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Cognitive tools of ClassSim: Building connections between theory and practice

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Abstract

This paper reports on the incorporation of an embedded tool within a virtual classroom environment (ClassSim) and the use of this by pre-service teachers as they engage with the software. The classroom simulation reported on in this research was developed to provide pre-service teachers with a safe virtual environment in which they are able to explore 'authentic' and practical classroom scenarios. The embedded tool, referred to as the 'Thinking Space', was developed to support pre-service teachers in capturing their reflections about the complex role of a teacher as they move through the experience. Encouraging reflection has long been acknowledged as an important strategy in the development of new understandings. Our trials of the software have shown that pre-service teachers have used the tool to reflect upon issues within the classroom, articulating their rationale at decision points and to identify underlying influences that affect their use of the classroom simulation (ClassSim) and their understandings of the role of a teacher. Our findings also reveal that the 'Thinking Space' provides a framework in which pre-service teachers are able to build connections between the theory of their pre-service training and practical experiences.

Keywords

classsim, building, connections, between, theory, practice, tools, cognitive

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Cognitive tools of ClassSim: Building Connections between Theory and Practice

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This paper reports on the incorporation of an embedded tool within a virtual classroom environment (ClassSim) and the use of this by pre-service teachers as they engage with the software. The classroom simulation reported on in this research was developed to provide pre-service teachers with a safe virtual environment in which they are able to explore 'authentic' and practical classroom scenarios. The embedded tool, referred to as the 'Thinking Space', was developed to support pre-service teachers in capturing their reflections about the complex role of a teacher as they move through the experience. Encouraging reflection has long been acknowledged as an important strategy in the development of new understandings. Our trials of the software have shown that pre-service teachers have used the tool to reflect upon issues within the classroom, articulating their rationale at decision points and to identify underlying influences that affect their use of the classroom simulation (ClassSim) and their understandings of the role of a teacher. Our findings also reveal that the 'Thinking Space' provides a framework in which pre-service teachers are able to build connections between the theory of their pre-service training and practical experiences.

Background to the Research

There have been a number of reviews in Australia over the last decade that focus on pre-service teacher education (for example CDEST, 2002; Education & Training Committee, 2005; MACQT, 1998; NSW/ACTIEU, 2000 & Ramsey, 2000). Prompting these reviews were concerns about declining teaching standards and the apparent lack of connection between the theory of pre-service teacher education and practical experience. These concerns were brought to light by a number of educational researchers including Cole and Knowles (2000) who claimed that there is an unmistakable gap between what teachers are taught during their pre-service teacher education and what they are expected to do at the 'chalk-face' in their professional career (p.9). Likewise, the Ramsey (2000) review of teacher education in New South Wales asserts that pre-service teachers often do not understand how classroom practice produces effective student learning. The most recent review conducted by the Education and Training Committee (Victoria) in 2005 presented findings indicating that many new graduates often lack practical teaching skills,

in addition to the theoretical foundations they require to be an effective teacher. This review suggests that achieving the right balance between the theoretical and practical components of teacher education is one of the most important challenges currently facing those involved in the design, delivery and accreditation of teacher education.

Traditionally theory and practice were regarded as separate entities of teacher education. It was the responsibility of the supervising teacher to model, explain and supervise classroom 'practice', whereas the teaching of 'theory' was the role of the university. This separation of theory and practice often resulted in pre-service teachers attaching a higher value to their practicum experiences than their university studies as it was the practice component seen to be crucial to their survival upon entry into the profession (Lanier & Little, 1986). Sorin (2004) suggests that "student teachers often report a lack of connection between what is learned in university studies and in the classroom, and often report feeling unprepared for the 'real life' situations that face them in their first days of classroom teaching" (p.102). There is now a considerable body of literature supporting the claim that there is a need to integrate these aspects of pre-service teacher education and address the perceived irrelevance of theory to students (for example Brady, Seagal, Bamford, & Deer, 1998; Lanier & Little, 1986), thus enabling pre-service teachers to gain a better understanding of the nexus between theory and practice (MACQT, 1998).

