Chapter 1.10
Games, Simulations, and Simulation Games for Learning:
Definitions and Distinctions

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ABSTRACT

The authors of this chapter carried out a systematic review of the literature from 1998 to 2008 with the goal of developing conceptual definitions of *game*, *simulation*, and *simulation game* based on their essential attributes. This chapter first describes the motivation for this project and its methodological approach. It then introduces the databases consulted, and the analysis grid used. Finally, it presents the review results, which suggest a differentiation among games, simulations and simulation games. This analysis is intended to improve the precision of future research studies concerning the effects on learning of games, simulations, and simulation games.

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INTRODUCTION

It is striking to note that, despite many studies, researchers and theoreticians do not always agree on precise meanings for the concepts of *game*, *simulation* and *simulation game*. Research to date on the learning efficacy of games, simulations and simulation games has suffered from an absence of clear concept definitions, comparing very different tools and activities without distinguishing among them. This has produced indecisive and sometimes divergent results. To attempt to remedy this methodological weakness, we carried out a systematic literature review to establish definitions and articulate the essential attributes of games, simulations, and simulation games (Sauvé et al., 2005), relating these definitions to the learning-oriented concept of *serious games.*

As seen in the examples of Crookall (1995); de Freitas, Savill-Smith, and Attewell (2006); Feinstein, Mann, and Corsun (2002); Kirriemuir and McFarlane (2004); Jones (1998); Sauvé (1985); Sauvé and St-Pierre (2003); and Wolfe and Crookall (1998), it is clear that the absence of consensus on terminology has led to contradictory research results on learning from games, simulations and simulation games. Since our larger project aims at examining the efficacy of games, simulations, and simulation games for learning, it is important to clearly define these concepts and to articulate their essential attributes.

It is not, however, easy to establish the critical attributes of these three types of activities when we are confronted with a plethora of definitions. Certain authors, notably supporters of *serious games* (e.g., Alvarez, 2007) opt for treating games and simulations as similar activities, emphasizing their technological attributes and the application domains in which they are used. Others identify certain characteristics (e.g., competition, risk, fantasy and suspense) which are more relevant to the spirit of game (Lhôte, 1986) or to motivation[1] (Rieber, 1996) than to the concept itself. Others describe them from a purely technology or mathematical perspective (Landry, 2003)[2]. Finally, many authors experiment with activities that they describe as games or simulations without defining them (e.g., Hunsaker, 2007; Mzoughi, Herring, Foley, Morris, & Gilbert, 2007). These practices reaffirm the importance and relevance of proposing essential attributes for games, simulations, and simulation games (Sauvé, Renaud, Kaufman, & Marquis, 2007).

To attempt to remedy this methodological weakness, we carried out a systematic literature review to establish definitions and articulate the essential attributes of games, simulations and simulation games (Sauvé et al., 2005). According to Larousse en-ligne (www.larousse.fr), an attribute is defined as *"that which belongs, that which is inherent to something."* We understand an essential attribute to be a characteristic or specific property which describes the element; without this property, the element is no longer recognized as such. We address the essential attributes in this chapter. In the first section, six critical attributes of educational games are examined: (1) player(s), (2) conflict, (3) rules, (4) predetermined goal(s), (5) artificial character, and (6) educational character. In the second section, five attributes of educational simulations are explained: (1) a model of reality defined as a system, (2) dynamic, (3) simplified, (4) having validity, and (5) having an educational purpose. In the third part, four attributes of educational simulation games are described: (1) a simulation (model of a real or fictitious, simplified and dynamic system); (2) players in competition or cooperation; (3) rules; and (4) educational character. Simulation games are then related to "serious games" as the term is now being used in the literature. In conclusion, a distinction will be made among the three concepts.

EDUCATIONAL GAMES

The literature on video games and serious games does not distinguish between games, simulations and simulation games[3] (Usta, Akbas, Cakir, & Ozdemir, 2008). Acknowledging that the essential attributes of a game are still very controversial, and that many authors define games to include attributes of a simulation, we base our argument, for the purposes of this chapter, on the authors who distinguish among the terms "game," "simulation," and "simulation game."

According to Stolovitch (1983), four essential properties define a game: *contrivance, conflict, control,* and *closure*. In other words, a game describes a fictitious (contrived) situation in which players are in position of conflict either with others or against outside forces, where rules provide a control structure for player actions, and where players pursue the purpose of winning (closure). Chamberland, Lavoie and Marquis (1995) define a game as an "interaction of learners in an activity