



UNIVERSITY
OF WOLLONGONG
AUSTRALIA

University of Wollongong
Research Online

Faculty of Education - Papers (Archive)

Faculty of Social Sciences

2005

The use of embedded tools and support materials within a classroom simulation to support quality teaching

Janice B. Turbill

University of Wollongong, jturbill@uow.edu.au

Lisa K. Kervin

University of Wollongong, lkervin@uow.edu.au

Brian Ferry

University of Wollongong, bferry@uow.edu.au

Brian L. Cambourne

University of Wollongong, bcambnrn@uow.edu.au

John Hedberg

Nanyang Technological University, Singapore, jhedberg@nie.edu.sg

See next page for additional authors

Publication Details

Turbill, J. B., Kervin, L. K., Ferry, B., Cambourne, B., Hedberg, J. & Jonassen, D. (2005). The use of embedded tools and support materials within a classroom simulation to support quality teaching. Proceedings of the 2004 Australian Association for Research in Education Conference (pp. 1-12). Melbourne, Australia, Nov/Dec 2004: Australian Association for Research in Education.

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

Authors

Janice B. Turbill, Lisa K. Kervin, Brian Ferry, Brian L. Cambourne, John Hedberg, David Jonassen, and Sarah Puglisi

The use of embedded tools and support materials within a classroom simulation to support Quality Teaching

Jan Turbill Faculty of Education University of Wollongong, Australia, jturbill@uow.edu.au
Lisa Kervin Faculty of Education University of Wollongong, Australia, lkervin@uow.edu.au
Brian Ferry Faculty of Education University of Wollongong, Australia, bferry@uow.edu.au
Brian Cambourne Faculty of Education University of Wollongong, Australia, bcambourne@uow.edu.au
John Hedberg Nanyang Technological University, Singapore, jhedberg@nie.edu.sg
David Jonassen University of Missouri, USA, jonassen@missouri.edu
Sarah Puglisi University of Wollongong, Australia

Abstract

This paper focuses on the use of embedded tools and support materials within a web-based simulated classroom environment. The developed simulation prototype allows the user to adopt the role of a Kindergarten teacher where they have to “teach” a typical literacy episode that we have called “days of the week”. During this episode the user is asked to make decisions about the organisation of the classroom, management of the classroom, and the teaching and learning experiences to be offered.

A key component of this on-line simulation is the incorporation of an embedded tool, referred to as a thinking space, at decisive points. Support materials have also been incorporated throughout the simulation to encourage the user to look at the theory and wider knowledge base around the issues they encounter. These components of the simulation have been developed to encourage users to think more deeply about their role as a classroom teacher. As users make decisions throughout the running time of the simulated classroom episode, they are supported with embedded thinking spaces and regular student updates organised according to the NSW pedagogy model (DET, 2003).

We report on the data that we have collected about use of the embedded tools and support materials by a cohort of pre-service teachers.

Rationale for the development of a classroom simulation

The development of a classroom simulation stemmed from both research-based and anecdotal-evidence that pre-service teacher training is often not preparing beginning teachers effectively for their entry into the teaching profession. Several studies have criticised pre-service teacher education courses for presenting a fragmented and decontextualised learning experience, (Ramsey, 2000; Entwistle, Entwistle and Tait, 1993). These, and other researchers, claim such learning experiences make it difficult for beginning teachers to retrieve knowledge from their pre-service teacher education 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 et al, 1990). Barth (1990:118) supports this view when he acknowledges the benefits to the teaching profession when pre-service training is linked with actual classroom experience. However, he asserts that, “seldom do these two worlds converge”.

Ramsey (2000) in the review of teacher education in NSW 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) also made this point and conceded that school-based practical experiences often consist of a series of isolated, decontextualised lessons prepared and are 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 (1996:2) research showed that classroom teachers can make over 3000 nontrivial decisions each day and these findings pose serious challenges to pre-service teacher education. Also others 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 (Kiggins, 2001; Groundwater-Smith, Deer et al, 1996). However, as Ramsey (2000) reported pre-service teachers experience is often limited by lack of regular access to quality classroom experiences.

