

2016

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Recommended Citation

Dalgarno, B., Gregory, S., Knox, V., & Reiners, T. (2016). Practising Teaching using Virtual Classroom Role Plays. *Australian Journal of Teacher Education*, 41(1).
<http://dx.doi.org/10.14221/ajte.2016v41n1.8>

This Journal Article is posted at Research Online.
<https://ro.ecu.edu.au/ajte/vol41/iss1/8>

Practising Teaching using Virtual Classroom Role Plays

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Abstract: Practice in the role of the teacher is an essential part of teacher education, however professional experience placements are becoming increasingly difficult to find. Consequently, additional university-based teaching practice, such as classroom role play with student teacher peers is important. Classroom role plays can be effective but there are limits to the realism of the experience and such strategies are not feasible for students studying at a distance. This article reports on a study in which a classroom in the virtual world of Second Life was used to house role plays of student teachers in preparation for their first professional experience placement. Based on the results of this study it is concluded that teaching practice using a virtual classroom shows promise but there are a number of usability and other issues which need to be resolved before it will be viewed as an effective strategy by all student teachers.

Introduction

The role of professional experience placements in schools as a key aspect of teacher education programs is well established (Darling-Hammond, 2006), however, such placements can be disruptive to schools or costly to support and manage and consequently, are becoming increasingly difficult to find (Le Cornu & Ewing, 2008). Additionally, when school placements are relied upon as the only opportunity for practice in the role of the teacher, student teachers can have difficulty seeing how to apply the theory studied at university in their school-based teaching practice (Zeichner, 2010). University-based teaching practice with student teacher peers, under the guidance of teacher educators, can help students to reflect on connections between theory and practice, can provide additional experience in the role of the teacher, and can be an effective strategy for preparing student teachers for school-based professional placements (Lee & Wu, 2006; Francis, 1997).

This article reports the results of a research study on the use of a virtual classroom in the virtual world of Second Life as a site for classroom role plays to provide on-campus teaching practice for student teachers. The article describes the initial design of the virtual classroom and the role plays and the way in which the environment and the role plays were refined in light of data collected from a trial with 72 student teachers (undergraduate students enrolled in a teaching degree). The article culminates in the presentation of the results of a second trial using the refined role plays with 82 student teachers.

Background

Challenges in Providing Teaching Practice to Student Teachers

Traditional models of teacher education involve a combination of on-campus classes, interspersed with professional experience placements in schools (Darling-Hammond, 2006). For example, a four-year program may include three or four placements in schools, each of duration between five and ten weeks. An alternative model, which is becoming particularly prevalent for students studying to become teachers after completion of another degree, is to study online or at a distance (Robinson & Latchem, 2002). In such courses, the on-campus classes are typically replaced by online study, while similar school-based placements are provided to those undertaken by on-campus students.

Professional experience placements are an essential part of teacher education programs, whether delivered on campus, at a distance or online (Darling-Hammond, 2006; Simpson, 2006; Smith & Lev-Ari, 2005). Many have called for increased time allocation for professional experience placements and an increased focus on school-university partnerships to increase the learning benefits of such placements (Darling-Hammond, 2006; Hammerness, van Tartwijk, & Snoek, 2012; Zeichner, 2010). The importance of placements has also been frequently highlighted by teacher education students as the most important aspect of their course (Brown, 2008; Koerner, Rust, & Baumgartner, 2002).

Despite their importance, it has become increasingly difficult to source sufficient professional experience placements for students due, in part, to significant increases in enrolments in teacher education courses and no subsequent increase in field placements (Brennan & Willis, 2008; Le Cornu & Ewing, 2008; Vick, 2006). This difficulty in obtaining and attending placements is even greater for students located in rural and regional centres, disadvantaged students, and students studying at a distance (Abbott-Chapman, 2011; Simpson, 2006). The challenge of ensuring the availability and quality of professional experience placements has been a recurring subject of academic commentary and government reports internationally (Darling-Hammond & Lieberman, 2012; Hartsuyker, 2007; Productivity Commission, 2012).

An ongoing problem faced by teacher educators in preparing student teachers for placement and subsequent practice as a teacher is the disconnect between students' university learning and their professional experience placements (Allen, 2009; Cope & Stephen, 2001). For example, Darling-Hammond (2006, p. 307) highlights the problem of "how to integrate theoretically based knowledge that has traditionally been taught in university classrooms with the experience-based knowledge that has traditionally been located in the practice of teachers and the realities of classrooms and schools" as a recurring issue in teacher education. More generally, this problem of how to design learning experiences that allow learners to apply theoretical ideas in the context of realistic problems has been the focus of authentic learning theorists across disciplines (see, for example, Herrington & Oliver, 2000). Effective teaching about pedagogical approaches, classroom management, understanding diverse students and so on, needs a combination of engagement with relevant theory and opportunities to experience the issues, and to practise relevant teaching techniques. The prevailing models of teacher education where professional experience placements are supervised and managed at arm's length to the university make it difficult to ensure that the students' professional placement experiences are aligned to their university learning (Allen, 2009; Zeichner, 2010).

The problem of limited availability of teaching placements and the need for students to better connect their theoretical learning to their practical teaching experience can both potentially be addressed through the provision of university-based teaching practice to complement the school-based professional experience placements (Lee & Wu, 2006; Francis, 1997). Opportunities to carry out the role of a teacher at university under controlled

conditions, with guidance from teacher educators, can also be a valuable strategy to prepare student teachers for their first placement and, in particular, to give them the confidence they need to be able to commence teaching classes early in their placement (Cheong, 2010; Gurvitch & Metzler, 2009). If students can be provided with the opportunity to practise their teaching skills as part of their university classes then this will also help to make the material they are learning in these classes less abstract and better connected to the actual practice context (Francis, 1997). A number of alternative approaches have been used over the years for providing students with university-based teaching practice and these are discussed further in the next section.

Providing Student Teachers with University-Based Teaching Practice

One approach to providing student teachers with university-based teaching practice that was used extensively in the 1960s and 1970s is micro-teaching, in which student teachers present short (e.g. 5–10 minute) lessons to either a small group of school students or to a group of their student teacher peers (see Allen, 1967, for a detailed description). A common feature of micro-teaching is that lessons are video recorded and student teachers receive feedback from their peers and instructors and have the opportunity to reflect on and discuss the teaching strategies used. Numerous research studies on micro-teaching were undertaken in the 1970s and 1980s, including studies that demonstrated its influence on change in the behaviour of the student teacher (see, for example, a meta-analysis of these studies in Butcher, 1981), studies that explored the relative value of a range of different aspects of the design of micro-teaching episodes (see Macleod, 1987, for a review), and studies demonstrating its overall effectiveness as a teacher preparation strategy (see Turney, Clift, Dunkin, & Traill, 1973). As discussed by Cornford (1991), micro-teaching seemed to fall from favour in the late 1980s, partly because of a lack of unequivocal empirical evidence of its value (see also Macleod, 1987) and partly because of its association with increasingly discredited skills-based approaches that implicitly assumed a causal link between teacher action and student learning, regardless of social or contextual factors (Francis, 1997).

More recently, micro-teaching approaches have re-emerged, either with a reconceptualised underpinning philosophy consistent with contemporary teacher education pedagogical approaches (see, for example, Francis, 1997) or under different labels such as small group teaching, teaching simulation, or laboratory based teaching experience (see, for example, Gurvitch & Metzler, 2009; Thiessen, 2000). An example of the latter approach is the model pedagogical laboratory where students undertake practice teaching on campus drawing on contemporary research on teaching practice under the guidance of expert teachers but with real school students (see, for example, Ma, Lai, Williams, Prejean, & Ford, 2008). Studies of these contemporary approaches have demonstrated their impact on student teacher foundational self-efficacy prior to undertaking practice teaching (see Gurvitch & Metzler, 2009) and have identified design issues that need to be considered in their effective use (see Ma et al., 2008). Although the results appear promising, there are substantial costs and logistical challenges in providing these kinds of experiences for all student teachers.

