Enhancing Medical Education with AI-Generated Visual Art: Benefits and Challenges

Dear Editor

Artificial intelligence (AI) has revolutionized traditional practices in different disciplines, including medical education.[1] Various art forms, such as illustration, painting, photography, and animation, have been employed in the medical education industry for many years.[2] Now, AI-generated visual art in different forms, namely illustrations, simulations, and visualizations, provides powerful tools for conveying complex medical concepts, supporting enhanced learning, fostering creativity, and helping future scientists and healthcare professionals develop essential skills. The use of AI-generated art in medical education is increasing, though improvement of related AI tools is still demanded. Here, we briefly discuss AI-generated art's potential benefits and challenges in medical education and the implications for future learning systems.

The main benefits of AI-generated visual art in medical education include:

1. AI can bring abstract medical concepts to life by creating clear and detailed visuals of anatomical structures, diseases, and medical procedures. This facilitates students' understanding during classes and lectures.[3] These visual aids can significantly improve students' knowledge and retention of complex information, mainly for cases that are rare or difficult to observe in patients, for example, pediatric congenital heart disease. AI can even create patient models for diagnostic and therapeutic procedures. Simulating rare clinical scenarios also offers valuable learning experiences that would be difficult to achieve without AI.

2. AI tools can create personalized art and visual content according to each student's unique learning styles and needs.[3] By analyzing students' preferences, interests, and progress, AI can provide adaptive learning and produce custom illustrations that truly connect with them. This supports learners' engagement and more enjoyable and effective learning experiences.

3. Creating art by AI can give learners easier access to high-quality educational resources. Students can benefit from the same level of visual content, regardless of their geographical location or institutional resources.[1] AI can also help develop educational materials with less financial resources and artistic skills.[3]

4. AI-generated art can be used to create patient scenarios for assessments and exams. By giving feedback, it can provide programs for students to learn from their mistakes.[1, 3]

5. Bringing AI art into medical education can help connect the worlds of healthcare, art, and technology, promoting creativity and innovation among medical students and enriching the learning experience. Moreover, visualizing patient stories and experiences stimulates empathy and observation skills in learners.[2]

Some universities have already started using AI in medical training. They employ AI to create educational materials, in addition to other applications. Examples include but are not limited to using AI-generative art in anatomy, physiology, and cellular and molecular sciences.[3]

However, some challenges should be considered.

1. One of the most significant challenges today is assessing the credibility of the AI-created art.[3] Though AI can quickly produce impressive art with various subjects, reliability, accuracy, and clarity should be carefully inspected to ensure its appropriateness and avoid misinformation. Moreover, a standard evaluation of the employed AI seems essential. Users' familiarity with the technology and critical thinking are also essential to avoid misleading consequences.

2. Some ethical concerns limit the usage of AI in educational settings, including authorship

and intellectual property issues. Guidelines for using AI-generated content in academic settings are urgently needed. Furthermore, patient confidentiality should be protected, mainly when the patient's photo is used.[4]

3.   Implementing AI-generated art into the current medical education system is challenging and requires methodical planning in multiple aspects. First, proper material development and integration need a multidisciplinary approach. Educators must learn how to embed AI-created art into their teaching effectively to maximize its benefits. Traditionalists' resistance is also a probable hurdle that should be handled when implementing such new methods.[1] Additionally, teaching outcomes and best practices should be studied.[3, 5] While these initiatives can be cost-effective, they still need funds, qualified experts, and resources.[5] This could limit their practice, especially in developing countries.

In summary, using AI art-assisted education in medical settings seems promising. Despite existing challenges, AI potentially enriches medical education by improving visualization, promoting personalized and adaptive learning, and increasing accessibility. However, instructing educators and learners, methodical implementation, ongoing assessment, and interdisciplinary approaches are essential to realize AI's immense potential in medical education. More specialized AI-based tools are needed to create detailed and accurate scientific images and figures. With the rapid advancement of AI technology, newer methods and more AI usage in medical education are expected. Further investigation of its uses and effectiveness may help. Future studies could focus on formulating approaches to AI-based art applications in educational programs, quality management, and ethical considerations.

Authors' Contribution

M.N: Conception and design of the letter, writing the original draft, and revision; MH.K: Helping in expanding the topic, critical revision, and drafting; M.A: Helping in expanding the topic, critical revision, and drafting, All authors have read and approved the final manuscript and agreed to be accountable for all aspects of the work to ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

Dr. Manica Negahdaripour, as the Assistant Editor at IJMS, was not involved in the peer-review and decision-making processes for this manuscript.

Manica Negahdaripour[1,2,3], PharmD, PhD, MBA; Mohammad Hasan Keshavarzi[4], PhD; Mitra Amini[4], MD

[1]Pharmaceutical Sciences Research Center, Shiraz University of Medical Sciences, Shiraz, Iran;

[2]Department of Pharmaceutical Biotechnology, School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran;

[3]Department of Artificial Intelligence, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran;

[4]Clinical Education Research Center, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence:
Manica Negahdaripour, PharmD, PhD, MBA;
Department of Pharmaceutical Biotechnology, School of Pharmacy, Shiraz-Isfahan Exp., Postal Code: 71468-64685, Shiraz, Iran
Tel: +98 71 3242-4127
Email: negahdaripour@sums.ac.ir
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