We believe that the development of a classroom-based simulation is one way to support the range of strategies incorporated within teacher education programs as pre-service teachers are provided with access to an additional classroom experience. While limited research has been conducted on simulations in teacher development advances in gaming software, particularly those which involve players creating worlds (eg The Sims), have demonstrated that it is possible to create a simulation that can support pre-service teachers professional learning. The development of embedded tools that allow the users to participate in the creation of a mini-classroom world, and then view and reflect on the effects of a multiplicity of classroom management decisions and teaching decisions, student users should be able to vicariously experience both the teacher's and student's experience while engaged in a typical literacy learning episode in a virtual Kindergarten classroom.

The simulation as a tool for professional learning

Many countries, including Australia, have established professional milestones for teachers in the last decade (Boston, 2002:9). The development of professional standards aims for "...professional enhancements which lead to improvements in both teaching and learning, and in student outcomes" (Boston, 2002:11). However, the links between theory and practice are acknowledged as a "creative tension" where the tension lies "...between developing professional teaching standards per se, and 'living these out' in everyday learning environments" (Cumming, 2002:3).

There is a considerable amount of literature surrounding the professional learning of teachers. The literature has for some time acknowledged and emphasised professional learning as an on-going process beginning with pre-service teacher training right through

to retirement from the profession (see for example Fullan, 1991; Guskey and Huberman, 1995). This theme is still running through more current literature. Cumming (2002:2) acknowledges that professional learning needs to “reflect a continuum ... from pre-service education through to educational leadership, allowing points of entry and re-entry”. We believe that the development of a classroom based simulation with the inclusion of embedded tools and support materials is something that would appeal to teachers at both a pre-service and in-service level of professional learning.

Since 1991 it has been argued that professional learning “has been a somewhat neglected area and that it has been under-resourced, under-researched and under-financed ... the complexity of the process has not been fully understood by employing authorities and those responsible for providing professional development programs” (Connors, 1991:78). In the current climate of professional standards, the demand and need for professional learning has become increasingly important. However, what is also apparent in the literature is the need for the delivery of professional learning to be re-evaluated. Johnson and Golombek (2002:1) write, “for more than a hundred years, teacher education has been based on the notion that knowledge about teaching and learning can be ‘transmitted’ to teachers by others”. Teachers need to have control over professional learning, focusing on areas of need at that particular time. We believe the development of a classroom-based simulation allows teachers to take responsibility for the direction and focus of their professional learning.

The literature reports that there is a need for professional learning opportunities to be conducted within meaningful contexts and be targeted at issues pertinent to teachers at that particular time (Kervin, 2004; Hoban, 2002; Hargreaves and Fullan, 1992). Thus the developed simulation has operationalised these reports by creating a web-based environment that makes use of the key elements of classroom organization, classroom management and the organization and structure of learning and teaching episodes within a literacy based context. Such an approach has allowed us to integrate the theory with what is happening in the virtual classroom. The theory has been presented as links from the main flow of the simulation, thus allowing the user to access the information that they are most interested in exploring at that particular point in time.

The integration of support materials within the simulation responds to Darling-Hammond’s (1997:319) argument that theory and practice or application cannot be separated from effective professional learning.

“Teachers learn just as their students do: by studying, doing, and reflecting; by collaborating with other teachers; by looking closely at students and their work; and by sharing what they see. This kind of learning cannot occur solely in college classrooms divorced from engagement in practice or solely in school classrooms divorced from knowledge about how to interpret practice.”

Darling-Hammond (1997:322) claims that by integrating theory with practice in professional learning opportunities, teachers are more likely to remember and continue applying what they have learned. The simulation is different from a typical classroom context as the user is able to pause what is happening, revisit previous decisions, revisit previous support materials and use of embedded tools or even restart the simulation.

With such understandings from the literature, the development of the simulation was perceived as one way in which professional learning of teachers could be encouraged and supported.

Darling-Hammond (1997:326) identifies several necessary components of professional learning opportunities. Such components connect with the design principles of simulations in authentic contexts (Gee, 2003; Herrington, Oliver & Reeves, 2003) and as such we concluded can be incorporated within a classroom based simulation. Each of Darling-Hammond's components will be discussed in relation to the design of the simulation to support professional learning.

- “Experiential, engaging teachers in concrete tasks of teaching, assessment, and observation that illuminate the processes of learning and development” (Darling-Hammond, 1997:326)

The developed simulation engages the user in organising teaching and learning experiences. Throughout these nominated experiences, the user is able to view student updates of targeted students within this virtual classroom. At the conclusion of each “episode” the user is encouraged to consider what assessment practices could be incorporated.

