

AUTHENTIC AND ENGAGING VIRTUAL PRACTICE TEACHING FOR RURAL AND REMOTE PRE-SERVICE TEACHERS

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ABSTRACT

Imagine being able practise your teaching techniques when enrolled in a teaching degree without the use of a 'live' classroom. It is a common phenomenon for off-campus (online) pre-service teachers living in rural and remote regions to not have access of schools to practise their teaching skills. Discussed in this article is a solution to this ever-increasing problem of finding a classroom of students where pre-service teachers can engage in their teaching to practise ideas and techniques in an authentic teaching environment. They practise from their own home, through a virtual school created in Second Life, complete with teacher and student avatars and role-play scenarios.

INTRODUCTION

The University of New England (UNE) is a regional university located 200 kilometres inland from the eastern New South Wales (NSW) coastline approximately halfway between Sydney and Brisbane. There are approximately 22,000 students enrolled at UNE with 80 per cent (University of New England, 2013) opting to study in an online mode, that is off-campus, from a distance (previously known as external studies). Lectures, workshops or tutorials are provided face-to-face to on-campus students. For online students, study materials are provided in a variety of formats that are accessible only through online means, usually through the Learning Management System (LMS), in UNE's case, Moodle. In the School of Education (SoE), at UNE, there are around 4,000 to 5,000 students enrolled each year with 12 per cent enrolled in on-campus mode (McGarry, 2014), leaving the remaining 88 per cent, higher than the UNE overall percentage, opting to study online. The number of students opting to study in online mode has increased over the past few years in the SoE. Outlined are the results of a research project that examined the results of 3,236 students comparing those who participated in virtual worlds activities to those who did not, and the perceptions of students who used a virtual world for complimentary professional experience practice.

BACKGROUND AND CONTEXT

The author began teaching Information Communication Technology (ICT) at UNE in the SoE in 2006. Since 2007, she has been exploring the use of a 3D immersive virtual world as a teaching and learning tool. Over a period of four years, from 2008 to 2011, 3,236 student grades were examined, comparing those students who chose to undertake virtual world activities (voluntary participation) and those who chose not to (non-participation). The results indicated that voluntary participation students outperformed their non-participating peers (Gregory, 2013). This research did not determine the reason for this significant difference but acknowledged that the virtual world did have an impact on the voluntary participating student's learning. These voluntary participating students may be the students that would have been successful no matter what they had chosen to do.

From 2010 to 2012, a resource was developed by the author with a team of educators to assist pre-service teachers to practise their teaching skills, through a process referred to as virtual professional experience (VirtualPREX, see <http://www.virtualprex.com>). VirtualPREX was established through an Office for Learning and Teaching grant and was created for pre-service teachers to practise their teaching skills (Gregory, Dalgarno, Crisp, Reiners, Masters, Dreher, & Knox, 2013). Through VirtualPREX, a space was created in Second Life, a 3D simulated virtual world, so that pre-service teachers could practise their teaching skills with their peers, who role-played as primary school students, prior to going out on professional experience in a real classroom. Students would use a

teacher avatar to teach a classroom of student avatars in order to practice their teaching skills, trialling a way of teaching or learning, whilst conducting a seven minute lesson. (Please see acknowledgements of the team who assisted in this project coming to fruition and being used in pre-service teacher education today in the SoE at UNE.)

All pre-service teachers are required to participate in professional experience in a school every year of enrolment (full-time equivalent year of enrolment). The duration is dependent on the year in which they are enrolled, but can range from 10 days to eight weeks. During VirtualPREX, all pre-service teachers were provided with roles to be enacted with allocated behaviours as either actively or passively on or off task. The teachers practiced his/her skills to determined ways in which to, firstly, teach the students, but secondly, keep students involved in the lesson by implementing various engagement strategies learnt during the course of their studies as pre-service teachers. Non-player characters (bots - meaning that they are not controlled by the humans but programmed to interact with other avatars through gestures, movement and speech) were also created for the role-plays but are yet to be sufficiently programmed to be usable by the practising teacher. All avatars have been created to look like either teachers or school students between eight and twelve years of age (see student avatars in Figure 1) so they could be used with either primary or secondary pre-service teachers.



Figure 1: *VirtualPREX school student avatars*

Demonstrated in Figure 1 are two student avatars that have been created for the VirtualPREX role-plays, where peers take on the characters (and persona) of a primary school student. These peers are provided with roles to play and act as either on or off task, passive or active. The scope of the role is that peers only acted in these specific roles 20 per cent of the lesson time, providing the teacher with some time to conduct their lesson.

To date, approximately 150 on-campus pre-service teachers have trialled VirtualPREX and 12 online pre-service teachers who were predominantly living in rural or remote locations (42 per cent living in locations of 18,000 or fewer people). There were only 12 online pre-service teachers participating in VirtualPREX because it was voluntary and timetabled at the end of a trimester when students were busy preparing for exams and final assignments. Also, VirtualPREX, due to various reasons, was not offered to online students every year. Provided in this article is context and results from this VirtualPREX project.

