https://africanjournalofbiomedicalresearch.com/index.php/AJBR
Afr. J. Biomed. Res. Vol. 27(4s) (November 2024); 3671-3675
Research Article

Artificial Intelligence in Education: Current Scenario and What the future Entails

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Abstract
The introduction of Artificial Intelligence (AI) has revolutionised various fields including education. This review aims to explore the current scenario with respect to AI in education, its implications on the teaching and learning practices and also peeks into the challenges that comes along with this new venture. Several AI -driven tools are designed to play a major role in facilitating educational content between teachers and students by using virtual learning environments. They also assist in automated grading, profiling and are also equipped to manage administrative tasks. It focuses on a more student-centred learning experience by engaging the students without overwhelming them. The future of AI in education is likely to place greater emphasis on personalised learning experiences, where AI systems tailor educational content to individual learning styles and preferences more effectively. With thoughtful implementation and ongoing dialogue, AI can serve as a powerful tool that enriches the educational experience and prepares students for success in an increasingly complex world.

Keywords: Artificial Intelligence, Education, Personalized Learning, Teaching, Virtual Learning.

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Received: 30/10/2024 Accepted: 26/11/2024

DOI: https://doi.org/10.53555/AJBR.v27i4S.4282

1. INTRODUCTION

Artificial intelligence (AI) and education has made strides in the past few years. Over the last decade, the educational sector has undergone many changes due to advancements in technology. The global market for AI in education was valued at 1.82 billion dollars in 2021 and may increase substantially at a rate of 36% from 2022-2030(1). Since AI is slowly but surely becoming a valuable part of the educational sector, the people in this field have been looking into the teaching and learning processes using AI. However, the use of AI in education comes with its own set of challenges that require careful deliberation, including ethical concerns, technological barriers and implications for traditional teaching roles.
The aim of this review is to explore the current scenario of AI in education and asses the changes in the educational world brought by AI. Moreover, it strives to identify the main challenges associated with introducing AI in the educational field and to shed light on the future trends in this rapidly evolving field. It also provides insights into how educational institutions can effectively prepare for the future integration of AI, ensuring that these technologies are poised to improve educational outcomes while addressing the associated challenges.

1.1 Current Scenario of AI in Education

1.1.1 AI in Educational Administration

Institutions can employ AI tools for automating and streamlining administrative tasks. AI-driven systems can be used to perform tasks like admissions, scheduling and providing student support services. This will minimise the workload considerably. Similarly, AI-based chatbots can be used to provide students with real time support in order to navigate queries regarding admissions, registrations and other academic related enquiries. These chatbots provide support 24/7 which can be challenging for human staff (2).

1.1.2 Assessment and Feedback Mechanisms

Timely and personalised feedback are a major advantage of AI-driven educational systems. They include automated grading systems that can evaluate various types of student work, including objective type questions and problem sets. Automated grading by AI can significantly reduce the workload on teachers while grading objectively and consistently. A large volume of assessments can be assessed quickly and efficiently with immediate feedback (3). AI can also provide detailed insights into student performance by identifying patterns in student errors and offer tailored guidance on how to improve (4).

1.1.3 Profiling using AI

AI can also be used to improve class schedules by keeping in mind the student's preferences, availability of the faculty and classroom availability. This not only saves a lot of time for the teachers but also improves student satisfaction by making sure that classes are scheduled in a way that best meets the needs of all students (5). Data mining and analytics are used to develop AI applications that identify learner characteristics, empowers students to have more control over their education and help teachers to identify advanced and slow learners (1). Furthermore, institutional decision making also benefits from AI profiling. For example, predictive analytics powered by AI can help institutions in studying student enrolment trends, improve resource allocation and even identify students who may be at risk of dropping out, allowing timely interventions (3).

1.1.4 Teacher Roles

A major shift in teacher roles with the introduction of AI is the shift from mere content delivery to facilitating learning. Other tasks like grading can be assisted by AI, which allows the teachers to focus more on engaging with the students deeply and on an individual level. However, this shift requires teachers to develop new competencies, particularly in data analysis and technology integration (3,6). Teachers must be trained in using AI tools and how to interpret the data generated by these tools to reform their teaching practices(4).

