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From Classroom Reality to Virtual Classroom: The Role of Teacher-Created Scripts in the Development of Classroom Simulation Technology

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Abstract

This paper describes a specific kind of teacher narrative (the teacher created script) to support the design of a classroom simulation to be used in pre-service teacher education. We intend to share our experiences in exploring and developing the kind of narrative text which can be developed from a large reservoir of ethnographically generated data collected from the teachers and classrooms we have closely observed and documented over the last two decades. In particular, we explore the role which these narratives play within the development of the kind of classroom simulation we have produced.

Reflection has long been acknowledged as a useful process for teachers to engage with. Also, the notion of formalising such reflections through writing has been acknowledged as a way to share, refine and articulate teaching practice. As stated by Barth (2001:66) "...with written words come the innermost secrets of schools".

This prototype simulation allows the user to adopt the role of a Kindergarten teacher using a daily literacy teaching episode we refer to as "days of the week" and encourages the user to reflect upon the decisions they make about the organisation and implementation of this recurring teaching experience. The range of options that occur in this simulation stem from the teacher-created script we developed drawing from our own teaching experiences and classroom-based research to shape this virtual classroom.

Rationale for the development of a classroom simulation

The idea for developing a classroom simulation stemmed from both research-based and anecdotal-evidence that pre-service teacher training is not preparing beginning teachers effectively. Some studies have shown that pre-service teacher education presents a fragmented view of learning (Hoban, 2002), which is often presented in a decontextualised way (Entwhistle, Entwhistle & Tait, 1993). It appears that many beginning teachers find it difficult to retrieve and apply knowledge from their pre-service teacher education when it is required in classroom situations because of the tenuous links between the theory and the practice (Kervin and Turbill, 2003; Bransford et al, 1990). For some time the benefits to the teaching profession when pre-service teacher training is linked with actual classroom experience have been acknowledged. However, as Barth (1990:118) asserts, "seldom do these two worlds converge".

The Ramsey (2000) review of teacher education in NSW strongly recommended that pre-service teachers receive quality classroom-based experience supervised by an accredited teacher mentor. However, just providing more extensive classroom-based experience does not guarantee quality experiences. Both Darling-Hammond (1999) and Ramsey (2000) concede that school-based practical experience often consists of a series

of isolated, decontextualised lessons prepared and implemented according to the requirements of the supervising teacher; or at worst it can be an unsupported and disillusioning experience.

Danielson (1996:2) states that classroom teachers make over 3000 nontrivial decisions daily. This poses serious implications for pre-service teacher education and how pre-service teachers are prepared for the complexity of teaching. It is acknowledged that pre-service teacher learning is enhanced when pre-service teachers regularly participate in the complex decision-making processes that teachers make in classroom settings (Kiggins, 2001; Groundwater-Smith, Deer et al, 1996). However, pre-service teachers experience is regularly limited by lack of regular access to quality classroom experiences where they see expert teachers articulate their decision-making processes. Further they tend to have limited opportunity to reflect on decisions and pose alternate approaches (Ramsey, 2000). In an ideal world pre-service teachers would have unlimited access to quality classroom episodes that are used to progressively develop their classroom practice and associated decision making abilities. The cost of the practicum experience, school needs, school availability and university course requirements places limits on access to practicum experiences. Therefore other ways of providing the sorts of experiences provided during personal experience with classroom-based teaching episodes are needed. One such approach is to make use of a classroom based simulation.

Limited research has been conducted on simulations in teacher development. However, advances in gaming software, particularly those which involve players creating worlds (eg The Sims), have demonstrated that it is feasible to create a motivational simulation that should support pre-service teachers professional learning. By developing tools that allow players 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 our student players should be able to vicariously experience both the teacher's and student's experience while engaged in a typical literacy learning episode.

A simulation can incorporate feedback and advice, through devices such as an on-line mentor teacher, and the opportunity to pause or repeat the episode and to explore alternative decisions and create other classroom worlds. Whilst it is understood 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).

