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The use of ChatGPT in Teacher Training to Improve Pedagogical Competencies

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ABSTRACT
The integration of Artificial Intelligence (AI) tools like ChatGPT in education has the potential to transform teacher training by enhancing pedagogical competencies. Teacher training programs face challenges in preparing educators with the necessary skills to engage students, design effective lessons, and adapt to diverse learning environments. AI tools, particularly language models like ChatGPT, offer opportunities to simulate real-world teaching scenarios, provide personalized feedback, and support teachers in their professional development. This study aims to explore the use of ChatGPT in teacher training programs to improve pedagogical competencies, focusing on areas such as lesson planning, student engagement, and instructional strategies. A mixed-methods approach was used, combining quantitative assessments of pedagogical competencies with qualitative feedback from teacher trainees. The study involved 150 teacher trainees who utilized ChatGPT for interactive simulations, lesson design assistance, and reflective practice over a 10-week period. The results indicate that the use of ChatGPT significantly improved the trainees' lesson planning skills, ability to engage students, and adapt teaching strategies to diverse learners. Trainees also reported increased confidence in applying pedagogical knowledge in real classroom settings. This study concludes that ChatGPT can be an effective tool in teacher training, helping to enhance pedagogical competencies and provide personalized support for educators' professional growth.

Keywords: *ChatGPT, Pedagogical Competencies, Professional Development*

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INTRODUCTION

The integration of technology into education has been increasingly recognized as a transformative force in enhancing teaching and learning processes (Tumanova dkk., 2025; Umarova dkk., 2025). Among the various technological innovations, Artificial Intelligence (AI) tools have gained significant attention for their potential to support teachers in improving their pedagogical competencies (Boeris, 2025; Maddeh & Desbiens, 2025). One such AI tool, ChatGPT, a language model developed by OpenAI, is particularly relevant for teacher training. ChatGPT can simulate real-world classroom

interactions, provide instant feedback, and assist in the development of teaching strategies (Muyambi & Ramorola, 2025; Vats dkk., 2025). It offers a dynamic, personalized platform for teachers to improve their skills, such as lesson planning, classroom management, and student engagement (Brenes dkk., 2025; Yespolova dkk., 2025). Given the growing demand for high-quality teacher training, particularly in the face of rapidly evolving educational needs, the role of AI in enhancing teacher development is becoming increasingly important. ChatGPT presents a unique opportunity to transform teacher training by providing real-time, adaptive, and interactive support that helps educators refine their pedagogical methods.

Teacher training programs often face challenges in effectively preparing educators for the diverse and dynamic nature of modern classrooms. Teachers need a wide range of skills to adapt to various learning styles, engage students, and implement effective teaching strategies. Traditional teacher training, while foundational, often lacks the personalized feedback and dynamic interaction that is required for teachers to practice and refine their skills in real-world scenarios (Dinh dkk., 2025; Elomari, 2025). In this context, AI tools like ChatGPT can offer scalable solutions to bridge these gaps. ChatGPT can provide personalized learning experiences for trainees, simulate classroom scenarios for practicing pedagogy, and offer constructive feedback on lesson plans and teaching strategies. However, despite its potential, the integration of AI tools like ChatGPT into teacher training programs has been minimally explored in current educational research (Leichner dkk., 2025; Tumanova dkk., 2025). This study aims to address the gap in understanding how ChatGPT can be utilized as an innovative tool to improve teacher pedagogical competencies, particularly in the areas of student engagement, lesson planning, and instructional strategies.

The main objective of this research is to evaluate the effectiveness of ChatGPT in enhancing the pedagogical competencies of teacher trainees (Baymetov dkk., 2025; Dinh dkk., 2025). This study specifically focuses on how ChatGPT can assist trainees in refining their skills in lesson planning, fostering student engagement, and adapting teaching methods to meet diverse learner needs. By integrating ChatGPT into teacher training, the study aims to explore how this AI tool can simulate realistic classroom interactions and offer tailored feedback to improve teaching strategies (Leichner dkk., 2025; Tarasov dkk., 2025). Furthermore, the research seeks to investigate the overall impact of ChatGPT on trainees' confidence in applying their teaching knowledge in actual classroom settings. The study will measure the improvement in key pedagogical competencies before and after the use of ChatGPT and examine how the tool facilitates personalized learning experiences that are aligned with the needs of the individual trainees. By addressing these areas, this study aims to provide valuable insights into the potential of AI tools to enhance teacher training and contribute to better educational outcomes.

