

## **Synergetic partnerships: Towards more effective professional development in IT use in tertiary teaching**

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### **Abstract**

This paper describes a synergetic partnership between two teachers (the authors of this paper). One had expertise in pedagogy and curriculum design, but had little experience with the use of the Web to support learning in tertiary settings. The other had little experience with pedagogy and curriculum design, but had expertise in using the Web to support learning in tertiary settings. The paper explains how the authors collaborated to develop deeper understandings of their roles as teachers and users of information technology to support adult learners. The process combined the skills of both teachers and led to improvements in the design, implementation and evaluation of a subject delivered by a mixture of face-to-face and Web-supported instruction. Two additional purposes were also achieved. First, both used multiple sources of information to gain insights into the effectiveness of their teaching practice and to use this information to make on-going modifications to the on-line delivery of the subject. Secondly, both teachers were able to extend their technical skills.

Data were gathered from students who provided written feedback via an asynchronous discussion forum, e-mail and written assignments, and informal oral feedback via discussion with a teaching assistant. The teachers kept journals and used these entries to provide each other with feedback via e-mail and formal discussion at weekly meetings.

### **1. Introduction**

The history of the introduction of technology in education is littered with broken promises and poor performances. As a result, teachers and administrators have become wary of visionaries bearing the latest computer-based application touted as the solution to their problems (Bork, 1995; Sewell, 1990). Jonassen, Peck and Wilson (1999, p. 2) argue that one reason for this is related to the traditional assumptions about learning held by teachers and students. Such assumptions are based on the belief that students learn from teachers who present to students what they know. If these assumptions are applied to technology, the belief becomes "students learn from technology what the technology knows" (p. 2).

Jonassen, Peck and Wilson assert that technologies can foster and support learning but students cannot learn from technologies—they need to be engaged by activity so that different kinds of thinking occurs. They argue that there is a need for technology-based courses to shift from the 'learning what the technology knows model' to one that makes full use of modern multimedia and communication capabilities by engaging learners in ways that foster different kinds of thinking. Such courses need to be highly interactive, but still have to be realistic in cost and time. However, as Collis' (1998, 1999) research shows, few academics possess all of the skills needed to develop such courses. This situation is exacerbated by a lack of professional development opportunities for academics in the use of

educational technologies (ET) as, in the rush to acquire the latest hardware and software, their professional development needs have been largely ignored (Ferry, Hedberg and Harper, 1996). These assertions about professional development are not new as they have been raised by a variety of researchers over the past decade (e.g. Ambron & Hooper, 1988; DETYA, 2000; Gagné, 1987).

The latter half of the 1990's in Australia saw the allocation of resources of some significance to the training of school teachers in ET, but this was not the case in universities as they suffered from a combination of shrinking budgets and increased student numbers. As a result less money was available for staff development, and most academics received little, if any formal training in the effective use of educational technologies. In most universities a minority of academics made good use of ET to support student learning. However, the majority struggled to keep up but some decided that they were not prepared to invest the effort needed to learn new skills and avoided ET as much as possible. Even a cursory glance into the "high-tech" lecture theatres at most universities reveals that there are still a significant percentage of academics who make little or no use of the new technologies available (Green, 1998). In some cases there may be sound pedagogical reasons for these decisions, but there are still many other occasions when the decision not to use the technology can be related to a lack of professional development. However, we acknowledge that universities in times of shrinking budgets do their best to offer staff development courses in information technology, but it has been widely recognised that such one-off training courses are ineffective (Ingvarson, & McKenzie, 1988). What is learnt quickly fades away after the learner returns to the workplace and, unless there is an opportunity to continue employing the skills learnt in real-life situations, the time and effort invested in developing the new skill is wasted (Squires & Coward, 1981).

It is timely to explore another approaches to profession development and this paper describes one alternative to one-off training courses. In particular the Australian Department of Education, Training and Youth Affairs (DETYA) supports "a range of professional development models" and wants to "stimulate and disseminate research into effective professional development using ICT (information and communications technology) and into the relationship between new technologies and improvements in learning outcomes" (DETYA, 2000. p. 6). Thus this paper contributes to the stimulation and dissemination of research into effective professional development in the use ICT to support student learning.

