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Introduction to the special issue on "Artificial Intelligence in Education"

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In recent years, artificial intelligence (AI) has transitioned from a niche technological innovation to a central component of educational discourse and practice. The advent of generative AI tools, such as ChatGPT, has sparked widespread interest and debate regarding their potential to transform teaching, learning, and assessment processes. These developments have catalysed a global conversation about the role of AI in education, encompassing its promises, challenges, and ethical implications.

This Special Issue of the Journal of Pedagogical Research is dedicated to exploring these multifaceted dimensions of AI integration in educational settings. Entitled "AI in Education", the issue compiles 13 peer-reviewed articles authored by researchers and educators from diverse geographical and cultural contexts, including Türkiye, Vietnam, Indonesia, Malaysia, Ghana, China, and the Philippines. These contributions examine AI's impact across various domains, such as language learning, teacher education, mathematics instruction, ethical awareness, student creativity, and systemic adoption models.

The collected works underscore the importance of critically engaging with AI technologies, not merely as tools to be adopted, but as catalysts prompting a re-evaluation of pedagogical approaches, curriculum design, and the broader objectives of education. The studies emphasise the significance of teacher self-efficacy, learner autonomy, digital literacy, and ethical considerations, highlighting that the successful integration of AI in education hinges on human agency, intentionality, and reflective practice.

The Evolving Landscape of AI in Education

The integration of AI into educational environments is occurring at an unprecedented pace, reshaping traditional pedagogical paradigms and institutional structures. Recent advancements in large language models (LLMs) have introduced new possibilities for personalized learning, automated feedback, and adaptive assessment. For instance, AI-powered tools are being utilized to provide instant feedback on student writing, support language acquisition, and facilitate differentiated instruction tailored to individual learner needs.

However, the rapid adoption of AI technologies also presents significant challenges. Concerns have been raised regarding data privacy, algorithmic bias, and the potential erosion of critical thinking skills due to overreliance on AI-generated content. Studies have highlighted the necessity for educators and students to develop AI literacy, encompassing not only technical proficiency but also an understanding of the ethical and societal implications of AI use in education.

Moreover, the equitable implementation of AI in education remains a pressing issue. Disparities in access to technology and digital infrastructure can exacerbate existing educational inequalities, underscoring the need for inclusive policies and practices that ensure all learners benefit from AI advancements. Research indicates that while AI has the potential to enhance educational outcomes,

its benefits are not uniformly distributed, necessitating deliberate efforts to bridge the digital divide.

In compiling this Special Issue, we sought contributions that address these complex dynamics, offering empirical insights and theoretical frameworks to navigate the evolving intersection of AI and education. The selected articles are organized thematically into four categories, each reflecting a critical area of inquiry in the current educational landscape.

1. AI and Learner Development: Creativity, Autonomy, and Confidence

Three papers explore how AI tools contribute to learners' creative, emotional, and self-regulatory capacities.

- **Kaşkaya and Ateş** investigate how AI-supported visualisation tools affect students' creative writing dispositions. Their mixed-methods study in primary education found that learners improved in fluency, emotional expression, and imaginative storytelling when using AI, aligning with broader findings that digital tools can enhance writing when used meaningfully.
- **Fitriati and Williyan** examine Indonesian EFL learners' experiences using AI to improve oral presentation skills. Their findings indicate that students used AI to refine pronunciation, strengthen vocabulary, and increase confidence—supporting autonomy in language learning.
- **Asare and Boateng** study pre-service mathematics teachers in Ghana using ChatGPT. They find that AI engagement strengthens self-efficacy through mediating mechanisms of self-awareness and self-regulated learning. These findings echo previous work suggesting AI can reinforce metacognitive development when embedded in reflective practice.

2. Emotional Responses, Digital Literacy, and Individual Differences

Understanding learners' psychological and emotional responses to AI is critical.

