Editorial

From Tutor to Tool: Can AI Transform Learning Without Replacing Human Thinking?

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Abstract:

Artificial Intelligence (AI) has emerged as a revolutionary force in education, transforming teaching, learning, and assessment. In medical education, AI introduces personalisation through adaptive learning models, intelligent tutoring systems, virtual reality simulations, and generative tools such as ChatGPT. They enable personalised feedback, collaborative learning, and a simulated clinical practice environment, thereby significantly improving access and the quality of training. Alongside its potential, AI also raises fundamental concerns, such as plagiarism, overreliance, privacy breaches, algorithmic bias, and gaps in accountability. Existing policies for the use of AI remain patchy, with initiatives by UNESCO, WHO, and the European Commission. In Pakistan, proposed AI policies aim to integrate AI into healthcare and education, although enforcement remains limited. Ultimately, AI must be promoted as a helpful tool rather than an alternative to human thinking, with proper guidelines, AI literacy, and ethical frameworks to support a human-centred approach for the future in education and medicine.

Keywords: *Tutor to Tool, AI Transform Learning, Human Thinking*

Introduction:

As machines start to think, do we forget how to think for ourselves? Artificial Intelligence (AI) is now a part of our everyday lives, from self-driving cars to chatbots like ChatGPT. It is now transforming the way we learn, teach, and envision the future of education. In classrooms, lecture theatres, and even operating rooms, AI has emerged as a mighty helpmate. Nevertheless, it is also a force that needs careful regulation. While students and teachers adopt its advantages, society must address the ethical and structural dilemmas associated with this new technological frontier.

AI has shown great promise in education and emerged as a transformative tool in creating engaging, interactive, and personalised learning experiences. Medical students increasingly see the benefits of artificial intelligence (AI) in their education. A recent study reveals that 75% of medical students believe AI enhances their learning, and over 95% understand how to utilise it.[1] These numbers indicate that students are not only aware of AI but also accept it as a helpful learning tool. The inclusion of AI in education has the benefit of personalising instruction. The three models that adaptive systems employ are the learner model (representing the student's past knowledge and difficulties), the pedagogical model (encompassing teaching competence and pedagogy), and the domain model (comprising knowledge of the subject).[2] All three combined can enable AI to give personalised feedback and adapt content according to each student's requirements and needs. This "adaptive learning" provides each student with a different trajectory, so no two students follow the same route, making education more inclusive, subjective, and effective.

Applications reach far beyond one-to-one tutoring. Intelligent tutoring systems (ITS), such as BUGGY and iTalk2Learn, operate on a pattern similar to human one-to-one tutoring.[3] In medicine, AI-powered tutors such as COMET and CIRCSIM-Tutor aid learners in developing problem-solving proficiency in complex clinical scenarios.[4] They make high-quality education accessible to everyone, especially where human tutors are not available in sufficient numbers.

AI is now becoming an assistant for people in learning together. It analyses how groups work and uses this information to form effective study groups. It also promotes and tracks each person's contributions, encouraging discussions.[5] These systems are especially crucial in medical school, where communication skills are as essential as technical knowledge. Apart

from tutoring and collaboration, virtual reality simulations are becoming game-changers. AI-powered programs such as Touch Surgery and DxR Clinician enable medical students to practice procedures or diagnose virtual patients without endangering the lives of humans.[6] Immersive simulations not only enhance engagement but also prepare learners for high-stakes real-world situations. Arguably, the most discernible effect of AI has been through generative tools such as ChatGPT. Students are increasingly turning to such tools to explain principles, offer comments, or mimic clinical interactions.[7] Although contentious, they have been effective in generating interest and making learning more engaging.

The Perils and Pitfalls: Nevertheless, AI in education comes with its own set of drawbacks. The same technology that makes learning fun also raises some significant ethical, social, and practical concerns. There is also the risk of plagiarism and dependency. AI generators can create entire essays or assignments, tempting students to bypass critical thinking and originality. Institutions such as the University of Southern California (USC) now encourage students to utilise AI responsibly, promoting creativity over substitution.[8] Second, privacy and data security take precedence over everything. AI systems collect vast amounts of personal and educational data, which, if misused, could compromise sensitive information. Developing nations, such as Pakistan, where data protection legislation is nonexistent, are particularly vulnerable.[9] On the other hand, transparency and algorithmic bias pose significant challenges. AI systems can perpetuate stereotypes if they are trained on unbalanced datasets, potentially producing unequal outcomes. These risks are fatal in education because fairness and inclusivity must be paramount.

Finally, there is the question of accountability. If the AI makes an error in a medical simulation, who is responsible? Student, institution, or developers? Currently, there are no clear national or international policies addressing this accountability gap.[10]

A Global Patchwork: Although the benefits and risks of AI in education are evident, policies defining how it should be used are fragmented. At the organisational level, universities are formulating guidelines to promote ethical use. Institutions are educating students and faculty on the proper use of AI to maintain a balance between creativity and academic integrity.[8] At the country level, initiatives vary significantly. The European Commission has proposed ethical standards for trustworthy AI,[11] whereas China aims to incorporate AI literacy into its education system.[12] At global levels, UNESCO and WHO have been at the forefront. UNESCO's leadership emphasises inclusiveness, equity, and ethical management of AI in learning, particularly in the pursuit of Sustainable Development Goal 4: quality education for all.[13,15] The WHO, in turn, cautions that uneven access to digital technologies may entrench prevalent global inequalities.[14] Although these guidelines advance vision, they fall short of presenting enforceable recommendations. In Pakistan, the draft of the National AI Policy aims to establish centers of Excellence in AI, with a focus on healthcare and personalised learning.[9] However, enforcement strategies in practice are still lacking. Artificial intelligence (AI) is no longer a distant idea in medical education, it is already changing how students learn, practice, and prepare for professional life. Adaptive learning platforms, virtual simulations, and intelligent tutors all promise to make training more interactive and personalised. Still, the conversation often remains one-sided.

The real question is no longer whether to use AI in medical education but how to use it wisely. For Pakistan, that means anchoring innovation in local evidence, investing in teacher training, building oversight structures, and communicating with clarity. When done well, AI can help prepare future doctors without losing sight of the human qualities, critical thinking, judgment, and compassion that no machine can replicate.

A Balanced Future: AI has made things possible that previously seemed impossible. It can teach, model, mediate, and tailor on scales unthinkable for mortal teachers. In the field of medical education alone, it can train future physicians with unprecedented accuracy and security. However, there is a promise that comes with danger: Overdependence, ethical compromise, invasion of privacy, and inequality. The test of time to come is no longer whether to integrate AI into education; it is already here! To achieve a balanced future, policymakers urgently need to create clear, enforceable guidelines. Schools need to educate people on AI literacy as earnestly as they educate on mathematics or ethics.[16,17] AI needs to be promoted as a tool, not an aid. Education has never been about preparing the future generation for what lies ahead.

As AI redefines learning, what we need to know is whether we can ensure this future is human centered.

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