



view of learning as (1) a process of constructing new knowledge within the mind by reflecting on the viability of one's existing knowledge in light of new experiences, and (2) a socially mediated process of negotiation of meaning amongst a community of learners. From *critical theory* comes a view of an empowered learner as one who (1) seeks to understand others' understandings through an interest in open communication, and (2) reflects self critically on the unconscious and shared beliefs and values that shape her routine social practices.

Combining these perspectives yields a set of educational principles for empowering students through self reflective critical thinking to develop deeply connected understandings (Belenky et al. 1986; Noddings, 1984) of their own beliefs and social actions. As educators, our aim is to enhance considerably that learning process by providing enriched opportunities (via Web based services) for intellectually and socially isolated students to engage in reflective discussions of the type that can occur in a university classroom setting.

## **The Educational Problem**

The existing print based unit had been redesigned recently to promote teachers' development of self reflective critical thinking skills, leading to deeply connected understandings of the need to improve their own professional practices. For example, throughout the unit participants are required to write reflective journals in which they record their educational beliefs, values and related practices. They are directed to readings, which serve as a source of new ideas, and are prompted to reflect on assumptions that underpin their earlier journal entries.

However, we felt that the success of the existing print based materials was restricted by several factors inherent in this traditional mode of course delivery.

1. Long delays (of 2-3 weeks) in receiving the tutor's written feedback on assignments delivered by normal mail services can contribute to lack of continuity of learning.
2. The invisibility of other students can result in almost total dependence on the tutor for a considered response to the quality of a student's developing ideas and ability to think critically and self reflectively.
3. Reliance on the printed Reader as the only source of new ideas can severely restrict the scope of inquiry based learning and can reinforce students' lack of intellectual autonomy.

We realised that something further was needed in order to really promote amongst distance learners the kinds of learning activities that we increasingly valued from a social constructivist perspective.

## **A Tentative Web-based Solution**

Rather than attempt to describe the Web-based services that we developed - electronic course materials, tutor student and student student email, and a Web based discussion forum - it is probably better if you explore them directly. The following URL will take you to the Web site of the unit.

<http://www.curtin.edu.au/learn/unit/smec612/intro.htm>

We envisaged that participation in these Web based components of the unit would enhance the following student learning outcomes.

1. Ability to negotiate new understandings with fellow students (i.e., professional colleagues), including active listening, seeking clarification, explaining and justifying interpretations, sharing ideas, challenging others' views, and self disclosure of uncertainty.
2. Willingness to suspend disbelief in new ideas, to be critical of one's valued professional beliefs and practices, and to countenance the prospects of transforming one's professional activities.

## **Research Approach**

Our *interpretive* evaluation (Erickson, 1986; Guba & Lincoln, 1989) focused on the impact on student learning of the supplementary Web based component of the 15-week unit during first semester 1997. By triangulating data from a variety of sources, we sought to understand the nature and extent of students' use of the Web based services.

We surveyed the students at the beginning, middle and end of the unit to ascertain their connectivity to our Web based services, their perceptions of the usefulness of the Discussion Room and email facility, and the perceived benefits of the Internet services.

Next, we selected two students - Laura and Philip (pseudonyms) - for case study analysis; we focused on students who had demonstrated higher than average levels of participation in the Web-based components and who had achieved learning outcomes in the range of good to excellent. Each student was interviewed by telephone, and interpretive analyses were conducted on the text of her electronic communications recorded in the Discussion Room and on her final assignment. The final assignment consists of an overview of each student's learning activities over the course of the semester and a reflective commentary on "What I have learned in this unit".

## **Connectivity**

Of the 20 students enrolled initially in the distance education mode, about 8 students made varying use of the Web-site, which ranged from 'lurking' unannounced to corresponding in the Discussion Room and by email, and reading exemplary student assignments that we posted on the Notice Board. Three of the 8 had Internet access from both home and school, 4 from home only, and one from school only. Six students had previously used e-mail, but only one had used (occasionally) Usenet news groups. All had some exposure to the use of a web browser - about equally distributed between Netscape and Internet Explorer. During the course of the unit, 2 students made no contribution in the Discussion Room. However, another 3 students joined the unit late and did contribute, bringing the total number of Web-site participants to 9.

### **Synopsis of Case Study 1 - Laura Tannock**

Laura Tannock teaches Year Four students in a South Australian primary school, but that's not how she defines herself. Here is part of her self-introduction from the Discussion Room (her name and some details have been changed to protect her identity):

Greeting to my fellow students from Laura Tannock in sunny SA. I am a primary school teacher employed by the Education Department. I live with my husband on an acreage estate just outside Adelaide and 55 minutes drive from the Barossa Valley.

Six years ago, I completed my degree and, since then, have been toying with the idea of further study, waiting until something of interest came along. Last year, we also bought a new computer and connected to the Internet. The idea of using the Internet for distance education sounds brilliant. I don't think I could be enticed into distance study any other way. Even though my computer skills are very basic I have a great sense of achievement when I manage to produce a document. Working on this unit should improve my proficiency. I look forward to the challenge.

