1-1-2005

Simulation technology in pre-service teacher education: 'Pleasurable learning' to inspire 'passionate teaching'

Lisa K. Kervin
University of Wollongong, lkervin@uow.edu.au

Janice B. Turbill
University of Wollongong, jturbill@uow.edu.au

Brian L. Cambourne
University of Wollongong, bcambrn@uow.edu.au

Brian Ferry
University of Wollongong, bferry@uow.edu.au

Simulation Technology in Pre-service Teacher Education: 'Pleasurable Learning' to Inspire 'Passionate Teaching'

Lisa Kervin
Jan Turbill
Brian Cambourne
Brian Ferry
University of Wollongong

Abstract

Reviews of beginning teacher programs over the past eighty years within an Australian context continually identify a number of key skills that are not well developed by traditional pre-service teacher preparation programs (DEST 2002, Ramsey, 2000; Vinson, 2001). In more recent times the teaching of literacy has been targeted as needing specific attention, especially at the pre-service level.

Advances in educational software have demonstrated that it is feasible to create a representation of a real situation through simulation. We believe that creating a virtual classroom environment for pre-service teachers to interact with is one way to support them with understanding the theory of literacy learning and the delivery of meaningful literacy classrooms.

This paper explores research findings related to the use of web-based simulation technology designed to support pre-service teacher education students' understandings of the teaching of literacy. The prototype version of the software will be described with description of the planning, design and research that underpin this. The findings from a case study of one pre-service teacher's interaction with the software will be shared.

Introduction

Reviews of teacher education within an Australian context identify that traditional preparation programs are not adequately preparing our graduate students for the teaching profession. Between the period of 2000 and 2002 there were three important state and federally funded reviews, all of which highlighted some vital considerations for teacher educators (Department of Education, Science and Training, 2002; Ramsey, 2000; Vinson, 2001). Each of these reviews has identified a number of key skills that are not well developed by traditional pre-service teacher preparation programs. Such skills include: student discipline, motivating students, dealing with individual differences, insufficient and/or inadequate resources, organisation of classwork, assessing student work, and relationships with parents. Interviews conducted with final year pre-service teachers report that they often leave university feeling under-prepared for life in classrooms and confused by what will confront them when they arrive at schools. Further, schools that employ beginning teachers, claim that a majority of recent graduates are unaware of how classroom cultures operate and find it difficult to transfer what they've studied at university into effective classroom practice (Ministerial Advisory Council on the Quality of Teaching, 1998). The Ramsey (2000) review of teacher education in NSW supported these findings and also asserted that pre-service teachers do not understand

how classroom practice produces effective student learning. In the current climate of national benchmarks and teaching standards for beginning teachers (Nelson, 2002), it is crucial that these issues are addressed within pre-service teacher training.

Hoban (2002) claims that many teacher education courses present a fragmented view of learning and this can hinder pre-service teacher development into flexible, progressive practitioners. His work supports other studies that have also reported on the fragmented and decontextualised way that knowledge is presented in schools and universities (e.g., Entwhistle, Entwhistle & Tait, 1993). As a result essential knowledge is often not retrieved when it is required in real-life classroom situations because there is minimal links made to the situation in which it applies (Bransford, Sherwood, Hasselbring, Kinzer and Williams,1990).

Teachers have been identified as being central to the quality of children's learning (Darling-Hammond, 2000). While this is important for all curriculum areas, the importance of this to literacy education is timely with the current concerns communicated by politicians and the wider community. Teacher education programs need to further consider how pre-service teachers can be further supported in both their understandings of how children best learn literacy practices and what the teaching of this may look like in actual classroom practice. The provision of a 'meaning-centred' curriculum working with the cultural resources children have in connection with a balance between explicit teaching and independent practice have all been identified as integral components of literacy practice (e.g. Dyson, 1993; Gregory and Williams, 2000; Kamler and Comber, 2003; McNaughton, 1995).

