

The Role of Artificial Intelligence in Reshaping the Educational Environment

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Received: 02/09/2025

Accepted: 14/12/2025

published: 26/12/2025

Abstract:

The field of education has recently witnessed profound transformations due to the rapid development of artificial intelligence technologies. This requires understanding the nature of these transformations, analyzing their scope, and their impact on various elements of the educational process. This study aims to highlight the growing role of artificial intelligence in transforming the educational environment by reviewing the key concepts associated with it. The study then moves on to examine the opportunities offered by artificial intelligence in education. The study also addresses the shifting role of the teacher, who is no longer merely a transmitter of knowledge, but rather a leader and facilitator of the learning process. Furthermore, the study addresses the challenges that may hinder the optimal use of artificial intelligence in education. The study concludes with a future vision for the role of artificial intelligence in education, emphasizing the need to adopt flexible and comprehensive strategies that integrate modern technologies with the educational vision. The study concludes that artificial intelligence is not merely a facilitating tool, but rather an effective factor in shaping the future of education.

Keywords: Artificial Intelligence ; Educational Environment ; Educational Technology ; Teacher's Role , Future of Education .

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1.Introduction:

As the world continues to experience unprecedented technological advancements, artificial intelligence (AI) plays a vital role in many sectors, including education. AI is no longer limited to industrial or technical applications; it is increasingly integrated into educational settings, impacting everything from teaching strategies and assessment tools to the overall learning experience. This evolution calls for a critical reconsideration of the traditional roles of teachers and students, as well as the dynamics of their interactions inside and outside the classroom.

The increasing presence of AI in education raises important questions about its impact on the quality of learning, the extent to which its benefits can be harnessed, and how to ensure that its integration enhances, rather than undermines, the fundamental human and pedagogical nature of education. In light of this, this study aims to explore how AI is reshaping the educational landscape, identify the opportunities it presents, and examine the potential challenges associated with its increased use.

2. Basic Concepts of Study

This study is based on two fundamental concepts artificial intelligence and the learning environment, given their central role in defining the characteristics of the modern educational process.

1.2 . The Concept of Artificial Intelligence :

Artificial intelligence is rapidly evolving, playing a pivotal role in many fields, particularly education. It does not aim to replace humans, but rather to support them by enhancing their capabilities, increasing productivity, and helping achieve better educational outcomes (Mariyono, 2025).

Artificial Intelligence (AI) technologies are advanced analytical tools that effectively process massive amounts of data and extract patterns to improve educational practices. Therefore, mastering the fundamentals of AI, along with the ability to use its tools and applications, is a prerequisite for professionals in scientific research and higher education, rather than simply a complementary technical option (Holmes, Bialik, & Fadel, 2019) .

Today, AI technologies are contributing to the development of various fields by improving work efficiency and opening new avenues for collaboration. In the field of education, both the National Science and Technology Council and the AI Centennial Report emphasize the need for technical expertise to help formulate public policies that support innovation while maintaining public safety. AI-powered adaptive education systems, which deliver personalized educational content to each student, demonstrate the importance of raising awareness of AI from both a technical and human perspective (Mariyono, 2025) .

Artificial intelligence in education can be viewed as a combination of machine learning and deep learning technologies, employing big data to analyze learning and teaching methods.

This analysis is used to predict learning outcomes and more accurately understand learning patterns, helping to improve and direct the educational process to suit students' needs (Council of Europe, 2019) .

Artificial intelligence (AI) is a field that combines several sciences, theories, and technologies, aiming to simulate human cognitive abilities. This includes enabling machines to perform complex tasks previously within the capabilities of humans (Department of Industry, 2024). AI systems are often autonomous and learning-based, able to predict, make decisions, and provide recommendations that impact real or digital environments (Bellas, Guerreiro, & Naya, 2023). Artificial intelligence (AI) plays a broad role in education through concepts such as learning with AI and "readiness to engage with it, which together are known as AI in education (Council of Europe, 2019). These concepts include the use of AI tools to provide personalized learning, support distance learning, and implement interactive technologies that adapt to the needs of each learner.

Table 1. Techniques of AI Education.

