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"The integration and impact of Artificial Intelligence tools in training and human resource development. An empirical study in Greece".

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"The integration and impact of Artificial Intelligence tools in training and human resource development. An empirical study in Greece"

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“Acknowledgements and Dedication”

I would like to express my sincere gratitude to my supervisors, Dr. Emmanouil Adamidis and Dr. Georgios Tsiotras, for their invaluable guidance , and support throughout the preparation of this research.

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Finally, this dissertation is dedicated to my parents. I hope that, from where they are now, they look down on me with pride and joy.

Abstract

This dissertation investigates the degree of integration of Artificial Intelligence (AI) tools into human resource training and development processes in Greek organizations. It focuses on the use of AI tools and on the challenges faced by trainers and trainees. The research captures the degree of AI adoption, the tools used, the participants' level of familiarity and knowledge, as well as the areas where further integration of this technology is desired.

The topic is particularly relevant, as the use of Artificial Intelligence is a central element of digital transformation in businesses and organizations within the context of Industry 4.0. AI can support personalized learning, automated skills assessment and HR process optimization, while also raising challenges related to readiness, acceptance, ethics and change management.

The study is based on primary data collected through questionnaires from trainers and trainees operating in different sectors of the private and public sectors. The questionnaires examined the use of AI tools, participants' attitudes and perceptions, as well as the challenges and limitations associated with integrating technology into education and staff development.

The dissertation contributes to understanding the degree of digital maturity of Greek organizations and the challenges they face when implementing AI in education, while highlighting good practices and proposals for improving education and human resource development strategies in the era of digital transformation.

Keywords

Artificial Intelligence (AI), Human Resource Development (HRD), Corporate Training, Reskilling and Upskilling, Digital Transformation, Fourth Industrial Revolution (Industry 4.0), Greek Organizations.

Περίληψη

Η παρούσα διπλωματική εργασία έχει ως στόχο τη διερεύνηση του βαθμού ενσωμάτωσης εργαλείων Τεχνητής Νοημοσύνης (AI) στις διαδικασίες εκπαίδευσης και ανάπτυξης ανθρώπινου δυναμικού σε ελληνικούς οργανισμούς, εστιάζοντας τόσο στη χρήση όσο και στις προκλήσεις που αντιμετωπίζουν οι εκπαιδευτές και οι εκπαιδευόμενοι. Η έρευνα επιδιώκει να αποτυπώσει τον βαθμό υιοθέτησης της ΤΝ, τα εργαλεία που χρησιμοποιούνται, το επίπεδο εξοικείωσης και γνώσεων των συμμετεχόντων, καθώς και τους τομείς όπου επιθυμούν περαιτέρω ενσωμάτωση της τεχνολογίας αυτής στο μέλλον. Το θέμα είναι ιδιαίτερα επίκαιρο, καθώς η αξιοποίηση της Τεχνητής Νοημοσύνης αποτελεί κεντρικό στοιχείο του ψηφιακού μετασχηματισμού των επιχειρήσεων και οργανισμών σήμερα στα πλαίσια της 4ης Βιομηχανικής Επανάστασης την οποία διανύουμε. Η ΤΝ μπορεί να υποστηρίξει εξατομικευμένη μάθηση, αυτοματοποιημένη αξιολόγηση δεξιοτήτων και βελτιστοποίηση διαδικασιών ανθρώπινου δυναμικού, ενώ ταυτόχρονα δημιουργεί προκλήσεις που σχετίζονται με θέματα ετοιμότητας, αποδοχής, δεοντολογίας και διαχείρισης αλλαγής.

Η μελέτη βασίστηκε σε πρωτογενή δεδομένα, τα οποία συλλέχθηκαν μέσω ερωτηματολογίων από εκπαιδευτές και εκπαιδευόμενους που δραστηριοποιούνται σε διαφορετικούς κλάδους του ιδιωτικού και δημόσιου τομέα. Τα ερωτηματολόγια εξέτασαν τη χρήση των εργαλείων ΤΝ, τις στάσεις και αντιλήψεις των συμμετεχόντων, καθώς και τις προκλήσεις και τους περιορισμούς που σχετίζονται με την ενσωμάτωση της τεχνολογίας στην εκπαίδευση και ανάπτυξη προσωπικού.

Η εργασία συμβάλλει στην κατανόηση του βαθμού ψηφιακής ωριμότητας των ελληνικών οργανισμών, των περιορισμών και των προκλήσεων που αντιμετωπίζουν στην εφαρμογή ΤΝ στην εκπαίδευση, ενώ αναδεικνύει καλές πρακτικές και προτάσεις για τη βελτίωση των στρατηγικών εκπαίδευσης και ανάπτυξης ανθρώπινου δυναμικού στην εποχή του ψηφιακού μετασχηματισμού.

Λέξεις – Κλειδιά

Τεχνητή Νοημοσύνη (ΤΝ), Ανάπτυξη Ανθρώπινου Δυναμικού, Εταιρική Κατάρτιση, Reskilling και Upskilling, Ψηφιακός Μετασχηματισμός, 4η Βιομηχανική Επανάσταση, Ελληνικές Επιχειρήσεις.

Table of Contents

Abstract	v
Περίληψη	vi
Table of Contents.....	vii
List of Figures	ix
List of Tables	x
List of Abbreviations & Acronyms	xi
1. Introduction	1
1.1 The integration of AI as a strategic choice in organizational transformation.....	1
1.2 The paradigm shift in learning and work	2
1.3 The digital divide and the human challenges of Artificial Intelligence.....	3
1.4 Purpose of the research, research questions and contribution of the study	4
1.5 Limitations of the Research.....	5
2. Artificial Intelligence Theory	6
2.1 Artificial Intelligence: Definitions and Basic Concepts	6
2.2 Applications of Artificial Intelligence in Education and Human Resource Development ...	9
2.3 Artificial Intelligence Tools and Digital Learning Resources.....	11
2.3.1 Empirical Applications of Intelligent Tutoring Systems (ITS).....	12
2.3.2 Empirical Applications of Learning Analytics and Predictive Modelling Systems ..	13
2.3.3 Practical Applications of Generative AI and Digital Content Creation Tools.....	14
2.4 Challenges and Ethical Issues in the Integration of Artificial Intelligence	16
2.4.1 Data Protection, Security and Privacy in AI-driven Education	16
2.4.2 Algorithmic Bias and Lack of Transparency (The Black Box Problem)	17
2.4.3 Over-reliance and Loss of the Human Dimension of Learning	18
2.5 International Strategies and Best Practices for the Integration of AI	20
2.6 Linking Artificial Intelligence to Digital Transformation and HR Strategy	23
3. Research Methodology	25
3.1 Research Design and Research Questions	25
3.2 Population, Sample and Sampling Procedure.....	28
3.3 Data Collection Process and Research Ethics	30
3.3.1 Research Instrument and Questionnaire Distribution	30
3.4 Research Tools and Measurement Variables.....	32
3.5 Methods of Statistical Data Analysis.....	34
4. Presentation and Analysis of the Results	37
4.1 Statistical Analysis of the Trainer Sample (N = 100).....	37
4.1.1 Demographic and Professional Characteristics of the Sample of Trainers	37
4.1.2 Knowledge, Familiarity and Current Use of Artificial Intelligence	42
4.1.3 Previous Training and Artificial Intelligence Tools Used by Trainers	44
4.1.4 Effectiveness of Artificial Intelligence in Education.....	46
4.1.5 Challenges, Risks and Ethical Concerns	49
4.1.6 Organisational Readiness and Future Integration of Artificial Intelligence	51
4.1.7 Preferred Areas for Further Integration of Artificial Intelligence	53
4.1.8 Summary	54
4.2 Statistical Analysis of Trainees (N = 187)	55
4.2.1 Demographic Characteristics of Learners	55

4.2.2 Knowledge, Familiarity and Current Use of Artificial Intelligence	58
4.2.3 Previous Use and Artificial Intelligence Tools Utilized by Learners	60
4.2.4 Effectiveness of Artificial Intelligence in Learning	61
4.2.5 Challenges, Risks and Ethical Considerations	62
4.2.6 Organizational Readiness and Future Use of Artificial Intelligence	64
4.2.7 Preferred Areas for Further Utilisation of Artificial Intelligence.....	65
4.2.8 Summary	66
4.3 Additional Statistical Analysis	67
4.3.1 Comparison between Trainers and Learners	68
4.3.2 Sector Differences among Trainers	69
4.3.3 Gender Differences among Learners	71
4.3.4 One-Way ANOVA by Age Group	72
4.3.5 Correlation Analysis	74
4.3.6 Summary	75
5. Discussion.....	76
5.1 Overall Assessment of the Current Situation	76
5.2 Comparison with the International Literature and Good Practices	78
5.3 Interpretation of Findings Regarding Challenges and Concerns	79
6. Conclusions and Recommendations	81
6.1 Strategies for Improving the Integration of AI in Education.....	81
6.2 Limitations of the Research and Suggestions for Future Studies	82
6.3 Concluding Assessment	83
Bibliography	85
Appendix A: Research questionnaires.....	88

List of Figures

List of Figures

Figure 4.1. Gender distribution of trainers.....	38
Figure 4.2. Age distribution of trainers.....	39
Figure 4.3. Organisation size of trainers’ workplace	39
Figure 4.4. Training fields of trainers	41
Figure 4.5. Familiarity with Artificial Intelligence	43
Figure 4.6. Frequency of AI Use for lesson planning	43
Figure 4.7. Use of AI in training activities.....	43
Figure 4.8. Previous training on AI in education	45
Figure 4.9. AI tools used by trainers	46
Figure 4.10. effectiveness of AI in education	47
Figure 4.11. AI and the role of the trainer.....	48
Figure 4.12. Learners’ response to AI tools.....	48
Figure 4.13. Concern about the role of the human trainer	50
Figure 4.14. Resistance to AI adoption.....	50
Figure 4.15. Trust in AI outputs without review.....	50
Figure 4.16. Management support for AI integration	52
Figure 4.17. Need for further training in AI.....	52
Figure 4.18. Future impact of AI on professional training	52
Figure 4.19. Preferred areas for further AI integration	54
Figure 4.20. Gender distribution of learners	56
Figure 4.21. Age distribution of learners	56
Figure 4.22. Educational level of learners	57
Figure 4.23. Years of professional experience of learners.....	57
Figure 4.24. Employment sector of learners	57
Figure 4.25. Familiarity with Artificial Intelligence	59
Figure 4.26. Use of AI tools in organizational training programmes	59
Figure 4.27. AI Tools used by learners.....	60
Figure 4.28. Educational Benefits of AI	61
Figure 4.29. AI-Related Concerns and Ethical Issues.....	63
Figure 4.30. Organizational readiness and future AI Integration.....	64
Figure 4.31. Preferred areas for further AI Integration.....	66
Figure 4.20. Comparison of trainers and learners on key AI Dimensions.....	69
Figure 4.21. Significant Sector Differences among Trainers.....	70
Figure 4.22. Significant gender differences among learners.....	72

List of Tables

Table 4.1. Demographic characteristics of trainers (N = 100).....	37
Table 4.2. Training fields of trainers (multiple responses)	41
Table 4.3. AI familiarity and current use	42
Table 4.4. Previous training on AI in education	45
Table 4.5. AI tools used by trainers (multiple responses).....	45
Table 4.6. Educational effectiveness of AI	47
Table 4.7. AI-Related concerns and challenges	49
Table 4.8. Organizational readiness and future AI integration	51
Table 4.9. Preferred areas for further AI integration (multiple responses).....	53
Table 4.13. Demographic characteristics of learners (N = 187)	55
Table 4.14. AI familiarity and current Use	58
Table 4.15. Use of AI Tools in organizational training programmes	58
Table 4.16. AI tools used by learners (multiple responses)	60
Table 4.17. Educational effectiveness of AI	61
Table 4.18. AI-Related concerns and ethical issues.....	62
Table 4.19. Organizational readiness and future AI Integration	64
Table 4.20. Preferred areas for further AI Integration (Multiple Responses).....	65
Table 4.26. Trainers vs Learners.....	68
Table 4.27. Private vs public sector trainers	70
Table 4.28. Gender differences among learners.....	71
Table 4.29. AI familiarity by age group.....	73
Table 4.30. One-Way ANOVA results for AI familiarity by age group.....	73
Table 4.31. Pearson correlations among key AI dimensions	74
Table 5.1. Main Findings and Interpretation.....	77
Table 6.1. Strategies for AI integration in professional training.....	82

List of Abbreviations & Acronyms

Abbreviation / acronym	Full Form
AI	Artificial Intelligence
TN	Τεχνητή Νοημοσύνη
HRD	Human Resource Development
ICT	Information and Communication Technologies
L&D	Learning and Development
OECD	Organisation for Economic Co-operation and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
WEF	World Economic Forum
EU	European Union
GDPR	General Data Protection Regulation
M	Mean
SD	Standard Deviation
ANOVA	Analysis of Variance

1. Introduction

1.1 The integration of AI as a strategic choice in organizational transformation

To survive, businesses and organisations are now called upon to strategically integrate Artificial Intelligence and make effective use of available data in order to remain competitive and keep pace with the demands of Industry 4.0. In this process, the learning and development culture of the human factor plays a key role, as AI can support efficiency and skills development.

However, the term 'integration' does not simply refer to process automation. As Brynjolfsson and McAfee (2017) argue, it refers to a transition towards 'intelligent organisations', where humans and machines work together in a complementary way. The emphasis is therefore not on replacing the human factor, but on supporting the development of skills. Organisations are thus moving from a 'workforce management' model to a model of talent development and technology-supported learning (Davenport & Ronanki, 2018).

The key question that arises is how organisations can manage this transformation effectively. To harness the potential of Artificial Intelligence, organisations need to reshape their organisational culture and develop appropriate leadership initiatives. Therefore, it is important to examine how ready organisations are for this change and what the situation is in Greece.

A picture of the Greek market is provided by the National Bank of Greece's (2025) on the technological upgrading of Greek businesses, which informs us that organisations that have managed to integrate digital solutions show up to 25% higher productivity.

The benefits of integrating new technologies are important. According to OECD (2021), an organisation's ability to successfully integrate AI technologies depends on its technological culture, the digital literacy of its workforce and the degree of organisational learning. Put simply, organisations that invest in the training and development of their workforce are better able to make effective use of the potential of Artificial Intelligence.

The greatest challenge organisations face today is finding a way to effectively integrate Artificial Intelligence, and to achieve this, they must demonstrate a high degree of digital

readiness and organisational culture. To achieve this, people must be receptive to new technologies. (Raisch & Krakowski, 2021).

According to European Commission (2022), factors contributing to failure in integration include: a) a lack of trust in new technologies, b) the fear of being replaced, c) concerns about data protection, and d) a lack of transparency regarding how algorithms work.

Organisations that manage to successfully address this challenge are those that invest in training, communication and the ethical integration of AI (Rahwan et al., 2019).

Based on the above, some of the key questions that arise are whether employees in Greece today have been adequately trained in Artificial Intelligence, and whether they trust it or view it as a threat.

1.2 The paradigm shift in learning and work

The Fourth Industrial Revolution has also reshaped the relationship between workers and work. Lifelong learning is therefore no longer an optional choice but a basic prerequisite for professional sustainability (Redecker, 2017).

Artificial Intelligence not only enhances production and administrative processes but can also enhance the training process for staff by analyzing learning data, providing personalized learning pathways and assisting both the trainer and the learner at all stages of the learning process. (Luckin et al., 2016; Zawacki-Richter et al., 2019)

Amidst all these changes, it is impossible for the trainer's role to remain unchanged. The trainer also becomes a learning curator. Their traditional role is evolving into that of a guide, assessor and enabler, combining digital tools, analytical data and teaching skills (Popenici & Kerr, 2017; Holmes et al., 2019).

Research on teachers' attitudes towards Artificial Intelligence reveals that the majority of educators recognize the advantages of the complementary human-machine relationship, emphasizing that technology does not replace the teacher but complements them. (Popenici & Kerr, 2017).

At the same time, Artificial Intelligence applications in higher and lifelong education save valuable time for the trainer. According to studies published the automation of certain

processes (such as the analysis of performance statistics, the submission of marks and the creation of learning reports) enables the educator to free up time and focus on the pedagogical and emotional aspects of education, such as fostering critical thinking, creativity and the psychological support of learners. (Chen et al.,2020, Zawacki-Richter et al.,2019).

In the Greek context, despite significant investment in digital infrastructure, the culture of lifelong learning remains in its formative stages .Many organizations continue to view training as a cost rather than an investment, a fact that limits innovation.

Whilst theoretical and research evidence agree that organizations that foster a culture of continuous learning demonstrate greater resilience and adaptability during periods of transformation (Senge, 2006; ,World Economic Forum 2023; Redecker, 2017), organizations in Greece face challenges both in driving digital transformation and in building trust in digital learning.

1.3 The digital divide and the human challenges of Artificial Intelligence

It can be argued that the digital divide is an obstacle to the further adoption of Artificial Intelligence in Greece. Small and medium-sized enterprises, which account for 97% of Greek businesses, lack the necessary financial resources to invest in training on Artificial Intelligence.

Apart from the technological divide in Greece, the human and ethical challenges of integrating Artificial Intelligence are also significant. Whilst the usefulness of technology in education is recognized, at the same time there is strong concern regarding the role of the human factor in the digital age.

The main concerns relate to:

- The loss of human contact (Popenici & Kerr, 2017).
- The protection of personal data and algorithmic bias
- The fear of replacement (World Economic Forum,2023).

1.4 Purpose of the research, research questions and contribution of the study

The aim of this research is to examine the extent to which Artificial Intelligence is integrated into education and human resource development in Greece. The study investigated AI integration from the perspective of both trainers and trainees.

The research questions are based on the key points of the literature review. The international literature indicates that Artificial Intelligence can contribute to the personalization of learning, the provision of immediate feedback, and the improvement of training and human resource development processes. At the same time, however, it highlights issues related to trust, data protection, organizational readiness, and preserving the human role in the educational process.

The research is based on quantitative methodological analysis and utilized two different questionnaires via the Google Forms platform. The first was aimed at adult educators, seminar presenters and corporate training managers, while the second was aimed at trainees who have attended a vocational training programme. This study investigates the level of knowledge, attitudes and concerns of trainers and trainees regarding Artificial Intelligence. At the same time, it examines the organizational readiness of Greek businesses and the role played by managerial support in the degree of integration.

Based on the above, the research questions of this study were based on five main themes: the level of knowledge and use of Artificial Intelligence tools, the attitudes of instructors and learners toward AI, ethical concerns, organizational support and readiness, as well as potential variations related to demographic and professional characteristics. In this way, the research questions did not arise independently of the theory but were directly linked to the gaps and themes identified in the international literature.

The contribution of this study is twofold. At the theoretical level, it examines the application of Artificial Intelligence in vocational training in Greece. At the practical level, the findings may be used by educational organizations that seek to integrate Artificial Intelligence into educational processes in a structured and responsible way.

1.5 Limitations of the Research

The limitations identified during the research are as follows:

1. **Geographical and Sectoral Limitations:** As the research is conducted within the Greek labor market, any generalization of the findings should be treated with caution. Other countries are likely to have a different level of digital maturity compared to Greece. (European Commission, 2022).
2. **Subjectivity of Responses:** As the research is quantitative and questionnaire-based, the validity of the data depends to a large extent on the honesty of the participants. (Podsakoff et al., 2003). It is possible that there is a discrepancy between the findings and reality because participants answered untruthfully.
3. **Speed of Technological Developments:** A limitation of this study is that it captures the situation at a specific point in time, while technological developments are rapid (Brynjolfsson & McAfee, 2017; World Economic Forum, 2023).
4. **Sample Limitations:** Participation in the survey may be lower in certain sectors or specialisms, a factor that is taken into account during the statistical analysis of the results.

Despite the above limitations, the study offers significant findings regarding attitudes and the degree of integration of Artificial Intelligence into Greek education and the labour market.

2. Artificial Intelligence Theory

2.1 Artificial Intelligence: Definitions and Basic Concepts

Artificial Intelligence (AI) is currently one of the fastest-growing fields in science and technology. Across a wide range of economic and social activities, from industry and services to public administration and education, Artificial Intelligence has become increasingly important and is developing rapidly. It is therefore a frequent topic of discussion in global economic and academic forums. AI is defined as the science and engineering of creating intelligent machines and computer programmes (Russell & Norvig, 2021), which can simulate aspects of human thought and learning.

AI can be described as a set of methods that enable computer systems to perceive, learn, reason and act in ways that were previously considered exclusively human (Russell & Norvig, 2021). Current developments point towards an era of cognitive automation that complements the capabilities of the human mind rather than replacing humans (Brynjolfsson & McAfee, 2017). At present, AI functions mainly as a tool used by humans and does not represent full automation. The models currently available do not replace the human factor, but they can provide useful support in many sectors.

To fully understand Artificial Intelligence (AI), it is first necessary to analyse its fundamental operating mechanism. This section begins by comparing traditional computing with Artificial Intelligence. In traditional computing, problem-solving was based on predefined rules. In other words, the human operator entered the 'recipe' (the algorithm) and the data into the computer, and the system produced the result. Artificial Intelligence, however, introduces a significant technological change. The system is fed with data and desired results, and then attempts to identify the rules and patterns linking them (Russell & Norvig, 2021). This process is called Machine Learning, which imitates learning through experience, repetition and the correction of errors. According to Brynjolfsson and McAfee (2017), the operation of AI can be broken down into three stages:

1. Data Collection and Ingestion: Data is the raw material of Artificial Intelligence. In other words, for a system to develop digital perception, it is first necessary to study vast amounts of data, observe digital traces and past behaviors.
2. Model Training (Training & Pattern Recognition): At this stage, specialized algorithms analyze the data to identify recurring patterns. For example, through the artificial neural networks of Deep Learning, the system independently and autonomously performs millions of mathematical tests, evaluates its errors and self-corrects until it manages to stabilize its structure (LeCun et al., 2015).
3. Inference and Prediction: At this stage, the system has completed its training and is now able to accept new data and make predictions, classifications or decisions with high accuracy rates.