Planning for the simulation

The use of simulation to support pre-service teacher education and the relevance of this was clear to all team members involved in this project from the project's beginning. However, preliminary planning and discussions revealed that the interpretation of "simulations", what it would entail, and the perceived relationships between the

simulation and pre-service teacher education varied amongst team members. Preliminary planning for this prototype demonstrated the differences amongst our team members and impacted upon and directed the choices we began to make.

There appeared to be three main ‘perspectives’ amongst team members as the simulation was planned for its initial prototype. Team members could be categorised as:

1. Those who looked to the simulation for instructional purposes
2. Those who looked to the simulation in terms of the “gaming model” (Gee, 2003)
3. Those who looked to the simulation as a professional learning tool

Each of these perspectives will be explained further.

Simulation as “Instructional”

As initial literature was being investigated and preliminary ideas were explored much of what was emerging was looking towards the simulation for instructional purposes. A basic flow with quantitative data entries to guide the direction of the simulation in the form of outputs was investigated.

It was acknowledged at this time that software tools such Stella™ could be used to create simulations and it became apparent that many teaching courses do use Stella™ to develop student understanding of systems and systems thinking through the creation of simulated models of real life situations such as population dynamics, labour supply and demand, and learning. During this preliminary planning one member of the team used Stella™ to create a crude model the simulation. This was progressively modified to reflect the way that real classrooms operate and the screen capture below in figure 1 shows one of the early outputs from this development phase. It shows how one member of the research team was trying to use Stella™ to model how teacher, student and lesson inputs interacted to effect student engagement, intellectual quality, productive conversations and artefacts developed.

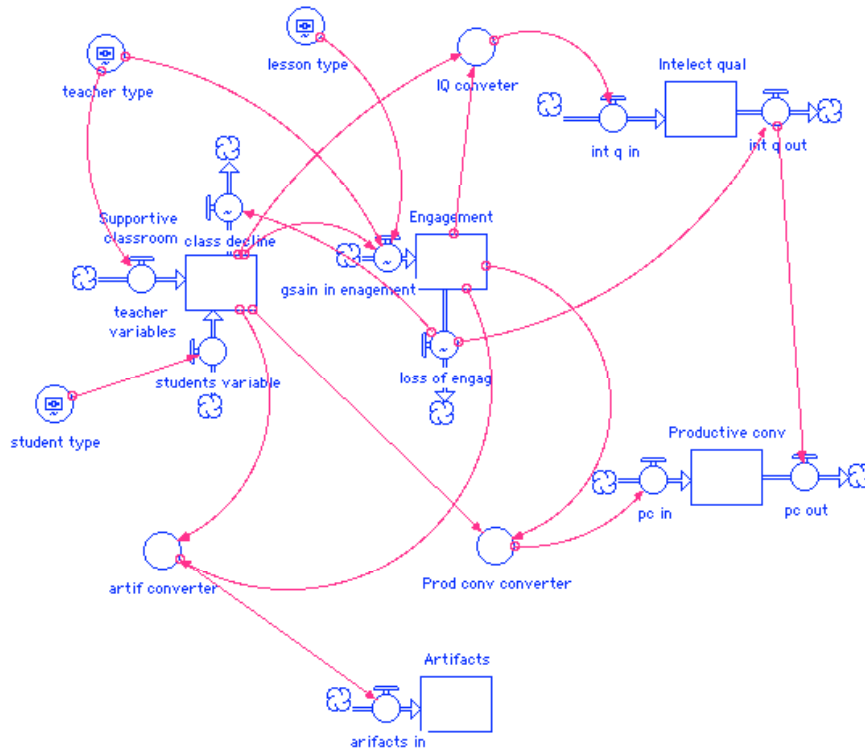


Figure 1: Early Stella Model of the simulation

The output of this process can be represented by the interface and graphical output shown below in figure 2. It shows how the different components of the lesson, those represented along the top of the graph, are sustained throughout this period of time. This relates to Jonassen’s (1993:21) notion of “contextualizing the instruction”.

