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Graduate-Level Training and Its Impact on Teachers' Use of AI Technologies In the Classroom

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Index Terms:

artificial intelligence, AI integration, graduate-level training, teaching practices, educational technology, teacher development

Abstract. Artificial Intelligence (AI) is rapidly transforming the educational landscape by enhancing instructional practices, supporting personalized learning, and improving teaching efficiency. As these technologies become increasingly integrated into classrooms, the role of teacher preparation—particularly through graduate-level training—has gained significant importance. This study examines the influence of graduate-level training on teachers' integration of Artificial Intelligence (AI) technologies in classroom instruction. A quantitative descriptive-correlational research design was employed, involving 30 teachers who were simultaneously engaged in graduate studies and active teaching. Data were collected using a structured questionnaire and analyzed through descriptive statistics, t-test, and Pearson's correlation coefficient. Findings revealed that teachers demonstrated a moderate level of AI integration, primarily utilizing AI tools for lesson planning and instructional support rather than for assessment or full classroom implementation. Innovative teaching practices and the perceived influence of graduate training were also rated at a moderate level. Teachers reported moderate challenges, particularly in terms of limited training opportunities, restricted access to AI technologies, and uncertainty regarding their effective use in instructional contexts. The results further indicated no significant difference in AI integration when teachers were grouped according to graduate level. However, a statistically significant moderate positive relationship was found between graduate-level training and AI integration, suggesting that advanced education enhances teachers' technological competence and confidence. The study concludes that while graduate-level training supports AI integration, effective implementation requires continuous professional development, access to resources, and strong institutional support.

Introduction

Artificial Intelligence (AI) is increasingly transforming education by enhancing teaching and learning processes through technologies such as intelligent tutoring systems and automated grading. These innovations support adaptive and personalized learning, allowing instruction to be tailored to individual students' needs (Alzakwani et al., 2025). Globally, there is a growing emphasis on integrating AI to improve instructional efficiency, promote student engagement, and provide real-time feedback that supports differentiated learning across educational levels (Tohănean et al., 2025). Teachers play a crucial role in this transformation as facilitators and assessors of learning; however, their readiness and consistent use of AI remain limited. This highlights the need for systematic professional development and advanced training to strengthen technological competencies and ensure the ethical and effective use of AI in education (Salas-Pilco et al., 2022).

In many countries, education systems, including the Department of Education in the Philippines, are pushing for digital transformation. They are keen to integrate new technologies into teaching to keep up with changing educational needs (Pratiwi et al., 2025). Graduate-level education programs are stepping up to the plate by boosting teachers' skills in pedagogy, technology, and research, so they are ready for these changes (Şimşek et al., 2025). However, the way AI is being integrate by teachers varies significantly. This inconsistency is often due to factors such as access to AI tools, level of support

from institutions, and availability of training opportunities (Alshammari et al., 2025; Traga Philippakos & Rocconi, 2025). Consequently, graduate-level education is becoming increasingly important in helping teachers feel prepared, confident, and capable of using AI effectively in their classrooms.

This study focuses on teachers who are simultaneously engaged in graduate-level education and active classroom teaching, examining how advanced academic training influences their integration of Artificial Intelligence (AI) technologies in instructional practice. Specifically, it investigates the extent to which graduate training affects teachers' use of AI tools, identifies the technologies most frequently utilized, and explores the challenges encountered in implementing AI in the classroom. By generating empirical evidence on the relationship between graduate-level training and AI integration, this study contributes to a deeper understanding of how professional development supports the effective and sustainable use of AI in education (Traga Philippakos & Rocconi, 2025).

