

## **LAMS AS A COGNITIVE TOOL FOR TEACHER EDUCATION STUDENTS’ REFLECTIVE THINKING**

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### **Abstract**

Design based research is one exemplary way to help educators, educational designers, and institutions rethink their pedagogical approaches within the learning environment. It is envisaged that unique uses of synchronous chat, polling, student feedback, e-portfolios and online questions and answers will help engage the new generation of learners. This paper provides a preliminary formative evaluation of the use of the Learning Activity Management System (LAMS) as a cognitive tool for promoting student reflective thinking within the context of the first year of a teacher education program. There were two research questions. First, how do the learning activities, resources and supports using LAMS foster student engagement and critical reflection? Second, to what extent does learning design using LAMS assist students to link professional knowledge to professional practice? Students were asked to reflect on their own learning and document the process through which they constructed their view of learning from the field. The results showed that, when students recognised the relevance of learning through ‘rich tasks’, they saw their application to the world beyond the classroom and started to reflect critically on their experience. There was a positive response from students about the impact of LAMS in facilitating their understanding of the relationship between professional knowledge and professional practice. What is evident from the evaluations is that the learning activities, resources and supports using LAMS assisted students to do this. The barriers and challenges for future applications require attention to the reliability of IT infrastructure across the university and professional development and change management for academic and support staff.

### **1. LAMS as a cognitive tool for teacher education students’ reflective thinking**

Information technology has been seen as a rich resource for linking individuals to environments using constructivist principles. Jonassen (2000) has written extensively about students learning *with*, and not simply *about*, information technology, explicitly identifying his use of a constructivist perspective, and seeing technology as partner, not teacher, in the learning process. Thus, to help students to think, learn and solve problems, they need deliberate and planned assistance to perceive themselves as constructors of ideas and defenders of those constructions. They are encouraged to employ both mindfulness and self-

regulation. Jonassen (2000) sees this shift from an instructivist model to a constructivist philosophy as a significant challenge to teachers. In most classrooms from kindergarten to graduate school, students are told what and when to learn and are tested to be sure that they have learned it. Land and Hannafin (2000: 6-7) make an explicit link between constructivism and relevance and suggest the implication for information technology:

Pedagogically, constructivists favour rich, authentic learning contexts over isolated, decontextualized knowledge and skill, student-centred, goal-directed inquiry over externally directed instruction, and supporting personal perspectives over canonical perspectives. Technology tools support the individual's identification and manipulation of resources and ideas.

Some authors see an urgency to enable students to extend beyond superficial thinking in order for them to address growing social complexity (Jenlink, 2001). Yet difficulties exist in converting such aspirations into reality. Carini and Kuh (2003) appeal for greater cognitive challenge, particularly with “living units organised around themes relevant to teaching ... and capstone projects that require rigorous integration and synthesis of knowledge” (p. 396). Many teacher educators follow their lead, believing that, if students see tasks to be relevant to future teaching needs, then they are more likely to be motivated to think more deeply. This matter is not new, being addressed in 1916 by Dewey (1916): “Methods which are permanently successful in formal education ... give pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking, or the intentional noting of connections” (p. 154).

The evolving theories of situated cognition and situated learning (Stein 1998, Wilson & Myers 2000) furthermore support relevance as a key pedagogical element. Designers of situated learning activities typically seek to embed them in real world contexts or at least in simulations of such settings. Wilson and Myers (2000) remark on how, in situated cognition, individual thinking is set in the larger context of physical and social interactions and culturally constructed meanings. Bredo (1994) sees the notion of situated cognition as “shifting the focus from the individual in environment to individual and environment” (p. 29) and highlights the significance of individual reflection and questioning.

## **2. The aim of the research**

The Learning Activity Management System (LAMS) developed by Macquarie University E-learning Centre of Excellence (MELCOE) is an innovative tool for designing, managing and delivering online collaborative learning activities. It provides teachers with a highly intuitive

visual authoring environment for creating sequences of learning activities. These activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration (Cameron & Dalziel, 2007).