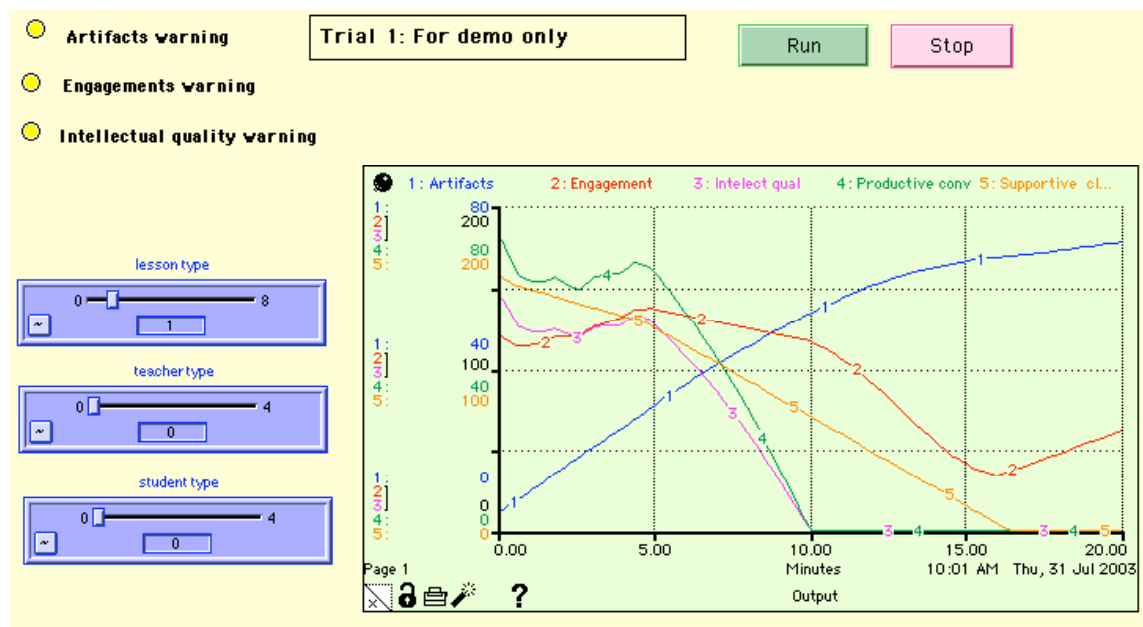


Figure 2: User interface and output from the original model

These models were not used in the final version but they did serve to focus the research teams' ideas around the relationships among key variables.

Simulation as "Gaming Theory"

From this point it became important to revisit the literature and consider how we could get our target audience, pre-service teachers, to engage with the simulation in a meaningful way. Research from Gee (2001, 2003) describes how computer assisted learning can support "...learning and mastering some extremely complex conceptual systems, abstract ideas, ways of thinking and knowing, and then applying what's been learned to solve a range of complex problems" (Cambourne, 2002: 759). We realised that the simulated classroom itself, and the organization and management of all the components within it, can be considered as an "extremely complex conceptual system" (Cambourne, 2002: 759).

It is recognised that computer assisted learning can allow the user to be actively involved in the learning process as they are encouraged to make decisions about the situations they are provided with. The development of a simulation supports Gee's (2003:22) argument that learning needs to be "active". A classroom based simulation allows pre-service teachers to experience the nature of the classroom "...in a new way" as they "learn to experience (see, feel, and operate on) the world in new ways"; "gain the potential to join this social group, to become affiliated with such kinds of people (even though we may never see all of them, or any of them, face to face" and; "gain resources that prepare us for future learning and problem solving" (Gee, 2003:23).

Gee (2001, 2003) further describes specific learning principles that need to be built into "good video games", principles which can be taken into account when thinking about the design of any computer assisted learning, this simulation being an example. Cambourne's (2002:760-761) analysis of these learning principles identified three common features for their success as learning enterprises.

- "They involve socially shared intellectual work that is organised around joint accomplishment of tasks. This allows elements of whatever skills are involved to take on meaning in the context of the whole.
- All of them have inherent elements of the traditional apprenticeship process. For example, they make explicit much of the covert invisible know-how that has to be acquired; they encourage student observation and commentary; and they allow skill to build up bit by bit, yet permit participation even for the relatively unskilled, often as a result of the social sharing of tasks.
- They are organised around particular bodies of knowledge and interpretation ... This subject matter is structured and presented so that students can engage in processes of meaning construction and interpretation."

