

VirtualPREX: open and distance learning for pre-service teachers

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Abstract

PREX is acknowledged as essential for teacher preparation and school-based practice sessions to allow pre-service teachers to apply pedagogical theories in a realistic teaching situation. Pre-service teachers invariably enter the workforce ill equipped for their professional role. This unpreparedness contributes to the rise in attrition rates when students undertake Professional Experience (PREX). Formative assessment explicitly designed to promote effective learning is the single most powerful educational tool available for both supporting high-quality learning and empowering lifelong learners. Through a 3D virtual primary school classroom students can practice their classroom teaching skills via role-play, learning, teaching, evaluation, reflection and self/peer/educator-assessment to consolidate their learning. Access to classroom-based practical experience, whilst highly advantageous, is high-cost; can be problematic; offers limited self-review of performance and does not provide pre-service teachers with a sufficiently broad range of experiential professional learning opportunities. The emergence of new technologies to foster active experiential learning provides the potential to develop virtual professional practice environments comparable to a live classroom experience. This gives pre-service teachers extended practice opportunities through interaction in and with a virtual environment to try out skills and apply concepts in a realistic setting in their own time, at their own pace, through an open and distant learning opportunity. This paper discusses the design and implementation of a 3D immersive virtual professional experience environment, VirtualPREX, incorporating formative assessment and a constructivist approach to provide pre-service teachers with experiences that reflect the complex, diverse and multi-faceted nature of a teacher's role in classrooms.

Keywords: virtual worlds, VirtualPREX, pre-service teacher virtual professional experience, Second Life (SL)

Introduction

Six institutions have embarked on a project to enhance pre-service teachers' exposure by providing virtual practical experiences (VirtualPREX) prior to embarking on their careers as a teacher. This paper outlines a joint project between the University of New England (UNE), Charles Sturt University (CSU), Australian Catholic University (ACU), Curtin University (CU), Royal Melbourne Institute of Technology (RMIT) from Australia and the University of Hamburg (UH), Germany where pre-service teachers can undertake role-play in a virtual world to expose themselves to a wider range of teaching experience using peers and bots (robots). Pre-service teachers are also able to reflect on their teaching through the provision of machinima (inworld video) of their teaching for self, peer, formative and summative assessment.

Background

The overarching purpose of this project is to investigate the design and

implementation of a 3D virtual environment to facilitate effective formative assessment of teaching practice in order to assist pre-service teachers to acquire a better range of professional skills and better confidence in, and more realistic awareness of, their skills before being placed in real life classrooms.

A strong PREX component is acknowledged as essential to teacher preparation. School-based practice sessions enable students to apply pedagogical theories in a realistic teaching situation, which is integral to all pre-service teacher education programs in Australia (referred to as professional experience or PREX, practicum, workplace learning; hereafter referred to as PREX). Nonetheless, research consistently shows that, in Australia as elsewhere, pre-service teachers invariably enter the workforce ill-equipped for their professional role (Ferry, Kervin, Cambourne, Turbill, Puglisi, 2004). This unpreparedness no doubt contributes to the rise in attrition rates when students undertake PREX (Sim, 2006) and the 45% of newly recruited in-service teachers who resign or burn out in their first five years of classroom teaching (Ingersoll, 2001).

Simply increasing pre-service teachers' exposure to 'live' classrooms will not fully address this problem since access to classroom-based practical experience, whilst highly advantageous, is also high-cost; can be problematic, logistically and legally; offers limited self-review of performance and does not provide pre-service teachers with a sufficiently broad range of experiential professional learning opportunities. It has, therefore, become necessary to re-think pre-service teacher PREX. To improve the quality of PREX and, thus, enhance the learning experience for pre-service teachers, as well as better access to practice classrooms, there is a need for improved preparation of pre-service teachers for PREX.

The emergence of new technologies, such as multi-media, the Internet, hyper-reality and virtual reality that foster active experiential learning provides the potential to develop virtual professional practice environments at least comparable to a live classroom experience, or even offering expanded experiential options (Aldrich, 2004). This gives pre-service teachers extended practice opportunities through interaction in and with a virtual environment to try out skills and apply concepts in a realistic setting (Antonacci & Modares, 2008). While academics have reported the need to reform pre-service teacher education, there have been few attempts to try new approaches in Australia, so the full potential of virtual worlds for supporting pre-service teacher PREX programs is yet to be explored. Education.au (2009) suggested development of a suite of virtual world schools to generate the curriculum pedagogy and access to practice necessary to embed ICT in learning and teaching. Investment over a period to create virtual classrooms would produce world class resources available to all.

