

## **AI in Education: Transforming and Reshaping Pedagogy**

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### **ARTICLE INFORMATION**

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### **ABSTRACT**

The process of teaching and learning can be described as a transformation process of knowledge and skills from teachers to learners. In this process, educators and students become engaged in the transfer and acquisition of knowledge, skills, attitudes, and values. However, pedagogy, in the era of artificial intelligence, is undergoing significant transformation, with new opportunities and challenges for both educators and learners. Artificial intelligence (AI) has profoundly influenced pedagogy by evolving and reshaping it in several ways. It offers not only a wide range of opportunities and dynamic changes in pedagogy but also reshapes how education is delivered, personalized, and assessed. AI-based pedagogy and traditional pedagogy differ significantly in terms of instructional methods, adaptability, and student engagement. The Traditional Pedagogy often follows an approach, where the same material is taught to all students, regardless of individual differences. Teachers may adapt to student needs, though the process is manual and time-consuming. On the contrary, AI provides multimodal learning as well as integrating audio and videos that help to simulate real-life cross-cultural scenarios. It effectively helps learners to acquire desired competence in their learning and offers new ways to engage themselves. Furthermore, as AI can identify individual students' strengths and weaknesses, it efficiently adjusts educational content according to their needs, learning styles, and paces. This creates a more personalized and effective learning environment. In areas like arts, literature, and critical thinking, human creativity is sometimes replaced by AI but obviously over-reliance on technology should be avoided.

In the 21<sup>st</sup> century, the influence of artificial intelligence is rapidly transforming every field and education is no exception. As schools, universities, and almost all the educational institutions increasingly incorporate AI technologies, the landscape of teaching and learning is undergoing profound changes. At present there is no way to deny the widespread demand for artificial intelligence in educational sectors to develop teaching and learning process. This article explores the impact of AI on pedagogy, highlighting its benefits, challenges, and the future direction of educational practices.

Pedagogy refers to the methods, strategies, practices, and approaches that educators use to facilitate learning. It considers factors like teaching styles, the use of educational tools and technology, curriculum design, assessment strategies and the development of critical thinking and problem-solving skills in students. In essence, pedagogy is about how educators design and implement effective teaching practices that support diverse learners in their intellectual and emotional development. It encompasses everything from curriculum design to the relationship between teacher and student.

However, in its traditional form, pedagogy has focused on face-to-face instruction, teacher-centered learning and fixed educational models. In the traditional educational model, the lectures of teachers or instructors would be considered as the primary source of knowledge but recently the integration of AI into education introduces new dimensions to pedagogy. AI-driven systems—such as adaptive learning platforms, intelligent tutoring systems, and automated grading tools—are increasingly augmenting, and in some cases, replacing traditional teaching methods. In this context, teachers must not only consider how knowledge is delivered but also how technology can be leveraged to support diverse learning styles.

The rise of AI is driving a shift toward more personalized, data-driven, and interactive learning experiences. It is fundamentally reshaping the way we think about teaching and learning. However, as educators, students, and policymakers navigate this new educational landscape by using AI, what types of challenges they need to consider have been explored in this article.

In the ever-evolving landscape of education, artificial intelligence (AI) has become a transformative force day by day because it reshapes pedagogy in ways that were once the stuff of science fiction. From personalized learning experiences to data-driven insights and the automation of administrative tasks, AI is influencing how educators teach and how students learn. Today's students, unlike their predecessors, are immersed in a world where technology and the internet are interwoven. AI is revolutionizing education by reshaping traditional pedagogical methods and introducing new possibilities for teaching and learning. At present, it is clear that the integration of AI into the classroom is not just a passing trend but a fundamental shift in the way education is delivered, experienced and assessed.

Significant advantage of integrating artificial intelligence in education is assessing students' performance and its subsequent enhancement. In the last couple of decades, with the advancement of Artificial Intelligence it becomes possible to assess each individual student's performance in advance and to assure his or her chances of success or failure. AI's ability to analyze massive amounts of data and convert its findings into convenient visual formats can accelerate the decision-making process. Thus, enhancing the process of how teachers instruct and how the learners learn, AI technologies are rapidly reshaping pedagogical practices.

Teachers have always been at the heart of education. In traditional teaching process, teachers spend a significant amount of time on administrative tasks such as grading papers, tracking student progress, and managing schedules. This leaves less time for direct interaction with students. But AI modifies the way teachers work, particularly by automating many of the administrative tasks that consume valuable time. Moreover, by the help of AI-driven systems, teachers can offload routine tasks such as grading, attendance tracking, and even scheduling, allowing them to focus more on instruction and student engagement.

