Chapter 4
Designing Simulated Learning Environments and Facilitating Authentic Learning Experiences in Medical Education

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ABSTRACT

The purpose of this chapter is to provide some practical guidance and theoretical basis on designing simulated learning environments to researchers and instructional designers, medical educators, instructional design students, and others who are committed to improving learning and instruction in medical education. This chapter will benefit those who are interested in designing simulated learning environments and facilitating simulated learning experiences in instructional settings. The chapter first defines various types of simulations and their cognitive functions in support of students' authentic learning experiences. Following this, the chapter highlights critical components for designing simulated learning environments, including identifying learning objectives, developing problem scenarios, and facilitating students' learning experiences. It is hoped that this chapter will be a useful tool and resource for medical educators, researchers and instructional designers, and graduate students who are pursuing an advanced degree in instructional design and technology.

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INTRODUCTION

Simulations have been regarded as the most prominent innovation taking place in medical education over the past decade (Passiment, Sacks, & Huang, 2011). They have been used as a pedagogical method for training in both medical schools and teaching hospitals. As many as 91% of emergency residency programs use simulations to train their residents (Okuda, et al., 2008). According to the American Board of Anesthesiology (2016), simulator-based education is required for Maintenance of Certification in Anesthesia. It is clear that simulations have become "a central thread in the fabric of medical education" (McGaghie, Issenberg, Petrusa, & Scalese, 2010, p.51).

Simulations are defined as a model that represents a certain phenomenon or activity that allows learners to acquire knowledge by interacting with the model (Alessi & Trollip, 2001). The definition is further contextualized in medical education by being referred to as a method "to replace or amplify real patient experiences with scenarios designed to replicate real health encounters" (Passiment, Sacks, & Huang, 2011, p.35). In today's medical field, where there are increasing concerns about patient safety and quality of care as well as increasing outpatient treatment, simulations have become a means to bridge classroom instruction and actual clinical environments (Okuda et al., 2009).

Simulations offer advantages that may not be readily available in real patient encounters or through other media or instructional methods. First, simulations can emulate and reproduce patient physiology and physiological responses, even those of rare conditions that may not be available in real-life encounters, and allow learners to engage in repeated trials and errors (Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005). Second, during repetitive practice, learners are also able to receive immediate and directed feedback through debriefing and discussion, especially for errors they make, while such teaching rarely takes place in reality due to legal concerns (Okuda et al., 2009). Third, simulations afford opportunities to train and assess competencies holistically in multiple domains, which facilitates transfer of learning to clinical settings. Fourth, many problems in medical education are complex and ill-structured, and simulations can help students build mental models and represent problems (Feltovich, Spiro, Coulson, & Feltovich, 1996). Through a carefully designed simulated learning environments, learners are able to acquire important teamwork and communication skills, in addition to basic science and clinical knowledge and skills. Fifth, simulations can present patient cases in a time efficient manner, which enables a focused learning experience (Alessi & Trollip, 2001). Lastly, simulations often gives trainers the flexibility to adjust levels of difficulty, which leads learners progressively through the trajectory of target competencies (Issenberg et al., 2005).

With the aforementioned advantages and the effectiveness of simulation-based medical education (e.g., Issenberg et al., 2005; McGaghie, Issenberg, Cohen, Barsuk, & Wayne, 2011; Okuda et al., 2009), there is an increasing motivation for medical educators to incorporate simulations in instruction. However, designing and delivering a simulated learning environment presents challenges to many medical educators and instructional designers. Part of the challenges comes from the complexity of designing learning environments, and part of the challenge is due to the lack of experiences in facilitating students' learning experiences that fully take advantage of simulations. As Okuda et al. (2009) stated, "simulators do not replace good educators" (p. 339); rather, instructors should play an essential role in facilitating, guiding and motivating learners (McGaghie et al., 2010). Indeed, the lack of faculty training in skillful use of simulations and debriefing has been identified as some of the major barriers to the effective use of simulation in medical education (Okuda et al., 2008; Okuda et al., 2009).