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ClassSim: preparing tomorrows teachers for classroom reality

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Abstract: This paper reports on an on-line simulation that we have developed to support our pre-service teacher education program. The purpose of this paper is three fold: first it reports on the need identified within the literature for pre-service teacher education to make stronger connections between the theory of their university experience with classroom reality; second it reports on the creation of a prototype version of simulation software (ClassSim) developed to engage pre-service teachers in decision-making processes within a virtual classroom environment; third it reports on our research where the software was used with a cohort of 186 pre-service teachers.

Introduction

The development of a classroom simulation stemmed from both research-based and anecdotal-evidence claiming that many pre-service teacher education courses are often not effective in preparing beginning teachers for their entry into the teaching profession. Several studies have criticised pre-service teacher education courses for presenting a fragmented and decontextualised learning experience (for example, Ramsey, 2000; Entwhistle, Entwhistle and Tait, 1993). Such research asserts that learning experiences in pre-service teacher education often make it difficult for beginning teachers to retrieve knowledge from their university experiences when they are required to apply it in classroom situations. They assert that this happens because there have often been minimal previous links between the theory and the practice (Kervin and Turbill, 2003; Bransford, Sherwood, Hasselbring, Kinzer & Williams, 1990). Barth (1990) supports this view and argues that the teaching profession is better served when pre-service training is linked with actual classroom experience. However, he claims, "seldom do these two worlds converge" (p. 118).

Ramsey (2000) in his review of teacher education recommended that pre-service teachers receive quality classroom-based experience supervised by an accredited teacher mentor as he asserted that just providing more extensive classroom-based experience did not guarantee quality experience. Darling-Hammond (1999) has also addressed this issue and conceded that school-based practical experiences often consist of a series of isolated, decontextualised lessons prepared and implemented according to the requirements of the supervising teacher. Others such as Ramsey (2000) take an even stronger view and believe that at worst the practicum can be an unsupported and disillusioning experience.

Danielson's (1996) research showed that classroom teachers typically make over 3000 nontrivial decisions each day and these findings pose serious challenges to pre-service teacher education. Other researchers have acknowledged that pre-service teacher learning needs to be organised in ways that allow pre-service teachers to regularly participate in the complex decision-making processes that teachers make in classroom settings (for example Groundwater-Smith, Deer, Sharp & March, 1996). However, as Ramsey (2000) reported pre-service teachers experience is often limited by lack of regular access to quality classroom experiences.

This project was grounded within our belief that the development of a classroom-based simulation is one way to support pre-service teachers to engage with the complex nature of classrooms. In particular, a simulation would enable the users to experience the nature of the decisions they are required to respond to daily in their work as a classroom teacher with opportunity to respond to these.

Planning the simulation software

We believe a simulated environment has the potential to support existing teacher education programs by providing access to additional classroom experience within a virtual environment. While limited research has been conducted on simulations in teacher development there have been significant advances in gaming software, (e.g. The Sims), and these have demonstrated that it is possible to create a simulation that can support pre-service teachers professional learning. In this project we have been able to create an environment that provides opportunity for users to participate in the creation of a virtual-classroom world, make decisions like a teacher would have to, and then view and reflect on the effects of a multiplicity of classroom management decisions and teaching decisions.

Overview of version 5 of the simulation software

In the planning for the software a series of teacher-created scripts were compiled. These involved members of the project team creating narratives that emerged from their own classroom teaching experiences and from the significant volume of ethnographic data collected from observing classrooms in action. These scripts provided us with considerable understanding of what literacy experiences could look like in a Kindergarten classroom and a solid pedagogical focus to base the simulation software on. This process has been reported in more detail by Kervin, Cambourne, Tubill, Ferry, Hedberg, Jonassen and Puglisi (2005).

