DOCUMENT RESUME

ED 441 788 SP 039 246

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TITLE Multiple Understandings: The Use of Different Sources of Feedback To Support Self-Study of Teaching in Information Technology.
PUB DATE 2000-04-00
NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 24-28, 2000).
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Faculty; *Computer Uses in Education; Doctoral Programs; *Educational Technology; Electronic Mail; Feedback; Foreign Countries; Graduate Students; Graduate Study; Higher Education; *Information Technology; Self Evaluation (Individuals); Teacher Role; Teaching Methods; *World Wide Web
IDENTIFIERS *Australia; *Hong Kong

ABSTRACT

This paper describes how multiple sources of information were used by two educators to develop new understandings about their roles as teachers of information technology research to a multinational class. The information was gathered from students who provided feedback via an asynchronous Web-based chat space, e-mail, written assignments, and informal discussions. The teachers also provided each other feedback via e-mail and formal discussion at weekly meetings. One of the educators had considerable experience in pedagogy and curriculum design but little experience in using the World Wide Web to support learning in tertiary settings. The second educator had little experience with pedagogy and curriculum design but considerable research and practical experience in using the Web to support learning in tertiary settings. The goal was to combine the two educators' skills in order to improve the design, implementation, and evaluation of a new postgraduate subject delivered by a mixture of face-to-face and Web-supported instruction. However, the educators had another more important purpose, and this was to use the multiple sources of information to gain insights into the effectiveness and appropriateness of their teaching practice and to use this information to improve and modify their teaching. (Contains 16 references.) (SM)

MULTIPLE UNDERSTANDINGS:
THE USE OF DIFFERENT SOURCES OF FEEDBACK TO SUPPORT SELF-STUDY OF TEACHING IN INFORMATION TECHNOLOGY

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Paper presented at the American Educational Research Association Annual Meeting, April 24-28, 2000, New Orleans, LA.

Multiple understandings: The use of different sources of feedback to support self-study of teaching in information technology.

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Abstract

Brookfield (1995, p. 1) asserts that "one of the hardest things teachers have to learn is that the sincerity of their intentions does not guarantee the purity of their practice." After considerable soul-searching the first author, a teacher of some 31 years of experience, found it difficult to accept that his practice did not always match his intentions. The reason was that regular feedback was needed from multiple sources in order to view his teaching practice from different perspectives. The sources of information that provided "backtalk" (Schön, 1987)were responses about content and the manner of his teaching from those he taught and taught with.

This paper describes how these multiple sources of information were used by the authors to develop new understandings about their roles as teachers of information technology research to a multinational class. The information was gathered from students who provided feedback via an asynchronous web-based chat space, e-mail, written assignments, and informal discussions . The teachers also provided each other with feedback via e-mail and formal discussion at weekly meetings. The first author had considerable experience in pedagogy and curriculum design, but had little experience with the use of the World Wide Web to support learning in tertiary settings. The second author had little experience with pedagogy and curriculum design, but had considerable research and practical experience in using the Web to support learning in tertiary settings.

Our goal was to combine our skills in order to improve the design, implementation and evaluation of a new postgraduate subject delivered by a mixture of face-to-face and Web-supported instruction. However, the authors had another more important purpose, and this was to use the multiple sources of information to gain insights into the effectiveness and appropriateness of our teaching practice and to use this information to improve and modify our teaching.

Introduction

In 1999, the authors taught a new postgraduate subject: *Research in Learning Environments*. Offered by the Faculty of Education, the subject was designed to support doctoral students in the process of developing a research proposal specifically in the field of information technology in education. The research proposal was to be a first draft of one that would be formally presented later in the year. Six students were enrolled in the subject. Three students were from Sri Lanka, two students were Australian, and one student came from Papua New Guinea.

The subject was delivered as a mixture of face-to-face and Web-supported instruction. In 2000 this subject is being offered to Australian-based students and to students from Hong Kong. A similar delivery strategy will be adopted for Australian-based students, however, the prime mode of delivery for Hong Kong students will be on-line, but it will be supported by an intensive workshop held half way through the teaching session.

The authors realised during the planning stage of the subject that multiple sources of feedback would be required in order to understand how well our intentions matched our practice. We

were cognizant of literature (e.g., Brookfield, 1995) that acknowledged that teachers find it difficult to accept that the sincerity of their intentions does not guarantee successful learning. Also, our previous research in constructivist-learning environments (Ferry, 1996; Agostinho, S., Lefoe, G., & Hedberg, J., 1997; Corrent-Agostinho, S., & Hedberg, J., 1998; Corrent-Agostinho, S., Hedberg, J., & Lefoe, G., 1998; Hedberg, J., & Corrent-Agostinho, S., 1999) informed us that it is naïve to assume that the meanings and significance we place on our instruction are the ones that students take with them. Thus we came to this subject with a premise that the success of our teaching, would depend on our ability to understand the prior knowledge, skills, and attitudes students brought to the subject. Further, we believed that we needed to develop an understanding of the students' learning processes, and in order to achieve this goal, we would need to make effective use of the information we gathered during the teaching session. Because we had similar histories as learners in information technology, we felt a commitment toward creating a supportive learning environment in which the teacher empowers the student to play a pro-active role in their learning experiences. By sharing and analysing our learning experiences, we were identifying the parts of our practice that we were strongly committed to (Brookfield, 1995, p. 32).