It has been suggested that a philosophy of reflective practice will help pre-service teachers articulate the theory to practice relationship and thus build stronger connections between the theory of their pre-service teacher education and the practicalities of a classroom (Brady, Seagal, Bamford, & Deer, 1998; Grimmitt, MacKinnon, Erickson, & Rieken, 1990). Reflection and reflective practice is a means to learn from experience by integrating new knowledge and constructing a new understanding of knowledge. The concept of reflective practice has been attributed to Dewey who in 1933 stated that, "reflective thinking is closely related to critical thinking; it is the turning over of a subject in the mind and giving it serious and consecutive consideration" (Dewey, 1933, p.3). Schön (1987) further developed this notion stating that professional knowledge can only be developed through practice within an appropriate context. Schön (1987) describes that there are three different types of reflection including:

1. *Reflection-in-action*, where one reflects on an activity as the activity unfolds, thereby guiding the future direction of the activity. This is also referred to as, "thinking on your feet" (p.26).
2. *Reflection-on-action*, where one reflects on the actions that have been taken, perhaps suggesting a more appropriate action to be taken next time a similar circumstance arises.
3. *Reflection on the reflection-in-action*, where one reflects on what they were thinking at the time the activity was carried out. Schön believes that this type of reflection leads to the best learning.

Overall, reflective practice provides an avenue for learners to assess outcomes after the event, "often when activities have failed to lead to the desired outcome" (Dobson, Pengelly, Onynio, & Sime, 2001, p.443). However, many teacher educators acknowledge that reflection is often not a natural process for pre-service teachers, therefore

exemplifying the need for this to be taught and integrated into meaningful learning experiences.

It is suggested that a virtual learning environment equipped with cognitive tools, can assist when building an individual's meta-cognitive strategies; that is strategies employed by the learner to improve their comprehension, retention and individual construction of knowledge. Such tools "amplify thinking and facilitate knowledge construction" (Jonassen, 1992a, p.4). Kozma (1987) explains that cognitive tools are "devices that allow and encourage learners to manipulate their thinking and ideas" (p.21). Further, Kelly (2002) suggests that cognitive tools within a simulation "will invite students to think about the wider implications of their choices" (p.3). Researchers such as Reigeluth and Schwartz (1989) and Breuer and Kummer (1990) identify that the virtual environment of a simulation enables learners to master cognitive processing skills by allowing them to apply the theory of their training within a realistic environment, thus facilitating the transference of skills from the simulation to real life situations. It can therefore be assumed that a virtual learning environment such as a simulation, with embedded cognitive tools, has the potential to offer pre-service teachers with a safe virtual environment in which he/she can experiment with a range of classroom-based scenarios, reflect upon the decisions made and theoretical grounding of such decisions, and thus build connections between the theory of their training and the practicalities of a classroom.

Design of the classroom simulation (ClassSim)

The classroom simulation (ClassSim) was developed with the support of a large ARC grant to support the existing teacher education programs by providing the pre-service teachers with access to additional classroom experience within a virtual environment (Ferry, Kervin, Cambourne, Turbill, Hedberg & Jonassen, 2005). The ClassSim allows the user to take on the role of a kindergarten teacher in a virtual classroom during a literacy learning session; referred to in the simulation as a 'literacy block'. The 'literacy block' incorporates the framework for literacy teaching where a block of time is comprised of a number of short lessons known as 'episodes' (Crevola & Hill, 1998). The simulation incorporates a number of different episodes for the user to explore with each episode designed to provide experiences for pre-service teachers to "read and respond to written text, use language to communicate in writing, and develop understandings of how language is used in our culture" (Ferry, Kervin, Turbill, Cambourne, Hedberg, Jonassen & Puglisi, 2004, p.437).

During the running time of ClassSim, the user is required to make a number of decisions regarding the management of the classroom and the organisation of the virtual 'literacy block' (teaching and learning strategies, behaviour management techniques and classroom organisation). 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 cognitive tool called the 'Thinking Space', support materials and decision-making opportunities.

