AI As a Co-Facilitator: Exploring Prompt- Based Learning in Teacher Education Classrooms

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ABSTRACT

The rapid integration of Artificial Intelligence (AI) in education signifies a paradigm shift in how teaching and learning are conceptualized, particularly in teacher education. This paper explores the role of AI as a co-facilitator in prompt-based learning environments within teacher preparation programs. Grounded in constructivist and connectivist theories, the study presents a conceptual framework highlighting human-AI collaboration, prompt engineering as a pedagogical tool, and the potential for enhanced personalization, critical thinking, and reflective practice. While AI enables differentiated instruction, streamlines administrative tasks, and supports the development of future-ready educators, its integration also raises concerns about ethics, over-reliance, and equity in access. The paper offers practical implications for curriculum design, professional development, and classroom implementation. It underscores the importance of developing AI literacy and ethical awareness among teacher educators and candidates. The findings call for continued research and innovation to leverage AI effectively in building adaptive, competent, and ethically grounded educators for the 21st century.

Keywords: Artificial Intelligence in Education, Teacher Education, Co-Facilitation, Prompt-Based Learning, Prompt Engineering, AI Literacy, Pedagogical Innovation, Human-AI Collaboration, Ethical Use of AI, 21st Century Skills.

INTRODUCTION

The educational landscape is undergoing a profound transformation, largely driven by the rapid advancements and integration of Artificial Intelligence (AI) technologies. This evolution is not merely about adopting new tools; it signifies a fundamental shift in pedagogical approaches, learning environments, and the very role of educators. AI, once a futuristic concept, is now an increasingly present reality in classrooms worldwide, offering unprecedented opportunities to personalize learning, automate administrative tasks, and provide immediate feedback to students. The potential of AI to revolutionize education is immense, promising more efficient, engaging, and equitable learning experiences for all.

However, amidst this technological surge, traditional teacher education models often struggle to keep pace. The preparation of future educators must evolve beyond conventional methodologies to equip them with the necessary skills and understanding to effectively navigate and leverage AI in their teaching practices. This necessitates a re- evaluation of how teachers are trained, moving towards models that embrace AI not as a replacement for human instruction, but as a powerful co-facilitator in the learning process.

This paper aims to explore the multifaceted role of AI as a co-facilitator within prompt-based learning environments specifically in teacher education classrooms. We will delve into how AI can support and enhance the pedagogical strategies employed by teacher educators, enabling them to foster deeper learning and critical

thinking among their teacher candidates. The focus will be on understanding the dynamics of human-AI collaboration, the significance of prompt engineering, and the broader implications for preparing a new generation of AI-literate educators.

Specifically, this research paper seeks to answer the following questions:

1. How can AI effectively serve as a co-facilitator in prompt-based learning environments for teacher education?

2. What are the pedagogical benefits and challenges of integrating AI as a co-facilitator in teacher education classrooms?

3. How does prompt engineering influence the effectiveness of AI as a co-facilitator in teacher education?

The significance of this study lies in its contribution to the burgeoning fields of teacher education and AI in education. By examining the practical applications and theoretical underpinnings of AI as a co-facilitator in prompt-based learning, this paper aims to provide valuable insights for curriculum developers, teacher educators, and policymakers.

Ultimately, this research seeks to inform the development of innovative pedagogical practices that harness the power of AI to prepare highly competent and adaptable educators for the 21st century classroom.

LITERATURE REVIEW

Artificial Intelligence (AI) in education encompasses a broad range of technologies designed to enhance teaching, learning, and administrative processes. Historically, AI's presence in education can be traced back to early intelligent tutoring systems and adaptive learning platforms. Today, the landscape has expanded significantly to include conversational AI, AI- driven assessment tools, immersive technologies, and learning analytics (Tan et al., 2024). These applications aim to personalize learning experiences, provide immediate feedback, and automate routine tasks, thereby freeing up educators to focus on higher-order pedagogical activities.

