

# Chapter 27

## Social Simulation and its Process in Learning

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### ABSTRACT

*Simulation has been applied in the fields of computers, engineering, entertainment, healthcare, education, training, etc. Much research on simulation uses computerized programs to imitate real objects or to visualize hypothesized objects. Due to the complex features of social societies, and the non-linear features of knowledge in the social context, it is somewhat rigid for learners to use computerized simulation programs to understand social activities. Therefore, the purpose of this chapter is to discuss simulation in the social context. The author first introduces the background of simulation. Then she discusses non-computerized social simulation and the process of how to apply social simulation in practice. Finally, the author points out the future trends of simulation.*

### INTRODUCTION

What is simulation? Did you know that the airplane was inspired by the flight of birds? Have you been to Disneyland — A simulated, fictionalized version of a perfect world? Did you watch the movie called Bicentennial Man, a story about how a robot was created by simulating human beings? It in turn simulated and learned from human beings, and in the end, it became a human being? These examples vividly capture the features of simulation which have been described by some scholars. For example, Doran and Gilbert (1994) thought that simulation is to construct a model which is similar to the target and can present the target.

They recommended that in a situation where it is difficult to directly study the target, we can study how the model works. This is what we called the simulation of the target. Winsberg (1999) defined simulation as a process of articulating a model that represents a similar structure in resonance with some phenomenon. Some scholars viewed simulation as a process of designing, and practicing a model generated from the representational structure of the real world and adapting the model to the specific contexts (Churchill, 2007; Eskrootchi & Oskrochi, 2010; Smith, 1998; Vescoukis, Retalis, & Anagnostopoulos, 2003). Chang (2010), from the perspective of knowledge construction, defined simulation as a process of how people gain

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knowledge suitably analogous through a process of observing the target, imitating the main features of the target, and adapting some features of the target to a new context. Shannon (1977) defined simulation as “being experimentation via a model to gain information about a real world system” (p. 37). These definitions reflect the imitation nature of simulation. “The important point about a model is that it must be designed to be similar to the target in structure and behavior” (Gilbert, 1993, para. 2). For example, computerized mannequins are the simulated models which are similar to real patients in their body structures. Students in nursing education can use mannequins to practice the clinical skills and to gain the knowledge which would otherwise be inconvenient to do in a real clinical environment.

The studying of simulation has a long history which goes back to the eighteenth century of the precomputer era (Goldsman, Nance, & Wilson, 2010). Nowadays, simulation has been applied in the fields of computers, engineering, entertainment, healthcare, education and training (Smith, 1998). Much of the research on simulation has used computerized programs to imitate real or to visualize hypothesized objects that do not exist (Field, 2009; Hartmann, 1996; Klopfer & Yoon, 2005). One of the limitations of a computerized simulation program is that it is designed by its researchers and learners using it only do what the computerized simulation is programmed to do. There can be as many scenarios and as many outcomes to a simulation as there are learners, since everyone has different experiences and may react differently to a given set of circumstances; but in computerized simulation programs, researchers cannot possibly foresee all the possible outcomes of a modelled scenario. Social simulation, however, can accommodate this limitation (For the convenience of the discussion, I will refer to simulation in the social context as social simulation). A dynamic simulation model in the social context can adapt to the needs of the learners and the expectations of instructors, while at the same

time lead learners in directions which the researchers of the simulation model had not envisioned. This is because each social simulation model is unique and depends not only on the information input into the scenario by researchers, but also on the learners’ interests and responses.

For the purpose of gaining knowledge through simulation, in a computerized simulation learning environment, participants usually learn knowledge by reacting to the program designed by the researchers. However, this approach cannot reflect the complex and non-linear features of knowledge in an open social context, a context which is open, natural and not controlled by the researchers. Therefore, some researchers have studied simulation in the social context, in which learners actively engage in the real world and socially interact with the real object they want to simulate from (Hamilton, 2008). However, due to much fewer studies on simulation in the social context, the purpose of this paper is to discuss simulation in the social context. Specifically, at the beginning of this chapter, I will introduce the background of simulation in order to place social simulation in a broader context. Then I will discuss non-computerized social simulation and discuss the process of how to apply social simulation in practice, and how we can simulate a social entity in a non-computational and non-statistical social learning context. Finally, I will point out the future trends of simulation.

## **BACKGROUND**

Simulation is broadly used for the purposes of training, evaluation, testing, prediction, assessment, planning, forecasting, etc. (Shannon, 1977). Learners can simulate knowledge from people, from daily life, from animals, or from the cultural and historical heritages (Chen & Howard, 2010; Vescoukis, Retalis, & Anagnostopoulos, 2003). The topic of simulation has been studied by scholars in different fields from a variety of per-

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