Research Article

Exploring K-12 teachers' attitudes and perceptions towards the use of AI applications in the teaching process

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ARTICLE INFO	ABSTRACT
	Artificial intelligence (AI) is rapidly reshaping instructional processes by providing new opportunities for personalized learning and enhanced classroom support. Although its potential is widely acknowledged, further investigation is needed into K-12 teachers' attitudes and perceptions towards integrating AI applications into educational practice, as well as the factors that shape these attitudes and influence their intention to adopt such tools. Addressing these issues, the present study explores the integration of AI in education by focusing on educators' perspectives. Data from 494 educators collected via a technology acceptance model-based questionnaire, assessed attitudes, perceived usefulness (PU), ease of use, and behavioral intention. Data analysis indicates that teachers' attitudes and perceptions are significantly influenced by various demographic variables—including gender, academic qualifications, subject area, age, and teaching experience—as well as school-related factors such as institutional context and engagement with information and communication technologies (ICT). The results show generally positive attitude towards AI, but a neutral stance in terms of its ease of use, suggesting a gap between general acceptance and practical readiness. Four key predictors of teachers' intention to integrate AI into their educational practices were identified: (a) PU, (b) positive attitude, (c) perceived ease of use, and (d) ICT training. These findings underscore the importance of enhancing teachers' digital competencies and providing targeted professional development opportunities to facilitate the effective adoption of AI within the K-12 educational context.

Keywords: artificial intelligence, K-12 teachers, teachers' attitudes and perceptions, technology acceptance model |

INTRODUCTION

Artificial intelligence (AI) has become an increasingly integral part of daily life, with its applications transforming various routines into ways once considered unimaginable. Technologies such as virtual assistants—e.g., Siri, Google Assistant, and Alexa—are among the most widely recognized AI tools, assisting users with tasks such as setting reminders, answering queries, and managing smart devices through voice commands. This widespread integration of AI highlights its growing influence and significance in

contemporary society. Simultaneously, rapid advancements in AI have led to profound and far-reaching changes in the field of education.

The COVID-19 pandemic, which emerged in December 2019, not only disrupted educational systems worldwide but also revealed longstanding limitations in traditional teaching methods and institutional structures (Jimoyiannis & Koukis, 2023). This disruption underscored the essential role of digital technologies in sustaining learning, thereby intensifying the need for innovative and adaptable instructional approaches (Jimoyiannis & Koukis, 2023; Pokhrel & Chhetri, 2021). Within this context, the rising demand for flexible, personalized, and efficient learning pathways has accelerated the adoption of AI-powered educational platforms. These systems demonstrate substantial potential to transform how students, educators, and institutions engage with teaching and learning processes (Colchester et al., 2016). By utilizing AI-driven adaptivity, they tailor instruction to individual learners' needs and progression, enhancing comprehension and overall instructional effectiveness (Akgün & Greenhow, 2021). Beyond performance data analytics, AI-enabled platforms support the creation of interactive learning tools and the refinement of digital content. Together, these capabilities broaden access to knowledge, strengthen learner engagement, and facilitate the implementation of innovative pedagogical practices (Akgün & Greenhow, 2021).

Countries such as the UK, Estonia, and Saudi Arabia have already made significant progress by investing in infrastructure and professional development initiatives (Alwaqdani, 2024; Chounta et al., 2021; House of Lords, 2018, as cited in Ayanwale et al., 2022). As AI continues to reshape the educational landscape, it is imperative to equip teachers with the necessary skills through structured, context-sensitive training programs to ensure the meaningful and effective integration of AI into teaching practices.

This article presents the findings from a study exploring Greek K-12 teachers' attitudes and perceptions towards the integration of AI in the educational process. This research addresses a critical gap in the existing literature, aiming to investigate how various demographic variables—such as gender, age, teaching experience, and information and communication technologies (ICT) engagement—shape these perceptions and attitudes. It also identifies and analyses the key factors that influence teachers' intentions to incorporate AI into their pedagogical practices.

Moreover, the results show that demographic and school-related factors substantially shape teachers' views on AI integration. The findings offer valuable insights not only for K-12 teachers but also for teacher educators, researchers, and policymakers. Given that this area has not been extensively studied in Greece, the study provides crucial insights for addressing the challenges associated with AI integration within the Greek educational reality.

LITERATURE REVIEW

Teachers' Attitudes and Perspectives Towards the Use of Artificial Intelligence

The integration of AI in education has attracted increasing academic interest globally. Although AI is highly promising, its adoption in educational contexts presents challenges for teachers, particularly regarding readiness and effective implementation. The limited number of studies focusing on K-12 teachers' attitudes towards AI highlights a notable gap in the literature (Al Darayseh, 2023; Alwaqdani, 2024; Antonenko & Abramowitz, 2022; Chounta et al., 2021; Galindo-Domínguez et al., 2024; Polak et al., 2022). In response, researchers have begun to investigate teachers' perceptions of AI, their level of understanding, and the challenges they face in integrating AI tools into classroom practice.

To systematically examine these attitudes and behavioral intentions (BIs), the technology acceptance model (TAM) has been adopted as a theoretical framework for understanding how teachers perceive, evaluate, and adopt emerging technologies in educational contexts (Al-Emran et al., 2018; Scherer et al., 2019; Teo, 2019). TAM posits that individuals' intentions to use technology are primarily influenced by perceived usefulness (PU)—the belief that a technology will enhance performance—and perceived ease of use (PEOU)—the belief that using the technology will not require undue effort. These beliefs shape attitudes towards use, which in turn influence BIs and ultimately determine actual adoption (Lew et al., 2019). The model also incorporates additional factors such as prior experience, self-efficacy, social influence, and organizational support (Guner & Acarturk, 2020). According to Saade (2007), TAM provides a robust theoretical foundation

that can be extended to research on digital education and its applications. Ayanwale et al. (2022) further highlighted its continued relevance, noting that TAM is one of the most widely applied frameworks for explaining how individuals' attitudes—whether positive or negative—shape their BIs. Prior studies have also demonstrated TAM's utility in predicting engagement with diverse educational technologies, including e-learning environments, augmented reality, and metaverse applications (Aburbeian et al., 2020; Asiri & El Aasar, 2022; Durak, 2019).

