



Changing directions through VirtualPREX: engaging pre-service teachers in virtual professional experience

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Many pre-service teachers currently undertake their professional experience with insufficient knowledge and confidence to handle unexpected teaching situations. VirtualPREX explores the experiences of 72 pre-service teachers who undertook a teaching role-play in a virtual world. The researchers discuss this opportunity for pre-service teachers to utilise new methods and avenues in a virtual world to both supplement their learning and undertake preparation for practical experience. Participation by pre-service teachers in role-play enables them to test and develop a better range of professional skills and acquire confidence in, and more realistic awareness of, their skills before being placed in real-life classrooms. Presented in this paper are the findings from a pilot of this study and pre-service teacher reactions to the role-play activity including whether they felt that it was helpful in preparing them for their upcoming professional experience placement.

Keywords: virtual worlds, Second Life, professional experience, pre-service teachers

Introduction

The term VirtualPREX (virtual+professional+experience) has been developed as part of an Australian Learning and Teaching Council (ALTC) grant where pre-service teachers role-play professional experience in a virtual world. Researchers from six institutions, University of New England (UNE), Charles Sturt University (CSU), Curtin University (Curtin), Australian Catholic University (ACU), Royal Melbourne Institute of Technology

(RMIT) and University of Hamburg (UHH), are exploring assessment of virtual professional experience using peers and bots (virtual world robots or non-human characters). An overview of the results of a pilot study, where pre-service teachers experience teaching their peers in the virtual world of Second Life (SL), is presented in this paper.

Key literature, background and rationale for the study

A virtual world is an online presence that imitates real, or fantasy, life in the form of a personal presence through someone's avatar, their alter ego, a graphical representation of themselves in the virtual world (Gregory, 2007). SL is one of over 200 virtual worlds (Gregory et al., 2010) and was chosen for the project as UNE, Curtin and ACU already owned a joint island in SL, Australis 4 Learning (C. Dreher, Reiners, H. Dreher, & N. Dreher, 2009), where five of the project members already taught. This was an ideal place for pre-service teachers to practise their teaching as a classroom and playground was already established on the island.

A strong professional experience component is acknowledged as essential to teacher preparation (Darling-Hammond, 2006; Hastings & Page, 2007; Keogh, Dole & Hudson, 2007; Smith & Lev-Ari, 2005) and school-based practice sessions to allow pre-service teachers to apply pedagogical theories in a realistic teaching situation are integral to all pre-service teacher education programs in Australia. Nonetheless, research has shown that, in Australia, as elsewhere, pre-service teachers often enter the workforce ill equipped for their professional role (Ferry, et al., 2004). This unpreparedness no doubt contributes to the rise in attrition rates when pre-service teachers undertake professional experience (Sim, 2006) and the 45% of newly recruited in-service teachers who resign or burn out in their first five years of classroom teaching (Ingersoll, 2001). However, and increasingly, accessibility to meaningful professional learning experiences, located in the field, is becoming limited due to significant increases in enrolments in teacher education and no subsequent increase in field placements (Barbousas & Nicholson, 2009). Furthermore, pre-service teachers who are located in rural and regional centres, or are in a low socio-economic bracket, and therefore have difficulty funding significant travel, are further restricted in the access to quality professional experiences (Abbott-Chapman, 2011). Therefore, there exists a mismatch between the value of learning in professional settings and the opportunity to undertake such learning. By supplementing traditional professional experience placements with a model of professional learning in the virtual world, concerns about accessibility may be partially addressed. Through a virtual model, pre-service teachers are no longer restricted by travel times nor availability of schools to practise their teaching prior to undertaking professional experience.