The purpose of the paper is to describe how the outcomes of a small-scale but sustained approach to professional development benefited both the students and lecturers involved. The goals of our research were:

1. To describe how we used the data gathered from our journals, meetings and interviews with students to inform the progressive development of our on-line subject.
2. To identify significant events that affected the way we taught on-line and face-to-face.
3. To describe the strengths and weaknesses of our approach.

## **2. Background**

Good teachers are practitioners who are unusually adept at handling situations of uncertainty, uniqueness, and conflict and much of their learning about the profession happens 'by doing' in context (Dewey, 1934). 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 that "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 discursive resources for the learner" (p. 58).

Thus learning about teaching occurs by practicing or performing in context, 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, 1934).

Some more recent researchers such as Guskey (1995) contend that whilst the relationship between professional development (PD) and student learning outcomes is complex, it is not random and chaotic. Factors can be identified and influences observed and it can explain the impact of PD on student learning. However, there are doubts that systematic models of PD can be successfully applied to specific local contexts such as ICT as there are too many variables unaccounted for at the local level. Guskey (1995) points out that there is no one best way at the systems level, but there may be optimal mixes for particular purposes and these 'optimal mixes' need to be investigated.

Recently DETYA (2000) reported of an emerging consensus among researchers on the characteristics of effective PD initiatives. First, they need to be experiential and engaging so that teachers are involved in concrete tasks that illuminate the process of learning and development (e.g. teaching, assessment, observation and reflection). Second, they need to be grounded in enquiry, reflection and experimentation that is driven by the participants. Third, they need to be connected to and derived from teachers' work. Fourth, they need to be sustained, ongoing and intensive, supported by modeling, coaching and collective problem solving and finally, they need to be connected to other aspects of change.

Most PD programs in ICT for university teachers, however, are based upon a training model. Typically, an instructor demonstrates a new skill to a group of teachers and then each teacher goes to a nearby computer and practices the skill demonstrated. The instructor or an assistant wanders around, monitors the progress of the teachers and assists as required. Rarely, if ever, do the teachers see the instructor work with a group of students in a natural learning environment. Therefore, the skill is acquired in isolation from the context and later the skill learnt is applied in context - often through a process of trial and error. This approach to PD of teacher has been criticised by Brookfield (1995, p. 29) who asserts that learning through guided practice does not necessarily contribute to the development of good teachers. He claims that we need to do more than this and argues for a different approach that is based on critical reflection. Brookfield believes that critical reflection is achieved by observing the world via 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) asserts 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 world rather than solely respondents to it. (p.197)

When done properly, critical reflection allows us to identify the causal, prescriptive and paradigmatic assumptions that we make about our teaching. This is particularly important as the use of information and communication technologies (ICTs) to support learning is new and there is a need to "support a range of professional development strategies and models" (DETYA, 2000). An important outcome of the process of critical reflection is its contribution

to the development of "the craft of teaching". Donald Schon (1987, p. 15) believes that "we must foster and reward development of the craft of teaching" and describes such learning as "knowing in action" (p. 151) as it involves rules and procedures that cannot be followed in a simple, mechanical way as they occur in action within a context.

### 3. Teaching an on-line subject and reflecting on its implementation

#### 3.1 Contextual background

At the end of 1998, the first author (Brian) was asked to develop a subject that introduced post-graduate students to research in information technology. The subject was to be delivered flexibly and its main purpose was to support doctoral students in the creation of a research proposal which could be formally presented later in the year. He faced several challenges: one was to develop a new subject containing new content; the second was to organise an approach that allowed for flexible delivery of the subject through the medium of the Web; and the third was a lack of time to develop his expertise to the level required to complete the task effectively and on time. Help was also needed on organising his research literature into a format that would be accessible to others.

He felt that he could achieve his goals more efficiently by seeking help from a person who was experienced in the areas of Web site design and flexible delivery. This person could do most of the development work, and simultaneously act as a scaffold, ultimately extending his understanding and skills in this area. Brian decided to use some money he received from a teaching fellowship to employ Shirley (second author) as a teaching assistant. He approached Shirley because she was completing a PhD study that focused on the flexible delivery of subjects via the Web and she had developed understandings of how the Web could be used to support effective learning and had considerable experience in structuring support material for Web-based learning environments (for example, see Agostinho, Lefoe, Hedberg, 1997; Corrent-Agostinho, Hedberg, & Lefoe, 1998; Hedberg, Brown, Larkin, & Agostinho, 2000). Thus her expertise was technical and pedagogical.