- “Grounded in participants’ questions, inquiry, and experimentation as well as profession wide research” (Darling- Hammond, 1997:326)

The issues highlighted within the simulation are those that have been identified as areas of need from reviews of pre-service teacher education (Ramsey, 2000). The simulation allows the user to experiment with different options within the support of additional reference material.

- “Collaborative, involving a sharing of knowledge among educators” (Darling- Hammond, 1997:326)

The simulation has been developed by a team of educators with varying experiences and areas of expertise. The user's ability to record thoughts throughout the simulation within embedded “thinking spaces” provides an avenue for further discussion and exploration, particularly within the context of pre-service teacher education.

- “Connected to and derived from teachers’ work with their students as well as connected to examinations of subject matter and teaching methods” (Darling- Hammond, 1997:326)

The simulation stems from research, anecdotal evidence and experience. The issues addressed within the simulation are linked to information from research, links to relevant web pages and typical pre-service teacher textbooks.

- “Sustained and intensive, supported by modelling, coaching, and problem solving around specific problems of practice” (Darling- Hammond, 1997:326)

The simulation is complex, allowing the user to investigate the areas of classroom organization, management and learning and teaching. The user is regularly asked to engage in problem solving activities as they deal with these areas.

The simulation as opportunity for pedagogical decision making

“The core business of the profession of teaching is pedagogy. As the art and science of teaching, pedagogy is evident both in the activity that takes place in classrooms ... and in the nature or quality of the tasks set by teachers ... pedagogy recognises that how one teaches is inseparable from what one teaches, from what and how one assesses and from how one learns.” (DET, 2003:4)

We want to develop user understanding of the importance of pedagogy. Therefore, the simulation was designed to engage the user in making decisions about how these virtual Kindergarten students were going to be taught about the concept “days of the week”. The decisions were embedded with a narrative context and were designed to stimulate deep thinking (DET, 2003) about the impact of choices made on classroom management and the learning experiences of three targeted students. To encourage users to think more deeply about their pedagogical decisions we designed a set of embedded tools and support materials. These are discussed in the next section.

Exploration of the embedded tools and support materials

Stallings (1989: 4) asserts that professional learning needs to involve the participant in:

- Learning by doing – try, evaluate, modify, try again
- Linking prior knowledge to new information
- Learning by reflecting and solving problems
- Learning in a supportive environment – share problems and successes.

Through the use of embedded tools and support materials we have been able to include these elements within this classroom based simulation. The user is actively “doing” as they make decisions. When they make decisions and solve problems within the virtual classroom they are drawing upon their previous experiences. The embedded tools and support materials encourage the user to reflect on what has happened while also providing avenues for additional information. These embedded tools and support materials will be discussed further.

Decision points

Throughout the running of the simulation, the user is regularly asked to make decisions about issues around classroom organization, management and teaching and learning experiences. The decision the user makes guides their course throughout the simulation. Some decisions may seem to be fairly inconsequential, but may later impact upon what happens in the classroom. An example of such a decision involves the user's decision whether or not to include parent helpers in the classroom during an activity based “episode”. If the user selects to have parent helpers they are able to organise the students into small groups to complete the task while parent helpers assist these groups. In addition to this, the user is able to work with a small group in guided format without disruption. If the user has selected not to have parent helpers they are faced with greater

classroom management implications and consequent decisions as they respond to the whole class while they are trying to work with a small group in a guided format.

The simulation also includes a number of random events requiring the user to make management decisions. These decisions have been designed to illustrate the often unpredictable nature of classrooms and to further exemplify the impact that these can have upon the teacher, the students and the quality of experiences and artefacts. The occurrence and frequency of these random events is unknown.

The Thinking Space

At times where decisions have to be made, or something notable has happened within the classroom the user is encouraged to record their thoughts in a “thinking space”. This tool allows the user to create an ongoing reflective text where they respond to what has happened, justify the choices they make and note any areas that they need to follow up.

There are some specific design features within the thinking space which support this tool in both Quality Teaching and professional learning contexts. Firstly, the user is able to edit previous entries in view of what has happened. Questions are available to the user to prompt their response. These questions have been arranged as key questions and things to consider. We believe these questions to be generic enough to guide the user in their reflections at any point in the simulation. The user is able to retrieve their thinking space entries in a printable format to keep a record of their engagement with the simulation. For professional learning purposes, we believe this is a tool that will be a stimulus to future professional dialogue. Figure 1 provides an example of a thinking space.