More recently, a number of authors have described strategies involving the recording of peer teaching practice using portable video recorders, which have a number of features in common with micro-teaching. An additional feature of such approaches that has been found to be effective is the use of online repositories and social networking tools to allow students to view the recorded lessons of themselves and other students, and provide feedback online (Bower, Cavanagh, Moloney, & Dao, 2011; Lee & Wu, 2006; So, Pow, & Hung, 2009). The analysis of video recordings of one's own teaching has also been found to be an effective

strategy within professional experience placement contexts (see, for example, Lee & Wu, 2006; Santagata, Zannoni, & Stigler, 2007).

Teaching lessons to one's student teacher peers can be further extended by having student teachers play the role of school students during the teaching episode (Anderson, Frager, & Boling, 1982; Hughes & Traill, 1975). This is an example of a more general approach used in a range of discipline areas under the broader labels of role plays or simulations (Feinstein, Mann, & Corsun, 2002; Lane & Rollnick, 2007). The main difference between a classroom role play and traditional approaches to micro-teaching is that in simulation, or role play, as well as a focus on the student teacher lesson delivery, there is also a focus on the interaction with the students playing the role of school students and this can expose the student teacher to decision making in the context of unexpected scenarios and events (Anderson et al., 1982; Hughes & Traill, 1975). This additional element, along with providing a more realistic opportunity for the student teacher to practise their teaching presentation skills, has also been found to help foster the development of classroom management skills (Hughes & Traill, 1975) and the interpersonal aspects of their teaching skills more broadly (Frankel & Corson, 2003). A key aspect of the difficulty faced by students early in their teaching careers relates to classroom management and a number of researchers have called for improvements to this aspect of teacher education programs (Giallo & Little, 2003; Jones, 2006; O'Neill & Stephenson, 2011). Classroom role plays also have the potential to benefit students playing the role of school students by providing a valuable opportunity to imagine themselves in the shoes of the students they will teach in schools and to experience particular pedagogical approaches from the school students' perspective (Anderson et al., 1982; Hume, 2012; Juárez-Porter Carlyle, 2012; Mayes, 1976). Lastly, role plays can also provide a context for students' teaching practice so that lesson designs can be targeted at the specific needs of students in the role-play scenario (Zuckerman, 1979).

In many disciplines where role plays as a strategy for developing student practice capacities are used, technology has increasingly been used to enhance the role-play activities. A range of technology enhancements to role-play design are discussed in the following section.

Technology Supported Role Play and Simulation

There are a number of different technological enhancements to traditional face-to-face role-play activities that have been reported in the literature. For example, technology can be used to support remote access to the role-play activity (Arvaja, Rasku-Puttonen, Häkkinen, & Eteläpelto, 2003; Kolloff & Rahimzadeh, 2004); to support communication and information dissemination during the role play (Asal & Blake, 2006); to simulate roles within the role-play scenario (Lane & Rollnick, 2007; Veletsianos, Heller, Overmyer, & Proctor, 2010); to simulate visual aspects of the role-play context (Cruickshank, 1988); or to provide an underlying model of the simulated scenario (Feinstein et al., 2002).

Arvaja et al. (2003) describe a role play involving students from two secondary schools exploring a scenario focussing on the notion of imperialism set in colonial India, where an online learning environment (the Future Learning Environment) was used to facilitate remote communication between students at the two schools. Asal and Blake (2006) discuss the way in which the ICONS simulation builder software can be used to support online communication between participants, voting on possible actions, and the generation of reports on the current situation within the simulated scenario in political simulations. Lane and Rollnick (2007) describe the way in which simulated patients are used in medical education, while Veletsianos et al. (2010) report the use of animated pedagogical agents

within virtual environments. Cruikshank (1988) discusses the way in which videos can be used to illustrate a classroom scenario which provides background to a role-play activity undertaken by teacher education students.

In a teacher education classroom simulation context there are two distinct ways in which traditional role-play activities have evolved through the use of technology. The first involves non-immersive computer-based simulations in which characteristics of the school students and the classroom scenario are represented through text and static graphical output, while the second (which is the focus of this article) involves the use of an online, visual, and potentially immersive virtual environment, in which the simulated classroom is hosted. Ferry, Kervin, Cambourne, Turbill, Puglisi, Jonassen et al. (2004), describe ClassSim as an example of the first type of classroom simulation in which student teachers work by themselves on textual descriptions of classroom events where they have to select the best choice out of a given set of options. Evaluation of the use of ClassSim by 200 student teachers found that the simulation supported students in thinking critically about complex teaching situations and helped them appreciate the impact of subtle changes that experienced teachers made during lessons (Ferry, Kervin, Cambourne, Turbill, Hedberg & Jonassen, 2005). SimSchool is similar in that it provides a school and classroom simulation with details of the scenario and the impact of teacher decisions on student activity, represented using text descriptions supplemented by graphical output (Christensen, Knezek, Tyler-Wood, & Gibson, 2011; Gibson, Christensen, Tyler-Wood, & Knezek, 2011). Christensen et al. (2011) report findings demonstrating that student teachers gained a sense of self-efficacy more rapidly using the simulator, compared to traditional teacher preparation approaches. The Cook District school simulation is another simulated school environment in which student teachers can explore the consequences of particular instructional decisions on the learning of simulated students with a range of different characteristics with results displayed using textual and graphical representations of outcome data (Girod & Girod, 2006).

The use of virtual worlds to house classroom role plays provides an alternative to these non-immersive simulation environments. Virtual worlds provide visually realistic representations of real-world spaces rendered dynamically from a 3D model according to the users' current position within this space. It was postulated that additional visual realism would help to ensure that student teachers would immerse themselves in the role-play activities and would contribute to transfer of the acquired teaching skills to the real classroom context. Participants are represented in the environment by avatars (Warburton, 2009). The key potential advantages of role plays housed in a virtual world over both face-to-face role plays and non-immersive simulations is that they allow for visual realism in the context in which the role play occurs, a key limitation of conventional classroom role plays identified by Anderson (1982). The realistic appearance of the role-play avatars can engage participants more deeply with the activity and allow them to identify more closely with their allocated role (Jamaludin, Chee, & Ho, 2009; Jarmon, Traphagan, Mayrath, & Trivedi, 2009). In a classroom role play, the student roles in particular can be more realistic in a virtual world than they are when played by university students in a face-to-face role-play context. Another advantage is that role plays housed in a virtual world can be undertaken by students who are not physically present on campus, which is particularly important for students studying at a distance (Gregory & Masters, 2012).

There has been growing interest in the use of virtual classroom environments in which students, through their avatars, can authentically play the role of a teacher and some early prototype systems have been reported in the literature. Cheong (2010) investigated the use of a virtual classroom environment in Second Life in which student teachers prepared and delivered lessons while their peers played the role of school students. Mahon, Bryant, Brown, and Kim (2010) describe a Second Life virtual classroom environment in which participants

play the role of a teacher or a school student with a focus on classroom and behaviour management techniques. An additional element within this environment is the inclusion of simulated school students exhibiting rudimentary student behaviours, implemented as bots (non-player characters). Fluck and Fox (2011) developed an early prototype of an OpenSim virtual classroom suitable for running from a USB memory stick. The intention of this environment, once complete, is that it will allow student teachers to interact with simulated students in order to develop their classroom management skills, but without the need for other students to be present to play the role of school students. The TeachLivE mixed reality classroom simulation (TeachLivE, 2011) uses computer-simulated school student avatars controlled by a specialist interactor who has experience and expertise in puppeteering and child behaviour (see also Dieker, Hynes, Stapleton, & Hughes, 2007). In this environment the student teacher undertaking the teacher role has a fixed position outside the virtual classroom environment and does not use an avatar, instead interacting with the virtual students using voice and body gestures, while viewing the virtual environment on a large screen.