In considering the learning that occurs in a professional placement there is the inevitable matter of inconsistency in experiences and thus concerns about ensuring a defined and expected level of quality in the pre-service teacher experience. As universities move further towards an accountability agenda (Massaro, 2010) there is a growing need to better manage the quality of learning, and hence professional experiences. Here quality is being distinguished from standardisation. The idea of a standard professional experience is an enigma, however, quality experiences should be aspired to for all pre-service teachers. Quality professional experiences provide a diversity of experience within a variety of learning settings and interaction in complex classroom environments. At times where a pre-service teacher is successful in being placed into a school, they are put into environments that are less than supportive, or limit their opportunities to take a leading teacher role, for example team teaching with other pre-service teachers. Whilst pre-service teachers do learn from such experiences there is no consistency on how this learning can then be related to the teaching skills that they have learned in their course, nor are they afforded the opportunities to develop the range of professional skills required of a professional teacher. SL provides a highly immersive environment (Dalgarno & Lee, 2010) where pre-service teachers can interact and become fully engaged in their experience as practice teachers.

Where issues of accessibility are not problematic, the experience of a virtual world can further supplement the development of professional skills necessary to ensure successful achievement in the real world professional experience. Formative assessment, explicitly designed to promote effective learning, has a powerful influence on educational outcomes, supporting both high-quality learning and empowering lifelong learners (Crisp, 2008). VirtualPREX is being designed and implemented to provide pre-service teachers with experiences that reflect the complex, diverse and multi-faceted nature of a teacher's role in classrooms, schools and the broader community. The virtual world learning experience provides the ability for an instructor to create spaces and experiences that permit pre-service teachers to engage in the variety of experiences needed to develop across all elements of teaching practice. Unlike real world professional experience, the virtual world is somewhat controllable by the instructor ensuring that a pre-service teacher's experience can test them in particular

circumstances and environments better suited to their current learning position. For example, a pre-service teacher who has difficulty in managing the disruptive student could potentially be able to access a virtual world experience where the other variables of the classroom are managed to permit a focus on the acquisition of this skill. Over time, the other elements could be varied slowly approaching a more definite simulation of the real world environment. Through constant practise and feedback, and the variations possible, a pre-service teacher will potentially be able to assess and evaluate their skills, developing these further before eventually applying them to the real world.

Locating practice within a virtual world creates a space of safety for the testing of ideas and practices which would otherwise be socially difficult in the real world (Campbell, 2009). The anonymity afforded by a virtual world environment may permit pre-service teachers to engage freely in practice and test their strategies to deal with the situation without a fear of errors being attributed directly to them. Also the errors of judgement, whilst providing valuable feedback, have no long-term impact on actual students in the real world. For example, a beginning teacher often has difficulty in assessing the levels and types of responses that should be given to certain behaviours of students. An inexperienced teacher may therefore either over-react or under-react to particular circumstances, with each level creating a range of possible consequences, such as impacts on student self-esteem. What may be regarded as small incidents in the classroom can have a long-term impact on the learning of students. Therefore, there is a need for emerging teachers to have developed proper responses to a range of classroom behaviours, but this should occur in a safe environment both for the teacher as well as the students. The virtual world presents such a possibility. Inherent in a progressive introduction of emerging professionals to the world of practice is one of the complementary development of professional identities and therefore the empowering of pre-service teachers to make mistakes and learn from these. As the pre-service teacher interacts with the virtual world professional experience it is anticipated that they will come to better understand themselves as teachers and therefore be able to draw from these experiences in responding to challenges in the real world.

Although providing these positive outcomes, it is acknowledged that limitations continue to exist in the use of virtual worlds as teaching and learning tools. Primarily, these limitations come through the 'opaqueness' of the technology and therefore the limitation of the ability of pre-service teachers to fully engage in this space. This critique refers to the problems associated with access to high-speed Internet which permits ease of use of the virtual world, particularly from a distance, and limits on the experience of pre-service teachers working in these environments. Despite Prensky's (2001) claims of the emergence of the digital native there still exists a substantial percentage of the current university student population who do not regularly interact with role-playing games (RPGs) or virtual worlds. Therefore pre-service teachers can make cynical responses about the use of these tools for meaningful learning (Gregory & Masters, 2010). VirtualPREX, as well as developing a useful professional experience for pre-service teachers to engage with, needs to also consider the usability of such tools for these purposes, as well as developing the capacities for pre-service teachers to competently and willingly engage with these.