REVIEW OF THE LITERATURE

Rural professional experience

There are insufficient places in schools for pre-service teachers to undertake professional experience (Le Cornu & Ewing, 2008), particularly for rural pre-service teachers. At the same time, there is a perceived disconnect between educational theory and teacher practice. There is also a strong political argument for a greater emphasis on professional experience in pre-service teacher education. A 3D virtual world can provide an alternate means for practising teaching skills. It could also possibly reduce the problem of insufficient professional experience places available in schools, particularly in rural schools (Green, 2008).

Pre-service teachers experience a *gap between the realities of teaching and on-campus courses which becomes evident from the first practice teaching session undertaken by pre-service teachers* (Allen & Peach, 2007, p. 31). The Hon. Christopher Pyne, current Minister for Education, believes that pre-service teachers are currently receiving too much theory and not enough practical training in their undergraduate degrees and declares that *I want [undergraduate teacher training] to be more practical, I want [pre-service teachers] to have better experiences in the classroom rather than in universities and I want it to be less theoretical* (Pyne, 2014, online). However, schools do not have the capacity for more professional experience placements for pre-service teachers. Further, the high attrition rate of beginning teachers has been partially attributed to the fact that there are too few available placements in schools for professional experience (Le Cornu & Ewing, 2008) with an oversupply of pre-service teachers to available school ratio. Indeed, 45 per cent of newly recruited pre-service and beginning teachers leave their teaching careers either during their studies or within the first five years of teaching (Buchanan, 2010, 2012; Ingersoll, 2001). Pre-service teachers can enter the workforce ill prepared for their professional role (Boylan, 2008; Ferry, Kervin, Cambourne, Turbill, Puglisi, 2004). To address this shortfall, Pyne (2014, online) argues that *the more a teacher is in the classroom learning on the job ... the better*, and Korthagen, Loughran and Russell (2006, p. 1020) state *many pleas are heard for a radical new and effective pedagogy of teacher education in which theory and practice are linked effectively*.

Discussion at the end of the 20th century pushed for a restructuring of teacher education that placed emphasis on practice instead of theory, just as it is today. However, to date, nothing has been done to bridge this gap. Pyne's terms of reference from the Teacher Education Ministerial Advisory Group, formed January 2014, are to identify, among other things, common components regarded as world's best practice in teaching education with particular focus on professional experience and improving university and in-school professional experience opportunities for pre-service teachers (Pyne, 2014).

While finding adequate professional experience placements is a universal issue, it is particularly difficult to find them in rural areas. VirtualPREX does not focus on this, but does provide a means in which students can practice their teaching skills as if it were in a rural school. Green et al., (2006) explored the special challenges of rural placements and notes the additional challenge to *attract, prepare, develop and retain quality teachers in rural schools in NSW* (Green, 2008, p. 7). Further, the preparation of teachers for these schools requires specific attention to *social, cultural, geographical, historical, political and service access issues* (Boylan, 2008, p. 28). It has been recommended that all pre-service teachers wishing to teach in rural schools gain experience in teaching in these schools. However, there simply are not enough schools to cater for the lack of placements for pre-service teachers (Le Cornu & Ewing, 2008). Research indicates, in some states, that less than 22 per cent of rural schools take pre-service teachers for professional experience (The Teacher Education Taskforce, 2012).

Geographical location, particularly for rural and remote schools, is seen as problematic, particularly for high quality teacher education (Kruger, Davies, Eckersley, Newell, & Cherednichenko, 2009). The National Inquiry into Rural and Remote School Education reports *that teacher training institutions should incorporate into teaching courses compulsory modules on rural and remote teaching and they should facilitate rural placements and recruitment strategies to prepare and encourage undergraduates for rural teaching positions* (Sidoit, 2000, online). The National Inquiry into Teacher Education in 2007 acknowledged that there were still *ongoing concerns about the quality of teacher preparation, with the practicum identified as a key persistent problem area* (Parliament of Australia, 2007, online). There is not necessarily equilibrium between the supply of pre-service teachers and the spaces available in schools for professional experience to be undertaken. This is more significant with professional experience placements in rural schools. As Ure, Gough and Newton (2009, p. 5) point out, careful consideration must be given to the costs and resources needed for professional experience.

Universities, whilst theoretically not tied to regional areas, in reality have a monopoly on the schools within their geographical region for professional experience placements. Therefore, finding suitable schools for professional experience can be very difficult for universities who predominantly have online students, such as UNE with 80 per cent of students studying from a distance (University of New England, 2013). Universities find placements for on-campus pre-service teachers as they have access to geographically co-located schools. In the School of Education at UNE, for example,

professional experience placements are found for the approximately 12 per cent of pre-service teachers who are on-campus students. Of the remaining 88 per cent of students studying off-campus, approximately half are located in urban areas and half from rural or isolated locations around Australia. UNE does not have access to schools in these geographically dispersed locations and cannot undertake to find placements. This vast majority of pre-service teachers (88 per cent) are therefore required to find their own school placements.