Additional studies, even without explicitly applying TAM, offer further insights into K-12 teachers' perceptions. For instance, in a study of 140 Estonian teachers, Chounta et al. (2021) framed their analysis within the scope of fairness, accountability, transparency, and ethics and found that most participants had limited or basic knowledge of AI technologies. Despite this limited understanding and practical experience, teachers generally expressed positive attitudes towards AI integration, recognizing its potential to enhance teaching and learning, while also acknowledging a sense of unpreparedness for effective implementation.

In a similar vein, Antonenko and Abramowitz (2022) explored the perspectives of 53 K-12 science teachers from schools in the southeast USA. Although the sample size was relatively limited, the study offered valuable insights into educators' conceptual understanding of AI and their readiness to engage with AI tools in pedagogical contexts. A great number of participants expressed a positive attitude towards the integration of AI in teaching, recognizing its potential to enrich the learning process by offering personalized learning, supporting student assessment, and facilitating administrative tasks. Nonetheless, the study also uncovered widespread misinterpretations, with some teachers linking AI to science fiction or irrelevant technological concepts. Despite these misunderstandings, the general attitude remained positive, with many participants expressing a willingness to integrate AI into their teaching, provided they receive the necessary training and support.

Similarly, Polak et al. (2022) identified differences in perceptions between Science teachers and educators in other subject areas, with these differences largely attributed to the increased importance of technological literacy for Science educators. In alignment with the findings of Polak et al. (2022), Al Darayseh (2023) found a positive correlation between Science teachers and their intention to adopt AI technologies, while demographic factors such as gender, teaching experience, and academic qualifications did not have a significant impact.

Another recent study conducted by Galindo-Domínguez et al. (2024), involving a large sample of 445 Spanish teachers across various educational levels, revealed that higher levels of digital competence are strongly correlated with more favorable attitudes towards the integration of AI in teaching regardless of factors such as educational level, gender, age, years of experience, or subject area. A discrepancy between teachers' strong willingness to adopt AI and their limited personal experience with the technology was also noted (Galindo-Domínguez et al., 2024).

On the other hand, Alwaqdani's (2024) study revealed that while many Saudi teachers have begun exploring the use of AI tools, only a limited proportion reported incorporating them into their instructional practice on a consistent basis. This suggests a gap between initial exposure and meaningful integration, likely stemming from insufficient training and a lack of pedagogical guidance. The findings also indicate that a large segment of educators perceive their understanding of AI as limited, with relatively few expressing confidence in their knowledge. These results emphasize the need for coherent professional development strategies and sustained institutional policies to enable the effective and responsible integration of AI within educational systems.

Predictive Factors in the Use of Artificial Intelligence

While the interest in incorporating AI into educational practices is growing, the lack of studies regarding the factors that influence teachers' attitudes and perceptions towards the implementation of AI in the educational process makes it difficult to understand the factors that influence teachers' intention to use AI. Wang et al. (2021) highlighted several key variables that shape educators' intentions to integrate AI into teaching. Notably, self-efficacy was identified as a strong positive predictor, enhancing both the perceived utility of AI and teachers' willingness to adopt such technologies. Furthermore, self-efficacy was inversely

correlated with anxiety, suggesting that fostering confidence in teachers' technological abilities could alleviate concerns related to AI implementation (Wang et al., 2021).

In contrast to Wang et al.'s (2021) findings, Ayanwale et al. (2022) discovered that anxiety was not a significant factor influencing teachers' intentions to adopt AI. Instead, a strong positive relationship was found between teachers' perceptions of AI's usefulness and their intent to incorporate it into their practices. Likewise, a study involving 452 pre-service teachers of a German university reinforced these findings, showing that the PU of AI was the most influential determinant in teachers' intentions to adopt AI (Zhang et al., 2023). The more teachers recognized AI's value in enhancing instructional practices, the more likely they were to consider its integration (Ayanwale et al., 2022; Zhang et al., 2023). Moreover, the study by Zhang et al. (2023) also noted gender differences in AI acceptance, with female participants reporting higher levels of anxiety regarding AI tools, which negatively impacted their perceptions of both ease of use and utility. This suggests that teachers' attitudes towards AI may be shaped by demographic variables, including gender.

A more recent study by Chou et al. (2024) examined the role of institutional support in the adoption of AI. Their findings indicated that the successful integration of AI is highly dependent on the encouragement of innovation and the establishment of adequate infrastructure by educational institutions. Access to technological resources, professional development, and continuous technical support were found to be critical in promoting teachers' willingness to adopt AI in their teaching. In addition, demographic factors such as gender, teaching experience, and prior AI exposure were found to influence teachers' perceptions of technology and their readiness to incorporate it into educational processes. The study further emphasized that public universities tend to offer more comprehensive support structures, facilitating the adoption of AI technologies. Similarly, Chiu and Chai (2020) stressed the critical role of institutional support in AI integration, recommending a variety of support strategies, including resource management, technology troubleshooting, and financial backing for tools and training, often provided proactively before teachers formally seek assistance.

Finally, a study by Sanusi et al. (2024) explored the attitudes of 796 pre-service teachers from Nigerian universities, revealing additional factors influencing AI adoption. Their research highlighted the importance of foundational AI knowledge and subjective norms in shaping teachers' intentions to use the technology. Particularly, students noted that a solid understanding of AI's core principles and its potential for problem-solving were crucial in shaping their willingness to adopt it. Peer influence was also identified as a significant factor, with students reporting that the perceptions of their peers played an important role in their decision to engage with AI.

Ethical Concerns Regarding the Use of Artificial Intelligence in Education

AI has become an integral part of the modern educational process, offering new opportunities and prospects for teaching and learning. However, its rapid development raises significant ethical concerns that make its adoption more complicated and require careful consideration and meaningful discussion.

