

Chapter 2

A MUVEing Success: Design Strategies for Professional Development in the Use of Multi-User Virtual Environments and Educational Games in Science Education

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ABSTRACT

The chapter will explain the role of scenario-based MUVES and educational games in science education and will present both the benefits for students and the challenges of using these forms of technology in a classroom setting. This chapter presents the findings of two case studies on the use of a scenario-based Multi-User Virtual Environments (MUVE) in science education. The chapter will consider strategies for designing professional development programs for teachers and pre-service teachers to enhance both the teachers' skills and their confidence in using and designing classroom activities suitable for MUVES and educational games in science inquiry learning.

INTRODUCTION

Virtual worlds, serious games, and Multi-User Virtual Environments (MUVES) have garnered much attention recently in educational circles for their ability to engage and motivate students. Thus far, only a small number of research studies have been undertaken on the roles of teachers and

pre-service teachers in using these environments successfully in a classroom. Successful, in this context, does not only mean noticeable learning gains for students, but also but also means that students and teachers effectively use the virtual world or computer game in a classroom setting in a way that is meaningful and worthwhile. The purpose of this chapter is to present two case studies on the

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use of *Virtual Singapura*, a scenario-based MUVE, to develop scientific inquiry skills. The chapter will provide a background of the technology and will discuss both the benefits and challenges of using this form of digital media in an educational setting. The chapter will conclude by providing an overview of strategies and design considerations for professional development and the use of scenario-based virtual worlds and educational games in educational contexts. Where relevant, reference will be made to *Virtual Singapura* and to other educational games or virtual worlds that educators can readily access.

BACKGROUND TO GAME-BASED LEARNING

Recent research that has been identified as containing aspects of game-based learning has broadened the concept of a definition of game-based learning and has resulted in the articulation of dimensions or common factors identified by practitioners and researchers. The term game-based learning is often used simultaneously with terms such as ‘serious’ games, educational games, and virtual learning environments. However, before moving ahead this chapter it is worthwhile to clarify exactly what these terms means so as to distinguish what a scenario-based MUVE is and what it is not.

Game-based learning is the use of a computer-based game, also called a video game, in an educational context (Gee & Shaffer, 2010; Watson, Mong, & Harris, 2011). Game-based learning can incorporate the use of Commercial Off-The-Shelf (COTS) games, such as *Civilization III*® (Squire, 2004). The use of the term ‘game’ or ‘serious game’ is often used in this context as the technology used in virtual environments is often drawn from gaming technology, and ‘game’ is also a user friendly term in that a member of the general public can identify with the concepts of online gaming. This research will avoid the use of the term game to describe

Virtual Singapura as this environment does not engage the use of features such as scores, which are identifying markers of ‘game.’ Moreover, as Squire (2007) explains, the term ‘serious’ is also part of a branding schemes for commercial purposes. McKerlich and Anderson (2007) in their research into *Second Life* in educational settings clarify that the terms ‘game’ and MUVE should not be used interpedently indicating that MUVES are not games but are neutral, changeable environments, whose purpose may not be to entertain but may be for education or business. Therefore, this chapter will differentiate between a MUVE and a game where necessary. However, for the purpose of the introduction the term game will be used as much of the current literature does not distinguish between the different forms.

There are several factors that underpin the move towards the use of game and virtual technology in educational contexts. The use of game technology to engage learners is one of the main motivators for educators. The problem of engagement and motivation of learners has been recognised as a factor faced by many institutions (Gee, 2005) and the use of games is viewed as a way to access the ‘Nintendo age’ or ‘video game generation’ (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005) which are the generation of learners that have grown up alongside the rapid developments in the game industry. In fact, the use of computer games is so ubiquitous that Ferdig (2007) indicates that 70% of college students in the United States play some form of game, whether it be online, video or computer, single player or multi-player. This is supported by Squire (2006) who indicates that children spend more time playing games than watching television. Dodge et al. (2008) explain that games may offer a way to empower students as classrooms are often passive, and because the learners are not able to control their learning experience, games may afford learners this control. The widespread use of games provides educators with opportunities to harness the motivating

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