The way that language is taught in classrooms has changed considerably over past decades within an Australian context. Teachers are being called upon to provide explicit teaching, but also allow for opportunities for individual exploration of language processes. The terms modelled, guided and independent are used frequently in current thinking about literacy teaching in the classroom (e.g. Department of Education and Training, 2000; Crevola and Hill, 1998). These three strategies are acknowledged as being 'recursive' as "…teachers constantly return to them and apply them in new ways" (Department of Education and Training, 2000:28). Teacher educators are challenged as they consider how these theoretical understandings can be best communicated to pre-service teachers in a way that is meaningful and representative of classroom reality.

The notion of a 'literacy block' or 'language workshop' containing 'episodes' as a way to organise literacy time in the classroom has become increasingly common (Cambourne and Turbill, 1994; Crevola and Hill, 1998; Ivey, 2002). Crevola and Hill (1998:14) state that "effective teaching is structured, and focused on the learning needs of each student in the class…" and a literacy block provides for this regardless of a teacher's "…previous level of training and expertise…" . Classroom teachers are being called upon to provide a 'balanced' classroom literacy experience for all students. We believe that such 'balance' comes about through the incorporation of modelled, guided and independent episodes within the classroom language experience.

The time has come for teacher education programs to further consider how pre-service teachers can actively construct their knowledge about literacy teaching. Doecke and McKnight (2003:297) write:

> Student teachers are not passively inducted into the profession … They actively participate in their own making, consciously applying various frames of reference in order to make sense of their own experiences and arrive at judgements about professional practice.

We believe the development of a classroom-based simulation that allows pre-service teachers to assume the role of the teacher, where they are immersed in current theory of literacy education, is one way to support their entry into the profession as confident and informed literacy educators.

The Developed Simulation Prototype

Limited research has been conducted on simulations for teacher development. However, advances in educational software have demonstrated that it is feasible to create a motivational simulation that supports pre-service teachers with tools that allow them to view the effects of classroom management decisions from multiple perspectives; allowing them to get close to the teacher's and student's experience of a learning experience. Furthermore, the design of the simulation can incorporate feedback and advice, through devices such as an on-line mentor teacher, and the opportunity to pause or repeat an episode, explore alternative decisions and explore related literature. Usually this is not an option in a real classroom. Whilst we acknowledge that a simulation is only a representation of real-life, there are features that can enhance real-life experience. For example, a simulation can provide authentic and relevant

scenarios, make use of pressure situation that tap users' emotions and force them to act, they provide a sense of unrestricted options and they can be replayed (Aldrich, 2004).

The classroom simulation prototype has been designed for use in initial teacher education and as such it allows the user to take on the role of the teacher within a simulated Kindergarten classroom. The pedagogical focus of the simulation is on the teaching of literacy skills in lower primary schools. These skills are considered one of the keys to success in schooling (Cambourne, 2000; Comber et al, 2001) thus, an important focus area for pre-service teachers. Teachers of children in the early years of primary schooling need to provide appropriate sequences of learning experiences that develop reading and writing skills (Purcell-Gates, 1995). It is also important that beginning teachers understand the impact of classroom discourse on student learning (Gee, 2000). This can be a very challenging task for beginning teachers. The simulation makes use of research data on how exemplar teachers facilitate learning and behaviour management within primary classroom settings, in particular during the teaching of reading and writing (Freebody & Luke, 1990).

At the beginning of the simulation, the user is provided with a scenario. They are to engage the virtual Kindergarten students in literacy experiences focusing on the 'days of the week'. We believe this is a typical classroom focus in most Kindergarten classrooms. The virtual Kindergarten class consists of twenty-six students, three of whom are profiled in detail throughout the running time of the simulation. As the simulation runs, the user is required to make many decisions about organising the literacy experiences, classroom management, responses to individual students and random events that typically occur in a classroom demanding the attention of the teacher. These issues have been highlighted as areas that underlie the quality of teachers (Nelson, 2002:25-26). The user is able to monitor and track the progress of three targeted students throughout the course of the simulation. The management decisions are represented in table 1.

