INTEGRATING AI-POWERED TOOLS TO DEVELOP CRITICAL THINKING SKILLS IN PRE-SERVICE ENGLISH TEACHERS: CHALLENGES AND OPPORTUNITIES

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Annotation. The integration of AI-powered tools in teacher education is revolutionizing the way pre-service English teachers develop critical thinking skills. AI-driven applications such as intelligent tutoring systems, adaptive learning platforms, and automated feedback mechanisms provide personalized learning experiences that encourage analytical reasoning and problem-solving. This article examines the opportunities AI presents in fostering critical thinking, including real-time feedback, interactive discussions, and tailored learning pathways. However, it also addresses key challenges such as ethical concerns, algorithmic biases, and accessibility issues. The study highlights best practices for integrating AI effectively in teacher training programs, ensuring that it complements rather than replaces traditional pedagogical approaches. Findings suggest that while AI has immense potential to enhance critical thinking, its implementation must be carefully designed to maintain human-centered teaching values. The article concludes by discussing the implications of AI in shaping future educators' competencies and readiness for dynamic classroom environments.

Keywords: AI-powered tools, critical thinking, teacher education, pre-service teachers, adaptive learning, automated feedback, intelligent tutoring

Introduction. The rapid advancement of Artificial Intelligence (AI) has transformed various sectors, including education, where AI-powered tools are increasingly integrated into teaching and learning processes. In the context of teacher education, AI-driven technologies offer new opportunities to enhance the development of critical thinking skills among pre-service English teachers. Critical thinking is a fundamental competency for educators, enabling them to analyze, evaluate, and synthesize information effectively. As future English teachers navigate the complexities of language instruction, the ability to think critically is crucial for problem-solving, pedagogical decision-making, and fostering students' analytical skills. AI-powered tools, such as intelligent tutoring systems, adaptive learning platforms, and automated feedback mechanisms, provide innovative ways to cultivate critical thinking[1]. These

[1] Luckin R. (2018). Artificial Intelligence and the Future of Learning. London: UCL Press.

technologies enable personalized learning experiences, offering real-time feedback and data-driven insights that encourage deeper engagement with content.

AI-driven discussion forums and interactive simulations further support the development of analytical reasoning by presenting complex, real-world scenarios for pre-service teachers to explore. Despite the numerous benefits, integrating AI-powered tools into teacher education presents challenges, including ethical concerns, data privacy issues, algorithmic biases, and accessibility disparities. Additionally, there is an ongoing debate regarding the extent to which AI should complement traditional pedagogical methods rather than replace human interaction in teacher training programs. This article explores the role of AI-powered tools in developing critical thinking skills in pre-service English teachers. It examines the opportunities and challenges associated with AI integration in teacher education, highlighting best practices for leveraging technology to enhance future educators' cognitive and pedagogical competencies. The integration of AI-powered tools in teacher education offers innovative ways to enhance critical thinking skills in pre-service English teachers.

These technologies provide interactive learning experiences that encourage analytical reasoning, problem-solving, and pedagogical decision-making[2]. AI-driven applications, including intelligent tutoring systems, adaptive learning platforms, and automated feedback mechanisms, help pre-service teachers engage critically with language instruction and teaching methodologies. One of the most effective AI-powered technologies is intelligent tutoring systems (ITS). These systems offer personalized instruction by analyzing students' responses and tailoring lessons based on their needs. AI tutors, such as IBM Watson Tutor and Carnegie Learning, provide explanations, pose follow-up questions, and encourage critical engagement with linguistic and pedagogical content. Through ITS, pre-service teachers develop the ability to assess, interpret, and apply knowledge critically in teaching contexts. Another significant tool is automated feedback mechanisms.

Platforms like Grammarly, Turnitin, and OpenAI’s ChatGPT analyze written work and provide instant suggestions for improvement. This real-time feedback encourages learners to critically evaluate their writing, argumentation, and organization of ideas[3]. Such AI-driven feedback helps future educators refine their analytical skills and encourages them to assess language patterns critically, an essential skill for English teachers. Adaptive learning platforms such as Coursera, Duolingo, and Khan Academy

[2] Hwang G. J., Xie H., Wah B. W., Gašević D. (2020). Artificial Intelligence in Education: Advances and Future Trends. Computers & Education, 151, 103850.
[3] Holmes W., Bialik M., Fadel C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Boston: Center for Curriculum Redesign.

customize learning experiences based on individual progress. These platforms assess users' knowledge and adjust content difficulty accordingly, prompting deeper cognitive engagement. By challenging pre-service teachers to reflect on their learning processes and adapt their strategies, adaptive learning promotes metacognitive awareness and critical thinking. AI-powered discussion forums and chatbots further enhance critical thinking by facilitating interactive learning environments. AI moderates online discussions, highlights key arguments, and suggests thought-provoking questions to deepen engagement. In teacher education programs, these forums allow pre-service teachers to practice evaluating different pedagogical perspectives, fostering a habit of critical analysis.