The VirtualPREX Classroom Simulation

The VirtualPREX (virtual professional experience) classroom environment was created in order to address the need for university-based classroom role-play activities to prepare student teachers for, and to supplement, professional experience placements in schools. Although there were a number of special purpose simulations available, including some virtual world based simulations which model aspects of classroom environments, at the time the project commenced there were no virtual-world-based classroom simulations which included a realistic classroom environment where whole lesson scenarios, including entry to the room, teaching, and classroom management could be practised. Consequently, a decision was made to create a new environment rather than adopting an existing environment for this study. The environment was designed and created by the second author, with input from other members of the research team (which includes experienced teachers, teacher educators and professional experience coordinators) as well as other teacher educators and teachers. The four classrooms are housed in the virtual world of Second Life and allow student teachers to adopt either a primary school student or a teacher avatar in order to participate in classroom role plays. Each virtual classroom is a 3D representation of a real classroom environment, which allows role-play participants to walk around, sit down, stand up and interact with each other. Second Life's dynamic rendering of the participant's viewpoint provides a realistic visual representation similar to what they would experience in walking around and interacting in a real classroom. Role-play participants are able to carry out activities, such as reading books and writing on boards, using a variety of interactive virtual tools,. Although it would have been possible to include alternative teaching tools with specific affordances for learning within a virtual world rather than those available in a real world environment, because the focus was on preparing student teachers for teaching in a real classroom, the VirtualPREX environment was modelled as closely as possible on the kinds of classrooms the student teachers were likely to encounter on professional placement.

The 3D immersive characteristics of the VirtualPREX environment make it similar to the environments described by Fluck and Fox (2011), Cheong (2010), and Mahon et al. (2010), but differentiates it from the ClassSim simulation (Ferry et al., 2004), the SimSchool simulation (Christensen et al., 2011), and the Cook District simulation (Girod & Girod, 2006). The ability for student teachers to play the role of school students rather than the use of simulated school students further differentiates the VirtualPREX learning environment from the latter three classroom simulations.

A key limitation of traditional micro-teaching activities, which focus on teacher presentation of content rather than interaction with students, is addressed in the VirtualPREX environment by allowing student teacher peers to play the role of school students within the classroom activity. As discussed above, such role-play activities can help student teachers develop their classroom management and interactive teaching skills, practise teaching presentations targeted at specific learners, and develop a better understanding of the role of school students in the classroom. Housing the role plays in a virtual classroom environment was intended to address another limitation of role-play activities undertaken in a university classroom by providing a realistic school classroom environment and having student teachers, through the teacher and student avatars, take on a realistic visual representation of their roles. This is important because it addresses a problem identified by Anderson et al. (1982) where it appeared that student teachers were averse to acting the part of children because of real or imagined peer appraisal. Because the roles are embodied by avatars in the virtual world the student teacher can participate somewhat anonymously and can therefore play their roles without fear of being judged by others (Campbell, 2009). Lastly, undertaking the role plays within a virtual environment will enable off-campus student teachers to participate in future iterations of the role plays without the need to be physically present on the university campus.

The following sections describe the study in which teacher role-play activities using an initial version of the VirtualPREX environment were trialled with 72 student teachers. The environment and other aspects of the activities were then refined in light of findings from this trial, and the revised version of the activities and environment were subsequently trialled with 82 student teachers. First, the research design, including the design of the virtual classroom environment and the learning activities, along with the data collection undertaken in order to evaluate each phase of the trial are described. Second, the results from the Phase 1 and Phase 2 trials are presented followed by a discussion of the results and conclusion.

Method

Overview

The VirtualPREX environment is housed on the Australis 4 Learning island in Second Life. It consists of four separate classrooms, each containing decoration, furniture and teaching tools similar to what one would expect to find within a Primary school classroom environment, along with teacher and student avatars. The following sections describe the specific features of the environment, the design of the role plays, and the data collection during the first phase of the study, as well as the refinements made to the role play and virtual classroom design before the implementation of the second phase of the study.

The Virtual Classroom Environment

Phase 1

The four classrooms were coloured blue, red, green, and yellow to allow for easy reference and identification to role-play participants. The four classrooms were positioned next to each other on a platform 300 metres above the Australis 4 Learning island in order to prevent Second Life explorers stumbling across them by accident during role plays. Each classroom included a teacher's desk, student desks, a blackboard, interactive books and resources, and various wall hangings appropriate to a primary school classroom, such as letter charts and atlases. A male and a female teacher and 10 school student avatars were created for each classroom each wearing informal clothing subtly colour coded to help ensure that the classroom each belonged to could be identified (for example, if left outside the classroom at

the conclusion of a role play). A Heads Up Display (HUD) was made accessible to each participant providing clickable toggle switches to activate appropriate classroom gestures, such as a raised hand, a nod, a shake of the head, or clapping. Figure 1 shows a screen shot of one of the virtual classrooms during Phase 1 of the trial.



Figure 1. Phase 1 VirtualPREX classroom including teacher and student avatars

Refinements to the Classrooms for Phase 2

Based on feedback during Phase 1 (discussed further below), the following changes were made to the virtual classrooms:

- The school student avatars were altered to better physically represent school students aged around 10–12 years old, and each avatar was dressed in clothing representing a more recognisable school uniform (see Figure 2);
- The classrooms were positioned further apart so that “local chat” in one classroom was not “audible” in the adjacent classroom;
- Additional interactive teaching tools were added, including an interactive blackboard that could be written on, a set of dice that could be rolled, and workbooks that when activated allowed students to appear to write; and
- Various other cosmetic changes were made, for example, the colouring of some classrooms was changed and various changes to the internal appearance of classrooms were made to make them more realistic, e.g., the sizes of the desks and chairs were reduced in size for increased realism.



Figure 2. A comparison of school student avatars used in Phase 1 and Phase 2

Figure 3 shows a screen shot of one of the virtual classrooms during the second phase of the study.



Figure 3. VirtualPREX classroom used in Phase 2

The Role-Play Activities

Role-Play Design

Role-play activities were designed with the intention that they would be carried out by student teachers during the first year of their course before their first professional experience placement. The design drew on the perspectives of eight experienced teachers who participated in a focus group interview designed to elicit ideas about the key pedagogical and classroom management scenarios student teachers at this stage of their training should be given the opportunity to experience. A key outcome of this focus group was the decision to provide specific behavioural roles to each student teacher playing the role of a school student, with these roles divided into the broad categories “good” and “naughty”, later renamed to “on task” and “off task”. Behaviours within off-task roles included walking around the room, calling out, looking out the window, and not responding to the teacher. The allocation of relatively simplistic behavioural roles to student teachers is consistent with the findings of classroom management researchers such as Beaman, Wheldall, and Kemp (2007). Classroom behaviour management is a major concern to student and early career teachers and “the main causes of disruption, while being frequent, are often trivial in nature” (p. 45). These researchers further report that the main disruptions they found in primary schools were “talking out of turn” and “hindering other children” (2007, p. 46), findings which were utilised in the revision of the role-play scenarios for Phase 2.

Participants

Seventy-two first year on-campus students training to be Primary school teachers (teachers of children aged 4 to 12) from the University of New England participated in the Phase 1 role-play activities. All student teachers were aged under 26 years, 85% were female and 15% were male. All student teachers completed a questionnaire following the activity in Phase 1. Eighty-two first year on-campus students training to be Primary school teachers from the same university participated in the Phase 2 role-play activities. Eighty of these

student teachers completed a questionnaire following the activity. Of those completing the questionnaire, 84% were female and 16% were male, 96% were aged under 26 years and 4% were aged between 26 and 35 years. The activity was a formal part of an Information Communication Technology (ICT) teacher education unit and all students who were present on the days in which the activities were scheduled participated in the activities. Students were able to choose whether or not to contribute to the research by completing a questionnaire at the conclusion of the role-play activity.

Questionnaire responses about ICT skills and experience indicated that whereas 61% of students in Phase 1 and 62% of students in Phase 2 rated their ICT skills as high or very high, only 27% in both Phase 1 and 2 rated their skill level with respect to virtual worlds as high or very high (with 64% in each phase rating their skills as average). Student teachers were also asked to indicate the frequency with which they used certain technologies and responses indicated that in Phase 1, 97% and, in Phase 2, 94%, of the student teachers used the Internet daily, and 80% in Phase 1 and 90% in Phase 2 used social networking sites such as Facebook daily, while 83% respondents in Phase 1 and 77% in Phase 2 indicated that they used virtual worlds infrequently or never.

