Chapter 6
Multiplayer Kinect Serious Games:
A Review

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ABSTRACT

Single and multiplayer serious Kinect games have been used in many different areas, including education. Due to its relative newness as a technology, a dearth of literature exists concerning the requirements for the use of Kinect games in educational settings. A comprehensive review was conducted to include various perspectives in order to provide background information on the existing research base that upholds the educational uses of these games. The review was built on empirical and theoretical studies conducted in the area of multiplayer Kinect games. A total of (748) articles were screened and (71) coded. While an abundance of convergent evidence from closely related domains has been produced on the subject, providing a set of recommendations for its proper usage; few studies have focused specifically on the role, development and effects of multiplayer Kinect games in educational settings. The potential for Kinect games to enhance learning experiences within educational contexts is promising; however, care must be taken to account for physical safety, emotional safety, and activity structure. Specific recommendations for addressing these important aspects of the use of multiplayer Kinect games are described in detail in the body of this manuscript.

INTRODUCTION

Serious Games

Serious games technology has become a significant aspect of e-learning (Moreno-Ger, Burgos, & Torrente, 2009). A large number of studies have been conducted on the pros and cons of using video games in education, as both primary pedagogical tools and educational enhancers. While the educational use of

video games has an ample share of both proponents and critics, it must be understood that these games are not all the same. Given the complexity and the range of the types of Kinect games that exist, the recognition that each element of video game design can play a significant role in the effectiveness of a serious game is paramount. It is a mistake and over-generalization to apply the impact of one particular graphic, sound, story, interface, or gaming mechanism to all video games (Kirriemuir & McFarlane, 2004; Sadigh, 2002). Instead, serious attention should be given to the study of the impact of each of these elements on individual players, given that types of and patterns in video games are evolving rapidly in ways not previously imagined.

The evolution of the video game is deeply connected to the evolution of hardware and software— as a rule, the vividness of games increases with the development of new software and hardware. Thanks to new technology, such as MUVE (Multi-User Virtual Environment) and motion controllers, the quality and potential of video games to be educationally impactful has increased and become more sophisticated.

Multiplayer Games

MUVE is a technology that allows players to interact with each other in virtual spaces (Dede, Clarke, Ketelhut, Nelson, & Bowman, 2005). Some examples of MUVE include traditional multiplayer games, Second Life, and massively multiplayer online games (Arslan, 2012; De Roo, Hillier, & Van Wezemael, 2012; Savin-Baden, Tombs, White, Poulton, & Woodham, 2009). Multiplayer games are often used in education to motivate students and enhance learning by creating and fostering a social atmosphere between learners. By using this technology to observe pre-existing dynamics and problem areas, serious games developers can enhance their games, drawing on pertinent social practices and motivational theories, such as modelling and social cognitive theory. Dede and Ketelhut (2003) suggest multiplayer games can help students improve their self-efficacy (perception of their ability to learn), which is related strongly to their achievement behaviours (Schunk, Meece, & Pintrich, 2014). Some projects, such as *River City* (a science curriculum), show the effectiveness of multiplayer games on motivating students with low perceived self-efficacy and improving their expectancies and values in learning (Nelson, Ketelhut, Clarke, Bowman, & Dede, 2005).

Success at engaging learners in a serious game often depends on their perceptions about what it means to use serious games. Serious games developers have to consider several requirements and live up to these requirements in order to reach a state of flow (Csikszentmihalyi, 1990), in which learners become fully involved in their games. The social atmosphere that multiplayer games offer can affect students' perceptions about using serious games. In general, there are several factors that determine students' perceptions of serious games, some of which include "…usefulness, ease of use, learning opportunities, and personal experience with video games in general" (Bourgonjon, Valcke, Soetaert, & Schellens, 2010, p.1145). Recent technologies, such as motion controllers, can contribute to greater social engagement in multiplayer video games by shifting the focus of players from a screen to their own physical body movements (Simon, 2009).

Kinect

Novel technologies, such as motion capture, can also affect students' perceptions of playing serious games. Since the 2010 release of Microsoft's Kinect (Stanley, 2013), the game controller has inspired developers and researchers to design and test a wide range of projects and applications in order to en-

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