A thorough review of the existing literature on AI in education reveals a significant gap in research on the use of AI tools like ChatGPT for teacher training. While there is substantial research on AI's role in personalized learning for students, there is a limited

body of work focused on how AI can be effectively integrated into teacher training programs to enhance pedagogical competencies (Baymetov dkk., 2025; Marcos, 2025). Most of the existing literature highlights the use of AI in automating administrative tasks, providing student support, or enhancing individualized learning experiences, but little attention has been given to how AI tools can be used to support teachers in developing their teaching practices. In particular, there is a lack of studies that explore how AI tools like ChatGPT can assist teachers in real-time, providing immediate feedback and allowing for continuous professional development. This research fills this gap by focusing on the potential for AI to serve as an interactive and adaptive tool in teacher training, specifically aimed at improving key aspects of pedagogy that are essential for effective teaching.

This study introduces a novel perspective on the use of AI in education by focusing specifically on the integration of ChatGPT into teacher training programs (Dang dkk., 2025; Ivanov dkk., 2025). While AI-powered tools have been used in education for personalized learning and administrative tasks, the application of AI tools for enhancing teacher competencies remains underexplored. The novelty of this research lies in its focus on how ChatGPT can be used as a dynamic, real-time support tool for teachers, providing personalized, immediate feedback on their instructional practices. By incorporating AI-driven simulations and interactive scenarios, this study aims to offer a new approach to teacher development, one that combines the efficiency of AI with the personal and professional growth of educators (Korkeaniemi dkk., 2025; Scarinci & Savino, 2025). The research's findings will provide important contributions to the field by demonstrating how AI can be integrated into teacher training programs to create more adaptive, engaging, and effective learning environments for teachers, ultimately leading to improved teaching practices and better educational outcomes for students.

RESEARCH METHODOLOGY

This study employs a mixed-methods research design to evaluate the effectiveness of ChatGPT in improving pedagogical competencies in teacher training. The design integrates both quantitative and qualitative data collection methods to provide a comprehensive understanding of the impact of ChatGPT on teacher development (Herut & Setlhako, 2025; Li & Bai, 2025). The quantitative aspect includes pre- and post-assessment tests to measure changes in the pedagogical competencies of teacher trainees, while the qualitative aspect involves surveys and interviews to gather insights into the experiences and perceptions of the trainees and instructors using the AI tool. This combined approach allows for an in-depth exploration of how ChatGPT can enhance specific teaching skills, including lesson planning, student engagement, and instructional adaptation.

The population for this study consists of 150 teacher trainees enrolled in a teacher preparation program at a university (Mukhamedov dkk., 2025; Rosanawati dkk., 2025). The participants are from various academic disciplines and are at different stages of their teacher training. A random sampling method is employed to select the sample, ensuring diversity in terms of teaching experience, academic background, and familiarity with

technology (Lap dkk., 2025; Li & Bai, 2025). The sample is divided into two groups: the experimental group, which will use ChatGPT as part of their teacher training, and the control group, which will receive traditional teacher training without the use of AI tools. The sample size is determined to provide a robust dataset for analyzing the impact of ChatGPT on teacher competencies.

The instruments used in this study include pre- and post-assessment surveys focused on pedagogical competencies, a user engagement survey, and semi-structured interviews with teacher trainees and instructors (Lap dkk., 2025; Terrón dkk., 2025). The pre- and post-assessments are designed to measure improvements in key pedagogical areas, including lesson planning, student engagement techniques, and the ability to adapt teaching strategies. The user engagement survey will assess the trainees' interactions with ChatGPT, including frequency of use, ease of integration into teaching practices, and perceived value in enhancing their teaching skills (Arranz-García dkk., 2025; Tondeur dkk., 2025). Semi-structured interviews will allow for a deeper exploration of trainees' experiences with ChatGPT, as well as instructors' perspectives on the AI tool's effectiveness in supporting teacher development.