Despite the increasing volume of research on AI in education, a significant gap remains in our understanding of how graduate-level training shapes teachers' actual use of AI technologies. Existing studies have largely focused on general technology integration and broad adoption factors, with limited attention to AI-specific applications in real-world classroom contexts. Furthermore, there is a lack of localized and comparative research examining teachers concurrently pursuing graduate studies while fulfilling teaching responsibilities. The extent to which advanced academic preparation influences teachers' confidence, readiness, and practical application of AI tools remains unexplored. To address these gaps, this study provides quantitative evidence of graduate-level training's role in enhancing AI integration among practicing teachers. By offering a more focused and context-specific analysis, the findings aim to inform educational policy, strengthen professional development programs, and support the design of targeted training initiatives that promote meaningful and effective AI use in teaching.

Research Questions

This study aims to examine the impact of graduate-level training on teachers' integration of Artificial Intelligence (AI) technologies in classroom instruction, focusing on their level of use, encountered challenges, and the relationship between training and AI integration. Specifically, it seeks to answer the following questions:

1. What is the demographic profile of the respondents in terms of age, gender, years of teaching, graduate level, and teaching level?
2. What is the level of teachers' AI integration in terms of:
   a. use of AI technologies,
   b. innovative teaching practices, and
   c. perceived influence of graduate-level training?
3. What challenges do teachers encounter in integrating AI technologies into classroom instruction?
4. Is there a significant difference in the level of AI integration when teachers are grouped according to their graduate level (Master's and Doctoral)?
5. Is there a significant relationship between graduate-level training and teachers' AI integration in classroom instruction?

Review Of Related Literature

Artificial Intelligence in Education (AI Integration in Teaching)

Artificial Intelligence (AI) in education is all about using technology to improve teaching and learning. These include machine learning algorithms, generative AI models, intelligent tutoring systems (ITS), adaptive learning platforms, and natural language processing tools. These AI systems work by analyzing data to tailor learning experiences, provide instant feedback, and automate tasks, which is changing the way education works and what it can achieve (Stošić et al., 2025). Educators often use AI tools, such as ChatGPT and similar chatbots, to help students grasp complex ideas, learn new languages, and conduct research by offering personalized explanations and boosting their engagement. AI grading systems take care of evaluate assignments and provide quick feedback, whereas adaptive learning platforms adjust content and pace based on students' performance and preferences. These platforms use intelligent tutoring systems to create personalized learning paths, which help improve knowledge retention and student satisfaction (Davar et al., 2025; Recalde Drouet et al., 2024; V. G & N. S., 2025). Integrating AI into teaching offers many exciting benefits. For example, AI can streamline lesson planning and content creation by efficiently generating educational materials. Its ability to personalize learning means that educators can better cater to diverse student needs, thereby promoting a more inclusive educational environment. AI tools also have the potential to boost student engagement by offering interactive, adaptive, and immersive learning experiences. In addition, AI tools have been shown to enhance students' critical thinking and problem-solving skills, particularly when they are integrated into classroom instruction (Anselmo et al., 2025). For instance, generative AI

can create simulations and interactive case studies and provide real-time adaptive feedback, which helps deepen understanding and create motivating learning environments (Gupta et al. 2024). However, the use of AI in education is not without its challenges. There are ethical concerns, such as biases in algorithms and data privacy issues, which can affect vulnerable students and erode their trust. The reliability of AI is crucial because errors can mislead students and compromise educational quality. Teachers might also be hesitant to embrace AI due to a lack of training, fear of job security, and general distrust of the technology. To fully harness AI's benefits of AI, it is important to implement thoughtful policies, provide ongoing training, and conduct ethical checks (Hussein et al., 2025; Reina-Parrado et al., 2025). Research has shown that AI can significantly enhance teaching and learning processes. Smart tutoring systems offer feedback that helps students improve, whereas adaptive platforms can identify learning patterns, predict potential issues, and provide timely assistance, all of which contribute to student success. Generative AI makes learning more engaging, accelerates skill acquisition, and boosts test scores, particularly in fields such as language and medical education. Experts suggest that AI should complement human-centered teaching to ensure that education is effective and equitable (Bidry et al., 2025; Recalde Drouet et al., 2024). Overall, although AI has the potential to personalize and enhance education, it also presents ethical and practical challenges, and its success depends on responsible use, inclusivity, transparency, and collaboration between educators and technology experts.