After analysing the stages of operation, the basic forms of Artificial Intelligence can be presented. The research community commonly distinguishes between three main forms:

1. Weak AI: this term refers to systems that perform tasks based on rules and algorithms. They may be called ‘weak’, but these systems are quite effective within their field of application and in some cases surpass human capabilities (e.g. in data processing speed). Their disadvantage is that they lack general understanding. In other words, such a system may be designed to detect fraud in banking transactions, but it would not be able to play chess or devise a strategy.
2. Strong or General AI (AGI): this term refers to a hypothetical and theoretical development model in which machines would possess full consciousness, self-awareness and a general form of intelligence similar to that of humans, enabling them to make decisions autonomously rather than merely executing pre-programmed commands. In theory, this would be a model with the ability to reason, plan strategically, solve complex problems and learn intellectual tasks autonomously. However, such a model does not currently exist and remains at a conceptual stage, while also being the subject of intense philosophical and ethical debate. Such a model would significantly change the world and redefine the role of humans more broadly (Bostrom, 2014).
3. Generative AI: Generative Artificial Intelligence is a recent development in Artificial Intelligence, representing a middle ground between task-limited models

and systems that can generate new content. These advanced architectural models, such as Large Language Models and Diffusion Models, can produce structured text, digital images, programming code or audio (Goodfellow et al., 2016). Tools such as ChatGPT and DALL-E are based on this technology and are significantly influencing education, scientific research and human creativity (Bandi et al., 2023).

Artificial Intelligence, however, is not a single technological entity, but rather an ecosystem comprising a set of interlinked technologies and architectures (Russell & Norvig, 2021). The main pillars that make up the field of modern AI are as follows (Jurafsky & Martin, 2023; LeCun et al., 2015):

a. Machine Learning (ML):

This is the central core of modern AI and is defined as the ability of computer systems to recognize patterns, draw conclusions and ‘learn’ through data analysis, without requiring human guidance (Murphy, 2022). The more data the system has at its disposal, the more it improves with the help of statistical algorithms.

b. Deep Learning (DL):

This is a specialized subcategory of Machine Learning, based on the architecture of Artificial Neural Networks (ANNs), which has a multi-layered structure and simulates the functioning of the human brain at a mathematical level. (LeCun et al., 2015). Deep Learning can process complex and unstructured data because the multiple layers of the network are capable of drawing high-level abstract conclusions from the input data.

c. Natural Language Processing (NLP):

This is the scientific field that enables computer systems to understand, interpret, analyse and generate human language in a natural way (Jurafsky & Martin, 2023). NLP helps bridge the communication gap between humans and machines because it converts human speech, which is often unstructured, into data that a computer can process.

d. Computer Vision and Robotics:

These are technologies that enable machines to digitize, process and perceive visual information from the physical environment (Computer Vision). They also

enable mechanical inventions to move and interact with the physical world autonomously (Robotics) (Siciliano & Khatib, 2016).

It is the synergy of all the above technologies that has made it possible today to create intelligent systems which are transforming the way organizations operate worldwide, and which are also driving the Greek industrial sector forward. (SEV, 2020).

2.2 Applications of Artificial Intelligence in Education and Human Resource Development

As noted above, Artificial Intelligence is currently an important catalyst for transformation in both corporate and academic environments. It is being integrated not only into business processes but also into learning and human resource development processes. Technology is becoming both a driver of training and development and a tool that contributes directly to education. As Holmes, Bialik and Fadel (2019) note, in the new environment, knowledge is not transmitted linearly, but is the result of two-way interaction between people and intelligent digital systems.

In recent years, numerous studies have confirmed that AI is transforming teaching and training by positioning it along three central and interrelated axes: a) personalisation, b) adaptability, and c) immediate feedback (Luckin et al., 2016; OECD, 2023). AI is now capable of processing large volumes of learning data, enabling us to utilise advanced learning analytics techniques. These techniques can record the current situation and predict future educational needs or potential difficulties faced by learners, thereby suggesting personalised learning methods in real time.

Consequently, the traditional logic of the ‘one-size-fits-all’ teaching model is now being replaced by a learner-centred approach that is adaptable and flexible in accordance with the learner’s abilities and pace of learning. The learner is no longer a passive recipient of information. In any case, passive teaching methods were already outdated in education even before the widespread adoption of ICT, let alone now that the possibilities have multiplied. Learners are now becoming co-creators. How? As documented by Chen, Chen and Lin (2020), AI systems analyse micro-behaviours, such as the time taken to learn a module or recurring errors, and thus suggest ‘learning pathways’. This leads to the

development of ‘predictive education’, which promotes learner autonomy, reduces mental fatigue and simultaneously increases motivation (Zawacki-Richter et al., 2019).

Examples of this include Adaptive Learning Platforms (such as Knewton, Smart Sparrow, and Coursera’s built-in AI assistants), which are based on Machine Learning algorithms. These algorithms are constantly updated and improved through the learner’s daily use (Holmes, Bialik & Fadel, 2019). But as the entire educational process changes, how is the role of the instructor evolving? In the traditional teaching model, they were the sole source of knowledge and were regarded as an authority, whereas now they act as a facilitator with the role of a learning curator. This saves time, which can be devoted to providing meaningful guidance and emotional support to the learner. They act as a supervisor and monitor the individual’s overall progress through data on progress and active participation. (Popenici & Kerr, 2017).

In today’s corporate environment, HR plays a leading role in strategic human resource management and supports processes for identifying, developing and retaining talent. Traditional corporate training, which used to be fragmented, is now being replaced by ‘intelligent learning ecosystems’, which help HR professionals to design and implement reskilling and upskilling strategies that are now based on real data. (Davenport & Ronanki, 2018). Executives also find it easier to carry out ‘skill mapping’ because they can easily analyze market requirements and compare them with employees’ existing skills, thereby identifying the ‘skills gap’ within the organization. The study therefore observe that organizations that integrate AI technologies into HRD are more effective a) in identifying learning needs, b) in improving work performance, and c) in fostering stronger employee engagement, as employees themselves recognize that their training is directly linked to their professional development (Wamba et al., 2021). In this way, an organizational ‘learning culture’ is fostered, which, as noted above, can constitute a competitive advantage for an organization. According to WEF (2023), AI technologies in vocational training function as ‘co-learning systems’, yet the human factor remains the undisputed center of the educational ecosystem. (Huang & Rust, 2021). Whilst the ongoing development of these systems holds enormous promise for the collaboration between machine and human, the study must not forget that the greatest challenge and, at the same time, the strategic goal of the academic community and the business world must remain

the human-centred nature of learning. It is crucial that AI serves as a lever for empowerment and not as a means of alienating or replacing human existence. (Miao, F., & Holmes, W. 2021).

2.3 Artificial Intelligence Tools and Digital Learning Resources

From the above, it can be observed that the rapid integration of Artificial Intelligence into education has led to the development of digital tools that support the learning process. Modern AI tools collect, process, analyse and adapt data in real time. In this way, trainers and trainees interact more actively, and the training process becomes more participatory and interactive, thereby improving overall outcomes (Chen et al., 2020; OECD, 2023).

In the international literature, these technological applications are classified into three broad categories which, while interrelated, serve different educational needs. (Luckin et al., 2016; Zawacki-Richter et al., 2019).

These three categories are as follows:

1. Intelligent Tutoring Systems (ITS): These are autonomous systems which, using highly sophisticated algorithms, provide personalized guidance and immediate feedback. They continuously assess the level of understanding and performance of individual learners. (Luckin et al., 2016).
2. Learning Analytics and Predictive Modelling Systems: These systems use Machine Learning algorithms to analyze each user's digital footprint and identify knowledge gaps and any learning difficulties. They are capable of suggesting targeted corrective actions or tailored learning methods. (Zawacki-Richter et al., 2019).
3. Generative AI and Digital Content Creation Tools: This represents the latest generation of technology, where language models such as the popular ChatGPT or Microsoft Copilot are capable of producing original material for educational use very easily and quickly. These models can also answer specialised questions and provide examples and exercises to successfully meet the specific educational needs of each student (Goodfellow et al., 2016).

2.3.1 Empirical Applications of Intelligent Tutoring Systems (ITS)

In the international literature, these systems are divided into two main categories:

- A. academic systems that laid the foundations for research
- B. modern large-scale commercial systems implemented in the market.

A) Academic Systems

i) Cognitive Tutor System (Carnegie Learning)

This system was developed at Carnegie Mellon University (CMU) and is one of the most renowned ITS systems in the Western academic world (Anderson et al., 1995). The system is based on the ACT-R (Adaptive Control of Thought-Rational) cognitive architecture, meaning that it models the way in which people process information and solve problems. Pedagogically, its key innovation is that it monitors the entire problem-solving process and does not merely assess the final answer, as a teacher would. If the student makes a mistake at an intermediate stage, the system provides a targeted hint, guiding them through the entire reasoning process.

ii) The AutoTutor System

Auto Tutor (Graesser et al., 2004) is the most widely recognized ITS system that enhances interaction and learning through the use of natural language. This system is not based on multiple-choice quizzes but poses judgement questions to the learner, and the user must write a free-form response to answer. With the help of Natural Language Processing (NLP) algorithms, Auto Tutor analyses and understands the response. If the learner provides an incomplete answer, the system will ask follow-up questions and will not provide the answer. In other words, it is based on the Socratic method of teaching, which compels the learner to discover knowledge for themselves.

B) Modern Large-Scale Commercial Systems

i) The ALEKS System (Assessment and Learning in Knowledge Spaces)

The ALEKS system is a product of the publishing and educational giant McGraw Hill. It is a typical example of a commercial ITS and is based on ‘Knowledge Space Theory’ (Chen et al., 2020). This system selects the next question non-linearly, that is, based on the correctness of the previous answer. Thus, if the learner answers correctly, the system will select a question requiring a higher level of knowledge and skills, while in the event of an error, it will return to more basic concepts to identify the knowledge gap. With mathematical precision, it maps the learner’s knowledge and level, thereby improving time allocation and maximizing efficiency.

ii). The Squirrel AI System (Advanced Adaptive Learning)

Squirrel AI is a pioneering, large-scale adaptive learning platform which is characterized by extremely fine-grained architecture (Luckin et al., 2016). This platform breaks down an educational module into ‘nano-elements’ of knowledge (knowledge points). As the learner interacts with the platform, machine learning algorithms track their every move; if a gap is identified in a specific module, the content is then tailored to the module where the learner requires further learning.

2.3.2 Empirical Applications of Learning Analytics and Predictive Modelling Systems

Learning Analytics and Predictive Modelling systems utilize data for data-driven decision-making (Zawacki-Richter et al., 2019). In contemporary international practice, these systems operate as standalone analytics engines or as integrated dashboards within comprehensive Learning Management Systems (LMS). Two of the most characteristic examples of this category are Knewton and the Brightspace Insights system (Ferguson, 2012; Siemens, 2013):

A. The Knewton Predictive Engine (by Wiley)

Knewton is the world’s most renowned and powerful data analytics infrastructure, serving as the backbone behind major corporate and academic learning platforms (Zawacki-Richter et al., 2019). It is a system that analyses billions of digital traces (clickstream data) from millions of users around the world. This system assesses in

real time how the learner arrived at an answer, whether they answered correctly, how much time they spent on a page and what type of content (e.g. video, text, interactive graph) helped them most in their understanding. Predictive models are created through this process. If learners with a similar profile were helped by specific content, the model will recommend the same content to another user with similar learning needs (Siemens, 2013). In this way, personalization is achieved based on the behaviour of the user group as a whole.

B. The Brightspace Insights (D2L) System & Predictive Dashboards

Brightspace Insights (by Desire2Learn – D2L) is one of the most popular and sophisticated Predictive Learning Analytics systems used by the academic and corporate worlds to monitor the educational process (Davenport et al., 2020). This system collects data on user login frequency, the speed at which each module is completed, and test performance. Once this data has been collected, it is processed to create dashboards, which are used by trainers and HR managers. Its advantage lies in its ability to predict drop-out risk. The system categorizes learners and issues a warning (red flag) for those employees showing a declining level of engagement, well before this manifests as a failure in the final exams. This enables the trainer or HR manager to provide timely, targeted support and guidance to the trainee so that they, in turn, can complete the corporate training programme.

2.3.3 Practical Applications of Generative AI and Digital Content Creation Tools

The emergence of Generative Artificial Intelligence (Generative AI) is the most recent and radical development in digital learning tools because it is not merely an example of statistical data analysis but can also autonomously generate new knowledge and content. The most characteristic and widely used examples in this category are ChatGPT, Microsoft Copilot and the Khanmigo platform (Miao & Holmes ,2023) / UNESCO):

A. ChatGPT (OpenAI) & Microsoft Copilot (Microsoft)

ChatGPT (particularly versions based on the GPT-4 model and later) and Microsoft Copilot are the most popular Generative AI tools worldwide and are widely used in both the corporate and academic sectors. (Bandi et al., 2023). These

tools use deep neural network architectures (transformers) to process linguistic prompts from the user. They are capable of generating original text, summarizing long documents, explaining difficult and complex concepts, as well as creating programming code and educational exercises. All of this within a few seconds. For a trainer, these systems can act as assistants in creating materials (presentations, case studies, assessment questions) and reduce preparation time. (Goodfellow et al., 2016). For the learner, too, with appropriate programming, they can act as ‘Socratic interlocutors’ who will guide them step by step towards solving a problem, rather than giving them the solution straight away, thereby helping them to build knowledge and develop critical thinking skills (constructivist learning) (Huang & Rust, 2021).

B. The Khanmigo System (by Khan Academy)

Khanmigo is a specialized digital educational assistant (AI tutor and teaching assistant) developed by the global educational organization Khan Academy, which incorporates OpenAI’s technology within a strict educational framework (Miao & Holmes ,2023 / UNESCO). When a learner asks a question and seeks the solution to an exercise, the system analyses their thought process and identifies the exact point where the learner is making a mistake. It functions, one might say, as a very patient mentor who asks the learner questions and encourages them to think deeply. At the same time, it provides trainers with data on how their students think, thereby facilitating their role as learning curators (Popenici & Kerr, 2017).

All of the above tools contribute to improving the overall performance of educational organizations while simultaneously enhancing the productivity, efficiency and professionalism of the trainers themselves (World Economic Forum , 2023). The question that arises is whether these tools, which are used worldwide, are known in Greece and to what extent they are currently used in the training process by corporate trainers and by their trainees. The level of acceptance, the frequency of their use, and which categories of the above tools are currently utilized in Greece, form the central focus of the empirical investigation in this study, as reflected in the responses provided by trainers and trainees.

2.4 Challenges and Ethical Issues in the Integration of Artificial Intelligence

The introduction of Artificial Intelligence into education and human resource development offers undeniable advantages; however, its ongoing integration into educational processes is accompanied by a series of very significant challenges. These challenges are not merely technical in nature, but concern ethical, social, pedagogical and organizational issues, making their critical and careful management essential (European Commission 2022, UNESCO, 2023). In the current literature, the main concerns and limitations are categorized under the following headings:

- 1) Data Protection, Security and Privacy in AI-driven Education
- 2) Algorithmic Bias and Lack of Transparency (The Black Box Problem)
- 3) Over-reliance and Loss of the Human Dimension of Learning
- 4) Organizational Readiness, Administrative Support and Resistance to Change

2.4.1 Data Protection, Security and Privacy in AI-driven Education

As discussed in the previous section, the operation of modern Artificial Intelligence systems, and in particular Machine Learning and Learning Analytics systems, relies on the collection, storage and processing of vast amounts of data (Big Data) (Russell & Norvig, 2021). This raises serious concerns regarding privacy protection and information security (Holmes et al., 2022). In order to achieve the much-desired personalization and suggest tailored learning methods, they continuously record the user's digital behavior (Chen et al., 2020). This data includes:

- Performance statistics and patterns of recurring errors in quizzes and exercises.
- The time the user spends on each learning module.
- The pace at which the user responds while navigating
- Individual interactions with AI assistants and chatbots.

This detailed mapping creates a ‘digital learning footprint’ for each learner. As Mitchell (2019) points out the collection of all this analytical information describing an individual's

cognitive weaknesses and psychological characteristics could become dangerous if this information falls into the wrong hands for malicious use or is leaked to unauthorized users.

As regards the field of Human Resource Management, the challenge lies in another dimension, where the gathering of information for skill mapping and the identification of training needs may be interpreted by employees as a mechanism for continuous monitoring and supervision (Davenport et al., 2020). Employees, for example, may believe that their performance in a platform-based training programme could lead to a lower score in their annual appraisal. The resulting lack of trust will lead to rejection of the

To address these risks, the international literature emphasizes the need for a rigorous and transparent framework for algorithmic governance (Jobin et al., 2019). In the European context, any AI tool used for staff training must fully comply with and respect the General Data Protection Regulation (GDPR). Organisations must therefore ensure:

1. The principle of data minimization: Only the absolutely necessary data should be collected.
2. Transparency and consent: Trainees must be informed in advance of what data is being collected and for what specific purpose
3. The right to human intervention: No employee should be assessed solely through an automated algorithmic process (UNESCO, 2023).

2.4.2 Algorithmic Bias and Lack of Transparency (The Black Box Problem)

One of the most complex ethical challenges regarding Artificial Intelligence concerns algorithmic bias and the so-called ‘black box problem’ (O’Neil, 2016). How valid are the decisions made by machines, and to what extent can we, as humans, ultimately trust them? (Barredo Arrieta et al., 2020).

There is a common, yet mistaken, perception that computers, as mathematical systems, are by definition objective, which in practice is not the case. In reality, Machine Learning algorithms are trained on vast amounts of historical data generated by humans (Russell & Norvig, 2021). If this data is biased or contains prejudices, the model will detect and reproduce them, even lending them a veneer of scientific validity (O’Neil, 2016).

In terms of human resource management, this bias can have serious consequences. If an automated skill mapping or CV assessment system is trained using data from a company where, to date, only men or younger employees have had opportunities for advancement, the algorithm may limit or exclude women or older executives from training, thereby reinforcing existing

The challenge of bias lies in the lack of transparency. Many modern models (such as Deep Learning) operate as ‘black boxes’ (LeCun et al., 2015). This means that, while the input and output are fully visible, it is impossible for a human to discover the exact path of the machine’s reasoning due to its complexity (Barredo Arrieta et al., 2020). In education, however, this lack creates significant pedagogical and ethical problems:

- If an Adaptive Learning system decides to exclude a learner from an advanced module, the trainer cannot know why.
- It is unclear whether the decision was actually based on a lack of understanding or on some statistical error in the platform.
- The inability to justify the results undermines the principle of ‘Explainable Artificial Intelligence’ (XAI), which is essential for building trust (Holmes et al., 2022).

2.4.3 Over-reliance and Loss of the Human Dimension of Learning

The educational process, whether referring to academic education or corporate training, is undoubtedly an activity that is traditionally social and human-centred. The widespread replacement of traditional teaching methods with automated digital tools poses risks relating to cognitive dependence and the social alienation of learners (Popenici & Kerr, 2017).

The remarkable ease and speed with which modern Generative AI tools, such as ChatGPT, provide rapid responses and ready-made texts may lead to the risk of these tools becoming ‘intellectual crutches’ (Brynjolfsson et al., 2023) and to instances of ‘cognitive laziness’ (Bandi et al., 2023). Thus, learners bypass the critical stages of the educational process that require in-depth study, the synthesis of different viewpoints and independent research, and their critical thinking skills will gradually deteriorate (Holmes et al., 2022).

The transfer of the learning process from a classroom to a digital screen deprives the individual of key elements of traditional education. (OECD ,2023). Learning is not merely a transfer of information from a database to a person but is based on:

- Group dynamics and collaborative learning among learners (peer learning).
- On face-to-face interaction and the exchange of experiences, ideas and opinions.
- On the emotional connection, inspiration and psychological encouragement provided by the trainer themselves.

As Huang and Rust (2021) point out, the absence of the above elements hinders and makes it more difficult to develop so-called ‘soft skills’. Skills such as empathy, leadership, conflict management, teamwork and emotional intelligence require human interaction and cannot be achieved by any intelligent system or chatbot (UNESCO, 2023).

The successful integration of Artificial Intelligence into training and human resource development processes is directly linked to the culture of each company, the strategy chosen by its management, and the readiness of its staff who are called upon to embrace the change. In contemporary literature, the introduction of the systems mentioned above is being delayed due to organizational inertia and a lack of digital maturity (World Economic Forum, 2023).

With the introduction of new technologies, such as Generative AI and automated assessment systems, employees are gripped by feelings of insecurity as existing work patterns are disrupted. According to Holmes et al. (2022), trainers and employees often face what is known as ‘AI anxiety’. On the one hand, trainers may feel threatened and fear that their role is being undermined and their professional authority challenged. On the other hand, they may view the new systems with suspicion as tools for further control rather than as means of educational empowerment. This psychological pressure translates into active or passive resistance to change within the organization. Users sabotage or dismiss the new platforms, preferring the traditional methods with which they are familiar. To resolve this problem, it is recommended that a proper change management strategy be put in place beforehand.

Management support is the most important factor in overcoming the above obstacles. An organization's management must support digital transformation by formulating a clear vision (SEV, 2020). Furthermore, providing regular retraining opportunities can help bridge the digital divide and foster an organizational culture of learning and a growth mindset (WEF, 2023).

2.5 International Strategies and Best Practices for the Integration of AI

For the integration of Artificial Intelligence into education and human resource development to be successful, it requires strategic planning, coordinated action and best practices that have been tested in certain countries or organizations. The common characteristics found in these cases are as follows: a) a human-centred approach, b) ethical responsibility, c) public-private sector collaboration, and d) investment in human resource development (OECD, 2024; UNESCO, 2023; World Economic Forum, 2024).

The successful practices encountered around the world are based on the principle of a ‘gradual and participatory transition’. In other words, trainers, trainees and strategy managers all work together collaboratively to shape the introduction and implementation of new technologies.

The following section briefly analyses examples of best practices that have been observed and studied worldwide.

1. Singapore's National AI Strategy (AI Singapore)

Singapore is considered a global pioneer in the integration of Artificial Intelligence. It has established the education and upskilling of its workforce as a key strategic pillar of its development. The government designed and implemented the “AI for Everyone” programme (AI4E), through which it funded basic training for tens of thousands of citizens and workers on understanding AI, regardless of their sector of activity. It has developed programmes that use AI to solve social problems and has collaborated with the private sector to create specialized AI training programmes in sectors such as healthcare, financial services and transport (Tan & Lee, 2024). It has also developed the “LEARN” platform, an intelligent adaptive learning system designed for public and private sector employees.

2. The European Union Framework (Digital Education Action Plan & AI Act)

The European Union is the first region in the world to have established a comprehensive legal framework (EU AI Act) because it approaches Artificial Intelligence from a human-centred and ethical perspective. As part of the ‘Digital Education Action Plan’, the EU has issued the ‘Ethical Guidelines for Educators on the Use of AI and Data in Teaching’. This framework stipulates that AI systems used by educational organizations must have ‘transparent algorithms’ (Explainable AI) and ensure that no decision regarding a learner’s progress or assessment is made solely through the use of systems and in a fully automated manner. European best practice provides a solution to the challenge of data protection and seeks to restore the relationship of trust between people and Artificial Intelligence by establishing the widely recognized legal framework of the GDPR.