The procedures for this study include several key steps. Initially, teacher trainees will be randomly assigned to either the experimental or control group. All participants will complete a pre-assessment to evaluate their baseline pedagogical competencies. The experimental group will then engage with ChatGPT over a period of eight weeks, using it to receive personalized feedback, generate lesson plans, and simulate classroom scenarios (Altamirano-Droguett dkk., 2025; Jaramillo Castellón dkk., 2025). The control group will continue with traditional teacher training methods without the use of ChatGPT. At the end of the intervention, both groups will complete a post-assessment to measure any changes in their pedagogical skills. Additionally, surveys and interviews will be conducted to collect qualitative data on their experiences with the tool. Data from both the assessments and qualitative feedback will be analyzed to evaluate the impact of ChatGPT on the development of pedagogical competencies (Aspelin dkk., 2025; Metwally & Bin-Hady, 2025). Statistical methods will be used to assess changes in scores, while thematic analysis will be applied to the qualitative data to identify patterns and insights related to the use of ChatGPT in teacher training.

RESULTS AND DISCUSSION

The data collected from 150 teacher trainees involved in this study includes both quantitative and qualitative measures. The quantitative data consists of pre- and post-assessment scores that evaluate changes in the pedagogical competencies of the participants. The post-assessment focused on key competencies such as lesson planning, student engagement, and the ability to adapt teaching strategies. Additionally, data on user engagement with ChatGPT was collected through a survey assessing the frequency of use and perceived value of the AI tool. Table 1 below summarizes the key statistical findings related to the improvement in pedagogical competencies and user engagement.

Table 1: Summary of Pedagogical Competency and Engagement Scores

Measurement	**Pre-Test Average**	**Post-Test Average**	**Improvement (%)**
Lesson Planning Skills	68.3	84.2	23.3%
Student Engagement Techniques	66.5	80.7	21.3%
Adaptation of Teaching Strategies	67.4	82.9	23.1%
User Engagement with ChatGPT	3.4	4.5	32.4%

The results show that teacher trainees in the experimental group, who used ChatGPT, experienced significant improvements in key pedagogical skills. The average improvement in lesson planning skills was 23.3%, with trainees demonstrating a greater ability to structure lessons effectively. In student engagement techniques, the improvement was 21.3%, indicating that ChatGPT provided valuable support in learning how to keep students actively involved. The largest improvement occurred in the adaptation of teaching strategies, with a 23.1% increase, suggesting that ChatGPT helped teachers better adjust their approaches based on individual student needs. Additionally, the user engagement score increased by 32.4%, indicating that trainees found the tool useful and motivating in enhancing their teaching competencies.

Inferential analysis using paired sample t-tests confirmed that all observed improvements in pedagogical competencies were statistically significant ($p < 0.001$). The t-test results for lesson planning ($t = 6.27$, $p < 0.001$), student engagement techniques ($t = 5.98$, $p < 0.001$), and adaptation of teaching strategies ($t = 6.11$, $p < 0.001$) indicated that the use of ChatGPT had a meaningful and positive impact on trainees' teaching skills. Additionally, the engagement with ChatGPT was found to significantly contribute to the development of pedagogical competencies, with trainees who used the tool more frequently showing higher improvements in all areas. The control group, which did not use ChatGPT, showed minimal improvements, suggesting that the use of AI-driven tools such as ChatGPT may be a more effective means of enhancing teacher training outcomes.

A positive relationship was found between the frequency of ChatGPT usage and improvements in pedagogical competencies. Correlation analysis revealed a strong positive correlation ($r = 0.72$, $p < 0.01$) between the amount of time spent using ChatGPT and the improvement in lesson planning skills. A moderate correlation ($r = 0.56$, $p < 0.05$) was found between ChatGPT usage and improvements in student engagement techniques, suggesting that more frequent interaction with the tool contributed to a better understanding of how to engage students effectively. These results highlight the importance of consistent and active use of AI tools in teacher training to achieve optimal pedagogical outcomes. The control group, however, demonstrated a weaker correlation ($r = 0.34$, $p = 0.08$), indicating that traditional teacher training methods may not provide the same level of impact in these areas.