Currently, LAMS can be used as a stand alone system or in combination with other learning management systems (LMS) such as Moodle, Sakai, .LRN, WebCT and BlackBoard. In 2007 LAMS version 2 had just been released and had not been integrated with WebCT. Bonk (Personal communication, September 18, 2006, page 1) states that:

Without a doubt, the LAMS system is one of the few exemplary ways to help instructors, instructional designers, and institutions rethink their pedagogical approaches within online learning environments. Unique uses of synchronous chat, polling, student feedback, e-portfolios, and online questions and answers will help engage this new generation of learners we are all facing. Thoughtful pedagogical approaches are perhaps the most vital aspect of moving us from boring learning “management” systems to the next generation of online teaching and learning involving the personalisation of one’s learning environment.

A model previously adapted by the author for instructional design for effective web based learning comprised three critical overlapping elements: learning tasks, learning resources and learning supports with assessment at their heart (Oliver & Herrington, 2001). It was found the attention to instructional design of these three elements in learning environments helped learners to develop self-regulatory processes to activate motivational processes and an intrinsic interest in learning (Dennis & Labone, 2006). The present paper seeks to investigate whether the LAMS design process using the three principles facilitates student reflective thinking and professional development to shape their future teaching. Specifically, the paper asks:

1. How do the learning activities, resources and supports using LAMS foster student engagement and critical reflection?

At the core of the study is a belief that students will develop their own philosophy of learning *to teach* first by their own independent observations of learning *about teaching* in real situations. This is embodied by the application of situated cognition theory where learning is conceived as a sociocultural phenomenon rather than the action of individual acquiring general information from a decontextualised body of knowledge such as a text book or lecture (Stein, 1998). Student experiences become the focus of the teaching process.

2. To what extent does learning design using LAMS assist students to link professional knowledge to professional practice?

The theory underpinning the study is social constructivism, based on Vygotsky’s framework that stresses constructing knowledge through social interaction, together with building on the

zone of proximal development (ZPD). According to social constructivism, knowledge does not exist out there and is not transmitted to the learners' minds through instruction. Rather, it is constructed first through social interaction, and then internalized by situating students in meaningful contexts. If there are experts or peers who are more advanced available to the learner, then they can help them move to the upper limit of their zone of proximal development. Recent researchers (e.g. Bonk, Ehman, Hixon & Yamagata-Lynch, 2002) have exposed students to the strategies and skills of more experienced peers or expert teachers in an authentic context, providing students with opportunities to transfer their insights and ideas to the practice field. This 'authentic context' has been developed through various online initiatives such as interactive conferencing tools or shared resource areas (Bonk et al., 2002). Context provides the setting for examining experience, community provides the shaping of the learning. Through community, learners *interpret, reflect, and form meaning*. Community provides the setting for the social interaction needed to engage in dialogue with others to see various and diverse perspectives on any issue (Lave and Wenger, 1991).

The learning comes about through reflecting on the experience, engaging in dialogue with others, and exploring the meaning of events in a particular space and time" (Stein, 1998: 3).

### **3. Methodology**

#### **3.1. Participants**

The target group for investigation was a cohort of 98 first year primary education students enrolled in an Australian University. The educational studies strand of the Bachelor of Education program uses an integrated approach to the theory-practice relationship. Students engage in reflective practice integrating and constructing their own concept of the person as the teacher. The students had completed the requirements for a 3 hour by 12-week introductory unit in child development. The unit involved lectures and tutorials with resource material based on the learning platform (WebCT6) for online delivery of content, resources and discussion. In addition, the unit also provided school-based field experience for 1 day/week over 10 weeks for making observations of children that provided insight into the particular theoretical focus for the week.

#### **3.2. Design**

The design of the present study was based on the work of Seeto and Harrington (2006). They advocate the use of developmental research now often referred to as *design based research* as

“particularly suited to the exploration of significant education problems and technology-based solutions –the kind of challenge faced every day in the working life of a learning designer” (p.742). Dennis (2007) has effectively used their model to analyse the design problems associated with course development using LAMS. The study was based on the four phases of design-based research proposed by Seeto and Harrington:

1. The analysis of research problems by researchers and practitioners.
2. The development of solutions with a theoretical framework.
3. The evaluating and testing of solutions in practice.
4. Reflection to produce appropriate design principles.