One critical ethical issue arising from the use of AI in primary and secondary education relates to the privacy of students and teachers (Akgün & Greenhow, 2021; Chounta et al., 2021; Holmes et al., 2021; Mogavi et al., 2024; Regan & Jesse, 2018; Stahl & Wright, 2018). AI applications, which often collect and process personal data in the context of personalized learning, raise concerns about the protection of sensitive information. The collection of information regarding the actions and preferences of students and teachers through surveillance or monitoring systems is a characteristic example of a privacy violation, as it may lead to the identification and exploitation of personal data without consent (Akgün & Greenhow, 2021).

Additionally, there is a growing concern about the over-reliance on AI tools, as this may limit the development of critical thinking and autonomy among users (Akgün & Greenhow, 2021; Mogavi et al., 2024; Regan & Jesse, 2018). Continuous dependence on AI may degrade students' and teachers' ability to think critically and make autonomous decisions, which restricts their ability to develop critical thinking skills essential for their personal and professional growth.

Finally, bias and discrimination also raise significant ethical concerns in AI, as algorithmic systems may reinforce and reproduce pre-existing prejudices inherent in the data on which they are trained (Krutka et al., 2019; Mogavi et al., 2024; Stahl & Wright, 2018). A prominent example of this tendency is AI-supported

translation tools, which often incorporate gender stereotypes during the translation process from languages that use neutral pronouns (Krutka et al., 2019).

Therefore, to address the ethical challenges related to the use of AI in education, educators must utilize teaching resources appropriate for students, paying particular attention to the ethical dimension of AI integration in education (Akgün & Greenhow, 2021). Sources such as those from the MIT Media Lab can offer valuable insights into the complexities of AI and emphasize the importance of ethics in its applications (Akgün & Greenhow, 2021). Education around the ethical parameters of AI is critical to ensuring responsible and fair use of this technology in the educational process, promoting social justice and individual responsibility.

Aim and Research Questions

This study explores K-12 teachers' attitudes and perceptions of AI in teaching, examining how factors such as gender, age, teaching experience, and ICT engagement influence these views. Using the TAM as a framework, the study considers PU, PEOU, attitudes towards use, and BIs to identify the factors shaping teachers' readiness, engagement, and intention to adopt AI. Framing the investigation within TAM allows for systematic analysis and meaningful comparison with prior research, while highlighting areas where professional development and support are needed. To achieve these objectives, the study addresses the following research questions:

- What are the attitudes and perceptions of K-12 teachers regarding the use of AI applications in educational practice?
- Which factors influence the attitudes and perceptions of K-12 teachers concerning the use of AI applications in educational practice?
- Which factors affect the intention of K-12 teachers to use AI in their teaching practice?

METHODOLOGY

Quantitative Research Approach

The present study adopted a quantitative, cross-sectional survey designed to examine teachers' attitudes and perceptions concerning the use of AI in educational practice. This approach was employed due to its suitability for capturing comprehensive, cross-sectional data that reflect current trends and patterns within the target population.

Sample

The final sample consisted of 494 K-12 teachers. **Table 1** presents their demographic characteristics, including gender, academic qualifications, subject area, age, and years of teaching experience. Most participants were female, with ages ranging from 31 to 60 years. Teaching experience was almost evenly divided between teachers with 15 years or less and those with more than 15 years. The majority worked in public primary and secondary schools located in urban areas, and a substantial proportion had completed level A ICT training for educational purposes.

Instrument

The research instrument used was based on the TAM, which was introduced by Davis et al. (1989) to examine how users perceive and adopt new technologies (as cited in Fokidis, 2017). The model incorporates four key components:

(1) the user's attitude towards the technology (ATT),

(2) their PU,

(3) their PEOU, and

(4) their BI to use.

The instrument consists of 20 items rated on a 5-point Likert scale (1= strongly disagree, 5=strongly agree).

As shown in **Table 2**, the reliability analysis indicated satisfactory to excellent internal consistency for all measured constructs, based on Cronbach's alpha values. The high reliability scores suggest that the

Table 1. Teachers' Demographic Profile

Demographic variable	Value	Number of teachers	Percentage (%)
Gender	Male	69	13.97
	Female	424	85.83
	Other/no response	1	0.20
Academic qualifications	Bachelor's degree	155	31.38
	2nd bachelor's degree	28	5.67
	Master's degree	232	46.96
	2nd master's degree	65	13.16
	Doctoral degree	14	2.83
Subject area	Special education	103	20.85
	Primary school teachers	111	22.47
	Language and literature	78	15.79
	Foreign language	62	12.55
	ICT	22	4.45
	PE	12	2.43
	Mathematics	20	4.05
	Humanities	14	2.83
	Physics	11	2.23
	Economics	16	3.24
	Other	45	9.11
Age	21-30	84	17.00
	31-40	128	25.91
	41-50	160	32.39
	51-60	107	21.66
	60+	15	3.04
Years of teaching experience	0-5	138	27.94
	6-10	60	12.15
	11-15	59	11.94
	16-20	102	20.65
	20+	135	27.33

Table 2. Reliability analysis of the instrument constructs

Factor	Items	Cronbach's alpha
Attitude towards use	1R, 2R, 3, 4R, 5R, 6R	.906
PU	1, 2, 3R, 4, 5	.829
PEOU	1, 2, 3, 4R, 5	.872
Intention to use	1R, 2, 3R, 4	.849

instrument was consistent and trustworthy, which adds confidence to the data used in the subsequent analysis. More specifically, the participants responded to the items in a way that showed strong agreement within each group of questions. The construct attitude towards use demonstrated excellent reliability (α = .906), while PEOU (α = .872), intention to use (α = .849), and PU (α = .829) showed high reliability.

