Chapter 14
Constructivist Learning Through Computer Gaming

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ABSTRACT
Apart from the ability of computer games to make learning more interesting, a number of researchers and educators have been exploring other educational potentials of computer games. In parallel with the advancement of computer and information technology and the advocacy of constructivism in education, the issue of harnessing computer games to create new constructivist learning opportunities has received attention in both education and game research domains. This chapter is aimed at giving an introduction to computer game-based learning. Besides discussing computer games’ intrinsic educational traits favouring constructivist learning from different perspectives, the authors also review a number of instances of two recent foci in the game-based learning domain. The first one is education in games that involves the adoption of existing recreational games in the commercial market for educational use. The second is games in education that entails designing and developing educational games articulated with different constructivist learning paradigms or pedagogical approaches.

DOI: 10.4018/978-1-60566-934-2.ch014
INTRODUCTION

Computer games have become an important part of the leisure lives of young generation (Kirriemuir & McFarlane, 2004; Newman, 2004). This attention has been one of the common premises of various research on harnessing games in education for these decades (e.g., Adam, 1998; Betz, 1995; Bowman, 1982; Buckingham & Burn, 2007; Cameron, 2008; Egenfeldt-Nielsen, 2007; Gredler, 2004; Jong, Shang, Lee & Lee, 2006, 2007; Lee, Lee & Lau, 2006; Malone, 1980, 1981; Mason & Moutahir, 2006; Squire, 2003, 2005; Shaffer, 2006).

Along with the advancement of multimedia, gaming, and Internet technology, as well as the pervasive promotion of student-centredness in education, the focus of game-based learning has been shifting from its original purpose of “sugar-ing” the process of learning onto today’s purpose of offering students constructivist learning experiences. A number of contemporary game-based learning researchers have been endeavouring to investigate how to employ the intrinsic educational traits of games for exploiting new constructivist learning environments. In general, their work can be categorized into two main research foci, namely, (1) education in games, and (2) games in education. The former adopts existing recreational games in the commercial market for educational use, while the latter designs and develops educational games articulated with different constructivist learning paradigms or pedagogical approaches.

In this chapter, firstly, we discuss what and how the intrinsic traits of games can promote constructivist learning. After that, we review a number of instances of the recent research foci in the game-based learning domain. Further, we give an introduction to our recent game-in-education work, before our concluding remarks are given.

INTRINSIC EDUCATIONAL TRAITS OF GAMES

The discussion of utilizing games for learning and teaching 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). In direct contrast to behaviourist education, constructivist education emphasizes that students should construct knowledge on their own. Students’ learning is not imposed simply by conditioning and reinforcement, but rather a cognitive and socio-cultural interaction in an engaging and authentic learning environment (Otting & Zwaal, 2007).

Initiating and sustaining students’ learning motives through gaming has been one of the significant research areas of game-based learning (e.g., Bowman, 1982; Cordova & Lepper, 1996; Malone, 1980, 1981; Martens, Gulikers & Bastiaens, 2004). More recently, researchers in the domain (e.g., Aylett, 2005; Gee, 2003, 2005; Kirriemuir & McFarlane, 2004; Mason & Moutahir, 2006; Prensky, 2001, 2006; Shaffer, 2006; Squire, 2005) have also argued that the underlying cognitive and socio-cultural features of games can offer various “educative” opportunities to students. In the following, we will discuss games’ intrinsic educational traits that promote constructivist learning from the motivational, cognitive and socio-cultural perspectives.