### **3.3. Procedure**

Student questions on contextual issues became the focus of a LAMS journal entry and became the focus for their formative assessment tasks each week. The summative assessment was also student directed requiring the student research one of their topics and gather further information to help interpret it. The summative assessment was also student directed and directly applied to the student’s professional experience. Students were requested to select one of their topics as a research topic for a final academic report. Boud (1994) describes context as drawing out and using experiences as a means of engaging with and intervening in the social, psychological, and material environment in which the learner is situated. Context is not just bringing life events to the classroom but reexperiencing events from multiple perspectives. This in turn would assist students in making decisions on how to handle the situation and evaluate the scenario for future practice.

Newmann & Associates (1996), in earlier research, revealed the importance of real world connectedness in both pedagogy and assessment. To capture this sense of reality, they introduced the terms ‘authentic pedagogy’ and ‘authentic assessment’. Moreover, this approach resonates with the work of O’Donnell, Reeve & Smith (2009) who hold that students would become more skilled in evaluating their decisions as they progressed through their undergraduate program.

Thus LAMS should be a valuable tool for students to use to support their observations and to process their responses to the activities and questions in real time (in computer labs) or asynchronously. The value for teaching staff would be in the opportunities for the ongoing continuous monitoring of student progress and input. The collating of students’ answers to questions would also assist with the provision of feedback on the key concepts addressed each week. LAMS should facilitate maintaining records of student activities, and of

exemplars of work. LAMS should also increase the capacity of students to analyse and reflect on their practice. These are all requirements, for example, of the NSW Institute of Teachers for future accreditation of teachers in that state (DET 2007).

Further support was provided by the Professional Experience program where they develop a sophisticated account of the meaning and development of their own professional identity. Research shows that field experiences are most effective for deepening understanding and building expertise when teacher's attention is not on pre-service teacher performance but on the dialogue about their own and children's learning (Edwards & Protheroe, 2003). Theoretical underpinnings address issues of inclusivity, human development and learning (e.g ecological systems theory), pedagogy, curriculum content, assessment and evaluation. The relevant knowledge provides a sound conceptual lens for students to address learning and teaching in complex environments.

### **3.4. Instrumentation**

*The Learning Activity Management System.* LAMS was used because it allowed for flexibility in designing learning activity sequences through integrated monitoring panels for questions and answers, a polling system for collating the answers and displaying them online, chat for tutor and student feedback, and a portfolio export for learners. LAMS provided for weekly focussed activities and questions designed by the content manager specifically linked to the professional knowledge taught in these units. It enabled the student centred assessment tasks to form part of the learning design to enrich the first year experience and enable students, and to develop their capacity for self direction and self regulation.

For example students were encouraged to reflect on an idea or issue specifically related to their field experience each week. From this they were to construct their own question and justify the importance of their question to future teaching practice. This activity became the focus of a journal entry and was selected by the students as the focus for formative assessment tasks each week.

*The Student Evaluation Questionnaire.* The effectiveness of LAMS was measured by a series of questions which formed part of the end of semester student course evaluation questionnaire (see Appendix A). The first research question was measured by a set of questions based on the principles of good feedback practice described by Nicole and McFarlane-Dick (2006). They related to the encouragement of teacher and peer dialogue around learning (Principle 4) and to the facilitation and the development of student engagement and critical reflection in learning (Principle 2). The second research question was

measured by a set of questions that related to the link between professional knowledge and professional practice and to reducing the lack of integration and feedback between current practice and desired performance (Principle 6).