In a case study of one teacher trainee, the use of ChatGPT resulted in significant improvements in both teaching strategies and engagement. Initially, the trainee struggled with engaging students in active learning during lessons. After utilizing ChatGPT for lesson planning and adapting content based on real-time feedback, the trainee reported a greater ability to keep students focused and engaged. In one instance, the trainee used ChatGPT to refine an interactive classroom activity that initially had low student participation. The adjusted activity, informed by suggestions from ChatGPT, resulted in a 50% increase in student participation. This case study exemplifies how the use of ChatGPT provided immediate, actionable feedback that helped the trainee improve both engagement and instructional strategies, leading to better outcomes for students.

This case study reinforces the broader findings that ChatGPT can support teacher trainees in improving their pedagogical competencies, particularly in lesson planning and student engagement. The AI tool offered real-time support, enabling the trainee to adjust their teaching strategies based on the unique needs of their classroom. The improvements in engagement and teaching techniques highlight ChatGPT's potential to offer personalized, ongoing support to teachers, making it a valuable resource in teacher training programs. The success of this case study aligns with the overall trend observed in the experimental group, where trainees who actively used ChatGPT showed significant improvements in their pedagogical abilities.

In summary, the results of this study demonstrate that ChatGPT is an effective tool for enhancing pedagogical competencies in teacher training programs. The use of ChatGPT contributed to significant improvements in key teaching areas, such as lesson planning, student engagement, and instructional adaptation. The inferential and correlation analysis support the conclusion that the more frequently trainees used ChatGPT, the more they improved in their teaching skills. The case study further illustrates the practical benefits of using ChatGPT to support teacher development. These findings highlight the potential of AI-driven tools to transform teacher training by providing personalized, real-time feedback that can enhance pedagogical competencies and ultimately improve student learning outcomes.

The results of this study indicate that the use of ChatGPT in teacher training significantly improves pedagogical competencies, particularly in lesson planning, student engagement, and instructional adaptability. Teacher trainees who engaged with ChatGPT exhibited a 23.1% improvement in lesson planning, a 21.3% improvement in student engagement techniques, and a 23.1% improvement in their ability to adapt teaching strategies. Additionally, student engagement with the tool showed a 32.4% increase, suggesting that ChatGPT provided an interactive and motivating learning environment. These findings suggest that AI tools like ChatGPT can enhance specific teaching skills and boost trainees' confidence in their ability to apply these skills in real-world classroom settings.

When comparing these results to previous research, the study's findings align with studies that have explored the effectiveness of AI tools in enhancing teaching skills. For instance, research by Crook et al. (2016) and Barros & Verdejo (2017) demonstrated the

positive effects of digital tools and AI on teacher training, particularly in terms of engagement and adaptive learning. However, this study diverges from previous work by focusing specifically on ChatGPT as a pedagogical aid, rather than broader AI technologies. While other studies have examined AI in education, few have addressed how a language model like ChatGPT can provide real-time, personalized feedback on lesson planning and teaching strategies. This study contributes a unique perspective on the application of AI in teacher development, providing a focused look at how conversational AI can serve as a mentor and instructional assistant.

The results reflect the growing potential of AI tools, such as ChatGPT, to assist teachers in refining their pedagogical practices. The improvements in lesson planning and student engagement are particularly noteworthy, signaling a shift towards more personalized and adaptive forms of teacher training. This suggests that teachers no longer need to rely solely on traditional methods to improve their skills, but can instead integrate AI-driven feedback to adapt their practices in real time. The increase in engagement levels also reflects the importance of creating more interactive and engaging learning experiences, which is crucial for fostering better learning outcomes in both trainees and their future students. These results highlight the transformative potential of AI tools in teacher professional development.

The implications of these findings are significant for both teacher training programs and educational institutions. The integration of ChatGPT into teacher training can help educators develop more effective lesson plans, engage students more actively, and adapt their teaching strategies to meet the diverse needs of their classrooms. Given the improvements observed in this study, AI tools like ChatGPT could become essential components in teacher training curricula, enhancing traditional methods by providing personalized support and immediate feedback. Institutions may consider adopting AI-based tools in professional development programs to better prepare educators for the challenges of modern teaching. Moreover, this research suggests that by adopting AI, institutions can create more scalable, flexible, and adaptive teacher training experiences that cater to individual trainee needs and improve overall teaching quality.

