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Virtual world technology: a new way forward in teacher education

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Abstract

Teacher education has undergone rapid change in the last few decades, as has higher education generally. One feature of this change has been the expansion of higher education delivery via distance education, necessitating dramatic modifications in the way teaching and learning occurs, particularly in the area of online learning. Early forays into distance education delivered materials to students in print format and then progressed to CDs and DVDs. Distance education (external, off-campus) students generally studied in isolation from home. The advent of a more ubiquitous use of the Internet and also of Web 2.0 tools helped to bridge the gap between off-campus and on-campus study. While more interaction is possible with these tools, students studying via distance education still report that this method of study can be isolating. There is also still a perception that distance education is somehow inferior to the educational experience of on-campus students. Over the last four and a half years, the authors have conducted several research studies to investigate the use of a virtual world, in this instance *Second Life*, as a learning and teaching environment that can enhance student learning and provide a learning experience that is effective and engaging. In this paper we discuss several research studies conducted in two custom-built learning spaces in *Second Life*: Education Online Headquarters and the Second Life Classroom and Playground on Australis 4 Learning. The studies examine different methods of using the virtual world environment for teacher education including tutorials and role-play. The environment has thus been used for both theory and practice. Data from these studies support the thesis that the use of *Second Life* enhances student engagement. We conclude the paper with recommendations for future use of *Second Life* as a learning environment for teacher education.

Key words: Virtual worlds, teacher education, student engagement, distance education

Introduction

The face of higher education has changed dramatically over the last few decades owing to “the exponential expansion of distance education” (Peters, 2010, p. 9). Distance education (otherwise known as external or off-campus study) is now a common mode of study around the world (Beldarrain, 2006; Gutierrez, 2010) and Peters (2010) argues that the main reason for this world wide phenomenon is undoubtedly due to “the unbelievable advances and proliferation of information and communication technologies” (p. 9). Early on, distance education was largely conducted through the delivery of learning resources in paper format: indeed, at that stage it was often referred to as correspondence learning due to the delivery of materials to students and their assignments to universities via mail services. With the advent of a range of information and communication technologies (ICTs), particularly Web 2.0 tools, the use of ‘snail mail’ has become almost obsolete. Distance education students can now engage in what, as early as 1995, Keegan referred to as “face-to-face at a distance” (Keegan, 1995, p. 109).

Despite the uptake of distance education as a mode of study and the discussions regarding how ICTs have impacted this method of learning (Beldarrain, 2006; Bower, 2011; Buck, 2009; Hiltz & Turoff, 2005; Peters, 2010), distance education is also reported to have some major challenges to overcome including high attrition rates (Moody, 2004) and the view that distance education is a “second-rate, impersonal educational option” (Baggaley, 2008, p. 41).

Isolation, both geographical and social, has been reported as one factor of distance education that impinges on student satisfaction and contributes to high attrition (Alston et al., 2005; Buchanan, Myers, & Hardin, 2005). Overcoming the sense of isolation, and providing a sense of community and social interaction for these students is an important challenge in distance education.

Given the challenge of isolation in distance education generally, studying a teacher education course in this manner presents institutions with an imperative to develop a feeling of ‘social presence’ (Short, Williams, & Christie, 1976). Social presence is characterised by the quality of interactions both between student peers and between academics and students (Dow, 2008) and requires strategies that “effectively facilitate online socialization and engagement” (Dow, 2008, p. 240). In teacher education this is of vital importance because of the well-documented nature of teaching as a relational act (Bauml, 2009; Goldstein, 1999; Hargreaves, 1998). Teachers do not work in isolation. They need to develop relationships with their students, peers and parents. They frequently work in teams and interpersonal skills are important. On-campus students have many opportunities to develop these necessary skills for teaching. Online learning needs to provide similar opportunities for the distance education student.

While Web 2.0 tools such as wikis, blogs, chatrooms and other methods of social networking can assist in the development of interaction online (Guri-Rosenblit, 2009; Lee & Chan, 2007; Peters, 2010; Veletsianos, 2010), the authors began researching the efficacy of virtual world learning as a way of increasing social presence and engagement. Virtual worlds are “richly immersive and highly scalable 3D environments” (New Media Consortium and EDUCAUSE Learning Initiative, 2007, p. 18) with a capacity for simulation and extended interactions (Warburton, 2009) that is well suited to developing teacher skills. From 2008, the authors have worked on four research projects on virtual world learning that have demonstrated increased student engagement. Their findings have been supported in other studies and (McKerlich, Riis, Anderson, & Eastman, 2011) have reported that the “days of presence deprived online learning could be limited; virtual worlds have the potential to provide a rich learning experience overflowing with presence” (p. 334).