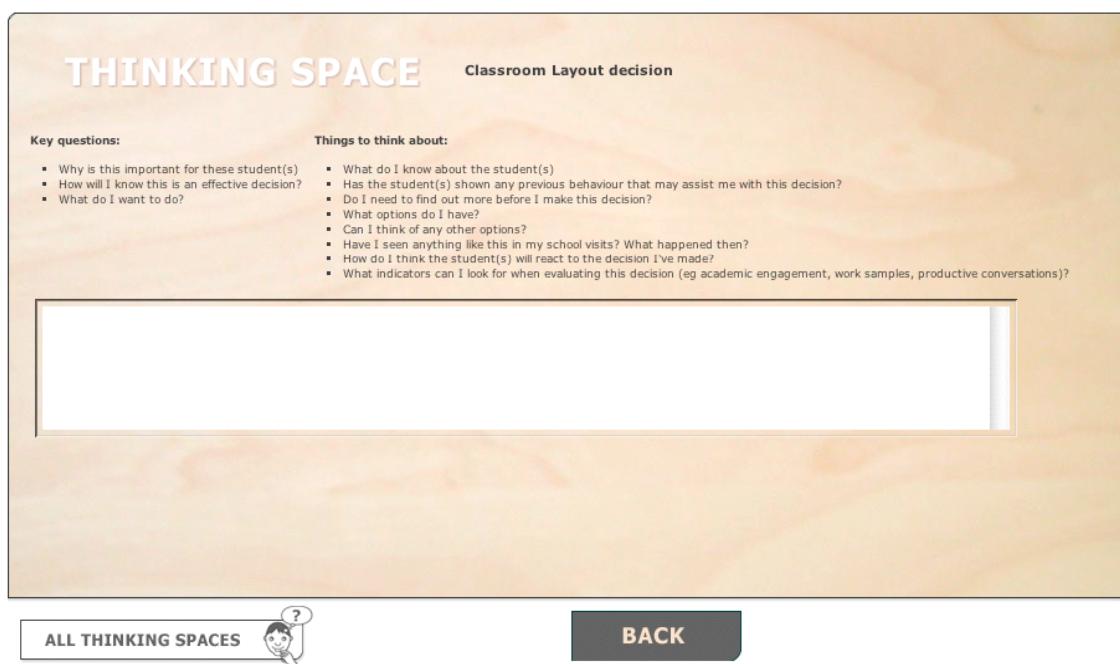
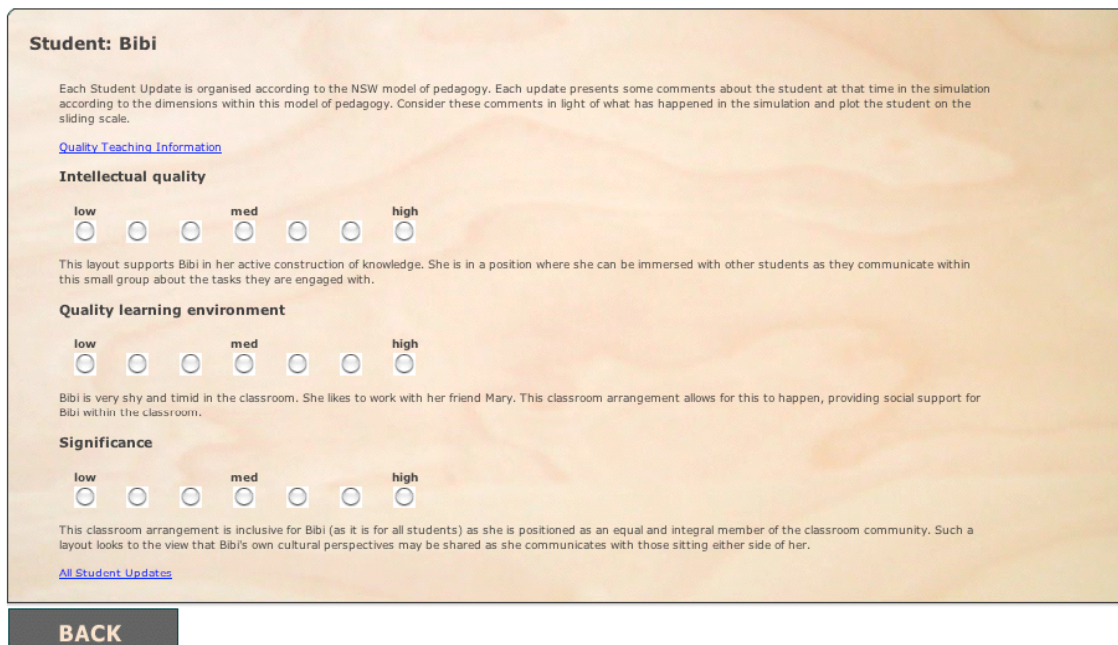