Shirley's experience as a teacher was limited to part-time work in post-graduate subjects offered by the Faculty, but she was keen to develop her skills further and saw the opportunity to work with Brian as way of 'learning by doing' under the guidance of an experienced practitioner. By way of contrast Brian, was an experienced teacher and received university wide recognition for his teaching skills. Thus his expertise was in terms of his understanding of curriculum content (research literature), teaching and the research process.

#### 3.2 The students

The background of the first cohort of students was diverse and are summarised in Table 1.

*Table 1: Background of the students*

Student	Position	Experience	Research interest
Nicole	Primary school teacher	<10 years	Student use of hypertext applications to demonstrate understandings
Sue	Secondary school - remedial teacher	>10 years	Students use of drill and practice software to support language acquisition

Emo	Mathematics teacher educator	>20 years	Use of the Web to support student understanding of spatial concepts in Mathematics
Anila	Science teacher educator	>20 years	Use of simulation to explain the mole concept in chemistry
Kirbu	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
Lalena	University Professional development officer	<10 years	The professional development of novice users of computers

Since 1998 the subject has been taught annually to an on-line cohort in Hong Kong. Each Hong Kong cohort consisted of 18 part-time students who came from varied careers. While the majority of students came from the education sector (primary, secondary or tertiary education), there were also students who worked as IT consultants, solicitors, psychologist and adult trainers.

The Hong Kong subject was introduced as an intensive weekend workshop and then the remainder of the subject was delivered on line using WebCT. The focus of this paper is on the first iteration of the subject. A modified on-line version of the research process was continued with subsequent iterations of the subject and the findings from these data will be briefly discussed at the end of this paper.

### **3.3 The research process**

We wanted to identify and describe the significant events that affected the way we taught on-line and face-to-face. We also wanted to describe the strengths and weaknesses of our approach so that others could benefit from our experience. Therefore it was important to gather information from our journals, our weekly meetings and interviews with students and to describe how this information was used to inform the progressive development of our on-line subject.

Both of us kept journals that were in the form of a learning log (Cambourne, 1988). Learning logs are personal reflections on learning episodes. The author of the log raise questions that help them to clarify their own understandings of a recent learning episode. We brought our learning logs to our weekly meetings and shared our entries. The record of our weekly meeting included our questions plus the tentative categories that we used to describe any common issues. Individual issues written in journals were discussed and allocate a number and a date so that we could revisit them if necessary. Our meeting record also summarised issues raised by students during the week and we categorised as either a face-to-face comment or an on-line comment. Also feedback notes made by Shirley during class were discussed and filed.

### 3.4 Planning of the learning processes

The subject known as EDGI955: Research in Learning Environments, was designed to be delivered as a 14-week subject by a mixture of face-to-face 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

Assessment was organised so that 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 was also produced and a sample is provided below:

Week	Topic	Required Readings	Tasks to Perform	Assessment Due
1	<p><b>Workshop 1</b></p> <p>Introduction to the subject.</p> <p>Introduction to concept maps and Inspiration®.</p> <p>"The changing nature of educational research" - A historical perspective.</p>	<p>Research on Instructional Media, 1978-1988. (Ch. 32, Anglin)</p> <p>The Status and Future of Research in Instructional Design and Technology Revisited. (Ch. 28, Anglin)</p> <p>Table of contents from selected conference proceedings.</p>	<p>Draw a concept map from the week's readings.</p> <p>Participate in online discussion.</p> <p>Review contents of relevant conferences.</p>	

<p>2</p>	<p><b>Workshop 2</b></p> <p>Concept maps: "show and tell" and some "joint construction".</p>	<p>Paradigms for Research in Instructional Systems. (Ch. 29, Anglin)</p> <p>Disciplines of Inquiry in Education: A New Overview. (Shulman, 1997) (In "close reserve" from the library.)</p> <p>Questioning the Questions of Instructional Technology Research</p>	<p>Discuss concept map produced.</p>	
<p>3</p>	<p><b>Online</b></p>	<p>The influence of reflective tools on teaching strategies and subject design. A paper by Ferry &amp; Brown.</p> <p>What We Know about Research in Instructional Technology: Interviews with Research Leaders</p>	<p>Online discussion.</p> <p>Decide topic for literature review. Compile list of search words.</p>	
<p>4</p>	<p><b>Workshop 3</b></p> <p>Library search skills.</p>	<p>Chapter 1 and Chapter 2, Creswell.</p>	<p>Library workshop from 4.30 - 6.30pm in the library. Room: Teaching Lab.</p> <p>Conference proceedings and their use.</p> <p>Formation of groups on similar topic.</p>	<p><i>Concept Map</i></p>

### *Subject Web site*

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

The home page of the Web site contained the information described in Table 2.