In this paper the authors discuss how the use of *Second Life* as a learning environment has been effective in engaging students and enhancing their learning. This environment has helped to overcome the issue of isolation in distance education learning and has fostered a sense of community among the students who have studied in this manner. The first section of the paper briefly outlines the four projects and then the authors discuss the findings of these projects in terms of three important themes: engagements and presence, enhanced learning and opportunities for practice. They conclude the paper with recommendations for future research.

The Research Projects

Project 1:

The initial project commenced in 2008 when Gregory began a research project designed to explore the efficacy of a virtual world environment, in this case *Second Life*, as a learning space for distance education students. The first iteration of the project had 12 participants who self-selected to take part as one of their assessment tasks.

Each week participants met in *Second Life* for a tutorial. In the first hour the tutorial was held at Education Online Headquarters, Gregory’s custom-built learning environment, to discuss

the focus issues of the unit. In the second hour, students engaged in a number of tours of virtual national and international institutions.

A range of data collection methods were used including surveys, recording of online dialogue and questioning. A pre-semester survey collected data about students' existing computer expertise, knowledge of Web 2.0 tools and of virtual worlds. The post-semester survey explored knowledge and skill development as well as student views of the efficacy and effectiveness of using a virtual world such as *Second Life* for educational purposes.

This project has been repeated in 2009, 2010 and 2011 with data collected from more than 250 students.

Project 2:

New projects were commenced by the authors in partnership in 2009 and 2010. In 2009 a project designed to replicate face-to-face role-plays in *Second Life*, using de Bono's six thinking hats (Bono, 1985) strategy as the role-play, was begun with on-campus students. It was then expanded in 2010 to include distance education students. This project was designed to investigate whether face-to-face teaching strategies could be replicated in a virtual world. The first iteration was with on-campus students to permit trialling of the environment and troubleshooting in regards to any technical problems.

Face-to-face workshops using de Bono's (1985) six thinking hats strategy were conducted first and then these were repeated in *Second Life*. Observation by two academics occurred for both the real and the *Second Life* workshops and all online dialogue (which took the form of typed chat) was recorded for analysis. At the end of each workshop the students and the observers completed a survey designed to ascertain perceptions about engagement (affective, behavioural and cognitive). Data was recorded on a 5 point Likert Scale with a section for further comments. Over 2009 and 2010 there was a total of 96 participants.

Project 3:

A new research project was commenced in 2010. This project examined the performance of students, as measured by final unit results, across seven units and across a range of modes including face-to-face, via a Learning Management System (LMS) and in *Second Life*. While the results of the on-campus students in those units that were offered in dual mode were collected, the data for distance education students has been the main point of comparison. This has been a conscious choice given that the age profile of on-campus students is significantly different from that of the distance education students: 83% of on-campus students are aged between 18 and 24, compared to the same percentage being over 25 in the distance education cohort (UNE Corporate Intelligence Unit, 2011). This difference in age and life experience was felt to have a greater bearing on result comparisons than other factors.

The collection of both quantitative and qualitative data occurred through the recording of all online postings in both the LMS and in *Second Life* and also via end of semester surveys to ascertain student perceptions of their engagement and learning. The surveys also provided background data such as student age, home location and computer expertise. 2411 students participated in this project across 2010 and 2011, 199 in *Second Life* and 2212 in the LMS.

Project 4:

The final project undertaken by the authors in collaboration with five other researchers from different institutions is part of an Office of Learning and Teaching grant. Conducted from

2011 to 2012, VirtualPREX (Virtual Professional Experience) explores the efficacy of a virtual world as a space for students to practise their teaching in an authentic environment without risk. Students are able to role-play teaching scenarios with their peers acting as primary school students. All students are provided with roles to play, either on- or off-task. The student in the teaching role has to teach their peers for a seven-minute period. Data has been collected in the form of machinima (in-world video) capturing all of the role-plays and a post role-play survey designed to ascertain student perceptions of the effectiveness of the role-plays for practice teaching.

Findings

The discussion of the results of the projects is provided under the headings of the key themes which emerged rather than each project reported separately.

Theme 1: Student Engagement and Presence

Engagement and presence have been identified as important in improving instruction effectiveness (Tu, 2002) and enhancing student outcomes (Richardson & Swan, 2003). In the 2008 project and further iterations, the results demonstrate that “the virtual world of *Second Life* is an engaging environment for the students” (Gregory & Tynan, 2009, p. 379). Many of the comments in this research project were indicative of both engagement and social presence:

I had a defining experience last week when we sat down in that open-air lecture space and I sat on one side and the rest of you sat on the other side. Suddenly I felt lonely and, without thinking, got up and moved to where you were all sitting. And then, I thought, that felt so real!

and

Since beginning my studies this year, I am excited again about learning. The interaction with my groups and lecturers has been inspiring.

and

I know I keep saying it, but I am absolutely loving this course. :) And not just SL: the entire unit is so well presented - for instance, I have heard your voice! It helps avoid the feeling of isolation so many of us externals feel and the way in which the information is delivered makes it so easy to learn. Thanks!