AI can automatically grade multiple-choice tests, assignments, quizzes, essays, and even code submissions, providing instant feedback to learners and tracking how well they are performing over time. At present, automated grading tools for multiple-choice questions and even essay evaluations save teachers' time. In traditional classrooms, grading can be a time-consuming and subjective process, often leaving students with limited opportunities for timely feedback. Since AI tools are capable of quickly grading assignments, quizzes, and even essays, this not only saves educators' countless hours but also enables students to learn from their mistakes in real-time.

Artificial intelligence has also the capacity to adapt the curriculum, based on the student's performance, identifying areas where the student is excelling or struggling. For example, if a student struggles with math concepts, the system can suggest additional resources or exercises tailored to that area. Overall, AI-driven systems can track student progress, attendance, and participation, enabling teachers to quickly identify which areas require attention.

No doubt AI has really expanded the boundaries of traditional learning. No longer is education restricted to just the classroom, textbooks, or face-to-face interactions. With AI, learning becomes personalized, self-paced, and accessible from anywhere. As resources like libraries and textbooks are valuable, they still have limitations in terms of availability and accessibility. AI facilitates learning beyond traditional classrooms. Virtual tutors, AI-driven simulations, and online courses make education more accessible, especially for students who reside in remote areas.

It is clear that the ability of AI to process vast amounts of data and adapt to individual learning needs is shaking the boundaries of traditional education, making learning more personalized and accessible. Furthermore, AI can also act as a teaching assistant, providing recommendations on lesson plans or offering resources tailored to the needs of the class. Thus, artificial intelligence is transforming the workplace and society, as this system takes on more complex cognitive tasks.

It is noted that from content delivery to assessment and classroom management, AI technologies are finding applications in many aspects of education. The integration of AI in pedagogy allows the collection and analysis of vast amounts of student data. These insights help educators make more informed decisions, optimize teaching strategies, and improve learning outcomes. Predictive analytics is the special area where AI excels. Thus, in the education sectors, AI tools directly help to increase the learning experience, making it more engaging, efficient, and accessible.

Moreover, AI enables highly personalized learning experiences by analyzing individual students' learning patterns, strengths, and weaknesses. Tools like adaptive learning platforms adjust the pace and difficulty of content to suit each learner's needs, ensuring better engagement and understanding. AI-powered tools like text-to-speech, speech-to-text, and translation services make education easy and accessible for learners. The technologies, like language translation tools, help weak students and non-native speakers to access into the education more easily. Microsoft's Immersive Reader is a free tool, which helps the students with dyslexia to improve reading and writing. This tool can assist students of all ages and abilities. Microsoft's Immersive Reader is designed to simplify web page layouts, to improve reading comprehension and to support new readers and language learners. Thus, AI contributes in various ways to the advancement of pedagogy.

Intelligent Tutoring Systems (ITS) provide personalized support, offering hints and explanations as students work through problems. An intelligent tutoring system (ITS) is a computer system that aims to provide immediate and customized instruction or feedback to learners, usually without requiring intervention from a human teacher.

Tools like ChatGPT and Jasper use AI to generate written content, creating practice exercises, summaries, and question banks. There are some programs such as Carnegie Learning's MATHia or Duolingo in language learning that offer immediate feedback, hints, and explanations based on a students' responses. MATHia is an adaptive math learning platform from Carnegie learning that uses AI. Squirrel AI and Carnegie Learning provide realtime feedback and personalized support to students, simulating one-on-one tutoring experiences. Furthermore, platforms like Canvas and Moodle use AI to analyze student data and make recommendations for content and activities suited to individual learning needs. Besides these, AI has also contributed to the rise of virtual and hybrid learning environments. AI technologies, such as augmented reality (AR) and virtual reality (VR), create immersive and interactive learning environments, making subjects more engaging and relatable.

AI powered virtual assistants are making their way into classrooms. Tools such as *Google Assistant* and *Amon Alexa* are increasingly used to answer questions, provide resources, or even facilitate learning activities. In more sophisticated uses, AI-based virtual assistants can track a student's learning journey over time and offer insights to both the learner and teacher about areas of strength and improvement. These assistants also provide an interactive experience, allowing students to learn in a more engaging and user-friendly manner. Furthermore, AI facilitates collaborative learning through tools that promote group projects and discussions. For instance, AI can group students based on complementary skills and learning styles, enhancing teamwork and peer learning. AI powered chatbots and assistants enable seamless communication among students by answering queries, moderating discussions, and keeping everyone on track. AI is capable to suggest relevant articles, videos and tools to group members, making collaboration more efficient.