1. The organisation of the classroom
2. The start of the day
3. The late arrival of a student
4. Random decisions

Table 1: Management decisions

Consistently throughout the running time of the simulation the user is required to make decisions about the sequence of their literacy experiences within the structure of a 'literacy block'. That is, the specific 'episodes' they will include within their teaching time in the simulation. For example, when teaching the 'days of the week' do they begin a lesson with a reading episode, a writing episode or a language activity? A range of possible episodes have been devised for the user to select from, these are listed below. Each of these episodes has been constructed from our own experiences as teachers and from also drawing upon our own classroom-based research. The different options available to the user are represented in table 2. While these 'episodes' are primarily concerned with the organization of teaching and learning experiences, there are elements of classroom management contained within each, adding to the depth of the simulated classroom experience.

Reading	**Writing**	**Language Activities**
Retell of a familiar story	Constructing a text around that day's name and weather	Sequencing activity
Modelled reading using the names of the days of the week on individual cards	Innovation on a poem	Handwriting task
Modelled reading using a calendar	Recount of previous week	Poetry activity
Modelled reading using a poem	Creation of a daily schedule	Search for the days of the week in community texts

Table 2: Teaching and Learning Decisions

Three targeted students have been developed to alert the user to the different responses made by different students in a typical classroom to the one experience. These students have been developed in reference to our own classroom teaching experiences and also from the data we have collected from observing children. The user is able to access 'notes' about the students along with regular updates on the student throughout the selected learning experiences. Throughout the simulation the user can focus in one of the targeted students to examine their learning outcomes. Work samples are also available to the user to further support their understanding of how that child is coping with the learning experience at that particular time. Each decision made by the user has the potential to impact on the behaviour and learning outcomes of three targeted students. Visual representations of individual students have been designed to provide the user with instant feedback about how that child is responding to the learning experience at that particular time.

An embedded tool, referred to as the 'thinking space', is used at decisive points for the user to plan and justify new decisions, and to reflect upon the observed consequences of previous decisions. Figure 1 presents the design of the thinking space. It presents three key questions developed to promote thoughtful decision making. These key questions are supported by the help screen shown on the right hand side that offers prompts and additional things for the user to consider. The user types their reflections and thoughts into the blank space and is able to save their notes. The user is able to retrieve and review their previous decisions and thoughts throughout the running time of the simulation.

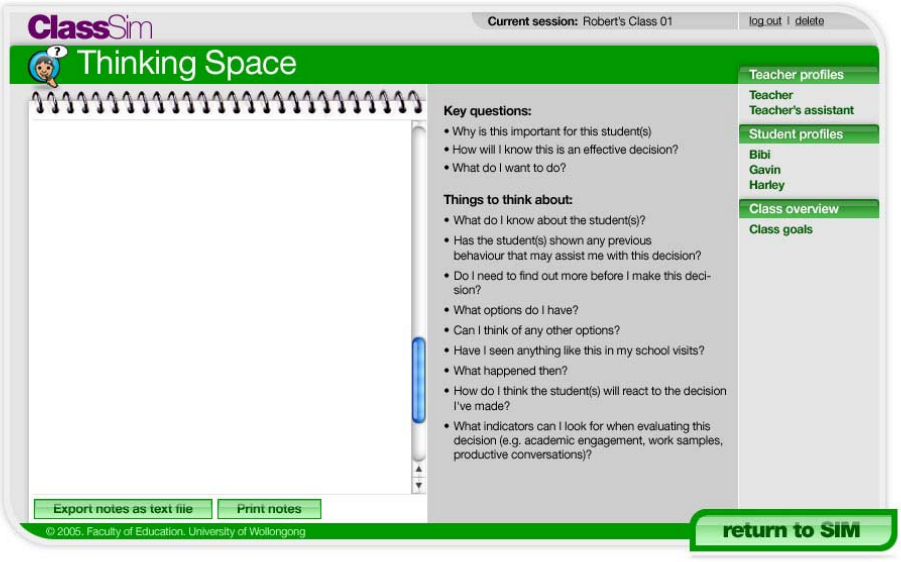

Figure 1: The Thinking Space

Support material has also been developed providing additional literature focusing on specific issues that arise in the simulation. As this software has been developed for pre-service teachers at the University of Wollongong in New South Wales, this material is made up of links to core subject textbooks, NSW Department of Education web sites, policy documents and syllabuses.