With these understandings of the benefits associated with more active learning, the use of computers and associated software to support this, and the learning principles that needed to be evident within the design, became accepted as a reasonable and justified approach to the simulation.

Simulation as “professional learning”

There is a large amount of literature surrounding professional learning. Such literature encapsulates and emphasises professional learning as an on-going process beginning with pre-service teacher training right through to retirement from the profession. Fullan (1991: 326-327) defines professional learning as “the sum total of formal and informal learning experiences throughout one’s career from pre-service teacher education to retirement”. Likewise, Guskey and Huberman (1995:133) state professional learning “...can also be viewed as a dynamic process that spans one’s entire career in the profession, from preparation and induction to completion and retirement”. With such definitions in mind, it was acknowledged amongst team members that this simulation could be designed for teachers both at the initial level of pre-service teacher training and also in-service capacities.

Much of the literature acknowledges that not all professional learning experiences result in positive experiences, usually labelling experiences as being “unsuccessful”. Since as early as 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” (Conners, 1991:78). Identified characteristics of professional learning that are considered to be “unsuccessful” provides us with insight into what we as educators have to consider with regard to the design features of the simulation.

Professional learning is regularly criticised for being “one-off” opportunities relying solely on the individual teacher. Hargreaves and Fullan (1992:6) refer to such opportunities as “skill-based teacher development” which is “...too often imposed on teachers rather than developed with them”. Hoban (2002:68) refers to such situations as being “isolated ... based on limited conditions for teacher learning ... the presentation of new content over a relatively short time”. Whilst the simulation involves the teacher primarily working alone, making decisions about the operation of the classroom, the need to build support structures into the simulation became evident. We acknowledged that such conclusions would add to the depth of the professional learning experience for the user.

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 for 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.”

In addition, 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.

With such expectations in mind, the development of the simulation was perceived as one way in which professional learning of teachers could be encouraged and supported. As such, the literature surrounding professional learning and our collective understandings of this provided us with another framework to consider in the development of the simulation.

Using teacher narrative to create teacher-created scripts

The three guiding ‘perspectives’ and their impact upon preliminary planning for the simulation have been described. Once each of these had been acknowledged and team members availed of the opportunity to share their thoughts, areas of expertise and “hopes” for the simulation we were then faced with the challenge of how to bring these insights together to create the simulation prototype and to best employ our collective areas of expertise. To do this, we began to explore the notion of teacher narrative in order to design teacher-created scripts.

“Living educational theories” developed by Whitehead (1989, 2000) explains the role of the knowledge teachers have and its impact on their classroom practice. Pre-service teacher education often presents “abstract” knowledge, removed from the reality of the classroom. When in the classroom, teachers are called upon to integrate and apply this knowledge with what they do in the classroom, incorporating this into their “narrative of experience” – “this process of weaving abstract theory into a narrative of learning from experience generates an embodied living theory of practice” (McNiff and Whitehead, 2000:38). We began to construct our own narratives with the focus on teaching “the days of the week” in a Kindergarten classroom. We drew upon our own classroom teaching experiences and the data we had collected from the many teachers we had observed and documented. Each of us worked on “...fitting the data together so that the story achieves coherence” (Clandinin and Connelly, 1998:170).

From our research and own classroom experiences we have repeatedly found that teachers regularly engage in oral storytelling as they retell their classroom experiences. Teachers are the creators of an oral tradition where “...stories are shared daily ...” (Anderson, Herr and Nihlen, 1994:35). We drew upon the stories that we knew in the construction of our narratives. The stories that teachers told explored the “personal practical knowledge” they have gained, that is “knowledge which is experimental, embodied and based on the narrative of experience” (Connelly and Clandinin, 1988:363).

Our challenge in the development of our narratives was to capture the “personal practical knowledge” of teacher stories and based on our own experiences and from those of the teachers we have observed in our research. Discovering and making explicit the “personal practical knowledge” embedded in these stories then provided us with a framework to showcase and explore the reality of a Kindergarten classroom. As we continually shared our drafts within the team we were able to draw upon those who had technological expertise to plan how this could ‘look’ in the simulation. Reflection has

long been acknowledged as a useful process for teachers to engage with. Also, the notion of formalising such reflections through writing has been acknowledged as a way to share, refine and articulate teaching practice. As stated by Barth (2001:66) “...with written words come the innermost secrets of schools”. Capturing this in the simulation would allow pre-service teachers to be both exposed to and able to interact with the richness of these experiences.