Background

If we regard teachers as practitioners who are unusually adept at handling situations of uncertainty, uniqueness, and conflict, it follows that much of the learning about the profession happens "by doing" in context (Dewey, 1934). Hence learning about teaching occurs by practicing or performing, but this learning needs to be guided by others who are usually practitioners who are familiar with the customs, methods and traditions of the profession (Dewey, 1974). Lave and Wenger (1991) describe such learning as a by-product of the socialisation process that emphasises the cultural, social, linguistic and contextual embeddedness of human thought and action. Bowden and Marton (1998) support this view and claim "meaningful learning of concepts, ideas and principles has to be situated in real-life practices where these concepts, ideas and principles are functional and where they constitute discoursive resources for the learner" (p. 58).

However, Brookfield (1995, p. 29) asserts that learning through guided practice in context does not necessarily contribute to the development of critically reflective teachers. He claims that we need to do more than this and makes a case for the use of four lenses (our biographies as teachers and learners; our students' eyes; our colleagues' experience; and theoretical literature). These lenses allow us to view our teaching from different perspectives and it is through this process that he asserts we develop into critically reflective practitioners. Richert (1992) believes that such teachers are empowered to:

> ...talk about their work and "name" their experiences, they learn what they know and believe. They also learn what they do not know...Teachers who know in this way can act with intent...(acting) as critics and creators of their word rather than solely respondents to it (p. 197).

Brookfield (1995, p. 30) believes that the process of critical reflection in teaching is based on a complex set of interactions that provides feedback which allows us to view our actions through

the four lenses previously mentioned. Each of these lenses illuminates part of our teaching allowing us to become aware of the assumptions that underpin our practice. When done properly, critical reflection allows us to identify the causal, prescriptive and paradigmatic assumptions that we make when we "teach".

The first author, Brian, had previous experience in developing an understanding of the effects of his teaching through the help of a colleague (Dr Garry Hoban). The feedback, occurred on a regular basis and was based on data collected from students as well as Hoban's observations of Brian's lectures. The analysis of this data was mostly done through Brian's interpretive filters as, due to timetable clashes, it was not always possible for him to arrange regular follow-up meetings with Hoban. Thus the final part of the process was limited, to some extent, by Brian's meaning schemes and perspectives (Mezirow, 1991). If it had been possible to hold regular meetings with Hoban then this colleague would have been able to serve as a critical mirror reflecting back on Brian's actions.

An important outcome of the process of critical reflection is its contribution to the development of "the craft of teaching". Donald Schon (1987) has argued that "we must foster and reward development of the craft of teaching" (p. 15). To reward those who are willing to put in the time and effort to develop "the craft of teaching" we need to devise processes that not only foster learning that leads to improved teacher performance; these processes must also benefit current stakeholders who are engaged in this process. If we consider the immediate stakeholders in tertiary settings to be teachers, students and colleagues, then the processes must reward these groups in some way. Teachers benefit from critical reflection when they gain knowledge about how to improve their performance and students benefit when they see that their feedback is translated into actions that enhances their learning.

Like Schön (1987) we believe that the "craft of teaching" is a process that can be learnt through coaching and self-reflection. Such learning is what Schon (1987, p. 158) calls "knowing in action" and involves rules and procedures that cannot be followed in a simple mechanical way. Instead it involves a kind of experimentation that is not 'trial and error' but a process that involves reasoned connection between prior errors and subsequent trials. Thus practice must involve reflection-in-action. Further, teaching is a holistic skill and it must be seen as a whole in order to grasp its subtleties.

However, most teacher education courses are fragmented and Hoban (1999) believes that this situation arises because of two reasons. Firstly, many teacher education courses split the study of learning into independent subjects focussing on psychological and sociological aspects. This can lead to narrow and fragmented view of learning. Secondly, the organisation of these subjects is often based on the delivery of decontextualised, theoretical knowledge that has little relevance to trainee teachers. It is likely that many of the complex interactions that occur in the real world will be missed and the practitioner will come away with a simplistic understanding of the "craft of teaching". Such a "simplistic" view of teaching is likely to promote and perpetuate beliefs

that simple solutions exist to problems associated with teaching and that the dynamics of teaching can be reduced to a linear quantifiable rating system. Teachers who possess such beliefs may still have an understandable pride in their craft wisdom and knowledge but can suffer from what Brookfield (1995) calls "the 'perfect ten' syndrome" as they often set great store by students' evaluation of their teaching. As a result, they suffer from feelings of guilt and incompetence when their student evaluations do not match their expectations.