Role-Play Activities

Role-play activities were conducted over a two-hour period in a computer laboratory with between 16 and 24 participants in each session, with groups of between 6 to 8 participants undertaking their role play in each virtual classroom. The activity was compulsory but was not an assessable task. Typed text was used to communicate via inworld local chat with the teacher role using upper case so that it was distinguishable from the primary school student chat. Student teachers were asked to prepare a seven-minute lesson in advance and during the role plays student teachers took turns at playing the role of the teacher as well as the primary school students. The actual activities undertaken by those playing the role of the teacher and the students during each role-play varied depending on the design of the prepared lessons. A two-hour Second Life orientation session was conducted for on-campus students, in Phase 1 four weeks prior to the role-play activity, and in Phase 2 in the week prior to the role-play activity. Having the student teachers play the role of the school students, as well as being a convenient way to ensure that the virtual classrooms were populated with school students, was also postulated to be of benefit to the student teachers in developing empathy with their students and in understanding classroom dynamics from multiple perspectives.

During Phase 1 there were half on-task and half off-task roles allocated to student teachers playing the role of school students and no constraints were placed on the off-task role players. As discussed below, the student teachers found this particularly challenging and consequently, for Phase 2, the number of off-task school students in the classrooms was reduced to roughly 20% to reflect more realistically the number of students who may be off task in a real classroom. The off-task roles were also re-written and those playing these roles were asked to only be off task around 20% of the time (based on the review of studies on troublesome behaviour by Beaman et al., 2007). Role-play scenarios were also re-written for greater clarity. The roles were divided into on-task active, on-task passive, off-task active and off-task passive. Off-task active roles involved behaviours that were sufficiently disruptive to require the immediate attention of the teacher. Off-task passive roles included various types of inattentiveness that did not attract immediate attention. On-task active roles involved behaviours such as asking questions, also requiring the teacher's immediate attention. On-task passive roles involved students working independently without the need for the teacher's

attention. In each class, one off-task active role and one off-task passive role were allocated, with the exception of the first workshop, which contained slightly larger groups, and two off-task passive roles were allocated.

The introduction to the role-play activity was updated in Phase 2 to include more detailed steps on how to participate in the role plays. Additionally, in Phase 2, participants were given the opportunity to refresh their knowledge of the Second Life environment immediately before commencing the role-play activity and were encouraged to practise using the interactive teaching tools. In Phase 2, student teachers were also provided with a “cheat sheet” on how to use some of the basics of Second Life and on how to use specific VirtualPREX interactive tools during the role-play activity. Further information about the design of the role-play activities including more images of the virtual classrooms and avatars, machinima recordings of student activities (video footage captured in the virtual world), and copies of the information provided to students is available at Gregory (2013).

Data Collection

After completion of the role-play activities, student teachers were invited to complete an online questionnaire. Questions included: demographic questions; Likert scale questions relating to their self-perceived ICT skills, experience in using technology including virtual worlds, views and beliefs about virtual worlds; perceptions of their preparedness for their professional experience placement; open-ended questions about their experience of the role-play activity and their views about its value. The design of the questionnaire in this study built on questionnaires used by the researchers in their prior research. Because the intention was to use the questionnaire data in a primarily descriptive way, it was not considered necessary to validate the questions through pilot testing. Students engaged in a group reflective discussion on the activity after completing the questionnaires and in Phase 2, following the workshops, a small number of students (10 in all) volunteered to participate in a group interview about the activity. Upon returning from professional experience placement, student teachers were invited to complete another questionnaire asking whether they thought the role-play activity had helped in preparing them for their professional experience placement. Students were also observed by members of the research team and two other teacher educators as they undertook the activities and written observation notes were made. Text, machinima, and screen shots were also collected during the role play (four computers were used to control virtual cameras for this purpose).

Results

Phase 1

During the first workshop in Phase 1, problems were encountered with the group chat feature of Second Life due to an Internet outage across campus and student teachers were required to use local chat. This caused difficulties due to the close proximity of the virtual classrooms. Specifically, chat messages posted in one classroom were visible to students in the adjacent virtual classroom. To address this issue, a decision was made for Phase 1 to use only two of the four virtual classrooms (the two furthest away from each other). This resulted in an increased number of student teachers in each role play, and in the case of the first workshop, this resulted in 10 students missing out on role-playing the teacher. In other workshops all student teachers had a turn at playing the teacher. In the larger groups it proved difficult to accommodate all role plays in the allocated time and some were reduced to six

minutes to achieve this. As discussed above, student teachers were asked to come prepared with a short lesson to teach to their peers. Despite reminders ahead of the session, only 10 of the 72 student teachers in Phase 1 actually showed evidence of having prepared a detailed lesson.

Table 1 shows a summary of student teacher questionnaire responses to a question asking them to rate the degree to which they found the activity confusing, difficult, irrelevant, boring, interesting, easy to use, useful and enjoyable. In discussing these results in this paragraph, the positive responses (scores of 5, 6 or 7) and the negative responses (scores of 1, 2 or 3) have each been grouped together, with a score of 4 categorised as undecided. Based on this grouping of responses, only 40% of the students found the activity useful with 24% undecided. Interestingly, of the 10 students who did not play the role of the teacher, 9 indicated that they found the activity not useful, and of those who did play the role of the teacher, only 28% indicated that they did not find the activity useful. This highlights the importance of providing students with the opportunity to play the role of the teacher. Encouragingly, 61% found it interesting, with 18% undecided. A sizable minority (31%) found the activity confusing with 28% undecided and 29% found it difficult with 15% undecided, indicating that additional support or preparatory training may be required.

Activity Descriptors	←-----→							Mean	Standard Deviation
	Not at all 1	2	3	4	5	6	Extremely 7		
Confusing	7%	15%	18%	28%	20%	8%	3%	3.75	1.48
Difficult	13%	20%	23%	15%	20%	8%	1%	3.41	1.58
Irrelevant	17%	29%	13%	14%	13%	9%	6%	3.26	1.82
Boring	13%	17%	19%	30%	7%	10%	4%	3.49	1.63
Interesting	1%	7%	13%	18%	30%	14%	17%	4.77	1.53
Easy to Use	0%	9%	16%	26%	23%	24%	3%	4.47	1.33
Useful	3%	13%	21%	24%	23%	10%	7%	4.08	1.50
Enjoyable	1%	7%	24%	24%	11%	19%	13%	4.44	1.58

Table 1: Overall perspectives on the role play activity during Phase 1

Student teachers were also asked in the questionnaire to state the best and worst thing about the activity. After analysing their responses based on themes, it emerged that carrying out the teaching role in a simulated classroom environment and responding to different types of student behaviours were frequently mentioned. The value of role-playing students with particular behavioural characteristics was also highlighted. Encouragingly, a large number of responses indicated that student teachers found the activity entertaining, fun and interesting, and enjoyed interacting in the activity with their peers. Responses also highlighted the novelty of the experience and the technology. When describing the worst thing about the activity a number commented on the difficulty and confusion of keeping track of what was happening when everyone was typing/talking at once. This could just indicate the challenges for novice teachers in managing student behaviour or it may suggest that there are problems in using text chat in a simulated classroom role play. Another major problem for the students role-playing teachers was the lack of control they felt they had over the primary school students. They felt the “naughty” students kept misbehaving even when they implemented strategies to bring them back on task. Responses indicated that for some students the activity was boring, pointless or frustrating and that the typing made it confusing and hard to keep up.

Student teachers were also asked to name one thing about the activity that could be improved. There were a number who commented on aspects of communication particularly

while playing the role of the teacher. Participants noted that it was difficult keeping up with the typed conversation when playing the role of the teacher and that having to type rather than talk was also difficult when teaching. Some suggested that the teacher should be able to use the audio talk function rather than text chat. Others suggested the need for stricter guidelines for the activity and restrictions on avatar actions (for example, preventing uncommon actions like walking on desks). A number of participants commented on the lack of realism of the scenario, with the over-the-top behaviour of, and lack of control over, the participants playing the role of the school students highlighted in particular. Others would have liked more time to play the teacher.

Student teachers were also asked in an open-ended question whether the activity was helpful in preparing them for their first professional experience placement. Answers to this question were distributed relatively evenly with 33% clearly indicating that they thought it was, 30% clearly indicating that they thought it was not, and the remaining 37% providing a response which was not overwhelmingly positive or negative.