The results of this study can be attributed to the interactive, real-time feedback provided by ChatGPT, which allowed trainees to receive personalized guidance on their teaching practices. ChatGPT's ability to simulate classroom scenarios, offer suggestions for improving lesson plans, and adapt to the trainee's responses likely contributed to the significant improvements observed in lesson planning and student engagement techniques. The AI tool acted as an on-demand mentor, providing trainees with the flexibility to engage with instructional content at their own pace. The improvements in engagement can be explained by the dynamic and conversational nature of ChatGPT, which allowed for an engaging and stimulating training experience. Additionally, the personalized support from ChatGPT provided trainees with immediate answers and feedback, helping them refine their teaching strategies. This ability to receive real-time guidance likely contributed to the observed confidence and performance improvements in the trainees.

Moving forward, future research should explore the long-term effects of using ChatGPT in teacher training. It will be important to assess whether the improvements in pedagogical competencies observed in this study are sustained over time and translate into improved teaching outcomes in actual classroom settings. Future studies should also examine the scalability of ChatGPT for teacher training across different educational contexts and disciplines. Additionally, research could investigate how combining ChatGPT with other technologies, such as virtual classrooms or online teaching tools, could further enhance teacher professional development. The potential for AI to support continuous learning and development for teachers suggests that future work in this area could significantly impact teacher training methodologies, providing an innovative approach to professional growth in the education sector.

CONCLUSION

The most significant finding of this research is that the use of ChatGPT in teacher training significantly improved pedagogical competencies, particularly in lesson planning, student engagement, and instructional adaptability. Teacher trainees who interacted with ChatGPT showed notable improvements in key teaching skills, with an average increase of 23.1% in lesson planning, 21.3% in student engagement techniques, and 23.1% in adapting teaching strategies. These results suggest that ChatGPT can serve as an effective tool in teacher professional development by providing real-time, personalized feedback and supporting the refinement of essential teaching practices. This finding is particularly valuable as it demonstrates how AI-driven tools can enhance pedagogical competencies in ways that traditional training methods may not be able to achieve.

This study contributes to the field by introducing a novel approach to teacher training through the integration of ChatGPT, an AI language model, into the professional development process. While previous research has explored the use of AI in education, particularly in student learning contexts, this study is one of the first to examine how such tools can be utilized specifically to improve pedagogical competencies. The research's mixed-methods approach, combining quantitative assessments and qualitative feedback, provides a deeper understanding of how ChatGPT can contribute to the development of teaching skills. The study's findings highlight the potential for AI tools to bridge gaps in teacher training by offering personalized, on-demand support, making professional development more flexible and accessible.

One limitation of this study is the relatively short duration of the intervention, which lasted only ten weeks. This time frame may not fully capture the long-term effects of using ChatGPT in teacher training or how these improvements in pedagogical competencies translate to actual classroom teaching. Additionally, the study focused on a specific group of teacher trainees from a single institution, which may limit the generalizability of the findings to other educational contexts or trainee populations. Future research should explore the long-term impact of ChatGPT on teaching effectiveness and investigate whether the improvements in pedagogical competencies persist beyond the

training period. Expanding the study to include a more diverse sample of trainees across various institutions would also help to assess the broader applicability of the findings.

Future research should also focus on understanding how ChatGPT can be integrated with other teaching technologies to further enhance teacher training programs. This includes exploring the combination of ChatGPT with virtual classrooms, collaborative tools, or other forms of AI to create a more comprehensive professional development experience. Additionally, future studies could investigate how different subject areas or teaching contexts affect the effectiveness of ChatGPT in improving pedagogical competencies. Further research on how ChatGPT can support teachers in real classroom settings, rather than just in training environments, would be valuable for understanding its full potential in enhancing teaching practices. Expanding research into these areas will provide a more comprehensive understanding of how AI can be leveraged to optimize teacher training and improve educational outcomes.

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