

# **PREPARING A CASE FOR THE EFFECTIVENESS OF 3D VIRTUAL WORLDS IN ELECTRONIC LEARNING**

## ***Giving Education a Second Life***

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**Abstract:** The potential of 3D virtual worlds to introduce a new educational medium which can serve all types of learning as well as enhance the experience of both the instructor and learner appropriate to the 21<sup>st</sup> century classroom has been recognised and explored in previous studies. While participants report enjoyment and even improved learning outcomes, it is unclear what role the technology has played in achieving these benefits. Furthermore, e-learning, with its many forms, has been criticized due to the inability of the technology to provide the means which allows e-learning to become an equivalent alternative to traditional face-to-face learning particularly in terms of effectiveness and quality. The proposed study will examine explore these issues by assessing new alternatives, namely the use of Second Life, to traditional face-to-face education.

## **1 INTRODUCTION**

While the use of technology in education is often viewed as a silver bullet, from an economic point of view it is often difficult to find any evidence of the benefits of technology (Landauer 1995). However, when there is “a good fit between a particular learning situation and specific technical solution” striking positive results can be found (Draper, Cargill and Cutts 2002). Due to the high levels of engagement and fun which they can afford, three dimensional virtual worlds have gained much attention over the past few years with respect to the potential they may have to revolutionise learning and transform the traditional educational classroom, environment.

Advances in technology, coupled with lower prices and higher performance capabilities of personal computers have enabled the adoption of 3D virtual worlds by different categories of users. Ever since its introduction, 3D virtual worlds have been slowly gaining exposure among individual users as well as corporations (Shen & Eder, 2009). 3D virtual

worlds are often Three-dimensional Multi User Virtual Environments (MUVE) (Warburton, 2009). MUVE’s were first widely used by gaming software to enable a large number of players to engage in an online collaborative or one on one gaming experience known as Multi-User Dungeons (MUD) and Massively Multi-payer Online Games (MMO) (Warburton, 2009). MUVEs allowed for a number of users to get together online and perform activities made possible by the environments. Designers of these environments make the choice on the type of functions and activities available to their users (Robbins & Butler, 2009). As time and technology progressed, MUVEs have become more sophisticated and very popular (Warburton, 2009). Today, there are many MUVEs which consist of advanced 3D technology as well as advanced capabilities which allow users to customize their environments.

It has been suggested that “current education systems are failing to meet the needs of individuals and society in the 21st century” (Twining, 2009, p. 496). This is primarily due to the advances in

technology and the corporate need for higher skill levels from their employees and the lack of an educational system to adapt such needs (Twining, 2009).

Although both the potential of 3D virtual worlds as a learning environment and the need for such an environment have been studied (e.g. Dickey, 2005, Piccoli, Ahmad, & Ives, 2001, Robbins & Butler, 2009, Salmon, 2009, Shen & Eder, 2009, Warburton, 2009, Winn, 1993), there is a lack of research on the true effectiveness of 3D virtual worlds with regards to student performance as well as the effectiveness of 3D virtual worlds as an alternative to face-to-face learning. Inspired by this notion, as well as the ability of technologies available today, the proposed study will examine the effectiveness of three-dimensional virtual worlds as a medium for electronic learning. The proposed study will also examine the potential of this medium to be as effective as the face-to-face learning experience. More specifically, the proposed study will examine how three-dimensional virtual worlds, when used as a medium for e-learning, can enhance the learning experience for higher degree candidates.

The study will answer the following question:  
*How do students who are taught using a 3D virtual world perform in comparison with students who are taught in a traditional face-to-face environment?*

## 2 LEARNING IN 3D WORLDS

Three-dimensional virtual worlds are “software which enables its users to interact with each other and with the software within a video-game like environment” (Robbins & Butler, 2009, p. 199). Users utilize avatars, which are 2D or 3D graphical representations of themselves, to be present in a virtual world environment. The environment differs from one software package to another. Specialized virtual worlds exist for a specific purpose and limit the freedom which comes with a multi-purpose virtual world such as Second Life (SL) (Robbins & Butler, 2009). Second Life is by far the most popular multi-purpose 3D virtual world available today.