Five targeted students were presented in the version of the ClassSim reported on in this research. These students were developed to represent the more challenging students teachers are often faced with in the classroom, while also being representative of the range of needs and abilities of students within a typical classroom. Each decision made throughout the use of the simulation has the potential to affect these students as they work within the virtual classroom.

In the development of ClassSim the notion that reflection was not a natural process for our pre-service teachers was explored. In response to this, the team decided it was necessary to create opportunities for the users to pause their use of the ClassSim and allow them the opportunity to think about what they were doing at that point in time, hence the creation of the ‘Thinking Space’. The ‘Thinking Space’ is consistently available to the user throughout the running time of the simulation and provides a framework in which the user can reflect upon issues within the virtual classroom, articulate their rationale at decision points and identify underlying influences that affect their use of the virtual learning environment and record their professional learning as they engage with the support material, thus engaging in higher-order thinking. As such the tool enables the user to *reflect-in-action*, *reflect-on-action* and *reflect on the reflection-in-action*, important features identified by Schön (1987). Figure 1 shows a screen capture of the ‘Thinking Space’ cognitive tool. Key questions and prompts are provided to help users to articulate, justify and reflect upon the decisions they make.

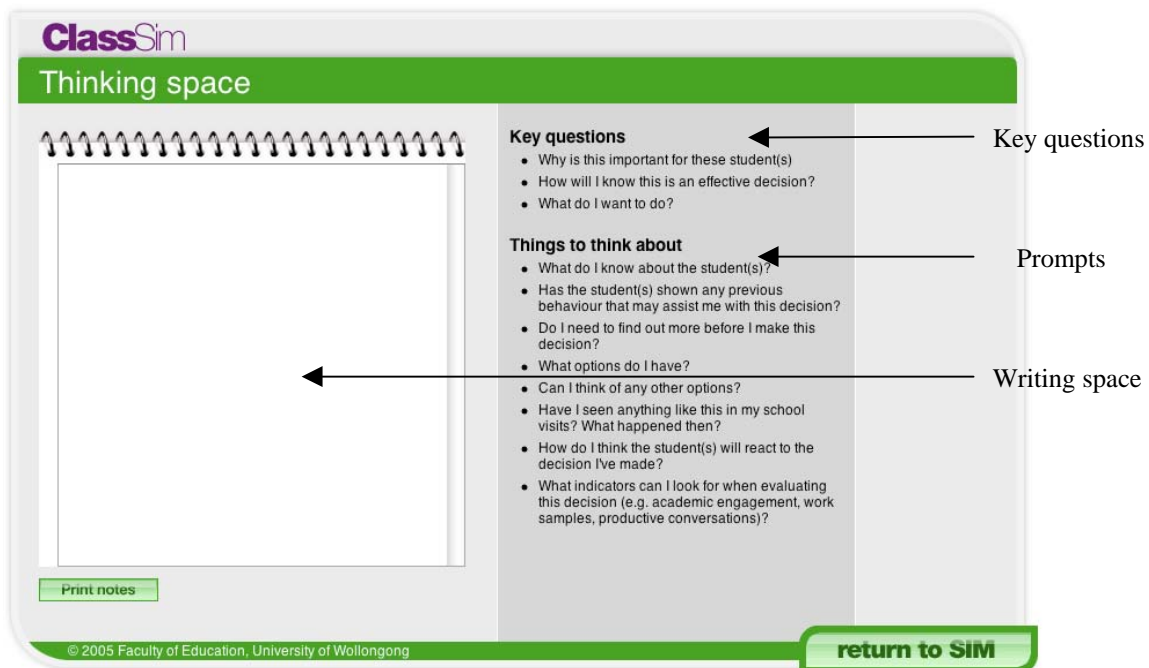


Figure 1: The embedded cognitive tool referred to as the ‘Thinking Space’

Throughout the running time of the simulation there are a range of support materials available for the user to access. This material was developed by the research team to inform and support the pre-service teachers in making connections between the theory

and the practice of teaching as they make decisions within the simulation. The summaries are available at differing times, dealing with a wide range of issues that confront the user throughout the simulation running time. Summaries include links to websites, textbook references and other literature. The student updates are available during each of the episodes at varying times, usually during and after a behaviour management incident or a significant teaching moment. These updates were developed to give the user an indication of the response of the targeted students in relation to the experiences within that episode. Information about the student is displayed in three different dimensions; on a scale organised according to the NSW Model of Pedagogy (DET, 2003a); a visual representation of the student, and through written 'expert' commentary of the student's response at that time within the virtual classroom (Figure 2 shows an example of a student update). Other types of support material available are student profiles and work samples.