Ai – related techniques
Adaptive learning method and personalised learning approach , academic analystics
Image recognition , computer – vision ,prediction system
Data mining or Bayesin Knowledge interference , intelligent teaching systems , learning analytics
Face recognition , speech recognition , virtual labs ,AR, VR, hearing and sensing technologies
Edge computing , virtual personalized assistants , real – time analysis

2.2. Understanding the Educational Environment :

Numerous studies have shown that school design plays a crucial role in students' behavior and academic performance. The physical factors of the educational environment effectively contribute to creating a stimulating and safe learning environment, which has a positive impact on students' psychological and cognitive well-being. Adopting sustainable design principles in schools and universities contributes to students' psychological and physical well-being and promotes long-term sustainable educational practices. This approach helps create healthy learning environments that balance educational performance with the preservation of environmental resources. This is achieved through the use of energy-efficient technologies, the use of environmentally friendly building materials, and the development of green spaces, thereby strengthening learners' environmental awareness and social responsibility (Ali Kashkul, Al-Hamdani, Al-Haboubi, & Al-Malik, 2024).

The educational environment is defined as the comprehensive framework that includes all the physical, social, psychological, and cultural elements that influence the teaching and learning process within an educational institution. This environment is not limited to the classroom

alone, but extends to include the relationships between students and teachers, teaching methods, educational resources, and even the institution's infrastructure (IERE, 2025) .

The educational environment can be considered an integrated system of educational and pedagogical factors and conditions that interact systematically, forming the structure within which the educational process unfolds. This system encompasses both the internal and external aspects of the educational context, making it the most important element influencing the quality of learning and its outcomes (Lodde O, 2021).

In light of modern trends in educational environment design, several of its key characteristics can be identified, including:

- Identifying students' interests, concerns, and individual abilities, allowing the educational process to be tailored to their innate abilities.
- Developing the creative aspects of the student's personality by taking into account the integration of their physical, cognitive, emotional, spiritual, moral, and personal abilities .
- Meeting the developmental needs of students by providing educational content and activities appropriate to their psychological characteristics, ages, and social situations .
- Implementing effective educational strategies and teaching methods, taking into account the physiological, psychological, and social development of students.

From this perspective, the learning environment is not limited to the organizational structure of the educational process alone, but rather is an educational reality that encompasses a set of educational and organizational conditions specifically designed to create a stimulating learning climate that enhances the development of students' personal skills and competencies and expands their opportunities for personal and creative growth (Lodde O, 2021).

3. Opportunities Offered by Artificial Intelligence in Education

Artificial intelligence offers valuable opportunities to develop and improve education. Not only does it offer diverse educational content, it also opens up new horizons, benefiting both students and teachers. Thanks to its diverse capabilities, AI opens up a wide range of opportunities, including :

1.3 Improving Learning Efficiency with Artificial Intelligence :

Artificial intelligence technologies have revolutionized the education sector, contributing significantly to improving learning outcomes by providing more effective, adaptive, and interactive learning experiences tailored to the needs of students. Unlike traditional teaching methods that often follow standardized patterns, AI technologies offer personalized learning solutions based on the analysis of student data and their learning behavior.

By tracking students' learning pace, interests, and level of understanding, AI systems can develop customized learning programs tailored to each student. This personalized approach to education not only improves the efficiency of the educational process, but also ensures a deeper understanding of concepts and provides students with more opportunities to progress academically in a flexible and supportive learning environment (Li & Jiang, 2024).

2.3 Improving Education Management :

The use of artificial intelligence technologies in education management has led to a qualitative shift in the efficiency and quality of administrative processes in educational institutions. Thanks to intelligent and automated management tools, these institutions can now more accurately and effectively organize and distribute resources, as well as support data-driven decision making and improve the overall efficiency of administrative tasks. This transformation contributes to the development of the education management system, making it more flexible and efficient (Jiang, 2024). The process of improving education management includes several aspects, such as strategic planning, analysis of educational data, and simplification of communication and decision-making processes within the institution .

3.3 Achieving Personalized Education :

Personalized education refers to adapting educational content and learning paths to suit each student's individual needs, while taking into account their interests and learning style. Smart technologies, particularly artificial intelligence, are powerful tools that contribute significantly to supporting this trend, providing extensive opportunities to deliver highly personalized learning experiences that adapt to the diversity and abilities of learners (Li & Jiang, 2024). Personalized education manifests itself in several aspects, including designing educational content tailored to the student's level, providing individualized educational recommendations, and using performance data to optimize the learning path for each individual learner.

