EDITORIAL

Artificial intelligence in Medical Education: Advantages and Challenges

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How to cite: Jawaid M. Artificial intelligence in medical education: advantages and challenges. Ann Jinnah Sindh Med Uni. 2023; 9(2):32-33. DOI: 10.46663/ajsmu.v9i2.32-33

Artificial intelligence is rapidly transforming medical education. With the increasing need for clinicians to use such tools, medical education must prepare future healthcare professionals for the evolving landscape of artificial intelligence[1].

The evolving digitalization of the medical curriculum and the collaboration between data scientists and physicians offer opportunities for the increased use of AI systems in medical education. As technology continues to advance, the potential uses of AI in medical education will continue to expand. This includes the integration of AI with immersive technologies such as virtual reality and augmented reality, offering new avenues for learning in medical education[2]. The University of Texas at San Antonio, in conjunction with UT Health San Antonio was the first university to offer a dual degree program in AI and medicine, demonstrating a proactive approach to the integration of these two fields[3].

The incorporation of AI into teaching, learning and assessment in the field of medical education is crucial to prepare future healthcare professionals. By leveraging AI, faculty can enhance the development and delivery of educational content[4]. AI-based systems can help instructors to develop personalized learning materials to support individual students' needs, ultimately fostering a more engaging and effective learning environment. By incorporating AI into the development of learning content, our organization has significantly reduced its workload. The robust system allows us to create individualized learning experiences for more than 2000 healthcare professionals with diverse learning needs. AI can contribute to addressing the shortage of faculty by providing innovative methods for teaching future doctors. Through virtual simulations, AI-driven tools can immerse students in realistic clinical scenarios, allowing them to hone their clinical reasoning skills in a safe and controlled environment[5].

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Received: Dec. 20, 2023
Revision: Dec. 22, 2023 **Acceptance:** Dec. 28, 2023

AI can play a pivotal role in easing the workload of medical educators by automating routine tasks like replying to emails, administrative work, marking assignments, developing assignments, enabling them to focus on more strategic and impactful aspects of teaching[1]. Now we are witnessing the AI Assistant powered by ChatGPT for different learning platforms. All this can lead to more efficient and effective use of educators' time and resources, ultimately enhancing the overall learning experience for the students. Artificial intelligence holds numerous benefits for medical students by offering transformative opportunities for learning, skill development, and professional growth. One of the key advantages of AI in medical education is its capacity to provide personalized, adaptive learning experiences. With AI-driven educational tools, students can receive tailored learning materials and support, catering to their unique learning styles and knowledge gaps[6]. AI can facilitate comprehensive and realistic clinical simulations, allowing students to practice and enhance their clinical reasoning abilities in a simulated yet authentic environment. These virtual scenarios not only provide valuable hands-on experience but also contribute to patient safety by ensuring that students are well-prepared and competent before entering real clinical settings[7].

AI can aid medical students in staying abreast of the latest advancements in the healthcare sector. By leveraging AI-powered educational platforms, students can access current and relevant information, keeping pace with the rapidly evolving healthcare landscape and expanding their knowledge base effectively. One such advance and free tool is *scispace* which is now reshaping how we review recent literature and navigate evidence-based clinical decisions[8].

The integration of artificial intelligence in medical education undoubtedly brings numerous advantages, but it also poses significant challenges and potential threats that need to be carefully addressed. One of the primary challenges of implementing AI in medical education is the need for faculty and institutions to adapt to rapidly evolving technology. This includes providing adequate training and resources for educators

to effectively integrate AI tools into their teaching methods. Additionally, ensuring the ethical and responsible use of AI in medical education is a paramount concern. It is essential to establish guidelines and regulations to govern the use of AI-driven technologies in medical learning to mitigate the risk of potential biases or inaccurate outcomes.

There is a risk that reliance on AI may lead to a reduction in critical thinking and clinical reasoning skills among medical students as the students may become overly reliant on AI tools for diagnosis and decision-making, potentially compromising their ability to think independently and critically analyze[9]. Another looming threat is the potential for data privacy and security breaches as AI-driven systems generate and analyze vast amounts of sensitive medical data. Institutions will need to invest in robust data protection measures to safeguard patient information and maintain the integrity and confidentiality of medical records. Thus integration of AI in medical education requires substantial investment and resources, which may pose financial challenges for many educational institutions, especially those with limited funding.

As the landscape of medical education continues to embrace AI, it is crucial for educators, institutions, and policymakers to proactively address these challenges and develop comprehensive strategies to harness the benefits of AI while mitigating potential risks. By promoting responsible AI use, ensuring ongoing faculty training, and safeguarding data security, the field of medical education can effectively navigate the challenges and maximize the potential of AI to train future healthcare professionals effectively. To substantiate the effectiveness of AI, comparative studies with traditional teaching methods are essential, requiring a substantial sample size for probabilistic results. This necessitates a robust and comprehensive approach to evaluating the role of AI in medical education, highlighting the need for extensive research and validation.

In Pakistan, where many of us are struggling to incorporate effective utilization of technology in education and we are far from their optimal usage, AI is another big entity to tackle. One area of focus should be on adapting AI applications to the specific needs and challenges of the Pakistani healthcare system. This involves identifying areas where AI can address existing gaps in medical education. Furthermore, the development of AI-driven educational tools tailored to the cultural, linguistic, and societal context of Pakistan can optimize their effectiveness and relevance in medical training. This involve collaboration between educators, AI developers, and healthcare professionals to ensure that the content and applications align with the unique requirements of the local healthcare landscape. This includes providing sufficient resources and training for educators to effectively utilize AI tools and platforms, as well as establishing robust data security measures to protect sensitive patient information. To navigate the financial challenges associated with AI implementation, partnerships with public and private stakeholders, international organizations, and governmental support may be beneficial in securing the necessary investment for AI integration in medical education. Moreover, fostering a culture of responsible AI use, research, and innovation within medical education institutions in Pakistan is essential. This involves promoting interdisciplinary collaboration, ethical guidelines, and continuous evaluation to ensure that AI applications align with the highest standards of patient care and educational excellence.

By carefully addressing these considerations and strategically planning for the integration of AI in medical education, Pakistan can harness the potential of AI to overcome existing challenges, enhance educational outcomes, and ultimately contribute to the advancement of healthcare provision in the country.

Funding: Nil

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