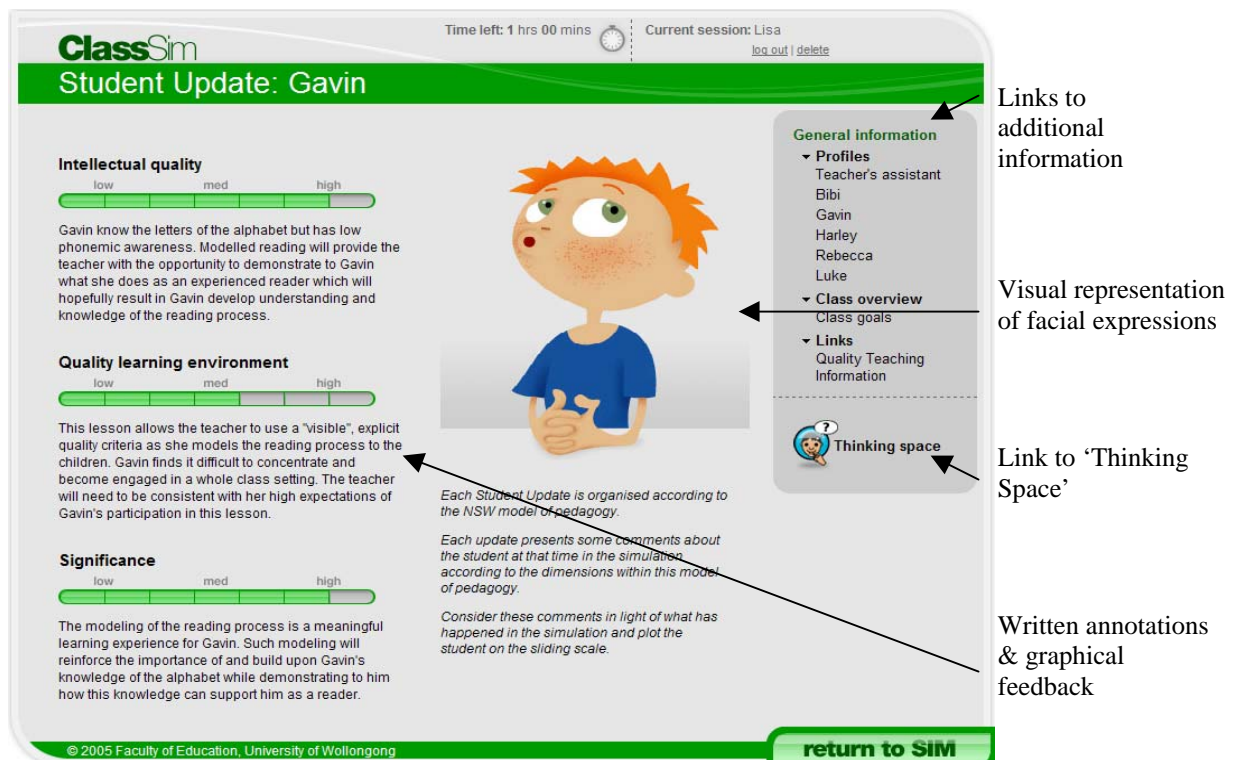


Figure 2: Student Update (Gavin)

The Study

The purpose of the study was to explore how first year pre-service teachers interacted with the ClassSim software; in particular how they used the embedded cognitive tool of the 'Thinking Space' to reflect upon issues within the classroom, rationalise the decisions they made and identify underlying influences that affect their use of the classroom simulation and how this contributed to their developing understandings of the role of a teacher. A case study design was utilised, with the purpose of obtaining 'thick description' (Guba & Lincoln, 1989) as the pre-service teachers' engaged with the

classroom simulation, within the broader setting of the interpretive research paradigm (Mertens, 1998). The case study method also enabled the researchers to investigate not only how the pre-service teachers interacted with the software (ClassSim) and made use of the cognitive tool of the 'Thinking Space', but also how the use of the cognitive tool, supported pre-service teachers in building connections between the theory of the training and its practical application.