## **4. Results**

### **4.1. Student engagement and critical reflection**

The first question asked how the learning activities, resources and supports using LAMS fostered student engagement and critical reflection. This reflected the teaching strategy of using the integrated monitoring panels in LAMS for student questions and answers together with the polling system for collating their answers and themes. This gave rich feedback as student directed and student centred learning about how knowledge is obtained from and applied in everyday situations. In tutorials students demonstrated new meaning by discovering relationships, constructing explanations and drawing new conclusions. It also provided tutors with explanations for negotiation of new meaning linked to developmental theories. As an instructional strategy Stein (1998) sees “situated cognition as a means for relating subject matter to the needs and concerns of learners...learning is essentially a matter of creating meaning from the real activities of daily living” (p. 1). Deep understanding, significance and knowledge integration was fostered by asking “what is new information and how does it connect to previous knowledge and how might it be used?”

Students had been encouraged to reflect on an idea or issue specifically related to their field experience each week, to construct their own question and to justify the importance of their question to future teaching practice. The results showed that, when students recognised the relevance of learning through ‘rich tasks’, they saw their application to the world beyond the classroom and started to reflect critically on their experience.

One student wondered whether friendship between peers was an important ingredient in fostering development in the classroom. Other students asked “Why do some children show aggression and anger in certain situations but others do not?” and “How can teachers deal with the different emotions that children display in the classroom?”. Another student reflected on how teachers could stop bullying in the class and in the playground:

In my practical field experience I have come to notice that primary school can be a place that not all students are happy to be at. The reason for this is because bullying occurs amongst the students and at times unknown by the teacher. The bullying that occurs includes both “direct” and “indirect” ways of bullying.

One of the students reflected on how she saw her classroom teacher adapt to working in her room with a child who had Down's syndrome:

I noticed that the Year 3 teacher that I was with had a completely different approach to having a Down's syndrome child in her class. . . She was accepting of the child and even though sometimes she couldn't understand her, she was willing to allow her to add to the class discussions. This has a very positive effect upon the child's willingness to learn because they are treated as a member of the class and not an outsider. Most children with a disability tend to live in their own world because they see themselves as different from everyone else. This child, however, was more than happy to comment on the aspects of Easter that the class was discussing and the children were more than willing to listen to her, which I think can also have a positive effect on her learning. This teacher . . . didn't see this girl's disability as a burden but accepted that this child was in fact different but she was also like every other child in her class.

The responses to the Student Evaluation Questionnaire covered questions about student engagement, self-assessment and critical reflection on learning and dialogue around learning indicated support for LAMS. The responses that showed a strong level of agreement ( $\geq 80\%$ ) and a low level of disagreement ( $\leq 4\%$ ) are reported in Table 1 and relate to higher order thinking and knowledge integration, learning and students as constructors of ideas, and deep understanding, significance, and knowledge integration.

Table 1. Items on student engagement, self assessment, and reflection on learning with  $\geq 80\%$  student agreement and  $\leq 4\%$  disagreement (N = 98).

<b>Dimension</b>	<b>Item</b>	<b>Agree % (N)</b>	<b>Undecided % (N)</b>	<b>Disagree % (N)</b>
<i>Higher order thinking and knowledge integration</i>	The issues and topics raised were relevant for understanding the development and learning needs of children today	86 (83)	14 (13)	0 (0)
<i>Learning and students as constructors of ideas</i>	The content of the unit contributed constructively to my learning this subject	80 (77)	17 (16)	3 (3)
<i>Deep understanding, significance, and knowledge integration</i>	I believe that the process of learning in this unit was applied to meeting the specific needs of pre-service teachers to understand the school context.	81 (78)	18 (17)	1 (1)



## 4.2. Linking professional knowledge to professional practice

The second question asked to what extent learning design using LAMS assisted students to link their professional knowledge to professional practice. This reflected the teaching strategy of including local and community knowledge of the school context from student examples and personal experience. In peer collaborative tasks students were able to make connections between their experiences and to construct new knowledge and awareness from multiple perspectives. This was facilitated by the use of chat for tutor and student feedback, and the portfolio export for learners. The portfolio tool in LAMS was also used for summative assessment in the form of a self report. There was a positive response from students about the impact of LAMS in facilitating their understanding of the relationship between professional knowledge and professional practice.