Procedure

An online questionnaire was created using the Google Forms platform, accompanied by a brief introduction outlining the study's objectives and the expected time commitment. Prior to participation, teachers were provided with an informed consent statement, which explained the purpose of the study, voluntary nature of participation, and the participants' right to withdraw at any time without penalty. Participants were explicitly informed that their responses would be treated with strict confidentiality and anonymity, and that no personally identifiable information would be collected. By proceeding to complete the questionnaire, participants provided implied consent to participate in the study.

The research protocol, including the data collection procedures and consent process, was reviewed and approved by Ethics and Bioethics Committee of Neapolis University Pafos ensuring compliance with ethical standards for research involving human participants. Responses were automatically recorded by the Google Forms platform, ensuring accuracy and integrity of the data. The survey remained open for two weeks and was distributed remotely to allow flexibility and encourage broader participation.

Table 3. Normality test for AI factors (n = 494)

Factor	Shapiro-Wilk statistic (494)	p
Attitude towards use	0.925	< .001
PU	0.974	< .001
PEOU	0.984	< .001
Intention to use	0.937	< .001

Table 4. Attitude towards use

Statement	M	SD	Range
I do not hesitate at all to use AI programs in educational practice.	3.73	1.11	[1, 5]
Whenever I use AI programs, I feel uncomfortable/nervous. [R]	2.16	1.10	[1, 5]
The use of AI programs frightens me. [R]	2.15	1.19	[1, 5]
I hesitate to use AI programs because I might make mistakes that cannot be corrected. [R]	2.06	1.11	[1, 5]
I hesitate to use AI programs in educational practice because I might look foolish. [R]	1.85	1.00	[1, 5]
I am afraid to use AI programs in educational practice since I might break them. [R]	1.80	0.98	[1, 5]

Note. SD: Standard deviation; [R] indicates a reverse-scored item

Data Analysis

The quantitative data were analyzed using SPSS version 26. Descriptive and inferential (inductive) statistical methods were applied to better understand the structure and relationships among the key variables. Four key factors were analyzed:

(1) attitude towards use,

(2) PU,

(3) PEOU, and

(4) BI to use.

A normality test was conducted on the AI factors using the Shapiro-Wilk test as displayed in **Table 3** (Razali & Wah, 2011). The results indicated that all four factors—attitude towards use (W = 0.925, p < .001), PU (W = 0.974, p < .001), PEOU (W = 0.984, p < .001), and intention to use (W = 0.937, p < .001)—did not follow a normal distribution. Given the lack of normality, nonparametric statistical tests were applied. Specifically, Spearman's rho was used to assess correlations among the AI-related factors, the Mann-Whitney U test was conducted to compare factor levels between two independent samples, and the Kruskal-Wallis H test was employed to compare factor levels among three or more independent samples (Field, 2017).

Given that none of the factors followed a normal distribution (p < 0.001), non-parametric statistical methods were utilized. Specifically, Spearman's rho was employed to assess the correlations among the AI factors, while the Mann-Whitney U test and the Kruskal-Wallis H test were used for comparing independent groups (Field, 2017).

FINDINGS

To address the first research question, descriptive statistics were examined across the four TAM constructs. **Table 4** presents the key outcomes of the descriptive analysis regarding Greek K-12 teachers' attitudes towards AI use in teaching. The findings reveal an overall positive stance (mean [M] = 3.73), with minimal indications of apprehension or resistance (M = 2.16, M = 2.15, M = 2.06).

Further insights are provided in **Table 5**, which illustrates teachers' perceptions of AI's usefulness in educational practice. M values for nearly all items exceed 3.0, indicating a generally favorable view of AI's contribution to teaching. Notably, participants adopted a more neutral stance regarding whether comparable outcomes could be achieved using simpler methods (M = 2.85), suggesting that while alternatives are acknowledged, AI is largely seen as a valuable enhancement.

Table 6 explores the PEOU of AI programs, showing that most educators feel moderately confident in learning and applying such technologies (M = 3.57, M = 3.41), although a notable need for support persists (M = 3.08).

Table 5. PU

Statement	M	SD	Range
AI programs can improve my work.	4.06	0.81	[1, 5]
AI programs can make my work more imaginative and interesting.	4.06	0.87	[1, 5]
AI programs can enhance my work to such a degree that the extra effort is worthwhile.	3.92	0.91	[1, 5]
AI programs make me more productive.	3.61	0.98	[1, 5]
There are easier ways to achieve similar results. [R]	2.85	0.91	[1, 5]

Note. SD: Standard deviation; [R] indicates a reverse-scored item

Table 6. PEOU

Statement	M	SD	Range
It will be easy for me to become proficient in using AI programs.	4.06	0.81	[1, 5]
Overall, AI programs seem easy to use.	4.06	0.87	[1, 5]
I believe I will be able to do exactly what I want using AI programs.	3.92	0.91	[1, 5]
Learning to use AI programs seems easy.	3.61	0.98	[1, 5]
I will need help using AI programs because they don't seem easy to use. [R]	2.85	0.91	[1, 5]

Note. SD: Standard deviation; [R] indicates a reverse-scored item

Table 7. BI to use

Statement	M	SD	Range
As a teacher, I will definitely use AI programs.	4.06	0.81	[1, 5]
I will use AI programs whenever I get the chance.	4.06	0.87	[1, 5]
I will only use AI programs if I am required to. [R]	3.61	0.98	[1, 5]
I will avoid using AI programs. [R]	2.85	0.91	[1, 5]