These narratives we developed supported the “vicarious experience” of the teaching accounts we were drawing upon as they typically emphasised time, place and person and the relationships among these (Stake, 1995:87). The sharing of our individual narratives within our team highlighted the differences and similarities between our experiences and allowed for the three ‘perspectives’ to come together. This then enabled us to highlight issues around classroom organization and classroom management along with four key teaching episodes that could be incorporated within the simulation. These narratives supported the “vicarious experience” of our teaching accounts as they typically emphasised time, place and person and the relationships among these (Stake, 1995:87).

We were confronted with the question of how to best learn from these stories, how to analyse them, how to keep the teacher voices intact and most importantly how to get others with limited classroom experience to interact with these. The narratives that we had composed were interwoven into each other and one story – a teacher-created script - with many different options evolved. This teacher-created script then became the framework for the flow of the learning and teaching of literacy practices within the virtual Kindergarten classroom to be focused on in the simulation. We had used narrative as a way of reflecting upon our experiences and viewpoints to communicate what we know to team members and those who would engage with the simulation.

Using our teacher-created script to shape the virtual classroom

The one teacher-created script that we developed provided us with an emerging framework that we could use to structure the virtual classroom contained within the simulation. For the purposes of this script the teacher was given a name, “Sharon”. We then modelled the simulation around this teacher and what the possibilities were for her in this virtual Kindergarten classroom. The teacher-created script enabled us to identify a basic flow for the simulation, this is represented in figure 3.

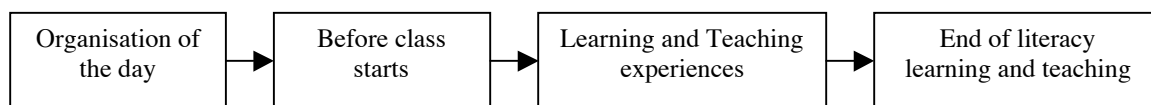


Figure 3: Basic flow of the simulation

This basic flow coupled with the teacher-created script assisted us in identifying key decision points for the user. Drawing upon each of the three “perspectives” previously discussed allowed for these to be expanded in terms of student updates and support material (in the form of excerpts from core textbooks, Department of Education and

Training web links, and additional reading material) to ensure that the user was informed and supported in their decision-making.

What follows are three excerpts from this script along with an example of associated screens developed for each within the simulation. An example for each of the focus areas of the simulation - classroom organisation, organising the teaching and learning experiences and classroom management - is provided. Each example will be discussed in order to demonstrate how the teacher-created script provided the framework for the concepts within the “virtual classroom”. Additional reference will be made to how specific “perspectives” from the team members were incorporated into this.

The furniture comprises, student-sized tables and chairs which are arranged in “islands” at various locations in the room. The room was dominated by six “islands” of two tables each, (placed back to back), with four chairs at each “island”. It means that at each island two pairs of students face each other across the width of two tables. Slightly behind these islands is another comprising a couple of hexagonal tables back to back with a some chairs on opposite sides. This “island” served as a work space.

Along the wall opposite the entrance to the classroom there is a range of furniture which serves different purposes. There is one large un-recessed cupboard which containing craft and art supplies. This is jammed up close to a series of tote-tray cupboards which poke out into the centre of the classroom at right-angles to the wall. Another row of tote tray shelves continues to about half way along the wall. Each of these has a student’s name card attached near the top of the opening. Students seemed to make a bee-line for these shelves to unload the contents of their school bags and to find materials they know they will use during the course of the morning session. A large electric heater and some shelves for teacher’s books and materials fill the rest of the space along this wall.

Excerpt 1 from teacher-created script

This description from excerpt 1 of the teacher-created script encapsulates one classroom layout the user is presented with. Figure 4 illustrates the options available to the user – two typical classroom layouts we have observed used in classrooms. Additional reference material is provided to enable the user to engage with the considerations that need to be made by the teacher.

