

Natalia ZHELEZNIKOVA

*Doctor of Medicine, Professor
Kharkiv National Medical University*

Tetiana ALEKSANDROVA

*PhD, Associate Professor
Kharkiv National Medical University*

Galina PANCHENKO

*Candidate of medical science, Associate Professor,
Kharkiv National Medical University*

Olena GOPTSII

*Candidate of medical science, Associate Professor,
Kharkiv National Medical University*

Volodymyr MOLODAN

*Candidate of medical science, Associate Professor,
Kharkiv National Medical University
Kharkiv, Ukraine*

POTENTIAL RISKS ASSOCIATED WITH THE USE OF ARTIFICIAL INTELLIGENCE IN MEDICAL EDUCATION: A REVIEW

The accelerated development of artificial intelligence (AI) is surpassing society's ability to adequately assess and define their future roles and implications. This issue has been formally acknowledged in the Bletchley Declaration issued by countries participating in the AI Safety Summit in November 2023 [1, p. 1]. AI has emerged as a transformative force across multiple sectors and holds substantial potential to reshape personalized learning by enabling educational experiences that are adapted to the individual needs, preferences, and learning styles of students [2, p. 761]. Within the context of medical education, which is characterized by an extensive and demanding curriculum, AI has the potential to enhance learning efficiency, support effective time management, and improve the depth and durability of knowledge retention. The application of AI in medical education encompasses a wide range of possibilities, including support in scientific writing and research activities, the development of individualized curricula, enhanced access to up-to-date educational resources, the design of innovative learning strategies, personalization of teaching methods, and the improvement of student assessment and evaluation processes.

Despite the considerable theoretical potential of artificial intelligence, its practical implementation in medical education remains limited and heterogeneous across institutions. Recent research has highlighted both the benefits and the challenges

related to the incorporation of AI into medical curricula [3, p. 651]. AI-based tools enable educators to optimize the educational process while providing personalized learning support and facilitating the development of clinical practice-related competencies among students [4, с. 3]. However, the reliability of outcomes generated through the use of AI remains a subject of considerable debate. This uncertainty has contributed to growing concerns among medical educators and students regarding AI-based technologies. Such concerns may influence learners' perceptions, expectations, and attitudes toward artificial intelligence, potentially affecting the overall effectiveness of the educational process.

A major concern regarding the use of AI in medical education is the occurrence of AI “hallucinations,” wherein the system produces inaccurate or misleading information [5, p. 2]. It is important to acknowledge that errors are not exclusive to artificial intelligence; inaccuracies can also be present in textbooks and among human educators. AI models, however, have the advantage of being updated more frequently to incorporate the latest medical knowledge. Nevertheless, the phenomenon of AI hallucinations remains a significant concern, as such errors can be recurrent, vary with each generated output, and often appear plausible at first glance. This variability renders them difficult to identify, particularly for learners who may lack the clinical experience necessary to critically assess or verify the information [6, p. 19]. Unlike static inaccuracies found in textbooks, AI hallucinations may be presented in a confident and contextually relevant manner, yet remain factually incorrect. Such outputs can undermine trust and potentially propagate misinformation if not promptly identified and addressed. Although the frequency of hallucinations has generally decreased as AI models have become more sophisticated, the accuracy of AI-generated content continues to be a major concern [7].

In addition to hallucinations, the use of AI in medicine and medical education can give rise to, or amplify, biases, depending on the characteristics of the training datasets and the underlying design of the AI models [8, p. 834]. Such biases may mirror historical inequities, the underrepresentation of specific populations, or systemic patterns present within the training data. The risk is further amplified when biased AI-generated content is subsequently used as input for additional model training, creating a feedback loop that reinforces and magnifies existing inaccuracies or prejudices over time [9, p. 11].