Research design/methodology

Aims and objectives

The primary aims of the project are to:

- Assist pre-service teachers in acquiring a better range of professional skills and confidence before being placed in a real life classroom;
- Provide diverse professional experience options for pre-service teachers;
- Create awareness about virtual worlds as a pedagogical and social networking tool, and;
- Compare different methods of interaction to enhance pre-service teacher learning and teaching.

The primary outcome of this project will be the development, implementation and evaluation of VirtualPREX with structured learning experiences for formative assessment (Crisp, 2008). The project as a whole will consist of four phases as follows:

- During Phase 1 (which has been completed),
 - a focus group session was conducted with experienced teachers to identify the aspects of teaching practice to be included within VirtualPREX role-play scenarios, and;

- a pilot study of pre-service teachers undertaking a role-play activity using the initial version of the VirtualPREX environment was undertaken.
- During Phase 2, the VirtualPREX environment will be further developed, including the creation of bots (short for robots; being avatars completely controlled by the computer) representing school students exhibiting particular problematic behaviours;
- During Phase 3, the VirtualPREX environment will be trialed with cohorts from each of the partner institutions; and
- During Phase 4, data collected during Phase 3 will be analysed and the results reported in various formats.

The project has adopted an action research methodology involving action, analysis, reflection and re-action (Kemmis & McTaggart, 1988) and, in keeping with good evaluation practice, mixed methods will be used (Babbie, 2007) to ensure accuracy and alternative explanations (Stake, 1995). There is an ethical need to confirm validity of the process and this will be done through triangulation (Tellis, 1997), using multiple sources of data (Yin, 1994). Reported in this paper is Phase 1, which focused on developing a model of an effective, replicable approach to using and evaluating a virtual space for teaching and learning. Ethics clearance for Phase 1 was obtained from the University of New England Human Research Ethics Committee. Phase 1 consisted of two stages as follows:

Stage 1: A focus group of eight (8) experienced teachers was formed to gather the participants' experiences of key pedagogical issues and classroom management problems that they encountered during their careers. The focus group session was recorded and transcribed to provide material to be used to design the virtual world role-plays.

Stage 2: 72 pre-service teachers undertook role-play activities in an immersive virtual classroom environment, prior to undertaking a real professional experience placement. The pre-service teachers undertook teaching role-plays with their peers role-playing primary school students. After completion of the role-play activities students completed a survey. The interactions during the role-play were also captured as text, video and screen shots to allow for analysis as part of the project as well as for the purposes of reflection and evaluation by the pre-service teachers and their lecturers. The sequence of events for pre-service teachers in Stage 2 were:

- Undertake dispersed days in schools;
- Undertake VirtualPREX role-play in a computer laboratory, and;
- Complete a survey after the completion of the role-play focusing on the usability of the virtual environment and students' prior experience with virtual world technologies.

Environment and role-play design

SL was chosen as the platform for the research project as UNE, Curtin and ACU already owned a joint space for their students. Four new virtual classrooms were created on the Australis 4 Learning island in SL (see Figure 1). 40 primary school student avatars and 8 teacher avatars were created for the role-play. The primary school student avatars were small, looked younger and were dressed in school uniform. Four computers were set up to record the VirtualPREX classes (video, screen shots and text). These recordings will be used to create machinima (in-world video footage) to create tasks for self, peer, formative and summative assessment. They will also be used for reflective tasks.

Five 2-hour workshops were completed with 72 pre-service teachers, ranging in number from 9 to 19. The workshop groups were divided into smaller groups of between 6 and 8 pre-service teachers each, depending on the size of the group. Each workshop began with a reminder to students on how to control their avatar in the virtual world. Students had received a prior 2-hour workshop learning how to navigate and interact with the virtual world. The reminder presentation took approximately 15 minutes. The presentation put VirtualPREX in context. It was also to remind the pre-service teachers of a few tips and tricks on how to use SL. Pre-service teachers were then handed their avatar's name and their student role-play scenarios for the workshop and each person received the choice of a male or female teacher to role-play.