Additionally, AI-driven simulation-based learning and virtual reality (VR) environments provide pre-service teachers with immersive experiences in real classroom scenarios. Platforms such as TeachLivE and Mursion use AI-generated avatars to simulate student-teacher interactions, helping educators practice decision-making, classroom management, and instructional strategies[4]. These tools enable pre-service teachers to engage critically with real-world teaching challenges in a controlled setting, preparing them for future classrooms. The incorporation of AI-powered tools into teacher education presents several opportunities for improving critical thinking skills in pre-service English teachers. One of the most significant advantages is personalized learning, where AI tailors content to individual needs, strengths, and weaknesses. This customization ensures that learners engage deeply with complex topics, promoting analytical and reflective thinking. Another opportunity lies in real-time assessment and feedback.

Traditional feedback methods often involve delays, limiting students' ability to make immediate corrections. AI-powered tools provide instant feedback, allowing learners to identify and rectify misconceptions promptly[5]. This immediate correction process fosters deeper understanding and encourages self-directed learning. Furthermore, AI can support data-driven decision-making in teacher education. AI-powered learning analytics track student progress, highlight learning gaps, and suggest areas for improvement. By analyzing patterns in student responses, pre-service teachers can better understand their own cognitive processes and refine their teaching strategies accordingly. The development of independent learning and self-regulation skills is another key benefit of AI-driven education. With AI acting as a mentor, students take greater responsibility for their learning, actively engaging in problem-solving and reflective practice. This independence is crucial for teachers, who must be able to think

[4] Schmid U., Klüber P., Girwidz R. (2021). AI and Teacher Education: A Systematic Review. Journal of Educational Technology & Society, 24(3), 1-14.
[5] Ng W. (2021). Emerging Technologies and Digital Learning: Towards Creative Pedagogies. Cham: Springer.

critically and adapt to different classroom scenarios. AI also enables collaborative learning opportunities.

Through AI-driven platforms, students can engage in peer discussions, share diverse perspectives, and receive constructive feedback. This collaborative approach enhances their ability to evaluate information critically and develop well-rounded arguments. Despite its many advantages, integrating AI-powered tools into teacher education is not without challenges. One of the most pressing concerns is ethical issues related to AI-generated content and data privacy. AI systems collect vast amounts of user data, raising concerns about how this data is stored, used, and protected. Teacher training institutions must establish strict guidelines to ensure responsible AI use and safeguard students' personal information. Another challenge is algorithmic bias, which can lead to unfair or misleading recommendations. AI models are trained on existing datasets, which may contain biases that affect their suggestions. If AI-generated feedback is flawed or biased, pre-service teachers may develop misconceptions rather than enhance their critical thinking skills. To mitigate this issue, AI tools must be continuously updated and monitored to ensure fairness and accuracy. Over-reliance on AI is another potential drawback.

While AI can assist in developing critical thinking, it should not replace human interaction in teacher education. Teaching is an inherently social profession that requires empathy, emotional intelligence, and interpersonal skills qualities that AI cannot fully replicate[6]. Therefore, AI should be used as a supplementary tool rather than a substitute for traditional teacher training methods. Furthermore, technological disparities and accessibility issues present significant challenges. Not all educational institutions have access to advanced AI-powered tools, leading to inequities in teacher training.

Institutions must ensure that AI technologies are accessible and affordable to all pre-service teachers, preventing a digital divide in education. Lastly, pedagogical alignment with AI technology must be carefully considered. AI tools should be integrated meaningfully into the curriculum to complement existing pedagogical approaches. Teacher educators must be trained to use AI effectively and guide students in leveraging AI tools for enhanced learning outcomes.

Conclusion. AI-powered tools have the potential to revolutionize teacher education by enhancing critical thinking skills in pre-service English teachers. Intelligent tutoring systems, adaptive learning platforms, automated feedback mechanisms, and AI-driven simulations provide opportunities for deeper cognitive engagement, problem-solving, and reflective practice. These technologies enable personalized learning experiences,

[6] Anderson T., Dron J. (2017). Teaching Crowds: Learning and Social Media. Edmonton: AU Press.

facilitate real-time feedback, and support data-driven decision-making, fostering independent and analytical thinking.

However, the integration of AI in teacher training comes with challenges, including ethical concerns, algorithmic biases, over-reliance on technology, and accessibility disparities. To maximize the benefits of AI in education, it is crucial to address these challenges through responsible AI use, continuous monitoring, and meaningful pedagogical integration.

By leveraging AI-powered tools effectively, teacher education programs can equip future English teachers with the critical thinking skills necessary to navigate the complexities of language instruction. As AI technology continues to evolve, it holds the promise of transforming teacher training and fostering a new generation of educators who are analytical, reflective, and adaptive in their teaching practices.

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