Figure 1 – a sample thinking space

Student Updates

Understanding the importance of pedagogy and encouraging teachers to think about this, regular student updates on the targeted students within the simulation are available to the user. These updates have been organised according to the New South Wales model of pedagogy (DET, 2003) and as such respond to the three dimensions of pedagogy – intellectual quality, quality learning environment and significance.

At these points, the user is encouraged to consider what has happened to this point in the simulation, look at the narrative provided by the “experts” and then consider where on the continuum that particular child would be. The user is able to access additional information on the Quality Teaching project (DET, 2003) and on this link facilities are available for the user to download further materials from the Department of Education and Training’s web site. Figure 2 provides an example of a student update.



Student: Bibi

Each Student Update is organised according to the NSW model of pedagogy. Each update presents some comments about the student at that time in the simulation according to the dimensions within this model of pedagogy. Consider these comments in light of what has happened in the simulation and plot the student on the sliding scale.

[Quality Teaching Information](#)

Intellectual quality

low med high

This layout supports Bibi in her active construction of knowledge. She is in a position where she can be immersed with other students as they communicate within this small group about the tasks they are engaged with.

Quality learning environment

low med high

Bibi is very shy and timid in the classroom. She likes to work with her friend Mary. This classroom arrangement allows for this to happen, providing social support for Bibi within the classroom.

Significance

low med high

This classroom arrangement is inclusive for Bibi (as it is for all students) as she is positioned as an equal and integral member of the classroom community. Such a layout looks to the view that Bibi's own cultural perspectives may be shared as she communicates with those sitting either side of her.

[All Student Updates](#)

BACK

Figure 2 – Example of a student update

Support Materials

Throughout the simulation the user can access links called “summary sheets”. These links take the user to organised information sheets about specific areas that relate to what is being addressed within the simulation. As our intended audience at this point of development is with our first year pre-service teachers enrolled in a Bachelor of Teaching, these pages feature links to their core textbooks, links to relevant documents and web sites from the Department of Education and Training and the Board of Studies, along with other useful sources we have compiled. Figure 3 provides an example of a summary sheet.

SUMMARY SHEET
CLOSE

Behaviour Management Strategies

Students and teachers have the right to be treated fairly and with dignity, in an environment free from disruption, intimidation, harassment and discrimination." (New South Wales Department of Education and Training, 2002)

Schools are expected to have a policy outlining the procedures they have in place to encourage good behaviour and to discipline students who are poorly behaved.

The New South Wales Department of Education and Training (2002) states that a good discipline policy should cover:

- School rules or discipline code
- Strategies to promote good discipline and effective learning within the school
- Practices designed to recognise and reinforce student achievement
- Strategies for dealing with unacceptable behaviour

[Sample Policy - http://www.schools.nsw.edu.au/studentsupport/programs/behaviour.php](http://www.schools.nsw.edu.au/studentsupport/programs/behaviour.php)

Classroom teachers need to support the policy within the school through their own classroom management plan. This needs to be clearly communicated to the students and parents and followed for all students.

[Classroom Goals](#)

Figure 3 – example of a summary sheet

The Research Approach

The trial of the simulation was conducted with twenty-four pre-service teachers enrolled in the Bachelor of Teaching Program at the Faculty of Education, University of Wollongong. A case study design was utilised throughout the trial of this simulation with the aim of providing a detailed, descriptive analysis (Creswell, 2003) to capture the participants' initial use of the on-line simulation within the broader setting of the interpretive research paradigm (Mertens, 1998).

This trial aimed to explore how these users interacted with the simulation as they engaged with, and more specifically planned, implemented and evaluated decisions they make within the simulated classroom. The case study mode of inquiry enabled the researchers to investigate contextual conditions, as Yin (2003) states that these conditions have the potential to impact on the studied phenomenon. Conditions such as peer relationships, group dynamics, and the background and previous experiences of participants were important elements to be explored in this trial, as these conditions had the potential to impact on the way users interacted with the simulation. The case study approach allowed the researchers to explore these factors in-depth and therefore was an appropriate choice of design.