The intention was that all students would have the opportunity to play the role of the teacher as well as the role of a primary school student. Specifically, each pre-service teacher was to present a 7 minute teaching episode or idea focusing on their preferred Key Learning Area (KLA) to a virtual classroom of their peers, followed by an interactive peer feedback session. The pre-service teachers were expected to develop teaching strategies to control their class and to draw upon relevant resources such as readings, texts, web resources and study guides

to inform their role as the teacher. Peers, role-playing primary school students, were given their role during the workshop. These roles were designed drawing on the description of student behaviours that emerged during the focus group discussions. The role-plays that the students received were colour coded – pink/orange were “good” and blue/green were “naughty” students (see Table 1). This assisted in keeping the pre-service teacher on task as to which role to play and to easily swap if needed.



Figure 1: Pre-service teachers undertaking VirtualPREX role-play activities

Results

Focus group sessions

Eight experienced teachers and principals attended a focus group discussion and the session was recorded and transcribed. From this discussion, role-play scenarios for the primary school students for VirtualPREX were developed. The focus group thought that the following were the most common types of students you would find in a typical classroom:

- Getting up and down, wandering around and never still
- Calling out all the time
- Know-it-all – beyond putting their hand up, they just want to get the answer out
- “Goody goody” – just want to please the teacher all the time – going beyond being helpful
- Behaviour Disorders – may not have taken medication
- Tattletale – dobs on fellow students
- Over-achiever – knows answers beyond capabilities of other students – potential of becoming bored
- Noisemaker – tapping the desk, whistling, humming
- Under-achiever – does not understand and is always asking questions
- Does not pay attention and is always asking what is going on or getting the teacher to repeat things
- Slow learner – always behind in their work and often off-task
- Language Disorders – these children may be a bit slower
- Dominator and defiant – takes the teacher on
- Non-responsive student – withdrawn, sulky, non-cooperative, disengaged
- Eye-roller
- Attention seeker

After the focus group meeting the researchers chose the most common behaviours of students in a typical classroom and these are outlined in Table 1. Students were to role-play either a “good student” or a “naughty student”. It was decided that, as these were first year pre-service teachers, they would not be given any student role-plays that were beyond their capabilities to control as a teacher.

Table 1: VirtualPREX role-play characters

“Good Students”	“Naughty Students”
Good students – ideal students in a	Walk around the class a lot, stop and talk to other
Good students, but do not understand	“Dob” on peers and continuously interrupt
Teacher pleasers	Stay up too late and nod off
Know-it-alls	Withdrawn – will not say anything or do anything

Initially there were meant to be more “good students” in each class than “naughty students” to provide the “teacher” with the opportunity to focus on strategies to involve the “naughty students” in their lesson. However, this did not always eventuate depending on the number of pre-service teachers in the workshop.

Role-play participants

All 72 students who participated in the role-play activity were first year on-campus pre-service teachers at the University of New England. 61 were female and 11 were male. They were all aged below 26 years of age and came from various locations around NSW when they were not living on campus (none indicated in the survey that they lived in a capital or non-regional city, 55% indicated that they lived a regional town or city, and 37% indicated that they lived in a rural town or on a rural property). Students were asked a variety of questions in relation to their ICT skills prior to commencing university studies, their use of ICT online tools and knowledge of virtual worlds prior to commencing studies. 70 of the 72 respondents indicated that they used the Internet daily and 70 indicated that they used social networking tools either daily or several times per week, with 68 of the 72 respondents naming Facebook as the social networking tool they used regularly. However, less than 10 of the respondents regularly played networked or 3D games or regularly used virtual worlds. In fact, 37 respondents indicated that they never used virtual worlds and 25 indicated that they did so infrequently. When asked about their skill level in relation to the use of virtual worlds 30 indicated that it was very low, 20 low, 18 average, 4 indicated that it was high and none indicated that it was very high. Clearly, the profile of the students suggested high usage of computers and the Internet, but very low levels of experience with virtual worlds and related technologies.

