

VIEWPOINT

Medical Education in the Digital Era

A New Paradigm for Acquiring Knowledge and Building Communities



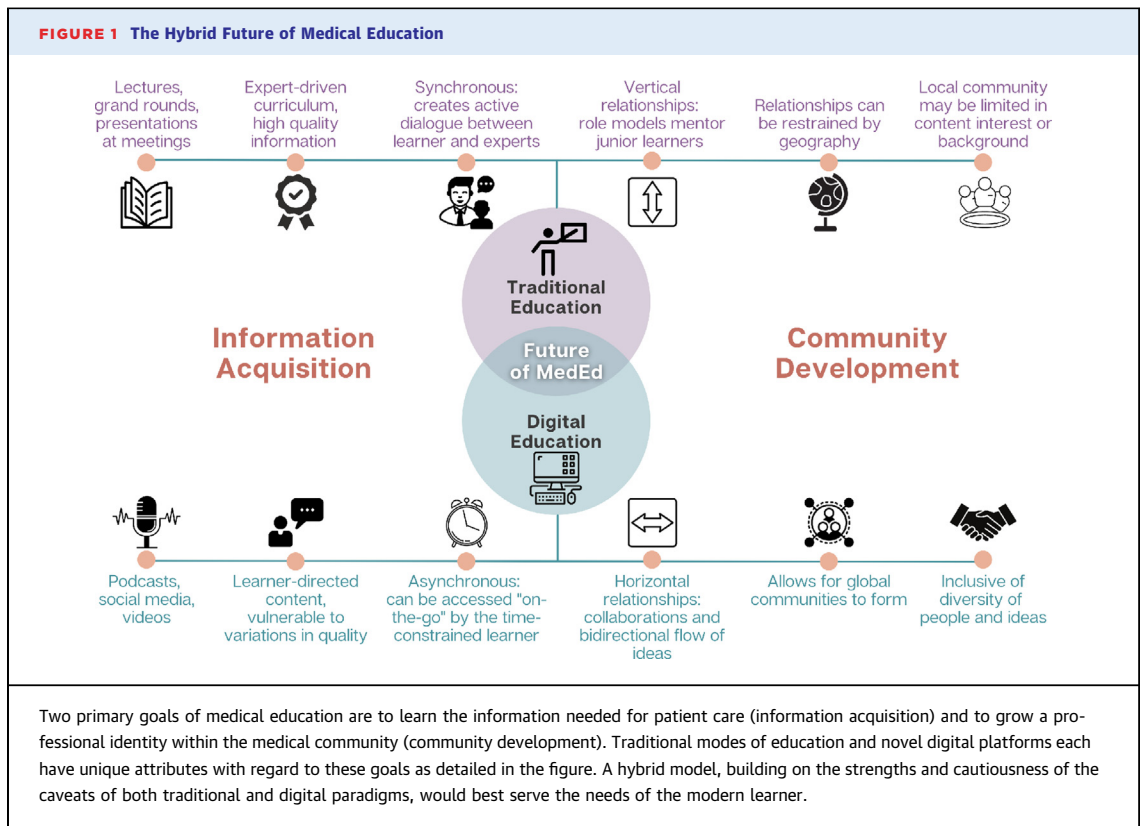
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In his seminal 1957 text describing the sociology of the student-physician, Robert K. Merton describes 2 primary goals of medical education: the learning and applying of information needed for patient care and the growth of a professional identity within a community of caregivers.¹ At the heart of these goals are key relationships, either between the learner and the educational content (ie, information acquisition) or between the learner and the teacher (ie, community development). While much has changed since the 1950s, few shifts have been as impactful in medical education as the proliferation of digital technologies. Through modalities such as social media, podcasts, or streaming video, our increasingly digital world has altered the landscape of how we interact with one another and how we learn the art of medicine. While it has been ongoing for several years, the digital transformation was accelerated by the COVID-19 pandemic. Physical distancing mandates created a vacuum in traditional in-person didactic curricula, spurring a rapid proliferation in digital platforms and content. In this new educational landscape, the digital space has become integral to how we access information and communicate with

one another. Thus, the modern medical educator must be able to deliberately appraise both the advantages and pitfalls of the digital world and traditional modalities. Our challenge now is to thoughtfully integrate digital and traditional platforms to help the modern learner effectively acquire information and build community (Figure 1). Therein lies tremendous opportunity.