Graduate-Level Training and Teacher Professional Development

Graduate-level training is important for teachers because it helps them dive deeper into teaching methods, technology and research. Such training enhances teachers' ability to integrate technology into their lessons and teaching methods. Studies have shown that graduate courses are instrumental in helping teachers develop digital teaching materials, focusing on improving digital skills through frameworks such as SAMR (Tseng & Lin, 2025). Advanced training also equips teachers to conduct educational research, which is crucial for evidence-based teaching and fostering new ideas in the field of education. Continuous Professional Development (CPD) is a process in which teachers continually update their skills, often emphasizing technology and innovative teaching methods. The TPACK framework, which blends technology, teaching, and content knowledge, plays a significant role in CPD programs (Adipat et al., 2023). Research indicates that teachers with more education are generally more open to adopting new technologies. This openness stems from their exposure to digital tools and AI during graduate studies, which has proven to be beneficial in the classroom (Rowston et al., 2021). For instance, learning about technology in postgraduate training boosts teachers' confidence and skills, helping them transition from traditional teaching to a more technology-driven, student-centered approach. Studies have confirmed that professional training enhances teachers' confidence and proficiency in using technology. Teachers involved in blended learning and CPD programs tend to exhibit better skills in utilizing digital tools for teaching (Damrongpanit et al., 2023). However, challenges such as limited infrastructure and the need for ongoing support persist, underscoring the necessity of continued investment in teacher development. In conclusion, the combination of graduate education and CPD significantly enhances teachers' skills in teaching, technology, and research, enabling them to teach effectively and adapt to the demands of 21st-century education (Dinçer, 2024; Rukajat et al., 2023).

Technology Acceptance and Factors Influencing AI Adoption

The use of Artificial Intelligence (AI) in education has gained increasing attention, particularly in understanding how teachers adopt and utilize these technologies in instructional practices. Researchers have applied theoretical frameworks, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), to explain this phenomenon. TAM emphasizes two key factors—perceived usefulness and perceived ease of use—which influence teachers' attitudes toward AI integration, while additional factors such as motivation, confidence, and institutional support further explain their willingness to adopt AI in teaching (Hazzan-Bishara et al., 2025). Teachers are more likely to use AI when they perceive it as beneficial and easy to implement, particularly when it is supported by adequate resources, training, and clear institutional policies. School support, including professional development and technical assistance, plays a significant role in enhancing teachers' confidence and motivation to use technology. Moreover, teachers' awareness and readiness to implement AI—especially in alignment with institutional guidelines—are critical factors influencing successful integration into educational settings (Anselmo et al., 2026). Teachers' attitudes and confidence remain essential for both the initial adoption and sustained use of AI technology (Hazzan-Bishara et al., 2025). Despite its potential, teachers face several challenges in integrating AI into education, including insufficient training, limited access to technology, and a lack of time to learn new tools. Teachers may perceive AI as less useful if it requires significant time and effort to understand, while inadequate infrastructure, such as poor Internet connectivity and outdated hardware, further hinders effective implementation. Concerns related to data privacy and potential risks also contribute to hesitancy in adopting AI (Şimşek et al., 2025). Studies have also indicated that teachers' educational backgrounds and professional experiences influence their use of technology, with those having higher levels of education generally being more open to innovation owing to prior exposure to digital tools and AI. Similarly, novice teachers and pre-service educators are influenced by social factors, motivation, and self-confidence, which shape their willingness to use AI, while technological competence, adaptability, and professional skills further affect their perceptions and use of AI in educational contexts