After the completion of their professional experience placement, participants were asked to complete a further questionnaire which included Likert scale and open-ended questions designed to find out if they thought the role-play activity had actually assisted in their preparation for placement. Unfortunately, only 10 students completed the questionnaire and consequently responses may not represent the views of the wider group. There were mixed results as to whether the activity was useful in preparing them for their professional experience. For example, four students agreed, two students disagreed and four were undecided about whether “the activity helped to develop my lesson presentation skills”. Three students agreed, two students disagreed and five were undecided about whether “the activity helped to develop my ability to provide clear instructions to students”. Two students agreed, one student disagreed and six students were undecided about whether “the activity helped to develop my behaviour management skills”. The following comments in response to open-ended questions illustrate the diversity of student perspectives about the activity upon returning from placement:

The activity was helpful in that we got to experience teaching in a different environment and with different kinds of students. However, it was very difficult as we were not teaching face-to-face and ... it was difficult to discipline the students as we only had a chat room to talk and we didn't use our voices.

This activity was highly valuable to my professional skills and confidence because it got me comfortable with teachers and peers, but most importantly the students.

The diversity in responses to the questionnaire in Phase 1 was noteworthy. Overall, there were more positive responses than negative responses to all questions with means below the midpoint for confusing, difficult, irrelevant and boring, and above the midpoint for interesting, easy to use, useful, and enjoyable. However, there was a sizable minority responding negatively to each question. A key question at the conclusion of Phase 1 was whether addressing the problems and issues identified would lead to a more positive rating of the activity by this minority of students or whether there are some students for whom this type of activity is seen as problematic and of limited value. In attempting to address some of the main issues emerging in Phase 1, it was hoped that Phase 2 would shed more light on this question.

Phase 2

As discussed in Section 3.2.2 and 3.3.3 above, refinements to the VirtualPREX environment and role-play design were undertaken prior to Phase 2 as a result of Phase 1 questionnaire responses and researcher observations. Firstly, to address the group chat problem, the virtual classroom locations were moved further apart allowing all four classrooms to be used concurrently, which reduced the number of participants in each role play, and ensured that there was sufficient time to allow all students to play the role of the teacher. A number of changes were also made to the visual appearance of the classrooms and the avatars in order to improve the realism of the classroom scenario. Refinements were also made to the role-play scenarios in Phase 2, with the number of off-task primary school students reduced to two per classroom and role descriptions re-written to ensure that off-task primary school students were only off task 20% of the time.

The Phase 2 role plays progressed relatively smoothly with few technical problems. There was a problem setting up the videoing of the machinima in the first workshop which meant a delay in starting. Although the refinements to the role play allowed all four virtual classrooms to be used, the group sizes meant that in fact only three classrooms were used. (It was determined that using all four classrooms would have resulted in too few school student roles which would have reduced the realism of the role play). Not all students had the opportunity to play the role of the teacher. Factors contributing to this were the delay in starting Workshop 1, which also had the largest groups, and the revision to the workshop design to allow the student teachers to refamiliarise themselves with Second Life which led to less time being available for the role-plays. This meant that again 10 (6 in Workshop 1) out of the 82 students did not get the opportunity to role-play the teacher. The majority of students had not prepared a lesson and consequently lessons tended to be improvised at the time rather than presented based on prepared material. Observation of the activity by the research team suggested that students varied in their initial engagement with the activity but in most cases became quite immersed once the role plays commenced. The students overall seemed to enjoy the role-play activity and were very engaged although there were signs of tiredness, boredom or distraction in a small number students towards the end of the two-hour session, and this was more common for students playing passive school student roles. The number of students overplaying the off-task roles was noticeably less than during the Phase 1 role plays indicating that the refinements to role descriptions had a positive effect.

Table 2 shows a summary of Phase 2 questionnaire responses to the question asking them to rate the degree to which they found the activity confusing, difficult, irrelevant, boring, interesting, easy to use, useful, and enjoyable. Similar to the discussion of the corresponding questions from Phase 1, responses have been collapsed into positive (scores of 5, 6 or 7), negative (scores of 1, 2 or 3) and undecided (a score of 4). As with Phase 1, there was a mix of positive and negative responses to all questions, however there was a noticeable downward trend on responses to the negative indicators in Phase 2. For example, 17% of the students found the activity confusing compared to 31% in Phase 1, 16% found it difficult compared with 29% in Phase 1, 14% found the activity boring compared with 21% in Phase 1 and 16% found the activity irrelevant compared with 28% in Phase 1.

Activity Descriptors	←-----→							Mean	Standard Deviation
	Not at all	1	2	3	4	5	6		
Confusing	13%	16%	36%	18%	13%	1%	3%	3.17	1.39
Difficult	18%	17%	30%	18%	11%	4%	1%	3.03	1.45
Irrelevant	16%	28%	25%	16%	11%	4%	1%	2.95	1.44
Boring	17%	33%	20%	15%	8%	5%	1%	2.84	1.48
Interesting	4%	5%	16%	24%	25%	17%	9%	4.49	1.51
Easy to Use	3%	14%	16%	29%	21%	13%	4%	4.07	1.45
Useful	0%	11%	26%	20%	24%	14%	5%	4.21	1.40
Enjoyable	5%	8%	17%	25%	14%	21%	9%	4.36	1.64

Table 2: Overall perspectives on the role play activity during Phase 2

In order to address the question of whether the refinements to the role play carried out prior to Phase 2 resulted in more positive responses, a T-test was used to compare responses to each question on the Phase 1 and Phase 2 questionnaires. The results of this analysis are shown in Table 3. The comparison indicates that the activity was considered significantly less confusing and less boring by Phase 2 participants. Although there were apparent increases from Phase 1 to Phase 2 in mean responses to questions asking whether the activity was interesting, easy to use, useful or enjoyable, the differences were not statistically significant. An additional question which can be used as a point of comparison between the two phases is the open-ended question asking whether the activity helped to prepare students for their professional experience placement. In Phase 1 the responses were split between a definite “yes” (33%), definite “no” (30%) and 37% wavering between, e.g., “yes and no”, “not really” “kind of”, or “in a way”. In Phase 2, however, the responses to this question were more positive, with 56% clearly responding that they thought it prepared them and only 15% clearly indicating that they thought it did not. This noticeable improvement indicates that the refinements to Phase 2 had a positive impact however there was still a minority of students who had reservations about the activity and its value for preparing them for placement.

Response	Phase 1 mean	Phase 2 mean	t	p
Confusing	3.75	3.17	2.431	0.016*
Difficult	3.41	3.03	1.527	0.129
Irrelevant	3.26	2.95	1.146	0.254
Boring	3.49	2.84	2.499	0.014*
Interesting	4.77	4.49	1.147	0.253
Easy to use	4.47	4.07	1.762	0.080
Useful	4.08	4.21	-0.527	0.599
Enjoyable	4.44	4.36	0.328	0.744

*=significant at the 95% level

Table 3: Comparison of overall perspectives across the two phases

In Phase 2, additional questions were added to the questionnaire in order to gather more specific information on students’ perceived value of the learning activity. These questions asked students to rate their confidence, knowledge, and experience with regard to certain aspects of their teaching skills and to indicate their level of agreement or disagreement with a series of statements about the value of the activity in developing these skills. These results are summarised in Table 4. Responses to these questions suggest that the majority of students thought the activity would help them to respond to unexpected occurrences (62%), develop their ability to structure a lesson (60%), provide clear instructions to students (59%)

manage student behaviours (58%), and understand student perspectives (51%). Close to a majority of students also thought the activity would help to develop their presentations skills (44%), their skills in moving around the classroom (46%), and their self confidence as a teacher (50%). Interestingly, the areas where the largest proportion of students indicated that they had low or very low confidence were responding to unexpected occurrences (44%), and structuring a lesson (40%), and these were the areas where the student teachers thought the activity would be most helpful. These results provide a more positive picture than the relatively low percentage of students who indicated that the activity was useful (43%), and suggest that when prompted about the possible benefits of the activity the majority of students did in fact consider it to be valuable. Importantly, however, a sizable minority of students were uncertain about whether the activity would help them in developing the various aspects of their teaching skills (between 22% and 41%), and another smaller minority disagreed with each statement (between 11% and 19%). This uncertainty could be partly explained by the fact that the students hadn't been on their first professional placement yet, however, the results do suggest that this type of activity may not be suitable for, or at least valued, by a certain proportion of students.

