THE HUMAN TOUCH: AI AS ENABLER OF HUMAN CONNECTION IN MEDICAL AND GRADUATE EDUCATION

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Medical and graduate education stand at a crossroads. As artificial intelligence (AI) systems grow increasingly sophisticated, medical and graduate schools worldwide are experimenting with AI-powered teaching tools that promise to revolutionize how future physicians learn their craft. We believe these technological advancements will, counterintuitively, accelerate a shift toward deeper mentorship and human connection between faculty and trainees.

PROMISING EXPERIMENTS ON THE FRONTIER

The innovations emerging in AI-assisted medical education are genuinely impressive. A few exciting examples include:

- Virtual reality (VR) simulations that allow students to practice diagnosing patients with complex presentations, using AI to simulate doctor-patient interactions.[1]
- VR and augmented reality to create realistic scenarios where medical students can practice procedures repeatedly before encountering real patients, building muscle memory and confidence in a consequence-free environment.[2]

- AI tutoring systems, including "tutorbots" that are trained on the school's own curricula using ChatGPT as the underlying engine, but constrained to course-specific information.[3, 4]
- Natural language processing systems to help students practice clinical documentation. [5, 6]
- Using AI to generate differential diagnoses that students can compare against their own reasoning, fostering critical thinking about diagnostic processes.
- At the home institution of two of the co-authors of this article, the Albert Einstein College of Medicine, our experimentation with AI includes a pilot using smart glasses as a feedback tool for teaching and evaluating medical students' oral exams.[7]
- Another example from Einstein shows how AI can support faculty in preparing materials. Researchers found that AI-generated rationales for multiple-choice questions were effective in supporting learning and were efficient to create.[8]

THE IRREPLACEABLE HUMAN ELEMENT

These technologies have the potential to accelerate the transfer of facts, procedures, and methods. However, medicine is not merely a body of information to be memorized or algorithms to be executed. It is also a profoundly human endeavor that exists at the intersection of science, ethics, emotion, and judgment. We believe that AI has the potential to augment current teaching methods, enabling significant shifts in classroom and teaching time. In their place, faculty will find their time increasingly focused on imparting the most critical lessons of medical practice, such as delivering devastating news with compassion, recognizing when to acknowledge uncertainty, and balancing competing values in complex situations.

Consider the teaching that happens during clinical rounds when an experienced physician pauses to explain not just what decision to make, but why, drawing on decades of experience with similar cases, their understanding of this particular patient's values and circumstances, and their intuition about what feels right in a situation where the evidence is incomplete. This kind of wisdom transmission happens through apprenticeship, observation, and mentorship. It requires the mentor to read subtle cues in the student's face, to know when to push and when to support, and to share not just successes but failures and the lessons learned from them.

Or think about the moment when a medical student first confronts their own mistake - a missed diagnosis, a communication failure, a lapse in judgment. The teaching that happens in that vulnerable moment, when a trusted mentor helps the student process guilt, learn from error, and rebuild confidence, is utterly irreplaceable. An AI tool cannot offer the reassurance that comes from a teacher saying, "I made a similar mistake in my third year. Here's what I learned."

The complexities of patient care involve navigating cultural differences, understanding social determinants of health, recognizing when patients are not telling you the full story and why, and making decisions in the vast gray zones where evidence is absent or conflicting. These skills are developed through reflection, discussion, and guidance provided by experienced clinicians who think aloud about their reasoning, expose their uncertainty, and demonstrate what it means to put patient welfare first even when it's difficult.

THE PATH FORWARD

The appropriate role for AI in medical education is as a powerful tool in the service of human teaching. AI excels at providing immediate feedback, practicing in simulated situations, and handling rare cases. It can handle the routine aspects of knowledge transmission efficiently, freeing human teachers to focus on the higher-order skills that only humans can teach: judgment, empathy, ethical reasoning, and the integration of complex factors in ambiguous situations.

The future of medical and graduate education will include thoughtful integration where AI handles what it does well while preserving and even expanding opportunities for meaningful human

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interaction. Every hour saved through AI-assisted learning should translate into more time for students to work alongside experienced clinicians, discussing actual patients, grappling with real ethical dilemmas, and absorbing the tacit knowledge that defines excellent medical practice.

We expect that, in the future, medical schools will seek to realign faculty teaching effort toward a greater focus on the human elements of teaching, given that so much factual work will be effectively conveyed by these emerging technologies. Medical and graduate education in the future could perhaps reclaim a degree of the apprenticeship model that it had in its infancy, where experienced practitioners guide novices not just in what to know, but in how to be. The white coat ceremony, the first time holding a newborn, and the conversation with a dying patient are examples of formative experiences that require human presence. In medicine, the teacher-student relationship is not merely pedagogical; it is the primary mechanism through which professional identity, values, and wisdom are transmitted across generations. That sacred trust can actually be enhanced by letting other methods, AI-enabled and otherwise, handle the details while human faculty focus on what only they can teach.

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