The VirtualPREX teaching classrooms and other spaces

VirtualPREX is located in Second Life, a 3D immersive virtual world where users can interact with the environment and the people who occupy the space. It offers role-plays with peers and synchronous teaching with bots in an authentic virtual classroom environment. The activities are authentic as they align with following ten characteristics of an authentic task (Herrington et al., 2010, pp. 46–48):

- Has real world relevance and it matches as nearly as possible with the tasks performed by expert practitioners of the field;
- Is not oversimplified but rather ill-defined, requiring and promoting problem solving and higher order thinking rather than memorizing correct answers;
- Requires significant investment of time and intellectual resources;
- Offers an opportunity to examine a problem from different perspectives, using multiple resources;
- Requires collaboration;
- Offers an opportunity for the student to make decisions and reflect on their learning;
- Can be applied across subject areas and require interdisciplinary perspectives;
- Is seamlessly integrated with assessment;
- Creates a polished product that is valuable in its own right;
- Allows alternative solutions and outcomes instead of a single right answer.

Such complimentary virtual world professional experience for pre-service teachers has not been offered to date, either nationally or internationally. Ferry, Kervin, Cambourne, Turbill, Puglisi, Jonassen and Hedberg (2004) have created ClassSim where pre-service teachers can work by themselves through text descriptors of classroom events providing choices of how they would teach. SimSchool (Christensen, Knezek, Tyler-Wood, & Gibson, 2011) and the Cook District School (Girod & Girod, 2006) have created simulations where the results of pre-service decisions are displayed using text and graphical representations of the output. The closest virtual world professional experience to VirtualPREX is TeachLivE, however, this simulation requires actors, with expertise in puppeteering and child behaviour, to control the avatar school children during a lesson (Dieker, Hynes, Stapleton, & Hughes, 2007). These simulations remove the spontaneity and authenticity that is offered by VirtualPREX as a pre-service teacher would have to read text and make a choice of how they teach, or organise actors to play the roles of school students. Figure 2 displays a pre-service teacher undertaking a teaching lesson in a virtual world with their peers who are acting as primary school avatars, sitting at desks, or walking around and participating in the lesson, through a role-play activity.



Figure 2: A VirtualPREX classroom in action

There is a considerable amount of research on the benefits of using a 3D virtual world as a teaching and learning tool (Warburton, 2009; Dalgarno, Gregory, Carlson, Lee, & Tynan, 2013). However, the uptake has been slow because even though the evidence has been provided to the sector that 3D virtual worlds provide an alternate, effective and immersive learning environment in which pre-service teachers can experiment with practice teaching techniques, most feel that the costs would override the benefits.

Background to the use of VirtualPREX

There are currently insufficient teaching practice placements available for pre-service teachers and there is also a high attrition rate of pre-service and early-career teachers, either during their studies or within the first five years of teaching (Ingersoll, 2001). The use of an immersive 3D virtual world can provide a space for extra practice teaching and thus work towards alleviating both these problems.

One way to alleviate the significant problem of pre-service teachers having difficulty in sourcing practice time in the classroom is to use alternative resources, such as an immersive 3D virtual world. There is a demand for more hands on experience without real life practical experience places available. For the ever-increasing proportion of university students opting to study by distance, an immersive 3D virtual world could provide an alternate place in which to learn (King, 2012; Moore, 2013). VirtualPREX has been created for teachers to practise their teaching skills and is a tested virtual teaching environment where four virtual classrooms have been created, complete with teacher and school student avatars, and is available for use by the higher education sector. VirtualPREX enables four virtual classroom teaching scenarios to be undertaken concurrently. Pre-service teachers can practise their teaching techniques in the virtual world where they are provided with autonomy and at no cost. It also provides them with the opportunity to trial teaching techniques that do not have adverse consequences on their students or themselves if they do not work or are inappropriate. A further classroom has been established to enable asynchronous teaching with student bots, which will be utilised once fully functional.

To overcome the shortage of professional experience placements in schools, VirtualPREX is used as a complementary (not supplementary) tool for professional experience. This shortage of professional experience placements has always existed but, over the past 12 months, has increased due to new accreditation of all pre-service teachers prior to participating in professional experience and a mandated increase in the number of days a pre-service teacher must be in the classroom. Experienced mentor teachers are now retiring and those capable of being mentors are decreasing due to new rules and regulations. The lack of available placements in schools is reaching a crisis point. If students are more prepared when they undertake professional experience due to their practice through a virtual world, this problem could be overcome.

This research provides pre-service teachers with a rich forum in which to practise their teaching skills as an adjunct to their professional experience. It enables those pre-service teachers who are unable to find school placements a possible alternate means in which to practise their teaching. As it is a complementary tool, it does not replace professional experience, but could become an alternative in the future. Individual universities worldwide have been trialling a variety of non-immersive ways in which to teach virtually through the use of text selection or human intervention (see, for example, Christensen et al., 2011; Dieker et al., 2007; Ferry et al., 2004; Girod & Girod, 2006).