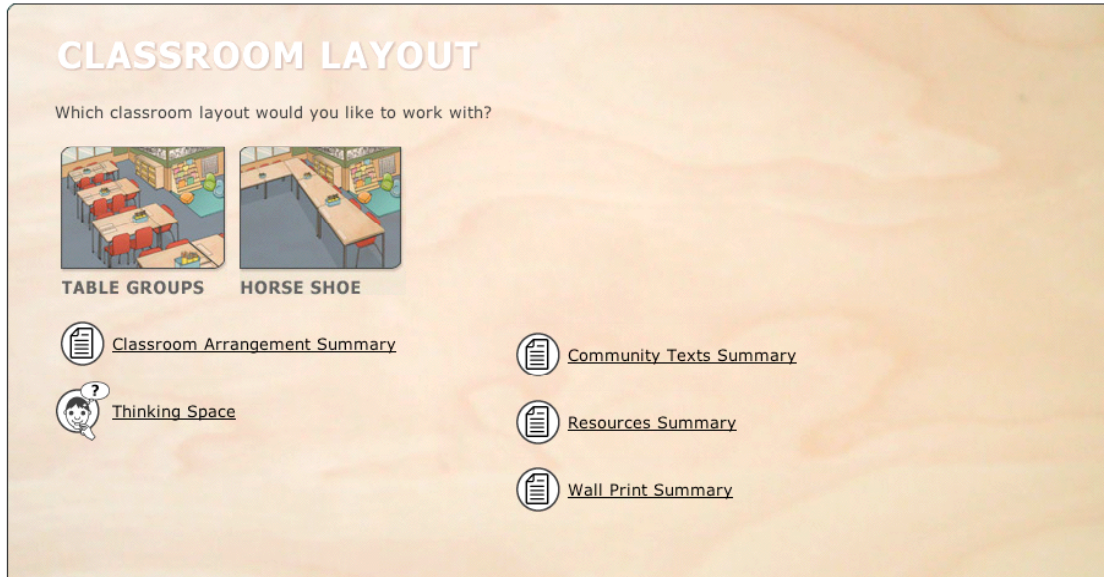


Figure 4: Classroom Organisation screen from the simulation

Like most modern infant school teachers in local schools Sharon organises her literacy teaching time using “ Blocks” and “Episodes”

A “ Literacy Block” is typically 90 minutes -> two hours in length and usually occurs in the first or morning session of school each day (e.g between 9..00am and 11.00 am)

This “ Literacy Block” is divided by Sharon into a series of shorter sessions, which she refers to as “ Episodes”

Episodes are Units of teaching-learning behaviour which the teachers purposely plans and runs for the purpose of creating opportunities for her students to learn the skills of reading and writing.

These vary in time from 10 minutes to 20 minutes.

Excerpt 2 from teacher-created script.

Excerpt 2 demonstrates this teacher’s organisation of teaching and learning experiences according to a “literacy block”. The screen capture from the simulation represented below in figure 5 demonstrates how this teacher-created script has been used. The user is presented with a situation where they have to select possible teaching “episodes” for the Kindergarten class. An additional link is available to additional reading material about a “literacy block”.