The participants of this study were first year students enrolled in a Bachelor of Teaching at the University of Wollongong. As part of their course requirements the pre-service teachers interacted with the ClassSim for two one-hour sessions concurrently with weekly visits to a local school for one-hour periods of observation and microteaching experiences. A questionnaire was used to gain general demographical information about the first year students enrolled in this degree. This survey asked the potential participants about their age, gender, computer competency and previous experience working with children. The final section of the questionnaire called for volunteers to participate in the study. Purposive sampling was used with specific predefined characteristics to ensure the collection of data from the widest range of personal experiences and backgrounds. Twenty participants were selected and five (two male and three female) were identified by the researchers as appropriate participants to be studied in-depth using case study methodology. Data collection methods used during this study included semi-structured interviews, artefacts collection, and participant observation.

During their use of the ClassSim the pre-service teachers were encouraged to utilise the embedded cognitive tools of the simulation to articulate their problem solving strategies and discuss the rationale behind the decisions they make whilst engaged with the simulation. The participants' 'Thinking Space' entries were downloaded and analysed. Other data collection procedures used included observations of participants interacting with the ClassSim and their peers, which were supported with both video footage and audio-taped peer discussions. At the end of the final session the researcher employed stimulated recall and semi-structured interview techniques in order 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 & Lincoln, 2000).

Findings

Our trial of the software with this cohort have indicated that pre-service teachers used the 'Thinking Space' to reflect upon issues within the classroom, articulate their rationale at decision points and to identify underlying influences that affect their use of the classroom simulation and their understandings of the role of a teacher. Our findings also reveal that the 'Thinking Space' provides a framework in which pre-service teachers are able to build connections between the theory of their pre-service training and practical experiences.

The findings suggest that the pre-service teachers used their 'Thinking Space' to reflect upon issues within the virtual classroom. For example, a participant reflected upon her belief that in order to promote a quieter classroom and to reduce the amount of distractions in the learning environment she should arrange the tables into a grouped set-up. She wrote that a "horseshoe could be a distraction to some students as it is visible to see what everyone in the classroom is doing whereas in grouped tables the focus is more on the people in the group". Another participant used her 'Thinking Space' to reflect upon the disruptive way in which the children of the virtual classroom entered the room. She stated that she would only allow one line to enter at a time to avoid this from happening and would ensure that Harley and Gavin (targeted students) were also separated during this time.

Instructing the whole class to go in at the same time was not a good move. Having Harley at the front of the line and allowing one line to go in at time would prevent behaviour management problems that Harley did display. This would also involve keeping both Gavin and Harley separated.

The findings of the study also indicate that the participants used their 'Thinking Space' to articulate their rationale at decision points throughout the running time of the simulation. Bree reflected upon her decisions in her 'Thinking Space' using the frame 'things to consider' to organise her decision making processes. Below is an extract from a participant's 'Thinking Space' regarding her decision to allow a child (Gavin) to go to the bathroom during class.

Things to consider:

- Does Gavin ask everyday to go to the toilet during class?
- Has Gavin already gone to the toilet today during a lesson?
- Has recess/lunch just finished?
- How long is it until recess/lunch?
- What will be the consequences if I don't let Gavin go? Will he wet his pants?

After much thought and deliberation this participant decided not to allow Gavin to go to the toilet. This decision resulted in Gavin asking a second time. When confronted with the decision again the participant decided to allow Gavin to go with a time limit. She detailed her response in her 'Thinking Space'. "I would reinforce the fact that he needs to go to the toilet during recess/lunch and I would give him a time limit to be back to class. 'Ok Gavin, go to the toilet but you must be back within 5 minutes'". The next decision the participant had to make was whether or not she would send him alone or with a friend. Again she considered a range of issues in her 'Thinking Space' before making up her mind to send him on his own.