METHODOLOGY

To date, researchers have relied on education learning theories that were not developed for a 3D virtual world context. Past researchers have used experiential learning (Kolb, 1984), behaviourist (Anderson, 2008; Pavlov, 1927), constructivist (Bruner, 1990), transformative (Cranton, 1992), and connectivism (Siemens, 2004) learning theories. Outlined is how the five theories are incorporated into virtual world activities:

- Experiential learning - through immediate, concrete experiences by undertaking role-play activities in the virtual world;
- Constructivism - learning by building on knowledge already acquired by participating in weekly

- virtual world activities;
- Connectivism - where new information through virtual world activities is continuously being acquired, requiring processing and drawing distinctions between vital and non-vital information;
- Transformative - where pre-service teachers reflect on actions undertaken during virtual world activities, paying attention to when reflections occur;
- Behaviorist theories - teaching the facts, such as how to use various resources in the virtual world.

This research is underpinned by the use of a social constructivist framework. Social constructivism provides a firm pedagogical foundation, understanding that learning is undertaken through social and cultural interaction; that is, interaction, sharing of ideas and discussions, all being built from past experiences, knowledge, perceptions and supporting new knowledge. For pre-service teachers generally, new knowledge around what it means to be a teacher in the classroom will come from prior knowledge (gained through classroom study, engagement with theory, role-plays, ideas around pedagogical best practise) and their experience in the classroom on practical experience. The extra practical experience offered to pre-service teachers through VirtualPREX has been designed to promote authentic learning through tasks that are either identical or similar to those that they would encounter in a real classroom; that is, the pre-service teachers construct ideas based on their prior knowledge (bringing in real world experiences) into their virtual world (complementary) practice teaching.

Methods

The virtual classrooms were first trialled in 2009 by Gregory and Masters (2012) where de Bono's (1985) Six Thinking Hats strategy was undertaken with on-campus and online pre-service teachers. This role-play activity has been so successful that it has been undertaken every year since with online students and provided the virtual world space and ideas to create VirtualPREX.

All student grades were examined to determine if there was a difference between those who chose to participate in virtual world activities and those who did not. All units (subjects) in which virtual world activities were offered as part of the student's learning were examined. From 2008 to 2011, this totalled 3,236 students, of which 232 were voluntary participation (i.e. online students).

From 2011 to 2014, approximately 200 on-campus pre-service teachers in the SoE at UNE were provided with VirtualPREX workshops to practise their teaching skills. Pre-service teachers were invited to complete post VirtualPREX teaching experience surveys. The surveys enabled pre-service teachers to provide their perceptions of the role-play activities through open-ended questions. The surveys consisted of a combination of demographic and likert scale questions, as well as open-ended responses. Pre-service teachers were asked to complete questions on demographics, ICT and virtual world knowledge and they were also asked open-ended questions in order to drill into their perceptions of their teaching experiences (such as best and worst things about the activity, what worked well, what didn't, and how valuable the activity was in contributing to their professional teaching confidence, skills and/or attitudes). These open-ended responses reported here are supported by some of the demographic responses. Further results of both on-campus and online VirtualPREX teaching activities are reported elsewhere (see dissemination at <http://www.virtualprex.com/dissemination.html>).

Twelve online pre-service teachers participated in VirtualPREX role-play activities from 2011 to 2013. Although a large sample of online pre-service teachers were enrolled and participated in virtual world learning activities, the VirtualPREX role-plays were offered to pre-service teachers at an inconvenient time. All pre-service teachers were given the opportunity to play the role of the teacher and their peers acted in the roles of school students. The lessons went for approximately seven minutes and the teacher role was rotated. The pre-service teachers were able to teach any lesson that they felt comfortable with or wanted to trial. The teaching was not part of an assessment task, although assessment tasks have been built around the machinima (video recorded of virtual world activities) of the lessons (see assessment at <http://virtualprex.com/assessment.html>).

RESULTS

Pre-service teachers who participated in VirtualPREX teaching role-plays from 2011 to 2013 were asked a series of questions in relation to their perceived skill level prior to commencing their studies at UNE and after the VirtualPREX activity. Table 1 indicates that pre-service teachers felt their ICT skill levels were either high or very high prior to commencing their studies (75 per cent), with the remaining 25 per cent believing their ICT skills were very low prior to commencing their studies. After undertaking the VirtualPREX activity, approximately eight weeks into the trimester, pre-service teacher's perceived skill level had not changed for those in the 'high' or 'very high' range. For the remaining 25 per cent, the ratings had changed from the 'very low' category to 'average' perceived skill. This was a very significant change in the pre-service teachers' perceived skill rating (up two levels). During the VirtualPREX activities, it was observed that all pre-service teachers demonstrated the skill level required to be able to undertake the activity without the need for any technical intervention.

Table 1: Pre-service teachers perceived skill level prior to commencing studies and after virtual world activities (2011 to 2013)

Skill rating	Perception of ICT skills prior to commencing studies	Perception of ICT skills after undertaking studies
Very high	25%	25%
High	50%	50%
Average	0%	25%
Low	0%	0%
Very low	25%	0%

After the VirtualPREX activity, pre-service teachers were asked to comment on various aspects of their session, such as the 'best thing about the activity', the 'worst thing about the activity', 'how could the activity be changed' or 'did they think that the activity prepared them for their professional experience in the real classroom'. Various themes emerged from these questions. These themes are indicated through the use of italics.