*Table 2: Main Features of the Web site*

<i>Feature</i>	<i>Purpose</i>
Subject outline	To provide detailed information about the subject
Assessment	To provide details of assessment tasks and criteria for assessment
Resources	To provide links to useful on-line resources
Week by week summary	To provide a weekly summary of class and on-line events with links to useful on-line resources
Chat space and discussions	To provide an asynchronous forum for discussion about assessments and readings.
e-mail	To provide individuals with communication that could be used to support learning tasks.
Older notices	A record of discussion for reference purposes.

### *Examples of EDGI 955/6 Resources*

The resources were designed to support on-line learning and the section that follows is taken directly from the Web site. All underlined text linked to on-line resources.

#### 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 simple concept map

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, 1977-1999

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 listserv 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.

Thus, the main features of the Web site were access to a full subject outline, a weekly schedule containing links to relevant resources, a resources file which could be expanded as students made contributions, an asynchronous discussion forum and e-mail access to the lecturer and other students.

### **3.5 The synergetic process**

This section describes the important events that occurred during the session and are taken from the data sources previously described. We have told it in the form of a narrative so that the reader can get a 'feel' for the real-life context.

The first iteration of the subject began with two three-hour workshops held during Weeks 1 and 2. These workshops introduced students to the outcomes of the subject, presented a lecture about the changing nature of educational research, introduced students to the subject web site, the concept of participating in on-line asynchronous discussions, and introduced them to concept maps and a concept map tool called Inspiration™. It also modelled how to participate in on-line discussion. Time was also allocated for discussion. Brian led the workshops and Shirley participated by asking questions when she could see that the students required further explanation. Shirley had an important role to play as she had to judge when it was appropriate for her to participate because her role was to act as a catalyst rather than as a resource person for students as we wanted to encourage them to

be proactive and to ask questions. Thus she helped with the facilitation of discussion, the generation of student questions and feedback. At the same time she provided Brian with constructive feedback as he used the technology.

During the first two weeks when Shirley was 'finding her feet' she asked Brian for feedback on her role in the class. He felt that her feedback 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 and Inspiration™ software. 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 used a speak-aloud protocol so that his own thinking processes were disclosed. Time was also allowed for student discussion. At the same time Shirley asked clarifying questions of Brian and used the computer software (Inspiration™) to demonstrate the use of the software. A joint workshop was then conducted. 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. Brian then realised that the students did not understand the purpose of the task was to provide them with a "snapshot" of their current knowledge of the literature and to use their first map as a scaffolding to build upon. Because he did not explicitly state this in the guidelines for the assessment task, students did not know the true purpose of the task and had had unrealistic expectations. He responded to the student concerns and his omission by explaining how the concept could be used as a scaffold for their research proposal.

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: 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 meetings as it showed that issues were being discussed, a degree of trust had been established, and every member of the class was prepared to voice a rational argument.

We felt that after assignment 2 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 and second they provided Shirley with positive feedback after class.

The first half of the session was really preparation for the task of writing and presenting a draft of a research proposal (assignment 3).

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 provided a model, some guidelines, and a chat space, the students were very concerned about their ability to complete this task. 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 two students lived more than 80 km from the University and 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 chat space to follow up any on-line discussion.

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 to the overseas students. At this stage Shirley suggested that the students might find it useful to participate in the grading process. We then negotiated an agreed set of criteria for marking the proposal presentations and produced a template that all students could use for grading purposes.

We were heartened when we found out that all students took the opportunity to rehearse their presentations with a peer prior to presentation. The final presentations were viewed by some of our colleagues, who like us, were impressed with both the structure and way that the students presented their proposals.