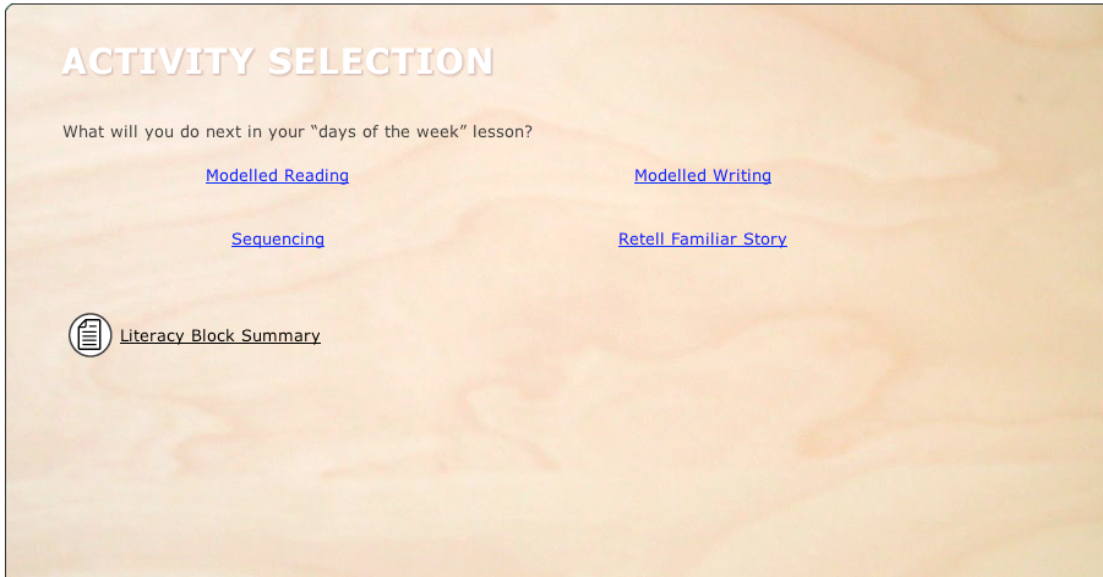


Figure 5: Teaching and Learning decision screen from simulation

9.32 am: The kids are finished packing up and putting things and, except for two girls, all are seated in the WCF position, looking at Sharon who is sitting on the teacher's chair .

Harley asks Sharon something which is drowned out by the last few getting ready.

She focuses her gaze on the couple who are still not fully settled and who are still carrying out an audible conversation as says:

“Hands in laps, close your lips; You two were talking at the wrong time and I couldn't hear Harley. Most of you were a lot better than yesterday but there are still some children having a big chat. When you come to the floor you must sit with lips closed and hands in lap.”

Excerpt 3 from teacher-created script

Excerpt 3 begins to identify some possible classroom management issues to be included within the simulation. The screen captured in figure 6 identifies some of these issues the teacher is faced with. Again, additional information is provided for the user to peruse in the form of a “classroom management summary”. Subsequent decisions follow this screen where the user has to make decisions about how they will address classroom management issues that they are presented with in this simulated classroom.