From this, the scripts were broken up into a series of cycles to identify the key periods of time within the virtual classroom. The research team spent a considerable amount of time expanding upon these to include decision points and alternative courses of action based on each of these options. The simulation software was then developed to run online and as such consists of over five hundred web pages linked together through the decisions made by the user. Once the user logs onto the site, a folder is created for them on our faculty server that saves their progression through the pages, enabling them to exit and re-enter the software. Most of the pages within the simulation are made up of static XHTML with a PHP "header" that tracks which pages have been viewed by the user. This tracking of pages is also used to include a "history trail" of the major sections the user has visited so far. The ability to track the trail of the user throughout the software enables us to see the decisions they've made and the time they spent looking at each of the pages. Many pages also contain "triggers" for random events designed to simulate some of the random interruptions (e.g. messages for the teacher, student requests to go to the toilet) that typically occur during a teaching session. Key elements of the ClassSim environment will be explored in more detail.

Working within the Virtual Environment

The design of the Classroom Simulation aims to provide authentic and relevant scenarios within a virtual environment giving the user the opportunity to experiment with strategies within a 'safe' context. This virtual environment has been designed to empower the users as they assume the role of the teacher and respond to decision-making opportunities. Throughout the running time of the simulation the user is expected to make a number of different decisions. These decisions focus on issues around classroom management, teaching and learning and responses to the individual targeted students.

ClassSim is based upon the theoretical understandings of a literacy learning session known as a 'literacy block'. This theoretical foundation has been selected as from our experiences and classroom-based data the majority of teachers use this framework to organise their daily literacy session. A 'literacy block' (sometimes referred to as a 'language workshop' in the literature) is made up of a number of short lessons known as 'episodes'.

A number of different design features have been incorporated within the simulation software for the user to interact with. These include the incorporation of targeted students, an embedded tool called the thinking space, and support materials.

Targeted Students

Three targeted students are presented in the Classroom Simulation and have been developed to represent 'typical' challenging students teachers are often faced with in the classroom. The issues these children face while in the classroom are indicative of central issues that confront many contemporary elementary teachers (for example, bullying, behavioural difficulties, needs of a learner who has English as a second

language). These students were developed from the collective professional classroom experiences of the research team and from extensive data collected from observations of classrooms. Each decision made throughout the use of the simulation has the potential to affect the learning of these students within the virtual classroom.

Thinking Space

An embedded tool, referred to as the 'Thinking Space', is consistently available to the user throughout the running time of the simulation. This tool was developed to encourage the users to engage in reflection throughout the running time of the software. Three key questions have been developed, along with other considerations, to assist the users in journaling their "thinking" as they make decisions and view the consequences of these within the virtual classroom.

Figure 1 : Embedded tool referred to as the "Thinking Space"

Support Materials

Throughout the Classroom Simulation there are a range of support materials available for the user to access. This material was designed to inform the pre-service teachers about the specific issues they were confronted with and to assist them in making connections between the theory and the practice of teaching, as they make decisions within the simulation.

Summary pages are available at differing times, dealing with a wide range of topics referred to throughout the simulation. These pages include links to websites, textbook references and other literature. They include information about a number of teaching strategies, dassroom management techniques and professional terminology used throughout the simulation.

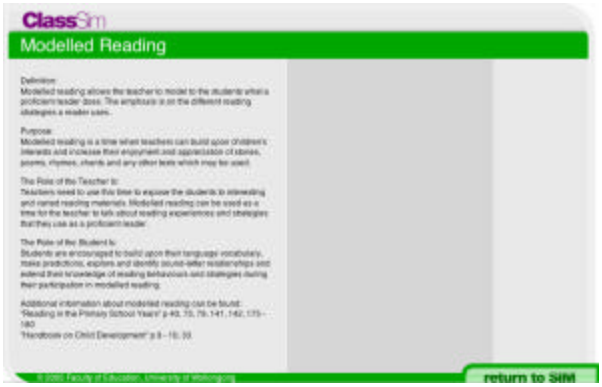

Figure 2: Modelled reading summary page

Student updates are available during the teaching and learning experiences at varying times, usually during and after a behaviour management incident or a significant teaching moment. These updates were developed to give the user information about how engaged the targeted students are in relation to the classroom experience and the previous decisions made by the user. The student's level of engagement is displayed in three different forms, on a scale organised according to the NSW Model of Pedagogy (DET, 2003), a visual representation of their facial expressions and in a written description of how the student reacted to the particular event.