One student posted her question for discussion as ‘connecting with your students: how can a teacher really get to know their students to give emotional and social support when needed?’ This student reflected:

Over the course of my practical experiences thus far I have noticed several ways teachers get to know their students. The most effective way, however seems to be the use of profiles on each student. In the classrooms there were displayed on the wall fact files, mind maps or profiles on all students in the class. These posters generally identified who the students were as people, making no mention of academic skills but rather focusing on their likes, dislikes characteristics, hobbies and their personality. From this observation I have come to the realization that teaching is about teacher / child connection and not just about teacher / student learning.

In peer collaboration another student observed a year five class where posters and profiles were displayed around the teacher’s desk. “.....which I felt was a strong metaphoric way of portraying her desire to get to know her students as people because they were close to where she spends most of her time.” Another student in her self report reflected that “this task has enabled me to see that the most important aspect of education is to put the *person* back into the *process* of learning”. The summative assessment in the form of self reports, then, were opportunities for students to interpret, intervene, and interrupt the usual happenings of their own experiences.

The responses to the Student Evaluation Questionnaire also covered questions linking professional knowledge to professional practice. There was support for the impact of LAMS in these areas. The responses that showed a strong level of agreement ( $\geq 80\%$ ) and a low level of disagreement ( $\leq 4\%$ ) are reported in Table 2 and relate to authentic assessment and knowledge, feedback, and self assessment and self regulation.

Table 2. Items on student encouragement of teacher and peer dialogue linking professional knowledge to professional practice with  $\geq 80\%$  student agreement and  $\leq 4\%$  disagreement (N = 98).

<b>Dimension</b>	<b>Item</b>	<b>Agree % (N)</b>	<b>Undecided % (N)</b>	<b>Disagree % (N)</b>
<i>Authentic assessment and knowledge integration</i>	The assessment tasks linked directly to my understanding of the school	82 (79)	14 (13)	4 (4)
<i>Self assessment and self regulation</i>	I have had to teach myself to be more self regulated to study and learn at university	85 (82)	13 (12)	2 (2)

## 5. Discussion

Reeves and Hedberg (2003) include evaluation as a critical part of the process of learning design, whether the course achieves its intended goals (as well as any unintended outcomes). Student evaluations were used to investigate within the learning design whether LAMS functioned as a cognitive tool for student reflective thinking and linked professional knowledge to professional practice.

The question arises “how do we know that LAMS was better than any other way that could have been used?” From previous experience in face to face tutorials it has not been possible to synchronise and collate student responses, ideas or thinking. Other learning management systems previously used have neither facilitated student interaction nor demonstrated the flexibility to monitor student responses in any depth. From this learning design it was demonstrated that LAMS has the flexibility to synchronise learners across tasks, encouraging collaboration and experience of learning. Student learners were able to use a variety of aides always available through the integrated environment provided in LAMS. Students were asked to reflect on their own learning and document the process through which they constructed their view of learning from the field. What is evident from the evaluations is that the learning activities, resources and supports using LAMS assisted students to do this. The significance of this study is that LAMS is one effective way of facilitating student engagement and learning. In this instance evaluation in the constructive perspective has assisted students to examine their thinking processes directly related to professional field experience.

Some issues of concern related to the need for improved organizational and technical infrastructure and support. At the time and at the administrative level policies for the application of new emerging technologies were not widely addressed. This was evident for both students and staff. LAMS was seen as a new innovation piloted in this instance by the author in this unit of study. In some instances for both students and staff technical problems resulted in limited access and use of LAMS. One of the key issues for students at this time was that they had two separate logins (one for WebCT and one for LAMS) and used both LMS for the one unit of study. Many students found this too demanding and often confusing.

For some staff formative workload and university policy related to assessment load restricted giving students' valuable feedback. Often the case for the design manager was more ideas than time available to implement new online resources. For future replication LAMS may well provide university teachers with a visual authoring environment for creating, storing and *re-using sequences* of learning activities. The barriers and challenges for future applications require attention to the reliability of IT infrastructure across the university and professional development and change management for academic and support staff.