To the question, 'what was the best thing about the activity?', pre-service teachers reported that the VirtualPREX teaching activities provided *interaction* with their peers and they were able to ask questions *without embarrassment*. They enjoyed the opportunity to *implement their learning* using the latest technology and that they were able to *present a lesson in front of peers and be able to get constructive feedback* (pre-service teacher perception). They felt that the VirtualPREX activity provided *insight into other's teaching strategies* and one comment that depicted this was: *Enjoyable to see what others did and how they coped with the situation i.e. a safe environment where you could make mistakes and learn from them* (pre-service teacher perception). The pre-service teachers also thought that they *got a feel for teaching* by using VirtualPREX. Pre-service teachers felt that the VirtualPREX classrooms provided an *authentic place* in which to practice their teaching techniques, as one person stated: *It recreates the classroom environment, more than I expected* (pre-service teacher perception).

In response to the question, 'what was the worst thing about the activity?', the pre-service teachers felt that it was *difficult to get an overall view* of what was going on in the classroom. They felt that *classroom management was difficult* without being able to gauge body language. One comment from a pre-service teacher depicted exactly what happens in a real classroom: *It was very difficult to be the teacher. I found that it was hard to ... keep up with what was being said while also keeping an eye on students' whereabouts* in the classroom, plus *remember where you were up to with your lesson* (pre-service teacher perception). They also thought that *classroom behaviour* was difficult to manage.

However, the question 'do you believe that the virtual worlds role-play activity was helpful in preparing you for your professional experience in a real classroom?' provided great insight into the perceptions of the pre-service teachers in using VirtualPREX. One pre-service teacher felt that they needed to consider *classroom management skills* when teaching as *it has made me think a little more about my 'off the cuff' discipline methods and it has made me realise that I need to have a more proactive approach to*

the 'off task' behaviour (pre-service teacher perception). The pre-service teachers felt that they needed to have control of the class before the students were going to learn. VirtualPREX gave you a place to practice and get feedback without actually being out there in the real world. You are able to do a lesson in front of your peers, which as an external student I don't get to do. It also gives you an opportunity to view other teachers and how they structure lessons and manage behaviour (pre-service teacher perception).

The pre-service teachers also felt that VirtualPREX provided an 'authentic learning' experience: *Yes. It recreates real life experience. It's a magnificent tool and great for role playing (pre-service teacher perception). The pre-service teachers thought that VirtualPREX enabled them to see what others did and how they coped with situations in a safe environment where you could make mistakes and learn from them (pre-service teacher perception). One pre-service teacher summed up their experience and the question of whether VirtualPREX would help with their future teaching with the following comment: Yes it would help, because it allows you to understand that when in a class room it does not always run smoothly and the interruptions can be endless (pre-service teacher perception).*

Overall, the feedback was extremely positive and provided insight into how to improve the VirtualPREX role-plays. Students provided their views on what worked, what didn't and how it could be improved, but most importantly, whether they believed this process could assist with their teaching in a classroom full of real students.

Finally, as one pre-service teacher summed up VirtualPREX practice teaching:

...the opportunity to stand up and teach a lesson in front of others was invaluable. I had started my prac but was on observation so this activity occurred at a particularly great time for me. It is daunting standing up in front of a class for the first time. This could probably be extended to being able to practice lessons you have planned. I am finding it difficult to judge how long things take with lesson planning and could find it useful to practice with pre-programmed bots who could throw in occasional interruptions, toilet requests, requests for help or further understanding, just to get a feel of how long a lesson should be (pre-service teacher perception).

On-campus students participated in compulsory workshops, and online students participated voluntarily in VirtualPREX activities. All students enrolled in first year education courses were invited to complete post VirtualPREX and professional experience surveys. Comparisons were made of voluntary versus compulsory participation in VirtualPREX of pre-service teachers, rural versus metropolitan living pre-service teachers, on-campus vs online pre-service teachers through the use of mean, standard deviation, effect size, cluster analysis, T-test and chi-square to determine differences, significance and distribution. How, when, where, what and why questions were used in order to provide more insight. (Please see <http://www.virtualprex.com/dissemination.html> for more dissemination of results).

DISCUSSION

Being able to properly prepare pre-service teachers in and for rural employment is of significant consequence to the Australian economy and educational system and creates a flow on effect from early childhood training through to adult education. There is a need to find opportunities for professional experience for rural students, especially when additional professional experience is becoming more emphasised and valued. UNE is well placed to address this issue with 71 per cent of students residing in rural and regional areas across Australia, 22 per cent residing in a capital city and six per cent from overseas (University of New England, 2013). Addressing the lack of off-campus, and in particular, rural professional experience placements, is a key step towards achieving appropriate levels of training for pre-service teachers. The use of a 3D virtual world for complementary professional experience practise can also go towards achieving this.