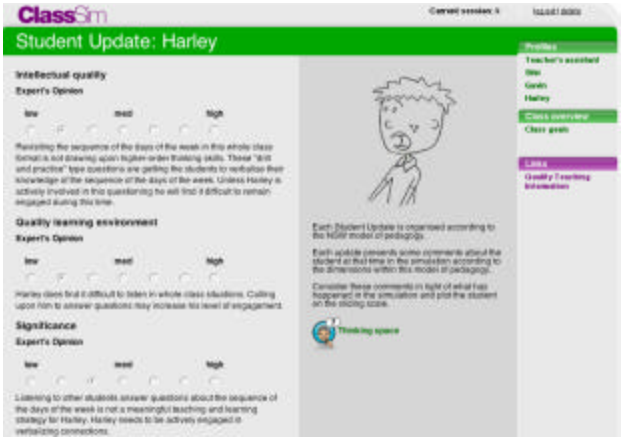

Figure 3: Student update (Harley)

Throughout the simulation the user has access to a number of student work samples. As part of the trailing of the software the teaching and learning experiences available to the user were implemented in various Kindergarten classrooms by the researchers to ensure their relevance to the nominated age groups. During this process a number of work samples from students were collected. These have been incorporated within the software as examples of the work that the targeted students may have produced during the episode.

Decision-making opportunities

The Classroom Simulation enables the user to take on the role of a kindergarten teacher in a virtual classroom. Throughout the running time of the simulation the user is required to make decisions about organising the lesson, classroom management and responses to individual students. When confronted with decisions the user must select from a number of options as they select what they consider to be an appropriate course of action. The decisions the user makes has subsequent implications on what happens in this classroom throughout the running time of the simulation.

Classroom Management Decisions

The user is presented with a number of classroom management issues to which they must respond. Some of these issues include: organising the classroom tables into a setting that will promote an effective learning environment; dealing with children calling out in whole class sessions; responding to increasing noise levels in the classroom; responding to a distressed student and managing students with a history of bullying and violence.

The first decision the user encounters within the simulation is focused on the classroom layout. The user is required to select table arrangement of their virtual classroom (horseshoe set-up or table groups).

Figure 4: Classroom Layout Decision

On the right hand side of Figure 5, there is a link to "class goals". These are available at any time throughout the simulation and provide users with a brief description of the class rules and the sequence of consequences if the goals are broken. One such rule is 'We will raise our hand to speak'. On a number of occasions the students in the simulated class will call out an answer and the teacher will decide to either accept the answer or remind the children of the class rules. These have been incorporated within the software as consistency with classroom management is an issue consistently identified as an area of difficulty for pre-service teachers.

Frequently throughout the simulation the teacher asks the students questions and the students either respond by calling out their answer or by raising their hand and waiting to be selected by the teacher. At theses times the user must decide whether to reprimand students or ignore the fact that they called out.

Information is provided about individual students in the student updates and student profiles. This information has been developed to support the user as they respond to particular behaviour incidents that arise from individual students. For example, at the beginning of the day the children line up outside their classroom and are told to enter the classroom by the teacher. Instead the children rush inside the classroom and push one another. The user has to decide how they will respond to this incident.

There are a number of different behaviour management decisions the user is required to make. These are typically in response to individual students. To help make these decisions the user can access student profiles to gain a better understanding of the individual students with information about suggested behaviour management strategies appropriate for that child. One student who poses significant behavioural needs is Gavin. He has been identified as having specific needs and the user is supported with information and classroom resources to support them. There are a number of occasions when the user must make decisions in response to an action or outburst by Gavin. For example, during the modelled reading episode drawing upon a familiar story, the user is asked to decide between involving Gavin or another student in a demonstration. If the user decides to select another student for the demonstration Gavin responds by sulking and subsequently withdrawing (noisily) to back of the classroom, refusing to participate.