A journey into unchartered waters

At the end of 1998, Brian was asked to develop a new subject in information technology. His brief was to develop a subject that could be delivered flexibly to support doctoral students in the creation of a first draft of a research proposal. The proposal was to serve as a platform for a formal proposal presentation later in the year. Brian was faced with two challenges. He was to develop a new subject containing new content and devise a delivery strategy that provided flexible access to content resources for students using the Web. He realised that he would need assistance to meet these challenges. He was a novice in terms of subject Web site development and flexible delivery and did not have time to develop these skills by the start of session. Also, he needed some support in order to organise his research literature into a format that would be accessible to others.

Brian decided to utilise some monetary resources he had received from a teaching fellowship to employ Shirley as a teaching assistant. He approached Shirley because she was completing a PhD study that focused on the flexible delivery of a postgraduate subject via the Web and her expertise was both technical and pedagogical. As a result of her studies, she had developed an understanding of how the Web could be used to support effective learning and had considerable experience in structuring support material for Web-based learning environments.

When we, Brian and Shirley began meeting to plan for the subject, we decided to start by considering approaches we had used in the past and critiqued these from the perspective of reflective practice as described by Brookfield (1995). First, we acknowledged weaknesses in our past practices and that we had failed to systematically analyse data from colleagues and students who provided a mirror of the reality of our practice. Second, we acknowledged that both of us as teachers and learners and were strongly committed to the promotion of a constructivist approach to learning (Driver, 1988) and this theoretical approach affected the way we taught. We were also mindful of the literature relating to 'cognitive apprenticeship' (Brown, et al, 1989) and wanted to adopt a similar model. Through this process we were able to identify the theoretical views that we held about learning and to appreciate that these views influenced our role as teachers.

At this point we realised that we had considered two of the lenses mentioned by Brookfield (1995), but we were aware that two additional lenses were needed before we could fully reflect on our practice in new ways. These lenses were those of student eyes and of our colleagues' experience. In our case the students enrolled varied in age as well as cultural and educational

experience, creating a rich tapestry of valuable information about our practice. (Table 1 outlines the students' backgrounds). It will be seen that this process benefited all teachers and the students regardless of their prior knowledge and experience.

We were aware that it requires an additional effort on our part to allow time for the process of criticism from ourselves and our students to occur. However, we believed that there were benefits in terms of professional growth and renewal that would sustain us in the future. Also we were not bound in by the 'perfect ten syndrome' and we believed that we were being responsible by challenging ourselves and the students to experience new ways of thinking.

Table 1: Background of the students

Student	Age range	Position	Experience	Research interest
Nicole	<30	Primary school teacher	<10 years	Student use of hypertext applications to demonstrate understandings
Sharon	40-50	Secondary school - remedial teacher	>10 years	Students use of drill and practice software to support language acquisition
E ?	50+	Mathematics teacher educator	>20 years	Use of the Web to support student understanding of spatial concepts in Mathematics
Anita	40-50	Science teacher educator	>20 years	Use of simulation to explain the mole concept in chemistry
K ?	30-40	Lecturer - information technology in teacher education	>10 years	Use of the Web to support teacher understanding of the potential of the Web to support instruction
Linda	30-40	University Professional development officer	<10 years	The professional development of novice users of

We began the subject design process by e-mailing experts in the field and searching the Web for examples. Whilst this process allowed us to view models that may have been appropriate, we realised that we would need to do more than find information and organise it into a Web-based learning environment. The way that student learning occurred was important to us and we were not satisfied with just producing a well-prepared and organised subject. In order to achieve our goal, which was to promote effective student learning, we needed to be open-minded about how we would merge the Web-based learning environment with the face-to-face learning environment. We agreed that we needed to be willing to tolerate uncertainty and to be open to suggestion at all times. In Brian's case, he was the subject coordinator and the main instructor with over 30 years of teaching experience. He had received two awards for his teaching and was recognised as an effective and caring teacher. We agreed that he might feel threatened by the process and that he needed to be flexible in order to tolerate ambiguities that would result from the use of the technology and unexpected feedback. Also he needed to be aware that "length of experience does not automatically confer insight and wisdom" (Brookfield, 1995, p. 7). Therefore, Brian needed to feel comfortable with the feedback offered by the students and by Shirley (who was just beginning her career as a lecturer). This would only happen if the two of

us had a strong working relationship that was based upon mutual respect and trust. We regarded this to be an essential factor in contributing toward the success of our self-study as we were able to make use of open and honest communication to help us to develop a better understanding of our teaching.

We also wanted to receive honest feedback from our students. This was challenging as the students from Sri Lanka and Papua New Guinea needed to be encouraged to participate in a process that they were not accustomed; for example, a teacher would not receive public feedback that was negative. The subject was designed to be very open-ended and responsive to the needs of the students. As a result much of the direction that the discussion took was directed by the students who were expected to come to face-to-face meetings after completing activities such as reading key articles, creating a concept map, critiquing research papers, preparing presentations, and contributing to asynchronous on-line discussions. The success of the face-to-face meetings depended on the amount of time students dedicated to the subject during the non face-to-face meeting weeks. Hence it was the on-line work plus the other preparation done by the students that shaped the face-to-face work.