Note. SD: Standard deviation; [R] indicates a reverse-scored item
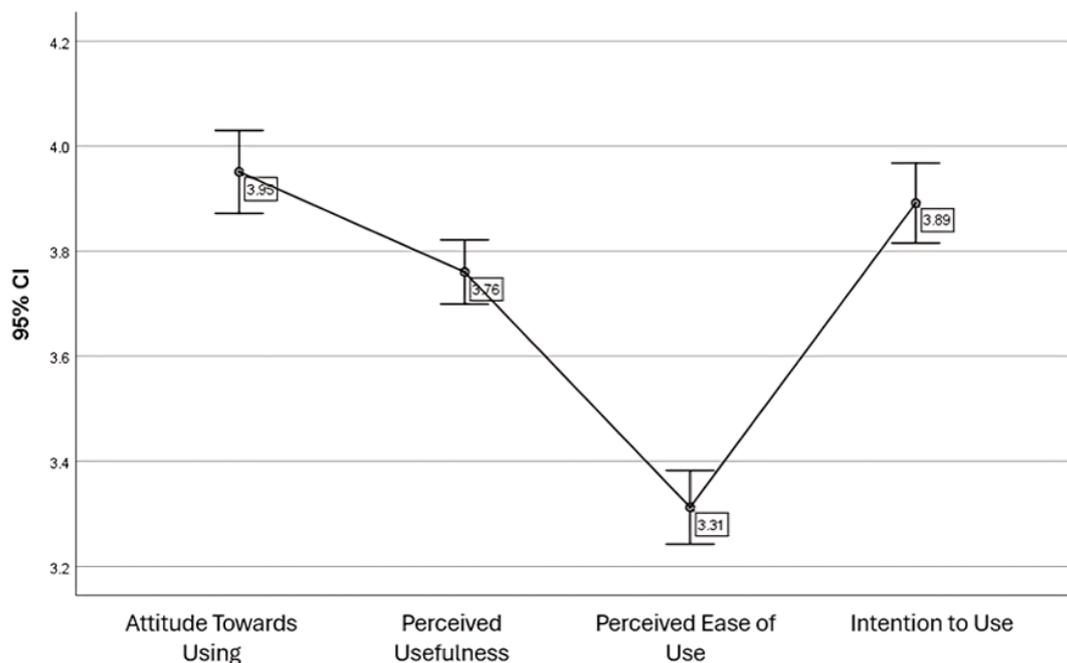
Figure 1. Descriptive statistics and 95% Cis (Developed by the authors)

Meanwhile, **Table 7** highlights teachers' strong willingness to integrate AI into their classrooms, as reflected by a high M score (M = 3.93).

Descriptive statistics and 95% confidence intervals for the four main constructs are presented in **Figure 1**.

High M scores were observed for attitude towards use (M = 3.95, 95% confidence interval [CI] [3.87, 4.03]), intention to use (M = 3.89, 95% CI [3.82, 3.97]), and PU (M = 3.76, 95% CI [3.70, 3.82]), indicating positive responses from the participants. In contrast, PEOU showed a moderate M score (M = 3.31, 95% CI [3.24, 3.38]). The findings suggest that although the participants generally held favorable attitudes and intentions towards using AI in education, they were comparatively less confident about the ease of use of such technologies.

Table 8. Correlations among AI factors

Factors	1	2	3	4
1. Attitude towards use	1			
2. Subjective PU	.480**	1		
3. Subjective PEOU	.633**	.386**	1	
4. Intention to use	.638**	.700**	.518**	1

Note. *p < .05; **p < .01

Table 9. Comparison of AI factors by gender

Factors	Gender	N	Mean rank	Z	p
Attitude towards use	Male	69	279.92	-2.079	0.038
	Female	424	241.64		
PU	Male	69	251.24	-0.268	0.789
	Female	424	246.31		
PEOU	Male	69	269.82	-1.440	0.150
	Female	424	243.29		
BI to use	Male	69	252.75	-0.364	0.716
	Female	424	246.06		

Table 10. Comparison of AI factors by academic skills

Factors	Academic skills	N	Mean rank	H (2)	p
Attitude towards use	Bachelor's degree	155	217.61	**11.948**	**0.003**
	Second degree–Master's	260	255.21		
	2nd master's–Doctorate	79	280.78		
PU	Bachelor's degree	155	228.13	**7.554**	**0.023**
	Second degree–Master's	260	248.58		
	2nd master's–Doctorate	79	281.97		
PEOU	Bachelor's degree	155	222.94	**7.076**	**0.029**
	Second degree–Master's	260	261.21		
	2nd master's–Doctorate	79	250.58		
BI to use	Bachelor's degree	155	221.49	**12.719**	**0.002**
	Second degree–Master's	260	249.78		
	2nd master's–Doctorate	79	291.01		

In examining research question 2, **Table 8** reports the correlations among the AI factors, indicating statistically significant positive associations at the .01 level across all factor pairs.

Demographic and school-related factors were also examined. As shown in **Table 9**, a statistically significant gender difference emerged, with male teachers exhibiting a more positive attitude towards AI adoption (p = 0.038), although no significant gender-based differences were noted for PU, ease of use, or BI.

Regarding academic qualifications (**Table 10**), teachers holding a second master's or doctorate degree reported substantially higher M ranks in attitude, PU, and BI compared to those with only a bachelor's.

Table 11 compares perceptions across teaching disciplines, revealing significant differences across all factors (p < 0.001). Computer science teachers reported the highest scores in PU (M = 310.84), ease of use (M = 365.34), and intention to use AI (M = 322.20), whereas humanities teachers recorded the lowest in PEOU (M = 146.86) and BI (M = 162.57).

Table 11. Comparison of AI factors by subject area

Factors	Subject area	N	MB	H (10)	p
Attitude towards use	Special education	103	191.58	47.279	< 0.001
	Primary school teachers	111	262.68		
	Language and literature	78	220.57		
	Foreign languages	62	283.17		
	Computer science	22	366.16		
	Humanities	14	164.14		
	Physics	11	266.86		
	Economics	16	267.44		
	Other	45	278.14		
Subjective PU	Special education	103	183.57		

Table 11 (Continued).

