονιζόμενων ερωτήσεων από το γαλλικό συγκείμενο στο ελληνικό είναι η εξής: Σε ποιόν βαθμό

- το αναγκαίο υλικό για τη συνεδρία (μάθημα) είναι εύκολα προσπελάσιμο (στην πλατφόρμα);
- το προτεινόμενο εκπαιδευτικό σενάριο επιτρέπει να αντιληφθείτε σύντομα την αντικειμενικούς στόχους και τις ενέργειες προς εκτέλεση;
- ο προτεινόμενος οδηγός του εκπαιδευτικού διευκολύνει την υλοποίηση της δραστηριότητας στην τάξη;
- η δραστηριότητα αποκρίνεται στις ανάγκες των μαθητών για την ανάπτυξη δεξιοτήτων;

Σαν μια επιπλέον χρήση της εφαρμογής MapEval, ο εκπαιδευτικός έχει τη δυνατότητα να αξιολογήσει το διδακτικό έργο, που έχει παραχθεί στην δική του τάξη και να μετρήσει την πρόοδο των μαθητών γνωστοποιώντας τους το αποτέλεσμα. Προαιρετικά, μπορεί να αναρτήσει τα δεδομένα αυτά στην πλατφόρμα, τηρώντας φυσικά τους δεοντολογικούς κανόνες.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Η ψηφιακή πλατφόρμα e-learning-Lamap προσφέρει υποστήριξη στο επιμορφωτικό έργο των Γάλλων εκπαιδευτικών Πρωτοβάθμιας και Δευτεροβάθμιας εκπαίδευσης, που διδάσκουν φυσικές επιστήμες. Παράλληλα, αποτελεί ένα διαδικτυακό μέσω εξ' αποστάσεως αυτοεπιμόρφωσης, μέσα από κατάλληλα σχεδιασμένες δραστηριότητες και βιντεοπαρουσιάσεις. Οι χρήστες - εκπαιδευτικοί έχουν πρόσβαση σε επιστημονικό και παιδαγωγικό υλικό, ενώ μπορούν να αλληλεπιδρούν με συναδέλφους τους για ανταλλαγή εμπειριών, απόψεων, ιδεών κλπ.

Σύμφωνα με τον πρόσφατο απολογισμό δραστηριοτήτων της e-learning-Lamap για το σχολικό έτος 2022-23, μεταξύ των προσφερόμενων θεματικών, οι βιντεοπαρουσιάσεις που είναι αφιερωμένες στην επιστημονική - διερευνητική μέθοδο διδασκαλίας γνωρίζουν ευρεία αποδοχή και εμπλουτίζονται συνεχώς. Επίσης, επανεπιβεβαιώνεται η ανταπόκριση των διαχειριστών και επιμορφωτών της πλατφόρμας e-learning-Lamap, στις τρέχουσες εκπαιδευτικές συνθήκες και ανάγκες, αναπτύσσοντας σύγχρονα εργαλεία, δράσεις και νέο υποστηρικτικό υλικό και συμβάλλοντας έτσι στην επαγγελματική ανάπτυξη των εκπαιδευτικών.

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Η ΕΠΑΓΓΕΛΜΑΤΙΚΗ ΚΑΙ ΕΠΙΣΤΗΜΟΝΙΚΗ ΑΝΑΒΑΘΜΙΣΗ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΩΣ ΚΡΙΣΙΜΗ ΔΙΑΣΤΑΣΗ ΚΑΙ ΠΡΟΟΠΤΙΚΗ ΤΩΝ ΔΥΝΑΤΟΤΗΤΩΝ ΤΗΣ ΤΕΧΝΗΤΗΣ ΝΟΗΜΟΣΥΝΗΣ

Μαστρογιάννης Αλέξιος
Επόπτης Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Μεσολόγγι, Ελλάδα
e-mail: alexmastr@yahoo.gr

Πασσά Σοφία
Επόπτρια Ποιότητας της Εκπαίδευσης
Πρωτοβάθμια Εκπαίδευση Πρέβεζας
Πρέβεζα, Ελλάδα
e-mail: sofipassa@gmail.com

Κατσιώπη Παρασκευή
Δ/ντρια Δημοτικού Σχολείου
Πρωτοβάθμια Εκπαίδευση Αιτωλοακαρνανίας
Αγρίνιο, Ελλάδα
e-mail: voulakats@gmail.com

ΠΕΡΙΛΗΨΗ

Η επιμόρφωση των εκπαιδευτικών αποτελεί κλειδί για την ουσιαστική αναβάθμιση της ποιότητας της εκπαίδευσης. Ένας επιμορφωμένος εκπαιδευτικός μπορεί να βελτιώσει σημαντικά τις παιδαγωγικές και διδακτικές του δεξιότητες, να αυξήσει την επιστημονική αυτογνωσία του, την επαγγελματική του αυτοπεποίθηση και τον ενθουσιασμό του, ώστε να δημιουργήσει τις συνθήκες εκείνες που θα του επιτρέψουν να ανταποκρίνεται πληρέστερα και επιτυχέστερα στην ποικιλομορφία και την ετερογένεια των αναγκών των μαθητών του. Η συνεχής επιστημονική και επαγγελματική αναβάθμιση των εκπαιδευτικών θεωρείται απαραίτητη όχι μόνο για τους νέους αλλά και για τους έμπειρους εκπαιδευτικούς, αφού πέραν των άλλων ενισχύει και το πάθος τους αλλά και την αποτελεσματικότητα του πολυδύναμου και πολυσύνθετου ρόλου τους. Μολονότι έχουν παρατηρηθεί δυσκολίες στην αλλαγή των διδακτικών πρακτικών και των πεποιθήσεων των εκπαιδευτικών, είναι αναγνωρισμένη η αξία στοχευμένων προγραμμάτων επιμόρφωσης υπό την προϋπόθεση, βέβαια, ότι αυτά θα γεφυρώνουν το χάσμα μεταξύ της θεωρίας και της πράξης, όπως ήδη είχε επισημάνει, από το 1914, ο μεγάλος John Dewey.

Στη σημερινή ψηφιακή εποχή, η επιμόρφωση των εκπαιδευτικών είναι περισσότερο αναγκαία από ποτέ, καθώς πέραν της ενίσχυσης και του βέλτιστου μετασχηματισμού των διαδικασιών, των μεγεθών και των διαστάσεων της διδασκαλίας και της μάθησης, μπορεί να αναδείξει και να προσφέρει νέες παιδαγωγικές δεξιότητες στους μάχιμους εκπαιδευτικούς, απαραίτητες για τη δημιουργία αλληλεπιδραστικών και εποικοδομιστικών περιβαλλόντων μάθησης τα οποία θα ανταποκρίνονται στις σύγχρονες κοινωνικοοικονομικές και τεχνολογικές συνθήκες. Προς αυτή την προκλητική σύγχρονη εκπαιδευτική απαίτηση, η αξιοποίηση της Τεχνητής Νοημοσύνης (ΤΝ) στην επιμόρφωση των εκπαιδευτικών προβάλλει ως μία εκ των ων ουκ άνευ ψηφιακή διαμεσολάβηση, καθώς μπορεί να προσφέρει καινοτόμες και ριζοσπαστικές δυνατότητες υποστήριξης της επαγγελματικής και επιστημονικής αναβάθμισής τους. Η ΤΝ μπορεί να παρέχει πλούσιες ευκαιρίες μικρομάθησης και δια βίου μάθησης στους εκπαιδευτικούς, να αναλύει πληθώρα εκπαιδευτικών δεδομένων, να προτείνει στοχευμένες διδακτικές και παιδαγωγικές παρεμβάσεις, να δημιουργεί εξατομικευμένα και διαφοροποιημένα σχέδια διδασκαλίας αλλά και ρεαλιστικά σενάρια, όπως και να παρέχει συνεχή και αντικειμενική ανατροφοδότηση. Η ΤΝ, από τώρα και στο εξής, θα διεκδικεί σημαντικό ρόλο και μερίδιο στην οικοδόμηση ενός αποτελεσματικού μοντέλου επιμόρφωσης, το οποίο θα είναι ικανό να υποστηρίζει τον εκπαιδευτικό στον απαιτητικό και πληθωρικό ρόλο του, ώστε, τελικά, να ενισχύεται η συνολική ποιότητα του εκπαιδευτικού έργου, αλλά και να παγιώνεται το θετικό αποτύπωμα της μαθησιακής εμπειρίας των μαθητών.

Προς την κατεύθυνση αυτή, η παρούσα εργασία θα παρουσιάσει πρακτικές εφαρμογές της ΤΝ, οι οποίες μπορούν να υποστηρίξουν την επαγγελματική και επιστημονική ανάπτυξη των εκπαιδευτικών και να συμβάλουν σημαντικά στην αναμόρφωση της εκπαιδευτικής διαδικασίας, καθώς και στη διαρκώς επιζητούμενη βελτίωση της ποιότητας της εκπαίδευσης.

Λέξεις – κλειδιά: Τεχνητή Νοημοσύνη, επιμόρφωση, αναβάθμιση, εκπαιδευτικός

ΕΙΣΑΓΩΓΗ

Η σημερινή λίαν απαιτητική σχολική πραγματικότητα απαιτεί τη δημιουργία μαθητοκεντρικών, συνεργατικών, αναστοχαστικών και μεταγνωστικών περιβαλλόντων μάθησης, τα οποία θα προάγουν την καλλιέργεια νοητικών δεξιοτήτων ανώτερης τάξης. Μια τέτοια παιδαγωγική περίσταση επιζητεί εκπαιδευτικούς ενημερωμένους και άριστα καταρτισμένους, ώστε να ανταπεξέρχονται αποτελεσματικά στο πολυδιάστατο και δύσκολο εκπαιδευτικό έργο τους, προσδίδοντας ποιότητα στις εκπαιδευτικές πρακτικές τους. Μια συστηματική περιοδική και καλά οργανωμένη επιμόρφωση των εκπαιδευτικών μπορεί να λειτουργήσει ως υποστήριγμα και ως καταλύτης βελτίωσης της καθημερινής εκπαιδευτική διαδικασίας. Η επαγγελματική και επιστημονική αναβάθμιση των εκπαιδευτικών, αν και δαπανηρή, είναι δυνατόν να καλύψει και τυχόν επιστημονικά και διδακτικά ελλείμματα των εκπαιδευτικών, να επικαιροποιήσει τις γνώσεις του και, γενικά, να τους προσδώσει πλούσιες παιδαγωγικές εξαρτύσεις για επιτυχημένη και δυναμική επιτέλεση του λειτουργήματός τους. Το δεύτερο μισό της τρίτης δεκαετίας του 21ου αιώνα έχει συσχετιστεί συμπαγώς και αδιάσπαστα με την έλευση, από το μέλλον, της εξωπραγματικής και απόκοσμης ΤΝ. Η αξιοποίηση της ΤΝ, μέσω των ανεξάντλητων εφαρμογών της, διαπερνά-τέμνει οριζόντια, σχεδόν κάθε ενέργεια, δράση, γεγονός και έκφανση της ανθρώπινης ζωής και καθημερινότητας. Στον εκπαιδευτικό χώρο, η ΤΝ έχει αρχίσει να επιφέρει επαναστατικές αλλαγές στον τρόπο διδασκαλίας και μάθησης, αντικαθιστώντας ή παραμερίζοντας παραδοσιακές στρατηγικές και μεθόδους. Η παρούσα εργασία θα επικεντρωθεί σε μια πτυχή των ωφελημάτων της ΤΝ προς την εκπαίδευση. Συγκεκριμένα, θα παράσχει πολλούς τρόπους και παραδειγματικές περιπτώσεις, που μπορεί να διευκολύνουν τον εκπαιδευτικό, στην αναβάθμιση της επαγγελματικής και επιστημονικής του υπόστασης, και κατ' επέκταση να συμβάλουν στη βελτίωση της ποιότητας του παραγόμενο εκπαιδευτικού έργου.

Η ΕΠΑΓΓΕΛΜΑΤΙΚΗ ΚΑΙ ΕΠΙΣΤΗΜΟΝΙΚΗ ΑΝΑΒΑΘΜΙΣΗ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ

Η επαγγελματική και επιστημονική αναβάθμιση των εκπαιδευτικών αποτελεί βασικό πυλώνα για την αναβάθμιση της ποιότητας της εκπαίδευσης σε βάθος χρόνου, σε όλες τις βαθμίδες της εκπαίδευσης (Stavermann, 2025; You et al., 2025; Sodiya & Quliyeva, 2019; Darling-Hammond et al., 2017; Day, 1999). Δε νοείται σύγχρονο εκπαιδευτικό σύστημα χωρίς την πρόβλεψη για συνεχή επιμόρφωση και διαρκή επαγγελματική εξέλιξη του ανθρώπινου δυναμικού του. Η παιδαγωγική, η διδακτική και οι επιστήμες της εκπαίδευσης εξελίσσονται ραγδαία, για αυτό η ενεργός συμμετοχή των εκπαιδευτικών σε προγράμματα κατάρτισης, μετεκπαίδευσης και επιμόρφωσης είναι αναγκαία, ώστε να παραμένουν ενημερωμένοι, αποτελεσματικοί και καινοτόμοι. Πράγματι, ως θεμελιώδες στοιχείο της επαγγελματικής εξέλιξης, τα προγράμματα συνεχιζόμενης εκπαίδευσης και επιμόρφωσης των μάχιμων εκπαιδευτικών διαδραματίζουν καθοριστικό ρόλο (Uzorka, Kalabuki & Odebiyi, 2024). Η συστηματική επιμόρφωση των εκπαιδευτικών προβάλλει ως μια ύψιστη προτεραιότητα για κάθε εκπαιδευτικό μοντέλο και μετασχηματισμό, ώστε οι εκπαιδευτικοί να καλύπτουν την ετερογένεια και την ποικιλία των παιδαγωγικών αναγκών κάθε μαθητή (Eurydice, 2025). Πλήθος ερευνών (Morina et al., 2025; Amemasor et al., 2025; Ambon et al., 2024; Ventista & Brown, 2023; Rangel-Pacheco & Witte, 2019; Phillips, McElwain & Clemmer, 2016), καταδεικνύει ότι η διαρκής επιμόρφωση (αυτή που γίνεται για μεγάλο χρονικό διάστημα φαίνεται να είναι πιο ωφέλιμη) και η συνακόλουθη επιστημονική εξέλιξη και αναβάθμιση των εκπαιδευτικών συμβάλλει ουσιαστικά στη βελτίωση της διδακτικής διαδικασίας και την υιοθέτηση σύγχρονων διδακτικών μεθόδων, καθώς ενισχύει τόσο τις παιδαγωγικές διδακτικές και μεταγνωστικές τους δεξιότητες όσο και την ικανότητά τους να αναστοχάζονται και να διαχειρίζονται αποτελεσματικά κρίσεις στο σχολικό περιβάλλον, αλλά και προβλήματα που ανακύπτουν στην τάξη.

Παράλληλα, η επιμόρφωση συνδέεται θετικά με την αυξημένη επαγγελματική ικανοποίηση των εκπαιδευτικών, καθώς και με την ενίσχυση της πρόθεσής τους να παραμείνουν στον χώρο της εκπαίδευσης μακροπρόθεσμα, μειώνοντας, μάλιστα, και το αίσθημα επαγγελματικής εξουθένωσης (Rajendran et al., 2023). Έχει διαπιστωθεί (Koulis, 2019; Day, 1999) θετική συνάφεια μεταξύ επαγγελματικής ανάπτυξης, ηθικής και εργασιακής ικανοποίησης αλλά και αφοσίωσης των εκπαιδευτικών, υπό τη μορφή μιας κυκλοτερικής σχέσης. Επίσης, έχει δειχθεί (Zhao, Byun & Jeon, 2025; Muñoz-Fernández et al., 2025; Asiyah et al., 2021; OECD, 2019) ότι η επαγγελματική ανάπτυξη των εκπαιδευτικών έχει σημαντική θετική επίδραση στην εργασιακή δέσμευση (work commitment), η οποία με τη σειρά της σχετίζεται με την αίσθηση ασφάλειας των εκπαιδευτικών, την επίδοση των μαθητών και γενικά με την ποιότητα της εκπαίδευσης. Η βελτίωση των δεξιοτήτων και των κινήτρων των εκπαιδευτικών (αυτό δε συναρτάται μόνο με την αύξηση του επιπέδου των τυπικών προσόντων τους αλλά και με την επιμόρφωσή τους) έχει βρεθεί ότι έχει θετικό αντίκτυπο στη διαδικασία και την οικοδόμηση της μάθησης από τους μαθητές τους (Government Office for Science, 2018; Mastrogiannis, 2015; LaChausse, Clark & Chapple, 2014).