Laura was interesting to us because she achieved extremely well on the valued outcomes we specified for students in the unit (her final grade was 99%), and because she represented a number of other teachers in the group who were also female primary school teachers in government schools.

### **Laura's Technical Context**

Laura had an Internet connection at home. She used an IBM computer and Netscape both for browsing and e-mail. She had significant problems with her 'net' connection during the unit. At the beginning of the unit, she was writing about one e-mail message every fortnight and used a web browser about once a week, but had no experience of Usenet news groups. Laura excitedly reported that, despite fairly limited experience, she had volunteered to set up her school's web site, and was really excited by the quality of student work she was able to scan and put on the web. She visited our Web site several times each week but, by mid-semester, felt that it had helped her only 'a little'. When asked for suggestions about how the site could be improved, she suggested (as did several other students) that the Comments box in the Discussion Room should be larger and the text should 'wrap' within them, and that the tutors should initiate topics for discussion (we thought we had been!)

### **Laura's Participation**

Laura was one of the more involved students in the Discussion Room, but her total of four messages (not counting one of congratulation on the birth of Philip's daughter!) was still short of what we had hoped for. On the issue of her participation, she wrote in the Discussion Room:

I have not felt that I have had anything sufficiently important to contribute. While I may be quite 'chatty' on a 1:1, I'm quiet in a larger group and especially if I don't know the people. I need to be more confident of what I am saying or be able to see the peoples' faces for an instant reaction. Apart from my guilt at not participating I have enjoyed having the discussion room open. I at least know people's names and a little bit about everyone. It has stopped me feeling so isolated. I also like having everyone's e-mail address. I have e-mailed Emma a few times which has been good. You may get a more outgoing group next year.

Clearly, Laura felt that participation in the Discussion Room was valuable, and was frustrated that it wasn't more lively. She is a bright, friendly and gregarious person herself, willing to talk candidly and interestingly about a wide range of topics. She felt the discussion needed to be lighter and simpler, more informal. She felt that Peter and I tended to leap in with highly abstract and theoretical responses that scared others off from feeling they could contribute something valuable to the discussion. What would have been most useful, she said, was for teachers to be able to swap "war stories" from the classroom, tales of their experiences and their thoughts and strategies.

Laura also explained that she felt very embarrassed by her relatively long and informal introduction, given that several of the other introductions ran to only a line or two, and only identified the writer's teaching field and school (see Philip's introduction). She felt that this was probably a gender issue: the men tended to define themselves more in terms of their jobs and institutional positions (at least in the context of this unit), and the women in terms of their families, pets, interests and histories. Or, as Laura more pungently put it, "We have a life outside the job!" (It's also possible, though, that our own discourse as tutors had tended to encourage a more formal and 'professional' discourse in the unit, in spite of our own aspirations for a more 'human' and connected way of communicating. (The language in the preceding sentence may offer some clues as to why!))

Laura was also unhappy in her school context - she felt isolated and unsupported, and appreciated the opportunity to discuss issues important to her teaching, but was disappointed that other members of the class didn't take more advantage of these opportunities. Laura and Emma - a member of the class living in Ireland - sent a number of private e-mail messages to one another (invisibly to the tutors). Emma asked Laura to write one of the commentaries on her teaching story for Module Two.

## **Perceived Benefits - Was it 'better' for Laura?**

Laura was quite definite in saying that the Web component significantly improved her learning experience. The most important advantage was feeling like a member of a class, rather than an isolated individual, and feeling that her tutors were people with families and lives of their own, rather than just names at the bottom of returned assignments. In her final assignment, she concludes her discussion of a fascinating teaching innovation that she attempted in her classroom as a result of her study in the unit by saying:

I believe I have had a very valuable learning experience this semester. Not all my attempts at change have been successful. Nor did I expect them to be on a first trial. I certainly do feel disheartened that my beliefs and my practices are so far apart. On the other hand, studying has given me a lot of confidence to speak to the administration on a few matters... The excellent grades I have received for my first two assignments have been an enormous boost to my self-esteem. I can go a whole year without a work-related positive comment from an adult. Fortunately my students...are far more generous. I have also benefited from reading other students' assignments. I was able to see things from a different perspective and it improved my understanding.

## **Synopsis of Case Study 2 - Philip Knightsbridge**

Philip is an experienced secondary school science teacher who works in a prominent single-sex private school in an Australian capital city. During the unit, he was promoted to Head of Science for this institution. His first child, a daughter, was also born during the semester. Philip produced some excellent, thoughtful and reflective work and achieved a final grade of 89%.

Philip was of particular interest to us for three reasons: (1) he achieved well, and seemed to have developed a good understanding of the goals of the unit; (2) he was representative of a cohort of students within the group - five students were male teachers of upper secondary school science; and (3) he had attempted - and not completed - this unit in 'paper-and-mail' mode the previous year, and therefore had a good basis for a direct comparison between modes of study.