The subject design

Research in Learning Environments, (code named EDGI955/6), was designed to be delivered by a mixture of face-to-face instruction and on-line instruction. The subject outline began as follows:

> The subject *Research in Learning Environments* is designed to prepare you to conduct research in educational technology. The content material will be approached from both a breadth and depth perspective. Firstly, we will examine how research in educational technology has been conducted and this should help you to identify an area of research interest. You will then be required to identify a topic of interest and focus on critical analysis of selected readings and the development of a research proposal that relates to this topic.

The learning outcomes were expressed as follows:

> The subject *Research in Learning Environments* will enable you to:
> - Describe the major trends in current research in educational technology.
> - Describe the general research methods currently employed in educational technology.
> - Develop the skills needed to conduct a literature search.
> - Develop the skills needed for the critical analysis of research literature.
> - Develop and present a research proposal.

Assessment was organised so that a 6 credit point and 8 credit point options existed, and the five assessment tasks for this subject, were clustered as follows:

EDGI 955 (6 credit points):
Concept Map - 20%
Literature Review - 30%

Research Proposal - 50%

EDGI 956 (2 credit points):
Research Proposal Presentation - 50%
Concept Map - 50%

A weekly schedule, which outlined the topic of discussion each week, selected readings and suggested tasks, was detailed on the subject Web site. A sample is provided below.

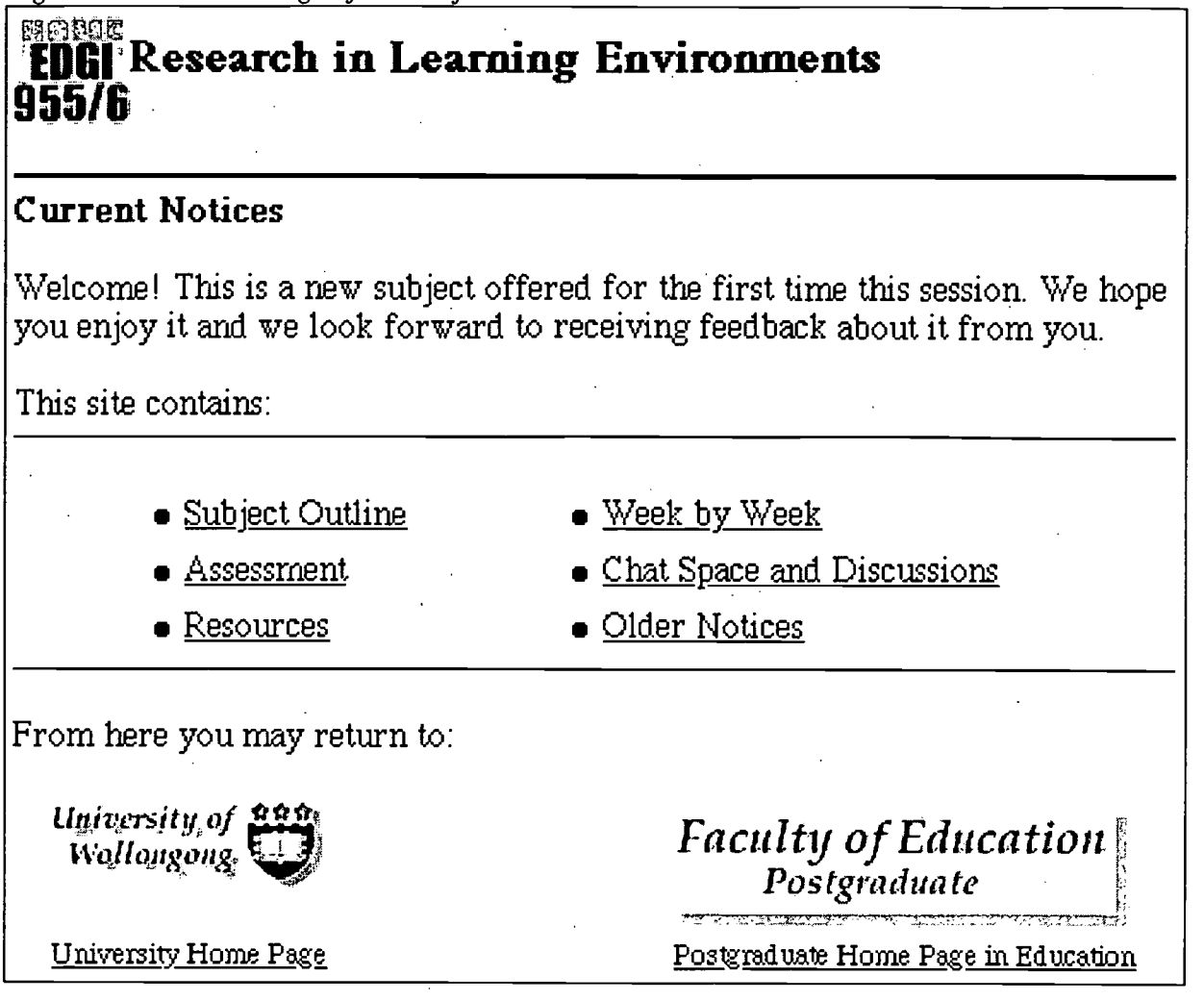
Week	Topic	Required Readings	Tasks to Perform	Assessment Due
1	***Workshop 1*** Introduction to the subject. Introduction to concept maps and Inspiration®. "The changing nature of educational research" - A historical perspective.	Research on Instructional Media, 1978-1988. (Ch. 32, Anglin) The Status and Future of Research in Instructional Design and Technology Revisited. (Ch. 28, Anglin) Table of contents from selected conference proceedings.	Draw a concept map from the week's readings. Participate in online discussion. Review contents of relevant conferences.	
2	***Workshop 2*** Concept maps: "show and tell" and some "joint construction".	Paradigms for Research in Instructional Systems. (Ch. 29, Anglin) Disciplines of Inquiry in Education: A New Overview. (Shulman, 1997) (In "close reserve" from the library.) Questioning the Questions of Instructional Technology Research	Discuss concept map produced.	
3	***Online***	The influence of reflective tools on teaching strategies and subject design. A paper by Ferry & Brown. What We Know about Research in Instructional Technology: Interviews with Research Leaders	Online discussion. Decide topic for literature review. Compile list of search words.	
4	***Workshop 3*** Library search skills.	Chapter 1 and Chapter 2, Creswell.	Library workshop from 4.30 - 6.30pm in the library. Room: Teaching Lab. Conference proceedings and their use. Formation of groups on similar topic.	*Concept Map*

