



ARTIFICIAL INTELLIGENCE IN EDUCATION: TRANSFORMING THE LEARNING ENVIRONMENT

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ABSTRACT

Artificial Intelligence (AI) is quickly taking over in educational settings and is becoming a very crucial tool for both learners and educators. It completely transforms the learning process for students worldwide. This research paper examines how artificial intelligence (AI) plays a major role in the modern education system. This study explores how technologies assist with the learning environment while also considering the potential challenges, risks, and limitations of using these tools. The study collates information from other studies that provide evidence for the academic development of students and an increase in their drive towards academic success when AI is integrated into classrooms carefully and responsibly through self-paced or learner-centered learning and engaging tutoring systems. It was found that AI can help reduce the workload of educators by handling repetitive tasks and lesson planning. Alternatively, despite these opportunities, AI tools still face obstacles regarding educational integrity, limited teacher training, and the potential risk of excessive dependence on these tools. There is also the possibility of bias in the results given by AI, which may mislead some learners. Ultimately, AI provides powerful ways to support teachers and students, but its effectiveness relies heavily on mindful and principled use of its tools in educational environments.

KEYWORDS: Artificial Intelligence (AI), Personalized Learning, Educational Technology, Teacher Workload Reduction, Academic Integrity and Ethics, Adaptive Learning Systems

INTRODUCTION

Artificial Intelligence (AI) has consistently shown to be one of the most impactful tools ever developed. AI is being embedded into the lives of millions of people, rapidly evolving many aspects of modern society, and education is no exception. From adaptive personalized learning platforms to chatbots providing tutoring support, countless students around the world are using this technology. Supporters argue that AI can improve learning efficiency and transform how students learn altogether. On the other hand, critics raise concerns about data privacy, bias, and over-reliance on this technology.

While AI clearly offers significant

opportunities to enhance students' learning experience, its effectiveness depends on how responsibly students and teachers use its tools. It improves the learning experience only when students are taught how to use it critically, not passively, turning it into a tool for problem-solving rather than shortcut-taking. This ongoing debate raises an important question: Does artificial intelligence improve educational outcomes or raise more challenges?

LITERATURE REVIEW

Artificial intelligence is becoming a central part of education in many schools. From increased efficiency in teaching to greater student engagement, it has affected the learning environment in

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numerous positive ways. However, this technology also poses many problems, raising ethical and privacy concerns. This literature review examines the opportunities and challenges associated with the use of artificial intelligence in education, including systematic reviews and qualitative research from the last ten years.

Ng, Chan, & Lo (2025) researched opportunities, challenges, and school strategies for integrating generative AI (GenAI) in education. This qualitative study explored how schools integrate AI into education by interviewing 76 educators who gave personal thoughts and provided insights on the impact of integrating GenAI into learning environments. The study found that AI can enhance personalized learning, student engagement, and teaching efficiency. Furthermore, schools raise ethical concerns and policy gaps, highlighting the lack of training needed by teachers. However, the results of this study are based on interviews with only 76 educators in Canada and may not represent all schools that have integrated GenAI in classrooms.

Similarly, the empirical study conducted in Ghana by Henkel et al. (2024) explored the impact of an AI named Rori on secondary school students. Similar to the findings of the qualitative study, this study reported that AI can improve student engagement and personalized learning. On the other hand, the study also found that students had difficulty adapting to the new technology and highlighted the risk of students relying heavily on this technology. Similar to the study conducted by Ng, Chan, and Lo (2025), this study was also conducted in one country, which limits the generalizability of its findings.

Garzón, Patiño, & Marulanda (2025) conducted a systematic review of 155 peer-reviewed studies published between 2015 and 2025 to identify trends, benefits, and challenges associated with integrating artificial intelligence into educational environments. This review reported that artificial intelligence has greatly enhanced learning outcomes and increased efficiency for teachers. Likewise to the two studies mentioned above, this review also noted ethical concerns and over-reliance on artificial intelligence. All the sources above only show the short-term effects of integrating artificial intelligence in education, but

not the long-term impact on students.

