Chapter 2
Effective Educational Games

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ABSTRACT

This chapter argues that although educational games have not always been taken seriously, they are forms of play that offer strong interactive communication support and should be a component of 21st century education. It reports on a systematic review of studies highlighting the game elements that support motivation and learning: repetition, learning content segmentation, feedback, challenge and competition, active participation in learning, teamwork, and interaction, and illustrates these mechanisms with examples.

INTRODUCTION

The game as a learning tool was first defended by thinkers such as Aristotle and Plato. It is to the latter that we owe this advice to teachers: "Do not use violence on children, but rather see that they educate themselves through play" (Rabecq-Maillard, 1969, p. 4). "It is interesting to note that the Romans gave to *school* the same name that they game to *game*, that is *ludus*." (Chamberland & Provost, 1996, p. 8).

Educational games are not always taken seriously. While they do involve play, today's games are highly interactive, communication-supported tools that should not be dismissed in 21st -century education. For example, their sound, image and animation capabilities are very useful for illustrating complex situations while maintaining playfulness. In addition, online games offer to the digital generation opportunities to practice inductive reasoning, increase visual skills, and improve their capacity to integrate information from various sources. Games also allow players to resolve cognitive conflicts through a constant cycle of hypothesis, testing and revision, (Van Eck, 2006). It appears that there are numerous game mechanisms that can lead to learning.

This chapter presents a synthesis of studies highlighting game characteristics which motivate

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and support learning, responding to the cognitive styles of digital-era students. These characteristics include, notably: practice, segmentation of learning content, feedback, competition and challenge, active learner participation, teamwork, and interaction. These mechanisms make possible the use of a socioconstructivist pedagogy (De Grandmont, 2005), as outlined in Quebec's new primary and secondary education program.

The notion of "game," along with simulation and simulation game, is defined and discussed in Chapter 1 of this volume. This chapter focuses specifically on games, with emphasis on those delivered online. Unless noted otherwise, our examples are frame games developed for the *Carrefour virtuel de jeux éducatifs / Educational Games Central* (http://egc.savie.ca) at la Société pour l'Apprentissage à VIE (SAVIE) (www.savie.qc.ca).

DEFINITIONS

Before discussing game mechanisms and learning, we define what we understand by learning and motivation.

Learning

"Game" and "learning" are terms that are regularly linked in the research literature. Games are studied from multiple perspectives in connection with knowledge acquisition and transfer; they are considered as favoring learning (described as tools for active participation by the learner, knowledge structuring and integration, information gathering and communication, etc.), or, conversely, as obstacles to learning. To unravel this controversy, we must understand what we mean by learning through games.

Learning is the acquisition of knowledge, attitudes and skills with the help of experience, practice, or study. Learning is a particularly complex act; a learning situation includes not only a specific environment, but also a person's individual characteristics. Learning means not only modifying behavior, but also, and especially, changing the meaning which we give to our experience. Cognitive psychology helps us to better understand the active role played by the person in a learning situation, as much in the effectiveness of his learning strategies as in the representations used to give meaning to activity. The socioconstructivist approach also demonstrates the important roles of both knowledge organization in memory and social interactions in the elaboration of new knowledge. All these aspects of learning are supported in an effective educational game.

INTERNAL AND EXTERNAL CONDITIONS

Among various learning activities, the game joins the case study, simulation, simulation game, project approach, and collaborative learning as an active educational method. Game mechanisms can create powerful conditions for individual learning. Motivation is the preliminary condition and foundation for the learner's engagement in the learning process; we examine motivation in more detail below. Aside from motivation, two sets of conditions for learning are important: internal and external (Sauvé & Chamberland, 2000).

Internal Conditions

Three sets of internal conditions refer to factors that the learner brings to the learning process. First are the user's *prior knowledge and experience,* which provide knowledge, competencies, and behaviors that must be exploited for learning. The more a game requires the learner to draw from and apply this prior learning, the more knowledge will be strengthened. For example, a game on sexually transmitted infections will appeal to the player's knowledge and experience to answer various