Thus, reshaping pedagogy, enhancing personalized learning, and providing new tools for teachers and students, artificial intelligence is increasingly becoming a transformative force to open new doors in the field of education. With advancements in machine learning, natural language processing, and data analytics, AI is not only revolutionizing our teaching and learning processes but also providing unprecedented opportunities for improving educational outcomes.

However, the blessings of AI in pedagogy are vast and transformative, offering a wealth of opportunities to enhance the learning experience for both students and educators. AI tools are increasingly becoming a fixture in classrooms worldwide and educators are gaining unprecedented

opportunities to personalize learning, enhance teaching methods, and support students in ways previously unimaginable. From adaptive learning systems to AI-assisted assessments, AI is transforming the way we think about education, offering both challenges and opportunities for educators and students alike. This writing briefly depicts the role of AI in education, its potential benefits, challenges, and the future of AI-driven pedagogy.

Though AI provides numerous opportunities, it also presents challenges that require careful consideration. It is the demand of time now that teachers should integrate their professional development of teaching strategies to AI and should adapt to changing educational strategies. Now teachers should intentionally and effectively combine AI into their professional growth to enhance teaching effectiveness and to save time.

However, pedagogy, in the age of AI, is about striking a balance between the benefits of technology and the need to maintain human-centered education. AI makes the strategy of teaching and learning revolutionary but it should be integrated carefully and ethically. While AI tools can assist with generating ideas, sorting information, or creating outlines, the human touch in interpreting, synthesizing, and producing creative content remains crucial. Educators should guide students in using AI as a collaborative tool, not a replacement for creative and critical thinking.

Since AI offers some disadvantages, over-reliance on AI sometimes becomes alarming. Ultimately it reduces human communication. Excessive dependence on AI tools might reduce critical thinking, problem-solving skills, and human interaction in the learning process. Hence, these particular challenges require special attention. Artificial intelligence should be accommodated thoughtfully and ethically, ensuring that education remains inclusive, personalized, and focused on developing skilled individuals. In order to integrate AI effectively in education, educators should be trained in using AI technologies, which may be a hurdle for some institutions due to time, cost, or resistance to change. Furthermore, all AI tools are not equally effective, and the use of unvetted technologies may hinder learning outcomes or lead to misinformation.

One of the major disadvantages of AI in education is the issue of data privacy. AI systems often require vast amounts of personal data to function effectively, including students' academic records and even biometric information. While the potential benefits of AI in education are vast, there are important ethical and practical considerations to address. Issues such as data privacy, algorithmic bias, and the digital divide must be carefully managed to ensure that AI technologies are used responsibly and equitably. Governments and institutions should establish clear guidelines for using AI in education.

As AI continues to evolve, it is likely to further revolutionize educational practices and make learning more adaptable to individual needs. However, it is crucial that educators, policymakers, and technologists work together to address the ethical implications of these technologies, ensuring that AI benefits all students, regardless of their background or resources. Educators, policymakers, and technologists need to collaborate to create frameworks that ensure AI tools are transparent, fair, and accessible to all students, regardless of their socioeconomic background. It is also important to ensure that AI does not replace the human element in education but rather enhances the role of teachers in facilitating learning.

Artificial Intelligence may rapidly change the landscape of education, not only in terms of technological advancements but also in how pedagogy—the art and science of teaching—evolves, but AI's capabilities must be combined with the human touch to make education truly transformative. The future of education lies not in replacing teachers with machines but in creating a harmonious relationship between human expertise and AI-driven innovation. By combining the best of both worlds, we can build an educational system that is more inclusive, engaging, and effective for learners around the globe. As technology continues to evolve, the future of education is undoubtedly bright and obviously AI will play a central role in ensuring that it remains accessible, inclusive, and effective for all. Though AI's role in education is expanding rapidly and its impact on pedagogy cannot be denied, we must remember that the key to success will lie in ensuring that AI is used as a complement to traditional teaching methods, rather than as a

replacement for teachers. It should be ensured that AI is developed and deployed in ways that promote inclusivity, fairness, and access for all learners. The best education systems will find ways to balance AI with strong human relationships in the learning process. Artificial Intelligence has the potential to make education more personalized, efficient, and engaging, but its implementation must be carefully managed to avoid exacerbating inequalities or undermining the importance of human interaction in the learning process. Undoubtedly, AI can empower educators, engage students in new ways, and make education more accessible and equitable on a global scale, as long as it is developed and implemented thoughtfully and responsibly. Ultimately, by addressing the challenges and harnessing the power of AI responsibly, educators and policymakers can unlock its full potential to improve educational outcomes worldwide.

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