How the role-plays progressed

A number of technology problems were encountered in the first workshop. Firstly, people and surroundings in the virtual world did not ‘rezz’ (come into focus), and secondly, and most importantly, for two of the groups, group chat did not work properly. Even though the group chat failure only affected two groups, everyone was affected by the revised strategy, which had to be applied quickly to keep the momentum going. The revised strategy, which was kept for all future workshops, was that the workshop participants were divided into only two groups (instead of four) and used the virtual classrooms that were far enough away from each other so that local chat could be used. After they had completed their seven-minute lesson, the pre-service teacher had to log off and change roles back to a student and the next teacher had to log on and begin their lesson. At the same time the role-playing students had to switch their student persona from “good” to “naughty” and vice versa. This process was repeated until everyone had had a turn at role-playing the teacher. In the first workshop, some students did miss out on role-playing the teacher because of lost time working out a strategy to overcome the technological problems. In all workshop teachers were asked to type in capital letters in local chat to differentiate the teacher’s talking from that of the students.

Pre-service teacher views on the role-play activity

At the conclusion of the role-play activity, pre-service teachers were presented with a survey and were asked a series of questions about their experience of the role-play activity and their views about its value. Table 2 shows a summary of their responses to a question asking them to rate the degree to which they found the activity Confusing, Difficult, Irrelevant, Interesting, Easy to use, Useful, Boring, and Enjoyable. Only 40% of the students found the activity useful with 24% undecided, possibly indicating that the value may not have been clearly communicated or perhaps that students did not see practicing in a virtual world as a valuable way to develop their teaching skills. 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 the remainder, only 28% indicated that they did not find the activity useful. This suggests that playing the role of the teacher is the most important part of the activity from the pre-service students’ perspective. 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. Another factor which was mentioned in a later question was the difficulty and confusion experienced by the role-playing teacher in keeping up with the typed conversation in the virtual world.

Table 2: Overall perspectives on the role-play activity

Response	Not at all ←————→ Extremel y							Mean
	1	2	3	4	5	6	7	
Confusing	7%	15%	18%	28%	20%	8%	3%	3.75
Difficult	13%	20%	23%	15%	20%	8%	1%	3.41
Irrelevant	17%	29%	13%	14%	13%	9%	6%	3.26
Interesting	1%	7%	13%	18%	30%	14%	17%	4.77
Easy to use	0%	9%	16%	26%	23%	24%	3%	4.47
Useful	3%	13%	21%	24%	23%	10%	7%	4.08
Boring	13%	17%	19%	30%	7%	10%	4%	3.49
Enjoyable	1%	7%	24%	24%	11%	19%	13%	4.44

Pre-service teachers were asked to state the best and worst thing about the activity. In describing the best thing, a number of students noted that it was entertaining; a number highlighted the novelty of the experience, while a number commented on the value of role-playing a teacher or particular types of student.

In describing the worst thing, a number mentioned the problem of everybody 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 rather than audio in a simulated classroom role-play. Consistent with this, a number also indicated that having to type made things move slowly and that they found it boring at times. A number also mentioned the difficulties in obtaining control of the class as a teacher, which may in fact be a positive rather than a negative, if in fact the pre-service teachers who were role playing primary school students were doing so in a realistic way.

Pre-service teachers were also asked to name one thing about the activity that could be improved. A number commented on aspects of communication suggesting, for example, that the teacher should be able to use the audio talk function. Others suggested the need for stricter guidelines for the activity and restrictions on avatar actions (for example preventing unrealistic actions like walking on desks).