3. The US Strategy (Department of Education – AI Policy)

The US Department of Education is another example of best practice, emphasizing the use of artificial intelligence to achieve educational equality and support the work of teachers. Official US policy favours the ‘AI as an Assistant, Not a Replacement’ model. Best practices focus primarily on developing tools that take on the significant administrative burden of teachers, which is time-consuming (such as the automatic organization of course material or attendance management), thereby making them more available for face-to-face and personalized training and support for students with greater difficulties. This approach reinforces ‘cognitive augmentation’ and demonstrates that AI is more effective when designed to empower people rather than marginalize them. (U.S. Department of Education , 2023)

4. UNESCO Guidelines (Beijing Consensus & Generative AI Guidance)

UNESCO has established the foundation and global pedagogical framework for the utilization of AI, placing particular emphasis on Generative AI. Through the ‘Beijing Consensus on Artificial Intelligence and Education’ programme and its recent guidelines on Generative AI, UNESCO recommends that member states

establish national training programmes for trainers (Train-the-Trainer). The basic principle is that trainers must become active ‘learning curators’ (UNESCO, 2023). Thus, the lifelong training of trainers is the solution to the problem of learners’ excessive dependence on AI and the loss of their critical thinking.

5. The Netherlands: The ‘Human AI’ Approach

The Netherlands has developed a human-centred AI strategy that emphasizes ethics, transparency and citizen participation in policy-making. The Dutch model is based on the principle that ‘AI must serve humans, not the other way round’ (Dutch Ministry of Economic Affairs, 2024). Consequently, it created the ‘National AI Course’, a free online course that has been taken by more than 1 million citizens. It has mandated the integration of ethical principles into all Artificial Intelligence educational programmes and established collaboration centres where private companies, universities and public bodies work together on the development of AI educational solutions. (van der Berg & Koops, 2024).

6. Finland: The ‘Digital Literacy for All’ Approach

Finland is a pioneer in the integration of Artificial Intelligence into education and training. It is, after all, a country renowned for its effective educational programmes, so it was to be expected that it would innovate in this field. The Finnish model is based on the principle that every citizen and worker must know and understand the basic principles of AI so that they can grasp for themselves the implications as well as the benefits of its use in everyday life (Finnish National Agency for Education, 2023). Finland’s flagship national programme is ‘Elements of AI’. It was developed at the University of Helsinki in collaboration with the company Reaktor and includes training for trainers in basic concepts, the integration of AI tools into educational programmes, and the development of platforms that combine algorithmic support with traditional pedagogical methods (Sahlberg & Hasak, 2024). It comes as no surprise that the results of this national strategy are impressive. According to the European Digital Economy and Society Index (DESI) reports, Finland consistently ranks among the world’s top performers in digital literacy and understanding of new technologies.

2.6 Linking Artificial Intelligence to Digital Transformation and HR Strategy

The integration of Artificial Intelligence into modern organizations is not simply an isolated technological upgrade, as noted above it forms the very core of the Digital Transformation of the Fourth Industrial Revolution (Schwab, 2017). Human Resource Management is now called upon to act as a strategic partner and to move definitively away from the administrative role it played in the past. Artificial Intelligence is emerging as a key tool contributing to this transition and to the formulation of a ‘data-driven HR strategy’ (Davenport et al., 2020).

Contemporary literature emphasizes that the introduction of AI tools must be fully aligned with an organization’s strategic objectives (strategic alignment) (Huang & Rust, 2021). The contribution of AI to HR strategy is based on and analyzed in parallel across three key areas:

1. Predictive Talent Management: As discussed in the previous section, Human Resource Management, with the help of Learning Analytics and Machine Learning, is now able to predict future skills gaps and to plan reskilling and upskilling programmes in good time, helping to ensure an organization’s sustainability (WEF, 2023).
2. Optimizing the Return on Investment (ROI) of Training: AI is capable of accurately measuring the effectiveness of training programmes. In this way, HR managers can identify which tools and learning pathways are most cost-effective (Return on Investment – ROI), enabling the appropriate allocation of resources (Bersin, 2026).
3. Enhancing the Employee Experience: By providing personalized learning and 24/7 support via digital tools, employees’ sense of satisfaction and commitment increases because they realize that the organization is investing in their personal professional development (Wamba et al., 2021).

It is, however, interesting to examine how Artificial Intelligence is linked to digital transformation and human resource management in the Greek workplace and educational environment. Greece is in a phase of digital transition, but the adoption of advanced

technologies is not uniform across all organizations. Differences are observed between the public and private sectors, and between large enterprises and small and medium-sized enterprises.

In the field of adult education, Artificial Intelligence could serve as a tool for bridging the digital divide if used correctly in an educational context. Adult educators can utilize AI tools to develop educational materials, provide feedback and support learning needs. At the same time, learners can access personalized learning methods by studying independently with flexibility. However, making the most of these opportunities requires a clear strategy that links artificial intelligence tools, human resource management, training, skills development and organizational competitiveness.

In order to investigate whether Greek companies have already formulated such a strategy or whether they are ready to adopt a strategy for integrating AI into staff training, this study undertakes primary quantitative research. The following chapter presents the methodological approach, the structure of the questionnaires examining the extent to which trainers and trainees use AI, as well as their attitudes, concerns and perceptions regarding this technology.

3. Research Methodology

3.1 Research Design and Research Questions

To bridge the gap between the theoretical background and the empirical reality in Greece, the present study was carefully and methodically designed as the core of this dissertation. This chapter presents the methods, tools and procedures followed for the collection and processing of the study's primary data, with scientific justification.

The main aim of this dissertation is to investigate the extent to which Artificial Intelligence tools have been integrated into human resource training and development processes in Greece, in both the public and private sectors. Through this research, the study also examines participants' perceptions and attitudes, as well as the challenges and ethical concerns surrounding AI technology and its integration into education.

To achieve the research objective, this study was based on a primary quantitative approach using a cross-sectional design. The choice of quantitative methodology was based on the scientific philosophy of positivism. According to this theory, social and organisational reality is studied objectively, through the measurement of observable phenomena and the use of statistical tools (Saunders et al., 2019).

Below, the study outline in detail the academic reasons why quantitative research was chosen as the most appropriate method for conducting this study. (Creswell & Creswell, 2018):

1. Generalizability: Quantitative research allows data to be collected from a relatively large sample of participants (trainers and trainees) working in different sectors of the private and public sectors in Greece, and also allows for the generalization of conclusions regarding the digital maturity of Greek organizations.
2. Objectivity and Standardization: The use of structured questionnaires ensures that all participants respond under the same conditions. This minimizes the researcher's subjective bias during data collection, analysis and interpretation.
3. Statistical Inference: quantitative research enables the application of advanced statistical tests (such as correlation analyses and tests of differences between

groups). These tests are considered essential for identifying and studying the factors that influence the general acceptance and use of Artificial Intelligence.

Survey research was deemed the appropriate research strategy. This is a tried and tested method in human resource management and educational research. This method makes it possible to systematically map the attitudes, beliefs and behaviours of a population.

Given the multifaceted nature of the subject of this research, it was deemed necessary to develop and distribute two separate questionnaires. This dual-focus strategy enables a more holistic understanding of the phenomenon, as it examines both the perspective of the trainers who design and implement programmes and the perspective of the trainees who participate in the educational process.

More specifically, each research question corresponds to a specific theoretical section of the literature review. The first question concerns the literature on familiarity with and the use of Artificial Intelligence tools in education. The second concerns effectiveness and personalization in learning. The third question concerns ethical challenges, algorithmic bias, data protection, and the human factor. The fourth question concerns the literature on organizational readiness, administrative support, and technology integration strategies. Finally, the fifth question explores differences among groups to examine whether perceptions of and use of Artificial Intelligence are influenced by professional and demographic characteristics.

In order to avoid the risk of fragmented data collection, the research was based on five (5) central research questions. These questions were derived from the international literature and correspond to the main thematic axes identified in the theoretical framework: familiarity and use of AI tools, perceived effectiveness, concerns and ethical issues, organisational readiness and differences between participant groups.

- Question 1 : What is the level of knowledge, familiarity and current integration of Artificial Intelligence tools into the educational processes of organizations in Greece?

This question investigates the level of ‘AI literacy’ and clarify which types of digital tools are currently in use. It examines whether use is limited to simple AI assistants (e.g.

ChatGPT) or also includes advanced adaptive learning platforms and learning analytics. It corresponds to Sections B and C of the questionnaires.

- Question 2 : What are the attitudes and perceptions of trainers and learners regarding the effectiveness of AI and its contribution to the personalization of learning?

This question examines the pedagogical and organizational contribution of AI technology. It investigates whether AI increases efficiency, whether it makes content more engaging and whether it supports the learning process without replacing the trainer.

- Question 3 : What are the main challenges, concerns and ethical considerations arising from the use or non-integration of AI?

This question examines the challenges and barriers identified in the literature review. It documents fears regarding the security of personal data, the potential for dependency, the lack of transparency, and the risk of a reduction in human communication and interaction within the educational process. It corresponds to Section D (Learners) and Section E (Trainers).

- Question 4 : What is the level of organizational readiness and administrative support among Greek businesses and organizations regarding the introduction of AI in education?

It examines the phenomenon from the perspective of Change Management. It examines whether the management of Greek businesses and public organizations actively supports the digital transformation of their educational structures and whether there is a culture of acceptance or resistance to change within the organizational environment. This corresponds to Section E of the measurement tools.

- Question 5 : How do participants' attitudes, usage and concerns vary according to their demographic and professional characteristics?

The aim of this question is to identify whether variables such as gender, age group, years of previous work experience, the sector of activity and the type of organization (private

versus public sector) are factors that significantly influence the statistical results, thereby highlighting the particularities of the Greek professional environment.

3.2 Population, Sample and Sampling Procedure

The design phase of a primary quantitative study is considered crucial for the external validity of a research project. Fundamental criteria include the clear definition of the target population and the selection of an appropriate sample size (Saunders et al., 2019). For this reason, in the present empirical study, as mentioned in the previous section, the study used a double-sampling strategy. This strategy enables the study to capture, as comprehensively and effectively as possible, the impact of Artificial Intelligence on education and the development of human resources in Greece.

The target population was divided into two independent target groups, which constitute the final research sample. The study population consists of adult educators, training professionals and working learners who have participated in vocational and corporate training programmes related to human resource development in Greece. The two groups were selected in order to capture the phenomenon from both sides of the educational process.

1. The Trainee Sample (N = 187): Consists of one hundred and eighty-seven (187) employees and managers from the public and private sectors who have participated in vocational education and corporate training programmes over the past year.
2. The Trainers' Sample (N = 100): Consists of one hundred (100) adult trainers, seminar facilitators, educational programme designers and specialist human resource development (HRD) professionals.

The sample includes participants from various professional sectors in the public and private sectors, such as telecommunications, public administration, retail, energy, vocational education and training, educational material development, and, more generally, companies and organizations involved in education, employment, and skills development. Organizations are deliberately not mentioned by name, as participation involved individual natural persons rather than the official participation of the entities for which they work.

The collection of a total of 287 valid questionnaires is considered satisfactory for the purposes of this dissertation. This number provides the necessary statistical power required to conduct reliable descriptive and statistical comparison tests (Creswell & Creswell, 2018; Field, 2018).

The selection of research participants was carried out using purposive sampling in combination with convenience sampling. These two methods were chosen to ensure that the sample included individuals who have direct experience of the training processes of the organizations where they work or collaborate. The diversity of the sample is one of its key methodological strengths, as it covers the entire spectrum of the Greek working environment. It was decided not to use probability sampling for this study, as the main objective was to collect empirical data from individuals who had relevant experience with training, training, or human resource development, rather than to provide a fully statistically representative sample of all workers in the country. In this way, the sample is directly linked to the research purpose and research questions of this study.

- Sectoral and Industrial Breakdown: The survey includes employees and trainers from both the private and public sectors. The inclusion of the public sector offers significant added research value. It gives us the opportunity to study the degree of digital maturity and the specific characteristics of public administration in Greece in comparison with the private sector. In particular, in recent years, public administration has set the strategic goal of strengthening digital transformation and digital governance; therefore, our research, in light of the above data, is considered timely.
- Organization Size: The sample is drawn largely from large and very large companies and organizations operating in the domestic market. Large-scale businesses and public organizations possess the necessary financial resources, IT infrastructure, and organized departments and programmes for training and human resource development. It is therefore deemed academically appropriate for the sample of our research to consist mainly of employees (trainers and trainees) from such large organizations (SEV, 2020).

This specific composition of the sample enables Chapter 4 to examine possible differences and relationships between variables. For example, the analysis examines whether the type

of organization (private versus public) or the size of the organization is associated with different levels of AI acceptance and organizational readiness for AI integration.

3.3 Data Collection Process and Research Ethics

The process of collecting primary data is a crucial stage in the empirical research of this dissertation and requires coordination and adherence to the selected statistical methods in order to ensure the quality and validity of the research (Saunders et al., 2019). For the purposes of this study, data collection took place during the current academic year, specifically in April and May 2026.

3.3.1 Research Instrument and Questionnaire Distribution

The participants reside in various parts of Greece, so the sample is characterized by a wide geographical spread. For this reason, and to ensure the immediate, accurate and secure recording of data, the data was collected exclusively using digital questionnaires (web-based questionnaires). The two standalone research tools that were designed (one tailored for the trainee sample and one for the trainer sample) were coded and formatted using the widely popular online form management platform Google Forms. The two questionnaires are the main research tools of the study. Their electronic format was chosen for reasons of practicality, speed, and easier access to participants from different sectors and regions, as well as for the more secure collection and extraction of responses for statistical analysis.

This platform was chosen because it offered significant advantages, such as reducing errors when recording responses, the requirement that all necessary fields in the questions be completed (thus preventing missing values), and the immediate export of data into spreadsheets ready for statistical analysis (Creswell & Creswell, 2018).

The distribution of the digital links to the two questionnaires was carried out in a carefully planned manner, using all available means of communication to ensure that the appropriate target population could be reached:

1. Professional and Social Networks (LinkedIn, Facebook, Messenger, Viber):
Personal messages were sent via social networks such as LinkedIn and Messenger, and public posts were also made in specialised digital communities (groups) on

Facebook and Viber that deal directly with Human Resource Management (HRM), Adult Education and Corporate Vocational Training.

2. Emails: The links were sent directly to HR training and development managers (HR Managers / Training Coordinators) at large and very large private sector companies, to Lifelong Learning Centres and Private Vocational Training Institutions, as well as to relevant departments and staff at public sector organizations involved in these fields. These individuals were also asked to pass on the questionnaires to colleagues who could contribute and who met the statistical criteria, thereby applying the snowball sampling method (snowball sampling).

Using the above method, and with considerable effort and dedication, a satisfactory volume of data was collected. A total of 187 valid questionnaires from learners/employees and 100 valid questionnaires from adult educators were collected. The total number of responses was considered adequate for the purposes of this dissertation.

As expected, the research was designed and conducted in accordance with the principles of academic ethics, with an emphasis on protecting the rights of participants. The research fully adhered to the guidelines on research ethics in the social sciences and business administration (Creswell & Creswell, 2018).

Specifically, the following ethical principles were applied:

- Informed Consent: To ensure that all participants were fully informed, a detailed explanatory note was included on the introductory page of both online questionnaires, explaining the purpose of the research in advance. This introductory statement also made clear that participation was voluntary and anonymous.
- Ensuring Complete Anonymity: The questionnaires were designed in such a way as to ensure complete anonymity and to prevent the collection of any data that could identify individuals. No names, email addresses, telephone numbers, IP addresses or the names of the companies and public organisations where the respondents work were requested. In this way, it was ensured that no response could be linked, directly or indirectly, to the identity of any participant.

- Confidentiality and the GDPR: Participants were given an explicit assurance at the end of the introductory note that the data they were about to enter would be used solely for the purposes of this specific academic study. The process was carried out in full compliance with the European Union’s General Data Protection Regulation (GDPR).

3.4 Research Tools and Measurement Variables

To collect the primary data for this study, two independent research tools (closed-ended digital questionnaires) were designed. The questionnaires were based on the structure of the literature review and the research objectives of Holmes et al. (2022) and UNESCO (2023). They were designed in such a way that the data could be easily transferred, coded and processed within the Microsoft Excel spreadsheet environment.

For terminological reasons, in this study the questionnaires are also referred to as “research instruments” because they are the structured tools used to measure the key variables of the study, which are: a) familiarity with Artificial Intelligence, b) frequency of use, c) perceptions of effectiveness, d) ethical concerns, and e) organizational readiness.

The questionnaire, which was designed for learners/workers, is divided into five (5) distinct sections, each of which measures specific categories of variables:

- Section A: Demographic and Professional Characteristics: Includes questions regarding gender, age group, level of education, years of previous work experience, sector of activity and type of organization (private versus public sector). These variables are independent variables for subsequent tests of differences. In Excel, these qualitative responses are coded numerically (e.g. 1 = Male, 2 = Female / 1 = Private, 2 = Public) to facilitate calculations.
- Section B: Familiarity and Current Use of AI: This section examines participants’ level of knowledge regarding the basic concepts of AI, as well as the frequency with which they use specific tools (e.g. Generative AI, chatbots) in their daily training and which tools these are.

- Module C: Perceived Effectiveness and Attitudes: This module examines employees' attitudes towards Artificial Intelligence and the extent to which it enhances the learning experience. It also examines whether it offers meaningful personalization of educational material and whether it increases their autonomy during their training.
- Section D: Concerns and Ethical Issues: This section examines the extent to which learners are concerned about the protection of their personal data, the risk of excessive dependence on new technologies, the lack of transparency (black box) and the potential reduction in human contact with the teacher.
- Module E: Organizational Readiness and Expectations: This section explores employees' views on whether their organization is ready to integrate Artificial Intelligence and whether management actively supports its integration, as well as what their future needs are for further training.

Similarly, the questionnaire for trainers/training managers follows a parallel structure to enable comparison of the results.

- Section A: Demographic data: This section records gender, age, level of education, employment status, years of experience in adult education, and the size of the organizations with which they collaborate.
- Section B: Knowledge and Familiarity with AI: This section records trainers' level of knowledge and familiarity with emerging technologies and specialized Artificial Intelligence educational systems.
- Section C: Current Use of Tools: This section identifies which tools (e.g. adaptive control panels, tools for the automatic generation of educational content) they use when designing their educational programmes.
- Section D: Attitudes and Perceptions regarding Effectiveness: This section examines whether trainers believe that Artificial Intelligence ultimately enhances their role, facilitates their work (by reducing administrative burden) and improves learners' performance.
- Section E: Challenges, Resistance and Management Support: This section examines concerns regarding data confidentiality, the existence of any resistance to

change on the part of colleagues or trainees, the level of support from senior management, and the need for specialized train-the-trainer programmes.

To measure attitudes, perceptions and concerns in Sections C, D and E of both questionnaires, a 5-point Likert scale was used, which is the most widely used tool in quantitative research for measuring psychometric and social variables. This scale allows participants to express the degree to which they agree or disagree (Saunders et al., 2019).

For the purposes of statistical analysis in Microsoft Excel, the scale options denoted by words were assigned integer numerical values (data coding) ranging from 1 to 5. The coding of the scale is as follows:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree (neutral stance)
- 4 = Agree
- 5 = Strongly agree

Converting these qualitative attitudes into numerical data (interval-like data) facilitates data processing as it allows Excel to perform higher-level mathematical operations. In this way, it is possible to calculate the means and standard deviations for each question, as well as to apply statistical comparison tests (t-test and ANOVA) using the algorithms of the Data Analysis Toolpak (Creswell & Creswell, 2018).

The choice of a 5-point scale was deemed the most appropriate, as it offers the respondent the option of neutrality (ensuring the honesty of responses) and also reduces fatigue while completing the questionnaire, which limits response errors.

3.5 Methods of Statistical Data Analysis

Before performing technical data processing in Excel, it would be necessary to clarify the theoretical framework of statistical analysis. The data analysis is based on statistical techniques that made it possible to organize, summarize, and interpret the participants' responses. In the context of this study, descriptive statistical techniques are used to present

the distribution of responses, while comparative statistical techniques are used where necessary to investigate differences between groups.

The use of frequencies, percentages, means, and standard deviations is appropriate for capturing the general trends in the sample and for linking the empirical findings to the research questions. In this way, statistical analysis serves as a tool for interpreting the attitudes and perceptions of instructors and learners regarding the integration of Artificial Intelligence.

Once the collection of primary data was completed, the responses from the 187 digital questionnaires completed by the trainees and the 100 questionnaires completed by the trainers were exported from the Google Forms platform in the form of Excel spreadsheets. Subsequently, after the necessary checks for any duplicate or incomplete entries had been carried out, the data was organized, coded and processed in Microsoft Excel. The built-in statistical functions and the specialized add-in ‘Data Analysis Toolpak’ were also utilized.

The statistical analysis is divided into two distinct but complementary stages, in order to answer the research questions of the dissertation with scientific validity (Berk & Carey, 2010):

Descriptive analysis is the first fundamental stage of the analysis. It is used to map, summarize and present the trends in the sample. Specifically:

- For nominal and ordinal variables (such as the demographic and professional data in Section A, as well as the frequency of use of Artificial Intelligence tools in Section B), Excel’s COUNTIF function was used to calculate frequencies (frequencies - N) and percentages (%). These data are presented in detail in Chapter 5 using frequency tables and bar charts or pie charts.
- For the variables on the 5-point Likert scale (attitudes, concerns, organizational readiness in Sections C, D and E), the mathematical functions AVERAGE and STDEV.S were used to calculate the means (M) and standard deviations (SD). These indicators highlight the prevailing trends of agreement or disagreement among participants, as well as the degree of homogeneity or dispersion in their responses.

To effectively examine Research Question 5 regarding potential variations and any relationships between opinions and the participants' demographic and professional characteristics, statistical comparison and correlation analyses were conducted using Excel's Data Analysis tool:

- Two-sample t-test: This was used to compare the means between two independent groups. For example, it was used to identify statistically significant differences in concerns regarding personal data or transparency between employees in the private and public sectors.
- One-Way Analysis of Variance (ANOVA): This was applied to compare the mean scores of a Likert scale variable across three or more independent groups. In this way, it was examined whether the age group of participants significantly influenced their familiarity with Artificial Intelligence tools.
- Pearson's Correlation Coefficient (Correlation Analysis): Using the CORREL function, the analysis investigated the existence, direction (positive or negative) and strength of linear correlations between the main variables of the study. For example, it examined whether increased subjective familiarity with Artificial Intelligence was statistically associated with lower levels of resistance to AI adoption.

