

Chapter 41

Multi-User Virtual Environments for Physical Education and Sport Training

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EXECUTIVE SUMMARY

For effective learning and training, virtual environments may provide lifelike opportunities, and researchers are actively investigating their potential for educational purposes. Minimal research attention has been paid to the integration of multi-user virtual environments (MUVE) technology for teaching and practicing real sports. In this chapter, the authors reviewed the justifications, possibilities, challenges, and future directions of using MUVE systems. The authors addressed issues such as informal learning, design, engagement, collaboration, learning style, learning evaluation, motivation, and gender, followed by the identification of required elements for successful implementations. In the second part, the authors talked about exergames, the necessity of evaluation, and examples on exploring the behavior of players during playing. Finally, insights on the application of sports exergames in teaching, practicing, and encouraging real sports were discussed.

INTRODUCTION

The new generation of students is growing up in a digital world, where they can multi-task and communicate the information rapidly (Prensky, 2001). Computer games and virtual environments are visibly present in the lives of these “digital natives” from a young age. They are comfortable with digital technologies and have different attitudes, expectations, and abilities towards technology (Beck & Wade, 2006). Advanced educational technologies can enhance several skills that traditional settings cannot account for (Passig, 2015). Students’ reading, writing, and communication have already been affected

DOI: 10.4018/978-1-7998-7707-3.ch041

by the new technology, and educators are looking for possible engaging ways to increase their learning capabilities (Fee, 2007; Malliarakis, Tomos, Shabalina, Mozellus, & Balan, 2015). Rather than only considering the outcome, effective teaching also focuses on context, process, and learning outcome. It also considers identity, individuality, approach, and knowledge of the learners (Kyriacou, 2009). More schools are incorporating informal techniques into their curriculum, and as a result, the boundaries of formal and informal schooling are blurring (Ketelhut & Nelson, 2016). A shift from teacher-centered environments to student-centered interventions may also increase students' motivation. Therefore, integrating technology into practice could be a viable tool for supporting different types of learners (Miyares, 2013). Debates also exist around the use of technology in sports learning and whether technology can eventually replace physical educators for promoting physical activity and health (Casey, Goodyear, & Armour, 2017).

In this book chapter, the authors talk about the integration of multi-user virtual environments (MUVE) technology for teaching and practicing sports. In the first part, the authors discuss various elements of the technology, and how virtual sports and sports exergames could be used in physical education. In the second part, the authors also characterize a swimming exergame from different aspects of biomechanics, physiology, and psychology. Based on the results of the chapter, physical education (PE) teachers and curriculum designer can decide how to use MUVE systems in their practice. Game designers could also benefit from the results of this book chapter to create more realistic and meaningful MUVE systems.

BACKGROUND

Three dimensional (3D) virtual environments resemble physical spaces and allow players to generate virtual selves (avatars) to interact with objects, virtual ambient, and other avatars. Impractical, costly, and dangerous real-life activities can be performed in virtual environments (Adams, Klowden, & Hannaford, 2001). These systems also have positive effects on learning and provide higher immersion, engagement, and motivation compared to common instruction techniques (Webster, 2016). Therefore, they may create opportunities for distance education and collaborative learning. Studies suggest that properly designed 3D virtual games may improve information retention and enable the situation to be practiced safely (Dutton, 2013). MUVE is a computer, server, or internet-based virtual environment that can be accessed by multiple users simultaneously. These systems provide low-cost and safe collaborative ambient for problem-based learning activities. They could offer similar learning outcome and satisfaction to the real-world conditions while being more pleasurable and informal compared to the stressful reality (Vrellis, Avouris, & Mikropoulos, 2016). MUVE systems provide the chance of deep learning experiences where various skills, cognitive, perceptual/motor, interpersonal, leadership, and team building could be considered at the same time (Chang & Lin, 2014; Clayton, 2017). MUVE-based interpersonal education is also easier to navigate and may fulfill pedagogical objectives (Morley et al., 2015). In recent years, there was a considerable hype around the use of virtual worlds in a variety of fields, but for efficient use of MUVE systems, some topics need to be addressed.

Various initiatives will have limited success if students are not motivated to participate actively in PE. Understanding the mechanism underlying motivation, engagement, and collaboration can optimize the system's interactions with students and increase the likelihood of realizing the potential benefits of PE participation. Gender also plays an important role in PE and overcoming traditional shortcomings (e.g.,

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