Using reactive bots to create an interactive classroom

In the Pilot, pre-service teachers engaged in different roles to interact with other human-controlled avatars. As a consequence of the Pilot study, a number of changes were recognised as being useful to ensure the role-play runs more smoothly and effectively in future sessions. First, the current turnaround time to change from one role to another (e.g. teacher to student) was too time consuming as pre-service teachers had to log off and back on. Second, the role-play was only possible if a certain number of human-controlled avatars were simultaneously online and knew how to play their role. The first concern can be solved easily by having *outfits* available that the avatars use to replace their current look (including items like glasses or hats to identify the avatar in the new role). The question of human-controlled avatars and consistency in the role-play can be resolved by the inclusion of bots, which are currently in the development stage. As is common in games, non-player characters or bots will be provided that can fill each role; see also Mahon et al. (2010), Jolie et al. (2011). Major advantages for this approach from a non-technological perspective are:

- Multiple roles for the simulation even if the classroom is used by an individual learner;
- Predefined (scripted) reaction on events occurring in the classroom;

- Re-playing the same scenario multiple times without variations, e.g. in the case of exams where each learner should get the same test and not depend on bad acting capabilities;
- Changeable behaviour of bots using script libraries, that is, the teacher can configure the bots in advance to define certain scenarios including required actions to react to, and observing the experiments, the teacher can interactively manipulate bots to change their behaviour;
- Monitoring is simplified: bot action can easily be recorded and consequently observer is focused on learner;
- Replay of sessions to provide formative feedback.

SL offers an ideal environment to implement an interactive environment that allows monitoring of all events as well as providing bots at a high level of sophistication by using the original avatar technology. Figure 2 shows a schematic of the anticipated framework consisting of in-world and external components. The design is related to performance issues, as a complete in-world control of avatars would be too slow (Ranathunga, Cranefield & Purvis, 2010; Kumar et al., 2008). An experiment involves the following activities:

1. All roles/characters are either assigned to a human-controlled avatar by wearing the corresponding outfit or a bot is initialised by requesting the external server to log in and take control.
2. Configuring the mood, behaviour, event and solution for each avatar. For human-controlled avatars, this is only a guideline, as the software cannot influence the behaviour. Bots, on the other hand, perform based on these settings; e.g. A2 is naughty (mood) and will throw paper-airplanes (behaviour) whenever the teacher's area of observation is not on the student (event) (see Figure 3). Asking the student to draw a picture or keep the area of observation on the student can prevent the behaviour. Note that we plan with single events and actions at this project stage. The configuration board can be in SL (e.g. hidden behind a flipchart that only the teacher can turn around) or on external clients.
3. During the experiment, all events (including chat, movements, actions) are observed by an *object* in SL and reported to the external server for storage and later analysis.
4. The results are exported in different formats (e.g. Excel, websites) and will allow the whole scenario to be replayed by having the server use the information to control all roles as bots.