Ωστόσο, το εκπαιδευτικό έργο - διδακτικό και παιδαγωγικό - απαιτεί συνεχή ενημέρωση και ανανέωση τόσο των γνώσεων όσο και των δεξιοτήτων των εκπαιδευτικών, συμπεριλαμβανομένης της τακτικής αναθεώρησης και προσαρμογής των διδακτικών προσεγγίσεων και μεθόδων τους. Η διδασκαλία πρέπει να αντιμετωπίζεται ως επάγγελμα της γνώσης (Ulferts, 2021), όπου οι εκπαιδευτικοί πρέπει να είναι ειδικοί που ενημερώνουν συνεχώς τις επαγγελματικές τους γνώσεις και δεξιότητες, για να ανταποκρίνονται αποτελεσματικά στις εξελισσόμενες εκπαιδευτικές προκλήσεις. Οι

εκπαιδευτικοί πρέπει να λειτουργούν ως δια βίου μαθητές, προσαρμόζοντας τις γνώσεις και τις παιδαγωγικές τους στρατηγικές στις σύγχρονες απαιτήσεις. Η προσαρμογή αυτή στις εκάστοτε κοινωνικές και παιδαγωγικές απαιτήσεις καθίσταται αναγκαία, ώστε οι παρεμβάσεις στο σχολικό πλαίσιο να είναι ουσιαστικές και αποδοτικές, και η μαθησιακή εμπειρία να αποκτά νόημα και αξία (Anane & Kuranchie, 2022), διαμορφωμένη μέσα σε ασφαλή, ευχάριστα και εστιασμένα στον μαθητή περιβάλλοντα.

Μολονότι οι εκπαιδευτικοί, από μισθολογικής άποψης, είναι πολύ δαπανηροί για τους κρατικούς προϋπολογισμούς των χωρών (Olsen & Wyss, 2022; Li Siu Pang & Kwo Wai Yu, 2005), όπως και τα προγράμματα επιμόρφωσής τους (Allen et al., 2016), η ανάγκη για έναν σύγχρονο και προοδευτικό προσανατολισμό καθιστά επιτακτική τη συνεχή επαγγελματική και επιστημονική αναβάθμιση των εκπαιδευτικών. Σκοπός είναι η ουσιαστική αναβάθμιση της ποιότητας του εκπαιδευτικού τους έργου σε όλες τις διαστάσεις, στοιχείο που είναι καθοριστικής σημασίας για την αναμόρφωση της εκπαιδευτικής διαδικασίας σε παγκόσμιο επίπεδο, τόσο στην Πρωτοβάθμια όσο και στη Δευτεροβάθμια εκπαίδευση. Σε κάθε περίπτωση, η ανάγκη για συνεχή, καλά οργανωμένη, συστηματική και περιοδική επιμόρφωση των εκπαιδευτικών συνιστά θεμελιώδη και αδιαπραγμάτευτη προτεραιότητα. Οι εκπαιδευτικοί, αναμφισβήτητα, θεωρούνται το κλειδί για την εδραίωση και σταθεροποίηση της ποιότητας στα εκπαιδευτικά συστήματα αλλά και για τη βελτίωση όλων σχεδόν των σχολικών συνιστωσών και παραγόντων. Αναμφίβολα, οι εκπαιδευτικοί θα πρέπει να στοχεύουν απαραίτητα και στην εξέλιξη και αναβάθμιση του εαυτού τους, και όχι μόνο στην ανάπτυξη και πρόοδο των μαθητών τους (Coppe et al., 2024).

Υποστηρίζεται ότι η αποτελεσματική επιμόρφωση οφείλει να προσθέτει και να αλλάζει όχι μόνο τη γνώση αλλά και τις πεποιθήσεις των εκπαιδευτικών, προκειμένου να έχει διαρκή αντίκτυπο στη διδασκαλία και στη μάθηση (Guskey, 2002). Ωστόσο, είναι ερευνητικά επιβεβαιωμένο ότι η αλλαγή των πεποιθήσεων και των πρακτικών των εκπαιδευτικών είναι δύσκολη υπόθεση (Krulatz et al., 2024). Πάντως, και οι ίδιοι οι εκπαιδευτικοί θεωρούν ότι στοχευμένα προγράμματα επιμόρφωσής τους είναι ικανά να συμβάλλουν κατά πολύ στην επιδιωκόμενη επαγγελματική τους ανάπτυξη, υπό τον κάθετο όρο ότι το χάσμα μεταξύ θεωρίας και πράξης θα γεφυρώνεται, όπως και ο John Dewey ήδη από το 1904 είχε επισημάνει (Wilkin, 2020; Korthagen, 2010). Παρεμπιπτόντως, αυτό το χάσμα μεταξύ θεωρίας και πράξης στην εκπαίδευση και την επιμόρφωση των εκπαιδευτικών, εξακολουθεί να υπάρχει, δεχόμενο, διαρκώς πολλά επικριτικά σχόλια (Hallmen et al., 2025; Abror et al., 2024; Korthagen, 2011). Έλληνες εκπαιδευτικοί (Stylianou, 2022) εκφράζουν την ανάγκη τα επιμορφωτικά προγράμματα να εστιάζουν σε πρακτικές διδακτικές εφαρμογές και προτάσεις, ικανές να δίνουν λύσεις σε ζητήματα που προκύπτουν στην καθημερινή εκπαιδευτική πράξη.

Η επαγγελματική ανάπτυξη - επιμόρφωση, ειδικά στον σημερινό ψηφιακό κόσμο, είναι κρίσιμη ακόμη και για έμπειρους εκπαιδευτικούς (Crispel & Kasperski, 2021), καθώς τροποποιεί τις διαδικασίες διδασκαλίας-μάθησης και τον διδακτικό ρόλο, ενσωματώνοντας νέες δεξιότητες στις πρακτικές τους (Fernández-Batanero et al., 2022), ώστε να υποστηριχθούν νέα ευφυή μαθησιακά περιβάλλοντα, που προσιδιάζουν στις τρέχουσες, πολύ απαιτητικές, κοινωνικές οικονομικές και «ψηφιακές» συνθήκες. Οι ειδικοί προτείνουν έναν κανόνα 30/70, δηλαδή το 30% να δαπανάται για εξοπλισμό και το 70% για την υποστήριξη επιμορφωτικών δράσεων (Ringstaff & Kelley, 2002). Μάλιστα, ο Άγγλος καθηγητής της μαθηματικής εκπαίδευσης Richard Noss, μίκρυνε κατά πολύ το παραπάνω κλάσμα, αφού υποστήριζε ότι τα ποσά, που δαπανώνται για την κατάρτιση και την επιμόρφωση των εκπαιδευτικών, πρέπει να είναι εκατό φορές περισσότερα από αυτά που διατίθενται για την προμήθεια ψηφιακών υλικών και μέσων (Mastrogiannis, 2021; Raptis, 2010; Maletskos & Mastrogiannis, 2006). Πράγματι, οι τεχνολογικές δεξιότητες διδασκαλίας των εκπαιδευτικών είναι ζωτικής σημασίας για τη δημιουργία περιβαλλόντων ενεργητικής και ανακαλυπτικής μάθησης, ενώ, αντιθέτως, ο ψηφιακός εξοπλισμός υστερεί συγκριτικά σε σημαντικότητα (Lohr et al., 2024).

Στη σημερινή ψηφιακή εποχή, όπου η Τεχνητή Νοημοσύνη (ΤΝ) αναδύεται με ραγδαίο και ηχηρό τρόπο, καθίσταται σαφές ότι, υπό συγκεκριμένες προϋποθέσεις και χάρη στην ανθρωποκεντρική της διάσταση, μπορεί να συμβάλει ουσιαστικά στη βελτίωση της ποιότητας της επιμόρφωσης των εκπαιδευτικών και στην ενίσχυση των διδακτικών και παιδαγωγικών τους ικανοτήτων (Lameras & Arnab, 2021). Μέσα σε αυτό το ευνοϊκό τεχνολογικό περιβάλλον, και με τη θεώρηση ότι η ορθά σχεδιασμένη αξιοποίηση της ΤΝ δύναται να αναβαθμίσει τις διαδικασίες επαγγελματικής ανάπτυξης των εκπαιδευτικών (Al Darayseh, 2023; Saputra et al., 2023; González-Calatayud, Prendes-Espinosa & Roig-Vila, 2021; Al-Zyoud, 2020), η παρούσα μελέτη προτίθεται να παρουσιάσει χαρακτηριστικά παραδείγματα εφαρμογών της, αναδεικνύοντας τις δυνατότητες, τις ευκαιρίες αλλά και τις προκλήσεις που σχετίζονται με τη διδακτική πράξη. Αυτά τα στοιχεία μπορούν να λειτουργήσουν ως μοχλοί ενίσχυσης του επαγγελματισμού και της παιδαγωγικής αποτελεσματικότητας των εκπαιδευτικών. Επιπλέον, το επίπεδο ψηφιακής ετοιμότητας των εκπαιδευτικών (Berdalieva, 2023; González-Salamanca, Agudelo & Salinas, 2020) αποτελεί κρίσιμο παράγοντα που επηρεάζει άμεσα το εύρος των δυνατοτήτων τους για συνεχή επαγγελματική και επιστημονική εξέλιξη.

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ ΚΑΙ ΑΚΑΔΗΜΑΪΚΗ ΑΝΑΒΑΘΜΙΣΗ ΤΩΝ ΕΚΠΑΙΔΕΥΤΙΚΩΝ

Η εντυπωσιακή και εκκωφαντική έλευση του ChatGPT («Generative Pre-trained Transformer», που μεταφράζεται ως «Παραγωγικός Προεκπαιδευμένος Μετασχηματιστής» στα ελληνικά), αυτού του μεγάλου γλωσσικού μοντέλου Γενετικής Τεχνητής Νοημοσύνης της OpenAI, την τελευταία ημέρα του Νοεμβρίου του 2022, δημιούργησε, στην κοινή γνώμη, πλησμονή προσδοκιών και παραληρημάτων. Βέβαια, ήγειρε και κάποια κύματα φιλυποψίας, αβεβαιότητας και επιφυλακτικότητας για το μέλλον και τη συνέχεια της ανθρωπότητας αλλά και για την ποιότητα της ζωής. Τα μεγάλα γλωσσικά μοντέλα είναι ικανά να δημιουργούν κείμενα με φυσική ροή προβλέποντας συνδυασμούς λέξεων, με βάση μοτίβα που αποκτήθηκαν από την ανάλυση εκτενών δεδομένων κειμένου (Google, 2025). Τα μεγάλα γλωσσικά μοντέλα, ως ένας εξέχων αντιπρόσωπος των αναδυόμενων τεχνολογιών, είναι εφαρμογές της Παραγωγικής (Γενετικής) Τεχνητής Νοημοσύνης η οποία δημιουργεί νέο περιεχόμενο, όπως κείμενο, εικόνες και κώδικα, εκπαιδευόμενη σε τεράστια σύνολα δεδομένων (Google, 2025). Στα τρία χρόνια που έχουν μεσολαβήσει, από τον Νοέμβριο του 2022, και άλλα τέτοια μεγάλα γλωσσικά μοντέλα παρουσιάστηκαν (LLaMA, Claude 3.5, Gemini, Grok, Copilot, Perplexity, Mistral, DeepSeek κ.ά), προσυπογράφοντας και αναδεικνύοντας το εξωπραγματικό επιστημονικό μεγαλείο των τεχνολογιών της ΤΝ. Ας σημειωθεί ότι το ChatGPT αποτελεί την ταχύτερα αναπτυσσόμενη καταναλωτική εφαρμογή στην παγκόσμια ιστορία (UNESCO, 2024; Mastrogiannis, 2023). Αυτή η κατακλυσμική εξάπλωση της ΤΝ, λόγω της εύκολης άντλησης δεδομένων, της οικονομικά προσιτής υπολογιστικής ισχύος και της εμφάνισης πρωτοποριακών καινοτομιών στη μηχανική μάθηση, προκαλεί έναν αντίστοιχο ραγδαίο κοινωνικό μετασχηματισμό, που σίγουρα θα ανασυστήσει τη βιομηχανία, την οικονομία αλλά και την ανθρώπινη καθημερινότητα (Velli & Zafiropoulos, 2024).

Σε ένα τέτοιο προκύπτον κλίμα προκλήσεων, προβληματισμού, ανασφάλειας και ενθουσιασμού ταυτόχρονα, η εκπαίδευση ήταν αδύνατο να μείνει αμέτοχη και να μην επενδύσει στην ανάπτυξη μιας ετεροβαρούς, επ' ωφελεία της «σχέσης», με τους αλγόριθμους της ΤΝ. Σήμερα, είναι αποδεκτό ότι η ΤΝ έχει τη δυνατότητα να αντιμετωπίσει μερικές από τις μεγαλύτερες προκλήσεις στην εκπαίδευση. Ο τρόπος διδασκαλίας και μάθησης μπορεί να καταστεί περισσότερο εξατομικευμένος, ελκυστικός και αποτελεσματικός, μέσω της επαναστατικότητας, που εγγενώς κομίζει η ΤΝ. Πολλά ερευνητικά αποτελέσματα δείχνουν ότι η ΤΝ βοηθά στην αύξηση της ποιότητας της εκπαίδευσης και βελτιώνει τις μαθησιακές επιδόσεις, παρέχοντας καινοτόμες πρακτικές διδασκαλίας και μάθησης (Mounkoro et al., 2025; Saleem et al., 2025; Fissore et al., 2024; Harry, 2023).

Είναι αδιαμφισβήτητο, σήμερα, πως η ΤΝ χρησιμοποιείται εκτενώς στην εκπαίδευση, σε διάφορες μορφές, αποτελώντας, πια, μια κρίσιμη στρατηγική αξία, προσφέροντας εργαλεία και συστήματα που μεταμορφώνουν, επί τω βελτίω, τις παραδοσιακές μεθόδους διδασκαλίας και μάθησης (Singh et al, 2025; Zhai et al., 2021; Chen, Chen & Lin, 2020). Ίδια άποψη περί της ωφελιμότητας της ΤΝ εκφράζουν και εκπαιδευτικοί. Σε μια διακρατική μελέτη (Daskalaki, Psaroudaki & Fragopoulou, 2024) με υποκείμενα 1.754 εκπαιδευτικούς από την Ελλάδα, την Ουγγαρία, τη Λετονία, την Ιρλανδία και την Αρμενία, καταγράφεται μια συγκρατημένη αισιοδοξία από την πλευρά των εκπαιδευτικών, όσον αφορά στη δυνατότητα της ΤΝ να εξελίξει το εκπαιδευτικό τοπίο, ιδίως μέσω διαφοροποιημένων και εξατομικευμένων προτάσεων και μαθησιακών εμπειριών. Πράγματι, η ΤΝ παρέχει διαφοροποιημένα εξατομικευμένα και καινοτόμα εκπαιδευτικά προγράμματα με τη δημιουργία μαθημάτων που είναι προσαρμοσμένα στις ατομικές ανάγκες των μαθητών. Η ΤΝ μπορεί να βοηθήσει τους δασκάλους να προσδιορίσουν τα στιλ μάθησης, την ετοιμότητα και τα ενδιαφέροντα των μαθητών τους, ώστε να προσαρμόσουν τις μεθόδους και τις στρατηγικές διδασκαλίας τους. Με αυτόν τον τρόπο μπορεί να βοηθήσουν και τους μαθητές τους να αναπτύξουν την κριτική σκέψη τους, σχετικά με την τεχνολογία. Επιπλέον, η ΤΝ μπορεί να αναλύει διαπολιτισμικά δεδομένα και να βοηθά τους εκπαιδευτικούς να αναπτύσσουν δεξιότητες διαχείρισης πολυπολιτισμικών τάξεων, συμπερίληψης και ισότητας σε ποικίλα εκπαιδευτικά περιβάλλοντα, προσφέροντας εξατομικευμένες στρατηγικές διδασκαλίας (Mariyono & Alif Hd, 2025; Mariyono & Hidayatullah, 2024). Ακόμη, μαθητές που φοιτούν σε τμήματα ξένων γλωσσών και χρησιμοποιούν εργαλεία ΤΝ βελτιώνουν τις επιδόσεις τους στην ανάγνωση, τη γραφή, την ακρόαση, την ομιλία, το λεξιλόγιο και τη συνολική γλωσσική κατανόηση, σε σύγκριση με συμβατικές μεθόδους (Kundu & Bej, 2025).

