

Generative AI in Initial Teacher Education: Exploring the Alignment of Pre-Service Teachers and their Teacher Educators

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Abstract

The rapid advancement of Generative Artificial Intelligence (GAI), such as large language models and AI-driven educational tools, has begun to reshape teaching, learning, and assessment practices in higher education. Initial Teacher Education (ITE) occupies a critical position in this transformation, as pre-service teachers must develop both pedagogical competence and ethical, reflective engagement with emerging technologies. Simultaneously, teacher educators play a decisive role in shaping how future teachers perceive, adopt, and critically evaluate generative AI. This paper explores the alignment between pre-service teachers and their teacher educators in terms of awareness, attitudes, pedagogical use, and ethical understanding of generative AI in initial teacher education. Drawing on a review of contemporary literature, conceptual analysis, and emerging empirical trends, the study examines opportunities and tensions arising from generative AI integration in teacher preparation programs. The findings highlight partial alignment between pre-service teachers and teacher educators, characterized by shared recognition of AI's potential but differing levels of confidence, pedagogical readiness, and ethical clarity. The paper concludes with implications for curriculum design, professional development, policy, and future research, emphasizing the need for coherent institutional strategies to ensure responsible and pedagogically sound integration of generative AI in initial teacher education.

Keywords: Generative Artificial Intelligence, Initial Teacher Education, Pre-Service Teachers, Teacher Educators, Educational Technology, Digital Pedagogy

Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the twenty-first century, influencing diverse sectors including healthcare, finance, governance, and education. Within education, recent developments in generative AI—such as large language models, text-to-image generators, and adaptive tutoring systems—have intensified debates about teaching, learning, assessment, and academic integrity. Generative AI systems are capable of producing human-like text, images, lesson plans, assessments, and feedback, thereby redefining traditional roles of teachers and learners.

Initial Teacher Education (ITE) represents a crucial stage for engaging with generative AI, as it prepares future teachers to navigate complex classroom environments shaped by rapid technological change. Pre-service teachers are increasingly exposed to generative AI tools during their academic and personal

lives, often experimenting with them for lesson planning, assignments, and reflective tasks. At the same time, teacher educators—responsible for designing curricula, modeling pedagogical practices, and mentoring pre-service teachers—are confronted with the challenge of integrating generative AI in ways that are pedagogically meaningful, ethically responsible, and professionally relevant.

Despite growing interest in AI in education, questions remain regarding the degree of alignment between pre-service teachers and their teacher educators in understanding, attitudes, and pedagogical use of generative AI. Misalignment may result in confusion, inconsistent practices, or superficial adoption of AI tools, while alignment can foster critical engagement, innovation, and ethical awareness. This paper seeks to explore this alignment within the context of initial teacher education, examining how both groups perceive and engage with generative AI, and what this implies for the future of teacher preparation.

Conceptual Framework: Generative AI in Teacher Education

Generative AI refers to artificial intelligence systems capable of generating new content—such as text, images, audio, or code—based on patterns learned from large datasets. In education, generative AI applications include automated lesson planning, intelligent tutoring systems, formative feedback generation, assessment design, and personalized learning support.

In the context of teacher education, the integration of generative AI can be examined through several theoretical lenses. The Technological Pedagogical Content Knowledge (TPACK) framework emphasizes the interplay between content knowledge, pedagogical knowledge, and technological knowledge. Generative AI introduces new forms of technological knowledge that require careful pedagogical integration rather than mere technical proficiency. Similarly, the SAMR model (Substitution, Augmentation, Modification, Redefinition) provides a lens for understanding how AI tools can transform teaching practices beyond surface-level substitution.

Another relevant perspective is critical digital pedagogy, which foregrounds issues of power, ethics, equity, and agency in the use of educational technologies. From this standpoint, generative AI is not a neutral tool but a socio-technical system embedded with values, biases, and assumptions. Teacher education programs must therefore cultivate critical awareness among both pre-service teachers and teacher educators, enabling them to interrogate the implications of AI for knowledge production, assessment, and professional identity.