The subject Web site

The subject was supported by a Web site. To access the web site students needed a user name and password.

A snapshot of the Web site Home Page is provided in Figure 1.

Figure 1: The Home Page of the subject Web Site



The *Current Notices* space at the top of the home page informed students of changes to the web site and provided up-to-date information about the subject. The *Subject Outline* area detailed information about the subject. The assessment tasks and their criteria were detailed in the *Assessment* section. Relevant on-line resources were provided in *Resources*. Resources could be expanded as students made contributions. The *Week by Week* space provided the weekly topic schedule and included links to useful on-resources. The asynchronous chat space (DISCUS) was available from the *Chat Space and Discussions* link. Each time a new notice was posted the previous message was archived under *Old Notices*.

The students and the teachers also used email to communicate amongst one another.

Details of EDGI 955/6 Resources

The resources are described in more detail as they were designed to support on-line learning and the section that follows is taken directly from the Web site. Note all underlined text were linked to on-line resources.

Details of EDGI955/956 Resources

Some resources are provided to assist you to develop your concept map and to design your research proposal.

Notes for the Guidance of Research Students
This document has been compiled by the Graduate School of Education to assist postgraduate students to develop a research proposal. Milestones in the research process are outlined and a template illustrating the format for a research proposal is provided.

Agostinho, S. (1996). Interactivity and Network Learning: Instructional strategies used in educational World Wide Web sites. A Ph.D Research Proposal, presented and defended at the Graduate School of Education Research Student Colloquium, 26-27 July, 1996.

Example of a concept map produced by Brian Ferry in Master of Education (Honours) thesis, 1993.
Web resources you may find helpful

(When accessing these resources, remember to either bookmark this site before you view the resources or click on the "Back" icon to return to this site.)
Doctoral Research in Educational Technology: A Directory of Dissertations, 1977-1998
This is a directory of dissertations compiled by Edward P. Caffarella, Ph.D. Professor of Educational Technology University of Northern Colorado Greeley, Colorado, 1999.
You may want to search this database to get a 'feel' for the topics that have been researched in educational technology. This will assist you in compiling your concept map. Please note this database only refers to dissertations written from 50 higher education institutions in America.

ITFORUM Web site
This is a very useful listserver archive that provides a collection of discussion papers regarding issues in instructional technology.

An example from this archive provided as a reading is:
ITFORUM paper No. 5: Questioning the Questions of Instructional Technology Research, by Professor Thomas C. Reeves.

The following papers may assist you to identify concepts to include in your concept map and may provide some ideas or your research proposal.
Technology, Multimedia, and Qualitative Research in Education by Trudy Campbell Kansas State University.

What We Know about Research in Instructional Technology: Interviews with Research Leaders. A presentation at the annual conference of the Association for Educational Communications and Technology. St. Louis, MO. February, 1998 by Marshall G. Jones, John D. Farquhar, Stephen W. Harmon, Susan Land, and Daniel W. Surry."

Our experience in teaching the subject

Some of the major teaching events that occurred during the session are described and how the sources of 'backtalk' were used to helped us modify and improve our instruction are explained.

The subject began with two three-hour workshops held during weeks 1 and 2. The goals of these workshops were to introduce students to the outcomes of the subject; to present a lecture to situate the current nature of education research from an historical perspective ; to introduction to students to concept maps and the application program Inspiration®; to demonstrate how to use Inspiration ®; to model how to participate in online discussion; and to allow time for discussion. Brian led the workshops and Shirley provided feedback to Brian, asked questions and participated when she could see that the students required further explanation. Both of us recognised that Shirley had an important but difficult role to play as she had to judge when it was appropriate for her to participate because we wanted her to act as a catalyst rather than as a resource person for students. Thus she helped with the facilitation of discussion, the generation of student questions and feedback. At the same time she provided Brian with constructive criticism.