Recognising that formative assessment explicitly designed to promote effective learning is the single most powerful educational tool available for both supporting high-quality learning and empowering lifelong learners, this project has designed and implemented a virtual PREX environment, VirtualPREX, incorporating formative assessment and a constructivist approach to provide pre-service teachers with experiences that reflect the complex, diverse and multi-faceted nature of a teacher's role in classrooms, schools and the broader community. Pre-service teachers have been provided with a virtual primary school classroom in which to practise their classroom teaching skills through

role-play, learning, teaching, evaluation, reflection and self/peer/educator-assessment, prior to their first PREX or between PREX to consolidate learning.

Overview of project

Providing pre-service teachers with opportunities to observe and interact with classroom environments, real or simulated, is critically important to educating high quality, well-prepared teachers. The five Australian institutions are experienced providers of pre-service teacher education, UNE and CSU having extensive distance education programs. UNE has used the virtual world of Second Life (SL) within its pre-service teacher curriculum for the past four years. UH has many years of experience in creating authentic virtual worlds for their on-campus students and has assisted Curtin to set up their own virtual world for assessment. ACU has been using a virtual world for ethics education for many years. RMIT has been exploring virtual worlds for assessment.

This project leverages the expertise and SL resources currently held by the project team which has transformed the existing online classroom space into VirtualPREX, a sophisticated, virtual, PREX environment that reflects the Australian social and educational milieu. It has moved beyond static, text-based 2D simulations to use the full range of audio-visual interactivity of 3D simulations and expands on previous work on the use of network-based systems in the classroom to enable pre-service teachers to partake in realistic, diverse, versatile, dynamic activities that emulate real life situations (Gregory & Masters, 2010a; Gregory & Masters, 2010b; Ferry et al, 2006). It embeds formative assessment in a way that is valid, reliable and feasible to implement. Sets of structured, collaborative role-plays have been developed to provide scenarios of common and challenging situations faced by teachers in the classroom (e.g. class management) that pre-service teachers may need to address during their live classroom placement. The system has been designed with three major formative features: personal e-journals, peer and educator assessment and reflective opportunities. Academics, classroom teachers and pre-service teachers have jointly developed the environments, simulations, pedagogy and practice.

Pre-service teachers are able to use the simulated classroom to translate their course knowledge about teaching into practical behaviours. Through VirtualPREX, pre-service teachers are able to visit the primary school classroom and adopt the role of teacher to practice their classroom skills with other pre-service teachers (synchronously) via role-play activities that require the 'teacher' to make many decisions about structuring the lesson, classroom management and responses to individual students. To afford greater equity and flexibility of access, especially for off-campus pre-service teachers, the team is currently developing life-like, interactive, automated bots, which looks and behaves like primary school students, to be used in asynchronous teaching practice sessions. The prototype bot is programmed to talk to the pre-service teacher by answering and undertaking general conversation, as well as responding in a variety of ways to a pre-service teacher practising their teaching skills. Machinima, like the assessable video-recordings sometimes used now, involve pre-production preparation and capture, editing and tagging of footage for easy reference (Dreher & Dreher, 2009). Machinima of online practice sessions are uploaded for viewing and used as learning aids, for self-assessment through reflection, as well as peer and educator formative

assessment.

Literature Review

Pre-service teachers report that they leave university feeling inadequately prepared for professional practice, with little awareness of the school context (Cambourne, Kiggins & Ferry, 2003; Armour and Booth, 1999). Schools support these claims, concurring that recent graduates sometimes lack the requisite skills for classroom teaching, often being ignorant of the workings of classroom cultures and uncertain how to transfer their university-acquired theoretical knowledge to effective practice in the classroom (MACQT, 1998). These findings were also confirmed by the Ramsey's (2000) review of teacher education in NSW, which found that pre-service teachers do not understand the relationship between classroom practice and effective student learning. Furthermore, over the past eighty years, repeated reviews of beginning teacher competencies have identified a number of key skills that traditional pre-service teacher preparation programs inadequately develop, including dealing with student discipline, student motivation, diversity and individual differences, lack of adequate or appropriate resourcing, organisation of lessons, student work assessment and parent/teacher relationships (Ferry, Kervin et al., 2004).