The level of statistical significance for the statistical tests was set at $p < 0.05$ (95% confidence interval), which is a commonly used criterion in social, educational and organizational research for interpreting statistically significant results.

4. Presentation and analysis of the results

This chapter presents in detail the statistical processing and interpretation of the primary data collected during the empirical phase of the research. The central focus and objective of the analysis is to explore the questions formulated in the methodological framework. This chapter documents the attitudes, perceptions, emerging challenges, as well as the level of digital readiness of trainers and trainees regarding the integration of Artificial Intelligence (AI) into training and professional skills development processes in the Greek workplace.

4.1 Statistical analysis of the trainer sample (N=100)

The first part of this chapter is devoted to the analysis of responses from the sample of one hundred (100) adult educators, seminar facilitators and corporate training managers.

4.1.1 Demographic and professional characteristics of the sample of trainers

This section examines the frequency distribution of the demographic and professional characteristics of the sample of adult educators, as recorded in the online questionnaires (N = 100). This analysis provides the background required for interpreting the subsequent findings.

Table 4.1 presents the basic demographic and professional characteristics of the trainers who participated in the study. The sample consists of 100 individuals, which makes it very easy and straightforward to compare the percentages with the absolute frequencies.

Table 4.1
Demographic characteristics of trainers (N = 100)

Variable	Category	N	%
Gender	Male	44	44.0
	Female	56	56.0
Age Group	18–30 years	4	4.0
	31–40 years	35	35.0
	41–50 years	40	40.0
	51+ years	21	21.0

Variable	Category	N	%
Years of professional experience	Up to 5 years	25	25.0
	5–10 years	26	26.0
	11–20 years	29	29.0
	More than 20 years	20	20.0
Employment Sector	Private Sector	72	72.0
	Public Sector	14	14.0
	Mixed Sector	14	14.0
Organisation Size	1–50 employees	25	25.0
	51–250 employees	8	8.0
	251+ employees	67	67.0

Figure 4.1. Gender distribution of trainers

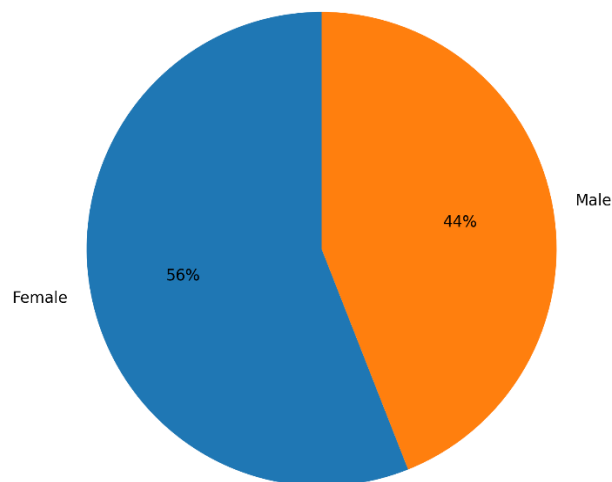


Figure 4.2. Age distribution of trainers

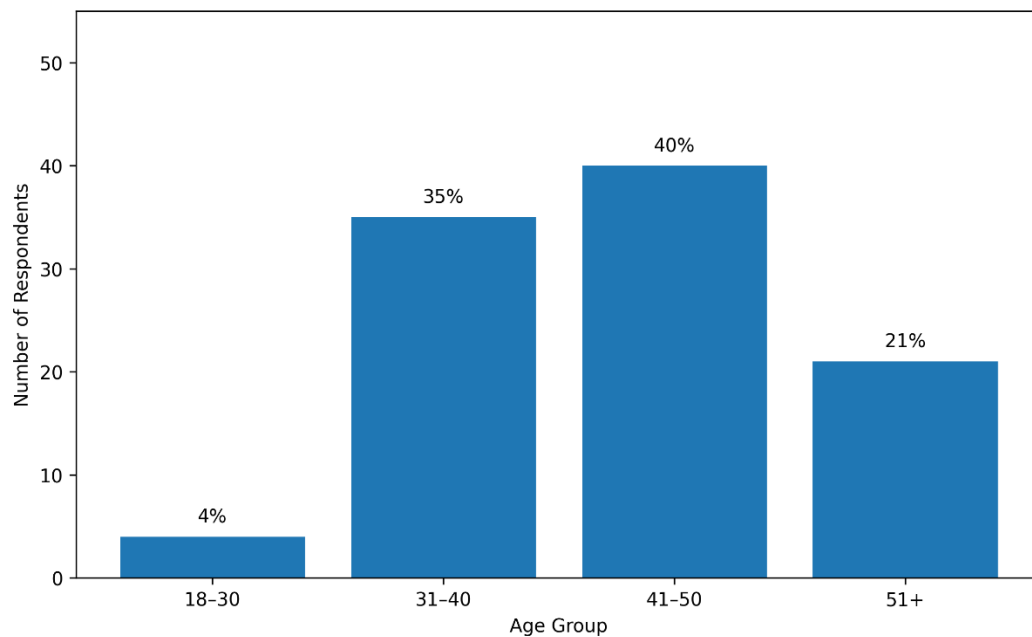
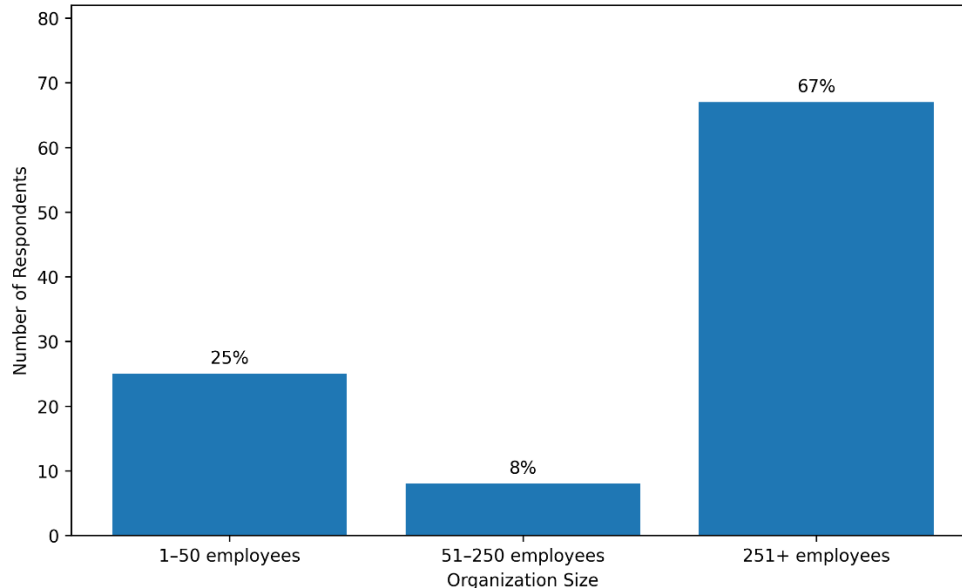


Figure 4.3. Organisation size of trainers' workplace



Based on the data in Table 4.1, the gender distribution is almost symmetrical. Women constitute the majority of the sample (56.0%). The slight asymmetry observed is considered normal and is consistent with the available data on the structure of the Human Resource Management (HRM) and adult education sectors, where higher rates of female employment are traditionally observed.

With regard to the age structure of the respondents, it is observed that the core of the sample is the productive age group of 31 to 50 years, which accounts for 75.0% of the participants in total. In particular, the largest group is that of 31–40-year-olds, accounting for 40.0% (N=40), followed by the 41–50 age group at 35.0% (N=35). Younger trainers (aged 18–30) account for 4% (N=4) and older trainers (aged 51 and over) account for 21.0% (N=21).

This finding is considered significant for the internal validity of the research because this predominant age group possesses sufficient professional experience to evaluate the educational tools with a critical eye. Furthermore, due to their professional maturity, they are quite familiar with digital tools, thus constituting a reliable sample for the study of Greece's digital transformation.

In terms of years of professional experience, the sample shows a relatively balanced distribution. 29% of participants have 11–20 years' experience, 26% have 5–10 years' experience, 25% have up to 5 years' experience, and 20% have more than 20 years' experience. This distribution indicates that both younger and highly experienced professionals are participating in this survey.

An analysis of professional characteristics reveals a strong presence of the private sector, which employs the overwhelming majority of 86.0% of the sample (including the mixed sector). However, the 27.2% (including the mixed sector) working in the public sector provides us with the necessary basis for comparison to enable us to draw conclusions regarding the integration of new technologies in both sectors of the economy.

Furthermore, the organizational structure shows that the sample consists mainly of large companies and organizations. Specifically, 75% of trainers are employed in large and very large organizations (with over 51 employees). This composition of the sample enhances the reliability of the results because it aligns with the data in the contemporary literature (as analyzed in the theoretical background), which states that large enterprises are those with the necessary financial strength to include a specialized Human Resources (HR) within their organizational structure in order to invest in Artificial Intelligence and learning analytics systems.

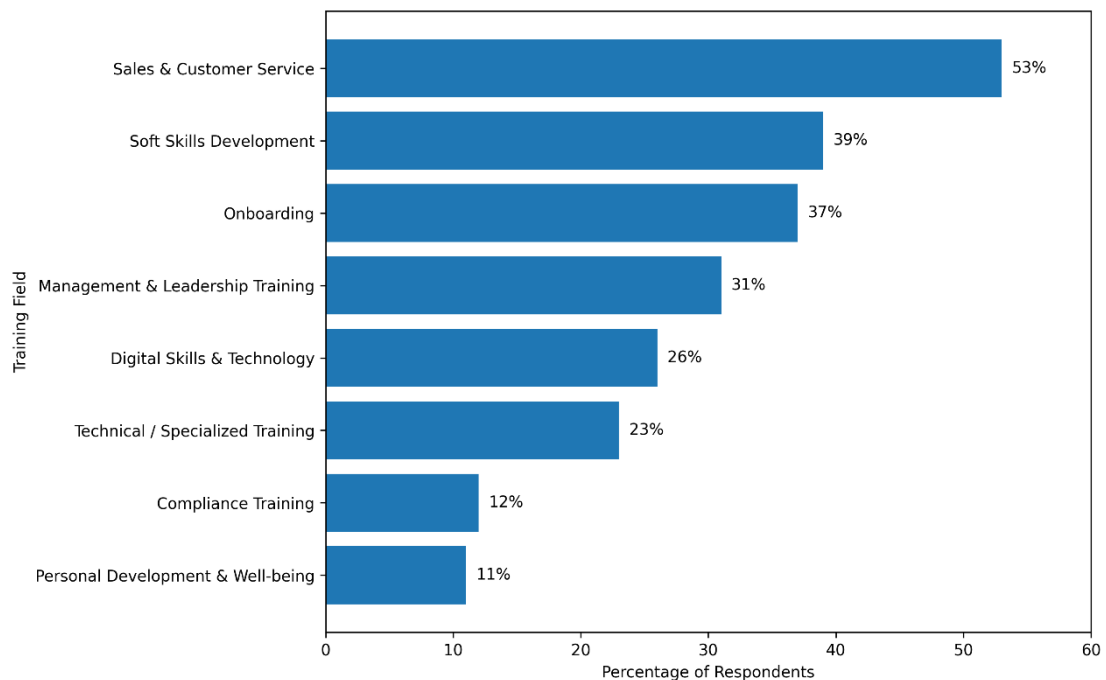
The key areas in which the participants are active are presented below. This particular question was a multiple-choice question in the questionnaire for this survey; therefore, the total of the percentages exceeds 100%.

Table 4.2

Training fields of trainers (multiple responses)

Training Field	N	%
Sales & Customer Service	53	53.0
Soft Skills Development	39	39.0
Onboarding	37	37.0
Management & Leadership Training	31	31.0
Digital Skills & Technology	26	26.0
Technical / Specialised Training	23	23.0
Compliance Training	12	12.0
Personal Development & Well-being	11	11.0

Figure 4.4. Training fields of trainers



As can be seen in Table 4.2, the most common training topics are sales and customer service, accounting for 53%. The next most common topics are soft skills development at

39% and onboarding at 37%. Administrative training and management account for 31%, while digital skills and technology account for 26% of responses.

From the above, it can be concluded that the trainers in the sample are primarily active in areas related to professional performance, communication, the recruitment and induction of new employees into the culture of the business or organization, and organizational functioning. At the same time, the presence of digital skills and technology as areas of training demonstrates that respondents are already involved in training fields linked to digital transformation.

4.1.2 Knowledge, familiarity and current use of Artificial Intelligence

The following section examines the knowledge, level of familiarity and current situation of the trainers who participated in this study. This section relates to the first research question of the study.

Table 4.3
AI familiarity and current use

Item	M	SD
Familiarity with the concept of Artificial Intelligence	3.80	0.98
AI knowledge is a necessary skill for the modern trainer	4.41	0.87
Frequency of AI use for lesson planning	3.13	0.87
Use of AI for creating educational material	3.63	1.13
Use of AI for the automatic assessment of learners	2.58	1.37
AI helps adapt the lesson to each learner's needs	3.18	1.22

Figure 4.5. Familiarity with Artificial Intelligence

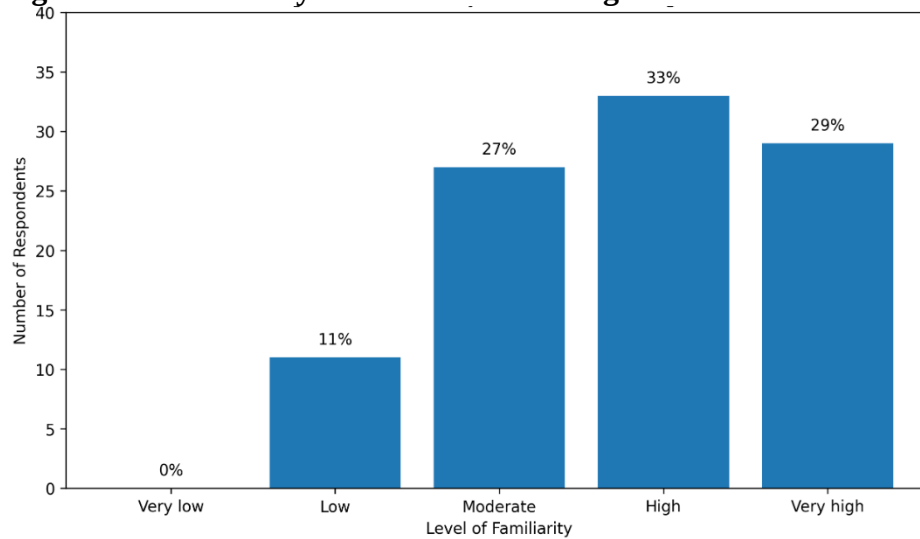


Figure 4.6. Frequency of AI Use for lesson planning

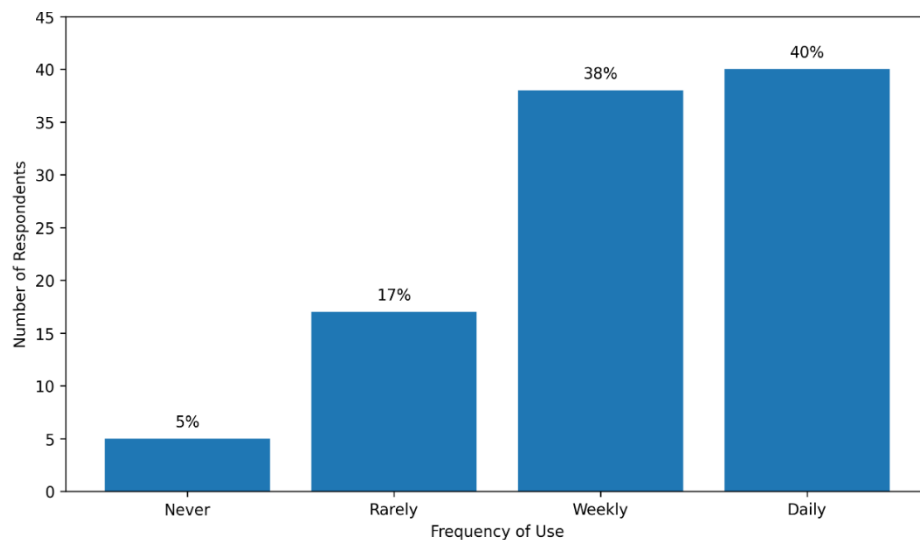
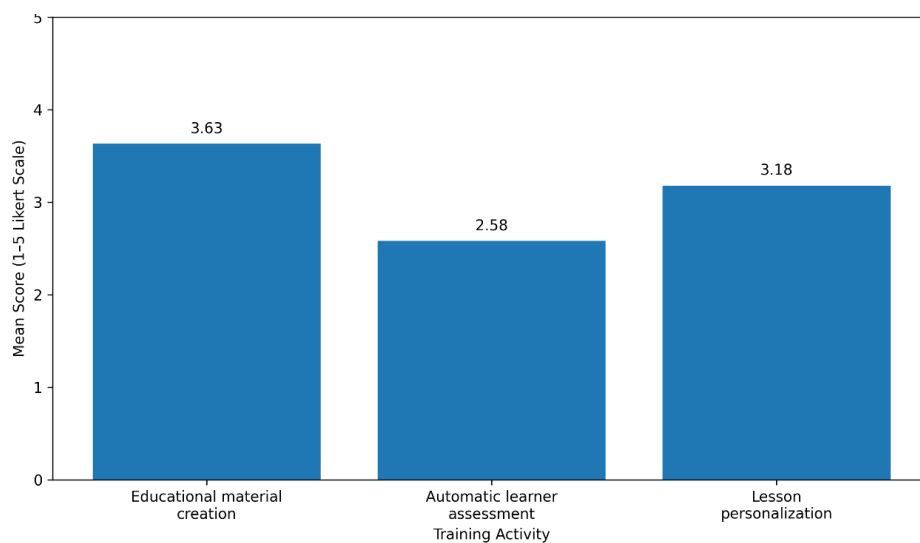


Figure 4.7. Use of AI in training activities



The results in Table 4.3 show that trainers demonstrate a relatively high level of familiarity with the concept of Artificial Intelligence, as the mean score is $M = 3.80$ on a scale of 1 to 5. This indicates that most participants are quite familiar with the concept, as they themselves state, and do not view this new technology as something unfamiliar.

The results show a particularly high mean score for the statement that knowledge of Artificial Intelligence is an essential skill for the modern trainer ($M = 4.41$, $SD = 0.87$). This demonstrates that educators in Greece today now recognize AI as a core professional skill for the modern role of the educator.

As regards the frequency of AI use in lesson planning, the mean is $M = 3.13$. This result indicates moderate to frequent use. A significant proportion of respondents stated that they use AI tools on a weekly or daily basis. However, it was observed that usage is not universal, which suggests that while they recognize its usefulness and feel familiar with it, the integration of AI is still at an evolutionary stage.

The use of Artificial Intelligence in the creation of educational materials has a higher average score ($M = 3.63$), which indicates that trainers make greater use of Artificial Intelligence in support processes, such as content and presentation creation or finding exercises. In contrast, the lowest average score for the use of Artificial Intelligence is found in the automatic assessment of learners. The average is $M = 2.58$, which indicates that there is still greater caution regarding learner assessment processes.

Finally, the question examining whether Artificial Intelligence helps to adapt the course to the needs of each student yields an average of $M = 3.18$. Trainers appear to recognize to a moderate extent the potential for personalizing learning through Artificial Intelligence, but this view is not universally accepted.

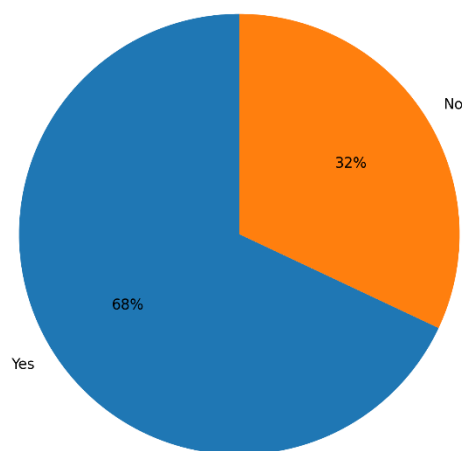
4.1.3 Previous training and Artificial Intelligence tools used by trainers

An analysis of trainers' current knowledge of Artificial Intelligence, based on their own responses, shows that the majority—namely 68% of participants—have attended relevant seminars, while 32% have not received such training.

Table 4.4
Previous training on AI in education

Response	N	%
Yes	68	68.0
No	32	32.0
Total	100	100.0

Figure 4.8. Previous training on AI in education



This finding indicates that most participants have already been exposed to training programmes relating to Artificial Intelligence in education. Nevertheless, it is noteworthy that approximately one in three trainers has not yet attended relevant training, so there is a need for more systematic professional development for a significant proportion.

Table 4.5
AI tools used by trainers (multiple responses)

AI Tool Category	N	%
AI Assistants / Conversational Tools	87	87.0
AI Tools for Educational Content Creation	58	58.0
Study Support and Content Understanding Tools	54	54.0
Automatic Assessment and Quiz Tools	33	33.0
Adaptive Learning Platforms	17	17.0
Learning Analytics Tools	12	12.0
No AI Tools Used	2	2.0

Figure 4.9. AI tools used by trainers

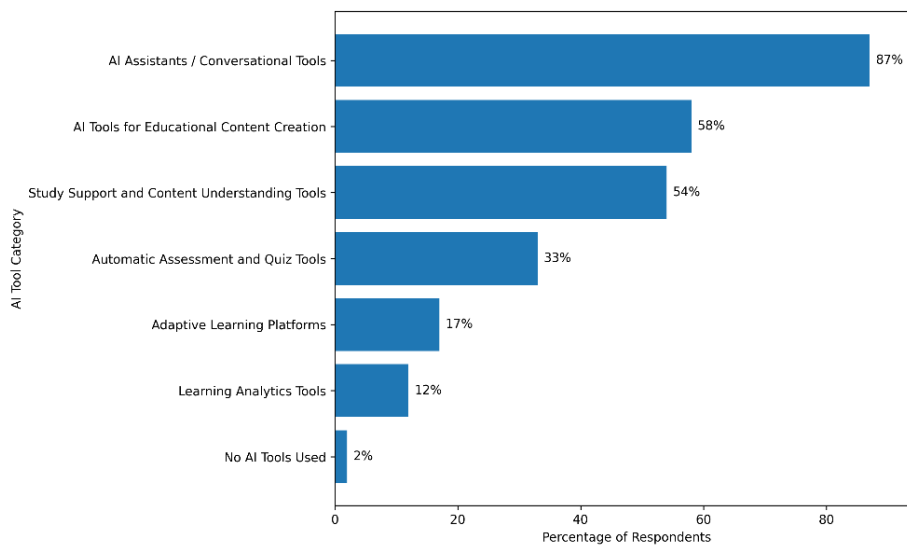


Table 4.5 shows that chatbots and AI assistants, such as ChatGPT and Microsoft Copilot, are the most widely used category of tools among participants, accounting for 87%. This indicates that the first and most immediate form of Artificial Intelligence integrated into educational practice is through user-friendly, general-purpose tools.