Teaching and Learning Decisions

Throughout the Classroom Simulation the user encounters a number of teaching and learning decisions. These decisions are typically focused on the organization of teaching and learning experiences (referred to as "episodes" within the literacy block). At these time the user is asked to select from various options in order to proceed with the program. The user is provided with a scenario at the beginning of the simulation experience outlining that throughout the running time of the simulation software they need to organise the two-hour literacy experience with a focus on the days of the week. The user is able to select the order of episodes the simulated class will complete during the 'days of the week' lesson. The user has twelve different episodes available to them organized into reading episodes, writing episodes and language activities. It is not expected that all of these will be used, rather a sequence determined by the user to be most appropriate for the needs of their virtual class. At the top of the screen there is a counter which counts down this two-hour period of time. As the user makes selections about teaching and learning experiences

time is deducted. Indication of timing is provided on this page, however if the user encounters significant behavioural management strategies this estimated time will increase impacting on how much time left for quality teaching and learning experiences.

Figure 5: Episode selection page

A key consideration for the user throughout the simulation running time is the challenge of engaging individual children within the teaching focus. At one point during a class discussion a student contributes a correct answer; however he uses a quiet voice only audible by the teacher. Should the teacher select to praise his answer and ask him to repeat it for the rest of the class to hear, the student responds by shaking his head implying that he did not wish to repeat his answer. The user must then decide how to respond to this student to best support his in the classroom. In contrast, another student frequently contributes some response to questions posed by the teacher. The user has to decide whether to encourage these responses through additional prompting or ignore them because of either time constraints or the child's neglect of following the class rules by calling out.

Trial of ClassSim with pre-service teachers

In 2005 version 5 of the simulation software was trialled with 187 first year students enrolled in the Bachelor of Teaching degree at the University of Wollongong. At the time of the trial the pre-service teachers were studying a literacy education subject and a subject focused on curriculum and pedagogy. They had also had weekly visits to a local elementary school for one-hour periods of observation. The pre-service teachers used the simulation software in a laboratory over two 60-minute sessions. Twenty participants were in the lab at a time. They each had a computer but were arranged in small groups so that they could converse and articulate their understanding and problem solving strategies when using the simulation. The researchers observed the participants during this time and also collected video and audio recordings of the participants in each of these sessions. At the end of each session, the researchers employed stimulated recall and semi-structured interview techniques conducted in focus groups to gain additional information from the participants. The data gathered were analysed using processes of data reduction, data display and conclusion drawing and verification. Constant comparative methods were used to determine issues and themes emerging from the data. (Denzin and Lincoln, 2000)

Discussion of pre-service teachers engagement with decision-making opportunities

The findings from our research indicated that an important feature within the software was the inclusion of support material. These explicit links to familiar courses textbooks, relevant policy documents and other materials were utilised by the pre-service teacher participants for support when confronted with unfamiliar decisions in the virtual environment. Whilst interacting with the simulation pre-service teacher participants appeared to draw upon the support material available within the simulation, the subject matter of their university studies and any previous classroom-based experiences they have had when making decisions.

The majority of the participants accessed the student updates whilst interacting with the Classroom Simulation. These were accessed to gauge the engagement of the targeted students in the teaching and

learning experiences and to support the making of decisions focused on the learning needs of the individual students. One pre-service teacher identified that the updates were very useful, in particular the scale based upon the NSW Model of Pedagogy (DET, 2003). Another believed the visual cues (facial expressions) provided a more realistic update, acknowledging that in a 'real' classroom a teacher is going to be able to more frequently judge the engagement of a student's through interpreting a student's facial expression. Many participants identified that these updates enabled them to obtain an immediate indication of how successful a decision was based upon the visual cue of the facial expressions. Our findings suggest that the pre-service teacher participants utilised the student updates whilst making decisions within the Classroom Simulation in order to gain additional information about the targeted students and the particular situation at hand to inform their decision-making.