(Rowston et al., 2021; Şimşek et al., 2025). Overall, the successful integration of AI depends on a combination of internal and external factors, including teachers' perceptions, psychological readiness, the institutional environment, and demographic characteristics. A comprehensive approach that integrates both motivation and support systems is essential for improving AI adoption in healthcare. Addressing these challenges requires targeted professional development, improved infrastructure, and the promotion of positive attitudes toward technology (Hazzan-Bishara et al., 2025). Furthermore, the integration of AI in education presents practical and systemic challenges, particularly in under-resourced schools, where access to reliable Internet and modern devices remains limited (Rony et al., 2025). Poor connectivity and outdated equipment make it difficult to implement AI effectively, while many teachers feel unprepared to use AI tools and require additional training to develop both technical and ethical competencies (Rony et al., 2025). Ethical concerns, including academic dishonesty and data privacy issues, further complicate AI integration, as students may misuse AI tools and teachers may struggle to ensure fair assessments (Alali & Wardat, 2024). Overreliance on AI may also reduce opportunities for critical thinking and meaningful human interaction, emphasizing the need to maintain human judgment and a pedagogical balance. In addition, a gap often exists between policy and practice, where well-designed AI initiatives are not fully implemented because of limited resources, insufficient training, and lack of institutional support. Addressing these issues requires context-specific and practical strategies, including targeted training programs that enhance both technical and ethical competencies, clear ethical guidelines and data privacy policies to build trust, equitable distribution of resources, and sustained investment in technological infrastructure (Plevris & Hosamo, 2025; Kim, 2025; Rony et al., 2025). Collaborative efforts among educators, policymakers, and technology experts are also essential to develop effective AI solutions tailored to diverse educational contexts and promote shared responsibility in the use of emerging technologies (Alali & Wardat, 2024).

Integrated Conceptual and Theoretical Mapping

The integrated conceptual and theoretical mapping of this study illustrates the relationship between graduate-level training and teachers' integration of AI technologies into classroom instruction, supported by the relevant theoretical frameworks. The model positions graduate-level training as a key input that influences teachers' use of AI technology, innovative teaching practices, and challenges encountered during implementation. These variables collectively shape the level of AI integration into teaching methods. The framework is grounded in the Technological Pedagogical Content Knowledge (TPACK) model, which emphasizes the importance of integrating technology, pedagogy, and content knowledge for effective teaching. In the context of this study, graduate-level training enhances teachers' technological and pedagogical competencies, enabling them to utilize AI tools more effectively in their instructional practices. This is further supported by the Technology Acceptance Model (TAM), which explains that teachers' adoption of AI is influenced by its perceived usefulness, ease of use, and their confidence in using technology. The findings of this study support the proposed framework, as graduate training was found to have a significant relationship with AI integration, indicating its role in improving teachers' readiness and confidence. However, the absence of a significant difference based on the graduate level suggests that training alone is insufficient and that other factors, such as access to resources, institutional support, and continuous professional development, play a critical role. Moreover, the presence of moderate challenges highlights the influence of external factors within the framework, reinforcing the idea that successful AI integration results from internal competencies and external support systems. Overall, conceptual and theoretical mapping provides a comprehensive understanding of how graduate-level training interacts with multiple variables to influence AI integration, aligning with the findings of this study and supporting its overall conclusions.

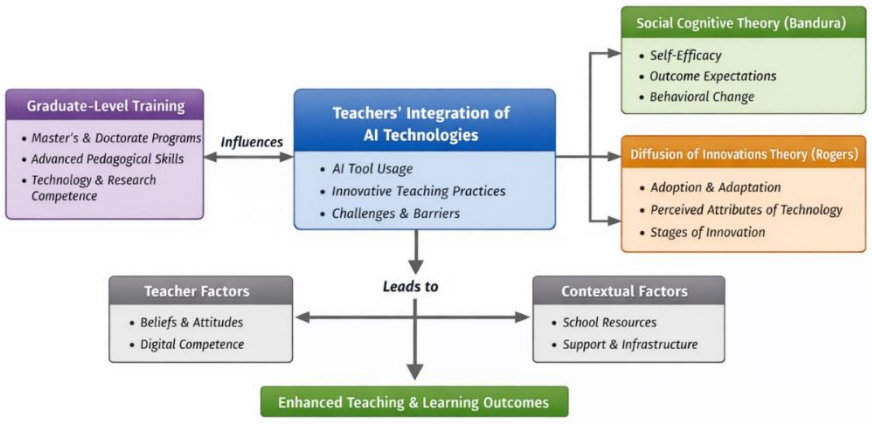

Figure 1. Framework Showing the Impact of Graduate-Level Training on Teachers' Integration of AI Technologies