The written proposals were marked by Shirley as Brian was required to go overseas at the end of the teaching session. Shirley provided the students with comprehensive feedback on their proposals and it appears that this may have motivated 3 of the students to enrol in EdD degrees and another 2 started an EdD. In 2000 two lecturers conducted a follow up interview the Sri Lankan students who had completed this subject. Their findings suggest that the comprehensive feedback provided by Shirley helped them to realise that they were capable of conducting research and this motivated them to apply for further study. In 2001 the first student from this cohort completed her Doctorate and graduates in July. Another 2 will submit their thesis in 2001. We feel that this is an indicator of success.

### ***3.6 Lessons learnt from the Hong Kong Implementation***

The Hong Kong program is now in its third cohort and during this time 3 students have enrolled in Doctoral degrees. The main differences between the off-shore and the on-campus model can be summarised as follows.

- It is very important to establish a good rapport with Hong Kong students as the weekend workshop in Hong Kong is the only time students have face-to-face contact with the lecturer. Time needs to be set aside for individual student inquiries so that students feel 'comfortable' with the lecturer. The number of entries per student on the discussion space was greater for cohorts 1 and 3. Cohort 2 was a more diverse group and preferred to send individual e-mails to Brian.
- We categorised the entries on the discussion space and in the e-mails. The figures are the averages for each cohort are rounded to the nearest whole number. The bulk were questions (35) to the lecturer but there were also 7 postings about group meetings and 5 entries which shared information. The on-campus students posted fewer messages per person and their messages were questions to the lecturer (5) and the arrangement of group meetings (3). No resources were shared via the discussion space but information was shared in class.
- All students preferred to e-mail assignments directly to the lecturer as it was a much simpler procedure for them than the cumbersome WebCT drop box.

Further, it was easier for the lecturer as it required fewer steps to access assignments.

- Well-designed web page with links to up-to-date resources and clear criteria for assessment criteria make the subject more accessible. We also found it was useful to post an example of a good assignment from a previous cohort.

#### 4. Implications and Conclusions

We feel that there are several implications that can be drawn from our experiences and these may be applicable to other contexts.

1. It is important that academics are realistic about their limitations and resist the temptation to be 'all things to all people' (Brookfield, 1995).
2. It is professionally responsible to admit to one's limitations and to use the professional expertise of others as this is a much more efficient use of time and human resources.
3. By trying to get as close to our experiences as we could, we were engaging in what Marton (1988) calls a "phenomenography of learning". This approach help us to understand how we experienced, cognitively and emotionally, the learning tasks that we planned and taught.
4. Effective use of feedback from each other and our students to provide a rich source of 'backtalk' (Schon, 1987). This 'backtalk' guided our teaching and allowed us to be proactive in dealing with our needs and the needs of our students.
5. The relationship between us, as teachers, and among all members of the groups 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 ourselves and our students to move outside our respective 'zones of comfort' and experience different approaches to teaching and learning.
6. We feel that the most important feature of our experience was our strong working relationship. 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.
7. The co-lecturing relationship provided an opportunity for Brian to mentor Shirley in the teaching aspect of academic life as she had the opportunity to be guided by a practitioner who was familiar with the customs, roles and traditions of the academic profession.
8. Shirley provided a scaffold that Brian could use to further develop his understanding of and skills in Web page design and flexible delivery. This was important as the success of the process lies with the professional development for *both* partners.
9. The process could be applied to the professional development of preservice and classroom teachers as the most important "issue facing teachers and schools are pedagogical rather than technical. While basic skills will assist teachers to advise and supervise students, the most important competency associated with computers is the ability to structure classroom and student-centred learning" (MACQT, 1997, 2.4). There are thousands of preservice teachers in universities who could work with a mentor teacher in a synergetic partnership like the one we have described, and we have seen examples where this is occurring in an informal way. The next step is to extend this informal network so that it benefits more people.
10. It is not practical for Universities and schools to fully address the fundamental issue of how to structure classrooms to support student-centred learning with information technology. They do not have the human resources needed and it is for this reason

that we believe that the process we have described could one practical way of addressing this issue.

The partnership that we have described has been a journey of self-study and we wish to emphasise that this journey was strongly supported by techniques that enhance critical reflection (Brookfield, 1995) and through the strong working relationship that we developed. However, the journey doesn't end here - it is really just a beginning as there is still much more to learn about structuring classrooms to support student-centred learning with information technology.

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