“Information acquisition” describes the relationship between learners and educational content; in other words, what content is available, how is it delivered, and when can it be accessed? One major dichotomy exists between information delivered “synchronously” (where the content is simultaneously delivered to and received by learners) and “asynchronously” (where the learner can access previously created content on their own schedule). Many examples of educational content in the traditional, predigital era are synchronous, such as in-person classroom lectures, grand rounds, and presentations at international meetings. Generally, this information is of high quality and is delivered by an acknowledged content expert who determines the key information that all learners should know. Additionally, by having learners and experts present synchronously, a traditional approach to information delivery can encourage dialogue and foster a sense of community. For these reasons, the synchronous and expert-driven nature of traditional information acquisition makes it well suited for forming the shared curriculum for medical trainees. However, digital modalities of information acquisition, which are often asynchronous and learner-driven, create opportunities for augmenting the shared knowledge base offered by traditional curricula. To best understand these opportunities, it is helpful to conceptualize the medical trainee as an “adult learner.” Adult learners are self-

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directed regarding what they want to learn, internally motivated to learn by a desire to better solve the problems they will encounter, and time-constrained due to responsibilities outside of their didactic education.² For these reasons, a digital form of content delivery, such as a medical education podcast, is uniquely poised to meet the adult learner's needs. Podcasts are inherently asynchronous and can be accessed whenever, wherever, and however best suit the needs and time restraints of the learner.³ This accessibility allows for "on-the-go" learning, where learners can listen to a podcast at a time convenient to them, such as while driving to work or exercising. Additionally, the learner is able to choose which podcasts they listen to and, thus, can tailor their didactic education to match their clinical interests or responsibilities. An adult learner, internally driven by the goal of helping a patient they are currently caring for, can seek out a podcast episode about that patient's disease state and listen to that information whenever they would like. For these reasons, podcasts are uniquely learner-driven, both in how they are accessed and in content the learner chooses to access. Importantly, learner-driven modes of information acquisition cannot exist in isolation, as knowledge of foundational concepts is needed for the

learner to recognize their own educational needs. A hybrid model, wherein a synchronous and expert-driven curriculum is complemented by digital, learner-driven content has the potential to provide the most benefit for the modern learner.

In addition to information acquisition, community development plays a pivotal role in medical education. In many ways, learning in medicine is a social activity that occurs between teachers and learners existing in a common community. One goal of medical education is facilitating entry of trainees into the medical community of practice, where members share a common purpose in the treatment of disease, a common skillset needed for patient care and professional collaboration, and a common social fabric, wherein members feel a sense of belonging.⁴ Educational relationships are instrumental in building this community. Conventional examples of these relationships are well known to us: attending-trainee, speaker-listener, and teacher-student. These bonds form a key bedrock in our medical education, and we can all likely identify the residents, fellows, and attendings who have mentored us throughout our professional lives. These relationships are often vertical, wherein a more senior mentor serves as a role model and advisor for a more junior learner. Effective