Σε κάθε περίπτωση, οι εκπαιδευτικοί κινούν τα νήματα σχετικά με την υιοθέτηση εφαρμογών και εργαλείων της ΤΝ σε εκπαιδευτικά περιβάλλοντα. Για αυτό, απαιτείται προσεκτική και διακριτική προσέγγιση, με σκοπό μια πιο ενημερωμένη, ηθική και αποτελεσματική χρήση των τεχνολογιών ΤΝ στον χώρο της εκπαίδευσης (Viberg et al., 2024). Η UNESCO έχει θέσει ως στόχο να τελεσθεί μια ολοκληρωμένη εισαγωγή των εκπαιδευτικών στις δυνατότητες της ΤΝ, ώστε να ενισχύονται συνεχώς η επαγγελματική και επιστημονική τους ανάπτυξη, μέσω της αξιοποίησης της ΤΝ στη δια βίου μάθησή τους (Cukurova et al., 2024). Η επαγγελματική ανάπτυξη των εκπαιδευτικών μέσω της ΤΝ είναι απαραίτητη και θα πρέπει, οπωσδήποτε, να περιλαμβάνει εξοικείωση με τα τεχνολογικά της συστήματα, ανάπτυξη δεξιοτήτων κριτικής σκέψης και ηθικής επίγνωσης σε αυτόν τον πολύπλοκο και εξελισσόμενο τεχνολογικό τομέα αλλά και διαμόρφωση μιας καινοτόμου και προσαρμοστικής προσέγγισης στις εφαρμογές της ΤΝ. Η συνεχιζόμενη ανάγκη για ολοκληρωμένη ανάπτυξη του γραμματισμού των εκπαιδευτικών στην ΤΝ είναι συστηματική και αδιάλειπτη, με σκοπό

να διευκολύνεται η ενσωμάτωση της ΤΝ στη διδακτική διαδικασία και σε προγράμματα επαγγελματικής ανάπτυξης (Ding et al., 2024). Βέβαια, απαιτούνται περισσότερες μελέτες, όσον αφορά στη βελτίωση των εργαλείων που μετρούν τον αντίκτυπο της ΤΝ στην εκπαίδευση, καθώς το είδος του εργαλείου της ΤΝ και η πιθανή εφαρμογή του, μπορεί να επηρεάσει τον βαθμό αποτελεσματικότητας της ΤΝ (Mounkoro et al., 2025). Επιπλέον, και ο αντίκτυπος της γενετικής ΤΝ στην αυτονομία των εκπαιδευτικών είναι προς διερεύνηση (Frøsig & Romero, 2024).

Χωρίς αμφιβολία (Kujundziski, & Bojadjiev, 2025; Celik et al., 2022), η ΤΝ μεταμορφώνει τον ρόλο των εκπαιδευτικών, μετατοπίζει την εστίασή τους σε περισσότερο δημιουργικές πτυχές της εκπαιδευτικής διαδικασίας, βοηθώντας τους να δημιουργήσουν αποτελεσματικά σχέδια διδασκαλίας και μάθησης για όλους τους μαθητές, χωρίς εξαίρεση. Στην πραγματικότητα, η μάθηση με αξιοποίηση της ΤΝ αναμένεται να μεταβάλει και να μετασχηματίσει το εκπαιδευτικό περιβάλλον την επόμενη δεκαετία. Γενικά, ορισμένα από τα οφέλη που μπορούν να κερδίσουν οι εκπαιδευτικοί, από τη χρήση εργαλείων ΤΝ, που θα τους ενδυναμώσουν και θα ενισχύουν την επαγγελματική και επιστημονική τους αναβάθμιση, είναι τα παρακάτω (Balasubramanian, 2025; Chandrakant, 2025; Kelley & Wenzel, 2025; Li, Wang & Bonk, 2025; Riggs, 2025; Shelton, 2025; Shezad et al., 2025; Tan, Cheng & Ling, 2025; Kujundziski & Bojadjiev, 2025; Adams & Guastaferro, 2024; Brandão, Pedro & Zagalo, 2024; Cukurova et al., 2024; Ghamrawi, Shal & Ghamrawi, 2024; Meylani, 2024; Nguyen, 2024; Zhai, 2024; Jamal, 2023; Mondal et al., 2023; Sok & Heng, 2023; Tammets & Ley, 2023; Poth, 2023; Cukurova, Miao, Brooker, 2023):

- Παροχή προσαρμοστικών πλατφορμών μάθησης, που αναλύουν την απόδοση των εκπαιδευτικών, εντοπίζουν τα δυνατά και αδύνατα σημεία τους, διεξάγουν αναλύσεις και προτείνουν εξατομικευμένη, στοχευμένη επιμόρφωση, που βοηθά τους δασκάλους να βελτιώνουν τις μεθόδους τους, ενθαρρύνοντας την κριτική σκέψη και υποστηρίζοντας τη συνεχή επαγγελματική τους ανάπτυξη. Αντίστοιχα, μια προσαρμοστική πλατφόρμα μάθησης λειτουργεί, υποστηρίζοντας και μαθητές. Γενικά, μια ηλεκτρονική πλατφόρμα προσαρμοστικής μάθησης χρησιμοποιεί προσαρμοστικές τεχνολογίες, συλλέγοντας και αναλύοντας δεδομένα μαθητών και εκπαιδευτικών για να προσαρμόζει δυναμικά το εκπαιδευτικό περιεχόμενο, ώστε να ανταποκρίνεται στις μαθησιακές (ή επιμορφωτικές) ανάγκες τους. Κατόπιν, μέσω εξατομικευμένων παρεμβάσεων, η πλατφόρμα προτείνει κατάλληλο περιεχόμενο που αντιστοιχεί στο προφίλ του μαθητή ή του εκπαιδευτικού, μεγιστοποιώντας τα μαθησιακά του αποτελέσματα και τις εμπειρίες (Tan et al., 2025). Παραδείγματα προσαρμοστικών πλατφορμών μάθησης είναι οι: Knewton Alta, Smart Sparrow, DreamBox Learning, Carnegie Learning, ALEKS (Assessment and Learning in Knowledge Spaces), Newton's Alta κ.ά. Ωστόσο, παρά τα υπάρχοντα στοιχεία, σχετικά με τη συμβολή των πλατφορμών προσαρμοστικής μάθησης στην εκπαιδευτική διαδικασία, η κλιμακωτή υιοθέτησή τους στα σχολεία είναι προς το παρόν, μάλλον, αργή (Cukurova, Miao, Brooker, 2023).
- Κατανόηση δεδομένων απόδοσης μαθητών και παροχή εξατομικευμένης και διαφοροποιημένης διδασκαλίας, μέσω αλληλεπιδράσεων και ανάλυσης, η οποία προσαρμόζεται στα χαρακτηριστικά των μαθητών για καλύτερη διαχείριση των αναγκών τους, αλλά και για τη δημιουργία ρεαλιστικών εμπειριών μάθησης. Αυτή η προσαρμοστική διδασκαλία υποστηρίζει τόσο τους εκπαιδευτικούς όσο και τους μαθητές.
- Εντοπισμός μαθησιακών προτύπων και προσφορά κατάλληλων προτάσεων για περαιτέρω εξέλιξη.
- Ανίχνευση μαθητών με μαθησιακές ή και άλλες δυσκολίες.
- Αξιοποίηση εργαλείων κατασκευής περιεχομένου, όπως δημιουργία διδακτικού υλικού, δραστηριοτήτων, ασκήσεων (με κείμενο, εικόνες και, video,) και διαγωνισμάτων, με ταυτόχρονη μείωση του φόρτου εργασίας.
- Αλληλεπίδραση με μαθητές, σε πραγματικό χρόνο μέσω αναλυτικών στοιχείων, υποστηρίζοντας τη συνεχή αυτοβελτίωση.
- Ολιστική αξιολόγηση δασκάλων μέσω πολυτροπικών δεδομένων (βίντεο, ανατροφοδότησης μαθητών, αποτελέσματα).
- Βελτίωση αναστοχαστικής πρακτικής και δεξιοτήτων μέσω ανατροφοδότησης.
- Βοήθεια στη συλλογή και οργάνωση πληροφοριών, στη σύνοψη, στην ανάλυση και ερμηνεία δεδομένων.
- Βοήθεια στη διδασκαλία ή την εκμάθηση ξένων γλωσσών, καθώς και στις μεταφράσεις.
- Παροχή αυτοματοποιημένων εργαλείων αξιολόγησης και ανατροφοδότησης, αναλύοντας τις γραπτές απαντήσεις μαθητών και τα δεδομένα μάθησης.
- Υποστήριξη Διδασκαλίας και Σχεδιασμού Μαθημάτων με την υπόδειξη αποτελεσματικών πλάνων διδασκαλίας (ως προσωπικός βοηθός). Βελτίωση της διδασκαλίας με προσαρμογή διδακτικών στρατηγικών, δραστηριοτήτων και μαθησιακών εμπειριών.
- Δημιουργία εικονικών βοηθών διδασκαλίας με χρήση μεγάλων γλωσσικών μοντέλων που μιμούνται την ανθρώπινη συνομιλία και μπορούν να απαντούν σε συχνές ερωτήσεις, να παρέχουν πόρους και να προσφέρουν υποστήριξη, αποδεσμεύοντας κατά τι τους εκπαιδευτικούς, ώστε να επικεντρώνονται αυτοί στη διδασκαλία.
- Δημιουργία «εικονικών μεντόρων» με χρήση μεγάλων γλωσσικών μοντέλων που μιμούνται την ανθρώπινη συνομιλία και μπορούν να λειτουργήσουν ως σύμβουλοι μάθησης, να παρέχουν συνεχή υποστήριξη, άμεση ανατροφοδότηση και να απαντούν σε ερωτήσεις δασκάλων.

- Προσομοιωμένες τάξεις με «εικονικούς μαθητές» (επαυξημένη πραγματικότητα) για εξάσκηση σε διαχείριση τάξης και σε παιδαγωγικές στρατηγικές, επιτρέποντας στους εκπαιδευτικούς να εξασκούνται στην αντιμετώπιση προκλήσεων που συναντούν στην τάξη, με σκοπό την υστερότερη προετοιμασία τους για τις απαιτητικές πραγματικές συνθήκες τάξης. Οι προσομοιώσεις δημιουργούν έναν ασφαλή χώρο για να για να δοκιμαστούν νέες στρατηγικές χωρίς την πίεση της πραγματικής τάξης.
- Μείωση και απλοποίηση της γραφειοκρατίας και του διοικητικού φόρτου (αυτοματοποίηση διοικητικών εργασιών, προετοιμασία μαθημάτων, βελτιώσεις διδακτικών μεθοδολογιών, προσωπική πρόοδος, χρόνος για έρευνα, διαχείριση απουσιών κ.λπ.) με εξοικονόμηση πολύτιμου χρόνου, ώστε να διατεθεί αυτός σε ανεύρεση τρόπων για βελτίωση του διδακτικού και παιδαγωγικού και αναστοχαστικού έργου.
- Βοήθεια για επιστημονικό ή και άλλο γράψιμο με ενεργοποίηση συνθηκών καταιγισμού ιδεών.
- Βοήθεια στη δημιουργία κώδικα.
- Ανίχνευση λογοκλοπής, και κειμένων παραγόμενων από εργαλεία ΤΝ.
- Καθοδήγηση σε ηθικά ζητήματα (π.χ. πώς να χειριστεί ο εκπαιδευτικός ευαίσθητες καταστάσεις στην τάξη).
- Δημιουργία Κοινοτήτων Μάθησης και Πρακτικής, ώστε να ενισχυθεί η συνεργατική μάθηση και η ανταλλαγής γνώσεων και πρακτικών, μεταξύ εκπαιδευτικών με παρόμοια ενδιαφέροντα ή ανάγκες.
- 24ωρη διαθεσιμότητα.

Γενικά, η ΤΝ δημιουργεί προσωποποιημένες διαδρομές μάθησης (προσαρμοστικές μαθησιακές διαδρομές) για τους δασκάλους, προσαρμόζοντας το υλικό και τους ρυθμούς μάθησης στις ανάγκες κάθε εκπαιδευτικού. Η ΤΝ υποστηρίζει την ασύγχρονη Επαγγελματική Ανάπτυξη αναδεικνύοντας μικρομαθήματα, πόρους και προσομοιώσεις με βάση τους ατομικούς στόχους και τις διδακτικές προτεραιότητες. Οι εκπαιδευτικοί μπορούν να μαθαίνουν με τον δικό τους ρυθμό, υιοθετώντας περιεχόμενο με βάση τα ενδιαφέροντα, τους στόχους, τις προηγούμενες αξιολογήσεις τους ή τα δεδομένα της τάξης τους. Αυτή η ανάλυση και η αξιολόγηση των δεδομένων απόδοσης των εκπαιδευτικών μπορεί να εντοπίσει τομείς, όπου οι εκπαιδευτικοί μπορεί να χρειάζονται περαιτέρω ανάπτυξη ή υποστήριξη. Επιπλέον, τα συστήματα ΤΝ μπορούν να παρέχουν συστάσεις για ευκαιρίες επαγγελματικής ανάπτυξης αλλά και υποστήριξη για μια διά βίου μάθηση. Ακόμη, η ΤΝ μπορεί να προσφέρει συνεχείς ευκαιρίες μάθησης, μέσω κουίζ, εξατομικευμένων σχεδίων μαθημάτων αλλά και μέσω μικρομάθησης (micro-learning), μιας τεχνικής που εστιάζεται σε σύντομες δραστηριότητες μάθησης.

Τα αποτελέσματα δείχνουν ότι η ΤΝ βελτιώνει τα μαθησιακά αποτελέσματα, αλλά χρειάζεται σχολαστική εφαρμογή για να ξεπεραστούν προκλήσεις και εμπόδια πρόσβασης και ηθικής (Saleem et al., 2025). Σε κάθε περίπτωση, η αποτελεσματική ενσωμάτωση των συστημάτων ΤΝ στην εκπαιδευτική διαδικασία απαιτεί την αντιμετώπιση προκλήσεων που σχετίζονται με τις υποδομές, την εκπαίδευση των εκπαιδευτικών και τις ηθικές ανησυχίες (Kotsis, 2025). Οι ανησυχίες για την προστασία της ιδιωτικής ζωής και της ασφάλειας, η έλλειψη εμπιστοσύνης, το κόστος και η πιθανή μεροληψία είναι μερικές από τις προκλήσεις που πρέπει να αντιμετωπιστούν (Harry, 2023). Η ικανότητα της ΤΝ να συλλέγει, να επεξεργάζεται και να αναλύει τεράστια σύνολα δεδομένων επιτρέπει την απόκτηση ισχυρών πληροφοριών, αλλά εισάγει, επίσης, σημαντικές ανησυχίες για την περιφρούρηση των προσωπικών δεδομένων και την ασφάλεια (Paul, 2024). Ακόμη, το περιεχόμενο, που δημιουργείται από εργαλεία της ΤΝ, μπορεί να περιέχει λάθη, παραπλανητικές και ψευδείς πληροφορίες ή να είναι επιστημονικά ανακριβές. Επιπλέον, και ηθικά ζητήματα ακαδημαϊκής πρωτοτυπίας και εντιμότητας μπορεί να ανακύπτουν με τη λογοκλοπή, την εξαπάτηση, την άδικη και μεροληπτική αξιολόγηση μάθησης. Τα κείμενα που παράγονται από την ΤΝ είναι, μάλλον, δύσκολο να εντοπιστούν, αν και τελευταία έχουν παρουσιαστεί σχετικά αξιόπιστες πλατφόρμες, όπως η detectable.ai και smodin.io., που εντοπίζουν σε πιθανοτική βάση, κείμενα που μπορεί να παρήχθησαν με ΤΝ. Ανησυχίες υπάρχουν, όσον αφορά και σε μια πιθανή υπερβολική εξάρτηση από τα συστήματα ΤΝ, η οποία μπορεί να ενθαρρύνει την επιφανειακή μάθηση, αποδυναμώνοντας τη δημιουργικότητα και καταστρατηγώντας τις δεξιότητες κοινωνικής, αναλυτικής και κριτικής σκέψης εκπαιδευτικών και μαθητών αλλά και τις δεξιότητες λήψης αποφάσεων, φαντασίας, καινοτομίας, έρευνας και επίλυσης προβλημάτων. Τέλος, ενστάσεις διατυπώνονται και για τον πιθανό περιορισμό του ρόλου των εκπαιδευτικών, επειδή η τεχνολογία αναλαμβάνει κάποια τμήματα των δράσεων και των καθηκόντων τους.