Methodology

Research Design

This study employed a quantitative descriptive-correlational research design to examine the impact of graduate-level training on teachers' integration of AI technology into classroom instruction. A descriptive approach was used to assess the level of AI use, innovative teaching practices, and challenges, while a correlational approach was used to determine the relationship between graduate training and AI integration.

Respondents of the Study

The respondents of the study consisted of 30 graduate students who were currently teaching in the university. These participants were selected because they were engaged in both graduate-level education and actual classroom instruction, making them suitable for examining the influence of advanced training on AI use in education.

Sampling Technique

This study utilized purposive sampling, a non-probability sampling method in which respondents were selected based on specific criteria. Participants were required to be currently enrolled in a graduate program and actively teaching to ensure relevance to the research objectives.

Research Instrument

Data were collected using a structured questionnaire developed by the researchers. The instrument consisted of sections on demographic profiles, AI technology integration, innovative teaching practices, challenges in AI integration, and the influence of graduate training. Responses were measured using a 4-point Likert scale.

Data Gathering Procedure

The researchers secured permission before conducting the study and informed the respondents of its purpose. The questionnaire was distributed and collected after the completion of the survey. The responses were then checked, organized, and prepared for analysis.

Statistical Treatment of Data

Descriptive statistics, such as frequency, percentage, mean, and standard deviation, were used to summarize the data collected. Inferential statistics, including correlation and comparative tests, were used to examine the relationships and differences among the variables.

Ethical Considerations

Ethical standards were followed throughout this study. Participation was voluntary, and the respondents were informed of the purpose of the research. Confidentiality and anonymity were ensured, and all data were used strictly for academic research.

Results and Discussion

Demographic Profile of the Respondents

Variable	Category	Frequency	Percentage (%)
Age	20–29	10	33.33%
	30–39	10	33.33%
	40–49	10	33.33%
Gender	Male	15	50.00%
	Female	15	50.00%
	Prefer not to say	0	0.00%
Years in Teaching	1–5 years	4	13.33%

	6–15 years	16	53.33%
	15–20 years	7	23.33%
	21–25 years	3	10.00%
Graduate Level	Master's	15	50.00%
	Doctorate	15	50.00%
Teaching Level	Elementary	6	20.00%
	Junior High	13	43.33%
	Senior & Junior High	10	33.33%
	Elementary & Junior High	1	3.33%

Table 1. Demographic Profile of Respondents

The group of teachers surveyed was diverse in terms of age, gender, teaching experience, and level of education. Teachers were evenly split into three age groups: 20–29, 30–39, and 40–49, each comprising 33.33% of the group. This means that the study included the perspectives of teachers at different career stages. Gender-wise, there was an equal number of male and female teachers, each making up 50% of the group. This balance helps reduce gender bias in understanding AI use in teaching. Most teachers (53.33%) had 6–15 years of experience, showing that they were mid-career and likely to be open to new technologies. Smaller groups had 1–5 years (13.33%), 15–20 years (23.33%), and 21–25 years (10.00%) of experience, covering both new and highly experienced teachers. Half of the teachers are pursuing master's degrees, and the other half are pursuing doctoral degrees. This balance helps compare the effects of different education levels on AI use in teaching. Most teachers worked at the junior high school level (43.33%), followed by those teaching both senior and junior high schools (33.33%). Fewer teachers taught at the elementary level (20.00%), and very few taught both elementary and junior high schools (3.33%). This suggests that the study mainly reflects secondary education, where AI use may be more common. Overall, the teachers surveyed were well-suited to provide insights into how advanced education affects the use of AI in teaching.