Factors	Subject area	N	MB	H (10)	p
	Primary school teachers	111	278.86		
	Language and literature	78	223.25		
	Foreign languages	62	289.82		
	Computer science	22	310.84	53.576	< 0.001
	Humanities	12	344.71		
	Physics	20	198.05		
	Economics	14	246.50		
	Other	11	212.55		
	Special education	103	202.16		
	Primary school teachers	111	254.55		
	Language and literature	78	218.87		
	Foreign languages	62	302.64		
Subjective PEOU	Computer science	22	365.34	47.144	< 0.001
	Humanities	12	267.29		
	Physics	20	249.28		
	Economics	14	146.86		
	Other	11	275.77		
	Special education	16	282.91		
	Primary school teachers	45	255.71		
	Language and literature	103	181.38		
	Foreign languages	111	273.35		
BI to use	Computer science	78	236.38	52.972	< 0.001
	Humanities	62	305.99		
	Physics	22	322.20		
	Economics	12	264.96		
	Other	20	203.40		

Table 12. Comparison of AI factors by age

Factors	Age group	N	MB	H (10)	p
	21-30	84	220.17		
	31-40	128	263.03		
Attitude towards use	41-50	160	248.12	18.885	0.001
	51-60	107	267.38		
	61+	15	119.53		
	21-30	84	233.67		
	31-40	128	264.54		
Subjective PU	41-50	160	250.80	6.991	0.136
	51-60	107	243.54		
	61+	15	172.53		
	21-30	84	235.22		
	31-40	128	249.25		
Subjective PEOU	41-50	160	259.68	11.914	0.018
	51-60	107	253.06		
	61+	15	131.77		
	21-30	84	215.24		
	31-40	128	258.16		
BI to use	41-50	160	255.63	14.525	0.006
	51-60	107	262.22		
	61+	15	145.40		

Age-related differences were also identified (**Table 12**), with younger teachers (ages 21-30) expressing the least favorable views, and those aged 51-60 reporting more positive attitudes, particularly in attitude towards use (M = 267.38). Participants over 61 years of age showed the lowest levels across all factors.

Similarly, years of teaching experience influenced perceptions (**Table 13**). Teachers with 6-10 years of experience achieved the highest scores in attitude (M = 279.18) and intention to use AI (M = 270.31), whereas those with 0-5 years of experience exhibited the lowest. No significant differences were found for PU (p = 0.305).

Table 13. Comparison of AI factors by years of teaching experience

Factors	Years of teaching experience	N	MB	H (3)	p
Attitude towards use	0-5	138	214.26	11.770	0.008
	6-10	60	279.18		
	11-20	161	255.13		
	20+	135	258.31		
Subjective PU	0-5	138	233.61	3.623	0.305
	6-10	60	256.86		
	11-20	161	262.03		
	20+	135	240.20		
Subjective PEOU	0-5	138	221.32	8.565	0.036
	6-10	60	238.08		
	11-20	161	267.99		
	20+	135	254.02		
BI to use	0-5	138	212.61	12.234	0.007
	6-10	60	270.31		
	11-20	161	263.48		
	20+	135	253.98		

Table 14. Comparison of AI factors by type of school-1

Factors	Type of school	N	MB	H (4)	p
Attitude towards use	Kindergarten	106	201.48	15.610	0.004
	Primary school	157	265.34		
	Junior high school	70	244.66		
	Senior high school	86	254.98		
	Other educational structure	75	269.27		
Subjective PU	Kindergarten	106	188.26	26.308	< 0.001
	Primary school	157	274.29		
	Junior high school	70	240.05		
	Senior high school	86	262.85		
	Other educational structure	75	264.49		
Subjective PEOU	Kindergarten	106	205.95	13.938	0.007
	Primary school	157	253.43		
	Junior high school	70	245.76		
	Senior high school	86	261.46		
	Other educational structure	75	279.43		
BI to use	Kindergarten	106	185.23	28.859	< 0.001
	Primary school	157	276.11		
	Junior high school	70	247.76		
	Senior high school	86	251.88		
	Other educational structure	75	270.35		

The analysis presented in **Table 14** showed significant variation in attitudes across school types. Primary school teachers and those in other educational structures demonstrated higher M ranks than kindergarten teachers. Statistically significant differences were found for all factors ($p < 0.01$), with PU and intention to use displaying the strongest effects.

Results from **Table 15** indicated that while no significant differences emerged regarding attitude towards use ($p = 0.474$) or intention to use ($p = 0.515$), differences were evident for PU ($p = 0.035$) and PEOU ($p = 0.037$), with educators in special education and other educational structures reporting higher M ranks.

Table 16 compares AI-related factors based on educators' engagement with ICT. Statistically significant differences were identified in attitude towards use, PEOU, and intention to use (all $p < 0.001$), favoring teachers who engage with ICT. No significant difference was observed in PU ($p = 0.075$).

Finally, the multiple regression analysis (**Table 17**) revealed that key predictors of teachers' intention to use AI explained 64.5% of the variance ($R^2 = 0.645$, $p < 0.001$). PU was the most influential predictor (beta = 0.525, $p < 0.001$), followed by attitude towards use (beta = 0.310, $p < 0.001$) and PEOU (beta = 0.075, $p = 0.034$). Participation in level A ICT training contributed modestly to the model (beta = 0.100, $p = 0.002$), and no multicollinearity issues were detected (VIF < 3).

Table 15. Comparison of AI factors by type of school-2

Factors	Type of school	N	MB	H (4)	p
Attitude towards use	Public	371	242.74		
	Private	55	242.59		
	Vocational	22	278.34	3.523	0.474
	Special education	13	272.50		
	Other	33	278.83		
Subjective PU	Public	371	239.81		
	Private	55	243.53		
	Vocational	22	263.30	10.340	0.035
	Special education	13	338.92		
	Other	33	294.06		
Subjective PEOU	Public	371	237.56		
	Private	55	257.60		
	Vocational	22	269.16	10.197	0.037
	Special education	13	300.92		
	Other	33	306.94		
BI to use	Public	371	245.89		
	Private	55	231.38		
	Vocational	22	246.07	3.261	0.515
	Special education	13	284.69		
	Other	33	278.79		

Table 16. Comparison of AI factors according to ICT engagement

Factors	ICT engagement	N	MB	Z	p
Attitude towards use	No	77	181.71	-4.420	< 0.001
	Yes	417	259.65		
Subjective PU	No	77	221.06	-1.778	0.075
	Yes	417	252.38		
Subjective PEOU	No	77	187.63	-4.020	< 0.001
	Yes	417	258.56		
BI to use	No	77	188.01	-4.007	< 0.001
	Yes	417	258.49		