Various data collection methods associated with the interpretive paradigm were used throughout this trial, including observations, interviews and artefacts. Data were analysed during and after each session of data collection, and emergent themes and issues were developed. Data collection occurred in four key phases which are represented in figure 4.

| Phase | Focus of Phase | Data Collection | Data Analysis |
|-------|----------------|---------------------|---------------|
| 1 | Background | Information session | Matrix of |

| | | | |
|---|--|---|-----------------------------|
| | information on participants | and survey | participant characteristics |
| 2 | Study user styles and interactions during simulation use | Observations of students | Emergent categories |
| 3 | Determine how participants interact with the embedded tool and support materials | Analysis of student artefacts (downloaded entries from embedded thinking space) | Emergent categories |
| 4 | Identify and study four participants in depth | Interviews | Emergent categories |

Figure 4: Overview of data collected throughout the simulation trial

Pre-Service teacher use of the embedded tools and support materials

Analysis of the data from this trial revealed that the embedded thinking tools were an important characteristic of this simulated environment. These tools appeared to support these participants in articulating and expressing their ‘virtual’ experiences. Within this simulation prototype, the embedded thinking tool act as a journal, which according to Lee (2004:74) is a valuable device in pre-service teacher education in fostering connections between theory and practice.

“Preservice teachers with no or little teaching experience are naturally preoccupied with acquiring a repertoire of survival skills in the classroom. One immediate and important need for them is how to transfer the skills and knowledge acquired in teacher education courses as students to the real classroom situation as teachers” (Lee, 2004:74).

The embedded thinking tool appeared to supported these pre-service teachers to make these links between their understandings acquired in their university studies with their classroom-based and simulated experiences.

Each of the pre-service teachers engaged in several processes while using the embedded thinking tools, including justifying decisions and beliefs, reflective practice and critique of the simulated teacher. According to Lee (2004) pre-service teachers need to be ‘pushed’ to think and reflect on the issues which arise in the classroom. The findings from this trial indicated that the embedded thinking tools encouraged this thinking and reflecting.

The reflections captured in the participants thinking space entries appeared to primarily concentrate on issues such as beliefs, teaching strategies, behaviour management, personal limitations and areas for improvement. It is reasonable to suggest that these pre-service teachers were supported in their development of emerging pedagogy by the opportunity to reflect on their professional knowledge and strategies, building on both their real and simulated classroom experiences. This is supported by Groundwater-Smith

et al (2003) who assert that improvements in teaching practice can only occur when teachers look beyond what they do in the classroom and reflect on why they are doing it.

The findings from this trial consistently suggested that working within the simulation provided these participants with an avenue to expand their professional knowledge base. The opportunity to teach in a 'safe' and self contained setting (McMahon, 2000) allowed the pre-service teachers to work in the 'virtual' classroom without the identified constraints often experienced in traditional practicum classrooms. Collected data indicated that the support material was useful in the expansion of the participants' knowledge. One participant claimed that the support material element of the simulation had the potential to expand the knowledge base of the user "exponentially". Another participant articulated that new ideas were able to be formed while working in the simulated environment as they explored what they knew from their own experiences, what the support materials suggested they needed to know and how this came together as they explored the decisions they made in their thinking space.

As the participants interacted with the elements of the 'virtual' classroom they appeared to gain ideas from their actions and observations within this environment. After analysing the data it seems appropriate to conclude that these participants were supported in the development of their pedagogical understandings as they engaged with the simulation.

Concluding comments

The literature clearly identifies several limitations of current approaches to pre-service teacher education. It is necessary for teacher educators to consider these limitations and contemplate new approaches for teacher training programs. The recent advances in technology reveal that simulations have the potential to support pre-service teacher education programs.

The findings from this trial indicated that this prototype simulation software supported these pre-service teachers to engage in active processes within the 'virtual' classroom environment. Considering the limitations of traditional pre-service teacher education and the findings from this trial, it is reasonable to conclude that simulation technology has the potential to support beginning teachers to integrate and consolidate their knowledge by linking the theory of their pre-service teacher training to what it could look like in "real" teaching practice.