The trial of this simulation prototype with pre-service teachers

The initial trial of this software was conducted with a group of 24 pre-service teachers enrolled in the first year of a primary teacher education course at the University of Wollongong. The participant ages ranged from 18 to 43 years and 19 were females. 19 were under the age of 25.

During the introductory session the group was broken in to two sub-groups of twelve and each sub-group spend 90 minutes familiarising themselves with the simulation. In these sessions three researchers took field notes. The users were videotaped and audio recorders were placed randomly on computer work-stations to capture dialogue between the users. Each member of this cohort were provided access to the simulation via a CD copy after this introductory session. Another 90 minute session was held with these participants the following week where they once again engaged with the simulation with the researchers present. Twenty-one of the users gave the researchers permission to download and analyse their personal thinking space entries. These data were analysed and a purposive sample of four users were then interviewed. The interviews were audio-recorded, transcribed and analysed.

A Case Study of one pre-service teacher's interaction with the simulation

Rachel, a 22 year old female pre-service teacher, had completed a period of work experience with a Year Six class prior to commencing her university studies. As part of her studies, she had been allocated another Kindergarten classroom to visit for classroom-based experience. She had visited this class a number of times prior to her interaction with the simulation software. Rachel indicated to the researchers that she was 'very competent' in relation to computer technology skills and was keen to use the simulation.

When asked to reflect on her actual classroom-based experience Rachel identified that she had not had opportunity to be responsible for any decision making while in the classroom. Rachel said that during classroom-based experiences as a pre-service teacher "you're not the one making the decisions, the teacher is. So you're just watching". Rachel appeared to be frustrated with her classroom-based experiences stating: "you sort of sometimes think, oh that's not what I would have done". However she also acknowledged that as a pre-service teacher you often do not have the opportunity to make or reflect on decisions. As Rachel

interacted with the simulated environment, it seemed to empower her, as the user, to make decisions and justify and evaluate her choices.

Rachel was able to associate events in the virtual classroom to her own experiences in schools. Rachel said "I can see [links] between this and what I'm seeing in the classroom". Her classroom-based experiences in a kindergarten classroom were similar to those incorporated within the simulation. Rachel stated, "I can see similarities".

The simulation required Rachel to be aware of and make decisions about three targeted students in the virtual Kindergarten class. While focusing on Bibi, a female targeted child in the simulation, Rachel linked her simulated and classroom-based experiences; "there's an English as a Second Language kid…So that's like Bibi is". Rachel was then able to make comparisons between the two children, as she reflected on the behaviour of a student she has encountered during classroom-based experiences; "he's not much of a distraction and, it's just you can see him sitting there and he doesn't understand things". The simulation appeared to support Rachel in considering the students from her school-based experiences more deeply through drawing comparisons.

The teaching strategies employed by the simulation teacher were primarily seen by Rachel as effective and well-suited to the class needs. Rachel's thinking space journal revealed that she believed that the whole class focus was an effective strategy to employ. Later in her journal Rachel cited possible advantages regarding this teaching strategy; "The whole class participation may help them to concentrate and feel involved".

Observations of Rachel while using the simulation indicated to the researchers that she was able to make decisions about the organization of literacy based classroom experiences quickly and confidently. For example, when first faced with the teaching strategy decision in the simulation Rachel chose a 'Modelled Reading' option. Stating that this strategy would be beneficial to the target children Harley and Gavin, Rachel also reflected on her apprehension regarding this option. Using the thinking space to work through her concerns, Rachel wrote, "the teacher must make sure that both children are constantly engaged and interested in the lesson. Both are disrupted easily and may cause problems if not kept engaged". So while

Rachel identified the children who will benefit from this strategy, she also recognised the limitations of this choice.