The integration of AI into educational settings is fundamentally reshaping the role of teachers, shifting them from sole knowledge providers to facilitators of learning. This transformation is particularly evident in the concept of AI as a co-teacher or co-facilitator, where AI tools work alongside human educators to enhance the learning process (EFLCafe.net, 2024; Integra, 2023; Getting Smart, 2025). AI's capabilities in personalizing instruction and providing tailored feedback are well-documented (Edutopia, 2023; Martin, 2023). This collaborative model between humans and AI allows for a symbiotic relationship, leveraging the strengths of both. While AI excels at data processing, scalability, and providing immediate, data-driven insights, human teachers offer emotional support, interpret nuanced contexts, and foster interpersonal connections crucial for effective learning (EFLCafe.net, 2024). Research suggests that such collaboration can lead to more engaging lessons and crucial mentoring opportunities for students (World Economic Forum, 2025).

Prompt-based learning, particularly in the context of generative AI, refers to the pedagogical approach where learning is driven by carefully constructed prompts or queries given to AI systems. This approach emphasizes the critical skill of 'prompt engineering' – the ability to craft precise and thoughtful inputs to elicit effective and relevant outputs from AI tools (Montalvo, 2025; Mentimeter, 2024; CIDDL, 2025). Prompt engineering is not merely a technical skill; it represents a significant pedagogical shift that can enhance instruction, reduce teacher workload, and prepare students for future-ready learning (Montalvo, 2025). The pedagogical implications of prompt-based learning with AI are profound, fostering creativity, critical thinking, and learning autonomy (Qian, 2025). However, it also raises concerns about overreliance on AI and the potential outsourcing of critical cognitive and metacognitive skills (Qian, 2025).

The integration of AI into teacher education programs is becoming increasingly vital to prepare future educators for AI-integrated classrooms. Current trends show AI being used in teacher training for various purposes,

including lesson planning, resource creation, and feedback generation (MagicSchool.ai; Eduaide.ai). A systematic review by Tan et al. (2024) highlighted that while much research focuses on AI applications in teaching, there is a significant gap in studies exploring AI's role in enhancing teacher professional development. The benefits of AI integration in teacher education include supporting candidates' competency development, fostering critical thinking, creativity, and collaboration, and assisting in planning instruction and creating curricula (Alexandrowicz, 2024). However, challenges remain, such as ethical concerns regarding bias, privacy, and data security, and the need for robust AI literacy among teachers (Alexandrowicz, 2024). Developing AI literacy, which includes understanding how to use AI wisely, ethically, and creatively, is crucial for both current and future educators (Montalvo, 2025; ISTE, 2024).

Conceptual Framework

To understand the role of AI as a co-facilitator in prompt-based learning within teacher education, this paper draws upon a conceptual framework rooted in several key educational theories and emerging models of human-AI collaboration. This framework integrates learning theories that support prompt-based learning, frameworks for human-AI interaction, and the pedagogical implications of prompt engineering.

Learning Theories Supporting Prompt-Based Learning

- Prompt-based learning aligns well with constructivist and connectivist learning theories. Constructivism posits that learners actively construct their own understanding and knowledge through experiences and reflection. In a prompt-based environment, learners are not passive recipients of information but are actively engaged in constructing responses, solutions, or creative outputs based on the prompts provided. This active engagement, facilitated by AI, encourages deeper processing and personalized learning pathways. Connectivism, on the other hand, emphasizes learning as a process of connecting specialized information sets and the connections that enable us to learn more. AI, as a co- facilitator, can serve as a powerful node in this network, providing access to vast information, generating diverse perspectives, and helping learners make connections they might not have otherwise. The iterative nature of prompt engineering, where learners refine their prompts and analyze AI outputs, further reinforces these constructivist and connectivist principles.

Human-AI Collaboration Frameworks

- The conceptualization of AI as a co-facilitator necessitates an understanding of human-AI collaboration. This framework moves beyond AI as a mere tool and positions it as an active partner in the educational process. Models of shared control and symbiotic relationships are particularly relevant here. In a shared control model, both the human teacher and the AI system contribute to and influence the learning environment. The AI can handle routine tasks, provide data-driven insights, and generate diverse content, while the human teacher focuses on higher-order tasks such as fostering critical thinking, providing emotional support, and adapting to individual student needs. This symbiotic relationship allows each entity to leverage its unique strengths, leading to a more effective and dynamic learning experience. The goal is not for AI to replace the teacher, but to augment their capabilities, allowing them to focus on the uniquely human aspects of teaching and mentoring.