VirtualPREX is not used as a replacement professional experience but as complementary experience and space in which to practice teaching. Teaching in a 3D virtual world is different from real classroom teaching for a number of reasons – peers played the role of students (and do not really know how a student may really respond), teachers have to use a range of ICT skills to control their avatar, which they would not have to do in a normal classroom, (for example, writing on the board required the avatar to click on the board and then type the text), talk is spontaneous, but, like a

normal classroom, if everyone spoke at once you couldn't hear (and can possibly cause audio feedback). Although teaching in a virtual world can provide spontaneous teaching and responses, it isn't always the case if the student is unfamiliar with the 3D virtual world teaching space. However, this is overcome by providing familiarisation lessons prior to the teaching role-plays.

There are multiple benefits to using VirtualPREX for complementary practice teaching. Firstly, if role-plays are undertaken, the students are not confronted with their peers as they would be in a real life role-play scenario. Therefore, by using child avatars, the role-plays are more realistic. In a real life role-play, again, the voice of the person playing the role would not align with the voice of a student. Therefore, using text for the student avatars is of benefit, even if it is time consuming. By using bots, the students can practice their teaching at any time that suits them. They do not have to organise peers or a classroom of students who are not always available in the same place and at the same time as others. This makes the VirtualPREX role-plays very useful, in particular for off-campus students. The role-plays have been designed to be as authentic as possible and students often comment on how authentic they appear, especially when they were not expecting them to be.

The research reported here works within an area of existing innovation through a 3D virtual world, but one that users are cautious of taking up because of the way it challenges preconceived notions of what constitutes quality education.

The impact of using a virtual world for teaching and learning arose from a comparison of 3,576 student grades. The positive impact of using a virtual world for teaching and learning has been demonstrated through research conducted by the author since 2008. This research found that voluntary virtual world pre-service teachers out-performed the non-virtual world peers (Gregory, 2013). Pre-service teachers (79.3 per cent) who chose to study using a virtual world attained a grade of 75 per cent or higher compared with 46.5 per cent of those who chose not to participate in virtual world activities.

Other than higher grades overall, just over twenty percent of voluntary virtual world participant students and 53.7 per cent of students who chose not to participate in virtual world activities received less than 65 per cent in their studies. While this research provided evidence of the positive use of a virtual world for adult educators, particularly those learning from a distance, it did not determine the reasons for this demonstrated difference in achievement. There are two factors at play regarding success in the voluntary participation in virtual world activities. The first is many of participants have self-identified as having very high or high levels of ICT skills. The units that pre-service teachers were enrolled in were either ICT or teaching and learning units. The second factor that should be considered is that the higher achieving students could be more generally apt to do something extra to what they need to in order to complete a unit.

Of the pre-service teachers who participated in UNE virtual world activities 22.9 per cent resided in rural or remote locations with a total of 52 per cent living in locations of 18,000 or fewer people (Gregory, 2013) – see Figure 3. This has implications for the pre-service teachers in finding a suitable school for their professional experience placement. As one pre-service teacher who undertook virtual world activities stated:

...we have geographically dispersed adult learners, so [virtual world practice teaching activities] could be a way to get everyone together in one place without actually going anywhere [such as a school]. We could also create scenarios to train staff on how to handle difficult [teaching] situations (Gregory, forthcoming, p. 4).

Online pre-service teachers have reported that virtual world learning activities stopped them feeling so isolated and by using a virtual world, distance education seems more real, like a part of the classroom. Others stated that there could even be several classes interacting at the same time, which is what VirtualPREX has been designed to cater for.

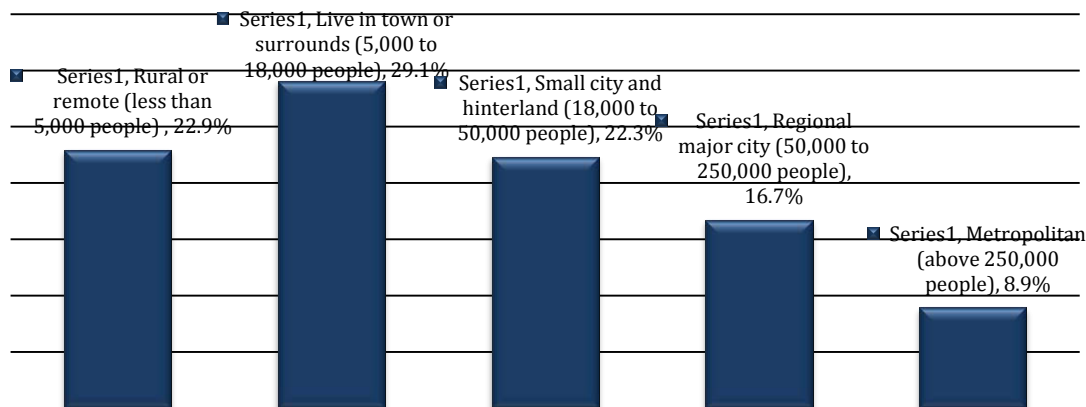


Figure 3: Demographics of pre-service teachers participating in virtual world activities

The future and concluding remarks

Pre-service teachers could be encouraged to practice their teaching skills using a virtual world to complement their learning and/or teaching. Ultimately this could reduce attrition rates to provide a group of teachers who are more confident and better prepared for classroom teaching due to the extra practice that they are able to undertake through the use of a virtual world.