Review of Related Literature

Recent literature indicates growing interest in the use of AI in teacher education, though much of the research has focused on general educational contexts rather than generative AI specifically. Studies suggest that pre-service teachers generally hold positive attitudes toward educational technologies and demonstrate willingness to experiment with AI tools for instructional planning and learning support. However, their understanding of AI concepts, limitations, and ethical implications often remains superficial.

Teacher educators, on the other hand, tend to adopt a more cautious stance toward generative AI. While many acknowledge its potential to enhance efficiency and personalization, concerns persist regarding academic integrity, data privacy, bias, and the erosion of critical thinking skills. Research has also highlighted a lack of institutional support and professional development opportunities for teacher educators, which constrains their capacity to model effective AI integration.

Empirical studies reveal gaps between policy aspirations and classroom realities. While national and international frameworks increasingly emphasize digital competence and AI literacy for teachers, implementation within ITE programs remains uneven. This unevenness contributes to misalignment between pre-service teachers—who may be enthusiastic but underprepared—and teacher educators—who may be theoretically informed but practically constrained.

Alignment Between Pre-Service Teachers and Teacher Educators

Alignment in the context of generative AI refers to the degree of coherence between pre-service teachers and teacher educators in terms of knowledge, attitudes, pedagogical practices, and ethical orientations. Evidence suggests partial alignment across these dimensions.

Both groups generally recognize the inevitability of generative AI in education and acknowledge its potential benefits, such as reducing administrative workload, supporting differentiated instruction, and enhancing creativity. This shared recognition forms a foundation for alignment. However, differences emerge in depth of understanding and pedagogical application. Pre-service teachers often approach generative AI pragmatically, focusing on immediate utility and efficiency, while teacher educators emphasize critical evaluation, responsible use, and alignment with learning outcomes.

Pedagogically, misalignment is evident when generative AI is either implicitly discouraged or inconsistently addressed within coursework. Pre-service teachers may use AI tools informally without explicit guidance, whereas teacher educators may avoid integrating them due to uncertainty or ethical concerns. Such discrepancies highlight the need for explicit dialogue, shared frameworks, and co-constructed norms regarding AI use in teacher education.

Ethical and Professional Considerations

Ethical considerations are central to the integration of generative AI in initial teacher education. Key concerns include academic integrity, data privacy, algorithmic bias, transparency, and accountability. Pre-service teachers must learn to navigate these issues not only as students but also as future professionals responsible for safeguarding learners' rights and well-being.

Teacher educators play a critical role in modeling ethical AI practices, such as transparent disclosure of AI use, critical evaluation of outputs, and adherence to institutional guidelines. However, without clear policies and professional development, ethical guidance may remain fragmented. Alignment between pre-service teachers and teacher educators on ethical principles is essential for fostering trust, responsibility, and professional integrity in AI-enhanced educational environments.

Implications for Initial Teacher Education

The findings of this analysis suggest several implications for initial teacher education programs. First, curricula should explicitly address generative AI literacy, encompassing technical understanding, pedagogical application, and ethical reasoning. Second, teacher educators require sustained professional development opportunities to build confidence and competence in using and teaching with generative AI.

Third, assessment practices in ITE must be re-examined to account for the presence of generative AI, emphasizing process-oriented learning, critical reflection, and authentic tasks. Finally, institutional policies should promote coherent and transparent approaches to AI integration, reducing uncertainty and supporting alignment between stakeholders.

Conclusion

Generative AI presents both significant opportunities and complex challenges for initial teacher education. This paper has explored the alignment between pre-service teachers and their teacher educators, revealing areas of shared understanding as well as points of tension. While both groups recognize the transformative potential of generative AI, differences in confidence, pedagogical readiness, and ethical clarity underscore the need for deliberate and collaborative approaches to AI integration.

Achieving alignment requires more than individual initiative; it demands systemic support, curricular innovation, and ongoing dialogue within teacher education institutions. By fostering aligned, critical, and ethical engagement with generative AI, initial teacher education can prepare future teachers to navigate and shape AI-enhanced educational landscapes responsibly and effectively.

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