For many users, their first indication of the potential of Kindergarten students work product was through the samples contained within the simulation software. One participant stated, "I found that [student work samples] helpful because you can see examples of what to expect." Our collected data revealed that the participants accessed the student work samples whilst interacting with the Classroom Simulation. These appeared to be accessed to understand what individual students learnt during the episode and what the work they produced may look like. For those participants who had minimal previous experience working with children, these resources appeared more useful and acted as a way for participants to familiarise themselves with examples of student work product. The student work samples did give the pre-service teachers examples of student work created during the episode and added to the authenticity of the environment.

The summary pages were consistently accessed to gain additional information on a range of topics referred to throughout the simulation. Analysis of the trail of the participants through the software revealed that these materials were accessed consistently and for extended periods of time (for example, a participant was observed to spend seven minutes looking at a summary page). The data collected suggests that many of the participants used the summary links to make informed decisions, to gain additional information about unfamiliar teaching techniques and strategies, and to assist in his decision-making throughout the simulation. It was observed that a few participants use of the summaries was quite unique in that they copied and pasted all the available information into his thinking space as a way to increase his professional knowledge of educational terminology and teaching strategies used in the simulation. Our data tells us that the participants generally accessed the summary support material to aid in their understanding unfamiliar topics such as educational terminology, teaching strategies and behaviour management techniques.

Our research revealed that a number of participants were able to make connections between what they had experienced during their use of the classroom simulation and their current pre-service teacher education within the simulation environment. This supports Gatto's (1993) view that students who interact with simulations are "better prepared to perform in real situations than those students who rely on other instructional media, such as text" (p.154). For example, one participant was able to identify a number of occasions when he made connections between his use of the simulation and his university studies, in particular behaviour management strategies and the framework of a literacy block. Another participant acknowledged that she referred back to her lecture notes on the different reading strategies on a number of occasions in order to clarify information on the different uses before deciding which strategy to use

In addition, the findings of this study identify that a number of pre-service teacher participants were able to make important connections between what they had experienced during their use of the Classroom Simulation and what they experienced in a 'real' classroom (i.e. from their periods of observation in a local elementary school). The traditional approach to pre-service teacher education is criticised as it often views theory and practice as separate entities with the responsibility for the teaching of theory regarded as the role of the university and the teaching of pedagogy the role of the supervising teacher on practicum (Graham & Thornley, 2000), resulting in pre-service teachers often not understanding the inter-relationships between theory and practice. It appears that the use of the Classroom Simulation supported a number of pre-service teacher participants were to make connections between their university course work and practical experiences. Analysis of collected data revealed that many participants were able to reflect upon their previous experiences during their use of the simulation and consequently use this experience to make decisions based upon these issues. A participant stated, "I think I learn a lot more by observing things…

When I'm focusing on practical stuff if I can actually see it, it sinks more into my head, and I can refer back to it".

Concluding comments

Our data showed that the simulation has the potential to develop pre-service teacher understanding of complex classroom situations associated with the teaching of literacy by giving them the opportunity to engage in decision-making opportunities within the virtual classroom environment. In particular, the ability to slow down or accelerate classroom events, revisit and reflect on critical decision points and replay events in the light of new understandings supported these users. These design features gave these pre-service teachers time to think critically about complex teaching situations which relied on their ability to tune into children's experiences, engage with them in dialogue and negotiation as well as utilise a range of indirect instructions such as questioning, modelling and prompting. Users reported that their experience with the simulation helped them to make connections to their practicum experiences more focused by giving them the knowledge and experience to more fully appreciate the impact of subtle changes that experienced teachers made during lessons. At this stage of our research we are confident that our prototype software has contributed to the development of pre-service teacher understanding of the complex work of teachers in virtual and in real classrooms supporting them for their own professional entry into the classroom.

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