During the first two weeks Shirley was 'finding her feet' and she asked Brian for feedback on her role in class. As Shirley had met most of the students in another subject and had worked with Brian on other projects, she had little difficulty in taking on the role expected of her. Her feedback to Brian was constructive and raised important pedagogical issues that needed to be addressed. One important issue raised was the lack of student experience with concept mapping. When we were planning the subject we were informed that all students would have completed two information technology subjects that used of concept mapping techniques to explore their knowledge base. It turned out that only one of the students had studied these subjects. As a result, we had to respond to this situation in week 2 because an assignment requiring students to create a concept map was due in week 4. We decided that we would demonstrate the process of concept map construction in a team teaching situation. Brian lead the demonstration (as he had a PhD in this area) and used a white board. During the demonstration he spoke out loud so that his own thinking was made public and was subject to student discussion. At the same time Shirley asked clarifying questions of Brian and used the computer software (Inspiration®) to demonstrate to students the use of the computer. Then we conducted a joint workshop where the students practiced constructing concept maps with computer software. At the end of this workshop we could see that the students were capable of independent construction of a concept map.

During our weekly follow up meeting, Shirley provided the first feedback from the students. Whilst they were happy with their progress in learning to construct concept maps, they felt less certain about completing the first assessment task because they were unfamiliar with the research literature. They suggested that the concept mapping task might be more useful if it were done at the end of the subject when they were more familiar with the literature. Brian then realised that the students did not understand the purpose of the task which was to provide them with a "snapshot" of their current knowledge of the literature and to use their first map as a scaffold to build upon. Because he did not explicitly state this in the assessment task, students did not know the true purpose of the task. An excerpt from the subject outline illustrates this point.

You are to develop a concept map that summarizes your understanding of past and current research in information technology. The map should indicate the research issues and the research methods employed.
The concept map should be produced using an appropriate software application package (for example, Inspiration®) and is to be submitted in paper format during class.
Your concept map should show:

- The extent of the field of information technology, that is, what is being researched and the research methods employed.
- Demonstrate an organisational structure that is hierarchical and contains branches that start with the most inclusive concept and end with the least inclusive concept.
- Include labelled links and cross links.

He responded to the student concerns and his omission by explicitly explaining how the concept could be used as a scaffold for their research proposal.

The third week was on-line and involved discussion of two articles as well as discussion about the concept maps. The following excerpts from the asynchronous chat space shows that the tone of these conversations was focused on the first assessment task.

Do you expect our concept maps to cover what we think is the field or rather contain only what we read from the two chapters in Anglin? Do you expect us to do something completed like the one you had on the web?
(Linda, Week 2, Thursday March 11)

We expect that your concept map may look like what we had on the web but mine is an example that was completed after several years of study. When I look at it now I realise I have left out a few things!! You will need to clarify which part of the map is likely to be the focus of the literature review and your research proposal.
(Brian, Week 2, Thursday March 11)

However, the tone of the discussions about the compulsory readings soon focused on higher order issues as shown by the quotes below.

1. First of all I would like to talk about the three levels of understanding which pre-service teachers had to develop in the learning process using the constructivist learning theory... I think it would have been much clearer if a brief explanation was given on what the students actually did in each level in the learning process.
2. I'm interested to know why teachers chose the software programs that were used in the classroom.
3. Another important point in this article worth mentioning is, the teachers had a good rapport with each other, they collaborated together, shared their ideas, expertise and had a similar philosophy. This was indeed the secret of their success in teaching the subject. Maybe more should have been mentioned on the type of collaboration that took place between students and their peers, between students and teachers in this class and maybe from other research as well. I am sure the social interaction was a key factor to the successfulness of this subject.
(Nicole, Week 2, Sunday March 14)

> Firstly thank you to Linda and Nicole for their responses. I think the following things need to be added to the paper:
> 1. more actual data to support the contention that thinking tools and the strategies employed have affected "the depth of student reflection".
> 2. I think a little more literature about "thinking tools" needs to be added. What do you think?
> 3. Also, I think the concept of metacognition needs more elaboration.
> 4. A big point that Nicole alluded to - was that the 2 teachers worked really well together - they truly collaborated and in that process they too underwent a process of reflection. This is a very important point
> because not only is this paper suggesting that a student environment should be one that encourages peer collaboration and not competition - could the same can be suggested for the teacher environment? (Shirley, Week 2, Sunday March 14)

At the end of Week 3 we felt that the students demonstrated that they had an understanding of the first assessment task. Also it was obvious that they had read the articles and were using the chat space effectively. We decided to mark the concept maps independently and average our marks. Prior to marking we met to discuss our expectations and at this stage differences in our expectations emerged. Shirley expected to see concept maps that contained a series of specific concepts that linked to 'doable' research topics, but Brian expected to see maps that displayed a more general research topic linking to concepts associated with research in learning environments. He expected to see less detail as he felt that the topics would change over the next few weeks as the students became more familiar with the research literature. We decided that each of us should apply our own set of expectations as this had not been made clear to students and the use of the two approaches would cover most contingencies. After marking each map we would then average the marks. The marks were 2 passes, 3 credits and 1 distinction.