Using the thinking space journal as a tool for critiquing the simulation teacher's strategies and skills, Rachel identified several positive teaching strategies used by the simulated teacher. In relation to the teacher's greeting style, Rachel wrote that she "like[s] the truthfulness of the teacher". The fact that she did not "speak down to the children" was identified as a positive strategy, however Rachel did not agree with the use of the word "awful" and claimed that she would not use this language in her own classroom. While seemingly not projecting herself into the role of the teacher when immersed in the simulated environment, Rachel did show signs of engaging with the teaching role. When critiquing the teacher, Rachel identified aspects of the simulation which she would not replicate in her classroom, thus the simulation seems to have helped her begin to define her teaching beliefs and philosophy.

The inclusion of support material was a key feature of the simulated environment that appeared to support Rachel. Rachel said that the references to textbooks were a "big help". This was the first comment she made in relation to how the simulation assisted her as a pre-service teacher to the researchers, suggesting that the support materials were a strength of the simulation environment for Rachel.

While immersed in the virtual environment of the simulation Rachel appeared able to draw comparisons between the students encountered during her classroom-based experiences and those in the simulation. Seemingly disillusioned with a lack of opportunities to make decisions in her classroom-based setting, Rachel enjoyed becoming an active participant in the decision making process in the simulation. It would be fair to conclude that Rachel gained a greater awareness of the challenges that teachers face through her use of the simulation, and her competency in computers may have contributed to her relatively positive experience with this learning tool.

Initial discussions with Rachel revealed not only her concerns regarding the level of involvement she has had during her classroom-based experiences, but also how the simulation compares to reality. It can be considered that when the context in which the pre-service teacher is working requires them to constantly make decisions and justify their choices, the

skills of problem-solving and decision making are being exercised and developed, and Rachel identifies this as a strength of the simulation. She stated in the interview that the simulation requires the user to "think more" about the decisions they make and the actions they carry out compared to her classroom-based experiences.

Implications for use of simulations in pre-service teacher education

While the literature advocates that pre-service teachers need increased classroom based experiences (eg Ramsey, 2000), the case presented by Rachel suggests that this is not always the answer. Rachel has clearly identified that a simulated classroom environment provided her with more opportunity to make decisions, trial different approaches and closely monitor the impact of these upon students than she would have been afforded in a regular classroom practicum experience. This example suggests that interaction with a classroom-based simulation is a feasible way to support and extend upon existing classroom-based experience. Analysis of Rachel's interaction with the simulation demonstrated three key implications for the use of simulation in pre-service teacher education.

1. Identifying Potential Classroom Problems

Using the simulation assisted Rachel in developing an awareness of the challenges she will face as a beginning classroom teacher; "you get into school the first time, you have no idea about kids with problems, because when you were in kindergarten there were those kids but you didn't pay attention to them…so you have no idea of what problems you're going to encounter". Rachel appeared to use the simulation to gain insight into some of the problems and challenges which face classroom teachers. Rachel referred to the ability to become immersed in the life of a classroom, in the "everyday decisions you have to make and interruptions…and losing your train of thought", as a strength of working within the simulated environment.

2. New Perspectives and Reflecting on Preconceived Ideas

Rachel claimed that using the simulation assisted her to "put things into perspective". She also made reference to its ability to encourage her to think more deeply about the decisions that are made on a daily basis as a teacher. Rachel's preconceived ideas about teaching were challenged while using the simulation. She said, "this [the simulation] does make you think about the ideas that you did form earlier".

3. Development of Opinions and New Ways of Thinking

According to Rachel, the simulation encourages the user to form opinions related to different facets of teaching, and to reflect on those beliefs. Rachel said that in real life situations she can dismiss the decision making process and does not "even bother thinking about it", however, the simulation is continually asking "What do I [the user] think?" The thinking spaces are designed to encourage the user to justify, reflect on and evaluate their decisions, and Rachel seems to believe that they achieve this aim in her case. She said that "seeing the thinking space there and thinking, ok I have to have an opinion on this" encouraged her to form and justify her beliefs.