Table 17. Multiple linear regression with intention to use as the dependent variable

Independent variable	B	Beta	t	p	VIF
Constant	-0.273	-	-1.632	0.103	-
Attitude towards use	0.299	0.310	8.341	< 0.001	1.877
PU	0.656	0.525	16.649	< 0.001	1.353
PEOU	0.082	0.075	2.129	0.034	1.702
Education level	0.035	0.040	1.434	0.152	1.059
Humanities/special education/maths	-0.108	-0.056	-1.355	0.176	2.328
Age (31-60)	0.082	0.038	1.146	0.252	1.488
Years of teaching experience (6+)	-0.003	-0.001	-0.042	0.966	1.523
Kindergarten	0.015	0.007	0.172	0.863	2.301
ICT engagement	-0.003	-0.001	-0.039	0.969	1.346
Level A ICT training	0.199	0.100	3.079	0.002	1.446
Level B ICT training	-0.019	-0.011	-0.346	0.729	1.357

Overall, the aforementioned analysis highlights a positive attitude among Greek K-12 educators towards the integration of AI in teaching. Factors such as gender, academic qualifications, subject area, age, teaching experience, school type, and ICT engagement contributed to varying perceptions. PU emerged as the strongest determinant of teachers' intention to adopt AI, underscoring need for targeted support and training initiatives that emphasize both the practical benefits and ease of use of AI tools in educational settings.

DISCUSSION

This study examined Greek K-12 educators' attitudes, perceptions, and intentions regarding the adoption of AI in education, contributing to the growing body of research on AI integration in teaching and learning.

The findings reveal several key insights:

(1) teachers generally hold positive attitudes towards AI adoption,

(2) there is a notable gap concerning the PEOU of AI tools,

(3) demographic factors—including gender, age, and teaching experience—significantly influence perceptions,

(4) academic qualifications and subject specialization further shape attitudes,

(5) the educational context and ICT training play critical roles, and

(6) PU, ease of use, positive attitude, and level A ICT certification predict teachers' intention to adopt AI.

The following discussion contextualizes these findings within existing literature, providing detailed explanations and highlighting implications for practice and future research.

Consistent with prior studies (Al Darayseh, 2023; Alwaqdani, 2024; Antonenko & Abramowitz, 2022; Chounta et al., 2021; Galindo-Domínguez et al., 2024; Polak et al., 2022), Greek K-12 teachers generally demonstrate positive attitudes towards incorporating AI in their teaching practices. This widespread acceptance reflects educators' growing recognition of AI's potential to enhance instructional effectiveness and learner engagement. However, our findings also reveal a neutral perception regarding AI's ease of use. Although teachers express overall favorable attitudes, many feel uncertain about their ability to learn and effectively manage AI technologies in practice. This disparity suggests a significant gap between theoretical acceptance and practical readiness, underscoring the urgent need for targeted professional development programs that enhance teachers' digital competencies and self-efficacy. Such training should especially support educators with limited prior exposure to advanced technologies, enabling more confident and effective AI integration in classrooms.

Demographic variables emerged as important factors influencing teachers' perceptions, an area less explored in recent literature. Male teachers reported more positive attitudes towards AI than their female colleagues, aligning with Zhang et al. (2023), who found that female pre-service teachers experience higher anxiety negatively impacting their PEOU and usefulness of AI. However, this contrasts with Chou et al. (2024), who suggest female teachers may display greater awareness and acceptance of innovation, highlighting gender-related differences in professional receptivity. Other studies, including Al Darayseh (2023) and Galindo-Domínguez et al. (2024), found no significant gender effect on AI attitudes or usage intention, implying that gender impacts may be context-dependent. This diversity of findings indicates that interventions to promote AI adoption should consider gender-specific needs and experiences to be effective.

Our study further highlights academic qualification as a robust predictor of AI acceptance, diverging from Al Darayseh (2023). Teachers with higher academic credentials, such as master's degrees or doctorates, exhibited more favorable perceptions of AI's usefulness and ease of use, alongside stronger intentions to adopt AI. This suggests that greater academic exposure may foster openness to innovative technologies and confidence in leveraging them pedagogically. These findings emphasize the importance of designing differentiated professional development programs that accommodate varying academic backgrounds to ensure equitable AI adoption across educators.

Subject specialization also significantly influenced attitudes towards AI. Educators in humanities, special education, language and literature, and mathematics demonstrated more hesitation regarding AI integration compared to colleagues in informatics, foreign languages, and economics, who showed higher acceptance. This disciplinary divide aligns with Galindo-Domínguez et al. (2024), who observed that STEM educators are generally more open to AI than those in social sciences or arts. Conversely, Chou et al. (2024) found greater receptivity among teachers in social sciences and law, possibly due to the dynamic and evolving nature of these fields. Polak et al. (2022) noted that while disciplinary differences exist, they often do not drastically alter overall AI attitudes, with significant variations primarily among natural science educators due to their closer engagement with AI's theoretical and practical dimensions. These findings underscore the need for multifaceted strategies that address both technological fluency and pedagogical readiness tailored to subject-specific contexts.

An equally important contribution of this study is the influence of teachers' age and teaching experience on AI attitudes. Specifically, teachers over 60 and those aged 21-30 were less positive about AI adoption, while

the 31-60 age group exhibited the highest acceptance. This pattern partially contrasts with Galindo-Domínguez et al. (2024), who found no age effect on digital competence or AI attitudes, suggesting that contextual or cultural factors may mediate age-related differences. Regarding teaching experience, educators with over five years of service showed greater acceptance of AI, consistent with Chou et al. (2024), who reported that more experienced teachers tend to be more receptive to innovation. However, this contradicts findings from Al Darayseh (2023) and Galindo-Domínguez et al. (2024), who reported no significant link between teaching experience and attitudes towards AI. These mixed results highlight the complexity of how age and experience interact with technology acceptance and suggest that personalized support may be necessary to address the concerns of both early-career and experienced teachers.

