Chapter 3
Simulation in Health Professional Education

David Kaufman
Simon Fraser University, Canada

ABSTRACT

This chapter begins with a definition of "simulation" and outlines simulation attributes. It then discusses the purpose of simulations, distinguishing and illustrating their various categories and forms in medical and health professional education, and describes their benefits, limitations, and ways to use them effectively. The elements of effective simulations for learning, and why these are important, are then explained. To illustrate these concepts, the chapter concludes by describing health-related simulations developed in the SAGE for Learning project, including COMPS, a collaborative online multimedia problem-based simulation; COMPSoft, a software environment for creating cases and allowing learners to work through them online; HealthSimNet, a simulation for HIV/AIDS patients and professionals to experience navigating the health care system; and MIRAGE, a psychiatry prototype for medical students.

INTRODUCTION

Simulations have long been used as training tools in many health disciplines in which "live" repetitive practice is difficult, costly, or risky; examples include simulated patients for medical diagnosis and treatment, organ dissection models, and computer-based clinical cases. This chapter presents an overview and examples of simulations for health professional education. It begins with a general definition and purpose of simulations, distinguishing and illustrating their various categories and forms in medical and health education and describing their benefits, limitations, and ways to overcome the latter. It then reviews the elements of effective simulations for learning and explains why these are important. To illustrate these concepts, it describes several health-related simulations developed in the *SAGE for Learning* project. These examples include *COMPS*, a collaborative online multimedia

DOI: 10.4018/978-1-61520-731-2.ch003

problem-based simulation; *COMPSoft*, a software environment for creating cases and allowing learners to work through them online; *HealthSimNet,* a simulation for HIV/AIDS patients and professionals to experience navigating the health care system; and *MIRAGE*, a psychiatry prototype for medical students.

BACKGROUND

Definition of Simulation

As noted in Chapter 1, there has long been a conceptual confusion about, and consequent misuse of, the terms game, simulation, and simulation game. To distinguish clearly among these often-confused ideas, we begin with the following definitions (Crookall, Greenblat, Coote, Klabbers & Watson, 1987; Garris, Ahlers, & Driskell, 2002; Sauvé, et al, 2005a; Sauvé, Renaud, Kaufman, & Sibomana, 2008; Stolovitch, 1981):

- **Games:** Activities that do not attempt to replicate reality, have clearly defined sets of rules including scoring systems, and produce winners and losers
- **Simulations:** Activities that include exploration and practice within models of reality, but without competition, scoring, and winners/ losers
- **Simulation games:** Games that are based on simplified but dynamic models of aspects of reality

We have found that these distinctions are necessary for a conceptual framework that relates these distinct types of activities to their impacts on learning.

Prensky (2004) asserts that simulation is, by definition, pretending (p. 1), and that the one universal truth about any simulation is that at its center lies a model (p. 2). Sauvé, Renaud, and Kaufman, in Chapter 1 of this book, elaborate by explaining that the essential attributes of educational simulations are the following: a model of reality defined as a system; a dynamic model, a simplified, precise and valid model, and a potential for fostering the understanding of the reality that the model represents. A model is first defined as an abstract or concrete representation of a real system in which components are clearly specified. Such a model is based on reality as defined by the perception which an individual has of a system, an event, a person or an object.

However, McGee (2006) asserts that a simulation is more than simply a model with which the learner interacts. Simulations provide a framework for learners to build on their existing knowledge and augment existing cases that they already have stored in their memory. They provide an experience where learning is both interactive and dynamic. It is difficult, if not impossible, to model the world completely in enough detail to replicate reality. However, Schank and Cleary (1995) note that the technology is becoming advanced enough that in a specific context it can make learners believe that they have encountered an accurate representation of reality, allowing them to act virtually in a way that is similar to how they would act in the real world.

As noted in Chapter 1, "fidelity" is defined as "the degree of similarity between the training situation and the operational situation which is simulated." It is a two-dimensional measurement of this similarity in terms of: (1) physical characteristics - visual, spatial, kinesthetic, etc.; and (2) functional characteristics, for example, "the informational, stimulus, and response options of a training situation" (Hays & Singer, 1989, p.50). The notion of validity refers to the degree of uniformity and coherence in the environment specifications in comparison to reality (Garris et al., 2002). In other words, the results obtained by simulations have to be the same as those obtained in the real world, with the system serving as a model for the simulation.