ΣΥΖΗΤΗΣΗ, ΣΥΜΠΕΡΑΣΜΑΤΑ, ΠΡΟΤΑΣΕΙΣ

Η παρούσα εργασία επιχειρηματολόγησε υπέρ της κομβικής σπουδαιότητας της επιμόρφωσης των εκπαιδευτικών, η οποία επιβάλλεται να είναι συστηματική, περιοδική καλά οργανωμένη και στοχευμένη, υπό την κάθετη προϋπόθεση, ωστόσο, ότι θα εστιάζεται περισσότερο στην πράξη, αποφεύγοντας εξαντλητικές και πληκτικές θεωρητικοποιήσεις, ώστε οι συμμετέχοντες εκπαιδευτικοί να αποκομίζουν απτά οφέλη, τα οποία θα μετουσιώνουν αμέσως σε πράξη, σύμφωνα με τις προτάσεις και τις εισηγήσεις των επιμορφωτικών συνεδριών. Η επένδυση στην επαγγελματική και επιστημονική αναβάθμιση των εκπαιδευτικών πρέπει να αποτελεί ύψιστη προτεραιότητα για κάθε

πολιτεία με φωτεινό όραμα, επειδή οδηγεί σε υπεύθυνους, αφοσιωμένους και καλά καταρτισμένους λειτουργούς, που προάγουν, σε βάθος χρόνου, την ποιότητα του εκπαιδευτικού έργου.

Σήμερα που η πρόοδος της ΤΝ έφερε σκηνές και εξελίξεις από το μακρινό μέλλον, η ανάγκη κατάλληλης και ευρείας επιμόρφωσης των εκπαιδευτικών, όσον αφορά στην αξιοποίηση των αναδυόμενων τεχνολογιών, ιδιαίτερα των εργαλείων της ΤΝ, είναι αδιαπραγμάτευτη, για να δημιουργηθούν ευφυή εκπαιδευτικά περιβάλλοντα, ενισχυμένα από τα πολλά πλεονεκτήματα των συστημάτων της ΤΝ. Οι πολλές εφαρμογές της ΤΝ, που αναβαθμίζουν το επαγγελματικό και επιστημονικό στάτους των εκπαιδευτικών, διευκολύνουν και ενισχύουν τη μαθησιακή διαδικασία, δεδομένου ότι δίνουν τη δυνατότητα στους δασκάλους να κατανοούν καλύτερα τις ανάγκες των μαθητών και να προσαρμόσουν ανάλογα εξατομικευμένες διδακτικές παρεμβάσεις. Επιπλέον, οι εικονικοί βοηθοί και διάφοροι προσομοιωτές βελτιώνουν τις ψηφιακές δεξιότητες των εκπαιδευτικών, προσφέρουν άμεσες ανατροφοδοτήσεις και προτείνουν τρόπους για να εφαρμοστούν τα αποτελέσματα, σε πραγματικές καταστάσεις, κάνοντας τη μάθηση πιο πρακτική και πιο αποδοτική.

Γενικά η αξιοποίηση της ΤΝ στην εκπαίδευση παρότι παρέχει πολλά οφέλη, θέτει όμως και ορισμένες προκλήσεις. Οι δεοντολογικές ανησυχίες για την προφύλαξη της ιδιωτικότητας, οι ηθικές παράμετροι και οι ενδεχόμενες προκαταλήψεις είναι απαραίτητο να υπερνικηθούν επιμελώς, με σκοπό να εξασφαλιστεί η υπεύθυνη και πρεπούμενη χρήση αυτών των τεχνολογιών της ΤΝ. Ο τρόπος κριτικής χρήσης της ΤΝ είναι η ασφαλέστερη οδός, ώστε οι παρεμβάσεις των εκπαιδευτικών να συνεχίσουν να διέπονται από υψηλή ακαδημαϊκότητα, εντιμότητα και αποτελεσματικότητα.

Καθώς η ΤΝ έχει υπεισέλθει παντού, είναι αδύνατον για οποιονδήποτε (ειδικά για έναν εκπαιδευτικό) να εθελοτυφλήσει και να παρακάμψει ή να απαλλαχθεί από το δίχτυ της, με το οποίο περιβάλλει πια το ανθρώπινο συγκείμενο. Για να διασφαλιστεί ότι η ΤΝ χρησιμοποιείται στο μέγιστο των δυνατοτήτων της στην εκπαίδευση των εκπαιδευτικών, είναι απαραίτητο να αναπτυχθεί ένα ολοκληρωμένο, αυστηρό πλαίσιο που θα μπορεί να εγγυάται τη σωστή χρήση της, δεδομένου ότι οι ηθικές και νομικές πτυχές της ενσωμάτωσης της ΤΝ είναι πολυσύνθετες και περίπλοκες. Οι εκπαιδευτικοί, μέσω της επαγγελματικής αναβάθμισής τους και την εξοικείωσή τους με τα τεχνολογικά εργαλεία είναι πιθανό ότι θα αποκτήσουν τις γνώσεις και τις δεξιότητες, που απαιτούνται, για να καλλιεργήσουν ισχυρά, ποιοτικά και κονστρουκτιβιστικά περιβάλλοντα μάθησης, αλλά και να καταστούν ικανοί να αναλύουν κριτικά τις απαντήσεις της ΤΝ. Και φυσικά, ποτέ η ΤΝ δε θα λειτουργήσει ως υποκατάστατο του εκπαιδευτικού. Ουδέποτε θα τον αντικαταστήσει, απλώς θα τον υποστηρίζει, «παίρνοντας στην πλάτη της» πολύ από το καθημερινό δυσβάστακτο φορτίο του.

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ΨΗΦΙΑΚΗ ΕΠΙΜΟΡΦΩΣΗ & ΕΚΠΑΙΔΕΥΣΗ: Ο ΕΚΠΑΙΔΕΥΤΙΚΟΣ ΣΤΗΝ ΕΠΟΧΗ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

Πούλιος Χρήστος
Σύμβουλος Εκπαίδευσης ΠΕ81, ME.d,MSc,
ΔΔΕ Ιωαννίνων

ΠΕΡΙΛΗΨΗ

Η επαγγελματική ανάπτυξη των εκπαιδευτικών αποτελεί αναπόσπαστο στοιχείο της ποιοτικής εκπαίδευσης, ενώ οι ραγδαίες τεχνολογικές εξελίξεις δημιουργούν νέες δυνατότητες και προκλήσεις. Η παρούσα εργασία εξετάζει τη συμβολή της ψηφιακής επιμόρφωσης στην ενίσχυση της διδακτικής πρακτικής των εκπαιδευτικών, μέσα από τη χρήση καινοτόμων εργαλείων, όπως η εξ αποστάσεως εκπαίδευση, οι διαδικτυακές πλατφόρμες επιμόρφωσης, οι κοινότητες πρακτικής και η τεχνητή νοημοσύνη. Η ανάλυση βασίζεται σε βιβλιογραφική επισκόπηση και παρουσίαση επιλεγμένων παραδειγμάτων εφαρμογής από την ευρωπαϊκή και κυπριακή εκπαιδευτική πραγματικότητα.

Λέξεις-κλειδιά: Ψηφιακή επιμόρφωση, εκπαιδευτικοί, εξ αποστάσεως εκπαίδευση, τεχνητή νοημοσύνη, επαγγελματική ανάπτυξη.

ΕΙΣΑΓΩΓΗ

Η συνεχής επαγγελματική ανάπτυξη των εκπαιδευτικών αποτελεί ζωτικής σημασίας παράγοντα για την αναβάθμιση της ποιότητας της εκπαίδευσης σε ένα ταχέως μεταβαλλόμενο περιβάλλον (Darling-Hammond et al., 2017). Καθώς οι εκπαιδευτικές τεχνολογίες εξελίσσονται και οι κοινωνικές ανάγκες διαφοροποιούνται, οι εκπαιδευτικοί καλούνται να αποκτήσουν νέες δεξιότητες, να προσαρμοστούν σε καινοτόμες διδακτικές μεθόδους και να αξιοποιούν δημιουργικά τα ψηφιακά εργαλεία. Η πανδημία COVID-19 επιτάχυνε τη μετάβαση στην ψηφιακή μάθηση, αναδεικνύοντας τη σημασία της ψηφιακής επιμόρφωσης για την ενίσχυση της εκπαιδευτικής ετοιμότητας και ανθεκτικότητας (Trust & Whalen, 2020).

Παράλληλα, παρατηρείται στροφή προς πιο ευέλικτες και εξατομικευμένες μορφές επαγγελματικής ανάπτυξης, που βασίζονται σε διαδικτυακές πλατφόρμες, ψηφιακές κοινότητες πρακτικής και τεχνολογίες τεχνητής νοημοσύνης (Zhang et al., 2023). Αυτές οι τεχνολογικές εξελίξεις προσφέρουν τη δυνατότητα στους εκπαιδευτικούς να επιμορφώνονται συνεχώς, προσαρμοσμένα στις ανάγκες τους, ανεξάρτητα από γεωγραφικούς ή χρονικούς περιορισμούς (König et al., 2020).

Η ποιότητα της εκπαίδευσης εξαρτάται σε μεγάλο βαθμό από το επίπεδο επαγγελματικής ανάπτυξης των εκπαιδευτικών. Η ταχεία εξέλιξη των ψηφιακών τεχνολογιών έχει επηρεάσει τη φύση της διδασκαλίας και της μάθησης, δημιουργώντας την ανάγκη για συνεχή ανανέωση των δεξιοτήτων των εκπαιδευτικών (Kraft & Papay, 2019). Ειδικότερα, η ενσωμάτωση καινοτόμων τεχνολογικών εργαλείων στην επιμόρφωση δημιουργεί ευκαιρίες για εξατομικευμένη, προσβάσιμη και ευέλικτη επαγγελματική ανάπτυξη (Collins & Halverson, 2020).

Η παρούσα εργασία επικεντρώνεται στη διερεύνηση των ευκαιριών και των προκλήσεων που σχετίζονται με την ψηφιακή επιμόρφωση, παρουσιάζοντας μελέτες περίπτωσης από επιτυχημένα προγράμματα, όπως τα MOOCs for Teachers, το SELFIE, το πρόγραμμα Καινοτόμα Σχολεία και Εκπαιδευτικοί Πυρήνες, το eTwinning και η αξιοποίηση της τεχνητής νοημοσύνης στην επαγγελματική ανάπτυξη.

ΘΕΩΡΗΤΙΚΌ ΠΛΑΙΣΙΟ

Η επαγγελματική ανάπτυξη των εκπαιδευτικών ορίζεται ως η συνεχής διαδικασία μέσω της οποίας οι εκπαιδευτικοί βελτιώνουν τις γνώσεις, τις δεξιότητες και τις στάσεις τους, με σκοπό την αναβάθμιση της διδακτικής πρακτικής και της μαθησιακής εμπειρίας (Guskey, 2002). Η έννοια της ψηφιακής επιμόρφωσης εντάσσεται σε αυτό το πλαίσιο, προσφέροντας σύγχρονες προσεγγίσεις μέσω της αξιοποίησης τεχνολογικών εργαλείων, εξ αποστάσεως μαθησιακών μοντέλων και συστημάτων υποστήριξης βασισμένων στην τεχνητή νοημοσύνη (Redecker & Punie, 2017).

Η θεωρία των Κοινοτήτων Πρακτικής (Communities of Practice) του Wenger (1998) προσφέρει σημαντικές θεωρητικές βάσεις για την κατανόηση της συνεργατικής μάθησης μεταξύ εκπαιδευτικών σε ψηφιακά περιβάλλοντα. Παράλληλα, η θεωρία του Συνδετισμού (Connectivism) του Siemens (2005) υπογραμμίζει τη σημασία της δημιουργίας και αξιοποίησης ψηφιακών δικτύων μάθησης. Οι θεωρίες αυτές εναρμονίζονται με την αυξανόμενη χρήση ψηφιακών πλατφορμών, MOOCs, και εργαλείων AI για την υποστήριξη της επαγγελματικής ανάπτυξης.

Σύγχρονες έρευνες έχουν δείξει ότι οι εκπαιδευτικοί που συμμετέχουν ενεργά σε ψηφιακά επιμορφωτικά προγράμματα αναπτύσσουν περισσότερες δεξιότητες παιδαγωγικής αξιοποίησης της τεχνολογίας και ενισχύουν τη μαθητοκεντρική προσέγγιση στη διδασκαλία (Voogt et al., 2015; Holmes et al., 2022). Ταυτόχρονα, επισημαίνεται η ανάγκη για συστηματική υποστήριξη, αξιολόγηση και ανάπτυξη πολιτικών που να διευκολύνουν την ισότιμη πρόσβαση στην ψηφιακή επιμόρφωση (European Schoolnet, 2023).

Η έννοια της επαγγελματικής ανάπτυξης αναφέρεται σε διαδικασίες μάθησης που αποσκοπούν στη συνεχή βελτίωση των γνώσεων, δεξιοτήτων και στάσεων των εκπαιδευτικών. Οι ψηφιακές τεχνολογίες έχουν μετασχηματίσει τον τρόπο που αυτή η ανάπτυξη πραγματοποιείται, επιτρέποντας τη δημιουργία προσαρμοσμένων, συνεργατικών και διαρκών μαθησιακών εμπειριών (Laurillard, 2022).

Η εξ αποστάσεως εκπαίδευση, οι διαδικτυακές κοινότητες πρακτικής και η τεχνητή νοημοσύνη αποτελούν βασικούς πυλώνες του νέου οικοσυστήματος επιμόρφωσης. Η αποτελεσματική ενσωμάτωσή τους εξαρτάται από παράγοντες όπως η ψηφιακή επάρκεια των εκπαιδευτικών, η τεχνολογική υποδομή και η παιδαγωγική στόχευση των προγραμμάτων (Wenger, 2020; OECD, 2021).

ΜΕΘΟΔΟΛΟΓΙΑ

Η παρούσα μελέτη βασίζεται σε ποιοτική και ποσοτική ανάλυση, με τη χρήση της μεθόδου βιβλιογραφικής ανασκόπησης και τη μελέτη περιπτώσεων (case study analysis). Η επιλογή της μεθοδολογίας αυτής αποσκοπεί στην εμβάθυνση της κατανόησης των πρακτικών και των εργαλείων ψηφιακής επιμόρφωσης που έχουν εφαρμοστεί με επιτυχία σε ευρωπαϊκό και διεθνές επίπεδο (Merriam & Tisdell, 2016).

Συγκεκριμένα, εξετάζονται πέντε επιλεγμένες περιπτώσεις: το εργαλείο SELFIE της Ευρωπαϊκής Επιτροπής, η πρωτοβουλία eTwinning, το πρόγραμμα "Καινοτόμα Σχολεία και Εκπαιδευτικοί Πυρήνες" στην Κύπρο, τα MOOCs για Εκπαιδευτικούς, καθώς και εφαρμογές Τεχνητής Νοημοσύνης στην επιμόρφωση. Η επιλογή αυτών των περιπτώσεων έγινε βάσει της επιστημονικής βιβλιογραφίας, της διαθεσιμότητας δεδομένων και της αντιπροσωπευτικότητας διαφορετικών μοντέλων ψηφιακής επιμόρφωσης.

Η ανάλυση πραγματοποιήθηκε βάσει θεματικής κατηγοριοποίησης, εστιάζοντας στις παραμέτρους: στόχοι και δομή κάθε προγράμματος, τρόποι εφαρμογής, παιδαγωγική αξία, τεχνολογικά εργαλεία, επίπεδα συμμετοχής και επιδράσεις στη διδακτική πρακτική. Επιπλέον, γίνεται χρήση επικαιροποιημένων πηγών και διεθνών οργανισμών (π.χ. OECD, UNESCO) για την τεκμηρίωση των ευρημάτων και την ανάδειξη τάσεων.

Η εργασία ακολουθεί μεθοδολογία ποιοτικής προσέγγισης, με βασικό εργαλείο την βιβλιογραφική ανασκόπηση και την ανάλυση μελετών περίπτωσης. Επιλέχθηκαν προγράμματα που έχουν τεκμηριωθεί μέσω δημοσιευμένων ερευνών ή επισήμων εκθέσεων διεθνών οργανισμών (UNESCO, European Commission, OECD). Για κάθε περίπτωση παρουσιάζεται τριμερής ανάλυση: (α) περιγραφή του προγράμματος, (β) αξιολόγηση των επιπτώσεων στην επαγγελματική ανάπτυξη και (γ) εντοπισμός προκλήσεων και δυνατοτήτων περαιτέρω ανάπτυξης.

ΜΕΛΕΤΕΣ ΠΕΡΙΠΤΩΣΗΣ

MOOCs for Teachers

Τα MOOCs (Massive Open Online Courses) αποτελούν σημαντικό εργαλείο για την ψηφιακή επιμόρφωση εκπαιδευτικών. Προγράμματα όπως αυτά που προσφέρονται από το Coursera και το European Schoolnet παρέχουν δωρεάν πρόσβαση σε εξειδικευμένα μαθήματα με παιδαγωγικό περιεχόμενο, προσαρμοσμένα στις ανάγκες των εκπαιδευτικών (Siemens, 2020).