Prompt Engineering as a Pedagogical Tool

- Prompt engineering, often viewed as a technical skill, is re-conceptualized within this framework as a powerful pedagogical tool. It is not just about getting the right answer from an AI; it is about the cognitive process involved in formulating clear, precise, and effective questions. This process itself fosters critical thinking, problem-solving, and metacognitive awareness. When teacher candidates engage in prompt engineering, they are forced to articulate their learning objectives, consider different perspectives, and anticipate potential outcomes. This iterative process of refining prompts and evaluating AI-generated responses becomes a learning experience in itself, developing skills essential for future educators.

Furthermore, teaching prompt engineering to students empowers them to become active participants in their learning, fostering digital literacy and responsible AI use. The ability to effectively communicate with AI, to understand its limitations, and to critically evaluate its outputs are becoming indispensable skills for 21st-century learners and educators alike.

DISCUSSION

AI As a Co-Facilitator in Teacher Education Classrooms

The integration of AI as a co-facilitator in teacher education classrooms presents a transformative opportunity to enhance pedagogical practices and prepare future educators for the complexities of modern learning environments. This section discusses the pedagogical benefits, challenges, and practical implications of this integration.

Pedagogical Benefits

One of the most significant pedagogical benefits of AI as a co-facilitator is its capacity for enhanced personalization and differentiation in teacher training. AI tools can analyze individual learning styles, strengths, and weaknesses of teacher candidates, providing tailored resources, feedback, and learning pathways. This allows teacher educators to address diverse needs within their classrooms more effectively, ensuring that each candidate receives the support necessary for their professional development. For instance, AI can generate varied examples of lesson plans, differentiated instructional materials, or even simulated classroom scenarios, allowing candidates to practice and refine their skills in a safe and adaptive environment.
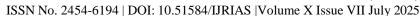
Furthermore, AI can streamline administrative tasks and significantly reduce teacher workload (Montalvo, 2025; Stanford Accelerator for Learning, 2023). By automating tasks such as drafting rubrics, generating assessments, and providing initial feedback on assignments, AI frees up valuable time for teacher educators. This reclaimed time can then be reallocated to more impactful activities, such as one-on-one mentoring, in-depth discussions, and fostering stronger relationships with their candidates. This efficiency not only improves the quality of instruction but also helps mitigate teacher burnout, a critical issue in the education sector.

AI, particularly through prompt engineering, also facilitates the development of critical thinking and problem-solving skills. When teacher candidates engage with AI by crafting precise prompts, they are compelled to think critically about their objectives, the information they seek, and how to evaluate the AI-generated responses. This iterative process of refining prompts and analyzing outputs cultivates higher-order thinking skills, essential for navigating complex educational challenges. Moreover, AI can present various solutions or perspectives to a given problem, encouraging candidates to analyze, compare, and synthesize information, thereby deepening their understanding and problem-solving abilities.

Finally, AI can facilitate reflective practice and self-directed learning for teacher candidates. AI-powered tools can provide immediate, objective feedback on teaching simulations, lesson plans, or even written reflections. This instant feedback loop allows candidates to identify areas for improvement, experiment with different approaches, and engage in continuous self-assessment. By prompting candidates to reflect on their practices and providing data-driven insights, AI empowers them to take greater ownership of their learning journey, fostering a mindset of continuous professional growth.

Challenges and Considerations

Despite the numerous benefits, the integration of AI as a co-facilitator is not without its challenges. Ethical concerns surrounding bias, privacy, and data security are paramount. AI models can perpetuate and even amplify existing biases present in their training data, leading to inequitable outcomes for certain student populations. Protecting sensitive student data and ensuring the responsible use of AI tools are critical considerations that require robust policies and ethical guidelines. Teacher education programs must address these issues explicitly, preparing candidates to critically evaluate AI tools and use them ethically.