4.3 Reducing Teachers' Workload :

The role of AI in education is not limited to providing personalized learning experiences for students, but also extends to supporting teachers by reducing their daily burdens. AI technologies enable the automation of many routine and repetitive tasks, contributing to reducing the time and effort spent on administrative and organizational aspects. These technologies also provide intelligent assistant tools that contribute to supporting the educational process, enabling teachers to focus more on pedagogical aspects, such as academic guidance and providing direct support to students (Jiang, 2024) .This workload reduction is evident in several areas, including assessment marking, lesson planning, and effective student performance analysis.

5.3 Promoting Educational Equity :

Achieving educational equity is one of the primary goals of modern education systems, which aim to provide equal educational opportunities for all students, regardless of their social or economic status. In this context, artificial intelligence plays an effective role in achieving this goal by providing equal educational resources and learning opportunities for different groups. AI also contributes to narrowing the educational gap between students and offers innovative solutions that promote more equal and inclusive education (Li & Jiang, 2024).

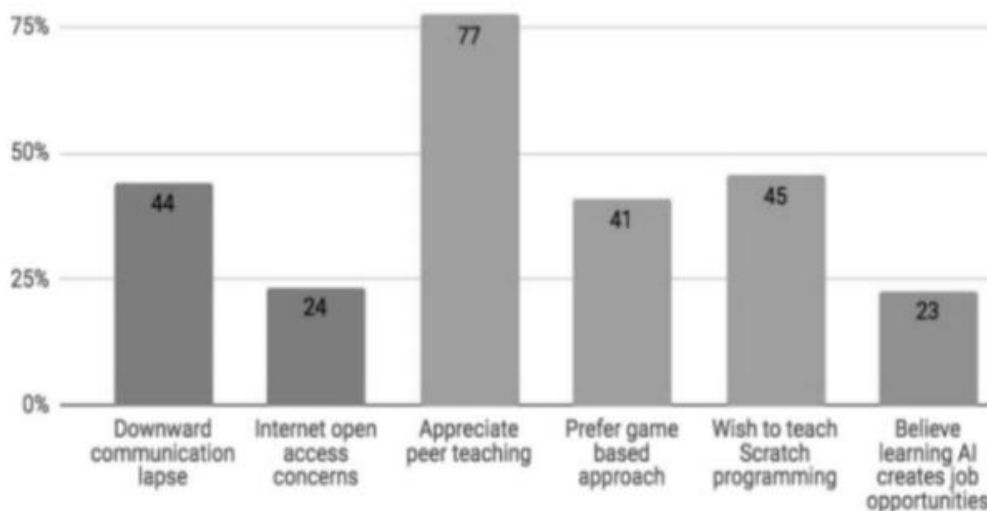
AI's contribution to educational equity is evident in many aspects, including improving access to educational content, providing personalized support for students with special needs, and enabling students from remote areas to receive an education of comparable quality to their peers in advanced educational institutions.

4. The Changing Role of Teachers in the Context of Artificial Intelligence

Artificial intelligence (AI) is a powerful tool for improving the educational process. It can expand access to learning opportunities and deliver personalized learning experiences tailored to each student's needs, helping to bridge educational gaps and enhance student engagement (Onesi, Yinka, & Oluwaseun, 2024). AI-powered adaptive learning systems rely on understanding individual learning styles and learners' progress and adapt content to these characteristics, leading to more effective learning experiences (Onesi, Yinka, & Oluwaseun, 2024).

By analyzing student performance data, these systems can build personalized learning paths that improve learning outcomes and support inclusive education. However, despite these benefits, a number of challenges remain that cannot be ignored, such as privacy issues, algorithmic bias, and the digital divide across communities. These challenges highlight the importance of applying AI technologies in education responsibly, with human oversight necessary to ensure their fair and safe use (Onesi, Yinka, & Oluwaseun, 2024).

Figure 1: : the role of artificial intelligence in teacher professional development



When AI is addressed seriously, this field could radically transform education worldwide. Investing in infrastructure development, providing appropriate teacher training, and ensuring equitable access to these technologies will help enable both students and teachers to succeed in a constantly evolving digital learning environment. To maximize the benefits of AI within the education system, well-thought-out public policies and effective teacher training programs are essential. These policies should focus on expanding access, encouraging the ethical use of technology, and building resilient and sustainable infrastructure (Al-Zyoud, 2020) . Investing

in teacher training is also essential, enabling teachers to understand and effectively use AI tools in the classroom, which will positively impact the quality of education.