Notably, this research uniquely underscores the role of school context in shaping perceptions. Kindergarten teachers demonstrated more resistance to AI adoption, while educators in special schools emphasized its benefits. Additionally, public school teachers expressed greater skepticism about AI's ease of use, possibly reflecting disparities in institutional resources and support, as suggested by Chou et al. (2024). These findings point to the necessity of tailored, context-sensitive professional development and infrastructure investment that address the diverse needs of different educational settings, fostering more equitable and effective AI integration.

The impact of ICT training emerged as a critical factor influencing AI acceptance. Participation in ICT training, especially at level A and level B certification, correlated positively with favorable attitudes, corroborating Galindo-Domínguez et al.'s (2024) emphasis on digital competence's importance regardless of demographic factors. This reinforces the pivotal role of continuous professional development in equipping teachers with the skills and confidence required to effectively utilize AI tools in education.

Finally, this study examined the predictive factors shaping teachers' intention to adopt AI. The findings indicate that teachers who are most willing to adopt AI in their teaching are those who recognize its usefulness, hold positive attitudes towards it, find it easy to use, and possess level A ICT certification. These results align with prior research identifying PU (Ayanwale et al., 2022; Zhang et al., 2023) and PEOU (Al Darayseh, 2023; Wang et al., 2021) as key predictors of AI adoption. Al Darayseh (2023) further explains that ease of use strengthens teachers' positive attitudes and their perception of AI's value, thereby increasing their willingness to integrate it. Similarly, Wang et al. (2021) emphasize that ease of integration fosters acceptance and usage behaviors. Additionally, Sanusi et al. (2024) stress the role of AI-focused training in boosting teachers' confidence, enabling more effective classroom implementation. Consistent with these insights, this study highlighted the importance of professional development programs designed to strengthen teacher confidence, which appears to be crucial for successful AI adoption in education.

CONCLUSION

Key Findings

This study contributes to the growing body of research on AI integration in K-12 education by examining Greek educators' attitudes, perceptions, and intentions regarding the adoption of AI tools. Overall, teachers demonstrate generally positive attitudes towards AI-enhanced instruction, suggesting a readiness to integrate these technologies when they demonstrably enhance instructional quality and student engagement. However, lower levels of PEOU reveal a gap between acceptance and practical readiness, underscoring the necessity of systematic professional development to strengthen educators' digital competence and self-efficacy.

The results also indicate that demographic factors significantly influence teachers' perceptions of AI. Male teachers, those with higher academic qualifications, and more experienced educators report more positive attitudes. Subject specialization plays a key role, with STEM and informatics teachers showing greater acceptance than those in humanities or other fields. Age differences also emerge, as teachers over 60 and those aged 21-30 report lower levels of acceptance. ICT training is positively associated with AI openness, while educational context matters. Kindergarten teachers show higher resistance, special education teachers report more benefits, and public school teachers are more skeptical of AI usability. Importantly, PU is the

strongest predictor of intention to adopt AI, underscoring the need to emphasize AI's practical classroom value.

Recommendations

To promote equitable and effective AI integration across educational contexts, professional development initiatives should be tailored to the diverse needs of educators. Early childhood teachers may benefit from introductory training that emphasizes simple, playful, and developmentally appropriate AI tools, whereas secondary educators may require more advanced, subject-specific training. Programs should be flexible, practice-based, and include opportunities for hands-on experimentation, lesson design, and peer collaboration. In addition, training should incorporate foundational AI concepts to demystify the technology and reduce resistance among teachers with limited digital experience.

Institutional support is equally critical. Schools should provide adequate resources, time allocation, and leadership commitment to sustain AI adoption. Consistent with previous research, context-sensitive and research-informed professional development improves teachers' capacity and willingness to integrate technology meaningfully. Investing in such initiatives will enhance instructional practices and better prepare schools for the rapidly evolving role of AI in education.

Limitations

This study represents an initial effort to examine the attitudes and perceptions of Greek primary and secondary school teachers regarding the use of AI in education. Several limitations should be acknowledged. First, the sample showed a gender imbalance, which may have influenced the findings and limited their generalizability. Second, the focus on primary and secondary educators excludes perspectives from higher education, potentially overlooking important differences across educational levels. Third, the study did not investigate socio-cultural factors—such as social relationships, cultural beliefs, and social pressure—which may meaningfully shape teachers' acceptance of and intention to use AI technologies.

Furthermore, the findings are situated within the specific educational and cultural context of Greece. Future research could explore the influence of broader cultural or contextual factors on teacher perceptions in other countries, enabling comparative analyses that may reveal similarities and differences in AI adoption across diverse educational systems.

Suggestions for Future Research

Building on the limitations identified, future research should aim to achieve a more balanced gender representation to provide a comprehensive understanding of teachers' attitudes and experiences. Expanding the scope to include educators from tertiary institutions would enhance generalizability and capture potential differences in AI adoption across educational levels.

Investigating socio-cultural and contextual influences—such as social norms, cultural beliefs, institutional expectations, and peer interactions—would provide deeper insights into the factors shaping teachers' acceptance and intention to use AI. Comparative studies across different countries or educational systems could further illuminate how cultural and contextual variables influence AI integration, offering valuable guidance for designing context-sensitive professional development courses.

Finally, incorporating students' perspectives on AI use in education could provide a more holistic view of AI integration, helping to align teacher practices with learner experiences and ensuring that AI applications meaningfully enhance teaching and learning outcomes.

collection of sensitive or personally identifiable information. All participant responses were saved and processed under strict conditions of anonymity to ensure privacy protection. Data were maintained within secure, password-protected digital environments, with access restricted exclusively to authorized members of the research team. At no point were any data that could permit the identification of participants disseminated or disclosed in any format.

AI statement: Authors confirm that the development of this article was performed without the assistance of generative AI or AI-based tools.

Declaration of interest: The authors declared no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

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