Another significant concern is the potential for over-reliance on AI and the deskilling of teachers (Qian, 2025). If not implemented thoughtfully, AI could lead to a diminished emphasis on fundamental teaching skills, as educators might become overly dependent on AI for tasks they should master themselves. The goal is to augment human capabilities, not to replace them. Therefore, teacher education must focus on developing a nuanced understanding of when and how to best leverage AI, ensuring that human expertise remains at the core of the teaching profession.

The need for robust AI literacy and prompt engineering skills among teacher educators and candidates is also a considerable challenge. Many current educators may lack the necessary knowledge and skills to effectively integrate AI into their practice. Comprehensive professional development programs are essential to bridge this gap, focusing not only on the technical aspects of AI tools but also on the pedagogical principles behind their effective use. Without adequate training, the potential of AI as a co-facilitator may remain largely unrealized.

Finally, ensuring equitable access to AI tools and training is crucial. Disparities in access to technology and digital literacy can exacerbate existing educational inequalities. Teacher education programs must advocate for and implement strategies that ensure all teacher candidates, regardless of their background or institutional resources, have equal opportunities to engage with and learn from AI technologies.

Practical Implications for Teacher Education Programs

To effectively integrate AI as a co-facilitator, teacher education programs must consider several practical implications. Firstly, there is a clear need for curriculum integration of AI and prompt-based learning. This means embedding AI literacy, prompt engineering, and the ethical considerations of AI directly into core teacher education courses. Rather than treating AI as an add-on, it should be woven into the fabric of pedagogical training, demonstrating its relevance across various subject areas and teaching contexts.

Secondly, professional development for teacher educators is paramount. Those responsible for training future teachers must themselves be proficient in using AI as a co- facilitator and understand its pedagogical implications. Ongoing training, workshops, and collaborative learning opportunities can help teacher educators develop the necessary expertise and confidence to model effective AI integration for their candidates.

Lastly, programs should focus on designing effective prompt-based learning activities. This involves creating authentic learning experiences where teacher candidates can actively experiment with AI tools, formulate prompts, analyze outputs, and reflect on the process.
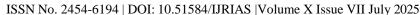
Such activities should be designed to foster creativity, critical thinking, and collaborative problem-solving, preparing candidates to confidently and competently use AI as a co- facilitator in their future classrooms.

CONCLUSION

This paper has explored the transformative potential of Artificial Intelligence as a co- facilitator in prompt-based learning within teacher education classrooms. The integration of AI is not merely a technological upgrade but a pedagogical paradigm shift that redefines the roles of both teachers and learners. By leveraging AI, teacher education programs can foster personalized learning experiences, reduce administrative burdens, cultivate critical thinking through prompt engineering, and promote reflective practice among teacher candidates.

The research indicates that AI, when used strategically, can significantly enhance the effectiveness and efficiency of teacher training. It allows for a more nuanced and individualized approach to professional development, preparing educators to navigate the complexities of 21st-century classrooms. However, realizing this potential requires careful consideration of the challenges, particularly ethical concerns related to bias and privacy, the risk of over-reliance on AI, and the critical need for comprehensive AI literacy and prompt engineering skills among all stakeholders.

While this paper provides a conceptual framework and discusses the benefits and challenges, it is important to acknowledge certain limitations. The rapid evolution of AI technology means that new tools and applications

are constantly emerging, necessitating continuous research and adaptation. Furthermore, the effectiveness of AI as a co-facilitator is highly dependent on the quality of prompts, the design of learning activities, and the pedagogical expertise of the human educator.

Future research should delve deeper into empirical studies examining the long-term impact of AI co-facilitation on teacher candidate performance and student outcomes. There is also a need for more case studies illustrating successful implementations of prompt-based learning with AI in diverse teacher education contexts. Further exploration into best practices for developing AI literacy and ethical guidelines for AI integration in teacher education is also crucial. By addressing these areas, we can ensure that AI truly serves as a powerful ally in preparing a new generation of highly skilled, adaptable, and ethically conscious educators.

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