METHODOLOGY

This paper adopts a qualitative, secondary research methodology to explore the integration of Artificial Intelligence (AI) in modern educational environments. Information was gathered from peer-reviewed journal articles, systematic reviews, and institutional publications between 2015 and 2025 using databases such as ScienceDirect, Google Scholar, and ResearchGate. The inclusion criteria focused on empirical studies and literature examining AI's role in adaptive learning, assessment automation, and student engagement. A thematic analysis approach was used to synthesize findings from diverse educational contexts, comparing AI applications across K–12 and higher education. Key themes, like personalized learning, teacher workload reduction, ethical risks, and dependency issues, were identified and critically analyzed. This approach allowed for a balanced examination of both the benefits and limitations of AI in the classroom.

A secondary research methodology is appropriate for this paper as it consolidates extensive existing literature across multiple disciplines. It enables a holistic understanding of how AI influences pedagogy, learning outcomes, and institutional practices without requiring experimental implementation.

RESULTS AND DISCUSSION

Benefits of Artificial Intelligence in Education

Across the world, artificial intelligence technologies are being integrated into classrooms to assist both students and teachers, and several benefits are being observed. From AI tutors and chatbots that can answer any questions or concerns a student might have outside of classroom hours to AI technologies that can grade assignments, manage attendance, and track progress, heavily reducing teachers' workload. One great example is the study on an AI-powered math tutor conducted in Ghana. The study involved 500 students from 11 of Rising Academies' schools in Ghana (Henkel, Horne-Robinson, Kozhakhmetova, & Lee, 2024) randomly split into control and treatment groups. The students in the treatment group were allowed to use a mobile phone for one hour every week. During this one hour, they were allowed to use an AI tutor named Rori to independently study

mathematics. The study concluded that the students in the treatment group had much greater growth scores than the students in the control group and that Rori was as effective as an additional year of schooling.

Another example is the systematic review of 155 peer-reviewed studies on artificial intelligence in education from 2015 to 2025. This review, conducted by Garzón, Patiño, and Marulanda, concluded that artificial intelligence technologies can greatly enhance student motivation and engagement by gamifying certain aspects of the learning process. Furthermore, they also reported that these technologies are making learning easier for students with special needs using adaptive personalized tutoring (Garzón et al., 2025).

Challenges and Limitations Concerning Artificial Intelligence in Education

Although artificial intelligence benefits learners and teachers in various ways, many challenges are also raised when utilizing AI technologies in a learning environment. Ng, Chan, and Lo (2025)'s qualitative study researched how schools are increasingly using generative AI in their classrooms. This study identifies many challenges, such as plagiarism and academic integrity. Additionally, the study raises concerns about students' data privacy and their over-reliance on this technology. Lastly, this study highlights the fact that most teachers are not able to use these technologies safely and effectively. This is why teachers may need special training (Ng, Chan, & Lo, 2025).

The Problem with Artificial Intelligence

Many critics may argue that even with careful and responsible use of artificial intelligence technologies, AI systems can sometimes mislead learners and may even create learning gaps, as these systems can provide biased, incomplete, and even inaccurate information. While it is true that AI can sometimes provide incorrect and biased results, these risks can easily be mitigated with proper guidance from teachers. Schools can combine these tools with the supervision of trained teachers. This means that educators can correct inaccuracies and contextualize information provided by the system. Therefore, using AI as a supplementary resource rather than a replacement can eliminate the risks associated with

potential inaccuracies in these systems.

CONCLUSION

Artificial intelligence has the potential to transform education, provide numerous opportunities like enhancing student engagement, personalized learning, and supporting educators in managing tasks. Studies show that tools, like generative and adaptive AI, enhanced learning outcomes in several schools. However, challenges like data privacy, over-reliance, and lack of teacher training remain. These challenges can easily be mitigated by using AI responsibly. While these tools provide a great amount of support, their true impact on learning relies heavily on how it is implemented in an educational setting.

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