For teachers to effectively manage AI-powered classrooms, they must be qualified and able to balance technology with traditional pedagogical methods. Teacher preparation programs should include content that introduces teachers to the basics of AI, focuses on the ethical aspects of its use, and provides practical training on how to integrate this technology into daily teaching (Jeong, 2020) . In this way, teachers will be able to leverage the capabilities of AI while maintaining the quality and core values of education.

Intelligent tutoring systems are one of the most important applications of artificial intelligence in the education sector, contributing to the delivery of educational content tailored to the individual needs of each student. These systems are characterized by their ability to explain concepts in a progressive and systematic manner, particularly in disciplines based on a clear logical sequence, such as mathematics and physics. This type of system also relies on a deep understanding of scientific subjects and the principles of effective teaching, allowing it to monitor student performance and identify weaknesses or misconceptions. Based on this information, the proposed educational path is reshaped, progressing from the easiest to the most difficult, taking into account individual differences. These systems also continuously adjust the level of difficulty and provide timely advice or tips, aimed at improving understanding and achieving concrete and effective learning results (Holmes, Bialik, & Fadel, 2019).

Intelligent transportation systems vary in form and function, but they often rely on the use of multiple AI models. These models are simplified mathematical representations of real-world facts and concepts, often expressed through semantic networks or knowledge graphs. In the educational context, intelligent transportation systems rely on models that represent different types of knowledge related to the learning process. A **domain model** generally represents knowledge related to the target subject, while a **pedagogical model** embodies effective teaching principles and strategies. A **learner model** reflects individual student characteristics, such as their level of understanding, thinking styles, and learning needs. By integrating these models, intelligent systems can provide a personalized learning experience that takes into account the subject content, appropriate teaching style, and learner characteristics, helping to improve learning quality and effectiveness (Holmes, Bialik, & Fadel, 2019).

Artificial intelligence has made significant advances in the field of education, particularly through its integration into smart, interactive online educational systems and the use of chatbots to perform specific educational tasks. These tools, whether operating independently or in collaboration with teachers, have contributed to improving the efficiency of the educational process. For example, they have facilitated various organizational tasks, such as grading and evaluating student activities, helping teachers improve the quality of their teaching and save time and effort (Al-Zyoud, 2020).

Furthermore, the flexibility of these AI-based systems has allowed them to adapt curricula and educational content to the diverse needs of learners, enhancing their ability to comprehend and follow through. This development has contributed to improving the overall learning experience and raising its quality, in line with modern developments. (Al-Zyoud, 2020) .

5. Challenges of Using Artificial Intelligence in Education

The world today is witnessing rapid transformations due to the continuous advancement of artificial intelligence technologies, which has become an influential element in various fields, especially in the education sector. This field is no longer limited to technology or programming alone, but has transcended that to become an essential part of the scientific research system and contemporary educational practice. Numerous studies have confirmed that the impact of artificial intelligence on education is expected to expand in the coming decades, which requires educational and academic institutions to keep pace with this change and build a solid understanding of the concepts and applications of artificial intelligence (Hutson & Jeevanjee, 2022).

In the educational context, it is advisable to simplify the concept of AI by considering it a natural extension of statistics and data analysis, as many of its algorithms, particularly in the fields of machine learning and deep learning, are based on precise mathematical and statistical principles. Therefore, possessing the necessary skills in data analysis and management is crucial for the effective and reliable use of AI in academia (Hutson & Jeevanjee, 2022) .

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1. Students' overreliance on AI tools for answers can undermine their critical thinking skills and their ability to analyze and solve problems independently.
2. Data privacy is a growing concern when using AI technologies, as users are sometimes unaware that the information they enter may be stored or transmitted to third parties. Due to the lack of transparency about how this data is processed, it

remains difficult to verify its security or determine who might use it for marketing or research purposes.

3. Educational institutions do not enforce strict data protection standards, including the use of strong passwords and storing information in a secure environment. To protect students' privacy, they should avoid entering their personal data into digital systems or instructions.

