EDITORIAL

Artificial intelligence tools: The digital colleague of the digital natives

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ABSTRACT

Artificial Intelligence (AI) is transforming physiology education and research from a futuristic concept into an essential "digital colleague." Once reliant on textbooks and manual tools, students now interact with AI-powered assistants capable of real-time ECG interpretation, heart modeling, and interactive feedback. In classrooms, AI facilitates adaptive learning, 3D simulations, personalized tutoring, and efficient data tracking—customized to meet the diverse learning needs of students. In research, AI accelerates discovery by uncovering hidden patterns, streamlining literature reviews, and aiding in data analysis. Yet, as AI reshapes teaching and learning, educators must transition from information providers to metacognitive coaches and wisdom designers, guiding students toward the ethical and responsible use of these technologies. The integration of AI presents not only opportunities but also challenges, including data privacy, algorithmic bias, the digital divide, and over-reliance, which pose risks to equity and human judgment. Recognizing AI as a tool—not a replacement—helps preserve empathy, creativity, and moral reasoning. Educators must promote digital literacy and critical thinking to prepare future physiologists who can navigate and collaborate with AI systems. The future of physiology lies not in resisting AI but in harnessing its potential while upholding the core values of education and research. Together, humans and machines can drive the field forward with integrity and innovation.

Keywords: Artificial intelligence, Digital colleague, Physiology laboratory.

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INTRODUCTION

You walk into a physiology laboratory and find yourself in front of R2-D2, a character straight out of Star Wars set, talking to the students, but the communication is no longer in beeps; it is a pure human voice, maybe your own. Students work with this digital aide instead of going through thick textbooks or painstakingly drawing graphs by hand. This assistant reviews ECG results in real-time, models heart output in real-time, and responds to queries as they arise. Things that used to appear as if they were in the future are quickly becoming part of our schools, colleges, and research. Thus, Artificial Intelligence (AI) is no longer just a distant idea. It is becoming a powerful "digital colleague," which is changing the way we teach, learn, and study physiology.

Artificial Intelligence (AI) is becoming increasingly important in the field of physiology teaching and research (Fig 1). Many of us remain in a resistant mode, believing that AI poses a threat to our knowledge, thinking, creativity, and existence. Can we not see this as a useful collaborator? A collaborator that makes our teaching and research better, a collaborator that makes us think more critically by challenging our beliefs without being judgemental, and a collaborator that supports our creativity in teaching and learning.

As teachers and researchers, our role is now shifting from teaching and facilitating to being a metacognitive coach and wisdom designer, leveraging AI's potential wisely to prepare the next generation to use these tools responsibly.

The growing roles of AI in Physiology

Physiology is a branch that is equally important in medical science and social science, and AI is helping in all fields in real ways. In the teaching-learning area, AI has provided opportunities to draft lesson plans and generate appropriate learning outcomes for students, serving the purpose of

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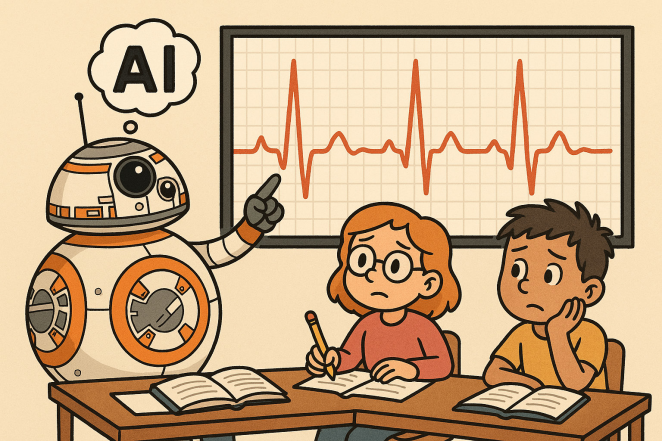

Fig 1: Graphical Abstract

building competencies. Multiple useful tools have been developed, including large language models, machine learning algorithms, and image recognition tools.

Subsequently, tools have emerged for big data analysis to track student progress, evaluate curriculum, and provide real-time feedback, which is very important in this century, particularly for Gen Z children.