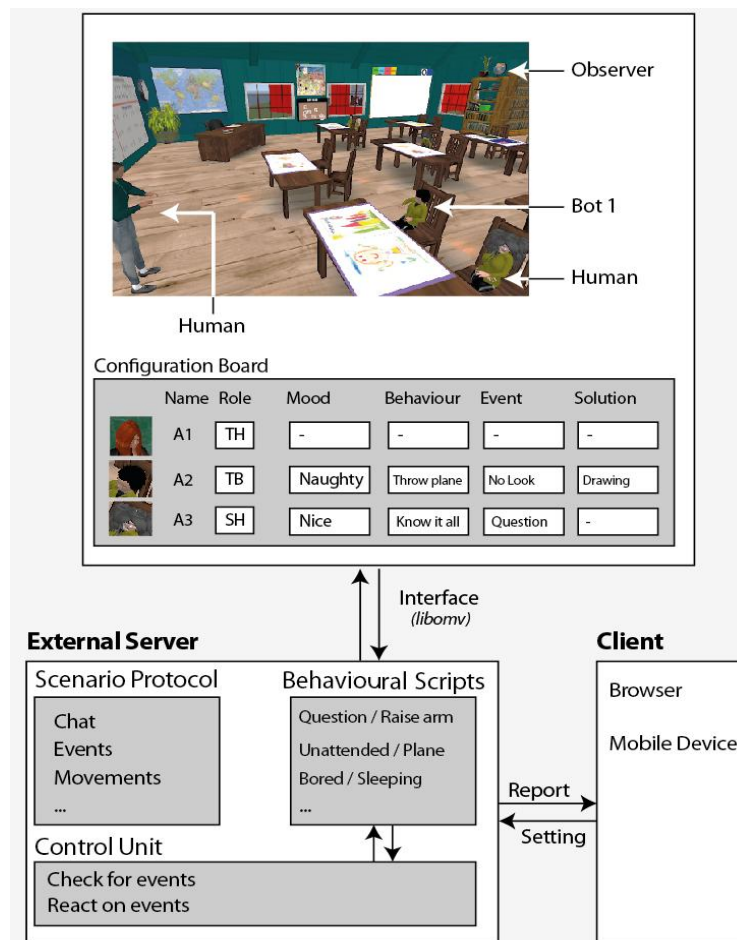


Figure 2: Schematic framework of in-world and external components of bot creation

The implementation uses the libomv-library (OpenMetaverse Foundation, 2011) for communication; thus allowing the usage of other virtual worlds in future projects; see Ranathunga, Cranefield and Purvis (2010), Prendinger, Ullrich, Nakasone and Ishizuka (2011); Gayle and Manocha (2008). The server applications are written in C# (due to the library being available for C# only), the in-world scripting uses the Linden Script Language (LSL). The whole system is kept modular such that scripts and server-client-technology can later be re-used as currently the development of virtual worlds is very fast paced. Over the last two years, several technologies to design and implement bots have disappeared and even though suggestions for standardisation exist e.g. MPML3D (Prendinger, Ullrich, Nakasone and Ishizuka, 2011), there is no final solution visible in the near future.

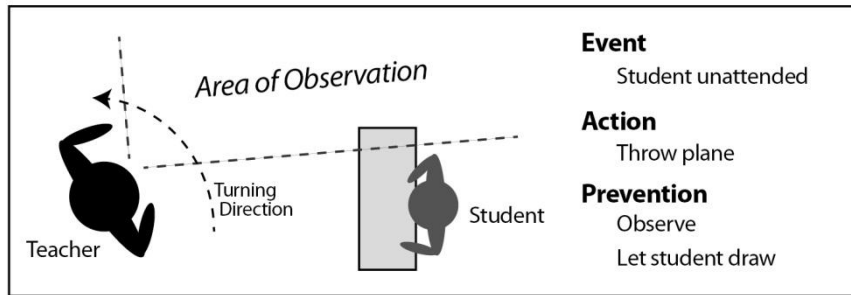


Figure 3: Example for event with teacher avatar and student bot

Conclusion and next steps

Each pre-service teacher was given two role-plays to act out as primary school students (one “good” and one “naughty”). When they had only two roles, after a while, they became bored and over-acted their part (or maybe this is just immersing themselves in their roles). Pre-service teacher feedback was that they wanted more in-depth criteria to act. Consequently, pre-service teachers will be given more roles to carry out. These will be created with the next iteration of the project.

In Phase 2 one component is the creation of machinima (in-world video) of online practice sessions that will be uploaded for viewing. The machinima will then be used as learning aids for self-assessment through reflection, as well as peer/educator formative assessment. Scripted machinima demonstrating best practice will also be produced and made available for pre-service teachers and other academics.

VirtualPREX on Australis 4 Learning will be accessible to members of the Second Life community of educators and all teachers, academics, pre-service teachers and postgraduate students across the higher education sector nationally, and potentially internationally, to use for practising and, researching professional skills. Results of the research will be shared and freely available to the higher education sector through the delivery of conference presentations, production of journal articles and via the virtual world of Second Life through online resources.

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