Things to consider:

- Am I putting Gavin's safety at risk if I send him alone?
- How far away are the toilets from the classroom?
- Will Gavin waste time if I send him with someone else?
- Will the child I send with Gavin miss out on something interesting?

This example provides evidence that this participant used the ClassSim to better understand that every decision made in a classroom has numerous consequences which must be taken into account before decisions are ultimately made.

A number of the participants were able to identify the underlying influences which affected their use of the ClassSim. These influences were usually concerned with their previous classroom-based practical experiences and their current pre-service teacher university coursework. Gabrielle explained that all her decisions she made whilst interacting with the classroom simulation had been based upon her classroom-based experience as a parent helper in her child's class. "All the selections I have made have been based on scenarios I have observed being a parent helper in my daughters class". Another participant reflected on his understanding of modelled reading from his university studies when he had to decide upon the sequence of episodes in his 'literacy block' as he stated, "I would pick a modelled reading one as I feel that is the best way to start the day I'm leaning towards the one that incorporates the days of the week so that the students get an understanding of the names of the days of the week and know their order". When asked in an interview about his 'Thinking Space' entry regarding his selection of modelled reading, he further identified that he "heard about it in a lecture". This suggests that the participant was influenced by his university coursework when engaging with the ClassSim.

A number of participants used the ClassSim to gain a better understanding of the role of a teacher. After viewing a student update a participant wrote in his 'Thinking Space' that a "teacher has to be mindful of gauging where they're [the students] at to stimulate them and make them want to learn and so they don't disrupt the rest of the class". This comment suggests that his use of ClassSim enabled him to better understand the role of an effective teacher, in motivating individual students to want to learn.

A number of participants reported that the 'Thinking Space' was one of the most useful features of the simulation as it supported their learning. In an interview a participant stated that, "It [the 'Thinking Space'] helped me to organise my thoughts". Another participant, Susan also found the 'Thinking Space' tool to be helpful in her use of the simulation as she was able to reflect upon her reflections. "I liked the 'Thinking Space'. I liked how I could go back and see what I thought while making a decision". Such examples illustrate the varying uses of the 'Thinking Space' as a learning tool for pre-service teacher education.

Concluding Comments

The purpose of this study was to investigate the use of the embedded cognitive tools within ClassSim; a virtual classroom environment developed for pre-service teachers. The findings of this study suggest that the pre-service teachers used the embedded cognitive tools to reflect upon issues within the classroom, articulate their rationale at decision points and to identify underlying influences that impacted upon their use of the software and contributed to their understandings of the role of a teacher. Our findings

suggest that the 'Thinking Space' provided a convenient means and a meaningful way for pre-service teachers to build connections between the theory of their pre-service training and practical experiences. The study's findings indicate that the participants were able to make connections among their university studies, classroom experiences and the simulation software. It can be suggested that the virtual environment of the simulation appeared to help them to 'bridge the gap' between the theory of pre-service teacher education and what this might look like in practice.

At this stage of our research we are confident that our prototype software (ClassSim) has contributed to the development of pre-service teacher understanding of the complex work of teachers. The virtual learning environment has provided scope and opportunity for users to explore the intricacies of classrooms which has worked to support them for their own professional entry into the classroom. Furthermore the ClassSim environment has demonstrated potential to provide a supportive context within which a pre-service teacher can explore possible scenarios using the theory of their university experience in connection with practical situations to construct their own understanding of their virtual teaching practice.

