

## Chapter 3.24

# Technology in Primary and Secondary Medical Education

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### **ABSTRACT**

There is an increasing need for cost control and improved outcomes in both primary and secondary medical education. This chapter reviews the characteristics of medical learners and summarizes shortcomings of traditional medical training that may be amenable to technological intervention. Technologies useful for educating medical students and practicing physicians will be described along with examples pertaining to each technology. The chapter concludes with a summary of potential barriers to the adoption of medical education technology.

### **INTRODUCTION**

Doctors spend the first years of their career completing an intensive primary medical education. Sadly, this primary medical training can become obsolete in a remarkably short time; new products and research constantly change the definition of “best medical practice.” Consequently, second-

ary training—usually referred to as continuing medical education or CME—is also an important component of a complete medical education.

Medical education presents some unique challenges for curriculum design. Further, ample evidence suggests that the traditional medical curricula could be considerably improved upon. In developing new approaches to clinical training, medical educators draw from a rich field of theory and evidence about professional education in other arenas. These generalizations tend to be quite successful when the source material was designed for learners with similar qualities; they can be stunningly unsuccessful when the two learner populations differ. The first section in this chapter describes qualities of medical learners that may be relevant to instructional design, and the following section outlines barriers to successful learning in a traditional medical education setting.

The next section describes technologies that hold particular promise for solving specific medical education challenges. Examples of successful implementations provide concrete examples of these technologies in action. In recent years, a

broad variety of technical tools has been employed in an effort to provide cheaper, more accessible, and more effective medical training. However, the application of technological tools in medical education is not without controversy, and the chapter closes with a discussion of some barriers to medical education technology implementation.

## **THE MEDICAL LEARNER**

As noted, medical education begins with an intensive primary training and ongoing learning that continues throughout the physician's career. Medical learners at any stage share some common characteristics, but important differences between the two groups may influence which educational approach is most successful.

## **DEFINITIONS**

*Primary medical education* describes the period in which the future physician builds a knowledge base *de novo* and learns to apply that knowledge effectively (D'Eon & Crawford, 2005). Learning tasks during medical school are both didactic and experiential; the student absorbs a fund of knowledge and also masters a repertoire of procedural skills. Generally, the student begins with a heavily didactic course load, which transitions to a primarily experiential curriculum by the end of his training.

*Secondary medical education* refers to the ongoing efforts of a practicing physician to renew and update his or her knowledge and skills. Because medical practices change over time, most licensing organizations require doctors to complete ongoing medical education—although the content and format of this education is often not specified. Thus, the main educational tasks a practicing physician faces are the identification

of knowledge deficiencies, and the selection of appropriate training to correct those deficiencies (Curran & Fleet, 2005). In response to that need, the physician will find a selection of continuing medical education programs offering a variety of educational content and structure.

The formal medical education process begins with university and/or medical school, then proceeds through a series of additional training steps, which may include internship, residency, public service, and fellowship training. At some point, a transition from “medical student” to “doctor” occurs. Studies of the medical education process suggest that the transition occurs as a dramatic step, rather than a gradual evolution (Prince, Van De Wiel, Scherpbier, Can Der Vleuten, & Boshuizen, 2000). Unfortunately, the exact timing of this transition is unclear and may differ from student to student. Thus, one of the major challenges in medical education is determining whether an educational tool should be optimized for the primary or secondary learner.

## **Common Characteristics**

For both primary and secondary medical training, the designer can count on at least some commonality among medical learners. All are adult learners—no nation trains children to be physicians. For most, a record of academic achievement encourages robust self-efficacy for medical learning tasks. The direct applicability of the material provides an inherent motivation to learn. And, the learning content is all drawn from a finite, if large, pool of knowledge.

## **Considerations for Primary Medical Education**

Superficially, curriculum design at the medical school level is simplified by a reasonably uniform body of learners and by a fairly universal cur-

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