

14 - 16 August 2026

Berlin , Germany

Ethical and Context-Sensitive Use of Artificial Intelligence in Science Education

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Abstract

This study aims to examine the role of AI-assisted applications in science teacher education and the potential impact of this transformation on openness, accessibility, and academic equity in higher education. In recent years, the widespread adoption of AI-based tools in higher education has reshaped teaching-learning processes, offering new opportunities such as personalized learning, rapid feedback, and digital content creation, particularly in teacher training programs. However, discussions on the pedagogical, ethical, and socio-cultural dimensions of these technologies are gaining increasing importance. In this context, the study argues that AI-assisted science teaching is not merely a technological innovation; it is also a process that transforms the concepts of openness, access to information, and academic participation in higher education. Particularly with the acceleration of digitalization in European higher education systems, how AI tools are experienced in different socio-economic and cultural contexts has become a significant area of ??research. The study will examine the views of prospective science teachers on AI-assisted learning processes within the framework of accessibility, ethical use, academic credibility, and digital inequality. The research plans to utilize a mixed-methods approach, combining qualitative and quantitative data collection processes. The findings are expected to contribute to the development of digital openness policies in higher education, the creation of ethical frameworks for the integration of artificial intelligence in teacher training, and a better understanding of digital transformation processes in science education. Furthermore, the study aims to contribute to comparative discussions on the opportunities and risks that AI-assisted teacher training presents for the future of higher education systems in Europe.- The widespread adoption of artificial intelligence technologies in education is leading to significant transformations in teaching and learning processes. In particular, AI-supported applications in science education offer new opportunities in terms

of personalized learning environments, rapid feedback, digital content creation, and data-driven teaching processes. However, the use of artificial intelligence in educational settings is not only considered a technological innovation; it is also discussed in terms of its ethical, pedagogical, and socio-cultural dimensions. This study aims to examine the ethical and context-sensitive aspects of using artificial intelligence in science education. In this research, the effects of AI-supported learning applications on prospective science teachers are examined within the framework of academic integrity, data confidentiality, accessibility, digital inequality, and critical thinking. In particular, how AI tools are experienced in different socio-cultural and educational contexts and how these technologies affect equal opportunities in education has become an important research topic. This study discusses the contributions of artificial intelligence (AI) to students' learning processes in science education, as well as its ethical risks and pedagogical limitations. The research plans to utilize a mixed methods approach. In this context, quantitative data collection tools will be used to determine the views of prospective science teachers on the use of AI, along with qualitative data obtained from semi-structured interviews. The findings of this research are expected to contribute to the development of ethical approaches to AI integration in science education, support context-sensitive teaching practices, and a better understanding of digital transformation processes in higher education. Furthermore, the study aims to contribute to international discussions on the sustainable, accessible, and ethical use of AI in educational settings.

Keywords: Academic Integrity; Accessibility; Critical Thinking; Digital Inequality; Socio Cultural Context