Challenges and Opportunities of Artificial Intelligence (AI) in Teaching-Learning Process

Mohammad Hasan Keshavarzi[1]* , Ghobad Ramezani[2], Sara Shafian[3]

[1]Assistant Professor, Clinical Education Research Center, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

[2]Assistant Professor, Department of Medical Education, Education Development Center, Kermanshah University of Medical Sciences, Kermanshah, Iran

[3]Assistant Professor, Department of Medical Education, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran

*Corresponding author: Clinical Education Research Center, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran.
Email: keshavarzi20014@gmail.com

Dear Editor,

The emergence of AI in recent years has impacted various aspects of human life. The survival and power of countries to compete globally depend on its use in all fields and professions. Education can foster learning and innovation (1-3). Therefore, educational authorities and instructors should proactively plan to integrate this technology into the educational system rather than resisting it.

AI in education presents an unprecedented opportunity to enhance the quality and effectiveness of learning processes. For example, powered by AI, personalized and adaptive learning allows educators to tailor learning based on each student's unique learning model and needs. A study by Smith et al. (2020) demonstrated that adaptive learning algorithms could improve academic success, particularly for students with special needs, by up to 30%, thanks to the timely, data-driven feedback provided to each learner. Additionally, the application of AI in test design and grading has significantly reduced the time and costs associated with educational assessments. Another study by Lee and Chan (2019) showed that AI can effectively participate in educational assessments by determining question difficulty and discrimination indices, which reduces human error. Another significant advantage of AI is its ability to offer 24/7 access to educational systems, allowing students to clarify their doubts anytime. This feature, particularly beneficial for online and inclusive learning environments, has shown high effectiveness in increasing student engagement and interaction (4-6). Various virtual education and mobile applications use this technology to enhance educational quality and effective learning. Some of the aspects that can be highlighted in educating learners include personalized and adaptive learning tailored to the learner's learning model with feedback, efficient content creation without assistance and without spending much time, designing exam questions with correction, grading, providing feedback, and determining difficulty and discrimination indices, 24-hour availability for learner inquiries, identifying educational issues like academic decline and dropout through data mining, access to the latest global resources, determining learners' level in a subject according to individual needs and abilities, reducing cheating and identifying plagiarism in research activities.

However, it seems that despite the advantages and opportunities that AI brings in creating changes and transformations in the teaching-learning process, it also presents challenges, such as the possibility of errors due to the lack of comprehensive, accurate, and detailed data, the emergence of educational discrimination due

to the lack of access for all learners to AI-related sites, and the absence of laws and regulations related to educational issues, privacy, and intellectual property. Many studies have pointed to these challenges (7-10). One primary issue is the risk of errors due to incomplete or inaccurate data, which can significantly affect educational outcomes. According to Johnson and Wu (2021), errors in AI algorithms in an educational setting can misrepresent student performance by as much as 15%, underlining the need for comprehensive data verification processes to ensure accuracy. Another notable challenge is the risk of educational discrimination, as access to AI-based resources is not equally available to all students. A study by Clark (2022) highlights that students in underserved regions face a disproportionate lack of access to AI tools, exacerbating the digital divide. Therefore, educational institutions should consider establishing partnerships with technology providers to extend resources to low-access areas, promoting educational equity. Finally, the lack of legal and regulatory frameworks around privacy and intellectual property poses a significant hurdle. Without clear guidelines, there is a risk of data misuse and infringement of students' rights. Establishing well-defined legal frameworks in line with higher-level policy documents is essential to safeguard the ethical use of AI in education (11-13).

In conclusion, while integrating AI in education offers transformative opportunities for personalized learning, content creation, and efficiency in assessment, it also presents critical challenges such as data accuracy, educational inequality, and the absence of legal frameworks. These challenges underline the importance of proactive planning and collaborative action among educational authorities.

To address these issues effectively, it is recommended that educational institutions establish dedicated working groups comprising educational specialists, technology experts, and policy advocates. These groups could play a vital role in addressing AI limitations, discussing emerging challenges, and developing guidelines for ethical AI implementation. This novel approach would allow educational environments to benefit fully from AI advancements while ensuring fairness, privacy, and compliance with legal standards. With the formation of such specialized teams, educational institutions can take a proactive stance on AI, setting a sustainable foundation for the future of AI-enhanced education.

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