

Chapter 20

Using Technology to Teach and Teaching About Technology: Synergies for the Digital Age

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ABSTRACT

This chapter analyzes the role played by technology in undergraduate medical education (UME) using two perspectives: how technology is used as a tool to facilitate teaching and how medical students are taught to use technology in the clinical setting. For each perspective, a survey of literature, published from 2009 to 2019, was conducted to understand the current state. Authors critically examine the current state and describe and analyze issues with it. Recommendations are made for improving the blending of medical education, technology, pedagogy, and clinical practice. The narrative in this chapter is at the intersection of digital technology, educational theories, and medical settings (educational and practice).

INTRODUCTION

Over the past 20 years, we have seen a convergence and an acceleration of the digital and information revolutions. Higher education, including medical schools, has not been immune to these revolutions. It is slowly, some would say in the face of strong resistance (Howard, 2013; Johnson, Wisniewski, Kuhlemeyer, Issacs, & Krzykowski, 2012), adapting to how curricula are shaped, pedagogies are evolved, and instruction and training are delivered (Orr, Weller, & Farrow, 2018). At the same time, encouraged by regulations and the need to manage costs and demonstrate quality outcomes, the clinical workplace is spending on technology at a feverish pace (Rossini, 2018; Sullivan, 2018). The clinical workplace now demands skills in utilizing digital tools and instruments, as well as competence in evaluating, understanding, and analyzing information. The AMA (2019a) considers “preparing future physicians to provide

DOI: 10.4018/978-1-7998-1468-9.ch020

care in the modern, technology-driven health care environment” as one of its mandates. Consequently, the inclusion of applications of technology in medicine and health information in medical curricula has been seen as a foregone conclusion for some time (Stead, Searle, Fessler, Smith, & Shortliffe, 2011; Triola et al., 2010).

Having come of age as digital natives, the millennial generation (born 1981-1996) of medical students are active users and adopters of digital devices and social media (Rideout, Foehr, & Roberts, 2010; Smith & Anderson, 2018). Additionally, most have seen the incorporation of technology in their secondary and tertiary educations, such as course presentation (white boards, online courses), content accessibility (eBooks, podcasts, digital open-source materials), and communicative applications (online gradebooks, e-Portfolios, course and learning management systems) (U.S. Department of Education, 2019). Incorporation into teaching activities of cutting-edge innovations, such as virtual reality (VR) devices and 3D printers, is steadily getting a foothold in high schools and colleges across the country (Griffith, de Cataldo, & Fogarty, 2016; Horton, 2017; Misak, 2018; Smiar & Mendez, 2016; Wood, 2018). These prior exposures to the use of technology in academic settings, the daily immersion in digital media, and facility in using digital devices, as well as the generational characteristics (Berk, 2009), are implicated in the millennial medical students’ expectation, attitude, and usage of learning technologies (Chen & Scanlon, 2018; Roberts, Newman, & Schwartzstein, 2012).

Developing learning curricula that incorporate technology for learning and teach technological competencies for future work is seen as crucial. Accordingly, in this chapter we explore technology adoption in undergraduate medical education (UME) from two perspectives of using technology to teach medical students and teaching students about the technology used in the practice of medicine. One views technology as a teaching tool, the other as the tool of trade. After providing a brief background, we review the current state of each perspective through key factors influencing the adoption of technology, and through real examples and cases. Subsequently, we present our understanding of controversies and issues leading to the discussions and arguments of the central theses of the chapter. Finally, we bring these two perspectives together under recommendations and conclusions. The overall organizing framework of this chapter is depicted in Figure 1.

BACKGROUND

In writing this chapter, we surveyed the literature in the use of technology deployed in the North American UME published in the past decade (2009-2019). The intention was not to do a systematic review, but to gain an understanding of research related to the following:

- Influences that drive technology adoption in UME.
- Context-specific challenges, needs, and issues the use of technology was intended to solve.
- Descriptions of technology implementation and utilization.
- Pedagogical justifications that were presented, and how technology was integrated in the course design and learning/teaching context.
- Descriptions of how technology solutions addressed the issues and how their impact was evaluated within a learning/teaching context.

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