Η συμμετοχή σε MOOCs ενισχύει την αυτονομία των εκπαιδευτικών, διευρύνει τους ορίζοντές τους και προσφέρει τη δυνατότητα σύγκρισης διεθνών πρακτικών. Έρευνες δείχνουν ότι η παρακολούθηση MOOCs συνδέεται με αυξημένη παιδαγωγική και τεχνολογική αυτοπεποίθηση (Luckin, 2021).

Ωστόσο, οι προκλήσεις περιλαμβάνουν την υψηλή εγκατάλειψη, την περιορισμένη διαδραστικότητα και την απουσία εξατομικευμένης υποστήριξης. Για να βελτιωθεί η αποτελεσματικότητα των MOOCs, προτείνεται η ενσωμάτωσή τους σε εθνικά προγράμματα επιμόρφωσης και η καθοδήγηση μέσω μέντορινγκ (Laurillard, 2022).

SELFIE – Εργαλείο Αυτοαξιολόγησης

Το SELFIE (Self-reflection on Effective Learning by Fostering Innovation through Educational Technologies) είναι ένα εργαλείο που βοηθά σχολικές μονάδες να αξιολογούν τη χρήση των ψηφιακών τεχνολογιών στη διδασκαλία και μάθηση (European Commission, 2020).

Το εργαλείο αυτό παρέχει εξατομικευμένη ανατροφοδότηση βάσει δεδομένων που συλλέγονται από εκπαιδευτικούς, μαθητές και διευθυντές. Η ανάλυση αυτών των δεδομένων επιτρέπει τον εντοπισμό αδυναμιών και την ανάπτυξη στρατηγικών για βελτίωση της ψηφιακής παιδαγωγικής (Garrison, 2020).

Η χρήση του SELFIE ενισχύει την κουλτούρα αναστοχασμού και την αυτορρύθμιση των επαγγελματικών πρακτικών. Ωστόσο, η επιτυχία του εξαρτάται από την ενεργό συμμετοχή όλων των εμπλεκομένων και την ύπαρξη κουλτούρας βελτίωσης (Redecker, 2021).

Μελέτη Περίπτωσης 1: Εφαρμογή του SELFIE σε Δημόσιο Γυμνάσιο στην Κύπρο

Η πρώτη μελέτη περίπτωσης επικεντρώνεται σε ένα δημόσιο γυμνάσιο της Κύπρου, το οποίο εντάχθηκε στο πρόγραμμα SELFIE της Ευρωπαϊκής Επιτροπής (European Commission, 2020). Η διαδικασία ξεκίνησε με τη

χαρτογράφηση της ψηφιακής ωριμότητας του σχολείου, μέσα από ερωτηματολόγια που απευθύνονταν σε μαθητές, εκπαιδευτικούς και διοίκηση. Τα αποτελέσματα αποκάλυψαν σημαντικά κενά στην ενσωμάτωση των ψηφιακών τεχνολογιών στην καθημερινή διδασκαλία, κυρίως λόγω έλλειψης επιμόρφωσης και καθοδήγησης στους εκπαιδευτικούς (Redecker, 2021).

Η διεύθυνση του σχολείου αξιοποίησε τα ευρήματα του SELFIE για να σχεδιάσει ένα στοχευμένο πλάνο επαγγελματικής ανάπτυξης των εκπαιδευτικών. Εφαρμόστηκαν εβδομαδιαία εργαστήρια με θέμα την ενσωμάτωση των ΤΠΕ στην εκπαιδευτική πρακτική, με έμφαση στη διαφοροποιημένη διδασκαλία και τη χρήση διαδραστικών εργαλείων (OECD, 2021). Επιπλέον, ενισχύθηκε η συνεργασία μεταξύ των εκπαιδευτικών μέσω δικτύων μάθησης, σύμφωνα με την προσέγγιση των «κοινοτήτων πρακτικής» (Wenger, 2020).

Μετά από έξι μήνες, το σχολείο παρουσίασε αισθητή βελτίωση στην αξιοποίηση ψηφιακών εργαλείων, καθώς και μεγαλύτερη εμπλοκή των μαθητών στη μαθησιακή διαδικασία. Οι εκπαιδευτικοί δήλωσαν αυξημένη αυτοπεποίθηση και ετοιμότητα στη χρήση ψηφιακών τεχνολογιών, ενώ το σχολείο επανασυμμετείχε στη διαδικασία SELFIE, επιβεβαιώνοντας την πρόοδό του.

Καινοτόμα Σχολεία και Εκπαιδευτικοί Πυρήνες (Κύπρος)

Το πρόγραμμα "Καινοτόμα Σχολεία" του Υπουργείου Παιδείας της Κύπρου εισήγαγε τις ψηφιακές τεχνολογίες στη διδασκαλία μέσω της δημιουργίας Εκπαιδευτικών Πυρήνων, που λειτουργούν ως κόμβοι επαγγελματικής μάθησης (Ministry of Education Cyprus, 2022).

Οι εκπαιδευτικοί που συμμετέχουν στους Πυρήνες αποκτούν πρόσβαση σε ψηφιακά εργαλεία, συμμετέχουν σε βιωματικά εργαστήρια και αναπτύσσουν συνεργατικά καινοτόμες διδακτικές πρακτικές. Το μοντέλο βασίζεται στη συλλογική μάθηση και την τοπική προσαρμογή των πρακτικών (Wenger, 2020).

Η επιτυχία του προγράμματος έγκειται στην ενίσχυση του επαγγελματισμού των εκπαιδευτικών και στην ανάπτυξη κουλτούρας εκπαιδευτικής καινοτομίας. Ωστόσο, απαιτείται σταθερή χρηματοδότηση και μακροπρόθεσμη υποστήριξη για τη διατήρησή του.

Πλατφόρμα eTwinning

Το eTwinning αποτελεί ευρωπαϊκή δράση που προωθεί τη συνεργασία μεταξύ εκπαιδευτικών και σχολείων μέσω της δημιουργίας κοινών ψηφιακών έργων (Redecker, 2021).

Η πλατφόρμα προσφέρει ευκαιρίες επαγγελματικής ανάπτυξης μέσω διαδικτυακών σεμιναρίων, κοινών δραστηριοτήτων και ανταλλαγής εμπειριών. Συμβάλλει στην ενίσχυση του ψηφιακού γραμματισμού και της διαπολιτισμικής συνείδησης των εκπαιδευτικών.

Η επιτυχία του eTwinning στηρίζεται στην αμοιβαία δέσμευση και στη δημιουργία βιώσιμων δικτύων μάθησης. Εντούτοις, οι τεχνολογικές ανισότητες και η περιορισμένη συμμετοχή από ορισμένα σχολεία αποτελούν προκλήσεις.

Μελέτη Περίπτωσης 3: Δίκτυο Εκπαιδευτικών σε Αγροτική Περιοχή μέσω eTwinning

Η τρίτη περίπτωση αφορά την ανάπτυξη ενός ψηφιακού δικτύου εκπαιδευτικών μέσω της πλατφόρμας eTwinning σε αγροτική περιοχή της Βόρειας Ελλάδας. Εκπαιδευτικοί από πέντε σχολεία συνεργάστηκαν για την υλοποίηση κοινών διαθεματικών σχεδίων δράσης με χρήση ψηφιακών εργαλείων (Redecker, 2021).

Η συμμετοχή στο πρόγραμμα οδήγησε σε συνεχή επιμόρφωση των εκπαιδευτικών μέσω ανταλλαγής καλών πρακτικών, από κοινού σχεδιασμού διδακτικών σεναρίων και αλληλοϋποστήριξης (Wenger, 2020). Επιπλέον, το eTwinning ενίσχυσε την εξωστρέφεια των σχολείων, ενσωματώνοντας διεθνείς συνεργασίες και δημιουργώντας κουλτούρα ψηφιακής καινοτομίας ακόμη και σε περιοχές με περιορισμένους πόρους.

Μαθητές και εκπαιδευτικοί ανέφεραν αυξημένο ενδιαφέρον για τα μαθήματα, βελτίωση στις ψηφιακές δεξιότητες και ενδυνάμωση των διαπροσωπικών σχέσεων. Η εμπειρία αυτή ανέδειξε την αξία της τεχνολογίας ως εργαλείου κοινότητας και ανάπτυξης επαγγελματικής ταυτότητας.

Τεχνητή Νοημοσύνη και Επιμόρφωση

Η τεχνητή νοημοσύνη (AI) προσφέρει δυνατότητες για εξατομικευμένη επιμόρφωση εκπαιδευτικών, μέσω της ανάλυσης δεδομένων απόδοσης και της παροχής στοχευμένης ανατροφοδότησης (Luckin, 2021).

Πλατφόρμες που ενσωματώνουν AI μπορούν να εντοπίζουν αδυναμίες, να προτείνουν εξατομικευμένες μαθησιακές διαδρομές και να υποστηρίζουν τη διαρκή επαγγελματική εξέλιξη. Αυτό διευκολύνει τη διαφοροποίηση της επιμόρφωσης, ιδιαίτερα σε μεγάλες εκπαιδευτικές κοινότητες (OECD, 2021).

Ωστόσο, η χρήση της AI εγείρει ζητήματα ηθικής, ιδιωτικότητας και διαφάνειας. Η ανάπτυξη σχετικών πολιτικών και η επιμόρφωση των εκπαιδευτικών σε ζητήματα ψηφιακής ηθικής είναι απαραίτητες προϋποθέσεις για την επιτυχημένη εφαρμογή.

Μελέτη Περίπτωσης 2: Καινοτόμο Πρόγραμμα Κατάρτισης Εκπαιδευτικών μέσω AI στην Αθήνα

Η δεύτερη μελέτη αφορά πιλοτικό πρόγραμμα που εφαρμόστηκε στην Αθήνα σε συνεργασία με ερευνητική ομάδα του ΕΚΠΑ, με στόχο την ενσωμάτωση της τεχνητής νοημοσύνης (AI) στην επαγγελματική ανάπτυξη των εκπαιδευτικών. Το πρόγραμμα, εμπνευσμένο από τις προτάσεις των Luckin (2021) και Zhang, Xu & Yan (2023), περιλάμβανε τη χρήση ψηφιακής πλατφόρμας με ενσωματωμένο προσαρμοστικό σύστημα τεχνητής νοημοσύνης.

Η πλατφόρμα ανέλυε τις ανάγκες κάθε εκπαιδευτικού βάσει των απαντήσεών του σε αυτοαξιολογήσεις και του ψηφιακού του αποτυπώματος κατά την πλοήγηση σε υλικά. Ανάλογα, πρότεινε εξατομικευμένες διαδρομές μάθησης, με σύγχρονες και ασύγχρονες δραστηριότητες. Η τεχνητή νοημοσύνη υποστήριζε επίσης την ανατροφοδότηση, με χρήση τεχνικών επεξεργασίας φυσικής γλώσσας (NLP), και παρείχε ειδοποιήσεις για ενδυνάμωση δεξιοτήτων σε πραγματικό χρόνο (Holmes et al., 2022).

Η ανταπόκριση των συμμετεχόντων ήταν θετική. Οι περισσότεροι ανέφεραν ενίσχυση των ψηφιακών δεξιοτήτων και καλύτερη προσαρμογή στις ανάγκες τους σε σύγκριση με τις παραδοσιακές μορφές κατάρτισης. Παρά τις τεχνολογικές προκλήσεις και την αρχική επιφυλακτικότητα, η διαρκής υποστήριξη της ερευνητικής ομάδας και η χρηστικότητα της πλατφόρμας συνέβαλαν στην επιτυχία του προγράμματος.

ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΠΡΟΤΑΣΕΙΣ ΠΟΛΙΤΙΚΗΣ

Η ανάλυση έδειξε ότι τα ψηφιακά εργαλεία και οι νέες τεχνολογίες μπορούν να αποτελέσουν ισχυρούς μοχλούς επαγγελματικής ανάπτυξης. Η συμμετοχή των εκπαιδευτικών σε ψηφιακές κοινότητες, η πρόσβαση σε εξατομικευμένο περιεχόμενο και η χρήση εργαλείων όπως το SELFIE ή η τεχνητή νοημοσύνη ενισχύουν τη διδασκαλία και τη μαθησιακή εμπειρία.

Ωστόσο, η επιτυχής ενσωμάτωση των ψηφιακών εργαλείων εξαρτάται από τη διαμόρφωση κατάλληλων πολιτικών, την επένδυση στην ψηφιακή υποδομή και την καλλιέργεια μιας κουλτούρας δια βίου μάθησης. Συνιστάται η ενίσχυση της επιμόρφωσης των εκπαιδευτικών σε ψηφιακές δεξιότητες, η ανάπτυξη συστημάτων υποστήριξης και η αξιολόγηση των επιμορφωτικών παρεμβάσεων με βάση τεκμηριωμένα δεδομένα.

Η ανάλυση των τριών μελετών περίπτωσης φανερώνει πως η επαγγελματική ανάπτυξη των εκπαιδευτικών στη ψηφιακή εποχή δεν μπορεί να περιορίζεται σε μονοδιάστατες επιμορφώσεις. Αντιθέτως, απαιτείται ένα πολυδιάστατο, ευέλικτο και προσαρμοστικό σύστημα υποστήριξης, το οποίο αξιοποιεί τεχνολογικά εργαλεία, δίκτυα συνεργασίας και την τεχνητή νοημοσύνη.

Η χρήση εργαλείων όπως το SELFIE ενισχύει την αυτογνωσία των σχολείων και κατευθύνει τις παρεμβάσεις. Η ενσωμάτωση AI δίνει νέες δυνατότητες στην εξατομίκευση της μάθησης των εκπαιδευτικών, ενώ τα δίκτυα όπως το eTwinning ενισχύουν την επαγγελματική κοινότητα, ειδικά σε απομονωμένα ή υποστηριζόμενα περιβάλλοντα.

Ωστόσο, η επιτυχία τέτοιων παρεμβάσεων εξαρτάται από τη θεσμική υποστήριξη, την κουλτούρα συνεργασίας, και τη συνεχή ανατροφοδότηση. Οι εκπαιδευτικοί χρειάζονται όχι μόνο ψηφιακά εφόδια αλλά και εμπιστοσύνη, χρόνο και αναγνώριση για να μεταμορφώσουν την πρακτική τους.

Καταλήγοντας, η επαγγελματική ανάπτυξη των εκπαιδευτικών στην ψηφιακή εποχή αποτελεί θεμέλιο για τον μετασχηματισμό της εκπαίδευσης. Οι σύγχρονες πολιτικές πρέπει να ενσωματώνουν παιδαγωγικές, τεχνολογικές και κοινωνικές διαστάσεις, ώστε να απαντούν στις σύνθετες ανάγκες των εκπαιδευτικών κοινοτήτων.

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ΑΝΤΙΛΗΨΕΙΣ ΚΑΙ ΑΠΟΨΕΙΣ ΕΝ ΔΥΝΑΜΕΙ ΛΟΓΟΘΕΡΑΠΕΥΤΩΝ ΓΙΑ ΤΗΝ ΧΡΗΣΗ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ ΤΗΣ ΟΦΘΑΛΜΟΚΙΝΗΣΗΣ ΣΤΙΣ ΔΕΞΙΟΤΗΤΕΣ ΑΝΑΓΝΩΣΗΣ

Πεκλάρη Βασιλική
Μόνιμη εκπαιδευτικός, φιλόλογος ΠΕ02 ΕΑΕ, MSc,
Υποψήφια Διδάκτωρ,
Τμήμα Λογοθεραπείας
Πανεπιστήμιο Ιωαννίνων,
Πανεπιστημιούπολη Β', 45500 Ιωάννινα
e-mail: vpeklari@uoi.gr

Τόκη Ευγενία
Καθηγήτρια,
Τμήμα Λογοθεραπείας
Πανεπιστήμιο Ιωαννίνων
Πανεπιστημιούπολη Β', 45500 Ιωάννινα
e-mail: toki@uoi.gr

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τη χρήση της τεχνολογίας οφθαλμοκίνησης (eye-tracking) για τη διάγνωση και την παρέμβαση σε αναγνωστικές δυσκολίες, εστιάζοντας στις αντιλήψεις των φοιτητών/τριών του Τμήματος Λογοθεραπείας του Πανεπιστημίου Ιωαννίνων. Σκοπός της έρευνας είναι να καταγράψει σε ποιον βαθμό οι φοιτητές/τριες αντιλαμβάνονται τα οφέλη αυτής της τεχνολογίας, ποια είναι η στάση τους ως προς την ενσωμάτωσή της στην κλινική πράξη της Λογοθεραπείας και ποιες δυσκολίες ενδέχεται να συναντήσουν κατά την εφαρμογή της. Το δείγμα της έρευνας αποτελείται από 49 προπτυχιακούς φοιτητές/τριες (Α:5, Γ:44) που επέλεξαν να συμμετέχουν απαντώντας σε ανώνυμο ερωτηματολόγιο. Τα αποτελέσματα υποδεικνύουν ότι οι φοιτητές αναγνωρίζουν τη σημαντική συμβολή της τεχνολογίας στην ενίσχυση της διαγνωστικής ακρίβειας και στην ανάπτυξη εξατομικευμένων θεραπευτικών παρεμβάσεων. Ωστόσο, εντοπίζονται προκλήσεις όπως το υψηλό κόστος εξοπλισμού, η ανάγκη εξειδικευμένης εκπαίδευσης και η δυσκολία ενσωμάτωσης της τεχνολογίας σε καθιερωμένες παρεμβατικές πρακτικές. Προτείνεται από τους εν δυνάμει λογοθεραπευτές η μελλοντική έρευνα να εστιάσει στη διερεύνηση της ένταξης της τεχνολογίας οφθαλμοκίνησης στην εκπαίδευση Λογοθεραπευτών ή/και άλλων συναφών ειδικοτήτων, με στόχο την ενίσχυση των κλινικών δεξιοτήτων των μελλοντικών επαγγελματιών αλλά και την αποτελεσματική αξιοποίησή της στην πρώιμη ανίχνευση και παρέμβαση σε δυσκολίες που επηρεάζουν τη δεξιότητα της ανάγνωσης.