This is followed by tools for creating educational content, at 58%, and tools for supporting the study and understanding of content, at 54%. In contrast, lower percentages are observed for more specialized applications, such as adaptive learning platforms (17%) and learning analytics tools (12%). Therefore, the use of Artificial Intelligence by educators in Greece at present is primarily functional and supportive, while the use of personalized learning systems and data analysis remains limited.

4.1.4 Effectiveness of artificial Intelligence in education

The following section relates to the second research question, which examines trainers' attitudes and perceptions regarding the effectiveness of Artificial Intelligence and whether and to what extent it contributes to the educational process.

Table 4.6
Educational effectiveness of AI

Item	M	SD
AI improves the effectiveness of the educational process	3.82	0.81
AI facilitates the role of the trainer	4.22	0.68
AI can successfully replace traditional teaching methods	3.10	1.11
Learners respond positively to the use of AI tools	3.74	0.69

Figure 4.10. effectiveness of AI in education

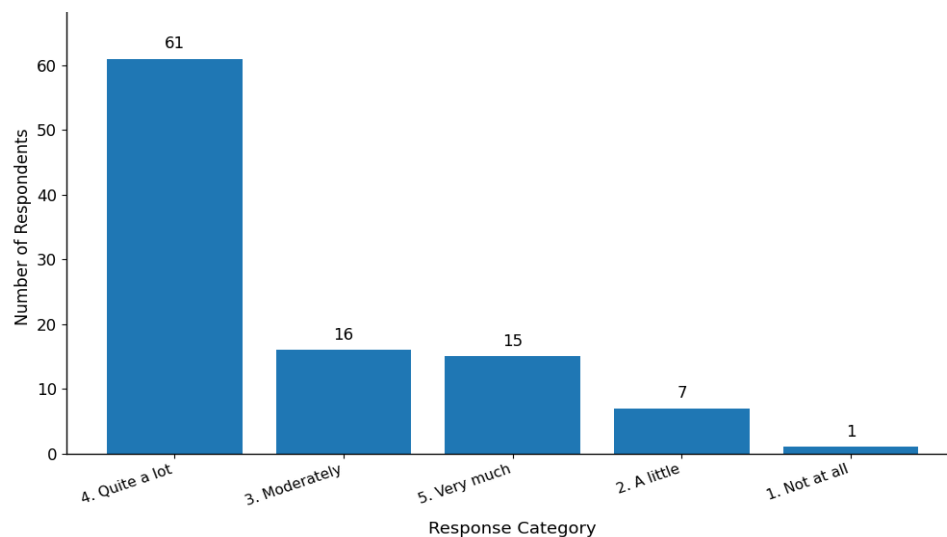


Figure 4.11. AI and the role of the trainer

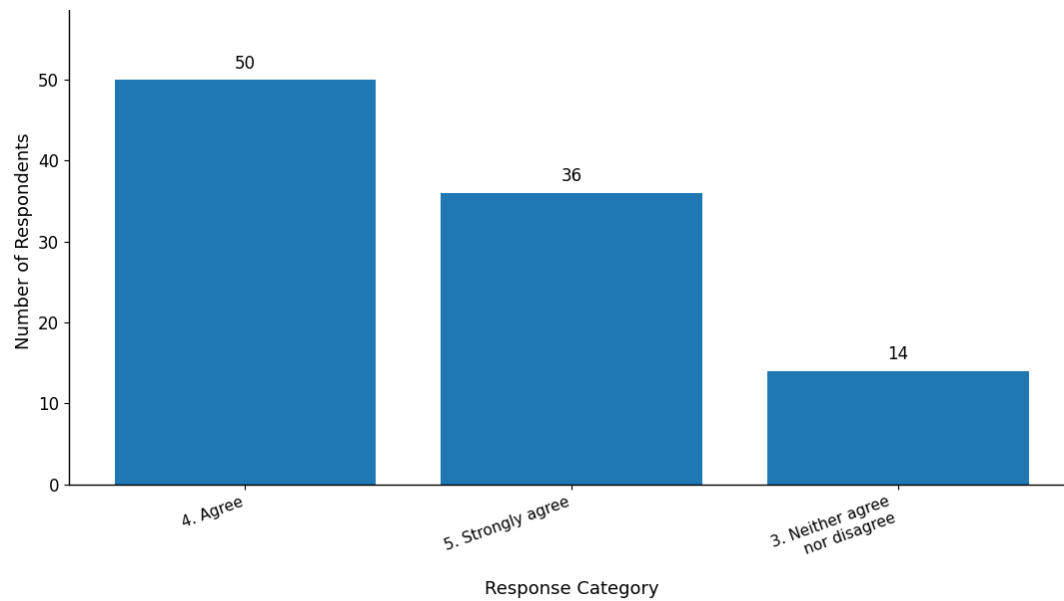


Figure 4.12. Learners' response to AI tools

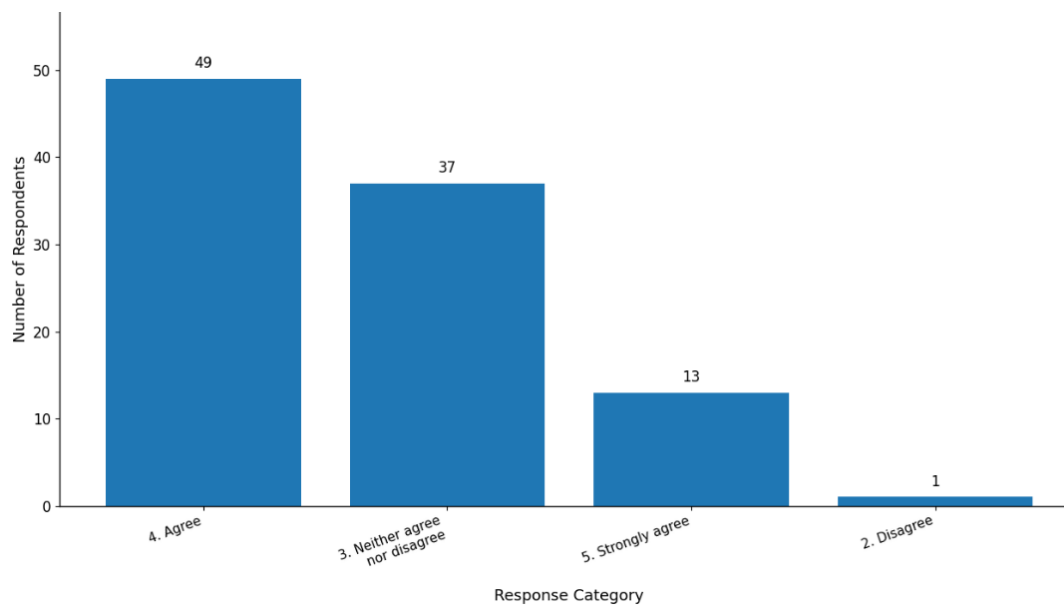


Table 4.6 shows that trainers tend to evaluate the contribution of Artificial Intelligence to the educational process positively. The statement that Artificial Intelligence improves the effectiveness of the educational process has an average score of $M = 3.82$, which indicates that there is a positive overall attitude.

An even stronger finding than the one above is the result of the survey concerning the facilitation of the trainer's role, with a mean of $M = 4.22$ and a relatively low standard deviation ($SD = 0.68$). Participants stated that they agree to a large extent that Artificial Intelligence can act as a support for the trainer, significantly reducing the time spent on preparation, facilitating the creation of materials and offering additional tools to help them organize the learning process.

At this point, however, it is important to emphasize that the statement that Artificial Intelligence can successfully replace traditional teaching methods received a lower average score ($M = 3.10$). While trainers today appear to recognize all the potential of Artificial Intelligence, they do not believe that it can replace human teaching and traditional pedagogical methods.

Finally, the question investigating whether learners respond positively to the use of Artificial Intelligence tools yields a mean of $M = 3.74$. This indicates that trainers generally perceive a positive attitude on the part of learners, but this positivity does not appear in the research as absolute or universal.

4.1.5 Challenges, risks and ethical concerns

This section analyses the research question concerning the challenges, concerns and ethical considerations surrounding the use of Artificial Intelligence in education.

Table 4.7
AI-Related concerns and challenges

Item	M	SD
Concern that AI may diminish the role of the human trainer	2.99	1.03
Resistance to AI adoption by colleagues or management	2.95	0.94
Trust in AI-generated results without extensive review	2.25	1.00

Figure 4.13. Concern about the role of the human trainer

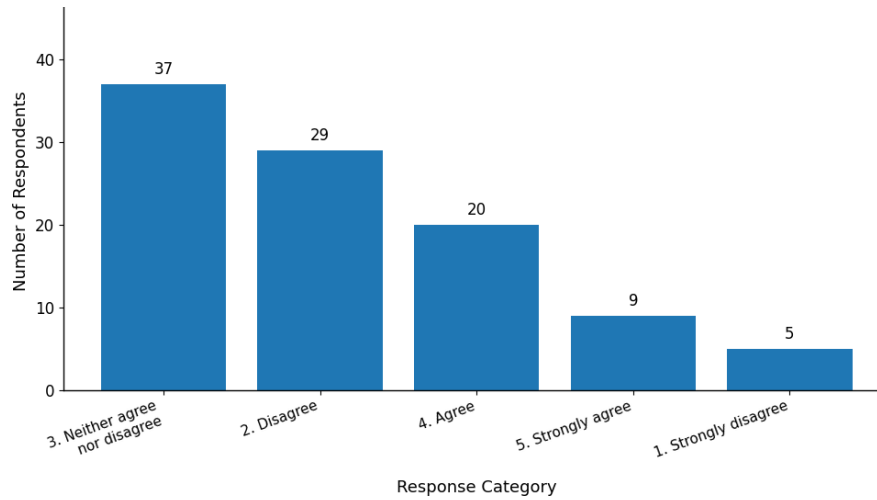


Figure 4.14. Resistance to AI adoption

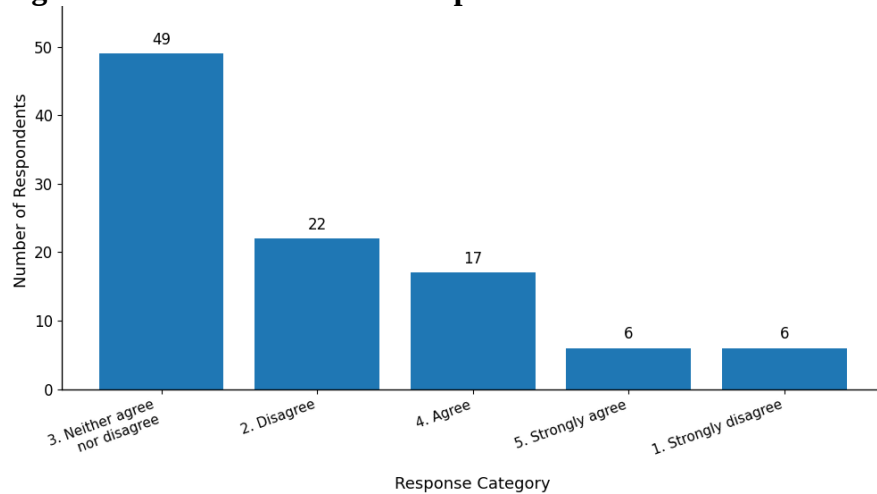
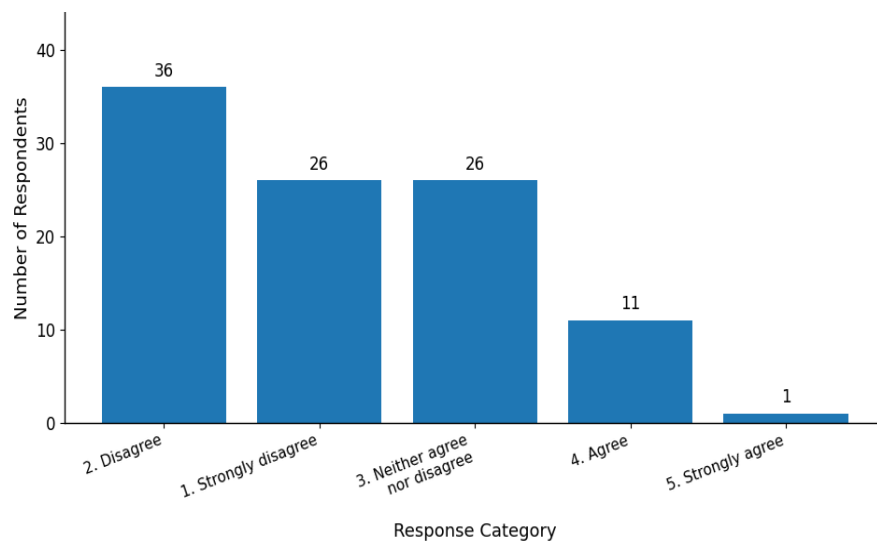


Figure 4.15. Trust in AI outputs without review



According to the results in Table 4.7, trainers do not hold an extremely negative attitude towards Artificial Intelligence, but maintain a cautious stance. The concern that Artificial Intelligence may undermine the role of the trainer scores an average of $M = 2.99$, meaning the average is close to the neutral point on the scale. This shows that educators in Greece today do not dismiss the possibility of risks, nor do they appear to be extremely fearful of technology.

The same conclusion can be drawn from the statement regarding resistance to the adoption of Artificial Intelligence by colleagues or management, where the average score is $M = 2.95$. Although resistance to change exists as a potential deterrent to integration, it is not a dominant obstacle in this particular sample.

Particularly significant in this study is the finding regarding the level of trust in the results produced by unmonitored Artificial Intelligence tools. The mean is low ($M = 2.25$), indicating that trainers do not trust content generated by AI unless they verify it themselves. They believe there is a need for human supervision, control and verification of the results.

This finding is particularly significant because it shows that in Greece today, AI functions primarily as a support tool and less as an autonomous replacement for the trainer.

4.1.6 Organisational readiness and future integration of Artificial Intelligence

This section examines organizational readiness, administrative support and the future prospects for the integration of Artificial Intelligence into vocational training, as presented in the responses of the trainer sample.

Table 4.8
Organizational readiness and future AI integration

Item	M	SD
Management supports the in -integration of AI in training	3.96	0.93
Desire for further training in advanced AI applications	4.38	0.62
AI will radically change professional training in Greece	4.06	0.79

Figure 4.16. Management support for AI integration

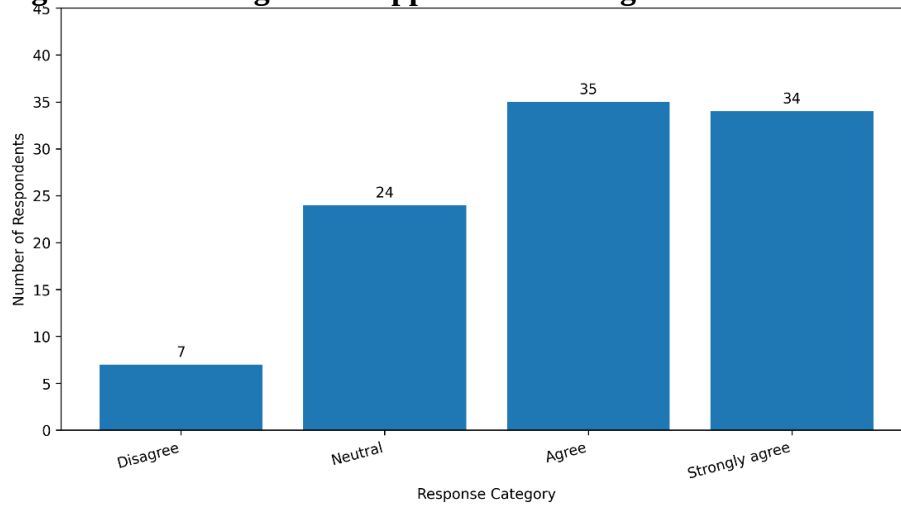


Figure 4.17. Need for further training in AI

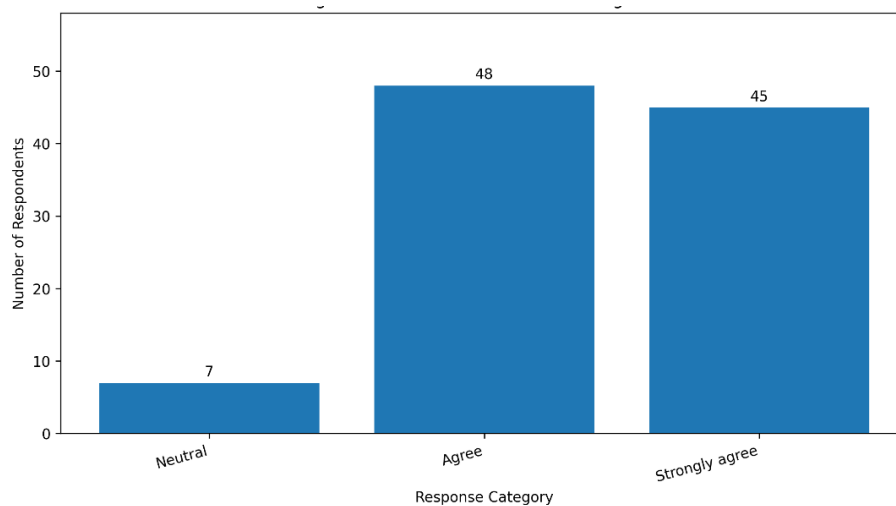
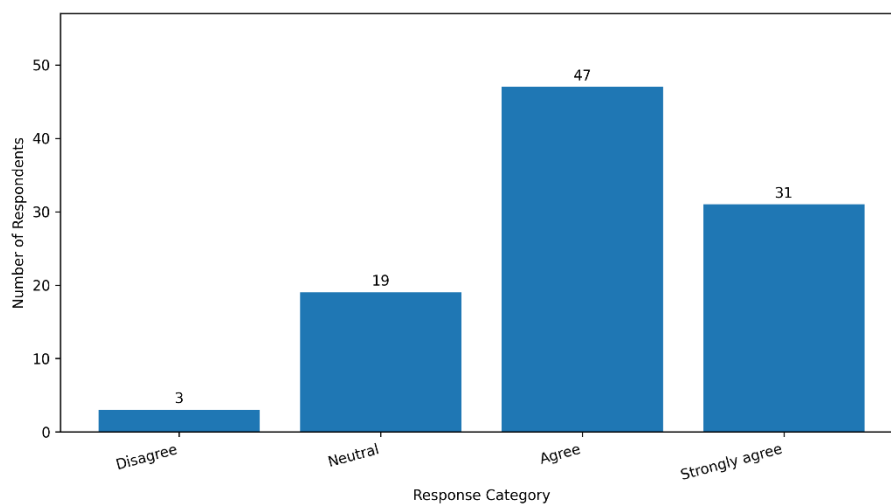


Figure 4.18. Future impact of AI on professional training



The above results show that trainers perceive a relatively high level of management support for the integration of Artificial Intelligence into training, as the mean is $M = 3.96$. This finding suggests that, at least within the organisations represented in the sample which are primarily large and very large—management appears to view Artificial Intelligence as an area of interest and potential investment.

Even more significant is the finding regarding trainers’ desire for further training in advanced applications of Artificial Intelligence. Here, the mean is $M = 4.38$ and the standard deviation is relatively low ($SD = 0.62$). This indicates a high degree of agreement among the participants. The trainers express an interest in further developing their skills in new technologies.

Finally, the statement that Artificial Intelligence will significantly change the landscape of vocational training in Greece received an average score of $M = 4.06$. Trainers recognize the significant contribution of Artificial Intelligence and believe that its impact on vocational training will be substantial in the coming years.

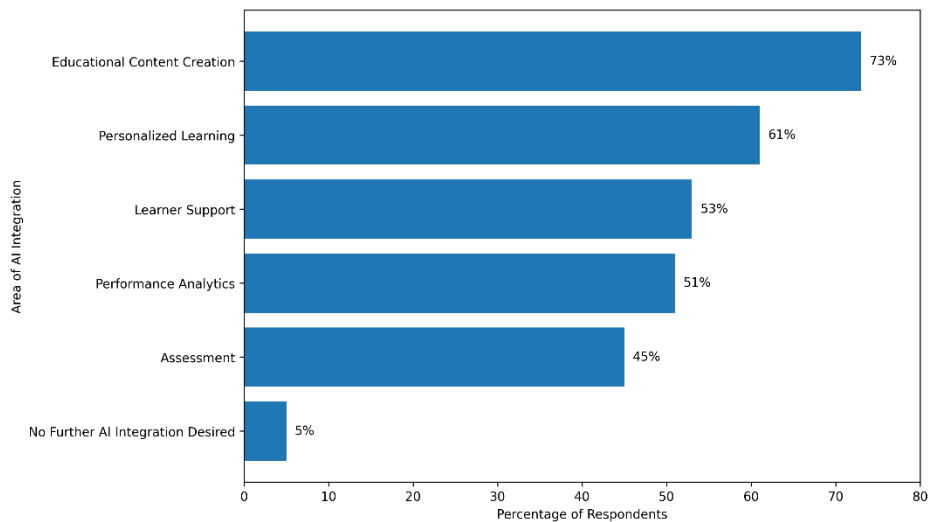
4.1.7 Preferred areas for further integration of Artificial Intelligence

The final question in the questionnaire concerns the educational sectors in which participants would like to see greater integration of Artificial Intelligence. The question allowed for multiple choices and therefore the percentages do not add up to 100%.