Level of AI Integration, Innovative Teaching Practices, and Graduate Training Influence

Dimension	Mean	SD	Interpretation
Use of AI Technologies	2.93	0.52	Moderate
Innovative Teaching Practices	3.19	0.54	Moderate
Graduate Training Influence	3.15	0.53	Moderate
Overall Mean	**3.09**	**0.53**	**Moderate**

Table 2. AI Integration and Graduate Training Influence

Table 2 provides a snapshot of how AI is being integrated into teaching, alongside innovative teaching practices and the impact of graduate training on teachers' performance. Overall, AI is being used to some extent, but it is not yet a staple in everyday classroom activities, with a moderate average score (M = 3.09, SD = 0.53). When we break it down, innovative teaching practices lead the way with the highest average (M = 3.19, SD = 0.54), followed by graduate training (M = 3.15, SD = 0.53). Interestingly, the use of AI technology scored the lowest (M = 2.93, SD = 0.52), suggesting that teachers are more comfortable using AI to boost their teaching methods rather than applying it consistently across all teaching areas. This moderate level of AI use indicates that teachers mainly rely on AI to prepare lessons and support their instruction. This finding echoes Salas-Pilco et al. 's(2022) assertion that teachers are still honing their skills in AI integration and need ongoing professional development. Similarly, Hazzan-Bishara et al. (2025) noted that factors such as training, confidence, and institutional support play a role in teachers use of AI. Moreover, the moderate impact of graduate training implies that while advanced education boosts teachers' confidence and innovation in using AI, it might not yet offer enough practical experience. This aligns with Damrongpanit et al. (2023), who found that professional development enhances technical skills but must be continuous and hands-on to be truly effective.

Challenges Encountered in AI Integration

Statement	Mean	SD	Interpretation
I lack sufficient training in using AI tools.	2.73	0.74	Moderate
I have limited access to AI technology at my school.	2.60	0.50	Moderate
I am uncertain about the effective use of AI in teaching methods.	2.67	0.80	Moderate
AI tools are difficult to use in my teaching context.	1.73	0.69	Very Low
I am concerned about the reliability of AI tools.	2.80	0.48	Moderate

Overall Mean	**2.51**	**0.64**	**Moderate**

Table 3. Challenges in AI Integration

Table 3 delineates the challenges faced by educators in the integration of AI technology. The overall mean reflects a moderate level of challenge (M = 2.51, SD = 0.64), indicating that although educators utilize AI, they continue to encounter several obstacles. Among the indicators, concerns regarding reliability (M = 2.80, SD = 0.48), insufficient training (M = 2.73, SD = 0.74), uncertainty in AI utilization (M = 2.67, SD = 0.80), and restricted access to AI tools (M = 2.60, SD = 0.50) were all rated as moderate, highlighting the prevalent issues in the adoption of AI. Conversely, the difficulty of using AI tools was rated very low (M = 1.73, SD = 0.69), suggesting that educators generally find AI tools user-friendly. These findings align with Kim, J. (2025), who identified that educators' challenges are more associated with inadequate training and limited resources rather than technical complexity. Similarly, Rony et al. (2025) emphasized that a lack of infrastructure and access to AI tools significantly impedes educators' ability to effectively integrate AI. Overall, the results suggest that enhancing training programs, access to resources, and institutional support can mitigate these challenges and facilitate more effective AI integration into teaching practices.