Researchers can utilize AI tools to brainstorm ideas and identify gaps in research in specific areas that may have been overlooked. Human capability is limited, and therefore, it might have missed some patterns in any medical data set that AI can identify. The primary advantage is saving a significant amount of time on repetitive tasks and devoting that time to performing actual, practical work. Complicated physiological processes can be brought to life in classrooms by using AI-powered simulations. The other most important advantage is that AI can help us teach students with varying qualities in ways and means that fit each one's pace and learning style.

We need to remember and appreciate that AI is not a replacement for us; it is an extension of human creativity, freeing us to think more profoundly and encouraging curiosity. Blended learning, which utilizes technology and AI tools, has become increasingly popular.

What can we do now that we were not able to do so until now?

AI-based simulations and interactive 3D models are changing teaching methods. Adaptive quizzes (Quizlet) and virtual dissection tools (Anatomage) can help individuals better understand abstract concepts, especially when traditional resources are scarce.

Chatbots provide students with instant feedback and offer assistance, thereby motivating them to learn outside of regular school hours. Students from diverse backgrounds with varying learning abilities particularly benefit, as the AI tutor can help them understand complex concepts through a step-by-step, inquiry-based method. The AI chatbot will patiently answer and teach the student, who, in turn, feels confident and learns in a safe environment. The teachers also benefit, as they only need to prepare this chatbot with the correct information to ensure that students receive accurate information rather than something hallucinated by the AI tool. Time saved, learning enhanced, and students' comprehension improved - all through a judicious role-play between two colleagues: human and machine.

AI accelerates the process of finding new things in research. AI can quickly scan large amounts of data and find new ideas that lead to new products and services. For example, it may analyze heart rate variability, map muscle activity, and track sleep patterns. AI techniques are changing, even in literature reviews, by scanning hundreds of papers to find gaps in research and new trends. In India, AI-assisted image analysis is accelerating histological study and enhancing the accuracy of diagnoses. Some medical schools are testing AI-powered platforms that create individualized exams to help students learn rather than memorize facts.

Is there a problem with the moral issues?

Yes, data privacy is, perhaps, the most important factor. Cloud-based services often retain private information about students or patients, which can be misused by malicious individuals on the Internet.

The algorithmic bias is another problem. If the AI system is not trained on data that are representative and skewed towards one particular area, it can cause worse health inequities. Despite being invaluable in providing personalized support for students, particularly those with disabilities or living in remote areas. The questions about the digital divide remains a glaring truth in remote, underdeveloped countries,

The third risk is over-reliance on AI, which surrenders human natural intelligence. We need to understand and recognize the fact that these tools can be very efficient time-savers, but they cannot replace the unique human skills of empathy, judgment, and moral reasoning.

These are important in both teaching and caring, where we interact with students and/or patients. Teachers, students, and clinicians need to understand that artificial intelligence is merely a tool. We must be cautious in how we use it and critically evaluate the outputs.

So what do we do?

Having understood the advantages and disadvantages of using AI tools, we are now entrusted with relying on our natural intelligence to make the best out of it.

As physiology teachers and researchers, we must look for opportunities to influence the growing relationship between people and technology. We need to keep up with the exponential development of new AI tools and evaluate them ourselves to determine the best one for a particular purpose. Our job is also to draft standard plans and discuss these available AI tools with students who may already be familiar with them. However, students need to be guided through real demonstrations about the potential and limitations of using AI tools and, therefore, be made aware of the ethical use of AI. We also need to inform students that those who can work with technology rather than against it will have a brighter future. This digital literacy will help them to become critical thinkers.

Thus, we can train a new generation of professional physiologists with a strong sense of humanistic values and the knowledge to work effectively with technology, thereby incorporating AI into education and research in a thoughtful and responsible manner.

Currently, there is no debate about whether AI is being discussed. The time has come to accept that AI has entered our lives and is here to stay. Let us harness its potential while upholding the creativity, curiosity, and ethics that define education and research. They are our digital colleagues, and together, we ensure the advancement of physiology in the future.