Statement	Very strongly disagree	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Very strongly agree	Mean	Standard Deviation
	1	2	3	4	5	6	7		
The activity will help to develop my lesson presentation skills.	1%	3%	12%	41%	34%	7%	3%	4.34	1.04
The activity will help to develop my ability to provide clear instructions to students.	0%	3%	11%	28%	43%	13%	3%	4.62	1.02
The activity will help to develop my skills in structuring a lesson.	0%	3%	8%	29%	43%	14%	3%	4.67	1.00
The activity will help to develop my skills in moving about the classroom.	3%	3%	13%	36%	34%	9%	3%	4.34	1.15
The activity will help to develop my ability to respond to unexpected occurrences.	0%	5%	9%	22%	43%	14%	5%	4.68	1.16
The activity will help to develop my behaviour management skills.	0%	4%	14%	24%	43%	12%	3%	4.53	1.09
The activity will help me to understand the perspective of my students.	0%	5%	14%	29%	37%	12%	3%	4.43	1.12
The activity will help to develop my self-confidence as a teacher.	1%	4%	11%	33%	37%	9%	4%	4.45	1.14

Table 4: Perceived value of the activity in developing teaching skills

Clearly, even though a number of refinements were made to the role plays from Phase 1 to Phase 2, there were still some students who found the activity difficult/confusing, uninteresting/boring or not particularly useful, or who felt that it did not contribute to the development of their teaching skills or help prepare them for professional experience placement. An analysis of the open-ended responses is necessary in order to understand whether this reflects the fact that we were unsuccessful in addressing issues identified in Phase 1, whether additional issues emerged in Phase 2 or whether there are some students who generally feel negative about this type of activity. On the positive side, the majority or close to a majority of students did find the activity valuable and analysis of the open-ended responses helped identify the aspects of the activity they found most valuable. The results of this analysis of the open-ended responses are presented in the following paragraphs.

A number of themes emerged in the responses to the question asking students what they thought was the best thing about the activity and in positive responses to the question about whether they thought the activity was helpful in preparing them for their professional experience placement.

The opportunity to experience the role of the teacher was a key benefit emphasised by a number of students and exemplified by the following student responses: “it provides the opportunity to teach a class in a simulated environment therefore enabling the development of necessary skills within a classroom”, “becoming a teacher and seeing things from that point of view”, and “I was able to learn what it is like to teach a lesson on a specific subject and answer constant questions from students”. Similarly, a number of students identified playing the role of the school student as one of the best things about the activity, for example, “interesting being in a student role” and “seeing situations through the eyes of a student”. A number of students also emphasised aspects of classroom management practice and experiencing the classroom environment as positive features of the activity, for example, “being able to consider unexpected occurrences within the classroom and approaches in how they can be overcome”, “looking at different ways to deal with interruptions”, and “it shows how you have to be aware of all of the things that happen inside of a classroom”. The anonymity and safety afforded by the virtual classroom environment and lack of judgement from peers were also commented on: “it is a good way for students to have an interactive classroom experience without worrying about consequences” and “being able to interact without judgement from others”. The enjoyment they obtained from the activity was notable in student responses, for example, “fun way of learning”, “it was fun and interactive”, “entertaining”, and “engaging”. Finally, a number of students mentioned interacting with their peers and the experience of using a virtual world as positive features as well, for example, “playing it with my peers”, “interacting with peers on a new software”, “learning about virtual worlds”, and “using virtual worlds was an experience in itself”.

In indicating why they thought the activity would be helpful in their preparation for professional experience, some students noted that observing their peers teach was valuable in becoming aware of different teaching approaches and different ways of dealing with unexpected occurrences in the classroom, for example, “it allowed me to observe how other students as teachers react and teach differently”. It also started students thinking about their upcoming professional experience, for example, “it allowed me to think about how I was going to teach, and that I should be prepared”, “it provides the opportunity to teach a class in a simulated environment therefore enabling the development of necessary skills within a classroom”, and “it created a possible real-life scenario of a Primary classroom”.

As with the previous question, a number of themes emerged in responses to the questions asking students what they thought was the worst thing about the activity and what could have been done differently, and in negative responses to the question asking whether the activity was helpful in preparing them for professional experience placement.

The challenging nature of playing the role of the teacher and responding to student behaviour was emphasised by a number of students, as exemplified by the following responses: “confusing trying to keep up with what is going on in the class room”, “it was difficult to keep on track and maintain classroom involvement and management”, and “too much going on at once”. In interpreting these responses it is unclear in some cases whether, even though this was noted as one of the worst things about the activity, it may nevertheless have been a valuable feature in preparing the students for similar challenges in the real classroom. Alternatively, these responses may indicate that they thought that the challenges were different due to aspects of the virtual world environment, as suggested by the following response, “the chat was sometimes difficult to work with when lots of people were trying to talk and you can’t get a perspective on the conversation”. Responses indicating that students

found the use of text chat difficult or unrealistic were quite frequent, for example, “I think it would be much easier to teach a classroom and stay in control if I was able to speak, rather than type”, “typing made it quite unrealistic”, and “not being able to use oral language”.

Comments about the unrealistic behaviour of their peers and their overacting when in disruptive roles were less frequent during Phase 2, but nevertheless a number of students still mentioned this as a problem, for example, “students being silly”, “off task students taking up all the time got pretty boring”, “the off task students were usually off task for the whole lesson, whereas they should have only been off task for 20% of the lesson”, and “people need to be more respectable and more like real life students in order for the teacher to conduct an adequate class lesson”. This was also mentioned as a key limitation of the activity in preparing students for professional placement, for example, when asked whether the activity was helpful in this respect student responses included “not particularly, I think that because it’s people our age generating what the avatars say - it’s not really what a primary school student would say”, and “I don’t think so, because we were dealing with our age group, not actual children - the classroom didn’t flow the way a proper one would”. The design of this aspect of the activity was mentioned as one of the ways in which it could be improved, for example, “don’t make so many disruptive students” and “don’t have as many off task roles”. However, problems with their peers not taking the activity seriously were also mentioned, which would not necessarily be addressed through improvements in the role-play descriptions, for example, “people being stupid with this – it’s not like a real classroom situation not all students misbehave” and “it wasn’t being taken seriously by everyone”. Again this could, however, be a valuable feature of the activity in that the student teachers may underestimate how many disruptions they may encounter on their professional placements.

Another common theme in responses was that of boredom, with a number of students indicating that the activity became boring, for example, “it got boring towards the end”. A number mentioned playing the role of passive students as an aspect of the activity that made it boring at times “being a student that said nothing until asked and never being asked”, “being the boring student who sits still all lesson”, and “when being a student, you spend a lot of time waiting around not doing anything whilst the teacher tends to other students”. The boredom could have resulted from a combination of the repetitive nature of the role-play activity coupled with the length of time of the activity.

A number of students mentioned that they found the activity difficult or confusing, particularly at the start, or that they had difficulty operating the virtual world software, for example, “slightly confusing”, “it was a bit hard to understand at the start”, and “without correct practice with all the control tools you couldn’t move around the classroom easily and lost track of where some people were”. A small number of students indicated a reluctance to undertake these types of computer-based activities, for example, “I hate computers and having to fiddle around with things like this”, “I’m not very good with computers, I think it’s a little weird”, and “I am not really a tech person, so sometimes I found it hard - as well at some stages for me it is hard to see how I could use this”. A somewhat related point made by a number of students was the fact that virtual world experiences are inherently unrealistic and consequently of limited value, for example, “I would simply much prefer to do this activity in real life - I believe the experience in reality differs greatly to pretending in the virtual world”, “I believe the only way to get confident with teaching is firsthand experience”, “but it is virtual and therefore real life situations are different and have consequences unlike virtual worlds”, and “virtually, you have time to think about how to discipline a child, but there is no guarantee that you will react the same in real life”.

The limited amount of time spent teaching was mentioned by a number of students, for example, “small amount of teaching time”, “teaching for only 7 minutes wasn’t really

enough time”, and “make a whole lesson instead of just small ones”. This was something that students thought could be an improvement for the activity with a number of students wanting a longer teaching time, for example, “longer lessons” and “more time to be the teacher”. A reduction in the number of students playing the role of school students was also mentioned as a way to address this, for example, “fewer students to allow more focus on instruction”, although this was countered by one comment that the lessons would be improved if there were more students.