### **Philip's Technical Context**

Philip's Internet connection was at work rather than at home, and he used a Pentium (PC) computer with Netscape as his browser and Pegasus for e-mail. The computer that Philip used at school was in a general computer lab, rather than on his own desk, which meant that he did not have completely free access. Philip had had previous experience with the use of both e-mail and a Web browser. His connection at school was operating for the entire semester, so he had the opportunity for relatively good access to our Web site. In the mid-semester survey, Philip indicated that he had visited the Web site 'at least weekly', and that he had benefited 'lots' from his participation.

### **Philip's Participation**

Philip was one of the more active participants in the Discussion Room, with a total of four messages, including his response to the mid-semester survey. This was still far short of what we as tutors would liked). In contrast to Laura, Phillip's 'Introduction' message was quite terse:

My name is Philip Knightsbridge and I live and work in Sydney, Australia. I teach Chem and Yr 10 science at an Anglican boys school. I'm enrolled in the MSc at SMEC. One of my interests is in the use of computers in learning in science ed. (Actually things are a little wild at our place at the moment as our first baby is due this week so I'm sure my early correspondence will be sporadic.)

Two of Philip's (male) colleagues at the school were also studying this unit, and their self-introductory messages were similarly brief, concentrating on where and what they taught, and on their institutional position, rather than on family or out-of-work interests. Philip's message was actually fairly unique among our male students in that he mentioned the impending birth of his child - a humanising touch that was largely absent from the messages of others. In contrast, the introductory messages from the female members of the class were usually several paragraphs long, and introduced partners, children and pets (see Laura's self-description). Philip explained that what he had said about himself reflected what he was most interested in knowing about others in the class. These interests were mostly related to teachers' professional contexts (i.e., subjects and year level taught), because he perceived the unit as being about professional development, and this was the kind of information about others that he needed in order to relate their contributions to his own context.

However, Philip's second message announced the birth of his daughter, and initiated a flurry of congratulations and Discussion Room activity. In hindsight, it seems to have been these human touches of life information that really encouraged people to respond and interact - why did we not manage to elicit more such moments? How, in a non-artificial manner, could we encourage students to reveal more of their lives to one another?

### **Constraints and Supports for Philip's Learning**

We had thought that, because two other teachers in Philip's science department were enrolled in the unit, there would be significant opportunities for collaboration and discussion, but Philip told us that they really hadn't talked much about their studies. The second module of the unit requires teachers to write a teaching case story and ask colleagues for written commentaries - Philip said that this activity was valuable, and that it encouraged him to a greater extent to seek reflective discussion with his colleagues, but there seems to be little evidence that this actually happened. Philip also noted that, although he thought student-student interaction by e-mail within the unit would have been valuable, he had not

initiated or participated in any such exchanges himself.

Philip felt that he was constrained - even more than most practising teachers - by external pressures in completing this unit, because of the combined pressures of a new baby in the house and a new role at school. Combined with his problems of access to the computer, this meant that Philip really enjoyed the unit and felt that it was valuable, but he was somewhat dissatisfied with the extent to which he had been able to participate.

### **Perceived Benefits - Was it 'better' for Philip?**

Philip's interview responses were very positive about his experience in using the Web component of the unit. He described this mode of study as "far superior" to the usual 'paper-and-mail' mode, and said that the materials were clearer and easier to understand. He suggested that factors in his relatively higher level of participation included that fact that he enjoys electronic communication and finds it valuable for his own learning.

Was possible to separate the benefits he received that related to the unit study materials (presented in paper form) from those due to the Internet component itself? Philip said that he felt the unit materials were good in themselves, but that the electronic components of the unit definitely enhanced his learning experience.

### **Conclusion**

The results of this ongoing study are encouraging, revealing and suggestive for our future use of electronic communications in enhancing the quality of teachers' learning experiences in the distance education mode. From a social constructivist perspective, we have obtained prima facie evidence of unique (albeit intangible) benefits accruing to students who made use of our Web site, especially enriched social learning experiences.

We also have discovered a number of key factors that can unduly constrain distance learners' educational use of electronic communications. Poor connectivity can be a severe constraint, even amongst enthusiastic technophiles and highly capable students. The intensification of teachers' professional lives can leave little time available for participation in non-compulsory enrichment activities (such as supplementary Web-based components) despite their perceived advantages. The user-friendliness of a Discussion Room can be compromised by the dominance of the tutors' expert voices, and by the dispassionate and impersonal voices of other students. We detected signs of gender differences in the voices projected by students in their Discussion Room messages.

So, where to from here? Should we integrate fully the Web-based component into the teaching program, thus rendering student participation compulsory and assessable? But what about students' differential quality of connectivity? Should we promote a more gender-inclusive rationality in the Discussion Room, one that allows teachers to engage in more personable communication, perhaps to 'swap war stories'? But how might other students respond whose enculturation in science, mathematics or technology education has legitimated a masculinist worldview and sense of self-representation?

This study has raised our hopes and generated challenging dilemmas. Continuing research of our use of the Web for enriching the learning of our postgraduate students is an essential ingredient in our future teaching.

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