Trends and statistics analyzed by many different researchers have found that the 3D virtual world is growing in popularity as well as potential (Salmon, 2009). Gartner predicts that 80% of internet users as well as corporations will have some kind of interaction with a 3D virtual world by 2011 (Gartner, 2007). Gartner adds:

The collaborative and community-related aspects of these environments will dominate in the future... the

majority of active internet users and the major enterprises will find value in participating in this area in the coming years. (Gartner, 2007).

The Metaverse Roadmap study, which forecasts the future of the 3D virtual web, finds that 3D virtual worlds have the capability to change the web and how we interact with it (Smart, Cascio, & Paffendorf, 2007). Other data from educational consulting firms such as Eduventures suggest that the majority of adult learners surveyed that are planning to pursue a higher degree prefer the courses they enroll in to be delivered using an online mode of delivery rather than attending an actual face-to-face lecture at the educational institution or at least some kind of blended mode of delivery (Eduventures, 2007).

In addition to trends and statistics, researchers have found that great potential exists through the use of 3D virtual worlds in education. A study by Yuanqiong Wang and James Braman conducted to evaluate the use of SL as an extension to the classroom shows that “activities performed in SL have a positive impact on students’ learning experience” (Wang & Braman, 2009, p. 243). This study used SL as an extension to the classroom where students can meet to engage in discussions, completion of labs and exercises, and also be able to receive feedback on the work performed by students (Wang & Braman, 2009). The study found that students were excited and attracted to discuss classroom material with other students, as well as engage in activities with each other so as to have a reciprocated learning environment. By being able to collaborate and receive feedback almost instantaneously, students were enabled to become active learners (Wang & Braman, 2009). The results of the study also showed that students who participated in SL to complete projects as well as engage in discussions found the learning experience to be more enjoyable. The students also showed higher motivation for learning (Wang & Braman, 2009).

In addition to the advantage of greater collaboration and instant feedback, 3D virtual worlds offer students and teachers the ability to implement different ways in which students can enhance their learning process as well as teachers demonstrating more effective results. The different types of 3D virtual worlds enable the teacher to choose the best 3D virtual world to support the teaching process (Robbins & Butler, 2009). Russell Robbins and Brian Butler suggest in their publication “Selecting a Virtual Platform for Learning”, which examined the different platforms of 3D virtual environments and how they can be

used to enhance the learning experience for students, that the key to choosing the right type of 3D virtual world for learning has to begin with declaring the learning objectives that teachers seek, then mapping those objectives to the different types of 3D virtual environments (Robbins & Butler, 2009). For example, first-person simulation worlds enable the teacher and student to engage in experiments and receive fast yet realistic feedback without bearing the expenses and dangers associated with performing such activities in real world (Robbins & Butler, 2009). For instance, the use of flight simulators has been adopted by almost all the pilot training programs across the world. The software is also available to allow any person to learn the basics of flying such as Microsoft Flight Simulator. Robbins and Butler breakdown the different 3D virtual environments platforms and how educators can go about choosing the right type of 3D virtual environment to best suit their educational need (Robbins & Butler, 2009). For example, a task-oriented VW “supports students practicing responding to ill-structured virtual situations” (Robbins & Butler, 2009, p. 204).

By understanding the learning objectives and the different 3D virtual environment platforms available, teachers can choose the best platform to help achieve their identified learning objectives.

A 3D virtual world also offers an environment which can be used to implement multiple learning models. “Research in educational VR reveals that 3D interactive environments provide support for constructivist-based learning activities by allowing learners to interact directly with information from a first-person perspective” (Dickey, 2005, p. 440). Moreover, constructivist-based learning relies on the notion that immersion is a better method of learning in such cases where knowledge needs to be assembled from experience rather than from another person’s description of the experience (Winn, 1993). 3D virtual worlds enable students to participate in active learning where they “actively process and apply information to learn as opposed to passive listening” (Wang & Braman, 2009, p. 244).