Difference in AI Integration According to Graduate Level

Variable	Mean (Master's)	Mean (Doctorate)	t-value	p-value	Interpretation
AI Integration	**3.02**	**3.16**	**1.23**	**0.230**	**Not Significant**

Table 4. Difference in AI Integration Based on Graduate Level

Table 4 presents a comparative analysis of AI integration among educators pursuing master's and doctorate degrees. The findings indicate no statistically significant difference (t = 1.23, p = 0.230), suggesting that graduate education level does not substantially affect the degree of AI integration in teaching practices. This observation implies that both cohorts exhibit comparable levels of AI utilization, irrespective of their enrollment in master's or doctoral programs. These results align with Rowston et al. 's(2021) conclusion that technology integration is more significantly influenced by experience and exposure than by academic qualifications. Similarly, Şimşek et al. (2025) emphasized that motivation, training, and institutional support are more pivotal than formal educational attainment in the adoption of new technologies. Overall, the findings underscore that graduate level alone is not a decisive factor in AI integration, highlighting the critical role of practical training and support.

Relationship Between Graduate-Level Training and AI Integration

Variables	r-value	p-value	Interpretation
Graduate Training & AI Integration	**0.47**	**0.009**	**Significant (Moderate Positive Relationship)**

Table 5. Relationship Between Graduate Training and AI Integration

Table 5 shows the correlation between graduate training and AI integration in the classroom. The findings revealed a moderate positive correlation (r = 0.47, p = 0.009) that was statistically significant. This suggests that higher levels of graduate training are associated with increased AI technology utilization in educational settings. The positive correlation indicates that graduate education enhances teachers' confidence, skills, and preparedness to incorporate AI into classroom instruction. However, the moderate strength of this correlation implies that additional factors may influence AI integration in higher education. This conclusion is corroborated by Salas-Pilco et al. (2022), who highlighted the critical role of professional development in augmenting teachers' capacity to effectively employ AI. Hazzan-Bishara et al. (2025) observed that both internal (e.g., confidence and motivation) and external factors (e.g., support and access) affect AI adoption among educators.

Conclusion and Recommendations

This study concludes that graduate-level training plays a meaningful, though not exclusive, role in supporting teachers' integration of Artificial Intelligence (AI) technologies in classroom instruction. While teachers have demonstrated a growing capacity to utilize AI to enhance teaching practices, its overall integration remains in the developmental stage. The findings indicate that the effectiveness of AI use is not solely determined by the level of graduate education but is more strongly influenced by practical exposure, continuous professional development and access to appropriate technological resources. Although graduate education contributes to improving teachers' confidence and openness to innovation, it does not automatically result in the consistent or advanced application of AI in instructional settings. The presence of moderate challenges further highlights the influence of systemic factors, such as institutional support, infrastructure, and ongoing

training opportunities, on the successful integration of AI. These findings suggest that efforts to promote AI use in education should extend beyond formal academic preparation and emphasize sustained capacity-building initiatives, including hands-on training, improved access to digital tools, and development of supportive school environments. Strengthening these areas can significantly enhance teachers' ability to integrate AI technologies effectively, ultimately improving their teaching practices and their students' learning outcomes. However, this study is not without limitations, as the relatively small sample size of 30 respondents restricts the generalizability of the findings to a broader population. Thus, future research should involve larger and more diverse samples to validate and extend the findings of this study.

Recommendations

Based on the findings of this study, it is recommended that graduate-level programs strengthen the integration of AI-related competencies by incorporating more practical and hands-on experience in using AI tools for teaching. Educational institutions should provide continuous professional development programs focused on AI applications to enhance teachers' skills, confidence, and readiness for classroom integration. Schools should also improve access to technological resources, including reliable internet connectivity and AI-supported platforms, to facilitate effective implementation. Additionally, institutional support in the form of clear policies, technical assistance, and encouragement of innovative teaching practices should be reinforced to promote the sustained use of AI technologies. Guidelines for the ethical and responsible use of AI should be established to address concerns related to reliability, data privacy, and academic integrity issues. Finally, future researchers are encouraged to explore other factors influencing AI integration, such as teachers' attitudes, readiness, and organizational support, and to conduct studies with larger and more diverse samples to enhance the generalizability of their findings.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

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Appendices

No appendices are attached to this study.