Whilst it is well-established that pre-service teachers need to practice their classroom skills in an authentic environment, there has long been disquiet amongst academics about the remaining inadequacies of the PREX system to prepare pre-service teachers for their professional role. Problems identified in the literature include:

- Labour intensive with resultant very high cost of the school-based component of teacher education (Millwater, 2005);
- Challenges of providing quality supervision, observation and assessment (Millwater, 2005);
- Fragmented and decontextualised learning experiences hindering the development of links between their theoretical knowledge and the real-life classroom situations in which they apply it (Barth, 1990:118; Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Darling-Hammond, 1999; Entwistle, Entwistle & Tait, 1993; Hoban, 2002; Ramsey, 2000).
- Lack of exposure to the cultural and linguistic diversity extant in today's classrooms (Premier & Miller, 2010);
- Irregular access to quality classroom experiences due to lack of adequately trained supervising teacher (Darling-Hammond, 1999; Keogh, Dole & Hudson, 2006; Ramsey, 2000; Yorke 2005);
- Inequities in the nature and quality of practical experience and an inability to make all contextual experiences (e.g. indigenous students; rural/remote/international/middle schools) accessible to all pre-service teachers (Millwater, 2005); and
- Potential dangers/risks of placing pre-service teachers in a real-world situations without adequate training (Ingram & Jackson, 2004; Lombardi, 2007).

The value of formative assessment has since been stressed by a number of authors (e.g. Boud & Falchikov, 2006; Nicol & MacFarlane-Dick, 2006; Yorke, 2003). Peer assessment has shown positive formative effects on student achievement, understanding and attitudes (Topping, 1998).

Virtual worlds are an effective means of building social networks and

communities of learning (Boulos, 2007). The availability of synchronous communication means virtual worlds provide enhanced interactivity (Petraou, 2010). Synchronous communication allows for immediate, contextualised feedback, which has been shown to relieve the feelings of isolation characteristic of online learning. By utilising peers to operate avatars (an avatar is a personalised graphical representation of themselves used in a virtual world) (Gregory & Tynan, 2009), pre-service teachers can interact synchronously. Virtual worlds allow for both passive and active learning using bot school children (Paper, 2009). In the absence of peers, bot school students enable asynchronous active interaction. Machinima recording of bot interaction is used for passive learning. This flexibility supports and enhances solo learning, student-student interaction and academic-student interaction (Petraou, 2010).

Role-playing and simulations should occur in authentic learning environments to preserve a link with reality. Virtual worlds provide simulated learning by modelling a process or interaction that closely resembles real world situations, in terms of fidelity and outcomes. Authentic learning environments are created in both digital and physical settings (Ingram & Jackson, 2004; Lombardi, 2007). Realistic digital environments that use simulations to closely replicate the world and workplace have become popular over the past decade (Ferry, Kervin et al., 2004); however, these have primarily been 2D applications employing video playback or streaming and text-based simulations, with limited use of graphics and social networking tools. There are fewer instances of uses of virtual world environments. Hew & Cheung, (2010) found that they were primarily used for communication, simulation and experiments.

Digital environments have many advantages in common that could be brought to bear upon current problems in PREX, including wider access, potential to present a broader range of situational learning experiences, increased communication and interaction opportunities, greater safety than real-life learning environments for exploring the consequences of decisions and more facility for reflection (Ferry, Cambourne, Jonassen, Turbill, Hedberg, Kervin & Puglisi, 2006). Dalgarno & Lee (2010) show that the representational fidelity and aspects of the learner-computer interactivity in 3D environments provide extra advantages over 2D alternatives. The affordances they isolate include facilitation of tasks that lead to enhanced spatial abilities, greater opportunities for experiential learning, increased motivation/engagement due to higher levels of interaction and a sense of 'presence' born of the immersive nature of the interaction, improved contextualisation of learning and richer/more effective collaborative learning. Among the few studies on simulated classroom environments, Foley & McAllister (2005), Ferry, Kervin, Cambourne, Turbill, Hedberg & Jonassen (2005) and Girod & Girod (2006) have explored possibilities of linking simulations and workplace experiences—this blended approach proving helpful to cognitively prepare pre-service teachers for real teaching experiences, supporting transfer of knowledge and skills learned in virtual environments to real classrooms. Using SL to practise teaching with peers creates a significant difference in personal teaching efficacy after inworld practice sessions and that collaborative practice teaching is an effective way of practicing teaching (Cheong, 2010). Cheong's (2010) research showed that pre-service teachers can practice teaching skills in SL without negative impact on live students and the practice can be performed repeatedly and easier than in real life, making virtual worlds well-suited to providing authentic environments

where newly developing pedagogy could be practiced and assessed.