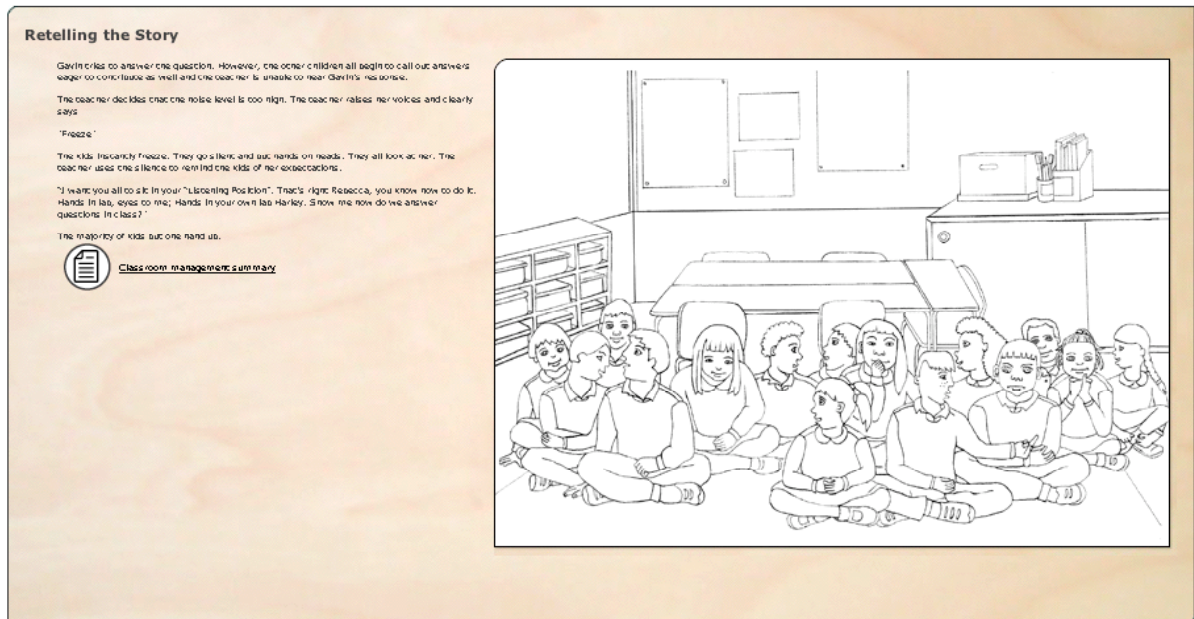


Figure 6 – Classroom management screen from the simulation

These three examples highlight the way that the key issues of the organisation of teaching and learning experiences, classroom organisation and classroom management issues have been addressed within the creation of this virtual classroom through the use of the teacher-created script. It is anticipated that the design of this virtual classroom will capture the expertise of team members and the “perspectives” they offered the development of this prototype to provide a worthwhile and meaningful tool for pre-service teacher education.

Trial of the Prototype Simulation

Our first trial of the simulation with a cohort of twenty four pre-service teachers enrolled in their first session of the Bachelor of Teaching program identified that the simulation appeared to support them with these key issues. The data collected in this trial indicated that while the participants were immersed in the virtual classroom created from the script, these pre-service teachers engaged in processes of connecting experiences, problem solving, critiquing the simulation teacher and reflective practice.

The findings from this trial indicated that the classroom story communicated within this on-line simulation provided an avenue for the participants to connect their university studies to those simulated experiences within the virtual classroom. Belisle (2002) suggests that pre-service teachers tend to focus solely on pedagogical issues, that is teaching and learning experiences, during practicum placements. What became interesting from the analysis of this trial was the focus of the participants on classroom organisation and classroom management in addition to teaching and learning experiences.

Organisation of Teaching and Learning Experiences

Analysis of the collected data demonstrated insight into some of the beliefs these participants had in relation to teaching and learning experiences. The participants recorded and reflected their beliefs as they interacted with the simulation whether they were justifying their choices or critiquing the simulation teacher. These beliefs appeared to stem primarily from what participants had seen in their first weeks of classroom-based experiences.

Classroom Organisation

Darling-Hammond (1999) reports that well-designed simulation environments have the potential to assist pre-service teachers to apply their professional knowledge to real problems, thus supporting their abilities to problem solve like teachers. The data collected from this trial indicated that the participants did utilise their professional knowledge and past experiences to solve problems and make decisions as Darling-Hammond suggests. For example, when organising the layout of their classroom, some of the participants cited past classroom experiences as an influencing factor on their decision. One participant selected a horseshoe layout during his first use of the simulation, however reassessed this decision after talking to his peers and considering the age of the students within the simulated classroom. When this participant engaged with the simulation again this decision was altered. This data supports the assertions of McMahon (2000:663) who suggests that simulations are conducive of this testing of decisions, as they provide a “safe and self contained scenario”.

Classroom Management

The findings from this trial revealed that the on-line simulation prompted the participants to make links between the classroom management strategies implemented in the simulated environment and those from theory and employed in the real classroom settings they have been exposed to. One participant reflected on her classroom-based experiences, reporting that when her classroom management plan was not working she was able to reflect on what worked during a simulated lesson. She implemented one of the ideas she had gained from the simulation, and it “ended up being [her] best lesson”. Another participant reflected on a new management idea gained from the simulation as she wrote “this is really interesting- i [sic] think i [sic] will remember this and try to incorporate it into my own teaching because it seems like a relally [sic] great activity and is a way that the teacher has effectively stopped the fidgeting around her”.

Concluding Comments

The trial of this prototype version of the simulation software suggests that the teacher-created script provided the users with a meaningful context within which to engage. The research and anecdotal evidence base from which the script was created appeared to

provide depth in the classroom “story” allowing the participants to explore the intricacies of this virtual classroom environment.

The simulation will undergo further refinement before the next trial. We have plans to increase the interactivity of the simulation by adding more choices and additional challenges to users. We also plan to explore literacy teaching throughout all the stages (Board of Studies, 1998) from Kindergarten to year six.

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