Table 4.9
Preferred areas for further AI integration (multiple responses)

Area of AI Integration	N	%
Educational Content Creation	73	73.0
Personalised Learning	61	61.0
Learner Support	53	53.0
Performance Analytics	51	51.0
Assessment	45	45.0
No Further AI Integration Desired	5	5.0

Figure 4.19. Preferred areas for further AI integration



As shown in Table 4.9, the area in which trainers would like to see greater integration of AI is the creation of educational material, with a percentage of 73%. This result is consistent with previous findings which showed that content creation is one of the primary uses of Artificial Intelligence by trainers.

This is followed by personalized learning at 61%. Trainers recognize the potential of Artificial Intelligence to contribute to the personalization of the learning experience. Learner support accounts for 53%, while performance analysis accounts for 51%. There is therefore a need for systems that are not limited solely to content production, as is currently the case, but which contribute to monitoring learners' progress, providing feedback and offering personalized learning support.

Assessment has the lowest, yet still significant, percentage of 45%. Trainers show an interest in the use of Artificial Intelligence in assessment processes but, as discussed above, they also express caution. Finally, only 5% of participants state that they do not wish to see greater integration of Artificial Intelligence, which confirms that the overall attitude towards AI remains positive.

4.1.8 Summary

Overall, the analysis of the trainers' responses indicates that AI has already begun to be integrated into the field of vocational education and training. Participants are largely familiar with Artificial Intelligence and now recognize knowledge of it as an essential skill for the modern trainer.

At present, artificial intelligence is mainly used for creating educational content, designing lessons and supporting the teaching process. In contrast, its use in more advanced applications, such as adaptive learning systems and learning analytics tools, is still limited. This indicates that the integration of Artificial Intelligence is still at an initial or intermediate stage, and the use of general-purpose AI tools predominates.

Trainers view the contribution of Artificial Intelligence to the effectiveness of the training process positively and consider that it makes their work significantly easier. However, they do not advocate the complete replacement of human presence but view Artificial Intelligence as a complementary and supportive tool.

At the same time, participants indicate that they do not blindly trust content produced by AI tools without human oversight.

Finally, the strong desire for further training in advanced AI applications indicates that trainers recognize AI as a factor that can substantially transform the field of vocational training in Greece.

4.2 Statistical analysis of trainees (N = 187)

The following section analyses the responses of the trainees who participated in the survey. The sample consists of 187 participants and reflects their views on the knowledge, use, benefits, concerns and future application of Artificial Intelligence in education and vocational learning.

4.2.1 Demographic characteristics of learners

Table 4.13

Demographic characteristics of learners (N = 187)

Variable	Category	N	%
Gender	Female	123	65.8
	Male	64	34.2
Age Group	18–30	25	13.4
	31–40	69	36.9
	41–50	70	37.4
	51+	23	12.3
Educational Level	Secondary education	13	7.0
	Higher Education	83	44.4
	Master’s Degree	88	47.1
	Doctoral Degree	3	1.6

Variable	Category	N	%
Years of professional experience	Up to 5 years	28	15.0
	5–10 years	43	23.0
	11–20 years	73	39.0
	More than 20 years	43	23.0
Employment Sector	Public Sector	76	40.6
	Technology / IT / Telecommunications	31	16.6
	Services	23	12.3
	Finance / Banking	17	9.1
	Commerce / Sales / Marketing	16	8.6
	Health / Social Services	6	3.2
	Education / Training	5	2.7
	Industry / Production	3	1.6
	Other	10	5.3

Figure 4.20. Gender distribution of learners

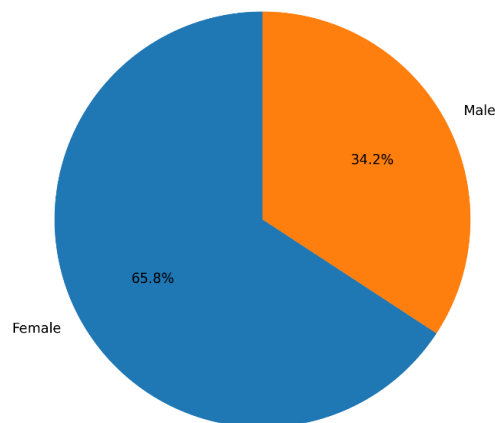


Figure 4.21. Age distribution of learners

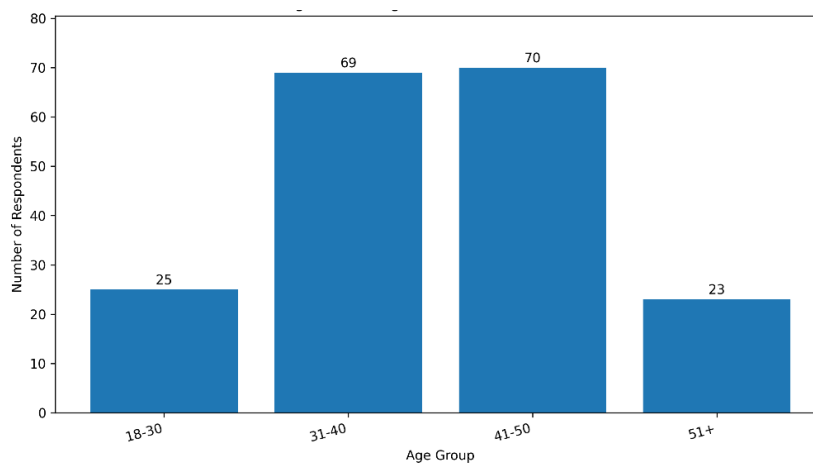


Figure 4.22. Educational level of learners

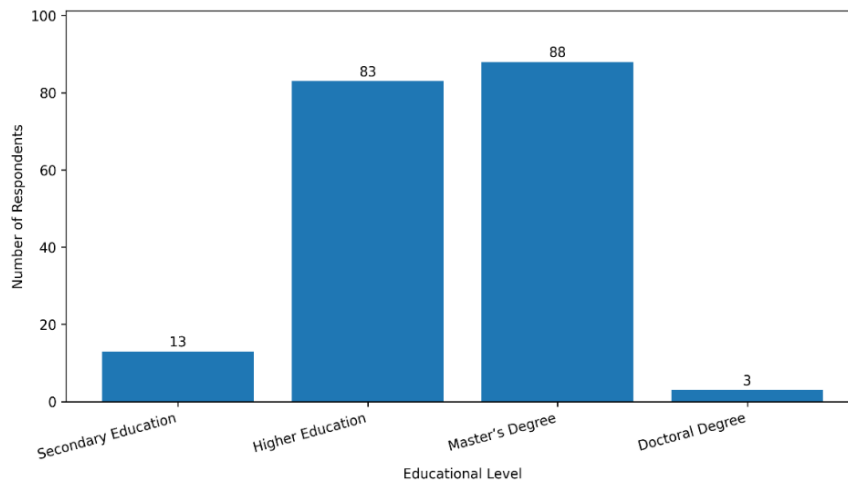


Figure 4.23. Years of professional experience of learners

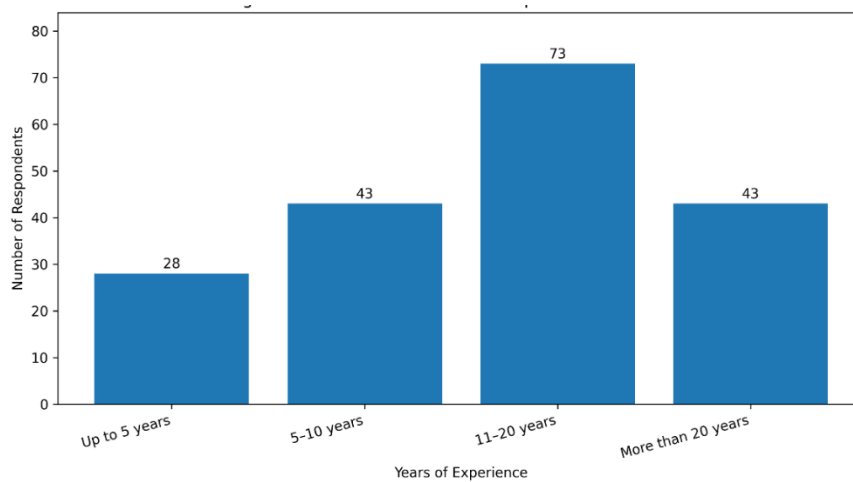
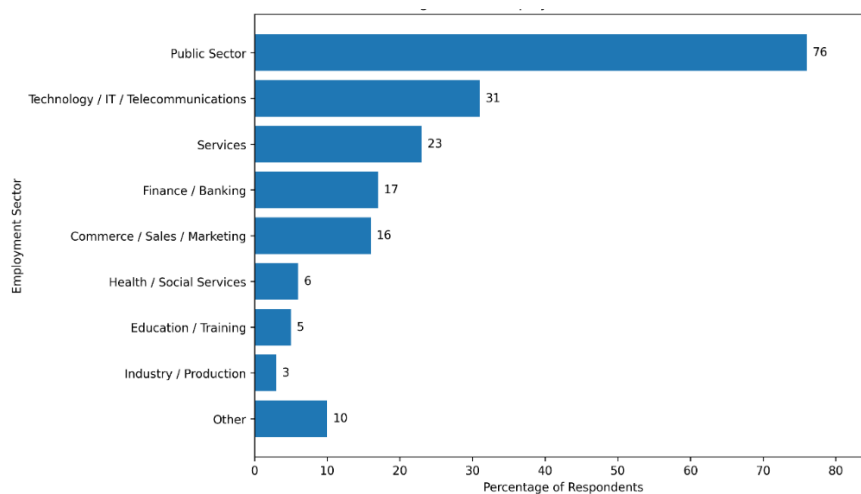


Figure 4.24. Employment sector of learners



From Table 4.13, it can be observed that the sample of learners consists mainly of women, who account for 65.8% of the total, while men account for 34.2% of the sample. This distribution was maintained, and all randomly collected questionnaires were retained in order to reflect the true picture of the responses gathered.

As regards age, the two largest groups in the sample are participants aged 41–50 and 31–40, accounting for 37.4% and 36.9% respectively. These data show that, as was the case with the sample of trainers, the participants are professionals with significant work experience.

Most respondents hold a postgraduate degree or have completed higher education. Meanwhile, regarding the participants' work experience, the largest group has 11–20 years of experience. Therefore, the responses analysed come from trainees with extensive professional experience in the labour market.

Finally, regarding the sector of employment, civil servants account for 40.6% of the sample. The remaining 59.4% employed in the private sector come from the technology, services, finance and trade sectors. This diversity allows the study to gain a more comprehensive picture of attitudes towards Artificial Intelligence across the various working environments that make up the Greek reality.

4.2.2 Knowledge, familiarity and current use of Artificial Intelligence

Table 4.14

AI familiarity and current use

Item	M	SD	Valid N
Familiarity with the concept of Artificial Intelligence	3.32	0.99	186
Use of AI increases the speed of training completion	3.40	1.04	187

Table 4.15

Use of AI Tools in organizational training programmes

Response	N	%
Yes	117	62.6
No	70	37.4
Total	187	100.0

Figure 4.25. Familiarity with Artificial Intelligence

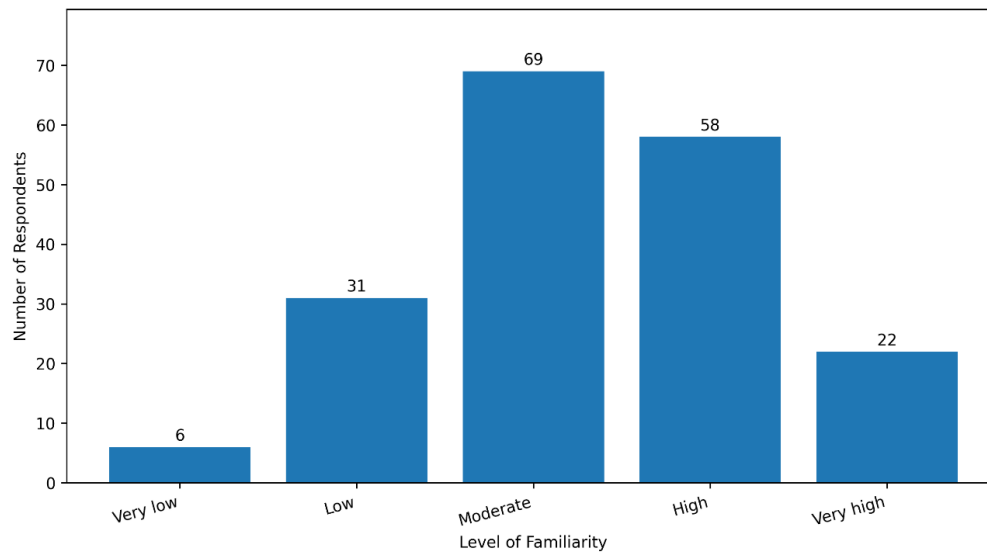
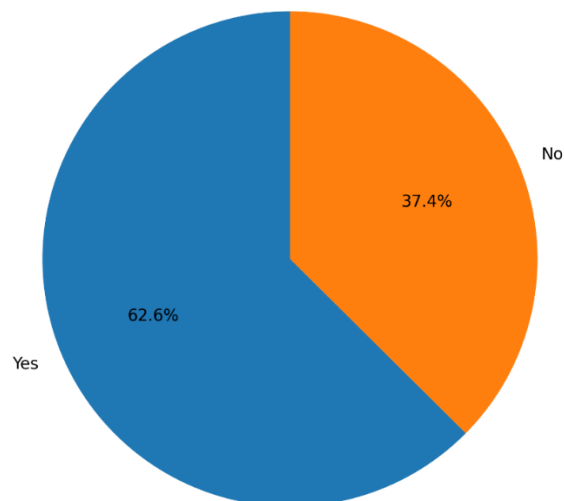


Figure 4.26. Use of AI tools in organizational training programmes



The above results show that trainees are familiar with the concept of Artificial Intelligence to a moderate to relatively high degree. The average score is $M = 3.32$, meaning that most participants are not beginners, but are not entirely familiar with the technology either. 62.6% of trainees stated that AI tools are already being used in the training programmes of the organizations they work for. This fact demonstrates that, while Artificial Intelligence has begun to be integrated into educational processes, a significant proportion in Greece – 37.4% – still state that these new technologies are not being used.

Based on the results of this study, the results show that the use of Artificial Intelligence is associated with faster completion of education, as the mean score for the relevant question

is $M = 3.40$. This result indicates that learners perceive, to a moderate to positive degree, that Artificial Intelligence tools can accelerate the learning process

4.2.3 Previous use and Artificial Intelligence tools utilized by learners

Table 4.16

AI tools used by learners (multiple responses)

AI Tool Category	N	%
AI Assistants / Conversational Tools	129	69.0
Study Support and Content Understanding Tools	44	23.5
Automatic Assessment and Quiz Tools	50	26.7
AI Tools for Educational Content Creation	45	24.1
Adaptive Learning Platforms	15	8.0
Learning Analytics Tools	14	7.5
No AI Tools Used	28	15.0

Figure 4.27. AI Tools used by learners

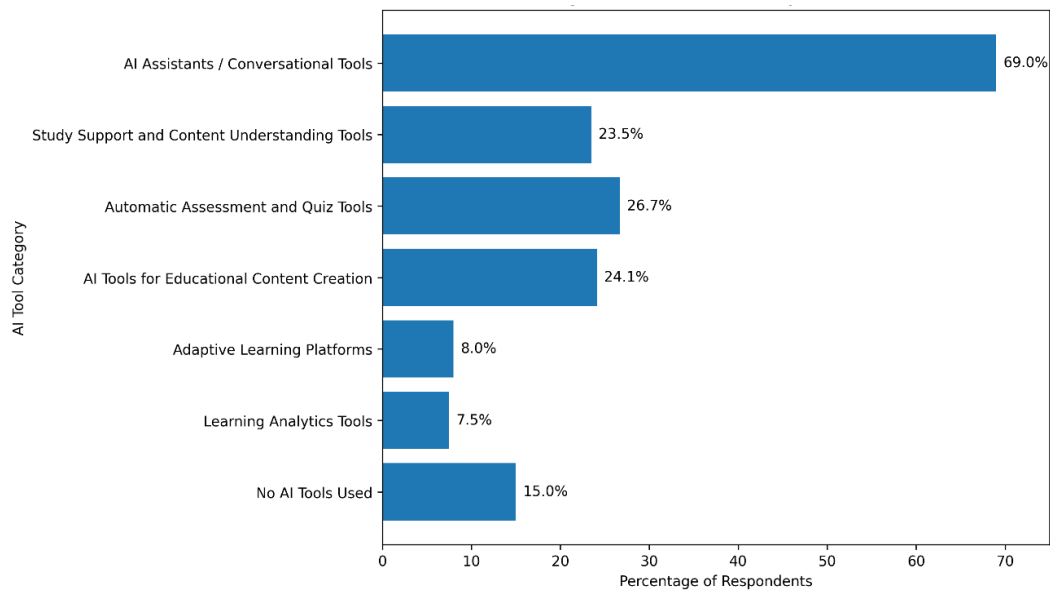


Table 4.16 shows the Artificial Intelligence tools used in the educational process. The question allowed for multiple choices, so the sum of the percentages is greater than 100%.

The most widely used tools, as presented in this study, are AI assistants and chatbots, such as ChatGPT and Microsoft Copilot, which are used by 69.0% of participants. In contrast, among learners, more complex applications, such as adaptive learning platforms and learning analytics tools, are used to a much lesser extent.

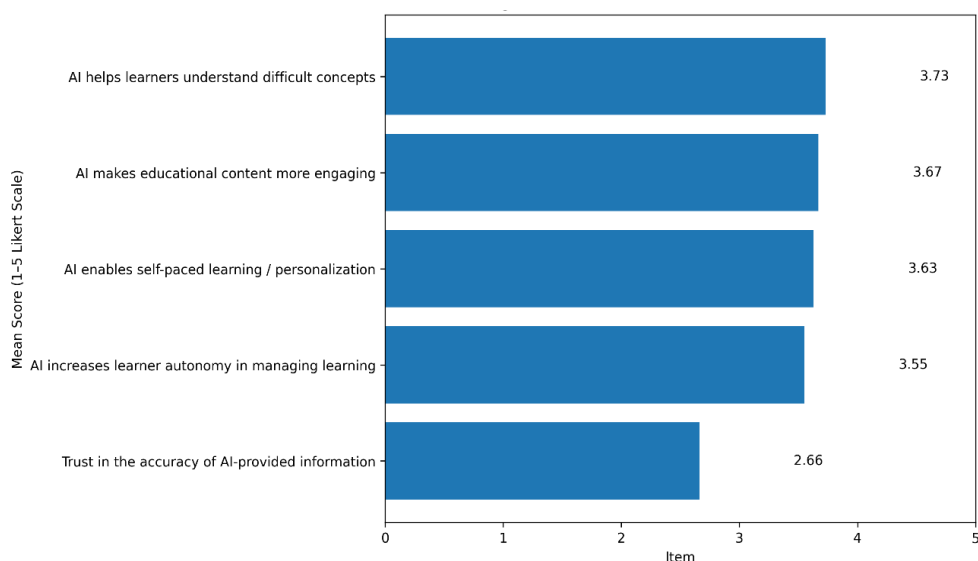
This finding suggests that learners’ engagement with Artificial Intelligence relies primarily on general-purpose tools and less on educational systems that utilize personalization or learning analytics.

4.2.4 Effectiveness of Artificial Intelligence in learning

Table 4.17
Educational effectiveness of AI

Item	M	SD	Valid N
AI helps learners understand difficult concepts	3.73	0.85	187
AI makes educational content more engaging	3.67	0.86	187
AI enables self-paced learning / personalisation	3.63	0.85	187
AI increases learner autonomy in managing learning	3.55	0.95	187
Trust in the accuracy of AI-provided information	2.66	0.86	187

Figure 4.28. Educational Benefits of AI



From the results in Table 4.17, it can be observed that learners rate the contribution of Artificial Intelligence to educational processes positively. The highest mean score is observed in the perception that Artificial Intelligence helps learners to better understand difficult concepts ($M = 3.73$).

Participants also rate positively the contribution of Artificial Intelligence to making educational content more engaging ($M = 3.67$), as well as the fact that learning with the aid of Artificial Intelligence adapts to participants' individual pace ($M = 3.63$). These findings show that learners recognize in practice the learning benefits they can derive from the use of Artificial Intelligence.

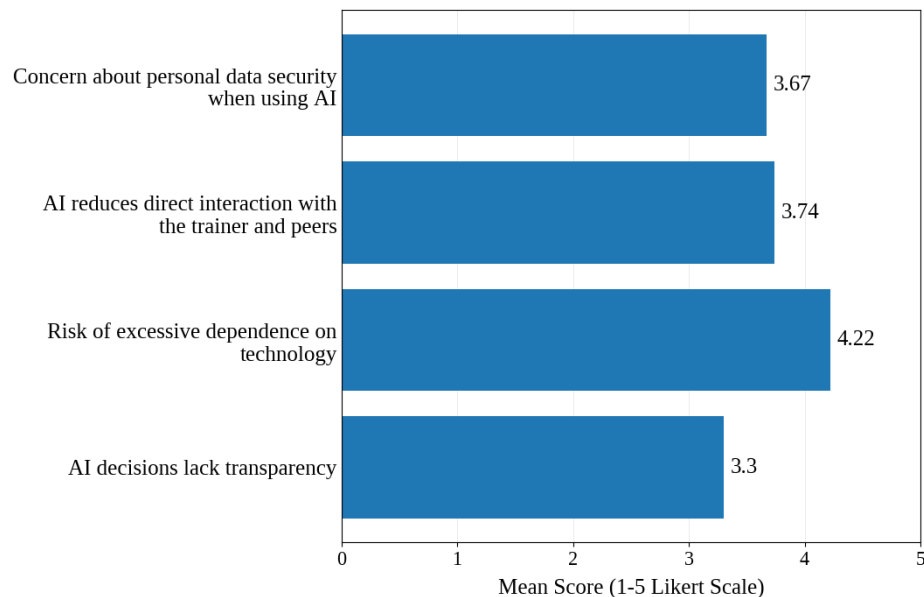
Conversely, the results show that confidence in the accuracy of the information provided by AI tools is lower ($M = 2.66$). This suggests that although participants have a positive attitude towards the usefulness of Artificial Intelligence, they remain cautious and sceptical regarding the reliability of the content.

