Chapter 11
VISOLE:
A Constructivist Pedagogical Approach to Game-Based Learning

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ABSTRACT

VISOLE (Virtual Interactive Student-Oriented Learning Environment) is a constructivist pedagogical approach to empower computer game-based learning. This approach encompasses the creation of a near real-life online interactive world modeled upon a set of multi-disciplinary domains, in which each student plays a role in this "virtual world" and shapes its development. All missions, tasks and problems therein are generative and open-ended with neither prescribed strategies nor solutions. With sophisticated multi-player simulation contexts and teacher facilitation (scaffolding and debriefing), VISOLE provides opportunities for students to acquire both subject-specific knowledge and problem-solving skills through their near real-life gaming experience. This chapter aims to delineate the theoretical foundation and pedagogical implementation of VISOLE. Apart from that, the authors also introduce their game-pedagogy co-design strategy adopted in developing the first VISOLE instance—FARMTASIA.

INTRODUCTION

The young generation loves computer games (Prensky, 2006). Even if computer gaming is prohibited at school or at home, youngsters will make all attempts to conduct this beloved activity somewhere else, such as game arcades, cyber cafés, or even game sellers' free demo machines on the streets. This "addiction" has been one of the common premises of various studies on harnessing games[1] in education in recent decades (e.g., Adam, 1998; Bisson &

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Lunckner, 1996; Bowman, 1982; Buckingham & Burn, 2007; Cameron, 2008; Crookall & Saunders, 1989; Gredler, 2004; Hub, 2008; Malone, 1980, 1981; Squire, 2005).

Most of the early research of game-based learning focused on investigating what, why, and how gaming can make the process of learning more interesting (e.g., Bowman, 1982; Malone, 1980, 1981). The basis of those studies was the ability of games to let players have fun and enjoyable experiences. Fun and enjoyment are essential elements in the process of learning as students can be more relaxed and motivated to learn (Bisson and Luncker, 1996). Players always undergo hard but engaging, challenging but pleasurable, and risk-taking but rewarding experiences in gaming (Prensky, 2001). All these are the experiences of fun and enjoyment.

In recent years, along with the advancement of gaming technology, the focus on game-based learning has shifted onto the issue of how to harness the ability of games to sustain spontaneous players' engagement and exploit proactive players' communities for students' constructivist learning (e.g., Aylett, 2006; Egenfeldt-Nielsen, 2007; Lee, Lee & Lau, 2006; Gee, 2003, 2005; Prensky, 2001, 2006; Shaffer, 2006; Squire, 2005). For example, Adam (1998) and Squire (2005) studied the opportunities to utilize some prevalent recreational games in the commercial market for activity-based learning at school. Shaffer (2006) and his colleagues developed a number of *epistemic games* for students to participate in simulations of various professional communities in a self-directed manner. Lee, Lee, and Lau (2006) proposed *Folklore-based learning* which portrays a new design paradigm of educational games. Apart from that, in this chapter, we introduce *VISOLE* (Virtual Interactive Student-Oriented Learning Environment)—a constructivist pedagogical approach to game-based learning. In VISOLE, we adopt a game-pedagogy co-design strategy for facilitating students' multi-disciplinary knowledge acquisition and problem-solving skill enhancement. We also emphasize the importance of teachers and their roles therein.

After the introduction, the rest of the chapter is organized as follows. Firstly, we discuss the background of game-based learning and some recent research foci in the domain. After that, we delineate the theoretical foundation and pedagogical tactic of VISOLE, followed by a description of FARMTASIA—the first instance of VISOLE. Further, we discuss some emerging issues of game-based learning, before our concluding remarks are given.

BACKGROUND

The discussion of harnessing games for teaching and learning has started since the widespread popularity of Pac-Man in the early 1980s (Squire, 2003). Without doubt, the "games" discussed in most of today's game-based learning research are quite different from the ones that were used in education in the last few decades. The differences are not only in games' technical enhancement (e.g., more sophisticated 3D user interfaces, dynamic synchronous players' interaction, etc.) brought by the advancement of technology, but also their underpinning learning philosophy, shifting from behaviourism (Rachlin, 1991; Skinner, 1938) to constructivism (Bruner, 1960; Papert, 1993; Piaget, 1964, 1970).

Behaviourist Game-Based Learning

Behaviourism was the dominating learning philosophy adopted in the design of so-called "educational games," when games were introduced to education initially (Egenfeldt-Nielsen, 2007). The behaviourist conception in education advocates that a human's mind can be treated as a black box (Skinner, 1938). The workings inside this black box need not be uncovered. The study of learning should focus only on observable events (i.e., stimuli and responses). Through practice students