In addition, the implementation of AI in medical education raises ethical concerns, particularly with respect to data privacy, data security, and algorithmic bias. AI systems are characterized by extensive parameters and large-scale training datasets, which can result in the inadvertent retention of sensitive personal information. Consequently, these models may produce outputs that contain identifiable individual data. AI systems

are characterized by extensive parameters and large-scale training datasets, which can result in the inadvertent retention of sensitive personal information. Consequently, these models may produce outputs that contain identifiable individual data [10, p. 3]. When AI tools are utilized to support learning, for example during clinical case discussions, the inclusion of sensitive patient information, such as names, gender, age, medical history, or final diagnoses, as well as imaging data like computed tomography and magnetic resonance imaging – poses a potential risk to patient privacy. Previous studies have demonstrated that even when such information is anonymized prior to input, advanced AI models can, through so-called linkage attacks, reidentify personal data from large datasets, thereby leading to potential information exposure [11, p. 9094]. Therefore, the mere deidentification of information is insufficient to ensure patient privacy, creating substantial challenges when large language models are employed in medical education. Moreover, since the training and user data of these models are typically stored on cloud servers, any security vulnerabilities may lead to the exposure of sensitive information [12, p. 2]. Developers of large language models, such as OpenAI, may utilize users’ personal information for purposes such as service analysis, improvement, or research, and may retain the right to share this information with third parties without obtaining explicit user consent [13].

It is also important to acknowledge that the use of AI tools in medical education may give rise to concerns regarding academic integrity, including issues such as plagiarism and fraudulent practices. Research has indicated that when abstracts generated by AI and those authored by humans are presented simultaneously, university professors struggle to distinguish between them [14, c. 6]. Another study that examined AI generation of fictitious article abstracts revealed that peer reviewers could identify only 68% of abstracts generated by ChatGPT as fictitious [15, p. 4].

Integrating AI into medical education offers considerable opportunities, but it also entails a range of potential risks. While AI tools can enhance access to information and support the development of critical thinking skills, they may introduce systemic errors, compromise personal data, raise ethical concerns, and contribute to academic dishonesty. To mitigate these risks, both students and teachers should recognize the limitations of AI, uphold academic integrity, and handle data responsibly. Teachers, in particular, should prioritize producing high-quality, original content rather than relying on AI-assisted methods. AI should be employed as a supplementary resource rather than a primary educational tool, with an emphasis on promoting accessibility, equity, and a culture of constructive feedback. Educational institutions are encouraged to establish guidelines that align with their specific pedagogical objectives, providing a clear framework for the responsible use of AI while addressing its inherent risks. Such policies should reflect the institution’s educational mission, whether focused on

clinical practice, research, or a combination thereof, and remain adaptable to evolving educational technologies.

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Olha TOKARIEVA,

*Associate Professor at the Department of English
in Marine Engineering
Kherson State Maritime Academy
Kherson, Ukraine*

INNOVATIVE APPROACHES TO TEACHING MARITIME ENGLISH IN MARITIME EDUCATION INSTITUTIONS

Maritime English is an essential component of maritime education and training, serving as the lingua franca of international maritime communication. As the global maritime industry evolves rapidly, it demands a higher level of linguistic competence from seafarers, navigators, and maritime specialists [2, p. 3]. This paper discusses innovative methods and pedagogical strategies for teaching Maritime English in maritime education institutions, with particular reference to experience at the Kherson State Maritime Academy. Key approaches include task-based learning, blended instruction, simulation and role-play, digital platforms, and performance assessment. The integration of these methods aims to enhance learners' communicative competence and professional preparedness for real-world maritime contexts.

The maritime profession is inherently international, engaging personnel from diverse linguistic and cultural backgrounds. Maritime English, therefore, plays a critical role in ensuring safety, operational efficiency, and compliance with international standards such as the Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) [2, p. 7]. Maritime education institutions must not only teach language but also develop learners' ability to apply English in authentic maritime scenarios.

At the Kherson State Maritime Academy, Maritime English instruction occupies a central position in the curriculum for cadets and maritime specialists. The challenges of teaching Maritime English are multifaceted, involving technical vocabulary, specific