

Chapter 3

Mastering Educational Computer Games, Educational Video Games, and Serious Games in the Digital Age

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ABSTRACT

This chapter explains the overview of educational computer games; the reward and feedback systems in educational computer games; the significance of educational computer games in the digital age; the aspects of educational video games; the multifaceted applications of educational video games; the perspectives on serious games; the design of serious games in educational settings; the applications of serious games in the health care industry; and the challenges of serious games in the digital age. The applications of educational computer games, educational video games, and serious games are essential in educational institutions that seeks to serve teachers and students, increase educational performance, enhance competitiveness, and fulfill accomplishment in global education. The chapter argues that utilizing educational computer games, educational video games, and serious games has the potential to improve educational performance and reach strategic goals in the game-based learning environments.

INTRODUCTION

Gamification of learning material has received much interest from researchers in the past years (Szegletes, Koles, & Forstner, 2015). Educational computer games and gaming have become a popular strategy for learning, being implemented in educational contexts in many countries and worldwide research has been conducted to examine the effect of games and gaming (Egenfeldt-Nielsen, Smith, & Tosca, 2008). Educational computer games offer potential and opportunities for learning (Vangsnes, Økland, & Krumsvik, 2012).

DOI: 10.4018/978-1-5225-1034-5.ch003

Like many rapidly growing industries, advances in educational video game technology are far outpacing research on its design and effectiveness (Hirumi, Appelman, Rieber, & van Eck, 2010). Video games, as technological and cultural artifacts of considerable influence in the contemporary society, play an important role in the establishment of educational identities (Muñoz & El-Hani, 2012). Video games can offer immersive experiences in which players solve problems (Squire, 2013). The increasing body of evidence supporting the application of educational video games in educational settings considerably pushes their deployment across the different areas of the educational system (Torrente, Freire, Moreno-Ger, & Fernandez-Manjon, 2015).

Serious games are rapidly gaining acceptance and represent a promising educational tool for the near future (Johnson, Adams, & Cummins, 2012), as evidence proving positive impact on students' achievements (Sadler, Romine, Stuart, & Merle-Johnson, 2013) and motivation continues to grow (Hwang & Wu, 2012). Serious games are defined as digital games that educate, train, and inform students (Khenissi et al., 2015). With the ubiquity of video game play and advent of new consumer-level physical interfaces for video games (e.g., the Nintendo Wii Fit balance-board and the Microsoft Kinect), serious games (i.e., games whose primary purpose is education and training), are able to provide players with interactive techniques that are highly engaging and immersive (Williams-Bell, Kapralos, Hogue, Murphy, & Weckman, 2015).

This chapter aims to bridge the gap in the literature on the thorough literature consolidation of educational computer games, educational video games, and serious games. The extensive literature of educational computer games, educational video games, and serious games provides a contribution to practitioners and researchers by describing the multifaceted applications of educational computer games, educational video games, and serious games in the game-based learning environments.

BACKGROUND

Games are defined as an ongoing array of complementary transactions that are superficially plausible but have a practical motivation to maximize payoffs and minimize penalties for the initiator (McIntosh, Dircks, Fitzpatrick, & Shuman, 2006). Games with such interactive interfaces create an environment that bridges between artificial and natural cognitive capabilities, enabling them to work together more efficiently (Nakai et al., 2015). In recent years, there has been a growing interest in educational computer games that enhance learning and teaching in global education (Khenissi, Essalmi, & Jemni, 2015).

Educational computer games can be recognized as artifacts or a cultural pattern that stimulate meaningful immersive experiences (de Freitas & Neumann, 2009). Educational computer games can promote the learning motivation of the learners (Hwang et al., 2013). Different studies show positive effects of the use of educational computer games in the classroom, both in student achievement and attitude toward learning, compared to traditional teaching (Lou, Abrami, & d'Apollonia, 2001). Using these applications, it is possible to develop different learning styles (Connolly & Stansfield, 2007), since the speed and difficulty level can be adjusted according to the profile of each player (Echeverria, Barrios, Nussbaum, Amestica, & Leclerc, 2012).

Video games are quickly becoming a significant part of people's lives (Baldwin & Dandeneau, 2009).

In addition to entertainment, video games are increasingly applied for other purposes, such as education and health (Yuan, Folmer, & Harris, 2011). Research has drawn from the basic psychological needs

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