Λέξεις-κλειδιά: Τεχνολογία οφθαλμοκίνησης, αξιολόγηση αναγνωστικών δυσκολιών, παρακολούθηση οφθαλμικών κινήσεων, διάγνωση και παρέμβαση, λογοθεραπεία και τεχνολογία.

ΕΙΣΑΓΩΓΗ

Η πορεία προς την κατάκτηση της αναγνωστικής δεξιότητας αποτελεί μια σύνθετη διαδικασία που απαιτεί τον συνδυασμό πολλών αλληλένδετων γνωστικών μηχανισμών (Baixauli et al., 2021). Ιδιαίτερη βαρύτητα αποδίδεται στη φωνολογική ενημερότητα, δηλαδή στην ικανότητα του ατόμου να αναγνωρίζει τους ήχους της γλώσσας (φωνήματα, συλλαβές, λέξεις) και να κατανοεί τη σχέση τους με τα γραπτά σύμβολα. Η δεξιότητα αυτή διαδραματίζει καθοριστικό ρόλο στη διευκόλυνση της αναγνώρισης και κατανόησης των λέξεων και, κατά συνέπεια, στην επιτυχή εκμάθηση της ανάγνωσης (Altamimi, 2024).

Εξίσου κρίσιμες παράμετροι για την αναγνωστική επάρκεια είναι η αποκωδικοποίηση, η αναγνωστική ευχέρεια και η κατανόηση. Συγκεκριμένα, η φωνολογική ενημερότητα αποτελεί το θεμέλιο για την ανάπτυξη της αποκωδικοποίησης, δηλαδή της ικανότητας να μετατρέπονται τα γραπτά σύμβολα σε προφορικούς ήχους. Στη συνέχεια, η αναγνωστική ευχέρεια εστιάζει στην ταχύτητα, την ακρίβεια, την εκφραστικότητα και τη ροή της ανάγνωσης (Toki, 2024). Αφού η διαδικασία της αποκωδικοποίησης αυτοματοποιηθεί, ο αναγνώστης μπορεί να επικεντρωθεί στην κατανόηση του περιεχομένου. Η κατανόηση, ως ανώτερη φάση της αναγνωστικής διαδικασίας, απαιτεί την ερμηνεία και ανάλυση των πληροφοριών του κειμένου, μέσω της σύνδεσής τους με τις προϋπάρχουσες γνώσεις (Snowling et al., 2022).

Η πορεία για την κατάκτηση της αναγνωστικής δεξιότητας δεν εξελίσσεται με τον ίδιο ρυθμό σε όλα τα άτομα. Για τους/τις τυπικούς/ες αναγνώστες/στριες η ανάγνωση σταδιακά αυτοματοποιείται, επιτρέποντας την εστίαση στην κατανόηση των νοημάτων που απορρέουν από τη συνεχή ροή του λόγου. Αντίθετα, στα άτομα με νευροαναπτυξιακές διαταραχές, όπως η Δυσλεξία, η αναγνωστική διαδικασία επηρεάζεται από βιολογικούς και περιβαλλοντικούς παράγοντες. Αυτοί συχνά διαταράσσουν την ακρίβεια λέξεων και περιορίζουν την αυτοματοποίηση της αποκωδικοποίησης. Επιπλέον, παρατηρούνται ελλείμματα στην οπτική προσοχή, τόσο σε άτομα με Δυσλεξία όσο και με ΔΕΠ-Υ καθιστώντας τη διαδικασία της ανάγνωσης λιγότερο αυτοματοποιημένη (Vajs et al., 2022; Luke et al., 2024). Παράλληλα, ελλείμματα στην οπτική προσοχή παρατηρούνται τόσο σε άτομα με Δυσλεξία όσο και σε εκείνα με Διαταραχή Ελλειμματικής Προσοχής και Υπερκινητικότητας (ADHD). Τα άτομα αυτά εμφανίζονται σαφώς βραδύτερα σε σειριακές δοκιμασίες αναζήτησης συγκριτικά με τα συνομήλικά τους με τυπική ανάπτυξη, γεγονός που υποδηλώνει δυσκολίες στη διαχείριση της οπτικής πληροφορίας (Hokken et al., 2023). Εκτός από την αποκωδικοποίηση μεμονωμένων λέξεων ή φράσεων, διαπιστώνονται ελλείμματα και στο πεδίο της κατανόησης. Όταν μάλιστα συνυπάρχουν Δυσλεξία και ADHD, οι γνωστικές δυσκολίες εντείνονται, επηρεάζοντας κρίσιμες λειτουργίες, όπως η εργαζόμενη μνήμη, η ταχεία ονομασία και η ταχύτητα επεξεργασίας των ερεθισμάτων. Τα ερευνητικά δεδομένα δείχνουν ότι η ελλειμματική προσοχή σχετίζεται με χαμηλή αναγνωστική επίδοση, ενώ η υπερκινητικότητα φαίνεται να επιδρά αρνητικά στη συγκέντρωση και στη σταθερότητα κατά την αναγνωστική διαδικασία (Caldani et al., 2022). Επιπρόσθετα τα άτομα με Διαταραχή Αυτιστικού Φάσματος (ASD) συχνά δυσκολεύονται να εφαρμόσουν συστηματικές στρατηγικές ανάγνωσης. Τείνουν να βασίζονται σε προσωπικές, εσωτερικές εμπειρίες, γεγονός που μπορεί να επηρεάσει την κατανόηση του νοήματος (Micai et al., 2021). Η γνωστική ευελιξία, η οποία συνιστά μία από τις βασικές εκτελεστικές λειτουργίες, πλήττεται σε μεγάλο βαθμό σε αυτόν τον πληθυσμό. Κατά συνέπεια, τα άτομα με ASD ενδέχεται να δυσκολεύονται να προσαρμόσουν αποτελεσματικά τις στρατηγικές τους κατά την ανάγνωση, κάτι που επηρεάζει την ευρύτερη αναγνωστική τους απόδοση (Baixauli et al., 2021).

Τα τελευταία χρόνια, η ανάπτυξη καινοτόμων τεχνολογικών εργαλείων έχει συμβάλει σημαντικά στη διάγνωση γλωσσικών και γνωστικών διαταραχών. Ενδεικτικά παραδείγματα είναι η εφαρμογή νευρωνικών δικτύων σε βιομετρικά σύνολα δεδομένων (Toki et al., 2023), η χρήση ταξινομητικών τεχνικών σε δεδομένα της πλατφόρμας SmartSpeech (Toki et al., 2023), καθώς και διαδικτυακά διαγνωστικά εργαλεία, όπως το **Askisi-SD,** τα οποία στοχεύουν στην ανίχνευση ορθογραφικών και γνωστικών ελλειμμάτων (Zygouris et al., 2025). Παράλληλα, έχει σημειωθεί πρόοδος στην ενσωμάτωση τεχνικών μηχανικής μάθησης, μέσω της αξιοποίησης «σοβαρών παιχνιδιών», για την ανίχνευση νευροαναπτυξιακών διαταραχών. Οι προσεγγίσεις αυτές αποσκοπούν στον πρώιμο εντοπισμό δυσκολιών, κάνοντας χρήση φιλικών προς τον χρήστη, αυτοματοποιημένων και υψηλής ακρίβειας εργαλείων (Toki et al., 2024).

Μέσα σε αυτό το πλαίσιο, μια ιδιαίτερα υποσχόμενη μέθοδος για την εξέταση της οπτικής προσοχής, η οποία σχετίζεται άμεσα με αναπτυξιακές διαταραχές, είναι η τεχνολογία οφθαλμοκίνησης (eye-tracking) (Wang et al., 2023). Η συγκεκριμένη τεχνική, αν και αναπτύχθηκε ήδη από τη δεκαετία του 1950 για τη μέτρηση των κινήσεων των ματιών με αντικειμενικό τρόπο, βρίσκει τα τελευταία χρόνια εφαρμογή και στον τομέα της εκπαίδευσης (Chan et al., 2022). Πρόκειται για μια μη επεμβατική, εύχρηστη τεχνολογία, η οποία καταγράφει το σημείο εστίασης του βλέμματος και προσφέρει πολύτιμες πληροφορίες σχετικά με την οπτική προσοχή, καθιστώντας την χρήσιμη και στη λογοθεραπευτική πρακτική (Toki et al., 2023).

Κατά τη διαδικασία, το άτομο κάθεται μπροστά σε μια οθόνη εξοπλισμένη με ειδικούς αισθητήρες. Καθώς εκτελεί οπτικές εργασίες ή διαβάζει, οι αισθητήρες καταγράφουν τις κινήσεις των ματιών και τα δεδομένα αξιοποιούνται

για ανάλυση. Με τη χρήση υπέρυθρου φωτός καταγράφεται ο αριθμός και η χρονική διάρκεια των εστιάσεων σε λέξεις και φράσεις, παρέχοντας ενδείξεις για το επίπεδο δυσκολίας της επεξεργασίας τους. Επιπλέον, παρακολουθείται η ταχύτητα των οφθαλμικών κινήσεων, η κατεύθυνση του βλέμματος, καθώς και οι σακκαδικές κινήσεις, δηλαδή οι ταχείες μετακινήσεις του βλέμματος από το ένα σημείο στο άλλο (Da Silva Soares et al., 2023). Καταγράφονται επίσης οι οπισθοδρομικές εστιάσεις, που αποκαλύπτουν εάν και πότε ο αναγνώστης επιστρέφει σε προηγούμενες λέξεις, ενδεχομένως για να νοηματοδοτήσει εκ νέου το περιεχόμενο (Smyrnakis et al., 2021).

Η ανάλυση αυτών των δεδομένων παρέχει τη δυνατότητα κατανόησης των αναγνωστικών δυσκολιών, προσφέρει άμεση ανατροφοδότηση και διευκολύνει την αξιολόγηση της προόδου των μαθητών (Da Silva Soares et al., 2023). Ως εκ τούτου, η αξιοποίηση της τεχνολογίας οφθαλμοκίνησης μπορεί να συμβάλει ουσιαστικά τόσο στη γρήγορη και αντικειμενική διάγνωση όσο και στην πρώιμη παρέμβαση, μέσω της διαμόρφωσης εξατομικευμένων προγραμμάτων υποστήριξης για μαθητές με αναγνωστικές δυσκολίες (Andreadakis et al., 2022).

Ο σκοπός της παρούσας μελέτης είναι να διερευνήσει τις αντιλήψεις και απόψεις των προπτυχιακών φοιτητών/τριών του Τμήματος Λογοθεραπείας του Πανεπιστημίου Ιωαννίνων σχετικά με την εφαρμογή της τεχνολογίας της οφθαλμοκίνησης για τη διάγνωση και παρέμβαση σε αναγνωστικές δυσκολίες. Ειδικότερα, διερευνάται ο βαθμός επίγνωσης των φοιτητών ως προς τα οφέλη της τεχνολογίας, η στάση τους απέναντι στην ενσωμάτωσή της στη λογοθεραπευτική πρακτική, καθώς και οι προκλήσεις που ενδέχεται να συναντήσουν κατά την εφαρμογή της. Επιπλέον, εξετάζεται αν η προηγούμενη έκθεση ή εμπειρία των φοιτητών/τριών με την εν λόγω τεχνολογία επηρεάζει τη στάση τους ως προς τη χρησιμότητά της στην κλινική πράξη.

ΥΛΙΚΟ ΚΑΙ ΜΕΘΟΔΟΣ

Ερευνητικά ερωτήματα μελέτης

RQ1. Ποια είναι η συμβολή της τεχνολογίας eye tracking στη διάγνωση αναγνωστικών δυσκολιών;
RQ2. Ποια είναι η συμβολή του eye tracking στην παρέμβαση για αναγνωστικές δυσκολίες;
RQ3. Ποια είναι τα πλεονεκτήματα και οι παράγοντες που δυσχεραίνουν τη χρήση του eye tracking;

Δείγμα

Το δείγμα της έρευνας αποτελείται από 49 τριτοετείς φοιτητές/τριες του Τμήματος Λογοθεραπείας, εκ των οποίων 5 είναι άνδρες και 44 γυναίκες.

Διαδικασία και Μέθοδοι Συλλογής Δεδομένων

Για τη συλλογή των δεδομένων χρησιμοποιήθηκε η μέθοδος του αυτοεπιλεγμένου δείγματος. Από το σύνολο των 155 φοιτητών/τριών που προσκλήθηκαν να συμμετάσχουν, ανταποκρίθηκαν οι 49, οι οποίοι κλήθηκαν να συμπληρώσουν ένα ανώνυμο διαδικτυακό ερωτηματολόγιο. Το ερωτηματολόγιο σχεδιάστηκε με σκοπό να καταγράψει: (i) τις απόψεις των φοιτητών/τριών σχετικά με τη συμβολή της τεχνολογίας της οφθαλμοκίνησης στην ανίχνευση και διάγνωση αναγνωστικών δυσκολιών, (ii) τις αντιλήψεις τους για τον ρόλο της τεχνολογίας αυτής στο πλαίσιο παρεμβάσεων, (iii) τις δυσκολίες και τους προβληματισμούς που ενδέχεται να προκύψουν κατά την εφαρμογή της στην πράξη και (iv) την προσωπική τους εμπειρία ως προς την αποτελεσματικότητα της εν λόγω τεχνολογίας.

Η μέθοδος του αυτοεπιλεγμένου δείγματος επελέγη ώστε να διασφαλιστεί η ανωνυμία και, κατά συνέπεια, η αυθεντικότητα και ειλικρίνεια των απαντήσεων των συμμετεχόντων. Το ερωτηματολόγιο περιλάμβανε τόσο κλειστές ερωτήσεις τύπου Likert όσο και ανοιχτού τύπου ερωτήσεις, ώστε να εξεταστεί σε βάθος πώς οι μελλοντικοί λογοθεραπευτές/τριες αντιλαμβάνονται την πιθανή ένταξη της τεχνολογίας της οφθαλμοκίνησης στην κλινική τους πρακτική.

Ανάλυση Δεδομένων

Οι απαντήσεις στις κλειστές ερωτήσεις αναλύθηκαν ποσοτικά με τη χρήση περιγραφικών στατιστικών δεικτών (όπως συχνότητες, ποσοστά και μέσοι όροι). Οι απαντήσεις στις ανοιχτές ερωτήσεις υποβλήθηκαν σε θεματική ανάλυση περιεχομένου, με στόχο την ανάδειξη κυρίαρχων μοτίβων και θεμάτων αναφορικά με τις στάσεις και τις εμπειρίες των φοιτητών/τριών. Ο συνδυασμός ποσοτικών και ποιοτικών εργαλείων επέτρεψε μια περισσότερο σφαιρική κατανόηση των αντιλήψεων των συμμετεχόντων ως προς τη χρήση της τεχνολογίας της οφθαλμοκίνησης — τόσο σε εκπαιδευτικό πλαίσιο όσο και στην κλινική πράξη.

ΑΠΟΤΕΛΕΣΜΑΤΑ

Η παρούσα μελέτη πραγματοποιήθηκε με στόχο τη διερεύνηση των αντιλήψεων φοιτητών/τριών του Τμήματος Λογοθεραπείας αναφορικά με τη συμβολή της τεχνολογίας ανίχνευσης της οφθαλμοκίνησης στην ανίχνευση, τη διάγνωση και την παρέμβαση σε περιπτώσεις αναγνωστικών δυσκολιών. Τα ευρήματα προέκυψαν από ανώνυμη, διαδικτυακή έρευνα στην οποία συμμετείχαν εθελοντικά 49 φοιτητές/τριες (45 γυναίκες και 4 άνδρες), κυρίως ηλικίας 18–21 ετών. Οι συμμετέχοντες/ουσες ήταν τριτοετείς φοιτητές/τριες που είχαν διδαχθεί τη χρήση και την εφαρμογή του eye tracking στο πλαίσιο της Λογοθεραπείας.