References

- Barth, R. S. (1990). *Improving schools from within: teachers, parents, and principals can make the difference*. California: Jossey-Bass Publishers.
- Boston, K. (2002). *The Road from Corio Bay: The Australian College of Educators and teacher professionalism*. Unicorn. 28 (2): 8-15.
- Bransford, J. D., Sherwood, R. D., Hasselbring, T. S., Kinzer, C. K., & Williams, S. M. (1990). *Anchored Instruction: Why we need it and how technology can help*. In D. Nix & R. Spiro (Eds.). *Cognition, Education, Multimedia: Exploring ideas in high technology*. Hillsdale: Lawrence Erlbaum. 115-141.
- Conners, B. (1991). *Teacher development and the teacher*. In P. Hughes (ed.). *Teachers' Professional Development* (pp. 53-81). Hawthorn, Victoria: ACER.
- Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. California: Sage Publications.
- Cumming, J. (2002). *Working together as a profession*. Unicorn. 28 (2):1-4.
- Danielson, C. (1996). *Enhancing Professional Practice: A Framework for Teaching*. Alexandria, Virginia, Association for Supervision and Curriculum Development
- Darling-Hammond, L. (1999). *Teacher Education: Rethinking Practice and Policy*. Unicorn 25(1), 31-48.
- Darling-Hammond, L. (1997). *The Right to Learn: A Blueprint for Creating Schools that Work*. San Francisco: Jossey-Bass Publishers.
- Department of Education and Training (2003). *Quality Teaching in NSW Public Schools: Discussion Paper*. Sydney: Professional Support and Curriculum Directorate.
- Entwhistle, N., Entwhistle A., & Tait H.(1993). *Academic Understanding and the Contexts to Enhance It: A perspective from research on student learning*. In T.M. Duffy,
- Fullan, M. G. with Stiegelbauer, S. (1991). *The New Meaning of Educational Change* (2nd ed.). Teachers College: Columbia University.
- Gee, J. P. (2003). *What Video Games Have To Teach Us About Learning and Literacy*. New York: Palgrave Macmillan
- Groundwater-Smith, S., Deer, C. E, Sharp, H. & March, P. (1996). *The Practicum as Workplace Learning: A Multi-Modal Approach in Teacher Education*. Australian Journal of Teacher Education, 22(2), 21-30.
- Guskey, T. R. & Huberman, M. (eds.). (1995). *Professional Development in Education: New Paradigms and Practices*. New York: Teachers College Press.
- Hargreaves, A. & Fullan, M. G (1992). *Understanding Teacher Development*. London: Teachers College Press.
- Herrington, J., Oliver, R., & Reeves, T. C. (2003). *Patterns of Engagement in Authentic Online Learning Environments*. Australian Journal of Educational Technology 19(1), 59-71.
- Hoban, G. F., (2002). *Teacher Learning for Educational Change*. Philadelphia: Open University Press.
- Johnson, K. E. & Golombek, P. R. (eds.). *Teachers' Narrative Inquiry as Professional Development*. Cambridge, UK: Cambridge University Press.
- Kervin, L. (2004). *Action Research as a professional development model for the teaching of writing*. University of Wollongong: Unpublished PhD thesis.
- Kervin, L. & Turbill, J. (2003) *Teaching as a craft: making links between preservice training and classroom practice*. English Teaching: Practice and Critique. 2 (3) 22-34 available: <http://www.tmc.waikato.ac.nz/english/ETPC/index.lasso> [accessed 24th March 2004]
- Kiggins, J. (2001). *The Knowledge Building Community Project: A Grounded Theory of an Alternative Teacher Education Model*. University of Wollongong: Unpublished PhD thesis.
- Lee, C. (2000). *A Paradigm Shift in the Technology Era in Higher Education*. World Conference on Educational Multimedia, Hypermedia and Telecommunications 2000(1), 575-580. [Online]. Available: <http://dl.aace.org/1308> [Accessed 2004, June 16].
- McMahon, M. (2000). *Developing Web-based Learning Strategies: a comparison between the Web and traditional learning environments*. World Conference on Educational Multimedia, Hypermedia and Telecommunications 2000(1), 693-701. [Online]. Available: <http://dl.aace.org/1373> [Accessed 2004, September 15].

Mertens, D.M. (1998). *Research Methods in Education and Psychology: Integrating Diversity with Quantitative & Qualitative Approaches*. California: Sage Publications.

Ramsey, G. (2000) *Quality Matters Revitalising teaching: Critical times, critical choices*. Report of the Review of Teacher Education in NSW. Sydney: NSW Department of Education & Training.

Yin, R.K. (2003). *Case Study Research: Design and Methods* (3rd ed.). California: Sage Publications.