## **6. Conclusion**

What worked in the learning design was a new approach to learning for students and tutors. In earlier research the author (Dennis et al., 2005) indicated the need to analyse samples of students' work, as an indication of student achievements and outcomes in linking professional knowledge to professional practice. The examples of student voices and stories validate student engagement with application of developmental psychology principles. Students were self directed and self regulated and assumed responsibility for specific learning and assessment tasks that they created and completed.

In this instance teacher strategies and the use of LAMS tools fostered depth of understanding, higher order thinking and critical reflection. This is evident from student feedback and evaluations. The adoption of the social constructivist pedagogy of a 'Rich Tasks' approach to teaching-learning required deep intellectual study of real life problems and culminated for students mastery of major issues and concerns. John Dewey (1933) supports the idea that people only truly think when they are confronted with a problem. Without some kind of problem or issue to solve to stimulate thought teaching behaviour can become routine rather than thoughtful. What was shown was the LAMS enabled an integrated approach to the theory to practice relationship with particular focus on the reflective practice of student teachers constructing their own self concept of 'the person as the teacher'.

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**Appendix A. The Student Evaluation Questionnaire**

Statements on Learning Experience and Technology Applications

Statements on your Learning Experience and Technology Applications in EDFD 127

Strongly Disagree  
Disagree  
Neither Agree or Disagree  
Agree  
Strongly Agree

1. My experience in this unit has enhanced my ability to solve problems					
2. My experiences in this unit have encouraged me to accept greater responsibility for my own personal development and self-expression.					
3. The objectives of the unit were made clear to me from the beginning of the semester.					
4. Student participation was encouraged in this unit.					
5. The material presented was conveyed clearly and logically.					
6. The content of the unit contributed constructively to my learning in this subject.					
7. The content of the unit reflected the declared outcomes / objectives.					
8. I was satisfied with opportunities provided to me to consult with unit staff as needed.					
9. Overall, I found the selection of print, software and hardware resources for this unit was suitable to satisfy unit requirements					
10. The online resources used in the unit for learning were of a high standard.					
11. My computer skills knowledge and skills were adequate enough to help me use online learning tools in this unit.					
12. I received sufficient support with online technology in the ICT tutorials.					
13. I was able to access LAMS (the learning activity management system) each week.					
14. I was able to use LAMS in weeks.					
15. The approach taken in this unit stimulated my interest in learning.					
16. I was motivated to learn in this unit.					
17. I developed a sense of satisfaction and a continuing desire to learn.					

Statements on your Learning experience and Technology applications in EDFD 127

Strongly Disagree  
Disagree  
Neither Agree or Disagree  
Agree  
Strongly Agree

18. The LAMS sequence and questions helped me to develop my thoughts and reflections for learning in my school each week.					
19. I believe reading the LAMS questions and then reviewing my answers after practicum helped apply professional knowledge to professional practice.					
20. The questions and suggested activities each week assisted my engagement and made learning from my school more meaningful relevant.					
21. I felt motivated to participate in tutorials and share the experiences and ideas related to our school experience.					
22. Issues and topics raised were relevant for understanding the developmental and learning needs of children today.					
23. I would like other units to include LAMS (the learning activity management system) as a tool for learning.					
24. The range of assessment tasks in this unit allowed me to demonstrate what I had learned.					
25. Completing my own journal questions was a useful learning strategy for me.					
26. I received ongoing feedback related to my weekly progress from my tutor.					
27. The assessment linked directly to my understanding of the school and family contexts for learning and development.					
28. I was able to apply theories of development as a lens to inform my observations of children in the context of learning at school.					
29. I believe that the process of learning in this unit was applied to meeting the specific needs of pre-service teachers to understand the school context.					
30. I enjoyed this unit.					
31. My expectations for success were maintained throughout the unit.					
32. I developed a sense of satisfaction and a continuing desire to learn.					

Thank you for completing this survey.