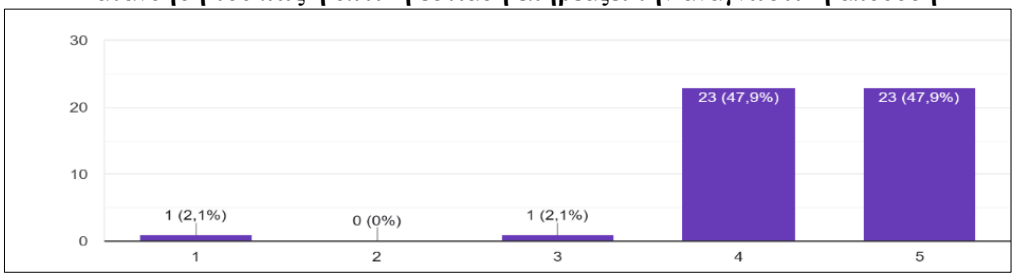
RQ1. Η συμβολή της τεχνολογίας eye tracking στη διάγνωση αναγνωστικών δυσκολιών:

1. Συσχέτιση οπτικής εστίασης και αναγνωστικής απόδοσης

Η πλειονότητα των φοιτητών/τριών εκτιμά ότι η τεχνολογία eye tracking βοηθά στην κατανόηση του πώς η οπτική εστίαση επηρεάζει την αναγνωστική απόδοση. Συγκεκριμένα:

47,9% συμφωνούν απόλυτα
47,9% συμφωνούν
2,1% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 1).

Εικόνα 3
Κατανόηση του πώς η οπτική εστίαση επηρεάζει την αναγνωστική απόδοση

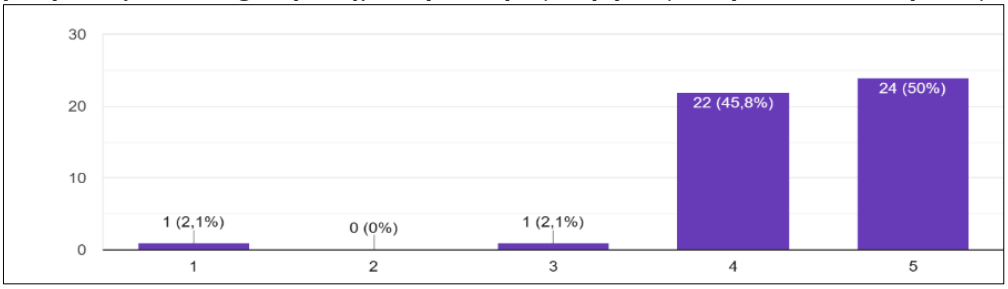


2. Ανίχνευση και έγκαιρη διάγνωση δυσκολιών στην ανάγνωση

Η τεχνολογία θεωρείται ιδιαίτερα χρήσιμη για την ανίχνευση και την έγκαιρη διάγνωση δυσκολιών στην ανάγνωση:

50% συμφωνούν απόλυτα
45,8% συμφωνούν
2,1% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 2).

Εικόνα 4
Συμβολή του eye tracking στην ανίχνευση και την έγκαιρη διάγνωση δυσκολιών στην ανάγνωση

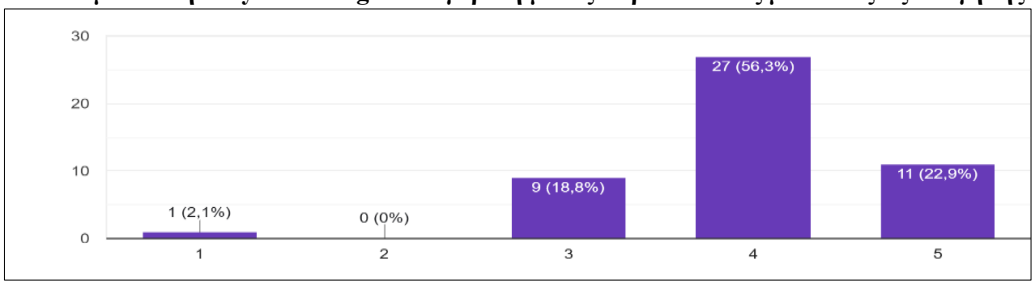


3.Αντικειμενικότητα σε σύγκριση με τις παραδοσιακές μεθόδους

Το eye tracking φαίνεται να προσφέρει περισσότερο αντικειμενικά δεδομένα σε σχέση με τις παραδοσιακές μεθόδους αξιολόγησης:

22,9% συμφωνούν απόλυτα
56,3% συμφωνούν
18,8% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 3).

Εικόνα 5
Αντικειμενικότητα eye tracking σε σύγκριση με τις παραδοσιακές μεθόδους αξιολόγησης

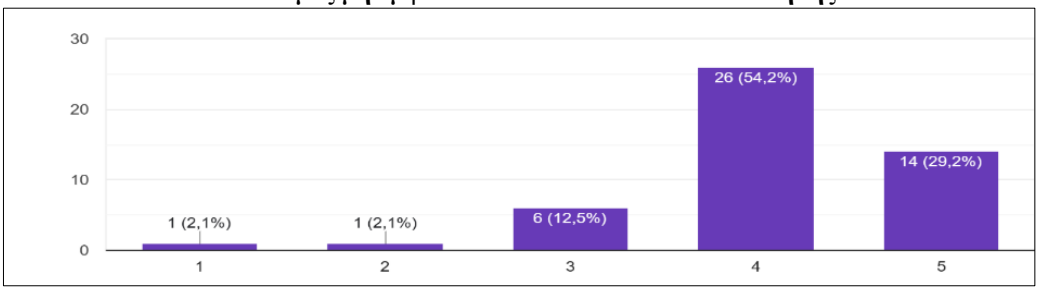


4. Εντοπισμός μη εμφανών δυσκολιών αποκωδικοποίησης

Οι φοιτητές/τριες αναγνώρισαν τη δυνατότητα του eye tracking να αποκαλύπτει δυσκολίες που ενδέχεται να μην εντοπίζονται εύκολα με άλλες μεθόδους:

29,2% συμφωνούν απόλυτα
54,2% συμφωνούν
12,5% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 4).

Εικόνα 6
Εντοπισμός μη εμφανών δυσκολιών αποκωδικοποίησης

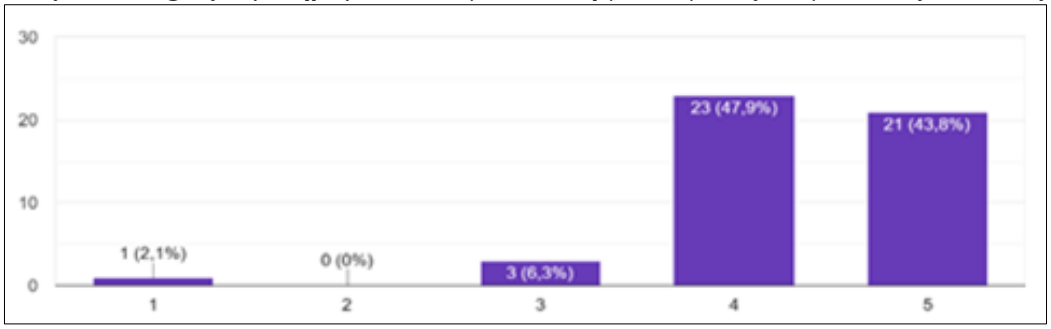


5. Συμπληρωματική χρήση στην αξιολόγηση

Ως προς τη δυνατότητα του eye tracking να λειτουργήσει συμπληρωματικά προς τις κλασικές διαγνωστικές διαδικασίες:

43,8% συμφωνούν απόλυτα
47,9% συμφωνούν
6,3% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 5).

Εικόνα 7
Το eye tracking ως συμπληρωματικό διαγνωστικό εργαλείο για τις αναγνωστικές δυσκολίες



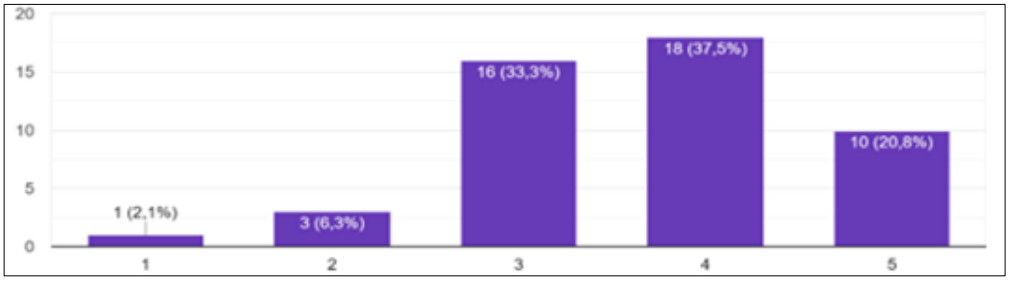
6. Διάκριση μεταξύ δυσλεξίας και άλλων μαθησιακών δυσκολιών

Σχετικά με τη χρησιμότητά του για διαφοροδιάγνωση:

20,8% συμφωνούν απόλυτα

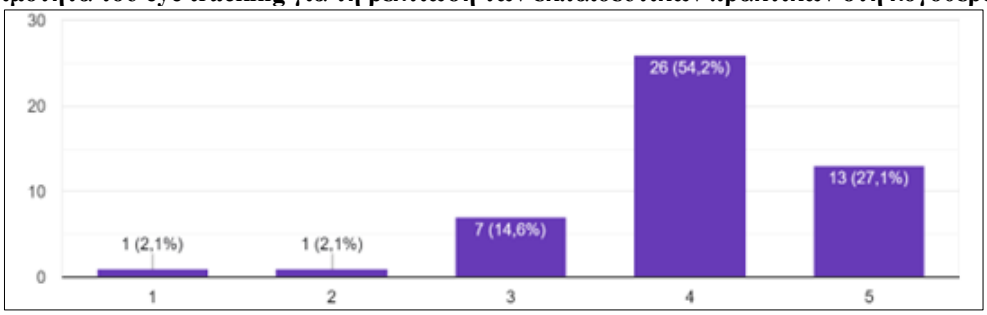
37,5% συμφωνούν
33,3% ούτε συμφωνούν ούτε διαφωνούν
6,3% διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 6).

Εικόνα 8
Η συμβολή του eye tracking στη διαφοροδιάγνωση δυσλεξίας και άλλων μαθησιακών δυσκολιών



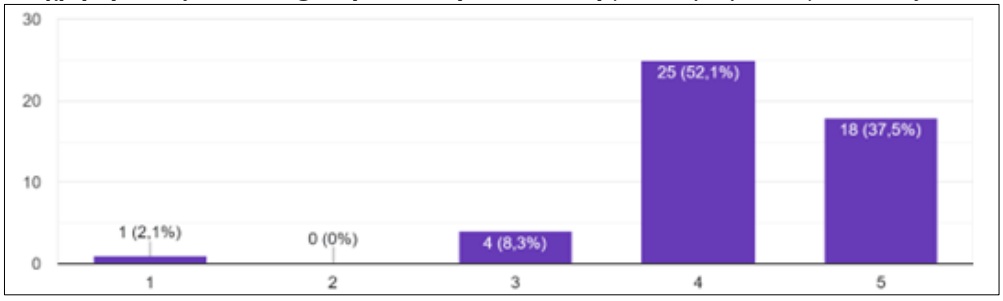
7. Βελτίωση εκπαιδευτικών πρακτικών στη λογοθεραπεία
Η πλειοψηφία θεωρεί ότι η τεχνολογία μπορεί να ενισχύσει τις εκπαιδευτικές πρακτικές:
27,1% συμφωνούν απόλυτα
54,2% συμφωνούν
14,6% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 7).

Εικόνα 9
Χρησιμότητα του eye tracking για τη βελτίωση των εκπαιδευτικών πρακτικών στη λογοθεραπεία



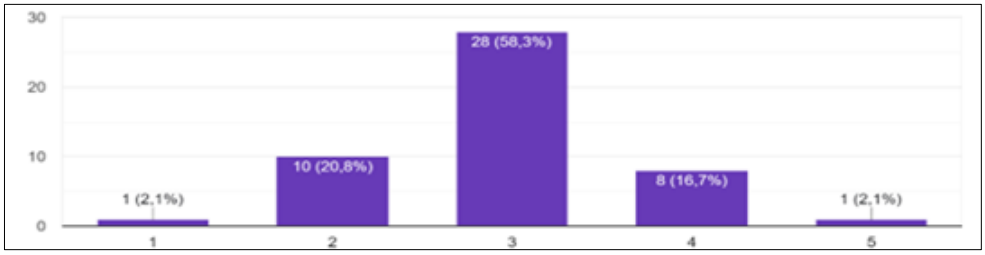
8. Ευρύτερη εφαρμογή στην πράξη
Οι φοιτητές/τριες εξέφρασαν θετική στάση στην ευρύτερη χρήση της τεχνολογίας στην εκπαιδευτική και κλινική πρακτική:
37,5% συμφωνούν απόλυτα
52,1% συμφωνούν
8,3% ούτε συμφωνούν ούτε διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 8).

Εικόνα 10
Ευρεία χρήση του eye tracking στην κλινική εκπαίδευση για άτομα με αναγνωστικές δυσκολίες



9. Προκλήσεις σχετικές με την εξειδικευμένη εκπαίδευση
Τέλος, οι απόψεις για την προσβασιμότητα στην απαραίτητη εκπαίδευση ποικίλλουν:
2,1% συμφωνούν απόλυτα
16,7% συμφωνούν
58,3% ούτε συμφωνούν ούτε διαφωνούν
20,8% διαφωνούν
2,1% διαφωνούν απόλυτα (Εικόνα 9).

Εικόνα 11
Εξειδικευμένη εκπαίδευση για τη χρήση του eye tracking, που δεν είναι εύκολο να αποκτηθεί

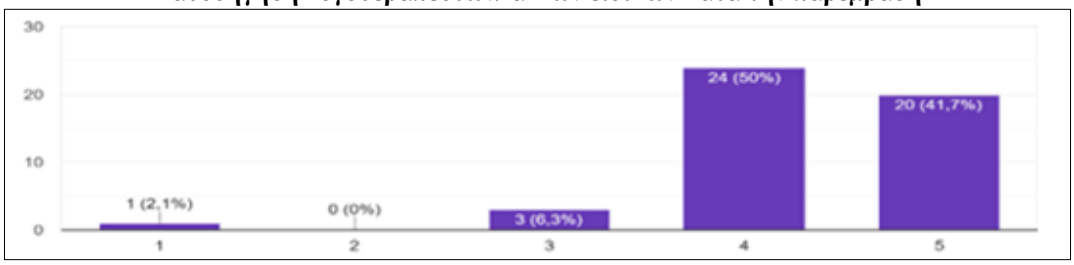


RQ2. Η συμβολή του *eye tracking* στην παρέμβαση για αναγνωστικές δυσκολίες

Η δεύτερη ενότητα της έρευνας εστιάζει στις αντιλήψεις των φοιτητών/τριών σχετικά με το πώς η τεχνολογία της οφθαλμοκίνησης (*eye tracking*) μπορεί να αξιοποιηθεί στην παρέμβαση για την ενίσχυση της αναγνωστικής δεξιότητας παιδιών με δυσκολίες στην ανάγνωση. Οι απαντήσεις των συμμετεχόντων/ουσών καταγράφουν ένα ευρύτερα θετικό κλίμα, το οποίο όμως συνοδεύεται και από προβληματισμούς για την πρακτική εφαρμογή και τις απαιτήσεις της τεχνολογίας.

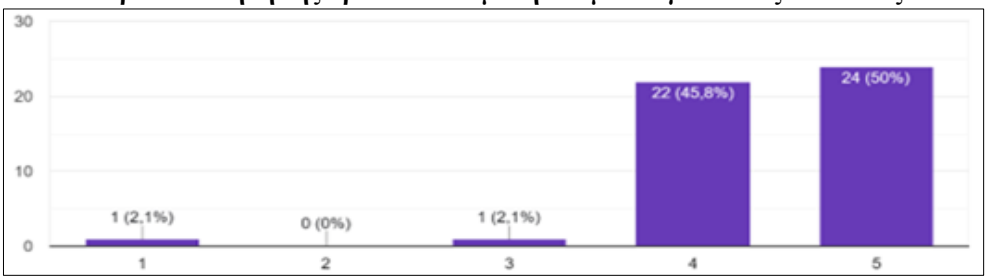
Καθοδήγηση των λογοθεραπευτών/άλλων ειδικών κατά την παρέμβαση
Οι περισσότεροι φοιτητές εκτιμούν ότι τα δεδομένα του *eye tracking* μπορούν να προσφέρουν πολύτιμη καθοδήγηση σε λογοθεραπευτές και άλλους ειδικούς κατά τη διάρκεια της παρέμβασης. Συγκεκριμένα:
41,7% συμφώνησαν απόλυτα,
50% συμφώνησαν
6,3% παρέμειναν ουδέτεροι,
2,1% διαφώνησαν απόλυτα (Εικόνα 10).