4.2.5 Challenges, risks and ethical considerations

Table 4.18
AI-Related concerns and ethical issues

Item	M	SD	Valid N
Concern about personal data security when using AI	3.67	0.96	187
AI reduces direct interaction with the trainer and peers	3.74	0.93	187
Risk of excessive dependence on technology	4.22	0.83	187
AI decisions lack transparency	3.30	0.90	187

Figure 4.29. AI-Related Concerns and Ethical Issues



This section presents the significant challenges and risks perceived by learners when using Artificial Intelligence. The strongest concern observed in the findings of this study relates to the risk of excessive dependence on technology for problem-solving, with a mean of $M = 4.22$.

The results also show that the mean score for the perception that Artificial Intelligence reduces direct interaction with the trainer and colleagues ($M = 3.74$) is also high. Equally high is the mean describing concerns about the security of personal data ($M = 3.67$). These data show that trainees do not view Artificial Intelligence as a useful tool and an opportunity, but perceive it as an area requiring caution and clear boundaries.

The participants' perception that Artificial Intelligence decisions lack transparency has a mean of $M = 3.30$. The above data demonstrate that there is a moderate but significant concern regarding the transparency of these new technologies.

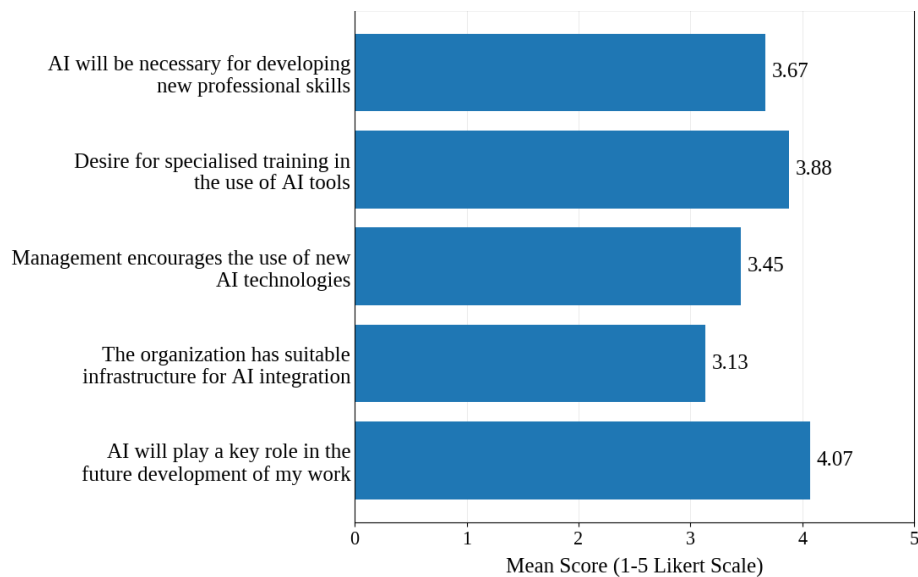
4.2.6 Organizational readiness and future use of artificial intelligence

Table 4.19

Organizational readiness and future AI Integration

Item	M	SD	Valid N
AI will be necessary for developing new professional skills	3.67	0.90	187
Desire for specialised training in the use of AI tools	3.88	0.90	187
Management encourages the use of new AI technologies	3.45	0.98	187
The organisation has suitable infrastructure for AI integration	3.13	0.98	187
AI will play a key role in the future development of my work	4.07	0.85	187

Figure 4.30. Organizational readiness and future AI Integration



As shown in Table 4.19, trainees believe that Artificial Intelligence will play a significant role in the future of the labour market in Greece and that it will influence their career development. The highest average score is observed in the statement that Artificial Intelligence will play a decisive role in the future development of their work ($M = 4.07$).

The results also show that participants expressed a clear desire for specialized training in the use of Artificial Intelligence tools in the future ($M = 3.88$). This is linked to the need to develop AI literacy skills, so that future learners can use these tools effectively and more efficiently.

However, the results show that organizational readiness in the companies and organizations where participants are employed appears to be less robust. Management encouragement for the use of new technologies has an average score of $M = 3.45$, while the availability of suitable infrastructure has a lower average score ($M = 3.13$) than organizational readiness. This suggests that trainees themselves recognize the importance of Artificial Intelligence, its benefits and its significant future role, but do not always consider their organizations to be fully prepared for its effective integration.

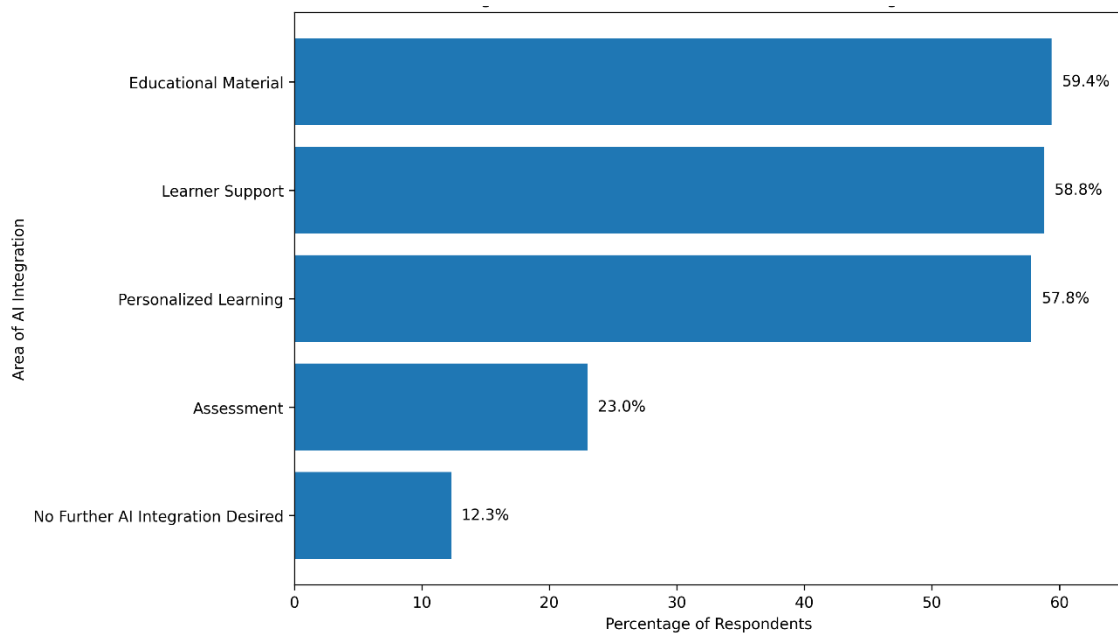
4.2.7 Preferred areas for further utilisation of Artificial Intelligence

Table 4.20

Preferred areas for further AI Integration (Multiple Responses)

Area of AI Integration	N	%
Educational Material	111	59.4
Learner Support	110	58.8
Personalised Learning	108	57.8
Assessment	43	23.0
No Further AI Integration Desired	23	12.3

Figure 4.31. Preferred areas for further AI Integration



As shown in Table 4.20, trainees would like to see greater integration of Artificial Intelligence in several areas. The question allowed for multiple choices and therefore the percentages do not add up to 100%.

The highest preferences, according to the participants' responses, were recorded in the teaching materials (59.4%), learner support (58.8%) and personalised learning (57.8%). The above data show that learners ideally wish to utilise Artificial Intelligence in ways that can improve access to, understanding of, and adaptation of education to their personal needs.

Assessment received the lowest percentage (23.0%), a finding that may be linked to the concerns expressed by participants regarding the transparency and reliability of AI decisions. At the same time, 12.3% stated that they would not want greater integration of AI, which indicates that there is a small but significant group of learners who maintain a more cautious stance.

4.2.8 Summary

Overall, the above analysis of our trainees' responses shows that Artificial Intelligence has already begun to be integrated into their educational process. Their familiarity with AI

tools is at a moderate to positive level, while the use of these tools in training programmes is already evident in a significant proportion of organizations.

Learners recognize the benefits of using Artificial Intelligence in terms of understanding difficult concepts, the appeal of the educational content, and the ability to learn at their own pace. However, they do not show complete confidence in the accuracy of the information produced by new technology tools, a fact that highlights the need for human supervision.

The findings highlight strong concerns regarding excessive reliance on technology, the reduction of human interaction during training, and the protection of personal data. These findings indicate that a pedagogical, organizational and ethical approach is necessary for the wider adoption of Artificial Intelligence in human resources training in Greece.

Finally, trainees recognize the significant future role of Artificial Intelligence in their professional development and progression, and for this reason they express the need for further training in the use of relevant tools. The perception regarding organizational readiness is more cautious, suggesting that the successful integration of Artificial Intelligence into the education and development of the country's workforce requires adequate infrastructure, strategy and support from organizations.

4.3 Additional statistical analysis

This section presents the additional statistical analysis of the data, with the aim of investigating possible differences and correlations between the two main variables of the study. This analysis complements the descriptive statistics presented in the previous two sections. This section relates to the fifth research question of the study, which investigates whether attitudes, usage and concerns vary according to the specific characteristics of the participants

To compare the two groups, an independent samples t-test with Welch's correction was applied, as the group sizes were not always equal. To investigate relationships between the variables, Pearson's correlation coefficient was used. Responses were coded on a Likert scale from 1 to 5, where higher values reflect a higher degree of agreement, use of

Artificial Intelligence or positive evaluation. The level of statistical significance was set at $p < .05$.

The results of this study should be interpreted as indicative and exploratory, reflecting the key trends currently present in training and human resource development within the Greek professional environment.

4.3.1 Comparison between Trainers and Learners

Initially, the differences that may exist between trainers and learners were examined in relation to key questions that were directly comparable in both questionnaires. These questions concern familiarity with Artificial Intelligence, the usefulness of Artificial Intelligence tools and their effectiveness, the need for further training, organizational administrative support, and the assessment of the future role of Artificial Intelligence

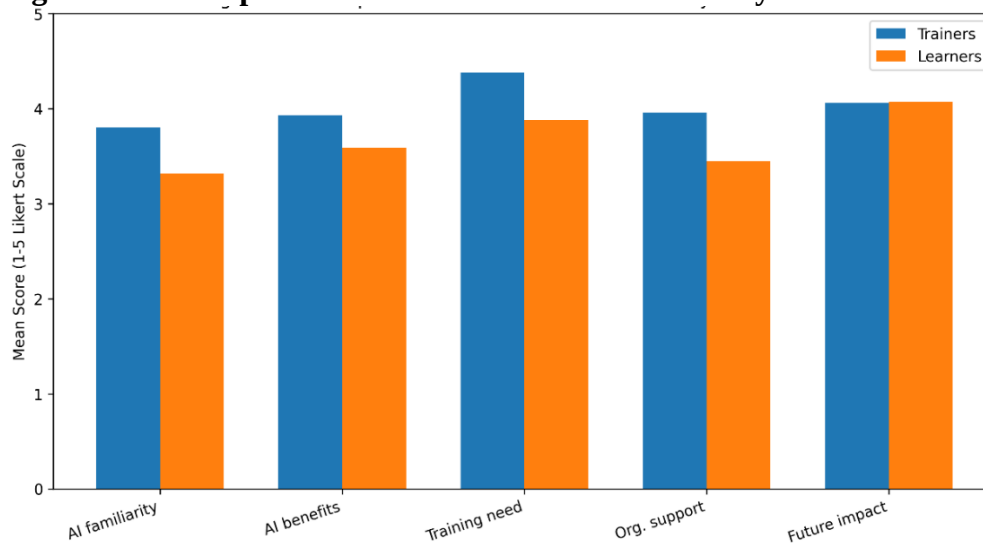
Table 4.26

Trainers vs Learners

Variable	Trainers M (SD)	Learners M (SD)	t	p	Cohen d
AI familiarity	3.80 (0.98)	3.32 (0.99)	3.94	< .001	0.49
Perceived AI benefits/effectiveness	3.93 (0.60)	3.59 (0.73)	4.14	< .001	0.48
Need for further AI training	4.38 (0.62)	3.88 (0.90)	5.58	< .001	0.62
Management/organisational support	3.96 (0.93)	3.45 (0.98)	4.29	< .001	0.52
Future impact of AI	4.06 (0.79)	4.07 (0.85)	-0.15	= .883	-0.02

Note. Trainers N = 100; Learners N = 187, except for AI familiarity where Learners N = 186 due to one missing response.

Figure 4.20. Comparison of trainers and learners on key AI Dimensions



The results of this study show that trainers demonstrate significantly higher familiarity with Artificial Intelligence tools compared to learners. The results show that this difference is statistically significant, $t = 3.94$, $p < .001$, and has a moderate effect size (Cohen's $d = 0.49$). This finding is to be expected, as trainers are more involved in the design and implementation of training programmes.

Significant differences have been identified in how they perceive the effectiveness of Artificial Intelligence, the need for further training in new technologies, and organizational support. Analysis of the data suggests that trainers have higher average scores across all three of these variables, indicating that they perceive AI tools as instruments for professional development and organizational transformation. Conversely, no significant difference is observed regarding the attitude that AI will influence the future of the professional sector in Greece, as both groups show similarly high scores.

4.3.2 Sector differences among trainers

The data were then analyzed to investigate whether trainers working in the private and public sectors differ in terms of key variables relating to the use and acceptance of Artificial Intelligence. The mixed sector category was excluded from the analysis so that the comparison would concern two clearly distinct groups and more reliable conclusions could be drawn.

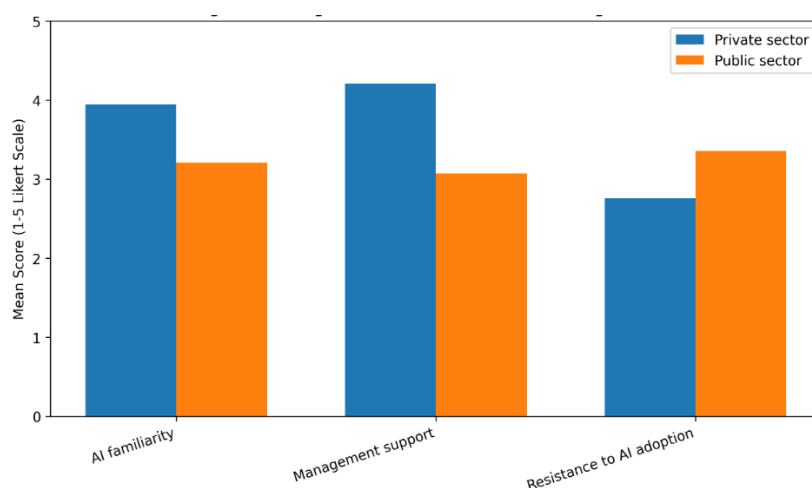
Table 4.27

Private vs public sector trainers

Variable	Private M (SD)	Public M (SD)	t	p	Cohen d
AI familiarity	3.94 (0.90)	3.21 (1.05)	2.43	= .026	0.79
Use of AI for lesson planning	3.36 (0.78)	3.12 (0.99)	0.64	= .537	0.29
Management support	4.21 (0.82)	3.07 (0.62)	5.96	< .001	1.43
Resistance to AI adoption	2.76 (0.91)	3.36 (0.84)	-2.38	= .028	-0.66
Need for further AI training	4.40 (0.64)	4.21 (0.58)	1.09	= .287	0.3
Future impact of AI	4.08 (0.73)	4.00 (0.96)	0.31	= .762	0.11

Note. Private sector trainers N = 72; public sector trainers N = 14. Mixed-sector responses were excluded from this comparison.

Figure 4.21. Significant Sector Differences among Trainers



The results of this study show that private-sector trainers are more familiar with Artificial Intelligence tools than public-sector trainers, with the difference being statistically significant ($p = .026$). An even more pronounced difference is observed in terms of the perceived administrative support trainers receive from their organizations, with the private

sector recording a significantly higher mean ($M = 4.21$) compared to the public sector ($M = 3.07$), $p < .001$.

At the same time, the results show that resistance to change and to the adoption of new technologies appears to be higher in the public sector than in the private sector. This finding is directly linked to organizational readiness and the culture of change management within organizations, as it shows that the introduction of new technologies ultimately depends not only on the individual attitudes of trainers, but also on the professional context in which they work.

4.3.3 Gender differences among learners

Due to the uneven gender distribution in the sample of learners, the study examined whether there are statistically significant differences between women and men on selected variables. This analysis is useful for the present study, as it allows the study to determine whether this gender imbalance in the sample significantly affects the key findings and the reliability of the research.

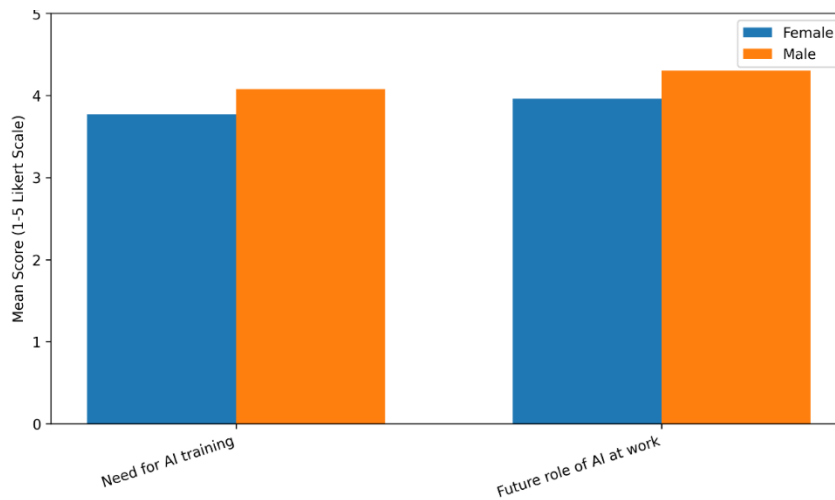
Table 4.28

Gender differences among learners

Variable	Female M (SD)	Male M (SD)	t	p	Cohen d
AI familiarity	3.32 (0.95)	3.32 (1.08)	-0.0	= .998	-0.0
Perceived AI benefits/effectiveness	3.60 (0.75)	3.58 (0.70)	0.17	= .865	0.03
Trust in the accuracy of AI information	2.68 (0.84)	2.61 (0.88)	0.55	= .584	0.09
Data privacy concern	3.63 (0.98)	3.77 (0.94)	-0.95	= .343	-0.14
Need for AI training	3.77 (0.95)	4.08 (0.76)	-2.39	= .018	-0.34
Future role of AI at work	3.96 (0.88)	4.30 (0.75)	-2.75	= .007	-0.4

Note. Female learners $N = 123$; male learners $N = 64$, except for AI familiarity where male $N = 63$ due to one missing response.

Figure 4.22. Significant gender differences among learners



The results show that there are no significant differences between women and men in terms of their level of familiarity with Artificial Intelligence tools, in terms of the degree of educational usefulness, their confidence in the accuracy of the information, and their concerns regarding personal data. Therefore, the key findings of the descriptive analysis do not appear to be substantially influenced by the unequal gender distribution.

However, it should be noted that two statistically significant differences were identified. Men have a higher average score regarding the need for further training in the use of Artificial Intelligence tools, as well as in the perception that Artificial Intelligence will play a decisive role in the future development of their work. These differences have a small to moderate effect size and can be interpreted as an indication of slightly higher future expectations on the part of the men who participated.

4.3.4 One-Way ANOVA by age group

In order to examine whether age significantly affects the degree of familiarity with Artificial Intelligence, a one-way analysis of variance (One-Way ANOVA) was conducted. The analysis was applied separately for trainers and separately for trainees, in order to determine whether the demographic characteristic of age affects both groups in the sample in the same way.

Table 4.29

AI familiarity by age group

Sample	Age Group	N	M	SD
Trainers	18–30	4	4.25	0.96
Trainers	31–40	35	3.91	0.89
Trainers	41–50	40	3.75	0.95
Trainers	51+	21	3.62	1.20
Learners	18–30	25	3.72	0.98
Learners	31–40	69	3.46	0.92
Learners	41–50	69	3.13	0.92
Learners	51+	23	3.00	1.24

Table 4.30

One-Way ANOVA results for AI familiarity by age group

Sample	Group Variable	Dependent Variable	F	p	Result
Trainers	Age Group	AI Familiarity	$F(3, 96) = 0.70$	.554	Not significant
Learners	Age Group	AI Familiarity	$F(3, 182) = 3.62$	.014	Significant

The results of the ANOVA indicate that, among trainers, there is no statistically significant difference in familiarity with Artificial Intelligence depending on the age of the sample, $F(3, 96) = 0.70$, $p = .554$. Although younger trainers show a slightly higher mean score, this difference is not large enough to be considered statistically significant.

In contrast, a statistically significant difference in familiarity with Artificial Intelligence tools was found among trainees depending on age group, $F(3, 182) = 3.62$, $p = .014$. Younger age groups show higher mean familiarity scores, while older groups exhibit lower levels. This finding indicates that age acts as a differentiating factor primarily for trainees and not for trainers.

This result is directly linked to the fifth research question, as it suggests that certain demographic characteristics can influence the degree of familiarity with Artificial Intelligence. However, this variation does not manifest itself in the same way across all groups in the sample. For this reason, the findings should be interpreted as indicative and utilized primarily to shape the further educational needs of the individual age groups.

4.3.5 Correlation analysis

Finally, correlations were analysed using Pearson’s correlation coefficient to investigate the relationship between familiarity with Artificial Intelligence, perceptions of its usefulness, concerns and organisational readiness. The analyses were carried out separately for trainers and trainees.

Table 4.31

Pearson correlations among key AI dimensions

Group	Variable 1	Variable 2	N	r	p
Trainers	AI familiarity	Perceived benefits	100	0.48	< .001
Trainers	Familiarity with AI	Concerns/challenges	100	-0.08	= .454
Trainers	AI familiarity	Organisational readiness	100	0.28	= .005
Trainers	Perceived benefits	Concerns/challenges	100	-0.19	= .053
Trainers	Perceived benefits	Organisational readiness	100	0.54	< .001
Trainers	Concerns/challenges	Organisational readiness	100	-0.17	= .098
Learners	AI familiarity	Perceived benefits	186	0.4	< .001
Learners	Familiarity with AI	Concerns/challenges	186	-0.09	= .237
Learners	AI familiarity	Organisational readiness	186	0.17	= .022
Learners	Perceived benefits	Concerns/challenges	187	-0.29	< .001
Learners	Perceived benefits	Organisational readiness	187	0.45	< .001
Learners	Concerns/challenges	Organisational readiness	187	-0.03	= .730

In the sample of trainers, familiarity with Artificial Intelligence tools is positively correlated with perceived usefulness ($r = .48$, $p < .001$) and with organisational readiness ($r = .28$, $p = .005$). The strongest relationship observed is between perceived usefulness

and organisational readiness ($r = .54, p < .001$). This indicates that the more trainers recognise the benefits of using Artificial Intelligence, the more prepared the organisational environment is to support new technologies and their further integration.