The VirtualPREX research addresses the significant problem of not having enough classrooms to practise teaching or the resources to be able to do so. Practice teaching in a virtual world could provide the pre-service teacher with skills that they were not otherwise able to acquire prior to teaching in a real classroom. VirtualPREX compliments existing professional experience and creates more opportunities for professional experience practice without placing additional burden on an already over-loaded placement system. This has a flow-on effect for rural placements.

Indicators to support this learning could provide the sector with an alternate means in which to undertake teaching practice. Those pre-service teachers wishing to teach in rural schools will be provided with the experiences to be able to do this confidently and effectively through virtual practise.

It is acknowledged that the best and most effective professional experience is from a face-to-face experience, and that additional professional experience for pre-service teachers is both desirable and warranted. However, it is also acknowledged that this extra experience is not always possible, especially if it leads to placing additional burden on an already over-burdened placement system. Using a virtual world is a way of addressing these issues through the effective application of new technologies, but there remains a resistance to its use. Demonstrating its effectiveness in providing professional experience practice, as well as identifying a synopsis of the types of pre-service teachers that choose to study using virtual worlds, will assist in promoting quality pathways to gaining practice teaching techniques and trial ideas, without the need of a real classroom. Professional experience is entrenched with traditional practices, but not necessarily better practices, and it is the responsibility of universities to bring about change (Patrick, 2013) that can benefit pre-service teachers. There is a need for a “new school-university partnership to ensure high quality professional experience” (Le Cornu, 2012). By providing a virtual world for practice teaching as an alternate way to overcome this problem will be of benefit to pre-service teachers if they implement VirtualPREX practice teaching into their resources. VirtualPREX practice teaching uses virtual worlds as a teaching and learning tool to teach pre-service teachers virtually, from their place, in their own space.

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REFERENCES

- Allen, J. M., & Peach, D. (2007). Exploring connections between the in-field and on-campus components of a pre-service teacher education program: A student perspective. *Asia-Pacific Journal of Cooperative Education*, 8(1), 23–36.
- Anderson, T. (Ed.). (2008). *The theory and practice of online learning*, (2nd ed.). Canada's Open University: Athabasca University Press.
- Boylan, C. (2008). Rural teacher education: A literature review. In B. Green (Ed.), *Spaces & places: The NSW Rural (Teacher) Education Project* (pp. 27–59). Wagga Wagga: Australia: Centre for Information Studies, Charles Sturt University
- Buchanan, J. (2010). May I be excused? Why teachers leave the profession. *Asia Pacific Journal of Education*, 30(2), 199–211.
- Buchanan, J. (2012). Telling tales out of school: Exploring why former teachers are not returning to the classroom. *Australian Journal of Education*, 56(2), 205–217.
- Christensen, R., Knezek, G., Tyler-Wood, T., & Gibson, D. (2011). SimSchool: An online dynamic simulator for enhancing teacher preparation. *International Journal of Learning Technology*, 6(2), 201–219.
- Cranton, P. (1992). *Working with adult learners*. Canada: Wall & Emerson, Inc.
- Dalgarno, B., Gregory, S., Carlson, L., Lee, M. J. W., & Tynan, B. (2013). *A systematic review and environmental analysis of the use of 3D immersive virtual worlds in Australian and New Zealand higher education institutions: Final report 2013* (pp. 1–226). Armidale, Australia: DEHub: Innovation in Distance Education, University of New England. Available from http://www.dehub.edu.au/downloads/VWSSP_Report_V2_TD_200613_dehub.pdf.
- de Bono, E. (1985). *Six thinking hats*. London: Penguin Books.
- Bruner, J. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press.
- Dieker, L., Hynes, M., Stapleton, C., & Hughes, C. (2007). Virtual classrooms: STAR simulator building virtual environments for teacher training in effective classroom management. *New Learning Technology SALT*, 4, 1–22.
- Ferry, B., Kervin, L., Cambourne, B., Turbill, J. B., Puglisi, S., Jonassen, D., & Hedberg, J. (2004). Online classroom simulation: The next wave for pre-service teacher education? In C. Atkinson, C. McBeath, D. Jonas-Dwyer, & R. Phillips (Eds.), *ASCILITE 2004: Beyond the comfort zone*, Proceedings of the 21st ASCILITE Conference (pp. 294–302). Perth, Australia. Retrieved from <http://www.ascilite.org.au/conferences/perth04/procs/ferry.html>
- Girod, M., & Girod, G. (2006). Exploring the efficacy of the Cook School District simulation. *Journal of Teacher Education*, 57(5), 481–497.
- Green, B., McConaghy, C., McCulla, C., Boylan, C., Maxwell, T., Novak, N., Letts, W., & Tamatea, L. (2006). *Spaces and places: The NSW Rural (Teacher) Education Project - Final Report (to NSW DET, ARC Linkage partners) (Volumes 1 and 2)*. Bathurst: Charles Sturt University.
- Green, B. (Ed.). (2008). *Spaces & places: The NSW Rural (Teacher) Education Project*. Wagga Wagga: Australia: Centre for Information Studies, Charles Sturt University.
- Gregory, S. (2013). Comparison of students learning in a virtual world. In P. Jerry, S. Gregory, & N. Tavares-Jones (Eds.), *The hype cycle upswing: The resurgence of virtual worlds*, At the Interface: Cutting Edge Research. Oxford, United Kingdom: Inter-Disciplinary Press.
- Gregory, S. (accepted). *Student perceptions of learning from a distance through a virtual world*. At the Interface: Cutting Edge Research. Oxford, United Kingdom: Inter-Disciplinary Press.
- Gregory, S. (2014). Taking the distance out of learning for students through a virtual world. In A. Hebbel-Seeger, T. Reinert, & D. Schäffer (Eds.), *Synthetic worlds: Emerging technologies in*