The de Bono research project also provided data which indicate strong levels of engagement. Off-campus students, in particular, commented in a post role-play survey that:

Using SL makes it feel as if I'm attending a tutorial and it makes the lesson more personal;

and

For an external student, you can feel very isolated and alone whilst studying. I find that SL provides an opportunity to 'pretend' that we are all sitting around a table throwing around ideas. I find SL engaging as opposed to chat rooms and I love wearing a ball gown to lectures each week!;

and

The use of Second Life is a great way to motivate and engage students, especially those studying off campus. I find that I am more absorbed in this unit (and ICT last semester) because of the interaction with the lecturer(s) and the visual stimulus of actually seeing the other students (avatars). In doing this I feel like I am actually part of the University, being involved in a tutorial and learning from others.

These student comments are representative of the majority of comments made and provide strong indications that learning in a virtual world is engaging and that it also enhances social presence. Several of the comments reported also indicate that the students were able to articulate what it was about their experiences that created this engagement. It is hoped that this will now enhance these preservice teachers' ability to engage their own students in the classroom.

Theme 2: Enhancing Learning

While engagement is important, engagement without learning would not be beneficial. The authors recognise the need to demonstrate that learning in a virtual world is as effective as learning in a face-to-face environment. Gregory's early project suggested that learning was effective, with all of the students scoring 80% or more on their assessment tasks. Student rating on a likert scale also indicated that the students believed that their experience in a virtual world contributed to their learning. Overall, 71.45% of students reported that the *Second Life* activities supported their learning "quite a lot" and 28.58% reported the support level as a "fair amount". These were the highest two choices on the scale.

The de Bono research project also had students comment about their learning, not just about the sense of engagement in a virtual world. One student, who had learned the theory of the six thinking hats from listening to a lecture and also reading texts, commented after the in-world role-play that:

The opportunity to use Six Thinking Hats strategies in a group situation to guide discussion was deeply beneficial. It gave me a clearer understanding of how to use the hats, and provided an insight into how it may be used in a classroom (something that up until the Second Life session had eluded me).

Clearly this student had learned the skills for using the de Bono role-play from being in a learning environment which facilitated engagement in an actual role-play situation.

The results from the third project, where assessment results of those who studied via the LMS and those who used *Second Life* as their learning environment were compared, show strong indications that the use of a virtual world is effective as shown in Figures 1 and 2.

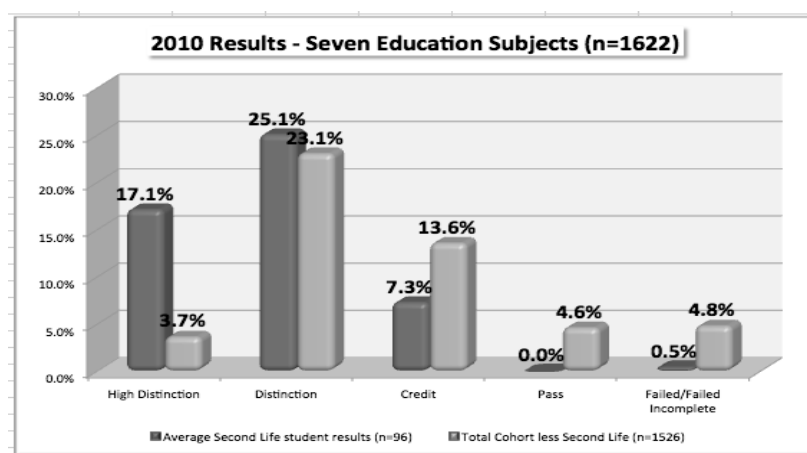


Figure 1: Student Grades - Comparison of *Second Life* and LMS 2010

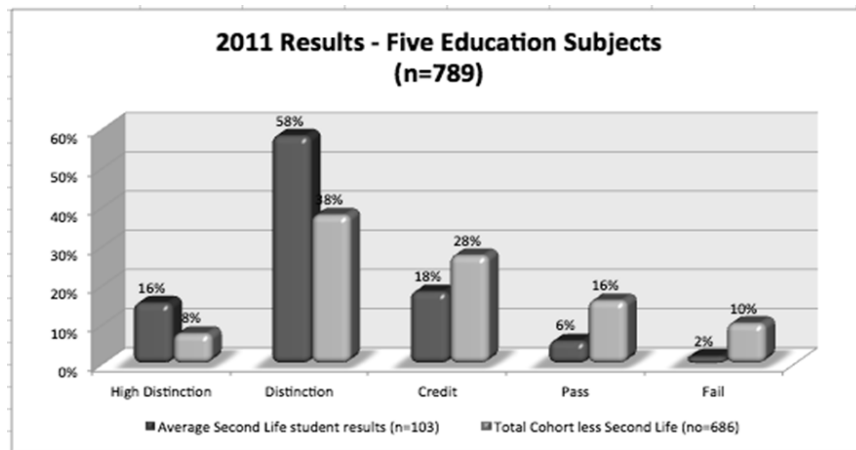


Figure 2: Student Grades - Comparison of *Second Life* and LMS 2011

Each year of this project demonstrated that students who studied via the virtual world environment performed at a generally high standard of achievement.