References

- Brady, L., Segal, G., Bamford, A., & Deer, C. (1998). *Student perceptions of the theory/practice nexus in teacher education: a longitudinal study*. A paper presented at the Australian Association for Research in Education (AARE), Adelaide, Australia.
- Breuer, K., & Kummer, R. (1990). Cognitive effects from process learning with computer-based simulations. *Computers in Human Behaviour*, 6, 69-81.
- Cole, A.L. & Knowles J.G. (2000). *Researching Teaching: Exploring Teacher Development Through Reflective Inquiry*. Boston: Allyn and Bacon.
- Commonwealth Department of Education, Science and Training, (2002, October). *An ethics of care: Effective programmes for beginning teachers*. Sydney: Commonwealth of Australia.
- Crevola, C., & Hill, P. (1998). *CLaSS: Children's literacy success strategy: An overview*. Melbourne: Catholic Education Office.
- Denzin, N.K. & Lincoln, Y.S. (2000). *Handbook of qualitative research*. 2nd edition. Thousand Oaks, CA: Sage.
- Department of Education & Training (NSW). (2003a). *Quality teaching in NSW public schools: A classroom practice guide*. Sydney: Professional Support and Curriculum Directorate.
- Dewey, J. (1933). *How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*. Boston: D.C. Heath.
- Dobson, M., Pengelly, M., Onynio, W., & Sime, J. (2001). Reflective Learning with Agent Simulations in Emergency Team Training. *World Conference on Educational Multimedia, Hypermedia and Telecommunications 2001*(1), 443-448.
<http://dl.aace.org/8492>

- Education & Training Committee, (2005, February). *Report on the Inquiry into the Suitability of Pre-service Teacher Training in Victoria*. Report by the Education and Training Committee. Melbourne: Parliament of Victoria.
- Ferry, B., Kervin, L., Cambourne, B., Turbill, J., Hedberg, J., Jonassen, D., (2005). Incorporating real experience into the development of a classroom-based simulation. *Journal of Learning Design*, 1 (1), 22-32. www.jld.qut.edu.au/Vol_1_No_1
- Ferry, B., Kervin, L., Turbill, J., Cambourne, B., Hedberg, J., Jonassen, D. & Puglisi, S., (2004). The design of an on-line classroom simulation to enhance the decision making skills of beginning teacher. *Proceedings of the AARE International Conference*. Melbourne, Victoria. <http://www.aare.edu.au/04pap/fer04656.pdf>
- Grimmett, P.P., MacKinnon, A.M., Erickson, G.L., & Rieken, T.J. (1990). Reflective practice in teacher education. In R. T. Cliff, W. R. Houston & M. Pugach (Eds.). *Encouraging reflective practice in education: An analysis of issues and programs* (pp. 20-38). New York: Teachers College Press.
- Guba, E.G., & Lincoln, Y.S. (1989). *Fourth generation evaluation*. Newbury Park, California: Sage.
- Kelly, G.C. (2002). A powerful virtual learning environment. Paper presented at the *ASCILITE* Conference, Auckland, New Zealand. <http://www.ascilite.org.au/conferences/auckland02/proceedings/papers/176.pdf>
- Lanier, J. E. and Little, J. W. (1986) 'Research on teacher education' in M.C. Wittrock (ed.) *Handbook of Research on Teaching*, New York, Macmillan, 527 - 69.
- Mertens, D.M. (1998). *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches*. California: Sage Publications.
- Ministerial Advisory Council on the Quality of Teaching, (1998, October). *Teacher preparation for student management: Responses and directions*. Report by Ministerial Advisory Council on the Quality of Teaching. Sydney: NSW Department of Education and Training.
- NSW/ACT Independent Education Union, (2000, March). *Review of teacher education in NSW*. Sydney: NSW/ACT Independent Education Union. <http://www.ieu.asn.au/about/teachereducationsub.html>
- Jonassen, D.H. (1992a). What are cognitive tools?. In P.A.M. Kommers, D.H. Jonassen, & J.T. Mayes (Eds.), *Cognitive tools for learning*. Berlin: Springer-Verlag.
- 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 and Training.
- Reigeluth, C. M., & Schwartz, E. (1989). An instructional theory in the design of computer-based simulations. *Journal of Computer-Based Instruction*, 16(1), 1-10.
- Schön, D.A. (1987). *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions*. San Francisco: Jossey-Bass.
- Sorin, R. (2004). Webfolio: An online learning community to help link university studies and classroom practice in preservice teacher education. *Australasian Journal of Educational Technology*, 20(1), 101-113. <http://www.ascilite.org.au/ajet/ajet20/sorin.html>

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