After we returned the marked maps time, we made time for students to provide feedback to Brian via face-to-face interviews. The feedback showed most students expected to score higher marks as they put considerable time and effort into their maps. All felt that the time required to completed the task was not commensurate with the marks allocated.

Shirley asked if they had discussed their map with colleagues and only the Sri Lankan students said that they done this. After analysis of the potential research topics selected by the students, we decided to that we could organise them into pairs for the next assessment task as this would encourage them to share ideas and to work collaboratively.

The second task was as follows:

> You are to form a group of two students and critically review four research articles associated with your chosen field of research. The four articles that you choose should link to a common theme. One article must be a journal article, one article must come from a conference proceeding, one article must come from the World Wide Web and the fourth article is to come from another source.
> Because the review will relate to a research theme, the introduction should outline the area of research and explain how the selected articles relate to your chosen area. Each article should then be discussed. In this section you need to critically analyse the article discussing its strengths and limitations as a publication including the appropriateness of the research methods employed. You may also want to suggest how the article could be improved. The review should conclude with a statement about the sorts

> of articles that you might wish to use in an extended review of literature about your chosen research area. A small selection of relevant citations from your on-line discussions should be included.

We expected that this task would generate concern as we were asking them to work in a different way. It came as no surprise that the students were forthright in expressing their concerns on the discussion forum as shown in the following excerpt:

> I am really worried about the work load that will be involved in the literature review assignment and my proposal. My problem is this, I will be working with a partner in our literature review assignment on a topic which may be completely different to my own topic or the area of my interest. Beside this workload in this assignment, I will then have to work on my own to prepare for the presentation in EDGI956 (review literatures on my topic etc). Don't you think this will be too much work for me? (L, Week 3, Thursday, March 18)

Brian replied as follows:

> The literature review is not as big as it sounds it is really a critique of 4 linked article that are around a common theme. You can split the work so that you 2 each and then you just have to add the intro and conclusion. Much of it can be done independently and then you can use e-mail to tie it together. (Brian, Week 3, Friday March 19)

Both of us felt that we had to encourage our students to work 'outside their zone of comfort'. In doing so we had to be supportive and helpful, but remain focused on what we believed were the goals of the process, that is: to promote collaboration and the joint construction of knowledge about how to critique research literature relevant to their proposed research topic. A certain amount of student criticism was expected and we were pleased with the openness of the concerns raised in face-to-face and on-line discussions as it demonstrated that students were thinking "deeply" about issues, a degree of trust had been established, and every member of the class was prepared to voice a rational argument. However, we believed that the process was beneficial and we described what these benefits would be to the class. Some were still not convinced but they completed the task in good faith and produced some well written critiques.

Shirley marked the second assignment; the literature review. She conferred with Brian before marking because the use of this strategy avoided giving students 'mixed messages' about assessment. However, this time there was close agreement on the criteria and when Brian reviewed the marks there was close agreement between our expectations. The standard of the work was quite high and during a follow-up meeting the students said that even though they originally opposed the idea, they had benefited by working with a partner. Two members of one group never met face-to-face as they lived over 80 km apart and found it easier to use e-mail and the telephone. Thus distance was not a barrier to collaboration.

We felt that after the second assignment was returned, the students showed increasing signs of confidence in themselves and trust in us as teachers. This was based on two sources of feedback. First they were more willing to raise issues in face-to-face meetings and on-line. Second they provided Shirley with positive feedback after class. However, the first half of the

session was really preparation for the task of writing and presenting a draft of a research proposal (assignment 3). The guidelines for assignment 3 are presented below:

> Research proposal
> [50% of final grade for EDGI 955, to be submitted in Week 14.]
> You are to prepare a research proposal that can be presented for faculty approval as a future Doctoral study.
> Details of assessment criteria are available from the class web site.
>
> Presentation of proposal
> [50% of final grade for EDGI 956. 20 minute presentation. Due: Weeks 12 - 13 during class.]
> You are to present your research proposal to the class. Your presentation should be complemented with visual aids (for example, you can use Powerpoint). Summary notes (which can be in Powerpoint) are to distributed to each class member and submitted.
> Details of assessment criteria are available from the class web site.

A model of a research proposal was available from the subject web site. Also a copy of the faculty guidelines for presenting research proposals was available at this site. Even though we had provided a model, some guidelines, and a chat space, the students had the tasks of constructing a proposal and of synthesising their work into a 20 minute presentation. Shirley suggested that we needed to provide some workshops where students could work in groups to discuss and prepare important parts of their research proposal such as the justification of the proposal, the purpose statement, the research questions and the methods. We then approached the students for their opinions and gave them the option of canceling an on-line session in favour of a series of workshops. All voted for the workshops even though one student lived more than 80 km from the University and two students were full-time teachers. As a result, three weekly workshops were organised.