Currently, there are many examples of universities who have adopted a 3D virtual world environment to offer courses, seminars, lectures, etc. Moreover, organizations have also undertaken initiatives to research new educational systems tailored for the information age. Harvard, MIT, Princeton, along with many other prestigious universities in the U.S. and overseas have in one way or another embraced the 3D virtual environment as a possible educational tool which can enhance the learning experience (Lamont, 2007) (MIT.edu) (Princeton.edu). MIT, Princeton and Harvard have Islands in Second Life where lectures, meetings, and

other educational related activities can take place (Lamont, 2007) (MIT.edu) (Princeton.edu).

SCHOME, an initiative which is dedicated to radically rethink the current educational system, has identified virtual worlds to be the best “vehicle for providing people with such lived experiences of radically different models of education” (Twining, 2009, p. 498). The Schome Park Programme (SPP) was developed to be an environment where radical new ideas for educational systems can be tested and researched in depth in a virtual world (Twining, 2009). SCHOME chose to pursue the virtual world, specifically Second Life, because “they allow you to do things which it would be difficult or impossible to do in the physical world—both literally and pragmatically,” (Twining, 2009, p. 498) and the fact that virtual worlds “are spaces which encourage playfulness and testing of boundaries” (Twining, 2009, p. 498).

### 3 RESEARCH METHOD

The proposed research topic will adopt a quantitative research methodology. The study will “ask specific, narrow questions; collect quantifiable data from participants; analyzes these numbers using statistics; and conducts the inquiry in an unbiased, objective manner” (Creswell, 2008, p. 46). Similar research conducted on learning and virtual worlds was conducted using a quantitative methodology (Piccoli, Ahmad, & Ives, 2001, Dickey, 2005, Wang & Braman, 2009, Warburton, 2009).

Specifically, the proposed research topic will use an experimental design. According to Creswell, “experimental designs are procedures in quantitative research in which the investigator determines whether an activity or materials make difference in results for participants” (Creswell, 2008, p. 60). An experimental design is the best approach for this study because we propose to study two different groups while attempting to “control all variables that influence the outcome except of the independent variable” (Creswell, 2008, p. 299).

The proposed study will look at two major groups to test the following hypotheses:

Null Hypothesis: *There is no difference between students who are taught through 3D virtual worlds and students who are taught through a traditional face-to-face environment in terms of student performance on test scores.*

Hypothesis 1: *Students who are taught using a 3D virtual world will have higher test scores than students who are taught using a traditional face-to-face environment.*

Hypothesis 2: *Students who are taught using a 3D virtual*

*world will have lower test scores than students who are taught using a traditional face-to-face environment.*

Group one will be taught through a traditional face-to-face environment. Group two will be taught using a 3D virtual world with no traditional face-to-face interaction in the physical world. The research population will consist of undergraduate students in a specific course. Models will be implemented to assess the effectiveness of each method and how each method directly relates to the results students achieve at the end of the study. The proposed study will adopt Second Life as its 3D virtual world learning platform. With an estimated 13 million registered users (Secondlife.com), SL is considered to have the largest number of registered users as well as the most mature 3D virtual world available to users all over the world.

## 4 CONCLUSIONS

The examined literature has made a compelling case for the potential and ability of 3D virtual worlds to introduce a new educational medium which can serve all types of learning as well as enhance the experience of both the instructor and learner. The literature has also shown the need for a new educational environment which can match the quality of traditional educational approaches as well as incorporates the needs of today's students in the information age. Trends, statistics, as well as the potential impact of 3D virtual world on education have been made clear by various scholars in this field. What is needed is a study on whether this new environment is effective in the educational field and if so, how effective is it. Technology has the potential to educate societies and communities all over the world at a fraction of the cost in comparison to traditional educational program. Nevertheless, e-learning, with its many forms, has always been criticized due to the inability of the technology to provide the means which allows e-learning to become an equivalent alternative to traditional face-to-face learning. Issues such as effectiveness and quality have always been associated with e-learning. It is believed that the proposed study will contribute to the literature considered to examine new alternatives to traditional face-to-face education.

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