The authors also separated the results for one of the learning and teaching units in the first year of the Bachelor of Education (Primary), Masters had five tutorial groups of off-campus students. Twenty of the students elected to form two groups who would meet in *Second Life* to discuss their required readings and also their assessment tasks. The three other tutorial groups (a total of 30 students) worked only within the LMS, using the discussion board and meeting for an hour a week with Masters in the chat room. Masters had groups in both environments in order to compare results with the skew of a different tutor being removed. Based on the final results of all students (rather than task by task) the two groups in *Second Life* performed significantly better than the three using the LMS as shown in Table 1.

Table 1: Student Grades - Comparison of *Second Life* and LMS

Adapted (Masters & Gregory, 2010, p. 6)

Result	Blackboard n=30	Second Life n=20
High Distinction	0%	17%
Distinction	46%	72%
Credit	46%	11%
Pass	8%	0%
Fail	0%	0%

These figures suggest that learning in a virtual world is not detrimental to learning. Also, after examination of the grades of the 50 students in other units during the same year of study, it appears that learning in a virtual world environment had a positive effect on results, with results in units where they used the *Second Life* environment being higher than those where they were not in a virtual world. Indeed, one student commented on the effect of her virtual world experience on her learning in two units (ICT and EDLT – Learning and Teaching) when she stated that:

From looking at my results in other units, I can see an improvement in results for both ICT and EDLT, compared to my other two units that had no chat option at all.

Theme 3: Benefits for Practice

The opportunity to role-play de Bono's six thinking hats was clearly beneficial as indicated by the quoted student comment explaining that it allowed her to understand a concept which '*up until the Second Life session had eluded me*'. This positive response to a role-play situation was also repeated in the VirtualPREX project.

Comments from students who participated in the VirtualPREX project depict the affordances of a virtual world for learning to teach when asked about their perceptions of the role-play activity:

Being able to consider unexpected occurrences within the classroom and approaches in how they can be overcome
and
Experiencing a classroom environment without a classroom
and
I liked how effective the role-play situations was, and how it relates back to teaching in real life. It helped me see and experience what happens within the classroom with the students.

These comments demonstrate that the students felt the teaching environment in the virtual world was authentic and that they were able to practise their teaching skills, including management of, and interaction with, the students. This research project is discussed more fully elsewhere (see Gregory, Dalgarno, Campbell, Reiners, Knox, & Masters, 2011).

Conclusion

Outlined above are several projects that demonstrate students feel their learning through the use of a virtual world made it more authentic and engaging. Students have expressed their feelings that it is just like a 'face-to-face' encounter. Many of the quotations above have been replicated by other students throughout the 4.5 years of studying of the efficacy of a virtual world as a teaching and learning tool. This empirical research has provided much data to support the notion that a virtual world is engaging, but it has also demonstrated that students who use virtual worlds as a learning tool outperform other students who choose not to. Role-plays have been found an effective means for students to understand concepts more fully by being able to experience a 'live' interaction with their peers and educators. We conclude that virtual worlds are engaging for students and they perceive they are learning in authentic environments. Students are undertaking tasks that are being delivered in a virtual world, but feel that it is like a real face-to-face learning environment.

Engagement is strongly emphasised in the National Professional Standards for Teachers (Australian Institute for Teaching and School Leadership, 2011) and recognition of what promotes engagement should be beneficial in meeting these standards. This is an area for further research as the students who took part in the *Second Life* research projects begin their own teaching careers.

The VirtualPREX role-plays will enable pre-service teachers to practise their teaching skills at anytime suitable to them. It is particularly useful for off-campus students where they are not provided with the opportunity to role-play in a face-to-face workshop. However, this mode of role-play requires other students to be available at the same time for synchronous practise. VirtualPREX is also currently developing bots (non-player characters) so that the student can

visit a VirtualPREX classroom and practise their teaching with bots, acting the primary school student where they interact with the teacher (pre-service teacher) who is giving a lesson.

While the results of these research projects are positive and indicate that virtual worlds are a feasible alternative learning environment, more research should be undertaken to make a definitive conclusion that virtual worlds are, indeed a new way forward for teacher education.

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