Brian began the first workshop by assigning students to the same pairs that worked on the literature reviews. However, Shirley soon realised that there were common problems among the groups and she suggested that Brian conduct a joint session where he modeled for the class the construction of a justification statement and a purpose statement. This strategy was successful and we followed the same procedure for the next 2 weeks. Also we used the asynchronous chat space to follow up any issues students wanted to raise after the face-to-face meetings.

By the end of week 11 we were confident that the research proposals were progressing well and we then turned our attention to the presentations as we realised that this would be a challenge for the overseas students. We asked on overseas student (Silvia) that Brian was supervising if she would present her proposal to the group as a trial because she was to formally present her research proposal in 2 weeks time. We felt that this was beneficial for her and the students as he was able to practice and gain feedback from Brian and Shirley before her formal presentation and the students were exposed to a "real and current" research proposal.

After Silvia's presentation time Brian suggested that Shirley lead a presentation based upon her PhD proposal. Brian felt that Shirley should provide the presentation as her propoal would

closely match the needs of the students because she was still finishing her own PhD and had recent experience with the proposal process. Further, he realised that the students regarded Shirley as a person of high credibility and her input would be highly regarded. In planning the presentation we decided that at first the proposal would be presented in its entirety and then Shirley would break it into sections to show how she constructed her presentation using Powerpoint. If necessary Brian would ask questions to prompt her.

We were heartened when the students asked all of the questions and later we found out that all students took the opportunity to rehearse their presentations with a peer prior to presentation. The final presentations were viewed in the rehearsal stages by some of our peers who instructed them in other classes. Like us, they were impressed with the structure and way that the students presented their proposals.

When we came to mark the presentations, Shirley suggested that the students should participate in the grading of the research proposal presentations. She discussed it with Brian and he agreed. She developed a criteria template which was used. The template was issued to both lecturers and to all of the students who graded each other's presentations.

The students appreciated such involvement as they felt that their opinions were taken seriously and we were treating their presentations seriously by allowing everybody to provide constructive feedback.

To assist in Brian's heavy workload, Shirley marked the research proposals and then Brian checked her grading. Her comprehensive and constructive feedback provided the students with further ideas that they could follow up. The positive remarks made by students about her feedback indicated that they appreciated her thorough approach to the marking of their proposals. Since completing this subject 3 of the students have enrolled in EdD degrees and another 2 have applied to start an EdD in 2000.

Conclusion and implications

By trying to get as close to the students' experiences as we could, we were engaging in what Marton (1988) calls a "phenomenography of learning". Such an approach helped us to understand how the students experienced, cognitively and emotionally, the learning tasks that they were engaged in. We also feel that we effectively used the various forms of feedback such as: each other and our students to provide a rich source of 'backtalk' (Schön, 1987). This 'backtalk' guided our teaching and allowed us to be proactive in dealing with the needs of our students.

However, we would not claim that the relationship between us, as teachers, and among all members of the groups was always warm and effusive, but it was based upon trust, and mutual respect. Through honest discussion of our different points of view we were able to modify our

teaching to better suit the needs of our students or alternatively persuade our students to move outside their 'zone of comfort' and experience different approaches to their learning.

We feel that the most important feature of our experience was our strong working relationship as at all times we felt that we valued each other's contribution even when it was contrary to the other person's current beliefs. Through discussion, planning, the use of feedback from students and appropriate reference to relevant theory we were consistently able to resolve differences in opinion and to take action that we felt led to more effective learning outcomes for our students. This was our primary goal. However, the co-lecturing relationship also led to effective outcomes for us as teachers. Brian's pedagogical experience enabled him to be a mentor for Shirley. Shirley's technical expertise provided a scaffold for Brian.

Through face-to-face and on-line forums that were non-threatening, we encouraged learners to have control over communication and high involvement in topic negotiation as well as the delivery of instruction. The chat space allowed students to maintain links with their learning community remotely and to take advantage of the scaffolding provided by such a dynamic social context. Such links are not limited by the constraints of time and space and allow for legitimate peripheral participation (Lave & Wegner, 1991).

The experiences described may also have implications for teacher mentoring in tertiary settings. The relationship that Brian and Shirley established allowed both of them to grow and enrich their teaching experiences. Shirley experienced cognitive apprenticeship by observing and participating as a teacher in his class. She had the opportunity to mark assignments which not only benefited Brian by saving him time but served as a learning experience for her as she was able to get feedback from Brian about her marking. In a period when universities are encouraging flexible delivery strategies, this co-lecturing arrangement may be an effective strategy for developing the skills of university lecturers. Brian was able to receive support and training about flexible learning from Shirley and was able to offer a great deal more for his students.

This story, however, does not end here. It is really just the "opening of a door" as we both have so much to learn about ourselves as teachers and our students as learners.

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