Rationale for establishing VirtualPREX

Simply providing greater access to practice opportunities will not necessarily ensure a quality learning experience for pre-service teachers, nor address the inherent problems of the PREX system. Therefore, other ways of providing experiences similar to those occurring during episodes of classroom-based teaching are canvassed. This is particularly true with respect to better opportunities for off-campus pre-service teachers to practice their professional skills and interact with their peers/lecturers. This approach takes advantage of the affordances of virtual worlds to develop a simulated classroom where pre-service teachers can engage.

Formative assessment can lead to greater confidence, enhanced self efficacy, enthusiasm for collaborative working and greater willingness and commitment to changing practice or trying new things (Cordingley, Bell, Rundell, Evans, 2003). However, limited class periods and large student–instructor ratios restrict opportunities for pre-service teachers to interact with and receive feedback from peers and course instructors. A virtual world has the potential to redress some difficulties associated with formative assessment, such as that it is time consuming, difficult to incorporate reaction and resubmission, and difficult to document and, thus, to formalize to metrics that are valid, reliable, and simple to implement (Nicol & MacFarlane-Dick, 2006).

If we are serious about preparing pre-service teachers to become lifelong learners, formative assessment must be given the same attention and resources presently devoted to summative assessment. Harlen (2003) laments the lack of professional development opportunities that enables teachers to acquire the skills necessary to effectively implement formative assessment. Designing VirtualPREX to facilitate formative assessment gives pre-service teachers first-hand quality experience of both receiving and giving feedback and assessment, allowing them to incorporate the advice into their practice.

In line with modern views of learning that acknowledge pre-service teachers as active participants in constructing understanding, VirtualPREX adopts a constructivist approach, where knowledge is user-constructed and pre-service teachers integrate new experiences into their knowledge based over time (Slone, 2009). Virtual worlds offer considerable potential to provide constructivist learning opportunities (Dickey, 2003). The combination of rich graphics and text-based communication allow users to interact with other people and objects in the virtual environment and to experiment with simulated real-life scenarios without real-life consequences.

Many educators have created content in SL that is usable by academics and pre-service teachers worldwide (Jennings & Collins, 2007). SL, the most mature and used virtual world, dominates the educational world (Warburton, 2009). Lester (2008) claimed there were more than 1,000 institutions using SL as an educational tool, and with more than 200 virtual worlds to choose from (Gregory et al., 2010). This growth has been rapid, and the use of virtual worlds continues to increase daily. Yet, no shared space has been developed for use by pre-service teachers in their own time or with peers/educators to practise classroom teaching and management skills.

Creating an automated classroom where pre-service teachers can interact with bots and/or peers controlling avatars provides learners with

authentic experiences that they are likely to encounter in their professional role, as well as a safe, low-risk environment in which to practice, experiment and react to real-life scenarios and see the consequences of complex decisions (Gregory, Reiners, & Tynan, 2010). This is particularly beneficial for the PREX of off-campus education pre-service teachers who have limited availability to work with peers and academics.

VirtualPREX places an emphasis on peer support rather than leadership by supervisors and use techniques such as microteaching and machinima of best practice examples to build a repertoire of skills, journalling and machinima of practice teaching sessions to encourage thinking and self-evaluation. Regular dialogues with peers and supervisors promotes collaborative exploration, engagement with and reflection upon key issues and challenges that are typically encountered in professional settings, as well as critical examination of particular educational practices in light of contemporary theoretical frameworks.

Conclusions and the future

This project addresses a gap in the research on how educational interaction and simulations, available to pre-service teachers prior to experience in the workplace for practice in their own time or with others in an authentic, safe environment, can support and augment PREX. Reviewing machinima can assist pre-service teachers to enhance their understanding of how they taught a lesson or dealt with a situation. This technology-aided assessment is an innovative alternative to the privacy and other legal issues that complicate recording live classroom sessions. Combining role-play in a realistic setting and machinima for reflection and self, peer, formative and summative assessment offers a significant, new option for supplementing pre-service teacher learning. Moreover, it promotes broad collaboration to develop a cost-effective national solution to a sector-wide problem.

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