The fact that student teachers on the whole did not come with a prepared lesson was mentioned as a limitation by some students as well as things that they personally could improve, for example, “could have been more organized with my preparation”, “take more notice of what students are doing in the classroom”, “been more prepared when I played the teacher role”. One student suggested that the activity could have been improved if “actual lesson structures and plans [were] given to us, so the acting teacher didn’t have to waste so much time deciding what to teach”. A couple of students suggested that the activity could have been improved with more varied lesson designs, for example, “more real life activities such as the students writing a paper while sitting in the chairs, and more group work could be included” and “more activities to do in the classroom - not just stand up the front and talk to the kids”.

As with Phase 1, after the completion of their professional experience placement, participants were asked to complete a further questionnaire, however in Phase 2 only five students responded. Two students were positive about the contribution of the activity to their preparation for placement. These two students provided positive responses to statements saying that the activity helped with structuring a lesson, instructing students, and development of behaviour management skills. Two students were more negative, disagreeing with these statements, while the remaining student was neutral in their response indicating that they were undecided about these statements.

Discussion

Students’ Overall Perspectives

Student questionnaire responses at the conclusion of the Phase 2 trial of the VirtualPREX virtual classroom role-play activities suggest that the majority of students (56%) felt that the activity would be helpful in preparing for professional placement, and valuable in developing their ability to respond to unexpected circumstances as a teacher (62%), structure a lesson (60%), provide clear instructions to students (59%), and manage student behaviours (58%). However, there was still a minority of students who were less positive about the activity, finding it confusing (17%), irrelevant (16%), boring (14%) or not useful (37%).

Positive Impact of Refinements to the Environment and Role-Play Design

Questionnaire responses and observation of the role-play sessions in Phase 2 suggest that the refinements to the environment and the role-play design had a positive impact. The changes to the location of the virtual classrooms meant that more classrooms could be used, even though group sizes meant that there was no need to use all four classrooms in this particular case. The changes to the school student avatar appearances resulted in less comments about the need to improve the realism of the environment. Finally, the changes to the role-play instructions appeared to result in less overacting by students playing the role of

off-task school students, and although there were still problems in this area mentioned in the questionnaire responses, this seemed to be a less major issue than it was in Phase 1.

Positive Aspects Identified

In discussing the positive features of the activity in questionnaire responses, students highlighted the value of practising in the role of the teacher and experiencing the activity from the perspective of the school student. Also valuable was the experience of having to respond to unexpected events in the classroom; being exposed to the types of behaviours that might occur in a real classroom; and interacting with and observing their peers in the role of the teacher.

Contrasting the activity with conventional approaches to the provision of university-based teaching practice, it can be seen that the benefit of practising the teacher role in delivering a lesson could perhaps be achieved through a micro-teaching activity, as described by Allen (1967) and by Francis (1997) or a face-to-face role-play activity, as described by Juárez-Porter Carlyle (2012) and Hume (2012). However, practice in the interactive aspects of teaching including responding to unexpected student behaviours would not be achieved through micro-teaching and arguably would not be as well addressed through a face-to-face role play due to the less realistic nature of face-to-face role plays in a university classroom with peers playing the role of school students (see Anderson et al., 1982). The benefit of watching one's peers teach could be achieved to some extent through a micro-teaching activity (at least from the perspective of the content delivery or non-interactive aspects of teaching), and through a classroom role-play activity. Similarly, experience in sitting in the shoes of a school student could to some extent also be achieved through a face-to-face role-play activity, although arguably the greater visual realism in a virtual classroom environment may result in greater role immersion. The comments by student teachers about the value of the somewhat anonymous participation and therefore the ability to carry out the role without judgement from peers were also noteworthy in illustrating the benefits of the activity compared to a face-to-face role play. The VirtualPREX role play activity therefore addressed some of the problems raised by Anderson et al. (1982) and Campbell (2009).

The other alternative approach to the provision of university-based teaching practice discussed above is the use of simulation environments where the school students are simulated by the software. Non-immersive simulations such as ClassSim (Ferry et al., 2004), SimSchool (Christensen et al., 2011), and the Cook District school simulation (Girod & Girod, 2006), provide practice in teacher decision making but do not put the student teacher into a situation where they need to instantly respond to student behaviours. The immersive aspect of the VirtualPREX role plays, and the way that the scenario unfolds in real time was intended to be a key advantage over these non-immersive simulations. Student comments highlighting the value of "becoming a teacher and seeing things from that point of view" and the value of obtaining practice in answering "constant questions from students" suggest that the VirtualPREX role plays were successful in this respect.

Finally, students commented on the engagement, enjoyment, and interactivity of the role plays with comments such as "It was very engaging and interactive", "It was a good interactive way to view a classroom from both perspectives", "You were able to connect with a group of people in a casual environment where learning can still occur", and more explicitly "It is a good way for students to have an interactive classroom experience without worrying about consequences".

Negative Aspects Identified

The student open-ended questionnaire responses provide valuable insight into the perspective of the students who were less positive about the activities, focusing on the virtual environment and on the design and implementation of the role-play activity itself. Virtual environment problems included a perception that the use of text chat made the activity unrealistic or unreasonably difficult, initial confusion or difficulty in moving around and interacting in the virtual environment, and negative views about the possibilities of virtual classrooms in general. Role-play design and implementation problems included boredom associated with the repetitiveness and length of the activity or with playing passive school student roles, the challenging nature of playing the teacher role, peers overacting or acting the role of school students in an unrealistic way, limited time to play the role of the teacher, and lack of preparation by those playing the role of the teacher.

Comments in relation to the difficulty in undertaking the role of the teacher when using text chat rather than spoken audio were also made by participants in Phase 1. The team discussed alternatives, but the problem was not able to be easily addressed due to the fact that the students undertook the activities in a computer laboratory environment. The use of the speakers and microphones built into the computers in the laboratory was not possible due to the problem of audio feedback and class sets of headsets were not available. There is also the issue of what may be lost by using audio in terms of anonymity and immersiveness. Specifically, the use of audio would remove the anonymity of the gender and age of the person playing the Primary school student and therefore potentially take away from the realism of the role play. In Mahon et al's (2010) study they allowed the person playing the role of the teacher to use spoken audio but required those playing the role of the students to use text chat. In their evaluation questionnaire their participants also commented that the use of text chat made the activity unrealistic. In another study of the use of the VirtualPREX environment with a small number of off-campus students, the student teachers used audio communication rather than text chat and this appeared to be an effective way of addressing these problems (see Masters, Gregory, Dalgarno, Reiners, Knox, 2012). Follow-up studies are required to explore the feasibility of this approach within large group role-play activities.

In the Phase 2 VirtualPREX trial, students were provided with a two-hour orientation a week in advance and time to practise moving around in the environment and using the teaching tools within the virtual classrooms immediately prior to the role-play activities. This compares with Phase 1, where students' orientation session was four weeks prior to the role plays and where time was not devoted to experimentation in the virtual classrooms at the beginning of the activity. This resulted in a significant reduction in the mean student response to the question asking whether the activity was confusing. Observations suggest that the vast majority of students overcame difficulties with the use of the virtual environment interface quite early in the role-play activity. It is noteworthy that in the study by Cheong (2010), student teachers used a virtual classroom environment for 30 minutes per week for eight weeks prior to the main virtual classroom activity. Clearly this more substantial preparation spread over a longer period of time would be advantageous, however, clear evidence of the value of teaching activities in a virtual classroom is required before such a substantial time allocation within a course can be justified.

A small number of students expressed a reluctance to undertake computer based simulation activities or reservations about the value of virtual classroom role-play activities in general. Those who indicated a reluctance to undertake the activity tended to also indicate a lack of computer literacy in general indicating a possible connection between lack of computer literacy and negative perspectives on the activity. More research is needed to systematically explore this possible correlation. If computer literacy and perspectives on the

activity do turn out to be related, it is possible that as the use of virtual worlds becomes more common and as generational change results in the majority of student teachers having experienced computer game playing, there may be a gradual increase in acceptance of activities like the VirtualPREX role plays.