in-person vertical mentorship can be vital in helping learners not only grow their clinical knowledge, but also find their place within the medical community. While impactful, these traditional relationships are often limited to those in close geographical proximity to one another, often within the same institution. If unable to find mentors with whom they share a content interest or background, the learner can feel that her interests and needs are not valued by her community of practice and thus struggle to find the sense of belonging critical to her professional development. This can be especially true for individuals from communities who have been traditionally underrepresented within medicine. While a predigital community of practice can be limited by geographical restraints, a digital community of practice extends far beyond these barriers. Social media platforms like Twitter allow individuals to share educational content from across the world and connect with colleagues in training environments that may be drastically different from their own. The implications of these connections are widespread, from augmenting scientific discourse through Twitter journal clubs to advocating for diversity and inclusion through the creation of online communities.⁵ These platforms can also be used to highlight topics that may have been underrepresented in the traditional cardiovascular education curriculum, such as cardio-obstetrics or adult congenital heart disease. Additionally, the open nature of these platforms allows for a bidirectional flow of ideas, where the highlighted content is not just the knowledge valued by the teacher, but also what is valued by the learner.⁶ Thus, the communities of practice formed through social media are made up of comparatively more horizontal relationships and have the potential to be particularly inclusive of a diversity of people and ideas. While the potential for finding a broader sense of community is ripe on social media, it may be more difficult to find meaningful one-on-one mentorship in the digital world. A hybrid model based on vertical in-person mentorship and horizontal digital community building has the potential to create the most fruitful educational ecosystem.

While technology has allowed medical education to be more learner-centric, horizontal, and accessible, the digital era is not without its pitfalls. The most common concern levied at the use of digital media as a tool in medical education is the potential for misinformation.⁷ Traditional educational content is typically delivered by a trusted and respected source, whether it be your local faculty at noon conference or international experts in a guideline consensus statement. However, a consequence of the open nature of

social media platforms is that the content has limited quality assurance. Thus, consumers of digital educational content should be wary of the information they encounter online. To help combat misinformation, creators of digital content should consider having experts review their work, and learners in the digital space should seek out references when assessing the content they encounter. Importantly, the deleterious public health consequence of widespread medical misinformation is itself a call to train health professionals in the effective use of social media to dispel myths and propagate data-driven education. Additionally, the algorithms used to promote content on these platforms are not related to the quality of the content themselves, but rather how often other users engage with the content. This has the potential to create motivation systems focused on obtaining “likes” and validation on the platform, as opposed to creating content that improves patient care or forming relationships that grow our cardiovascular community. These algorithms can also lead to confirmation bias by placing users in echo chambers, paradoxically limiting access to a diversity of viewpoints. Finally, it is important to acknowledge that these digital media platforms are open not just to medical providers, but also to the public. Unprofessional behaviors on these platforms have the potential to harm the individual, the community, and the public trust in our work.

The digital transformation in medical education creates several opportunities for learners, teachers, and institutions; appropriately, programs are already embarking on the mission of training the next generation of medical educators.⁸ The CardioNerds Academy is one such program, wherein medical students, internal medicine residents, and cardiology fellows learn key skills in digital educational content evaluation and creation, while also learning how to use the digital space to grow their professional network.⁹ These curricula exist outside of cardiology as well, both within and outside of academic institutions. As this field is still growing, there are several opportunities for scholarship regarding the effectiveness of digital medical education curricula and learning how these platforms can grow to best serve the needs of learners and educators.¹⁰

While the digital era has proved to be a disruptive force in medical education, digital content is most valuable to the learner when utilized in synergy with the traditional curriculum. Somewhat serendipitously, this harmony was well demonstrated in the 2022 Scientific Sessions for the American College of Cardiology—the first in-person American College of Cardiology conference since the dawn of the

COVID-19 pandemic. Against the backdrop of spring-time cherry blossoms in Washington DC, the interpersonal connections that help form the basis of our cardiovascular community were both formed and renewed. For many, these were not relationships made de novo, but rather an extension of bonds that had already begun to form on social media. Additionally, while in-person attendees could engage in panel discussions and debates regarding the cutting edge of cardiovascular medicine, the content was also available asynchronously to many virtual attendees eager to learn on their own time. Perhaps this hybrid event is the first of many in a new era in medical education, wherein the opportunities of the digital

era are blended into and throughout the traditional curriculum to create a truly transformative modern learning environment.

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Drs Goyal and Ambinder hold equity in CardioNerds. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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