Generative AI is a recent innovation that has not yet been fully addressed by educational policies and legislation, opening the door to unregulated uses by teachers and students. Therefore, it is essential to approach this technology with awareness and consideration of several key ethical issues, including (UK International S, 2024):

- Assumption: AI systems may produce content that does not accurately reflect the diversity of social and cultural groups, perpetuating stereotypes or excluding certain groups.
- Lack of Adequate Training: Forcing AI tools on teachers or students without proper guidance and training may lead to misuse or misunderstanding of the role of these technologies in the educational process.
- Intellectual Property Violation: Some outputs may include texts or ideas from protected sources without prior documentation or licensing, exposing users to legal and ethical responsibilities.
- Plagiarism: Some students may submit AI-generated content as their own, raising questions about academic integrity.

6. The Future of Artificial Intelligence in Education

The shift from the traditional teacher-centered education model to one that places the student at the center of the learning process has become an urgent need. This integration of technology and education opens new horizons for more interactive and inclusive learning, meeting individual needs and expanding opportunities for academic success. Artificial intelligence plays an increasingly important role in this transformation through :

- The gradual transition from the traditional teacher-centered educational model to a student-centered model is a fundamental step that requires careful planning and systematic implementation. This transformation includes the need to integrate appropriate curricula and educational activities that stimulate student engagement and enhance their active role in the educational process.
- Artificial intelligence is expected to simplify educational processes by taking over routine and tedious manual work, paving the way for a radical technological transformation that can transform various aspects of our daily lives. This transformation is gaining popularity among industry experts and technologists, and there are clear signs that its practical applications are starting to materialize.
- The ability to predict a student's future performance, such as their upcoming exam results, is a critical factor in supporting their academic success. Monitoring attendance patterns and changes in attendance provides a deeper understanding of a student's behavior and level of commitment. Accurate answers to these questions provide an

important basis for evaluating academic progress and making decisions that support improved educational outcomes.

- Modern teaching methods are no longer limited by traditional frameworks. Instead, they have evolved to include advanced strategies based on the effective integration of technology and multimedia. The use of these media is a key tool for increasing students' engagement in the learning process and motivating them to learn independently according to their individual interests and abilities.
- Group projects and collaborative assignments in schools, along with academic research in higher education institutions, are pivotal elements of the educational process. These activities allow students to engage in self-directed learning, which contributes to the development of critical thinking skills and enhances their ability to analyze and gain knowledge independently.
- Teachers have essential responsibilities, including preparing lesson plans, selecting appropriate instructional strategies, implementing them effectively, and monitoring their results and evaluating their impact on student learning. These tasks require significant effort and ongoing time to ensure the efficient achievement of educational objectives (Ahmed, 2024) .

With the rapid spread of AI technologies in educational institutions, there is a need for a thoughtful approach to their use, combining the benefits of their advanced capabilities with the preservation of educational quality and ethical standards. Despite the promising potential of these technologies in supporting the educational process and developing teaching methods, educators and educational institutions should consider the following factors (Ahmed, 2024):

- The need to establish strict rules and regulations governing the use of AI, which will reduce the level of academic plagiarism in research and writing.
- The strategic use of technology in the educational process, without excluding human expertise, particularly in important aspects such as teaching and student interaction.
- Achieving an effective balance between AI and human intervention, recognizing the importance of their integration to achieve educational goals effectively and efficiently.
- Improving the competence of faculty and staff in using AI tools through professional development programs that enable them to use them productively and purposefully in academic contexts.
- Committing to using AI within the framework of applicable laws and regulations, taking into account ethical considerations, particularly those related to the privacy and protection of student data.

7. Conclusion:

In conclusion, this study demonstrates that artificial intelligence represents a paradigm shift in modern education. It is no longer just a technical tool; it has become an effective element in rethinking the educational process in all its aspects, from personalized learning to improving

the governance of educational institutions. This technology offers valuable opportunities to meet the individual needs of students, enhance positive interactions between teachers and students, and create a more diverse and inclusive learning environment.

However, there are undeniable challenges that require serious consideration, particularly the changing role of the teacher, which has increasingly focused on leadership and guidance. These challenges also include issues related to privacy, equal access to technology, and the ethical framework for using these tools. Finding a balanced solution to these challenges is critical to maintaining the quality of education and ensuring the effective use of artificial intelligence.

Amid the continuous development of artificial intelligence technologies, it is essential to adopt comprehensive educational strategies that balance technological development with the human dimension, and work to create a flexible and adaptive learning environment for the future. This also requires greater collaboration between various educational and technical organizations to ensure that smart applications integrate with educational goals, promote equality, and provide equal learning opportunities for all.

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