Concluding Comments

Our first experience with the initial cohort showed that the simulation design has the potential to engage pre-service teachers in deep thinking about the virtual classroom environment. The case Rachel presents shows how the simulation has linked with her real classroom experience as she makes links and connections among the different situations and students within. Rachel has been able to link her school-based experiences to those presented within the simulation.

References

Aldrich, C. (2004). *Simulations and the future of learning*. San Francisco, Pfeiffer.

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* (p. 115-141). Hillsdale: Lawrence Erlbaum.

Cambourne, B. L. (2000) Conditions for literacy learning: Observing literacy learning in elementary classrooms: Nine years of classroom anthropology, *The Reading Teacher*, *53*(6), 512-517.

Cambourne, B. and Turbill, J. (1994). *Responsive evaluation: Making judgements about student literacy*. Melbourne: Eleanor Curtain Publishing.

Comber, B., Badger, L., Barnett, J., Nixon, H., Prince, S., & Pitt, J. (2001). *Socio-economically disadvantaged students and the development of literacies in school: A longitudinal study.* South Australia: Department of Education, Training and Employment and University of Adelaide.

Crevola, C. and Hill, P. (1998). *ClaSS: Children's literacy success strategy: An overview*. Melbourne, Australia: Catholic Education Office.

Darling-Hammond, L. (2000). *Teacher quality and student achievement: A review of state policy evidence*. Education Policy Archives 8.1 [Available URL: http://epaa.asu.edu/epaa/v8ni, accessed 13 March 2003]

Department of Education, Science and Training. (2002). *An ethics of care: Effective programmes for beginning teachers*. Sydney: Commonwealth of Australia.

Department of Education and Training (2000). *Focus on literacy: Writing*. Sydney, Australia: Curriculum Support Directorate

Doecke, B. and McKnight, L. (2003) Handling irony: Forming a professional identity as an English teacher. In B. Doecke., D. Homer., & H. Nixon (Eds.), *English teachers at work: Narratives, counter narratives and arguments* (p. 291-311). Kent Town, South Australia: Wakefield Press.

Dyson, A. H. (1993). *Social world of children learning to write in an urban primary school*. New York: Teachers College Press.

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, J. Lowyck & D.H. Jonassen (Eds*.) Design environments for constructive learning* (p. 331-357) Heidelberg: Springer-Verlag.

Freebody, P. & Luke, A. 1990, Literacies programs: Debates and demands in cultural context. *Prospect:A Journal of TESOL*, 5(3), 7-16.

Gee, J. P. 2000, 'New people in new worlds: networks, the new capitalism and schools'. In B. Cope and M. Kalantzis (Eds.), *Multiliteracies: Literacy learning and the design of social futures*. Melbourne, VIC: Macmillan

Gregory, E. and Williams, A. (2000). *City literacies: Learning to read across generations and cultures*. London: Routledge.

Hoban, G. F., (2002). *Teacher learning for educationalcChange*. Philadelphia: Open University Press.

Ivey, G. (2002). Getting started: Manageable literacy practices. *Educational Leadership*, *60*(3), 20-23.

Kamler, B. and Comber, B. (2003). Learning the secrets of teaching. In B. Doecke, D. Homer and H. Nixon (Eds.). *English teachers at work: Narratives, counter narratives and arguments* (p. 326-341). Kent Town, SA: Wakefield Press.

McNaughton, S. (1995). *Patterns of emergent literacy*. Oxford: Oxford University Press.

Ministerial Advisory Council on the Quality of Teaching. (1998). Teacher preparation for student management: Responses and directions. *Report by Ministerial Advisory Council on the Quality of Teaching, October, 1998*. Sydney, NSW: Department of Education and Training.

Purcell-Gates, V. (1995). *Other people's words: The cycle of low literacy*. Cambridge, MA: Harvard University Press.

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.

Vinson, T. (2001). *Inquiry into the provision of public education in NSW*. Annandale: Pluto Press Australia.