1.1.5 Virtual Learning Environments (VLEs)

VLEs are online platforms that support content delivery and facilitate teacher-student interaction in a virtual setting. They generally include various AI-driven tools, like adaptive learning systems, virtual instructors and automated assessment tools.

The COVID-19 pandemic has accelerated the adoption of VLEs, like Google classrooms, making them essential for maintaining educational continuity. They were successful in providing flexible learning options that are tailor made for a student's individual needs. These environments proved especially useful for remote learning, allowing students to access high-quality education from anywhere in the world (7).

1.1.6 Learning management systems (LMS) are critical components of VLEs, that provides a centralised platform for managing and delivering content with the help of AI. They provide personalised learning, automate administrative tasks, and analyse student performance in real time providing a centralised platform for managing and delivering educational content. This can enhance the effectiveness of work done by both teachers and the student (4).

Several educational institutions around the globe have implemented online teaching platforms. One notable example is the use of AI in China's squirrel AI system, which provides personalised tutoring to millions of students in fields such as mathematics (2). It will assess the strength and weakness of a student and update the content based on the student's progress. The success of such AI systems in improving student outcomes has sparked interest in their adoption in other countries as well.

Similarly, the use of AI by the Pearson publishing company, which has developed an AI-driven companion that helps students throughout their academic journey has caught global attention (5). This AI tool provides a combination of career guidance as well as assistance in academic tasks. The widespread use of AI technology shows a shift towards a more student-centred and personalised learning experience in education (3,8).

1.1.7 Personalised Learning

Personalised learning is a game changing contribution of AI in education which the traditional classroom settings cannot offer. In a large classroom, with diverse needs of students, it is difficult for teachers to adapt to the different learning styles. But AI can rise to this challenge by providing personalised and tailored instructions based on their needs (9).

Intelligent tutoring systems (ITS) use AI tools to provide more personalised content delivery to students by accommodating their personal learning styles and pace(5,8). This means analysing a student's current level of understanding of the content and modifying the subsequent lessons to address the issues, which will improve the overall learning experience (2,10).

The designs of adaptive learning and personalised learning have evolved to become more interactive, and learner centred (1). It is driven by data collected to monitor the student's progress in real time and adjust the content delivery and difficulty level accordingly. It is possible to for AI to identify the areas where a student is struggling and focus on helping them better. This in turn will improve student outcomes as well as student engagement and ensures that they are not overwhelmed by the content (8).

Furthermore, personalised learning systems is able to adapt to different learning styles by presenting information in different formats like text, audio or video. This allows more flexibility for the students to learn in the way that best suits them, which can lead to better retention and understanding of the material (5).

1.1.8. Interactive Learning

Traditional methods of education included passive learning, where students relied on lectures or textbooks without much engagement in the content. However, AI-driven tools' goal is to enable more interactive and immersive learning experiences. Virtual reality (VR) and augmented reality (AR) allow students to learn about complex topics in a more hands-on manner (5). For instance, in science education, virtual experiments can be conducted using AI tools where the students don't have to worry about the risks associated with doing the same in a real-world setting. Similarly, augmented reality tool can be used in history classes where the students can explore ancient civilisations and interact with historical figures. This will promote a more engaging and memorable way of learning rather than receiving information passively (5). These technologies allow students to adopt complex concepts in a hands-on and interactive way, making learning more enjoyable and effective (7).

1.2 Challenges in implementing AI in education

1.2.1 Technological Challenges

Even though there are many advantages of AI in education, it comes with its own set of challenges. A major challenge is the technological infrastructure needed for the AI systems. This can be challenging for educational institutions, especially those in developing countries, lacking high speed internet, skilled personnel and computing systems inorder to integrate AI into education (3,10). A lot of money and time need to invested to make the AI software and hardware available, as well as, provide training for the teachers to effectively navigate AI in teaching(9). The cost of these investments can be restricting for many institutions, particularly those that are already operating on tight budgets and in rural areas.

1.2.2 Data Privacy

Concerns regarding data privacy while using AI in education are on the rise. Since, AI systems need large amounts of data for training and effective functioning which may include sensitive information about students like their academic marks and personal details, the need for data privacy and confidentiality is valid. One way to go about this is to allow transparency regarding the use of student data and also give control to the students over their personal information(5).