- **Asio and Sardina** explore the relationship between AI self-efficacy, anxiety, and gender. Using a moderated mediation model, they find that while self-competency mediates anxiety, gender does not significantly moderate the relationship. This nuanced understanding challenges stereotypical assumptions and aligns with broader research on digital confidence and inclusivity.
- **Le Thai Bao et al.** apply the UTAUT2 framework to study Vietnamese mathematics teachers' adoption of ChatGPT. Their findings show that performance expectancy and social influence are key drivers of intention, while gender influences perceived ease of use. The study underscores the importance of context-sensitive training.
- **Tsiani et al.** examine undergraduate and postgraduate education students' perceptions of generative AI tools in the Greek higher education context. Through a mixed-methods design, they reveal a generally cautious optimism among students, with perceptions closely tied to their digital literacy levels and prior exposure to AI applications. The study highlights the role of experience in shaping ethical awareness and pedagogical openness, suggesting that higher education institutions must take differentiated approaches when introducing AI literacy across student populations.

3. Teachers' AI Readiness and Pedagogical Integration

Several articles centre on the role of teachers in determining the success of AI integration.

- **Ismaniati et al.** use the TPACK model to examine how Indonesian teachers' pedagogical knowledge and self-efficacy influence their intention to use AI. They find that self-efficacy mediates the relationship between knowledge and adoption intent—highlighting the need to build both confidence and competence.
- **Pratiwi et al.** conduct qualitative research with 127 teachers and identify systemic barriers including poor infrastructure, low digital literacy, and concerns about over-reliance.

Teachers urge for professional development and contextualised guidelines to navigate AI's ethical dimensions.

- **Sari et al.** assess AI literacy among higher education students in Indonesia. Despite widespread access to devices, students lack critical understanding of AI use, bias, and ethical implications—revealing a gap between access and informed use.
- **Yanar and Ergene** contribute a study focused on pre-service mathematics teachers in Türkiye, investigating how they utilised ChatGPT to design 5E lesson plans. Using the instrumental genesis framework, the authors show how initial uses of AI—primarily for brainstorming and idea generation—evolved into more structured pedagogical applications, such as planning guided inquiry and conceptual understanding phases. Their findings demonstrate that with appropriate scaffolding, pre-service teachers can critically adapt generative AI tools into meaningful instructional design, supporting the broader call for AI integration in teacher education.

4. Evaluating AI Tools and Adoption Pathways

Three papers critically evaluate AI systems or explore adoption dynamics through empirical models.

- **Memiş** compares how ChatGPT-4, Gemini, and Copilot solve proportional reasoning tasks in mathematics. All tools produce some errors—echoing recent work on LLM hallucinations—raising concerns about their reliability for conceptual learning.
- **Doğan and Talan** provide a bibliometric analysis of AI in foreign language education from 2010–2023. They reveal growth in publications, dominant keywords, and collaboration networks, showing how research in this area is evolving—but also calling for greater focus on critical and ethical dimensions.
- **Han et al.** explore AI adoption in accounting education in China and Malaysia. Using the UTAUT model, they find that social influence and curriculum relevance are key predictors. They recommend stronger curriculum-industry links to prepare graduates for AI-augmented careers.

Conclusion

This Special Issue reflects a maturing yet still evolving field. While the use of AI in education is gaining momentum, the findings presented here highlight the importance of critical engagement, ethical framing, and inclusive design. Several cross-cutting themes emerge:

- **AI literacy and ethics must become foundational in education**, not optional add-ons.
- **Teachers remain central to AI's success**—not as passive adopters but as designers of human-AI pedagogical partnerships.
- **Digital equity must guide implementation**, especially in under-resourced contexts.
- **Research must move beyond tool-use studies** to understand AI's deeper cognitive, emotional, and cultural impacts.

We hope the contributions in this Special Issue serve to inform, inspire, and challenge educators, researchers, and policymakers working to integrate AI in ways that enhance, rather than erode, the human dimension of education.

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