Εικόνα 12
Καθοδήγηση λογοθεραπευτών/ άλλων ειδικών κατά την παρέμβαση



Παρακολούθηση της προόδου
Ως προς τη δυνατότητα της τεχνολογίας να βοηθά στην παρακολούθηση της προόδου των μαθητών στην ανάγνωση, οι φοιτητές/τριες φάνηκαν ιδιαίτερα θετικοί:
50% συμφώνησαν απόλυτα,
45,8% συμφώνησαν,
2,1% ήταν ουδέτεροι,
2,1% διαφώνησαν απόλυτα (Εικόνα 11).

Εικόνα 13
Παρακολούθηση της προόδου των μαθητών με αναγνωστικές δυσκολίες

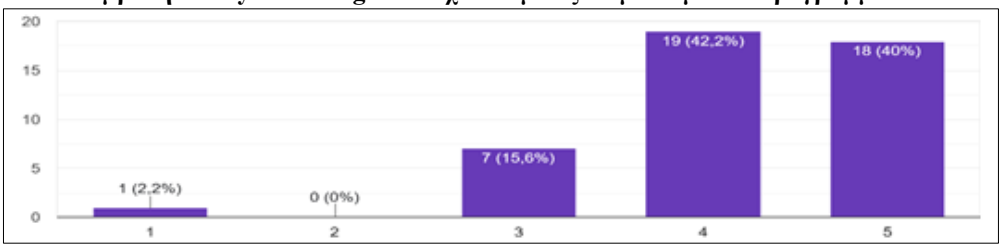


3. Σχεδιασμός εξατομικευμένων προγραμμάτων

Οι συμμετέχοντες/ουσες αναγνώρισαν επίσης την πιθανή συμβολή του *eye tracking* στον σχεδιασμό εξατομικευμένων παρεμβάσεων που ανταποκρίνονται στις ιδιαίτερες ανάγκες κάθε μαθητή:

40% συμφώνησαν απόλυτα,
42,2% συμφώνησαν,
15,6% παρέμειναν ουδέτεροι,
2,2% διαφώνησαν απόλυτα (Εικόνα 12).

Εικόνα 14
Συμβολή του eye tracking στον σχεδιασμό εξατομικευμένων προγραμμάτων

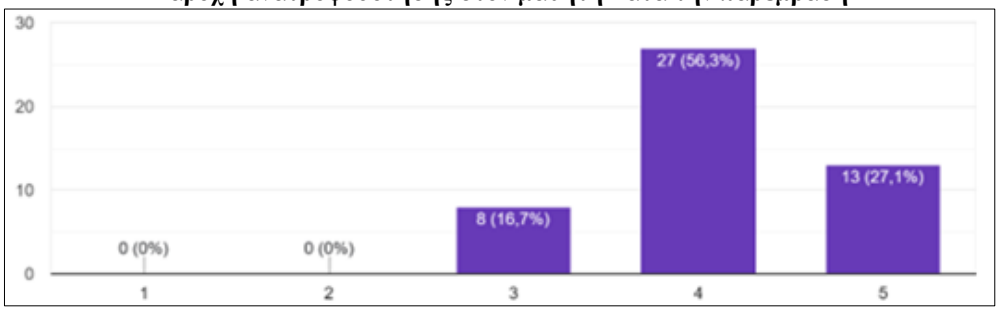


4. Ανατροφοδότηση προς τον μαθητή

Αναφορικά με τη χρήση των δεδομένων του *eye tracking* για την παροχή άμεσης ανατροφοδότησης προς τον ίδιο τον μαθητή κατά τη διάρκεια της παρέμβασης:

27,1% συμφώνησαν απόλυτα,
56,3% συμφώνησαν,
16,7% παρέμειναν ουδέτεροι (Εικόνα 13).

Εικόνα 15.
Παροχή ανατροφοδότησης στον μαθητή κατά την παρέμβαση



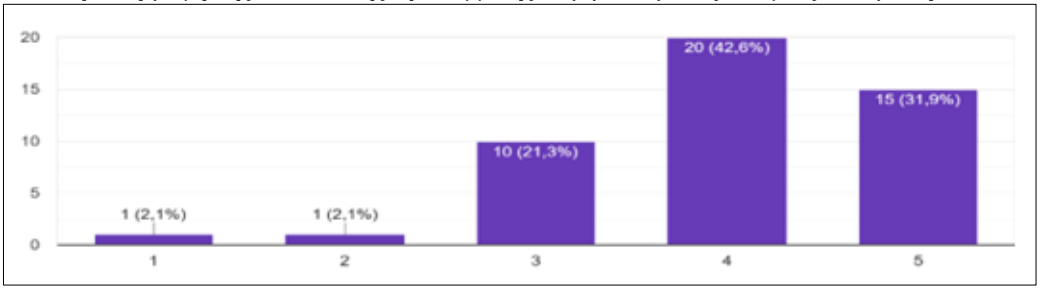
5. Προσαρμογή διδακτικής προσέγγισης

Η δυνατότητα που παρέχει στους/στις εκπαιδευτικούς να προσαρμόζουν την προσέγγισή τους με βάση τις ανάγκες των μαθητών θεωρείται επίσης σημαντική:

31,9% συμφώνησαν απόλυτα,
42,6% συμφώνησαν,
21,3% ήταν ουδέτεροι,

2,1% διαφώνησαν,
2,1% διαφώνησαν απόλυτα (Εικόνα 14).

Εικόνα 16.
Προσαρμογή της διδακτικής προσέγγισης σύμφωνα με τις ανάγκες των μαθητών

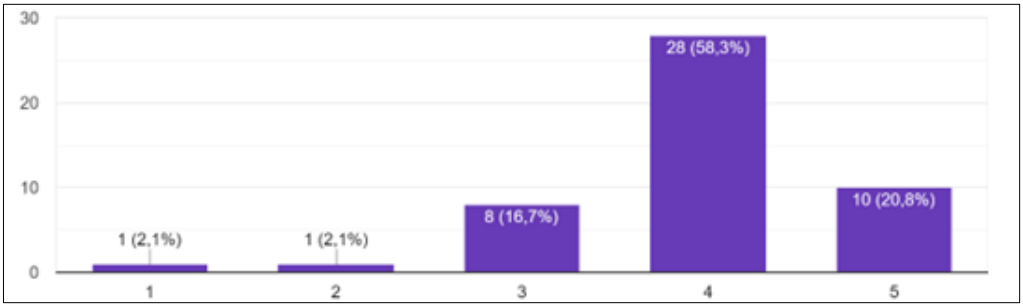


6. Ενίσχυση της συνεργασίας με τους γονείς

Τέλος, οι φοιτητές αξιολόγησαν και τον ρόλο της τεχνολογίας στην ενίσχυση της συνεργασίας μεταξύ θεραπευτών, άλλων ειδικών και γονέων:

20,8% συμφώνησαν απόλυτα,
58,3% συμφώνησαν,
16,7% ούτε συμφώνησαν ούτε διαφώνησαν,
2,1% διαφώνησαν,
2,1% διαφώνησαν απόλυτα (Εικόνα 15).

Εικόνα 17
Ενίσχυση της συνεργασίας μεταξύ λογοθεραπευτών/ άλλων ειδικών και γονέων



RQ3. Πλεονεκτήματα και παράγοντες που δυσχεραίνουν τη χρήση του eye tracking

Στο τρίτο και τελευταίο μέρος της έρευνας, οι φοιτητές/τριες κλήθηκαν να προβούν στην κριτική αποτίμηση της χρησιμότητας της τεχνολογίας eye tracking, εστιάζοντας τόσο στα πλεονεκτήματα όσο και στους περιορισμούς της. Μεταξύ των θετικών στοιχείων, πολλοί φοιτητές/τριες ανέφεραν τη δυνατότητα της τεχνολογίας να συμβάλει στην ανίχνευση νευροεκφυλιστικών παθήσεων, όπως η νόσος Alzheimer, καθώς και στη νευρολογική αποκατάσταση ύστερα από εγκεφαλικά επεισόδια ή τραυματισμούς, αξιοποιώντας την αντικειμενική παρακολούθηση της προόδου του ασθενούς (Reddy et al., 2020). Επιπλέον, επισημάνθηκε η συμβολή του eye tracking στη διάγνωση διαταραχών προσοχής καθώς και στη διάγνωση και παρέμβαση σε Μαθησιακές Δυσκολίες (Lee et al., 2023; Donmez, 2023; Bucci, 2021; Dostálová et al., 2024). Έμφαση δόθηκε επίσης στην αξιοποίηση της τεχνολογίας για τη βελτίωση των επιδόσεων αθλητών, μέσα από την καταγραφή της προσοχής και του χρόνου αντίδρασης. Οι φοιτητές ανέφεραν πως η παροχή άμεσων, μετρήσιμων και ακριβών δεδομένων αποτελεί έναν επιπλέον λόγο που η τεχνολογία αυτή αποκτά αυξανόμενο ερευνητικό και κλινικό ενδιαφέρον. Παρά τα παραπάνω οφέλη, οι φοιτητές/τριες αναγνώρισαν και σοβαρές προκλήσεις που θα μπορούσαν να περιορίσουν την εφαρμογή του eye tracking στην πράξη. Πιο συχνά αναφέρθηκε το υψηλό κόστος του εξοπλισμού και των λογισμικών, καθώς και η απαίτηση για εξειδικευμένη εκπαίδευση, ιδιαίτερα όσον αφορά την ορθή ανάλυση και ερμηνεία των δεδομένων.

ΣΥΖΗΤΗΣΗ

Η παρούσα μελέτη διερεύνησε τις αντιλήψεις προπτυχιακών φοιτητών/τριών του Τμήματος Λογοθεραπείας του Πανεπιστημίου Ιωαννίνων σχετικά με τη χρήση της τεχνολογίας οφθαλμοκίνησης στη διάγνωση και παρέμβαση σε

αναγνωστικές δυσκολίες. Η συλλογή των δεδομένων πραγματοποιήθηκε μέσω ανώνυμου, διαδικτυακού ερωτηματολογίου, το οποίο συμπληρώθηκε από 49 φοιτητές/τριες που συμμετείχαν εθελοντικά. Τα ευρήματα καταδεικνύουν τη θετική στάση των φοιτητών απέναντι στην τεχνολογία *eye tracking*. Ειδικότερα εννέα στους δέκα συμμετέχοντες θεωρούν ότι η τεχνολογία αυτή συμβάλλει ουσιαστικά στην κατανόηση του τρόπου με τον οποίο η οπτική εστίαση επηρεάζει την αναγνωστική απόδοση, καθώς και στην έγκαιρη και πιο αντικειμενική διάγνωση αναγνωστικών δυσκολιών. Επιπλέον, η πλειονότητα συμφωνεί ότι το *eye tracking* μπορεί να λειτουργήσει συμπληρωματικά με τις παραδοσιακές μεθόδους αξιολόγησης (Toki, 2024), ενώ θεωρεί ιδιαίτερα χρήσιμη την παροχή δεδομένων που μπορούν να καθοδηγήσουν την παρέμβαση και να υποστηρίξουν την παρακολούθηση της αναγνωστικής προόδου των μαθητών/τριών. Ωστόσο, παρά την ευνοϊκή αποδοχή, επισημάνθηκαν και παράγοντες που ενδέχεται να αναστείλουν την ευρεία εφαρμογή του *eye tracking* στην πράξη. Το κόστος απόκτησης και συντήρησης του εξοπλισμού, όπως και η ανάγκη για εξειδικευμένη κατάρτιση των επαγγελματιών, αποτελούν παράγοντες αναστολής της ευρείας εφαρμογής σύμφωνα με τις απαντήσεις των φοιτητών/τριών.

Επιπλέον, η τεχνολογία eye-tracking δεν λειτουργεί μόνο ως εργαλείο συλλογής δεδομένων, αλλά και ως μέσο ενίσχυσης της ενσυναίσθησης και της εξατομίκευσης στην κλινική πράξη. Η δυνατότητα παρακολούθησης της πορείας του βλέμματος παρέχει στους επαγγελματίες της λογοθεραπείας μια διακριτική και μη παρεμβατική εικόνα της γνωστικής διαδικασίας του παιδιού, ενισχύοντας έτσι τη θεραπευτική σχέση και περιορίζοντας το άγχος αξιολόγησης (Park et al., 2024). Επίσης, τα δεδομένα αυτά μπορούν να λειτουργήσουν ως βάση για την ανάπτυξη εξατομικευμένων στρατηγικών παρέμβασης, προσαρμοσμένων στις μοναδικές οπτικο-γνωστικές ανάγκες του εκάστοτε μαθητή (Chytry, et al., 2022). Η εν λόγω τεχνολογία έχει ήδη αρχίσει να χρησιμοποιείται σε διεπιστημονικά μοντέλα παρέμβασης, διευκολύνοντας τη συνεργασία μεταξύ λογοθεραπευτών, ψυχολόγων και ειδικών παιδαγωγών μέσα από κοινή γλώσσα ανάλυσης των δυσκολιών (Chan, et al., 2022). Αυτή η συνεργατική προσέγγιση μπορεί να ενισχύσει τη συνοχή της θεραπευτικής πορείας και να εδραιώσει πρακτικές που σέβονται τον άνθρωπο ως ολότητα, πέρα από τη διαταραχή του. Έτσι, η τεχνολογία δεν έρχεται να αντικαταστήσει την ανθρώπινη διάσταση της λογοθεραπείας, αλλά να την ενδυναμώσει, προάγοντας μία πιο βιωματική και ουσιαστική μαθησιακή εμπειρία (Chan, et al., 2022; Chytry, et al., 2022). Τα ευρήματα της παρούσας μελέτης συνάδουν με τη θεωρητική προσέγγιση της οπτικής επεξεργασίας ως βασικού πυλώνα της αναγνωστικής ανάπτυξης, ενισχύοντας την ανάγκη ενσωμάτωσης τεχνολογιών αιχμής στη διδακτική πράξη αλλά και την ανάγκη για περαιτέρω έρευνα, πιλοτικές εφαρμογές και ανάπτυξη εκπαιδευτικών εργαλείων για την κατάλληλη αξιοποίησή τους.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Συνοψίζοντας, η μελέτη ανέδειξε την ευνοϊκή στάση των μελλοντικών λογοθεραπευτών απέναντι στην αξιοποίηση της τεχνολογίας eye-tracking, επιβεβαιώνοντας τις δυνατότητες της τόσο σε επίπεδο διάγνωσης όσο και σε παρέμβασης. Μελλοντικές έρευνες καλούνται να διερευνήσουν πιλοτικές εφαρμογές στο πεδίο σε μεγαλύτερα δείγματα και να αναπτύξουν στοχευμένα προγράμματα κατάρτισης.

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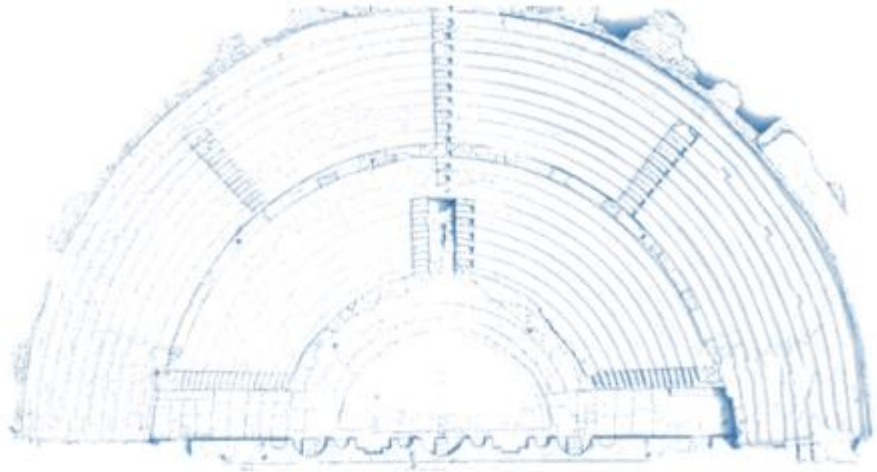
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