- education and economics* (Vol. 33, pp. 205–231). New York, NY: Springer Science+Business Media New York.
- Gregory, S., Dalgarno, B., Crisp, G., Reiners, T., Masters, Y., Dreher, H., & Knox, V. (2013). *VirtualPREX: Innovative assessment using a 3D virtual world with pre-service teachers: Final Report* (pp. 1–96). Sydney, Australia: Office for Learning & Teaching. Available from <http://www.olt.gov.au/resource-virtualprex-assessment>
- Gregory, S., & Masters, Y. (2012). Real thinking with virtual hats: A role-playing activity for pre-service teachers in Second Life. *Australasian Journal of Educational Technology*, 28(Special issue, 3), 420–440. <http://www.ascilite.org.au/ajet/ajet28/gregory.html>
- Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.
- Ingersoll, R.M. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal*, 38 (3), 499–534.
- King, B. (2012). Distance education and dual-mode universities: An Australian perspective. *Open Learning*, 27(1), 9–22. doi:10.1080/02680513.2012.640781
- Kolb, D. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.
- Korthagen, F., Loughran, J., & Russell, T. (2006). Developing fundamental principles for teacher education programs and practices. *Teaching and Teacher Education*, 22, 1020–1041.
- Kruger, T., Davies, A., Eckersley, B., Newell, F., & Cherednichenko, B. (2009). *Effective and sustainable university-school partnerships: Beyond determined efforts by inspired individuals* (pp. 1–108). Canberra: Teaching Australia.
- Le Cornu, R. (2012). School Co-ordinators: Leaders of learning in professional experience. *Australian Journal of Teacher Education*, 37(3), 17–33.
- Le Cornu, R., & Ewing, R. (2008). Reconceptualising professional experiences in pre-service teacher education... reconstructing the past to embrace the future. *Teaching and Teacher Education*, 24(7), 1799–1812.
- McGarry, L. (2014, March 5). *UNE School of Education statistics*. NSW: UNE.
- Moore, M. G. (Ed.). (2013). *Handbook of distance education* (3rd ed.). New York, NY: Routledge, Taylor & Francis Group.
- Parliament of Australia. (2007). *Top of the class: Report on the inquiry into teacher education* (pp. 1–258). Canberra, Australia. Retrieved from http://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=evt/teachereduc/report.htm
- Patrick, R. (2013). Don't rock the boat: Conflicting mentor and pre-service teacher narratives of professional experience. *The Australian Association for Research in Education, Inc.*, 40(2), 207–226.
- Pavlov, I. P. (1927). *Conditioned reflexes*. London: Clarendon Press.
- Pyne, C. (2014, February 19). *Announcement of teacher education Ministerial Advisory Group*. E&OE Transcript, Marion, SA. Retrieved from <http://www.pyneonline.com.au/media/transcripts/announcement-of-teacher-education-ministerial-advisory-group>
- Siemens, G. (2004, December 12). *elearnspace. Connectivism: A learning theory for the digital age*. Retrieved April 24, 2009, from <http://www.elearnspace.org/Articles/connectivism.htm>
- Sidoit, C. (2000). *The National Inquiry into Rural and Remote School Education*. Retrieved from <http://www.dci-au.org/html/ruralremote.html>
- University of New England. (2013). *UNE Overview*. Retrieved from <http://planning.une.edu.au/Statistics/overview/index.htm>

- Ure, C., Gough, A., & Newton, R. (2009). *Practicum partnerships: Exploring models of practicum organisation in teacher education for a standards-based profession*. Sydney, Australia: ALTC.
Retrieved from
<http://www.vit.vic.edu.au/SiteCollectionDocuments/PDF/practicum%20partnerships.pdf>
- Warburton, S. (2009). Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology*, 40(3), 414–426. doi:10.1111/j.1467-8535.2009.00952.x