The boredom associated with the length and repetitiveness of the activity would not be easily addressed through changes to the role-play design. This is particularly problematic when other student comments regarding the need for increased time in the role of the teacher are taken into account, which would have a flow on effect on the time in which student teachers would have to play the role of school students. One way to address this would be to increase the number of virtual classrooms so that the number of school students in each role play would be less and consequently the amount of time spent playing the role of the teacher would be greater. However it is worth noting that one student teacher commented in the questionnaire that the activity would be improved by having more students in the role plays. It is possible that one reason some students found the activity boring was that the lesson designs of their peers were not sufficiently engaging. Addressing this would require more preparation for the activity by those playing the role of teachers and possibly also the inclusion of additional virtual environment features allowing for a wider range of activities by those playing the role of students. Coupled with the issue regarding time and not getting through the role-plays in the two-hour period this might indicate a need to consider restructuring the workshops with longer teaching times and perhaps over two or three one-hour sessions. According to observers most of the boredom and distraction seemed to come towards the end of the sessions.

A more significant enhancement to the role-play environment that would address the problem above would be to have some of the student roles simulated by the computer. Pilot versions of immersive classroom simulations in which student roles are simulated by the software have begun to emerge in the literature (see, for example, Mahon et al., 2010; Fluck & Fox, 2011), and this is also an avenue being pursued by the project team (see, for example, Gregory & Masters, 2012). Environments in which a student teacher can undertake the teacher role in their own time without the need to coordinate with other student teachers are likely to be particularly valuable in off-campus or online teacher education courses. However, the fact that a number of student teachers in this study of the VirtualPREX role-play activities indicated that they saw the opportunity to play the role of school students as one of the valuable aspects of the activity also needs to be taken into account in considering alternatives where the student roles are simulated by the software.

A related problem identified by a number of students was the lack of realism in the school student roles played by their student teacher peers. Again, although this was addressed to some extent through refinements to the role descriptions in Phase 2, it is arguably an inherent limitation in role-play activities (see, for example, Anderson et al., 1982) and was also an issue in the study of an immersive role-play activity described by Mahon et al. (2010).

The TeachLivE (2011) mixed reality classroom simulation attempts to address this issue by using a specialist avatar controller with child behaviour expertise who gives realistic student responses. Although this environment addresses some of the key issues emerging in this trial of VirtualPREX, the fact that only one student teacher can undertake their teacher role at a time and the fact that trained experts are required to be present during the activity means that the per student costs are far greater in TeachLivE than in other simulated classroom environments.

Conclusion

This article has described a study in which student teachers undertook classroom role plays within the VirtualPREX virtual classroom environment in Second Life. Findings suggest that the majority of students found the role plays valuable, with the opportunity to experience being in the role of a teacher, practise in responding to student behaviours, and experience in playing the role of school students, specifically mentioned as aspects of the activity that were valuable. Despite the generally positive results, there were still some students who found the activity less valuable, with boredom in playing the role of school students, a lack of realism due to the inability of their peers to effectively play the role of school students, difficulty with using the text chat rather than audio communication, and perceived limitations of virtual environment experience as distinct from real classroom experience mentioned as negative aspects of the activity.

The use of virtual classroom environments to house student teacher role plays addresses an important need within teacher education courses for increased opportunities to practise in the role of a teacher, a need which is difficult to address with increased professional experience placements due to constraints in availability. Virtual world classroom role plays have some unique features when compared to alternative non-technology facilitated ways in which non-school-based teaching practice can be provided, such as micro-teaching or face-to-face classroom role plays. These features include a realistic visual context for role plays and the opportunity to practise not just lesson delivery but also interaction with students and classroom management techniques. Virtual classroom role plays also provide potential advantages over non-immersive simulated classroom environments due to the opportunity to undertake the role of the teacher anonymously in a real-time embodied way. Another important feature of the virtual classroom is the ability to practise teaching skills in a safe environment where mistakes can be made without fear of consequences either for real primary school students or for the student teacher themselves. The results of this study suggest that, due to these unique characteristics, virtual classroom role plays show substantial promise for providing additional teaching practice to student teachers.

The issues highlighted in this article relating to professional experience placements for teacher education students also have parallels in other professional fields. For example, the scarcity of professional (clinical) placements has been highlighted as an issue in nursing (Andre & Barnes, 2010), and the need for better integration between university-based learning and learning from professional placement has been a recurring problem across all professional disciplines (see, for example, Bates, 2008; Bradley, Noonan, Nugent, & Scales, 2008). Researchers across a variety of professional disciplines have highlighted differences in the bodies of knowledge and theories studied at university, and those used either explicitly or implicitly by practitioners (Johansen & Ouellette, 2008; Spouse, 2001). Approaches to addressing these problems in teacher education will therefore have the potential for wider application in other disciplines. As well as being of increasing interest to the teacher education community, role plays housed within a virtual world have been used in a range of other disciplines, including health and medical education (Boulos, Hetherington, & Wheeler, 2007), nursing (Kilmon, Brown, Ghosh, & Mikitiuk, 2010), languages (Henderson, Huang, Grant, & Henderson, 2012), physics (Wegener, McIntyre, McGrath, Savage, & Williamson, 2012), history (Wakefield, Warren, Rankin, Mills, & Gratch, 2012) and religious studies (Farley, 2010). As a consequence, the findings reported in this article are likely to be of interest to practitioners and researchers in these other professional disciplines.

There are a number of important limitations within this study. Firstly, in interpreting the students' responses to the questionnaire completed after the role play activity, it is important to note that their judgement of the contribution of the activity to their preparation

for placement is somewhat speculative because of their lack of professional placement experience at this stage. Consequently, although valuable data in evaluating the virtual environment and the role play activity, positive responses do not provide clear evidence that the skills developed during the activity will actually transfer to the real classroom. Although the students' reflections about the value of the activity after returning from placement were sought through an additional questionnaire, the low response rate to this questionnaire limits the conclusions that can be drawn from this data source.

Two key limitations of the virtual classroom role plays within this study were the small amount of time each student teacher had the opportunity to play the role of the teacher and the difficulty student teachers had in realistically playing the role of school students. Research being undertaken by the authors and also by others to develop virtual classroom environments in which some or all of the student roles are simulated by the computer software have promise in addressing these limitations. Another possible limitation is the potential for a lack of alignment between the visual characteristics and furnishings in the virtual classroom and the classrooms students encounter on professional placement. A final limitation within the role play experiences was the fact that text chat was used rather than audio communication which had an impact on the degree of realism experienced by students and is likely to have impacted on the degree to which the skills developed were able to be transferred into the real classroom. Recent iterations of the role-play activity required the role of teacher to use audio, making the activity more authentic.

A number of possible avenues for follow-up research emerged during the study. A follow up study using similar role play activities but with a focus in the questionnaire and interview data collection on the students' perspectives upon returning from placement would provide more reliable data on the actual benefits of the role play activity in preparing students for placement. There is also potential for future research focussing on identifying the ideal visual characteristics and furnishings of virtual classroom environments to prepare teachers for contemporary teaching practice. Such research could draw on a systematic overview of school classrooms across education systems within Australia. Another possible avenue for future research is a more systematic grounded analysis of student behaviour in the context of example lesson scenarios, which could lead to refinements to the role play designs and character definitions. The suitability of virtual classroom role play activities for students at a later stage of their teacher training could also be explored with the use of role plays that focus on more specific aspects of their teaching practice. Finally, there is scope for future research to explore ways in which students can be supported to reflect more deeply upon the complexities of their teaching practice while undertaking virtual classroom role plays.

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Acknowledgements

The authors would like to acknowledge the contribution of the following: Yvonne Masters (University of New England), Geoff Crisp (RMIT), Heinz Dreher (Curtin University), Deanne Gannaway (University of Queensland) and the Australian Office for Learning & Teaching (OLT) for the grant that enabled this project to come to fruition. Support for this publication has been provided by the Office for Learning & Teaching, an initiative of the Australian Government Department of Education, Employment and Workplace Relations. The views expressed in this publication do not necessarily reflect the views of the Office for Learning & Teaching.