In the sample of trainees, familiarity with AI tools is positively correlated with perceived usefulness ($r = .40, p < .001$), while perceived usefulness is also positively correlated with organisational readiness ($r = .45, p < .001$). However, concerns do not appear to be substantially related to organisational readiness. This finding indicates that, while trainees recognise the benefits of using Artificial Intelligence tools in education, they simultaneously have concerns regarding issues of security, transparency and human interaction.

4.3.6 Summary

Overall, the results show that the additional statistical analysis revealed four key conclusions.

- A) Firstly, trainers are more familiar with the use of AI tools than trainees, although both groups recognise the significant future role of Artificial Intelligence.
- B) Secondly, the sector of employment plays a significant role for trainers, as the private sector is associated with greater familiarity and stronger managerial support.
- C) Thirdly, while the ANOVA analysis showed that age group influences trainees' familiarity with AI tools, it did not indicate that the same assumption applies to trainers
- D) Fourthly, the correlations show that familiarity with AI tools and the perception of their benefits are linked to organisational readiness, a fact that highlights the importance of training and management support for the successful integration of TN into vocational education in Greece.

These findings address the fifth research question of the study, as they show that attitudes, use and concerns regarding AI tools are not homogeneous, but vary according to the participants' professional role, sector of employment and, to a lesser extent, gender

5. Discussion

5.1 Overall assessment of the current situation

This chapter discusses the empirical findings of the research in relation to the theoretical framework presented in the previous chapters. It provides an overall assessment of the current state of AI integration into vocational education and training in Greece.

The results of this study indicate that Artificial Intelligence has already begun to be integrated into the field of vocational education and training; however, it has not yet reached a systematic and mature stage. Both trainers and trainees recognise that Artificial Intelligence will play an important role in the future of vocational training and the workplace in general, but its use is still limited. So far, it has been used in practices that provide direct support to trainers and learners, such as the production of educational materials, information retrieval, lesson preparation and general support for the learning process (Schwab, 2017; World Economic Forum, 2023).

This picture shows that the integration of AI into the Greek context is currently in a transitional phase. Artificial Intelligence has begun to be used in the daily educational process, but its use has not yet reached the level of more complex applications, such as adaptive learning systems, learning analytics, automated feedback mechanisms and integrated personalized learning platforms. Consequently, the current situation is characterised as an initial or intermediate stage of integration (Davenport & Ronanki, 2018; OECD, 2023).

One of the most significant findings of this study is that trainers appear to be more familiar with digital AI tools than learners. This difference was also statistically confirmed, as analysed in the previous chapter. This finding is logical, given that trainers are called upon much more frequently to design, organise and evaluate a training programme. Consequently, they have a greater need to know and use tools with which they can improve the design of a training programme and the production of content so as to implement training processes more quickly (Redecker, 2017; UNESCO, 2023).

Furthermore, the application of a one-way analysis of variance (One-Way ANOVA) showed that age group significantly influences familiarity with Artificial Intelligence. This finding suggests that age may influence usage and familiarity, but the interpretation of this

phenomenon requires caution, as technological adoption depends not only on age but also on prior experience, training and the organizational environment.

At the same time, the findings showed that both groups recognize the important future role of Artificial Intelligence in the professional sector. There is no significant difference in the assessment that Artificial Intelligence will influence the future of work and vocational training, which demonstrates that the perception of the importance of technology is shared. In other words, while trainers and learners may differ in terms of their level of familiarity and daily use, they nevertheless share the view that AI tools will influence the future reality of education and work (World Economic Forum, 2023; OECD, 2023).

Table 5.1

Main Findings and Interpretation

Dimension	Main finding	Interpretation
Familiarity with AI	Trainers are more familiar with AI than learners.	Trainers are more closely involved in instructional design and therefore interact more actively with AI tools.
Current use of AI	Use is mainly focused on content creation and support activities.	AI integration is present but remains largely practical and not yet fully systemic.
Educational effectiveness	Both groups perceive AI as useful for learning and training.	AI is viewed as a supportive educational tool rather than a replacement for human teaching.
Ethical concerns	Participants do not fully trust AI outputs without review.	Human oversight remains necessary to ensure accuracy, transparency and educational accountability.
Organisational readiness	Management support and infrastructure appear uneven.	Successful AI adoption requires strategy, training and organizational culture.

Table 5.1 summarizes the key picture emerging from the results. Artificial Intelligence is viewed as a support tool. Participants appear to desire a form of integration into the educational process that preserves the role of the educator, human judgment for assessment, and pedagogical responsibility for the entire educational process (Popenici & Kerr, 2017; Holmes et al., 2019).

5.2 Comparison with the international literature and good practices

The findings of this study are directly linked to the international literature on the Fourth Industrial Revolution and digital transformation. Schwab (2017) describes technological change as a process of altering the way in which people live, work and interact with one another. Similarly, Russell and Norvig (2021) highlight Artificial Intelligence as a key driver of technological development, as it enables computing systems to analyze data, recognise patterns and support decision-making processes very quickly and effectively.

This study confirms that vocational education in Greece has not remained unaffected by this technological change. Trainers recognise Artificial Intelligence as an important skill and wish to receive further training in new technologies. These two findings are consistent with international discussions on the need for reskilling and upskilling. The World Economic Forum (2023) has highlighted that changes taking place in the labour market require continuous skills upgrading, while the OECD (2023) emphasises that skills training and assessment must be re-examined in light of Artificial Intelligence and its capabilities (World Economic Forum, 2023; UNESCO, 2023).

The results are consistent with those of Luckin et al. (2016), Holmes et al. (2019) and Zawacki-Richter et al. (2019), who argue that AI tools can help to personalise learning, provide immediate feedback and lead to a better understanding of educational needs. In this study, the findings showed that participants view the contribution of Artificial Intelligence to educational effectiveness and the adaptation of the learning process positively. However, they also showed that this positive attitude is accompanied by caution regarding reliability, personal data and the preservation of the human role.

The international literature also highlights that the role of the trainer is transforming, though not being replaced. Popenici and Kerr (2017) argue that Artificial Intelligence cannot fully replace the human dimension of education. The findings of this study confirm the

international literature, as trainers believe that while Artificial Intelligence facilitates their work, they do not accept the complete replacement of traditional teaching methods. Artificial Intelligence is regarded as a tool for enhancing and accelerating the educational process.

The best practices examined, drawn from international experience, show that the integration of Artificial Intelligence into education is most effective when it is based on three conditions: a clear pedagogical purpose, adequate training for users, and an institutional framework that protects human judgment and personal data. The findings of this study are consistent with this direction, as participants demonstrate a positive attitude towards new technologies but remain cautious regarding reliability, security and human oversight (Luckin et al., 2016; UNESCO, 2023; Redecker, 2017).

5.3 Interpretation of findings regarding challenges and concerns

The overall attitude of participants towards Artificial Intelligence is positive, yet the research also highlighted significant concerns. The participants' main concerns relate to the reliability of the information produced by AI tools, the reduction in human interaction, increased dependence on technology, and the protection of personal data (UNESCO, 2023; Rahwan et al., 2019).

Participants do not appear to trust the results of artificial intelligence without human oversight and verification. Human oversight is deemed essential for assessing the accuracy and appropriateness of the generated content (Russell & Norvig, 2021; Barredo Arrieta et al., 2020).

This concern, reflected in the findings of the present study, is linked to the international debate on algorithmic bias and the “black box” problem, which was analysed in a previous chapter. O’Neil (2016) and Barredo Arrieta et al. (2020) have noted that systems are influenced by the data on which they have been trained. In human resource training, this means that uncontrolled use of Artificial Intelligence can lead to incorrect assessments or content that does not align with the actual needs of learners.

Organisational readiness also poses a significant challenge. The results showed that the perceived usefulness of Artificial Intelligence is positively correlated with organisational readiness among both trainers and learners. This suggests that the more participants perceive the benefits and potential of using Artificial Intelligence, the more important they consider

the existence of a supportive organisational framework to be (Senge, 2006; Davenport & Ronanki, 2018).

This finding is important. The integration of Artificial Intelligence into staff education and training processes is not based solely on the individual initiative of the trainer or the trainee. It requires strategy, infrastructure, clear guidelines, leadership support and a culture of continuous learning from the organisations in which they work. The difference observed between the private and public sectors among trainers, which showed that private-sector trainers have greater familiarity with and administrative support, demonstrates that the organisational environment can accelerate or delay the adoption of technology (Senge, 2006; World Economic Forum, 2023).

Overall, the discussion shows that the key issue is how organizations can integrate AI tools with a clear pedagogical purpose, organizational support, ethical safeguards and preservation of the human role in the educational process.

6. Conclusions and Recommendations

6.1 Strategies for improving the integration of AI in education

Based on the research findings and the international literature, the effective integration of Artificial Intelligence into vocational education can be supported through a balanced strategy based on five key pillars.

The first pillar is the development of AI literacy. Trainers and trainees need to know how to use AI tools and what their limitations are. Basic training must include an understanding of key concepts, such as generative AI, algorithmic bias, data protection, assessing the reliability of responses, and the responsible use of digital tools (Redecker, 2017; UNESCO, 2023).

The second strategic pillar is the training of trainers. Educators must be provided with training so that they can integrate Artificial Intelligence in a pedagogically sound manner. (Luckin et al., 2016; Holmes et al., 2019).

A third and important strategic pillar is the creation of a clear organisational policy. Any organisation intending to integrate Artificial Intelligence tools needs rules regarding which tools are permitted, what data may legally be used, who is responsible for monitoring the content, and what criteria are used to assess the quality of the results (UNESCO, 2023; Rahwan et al., 2019).

The fourth strategic pillar is the strengthening of administrative support and infrastructure. The findings showed that organisational readiness is not a given. Investment is required in software, data security, technical support, training time and mechanisms for evaluating educational outcomes so that integration can take place effectively and universally (Davenport & Ronanki, 2018; Senge, 2006).

The fifth strategic pillar is pilot implementation. Rather than immediately adopting full-scale implementation, organisations may begin with small-scale programmes in specific educational modules in order to train users and adapt procedures before wider implementation (Creswell & Creswell, 2018; OECD, 2023).

Table 6.1
Strategies for AI integration in professional training

Strategic direction	Practical action	Expected benefit
Development of AI literacy	Training on basic AI concepts, limitations and ethical use.	More critical and responsible use of AI tools.
Trainer upskilling	Workshops on instructional design using AI.	Better integration of AI into teaching practice.
Organisational policy	Clear rules for tool selection, data use and human review.	Reduced uncertainty and increased trust.
Human oversight	Mandatory review of AI-generated content and assessments.	Greater accuracy, fairness and pedagogical quality.
Pilot implementation	Small-scale pilot schemes prior to full implementation.	Safer and more evidence-based integration.
Continuous evaluation	Monitoring learning outcomes and user satisfaction.	Improvement of AI practices over time.

The above strategies can serve as a practical roadmap for organisations wishing to utilise Artificial Intelligence in education.

Of particular importance is the concept of human-machine complementarity. Artificial Intelligence is best used for repetitive and time-consuming tasks, while the trainer remains responsible for pedagogical assessment, the implementation of the training programme and general supervision. (Brynjolfsson & McAfee, 2017; Popenici & Kerr, 2017).

6.2 Limitations of the research and suggestions for future studies

Despite the contribution of this study to understanding the attitudes of trainers and trainees towards Artificial Intelligence tools, the research is subject to certain limitations. The first limitation concerns the sample. The research was conducted in the Greek workplace and educational environment; therefore, the results must be interpreted in light of the characteristics of the Greek labour market and the level of digital maturity of organisations (Creswell & Creswell, 2018; Cohen et al., 2018).

A second limitation is the use of self-reported responses. Questionnaires record participants' perceptions, attitudes and statements, not necessarily reality, as it is possible that some participants may overestimate or underestimate their skills. This limitation is common in quantitative research using questionnaires and must be taken into account when interpreting the results (Cohen et al., 2018; Field, 2018).

A third limitation is the pace of technological developments. Artificial Intelligence is evolving at a rapid pace; therefore, the findings of this study reflect a specific point in time. (OECD, 2023; World Economic Forum, 2023).

A fourth limitation concerns the depth of the statistical analysis. In this study, the analysis focused primarily on descriptive analysis, group comparisons and basic correlations. These analyses are sufficient for the purposes of this study, but future research could employ more complex statistical models to investigate which factors predict the acceptance and use of new technologies (Field, 2018).

Future studies could also utilise a mixed-methods approach, combining quantitative research with interviews or focus groups to further explore participants' attitudes (Creswell & Creswell, 2018).

Furthermore, it is recommended that longitudinal studies be conducted to monitor whether familiarity, trust and organisational readiness increase over time and following targeted training programmes. This would make it possible to investigate whether participants' attitudes change following training processes (Creswell & Creswell, 2018; Cohen et al., 2018).

Finally, it would be useful for future research to compare different types of organisations, such as public bodies, private companies, educational organisations and small and medium-sized enterprises. This study has, moreover, demonstrated through measurable and comparable results that the sector of employment can influence the degree of familiarity and the level of organisational support (Senge, 2006; Davenport & Ronanki, 2018).

6.3 Concluding assessment

The final conclusion of this dissertation is that Artificial Intelligence can serve as an important support tool for vocational education, provided that its use is guided by

pedagogical planning, organizational support, ethical safeguards and preservation of the human role.

Overall, this study shows that Artificial Intelligence is already part of vocational education and training in Greece, but its integration is still at an initial or intermediate stage. Trainers and trainees have a positive attitude towards AI tools and recognise their potential as a means of supporting and improving the learning process. At the same time, however, they emphasise the need for human supervision, ethical use and organisational support (Holmes et al., 2019; UNESCO, 2023).

The key conclusion is that Artificial Intelligence is changing the way organisations learn, train and develop their human resources. The education of the future does not appear to be education without a teacher, but rather education in which the teacher uses Artificial Intelligence as a supportive tool in order to become more effective, creative and focused (Schwab, 2017; Brynjolfsson & McAfee, 2017).

Consequently, the contribution of this study lies in the fact that it presents a realistic picture of Artificial Intelligence in vocational education within the Greek context. The technology is accepted, but under human supervision. Its potential is recognised, but it is accompanied by concerns and challenges. Organisations show signs of readiness, but still need clearer strategies. Based on these findings, the next phase is not simply to integrate more Artificial Intelligence into education, but to integrate it more consciously, ethically and effectively.

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Appendix A: Research questionnaires

The following questionnaires were used for the quantitative part of the research. They are presented in English for appendix purposes. The structure follows the original Google Forms questionnaires and the exported response files used for the statistical analysis.

1) Questionnaire for trainers

Section A: Demographic and Professional Characteristics

1. Gender

Response options:

- Female
- Male

2. Age group

Response options:

- 18-30
- 31-40
- 41-50
- 51+

3. Years of work experience in education

Response options:

- Up to 5 years
- 5-10 years
- 11-20 years
- More than 20 years

4. Field of training

Response options:

- Management and Administrative Training (leadership, strategy, project management)
- Soft Skills Development (communication, emotional intelligence, teamwork)
- Digital Skills and Technology (IT, software use, data analytics)
- Technical / Specialized Training (hard skills depending on the profession, e.g. machinery operation, technical instructions)
- Sales and Customer Service (customer experience, negotiation)
- Compliance Training (occupational safety, GDPR, ethics, legal issues)
- Personal Development and Well-being (stress management, coaching)
- Onboarding (training of newly hired employees on company culture)
- Other: accounting, finance, marketing, or other field

5. Type of organization for which you work

Response options:

- Private sector

- Public sector
- Mixed / hybrid organization

6. Size of the organization with which you collaborate

Response options:

- 1-50 employees
- 51-250 employees
- 251+ employees

Section B: Knowledge, Familiarity and Current Use of AI

7. How familiar are you with the concept of Artificial Intelligence?

Response options:

- 1 = Not at all familiar
- 2 = Slightly familiar
- 3 = Moderately familiar
- 4 = Quite familiar
- 5 = Very familiar

8. Have you attended seminars related to AI in education?

Response options:

- Yes
- No

9. I believe that knowledge of Artificial Intelligence is an essential skill for the modern trainer.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

10. How often do you use Artificial Intelligence for lesson planning?

Response options:

- Never
- Rarely
- Weekly
- Daily

11. I use Artificial Intelligence to create educational material.

Response options:

- 1 = Not at all
- 2 = Slightly
- 3 = Moderately
- 4 = Quite a lot

- 5 = Very much

12. I use Artificial Intelligence for the automatic assessment of learners.

Response options:

- 1 = Not at all
- 2 = Slightly
- 3 = Moderately
- 4 = Quite a lot
- 5 = Very much

13. Artificial Intelligence helps me adapt the lesson to the needs of each learner (personalization).

Response options:

- 1 = Not at all
- 2 = Slightly
- 3 = Moderately
- 4 = Quite a lot
- 5 = Very much

14. Which Artificial Intelligence tools are provided or used in your training activities?
You may select more than one answer.

Response options:

- Conversational tools / AI assistants (e.g., ChatGPT, Microsoft Copilot)
- Study support and content comprehension tools (e.g., text summarization, concept explanation, automatic notes)
- Adaptive learning systems / platforms (e.g., personalized course recommendations, adjustment of learning pace)
- Automatic assessment and quiz tools (e.g., automatic test correction, immediate feedback)
- Educational content creation tools (e.g., presentations, exercises, training material)
- Learning progress and performance analytics tools (e.g., progress reports, learning analytics)
- I do not use Artificial Intelligence tools

Section C: Perceived Educational Effectiveness of AI

15. Artificial Intelligence improves the effectiveness of the educational process.

Response options:

- 1 = Not at all
- 2 = Slightly
- 3 = Moderately
- 4 = Quite a lot
- 5 = Very much

16. Artificial Intelligence facilitates the role of the trainer.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

17. Artificial Intelligence can successfully replace traditional teaching methods.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

18. Learners respond positively to the use of Artificial Intelligence tools.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

Section D: Challenges, Risks and Ethical Concerns

19. I am concerned that Artificial Intelligence may undermine the role of the human trainer in the future.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

20. There is resistance to the adoption of Artificial Intelligence from colleagues or management.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

21. I trust the outputs produced by Artificial Intelligence tools without extensive review.

Response options:

- 1 = Strongly disagree
- 2 = Disagree

- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

Section E: Organizational Readiness and Future Integration

22. Management supports the integration of Artificial Intelligence in training.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

23. I would like further training in advanced applications of Artificial Intelligence.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

24. Artificial Intelligence will radically change the field of professional training in Greece.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

25. In which educational areas would you like greater integration of Artificial Intelligence? You may select more than one answer.

Response options:

- Personalized learning
- Assessment
- Support
- Educational material
- I do not wish for greater integration of Artificial Intelligence
- Other

1)Questionnaire for trainees

Section A: Demographic and Professional Characteristics

1. Gender

Response options:

- Female
- Male

2. Age group

Response options:

- 18-30
- 31-40
- 41-50
- 51+

3. Educational level

Response options:

- Secondary education
- Higher education
- Master's degree holder
- Doctoral degree holder

4. Years of work experience

Response options:

- Up to 5 years
- 5-10 years
- 11-20 years
- More than 20 years

6. Employment sector

Response options:

- Public sector
- Finance / Banking
- Technology / IT / Telecommunications
- Education / Training
- Services
- Retail / Sales / Marketing
- Industry / Production
- Tourism
- European programmes
- Health / Social services
- Human Resources
- Natural Sciences

- Law
- Shipping
- Environment
- Other

Section B: Knowledge, Familiarity and Current Use of AI

7. How familiar are you with the concept of Artificial Intelligence?

Response options:

- 1 = Not at all familiar
- 2 = Slightly familiar
- 3 = Moderately familiar
- 4 = Quite familiar
- 5 = Very familiar

8. Are Artificial Intelligence tools used in the educational programmes of your organization?

Response options:

- Yes
- No

9. Which Artificial Intelligence tools are provided or used during your learning? You may select more than one answer.

Response options:

- Conversational tools / AI assistants (e.g., ChatGPT, Microsoft Copilot)
- Study support and content comprehension tools (e.g., text summarization, concept explanation, automatic notes)
- Adaptive learning systems / platforms (e.g., personalized course recommendations, adjustment of learning pace)
- Automatic assessment and quiz tools (e.g., automatic test correction, immediate feedback)
- Educational content creation tools (e.g., presentations, exercises, training material)
- Learning progress and performance analytics tools (e.g., progress reports, learning analytics)
- I do not use Artificial Intelligence tools

10. To what extent does the use of Artificial Intelligence increase the speed at which you complete your training?

Response options:

- 1 = Not at all
- 2 = Slightly
- 3 = Moderately
- 4 = Quite a lot
- 5 = Very much

Section C: Perceived Educational Effectiveness of AI

11. Artificial Intelligence helps me better understand difficult concepts.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

12. Educational content becomes more engaging through the use of Artificial Intelligence.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

13. Artificial Intelligence allows me to learn at my own pace (personalization).

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

14. The use of Artificial Intelligence makes me more autonomous in managing my learning.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

15. I trust the accuracy of the information provided by Artificial Intelligence tools.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

Section D: Challenges, Risks and Ethical Concerns

16. I am concerned about the security of my personal data when using Artificial Intelligence.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

17. Artificial Intelligence reduces direct interaction with the trainer and colleagues.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

18. There is a risk of excessive dependence on technology for problem solving.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

19. Artificial Intelligence decisions (e.g., in grading) lack transparency.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

Section E: Organizational Readiness and Future Integration

20. Artificial Intelligence will be necessary for the development of new professional skills.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

21. I would like to receive specific training on how to use Artificial Intelligence tools.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree

- 5 = Strongly agree

22. The management of my company encourages the use of new Artificial Intelligence technologies.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

23. My organization has the appropriate infrastructure for the integration of Artificial Intelligence.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

24. Artificial Intelligence will play a decisive role in the future development of my work.

Response options:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

25. In which areas would you like greater integration of Artificial Intelligence? You may select more than one answer.

Response options:

- Personalized learning
- Assessment
- Support
- Educational material
- I do not wish for greater integration of Artificial Intelligence
- Other

Author's Statement:

I hereby declare that, in accordance with article 8 of Law 1599/1986 and article 2.4.6 par. 3 of Law 1256/1982, this thesis/dissertation is solely a product of personal work and does not infringe any intellectual property rights of third parties and is not the product of a partial or total plagiarism, and the sources used are strictly limited to the bibliographic references.