1.2.3 Bias in AI Algorithms

This is a significant concern in the deployment of AI in education. AI systems are often trained using large datasets, and if these datasets contain biased information, then the AI system may learn and replicate these biases in its decision-making processes. AI systems that have been trained on data where certain demographic groups consistently receive lower grades may continue to assess lower grades to their growth even if they are workers of the same quality as that of their peers(4). Addressing algorithmic bias is critical to ensuring that AI enhances rather than hinders educational equity(5).

1.2.4 Teacher Competencies

As AI becomes more integrated into education, the competencies of teachers must evolve to meet the demands of this new enhanced technology and learning environment. Teachers need to develop a range of new skills, including the ability to work with AI tools and interpret the data these tools generate.

Hence, there is a need for teachers to adopt a growth mindset embracing AI as a tool that can enhance their teaching rather than replace it, as teachers must be willing to continuously learn and adapt to new technologies to remain effective in an AI-enhanced educational landscape(4,6).

1.3 Future Trends in AI and Education

1.3.1 Technological Advances

As AI continues to evolve, several trends are anticipated to shape the future of education. One of the most significant trends is the development of more advanced adaptive learning systems. These systems can provide even more personalised learning experiences by using sophisticated AI algorithms to analyse a wider range of data, including not only academic performance but also factors such as student motivation, engagement and emotional state (3,11,12).

AI companions or virtual teaching assistance is garnering a lot of attention. They can provide continuous support to students, give personalised guidance and even suggest career paths based on the student's aptitude. This focuses on a more student-centred approach helping them prepare for the future(5,13).

In the long term, AI will most likely reform the traditional role of teachers and modify the structure of educational institutions. Since AI technologies are evolving, they can assist or even take up more responsibilities of teachers which includes grading, lesson planning and course delivery(8). This in turn can help teachers focus more on other aspects like mentoring students, facilitating critical thinking and creating innovative learning experiences(6).

But this also raises concerns about the role of teachers in a future educational system that is mostly AI-driven. Some of them include devaluation of teachers' role in the learning process. To avoid this risk, it is essential for institutions to ensure that AI is used as a supplementary tool that will complement a teacher's work and not replace them(2).

1.3.2 Institutional Strategies

For effective integration of AI into education, institutions have to develop strategies that will consider both the pros and cons associated with this technology. One of the main strategies is investing in professional development of educators so that they are equipped with the skills and knowledge required to use AI

effectively(3). Training on data interpretation generated by AI, incorporating AI-driven insights into lesson planning and handling the ethical and privacy concerns while using AI are some examples. Institutions can also collaborate with AI developers so that can make sure that the AI tools designed are centred around the needs of educators and students and are trained and validated properly. This collaborative approach can help ensure that AI is used in a way that enhances learning outcomes and supports the goals of education(5).

1.3.3 Policy and Governance

Along with institutional strategies, there is also a need to introduce robust policy frameworks that will guide the use of AI in education. The aim of these policies should be addressing major issues with AI like data privacy, transparency and accountability while using AI for the assessments or decision-making processes and other ethical concerns. The educational authorities and governments should work hand in hand to implement policies that will prevent the misuse of AI while promoting innovation and ethical use of AI technologies(3).

Moreover, policymakers should also keep in mind the societal effects of AI in education, which includes its potential impact on the future of work and employment. As the world is progressing technologically, there is a need to make some changes in the traditional educational curriculum to ensure that students are well prepared for the changing demands of the workforce. This could include putting more focus on teaching skills such as critical thinking, creativity and digital literacy, which are less likely to be automated(5).

2 CONCLUSION

It is clear that AI is going to play a huge role in the education field, leading to improvements in the teaching and learning processes. It has several benefits starting with personalised learning to aiding in administrative tasks. However, some of the challenges also need to be considered during AI implementation, including technological barriers, ethical concerns and the need for appropriate policy frameworks(11,13–15).

While integrating AI into the educational field, institutions and policy makers should ensure they are used in a way that will enhance the learning experience of the students. There is a need to take a balanced approach that will explore the potential of AI and at the same time addresses its challenges. Only then will the education sector be able to harness the power of AI to create a more effective, inclusive and equitable learning environment.

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