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INTERACTIONS IN A WEB-BASED LEARNING ENVIRONMENT: CREATING AN ONLINE LEARNING COMMUNITY

A thesis submitted in fulfilment of the
requirements for the award of the degree

DOCTOR OF PHILOSOPHY

from

UNIVERSITY OF WOLLONGONG

by

Shirley Flavia Corrent Agostinho
BInfo Tech(Hons Class 1)

Faculty of Education
2000

DECLARATION

I, Shirley F. Corrent Agostinho, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Education, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Shirley F. Corrent Agostinho
4 September 2000

ACKNOWLEDGMENTS

What an incredible challenge this has been. I wish to express my gratitude to the following people who helped me realise this achievement.

I would like to thank my former employer, Dr Ian Reinecke, and my supervisor Professor Barry Harper, for their confidence in me when I approached both of them all those years ago to ask their advice about pursuing doctoral studies.

I am very grateful and fortunate to have been supervised by two leading experts in the field of Educational Technology. To Professor John Hedberg and Professor Barry Harper—thank you for your constant encouragement, guidance, support and patience!

To Christine Brown—thank you so much for all those peer debriefing sessions. Your empathy of the qualitative research process always gave me renewed enthusiasm.

I would like to thank the participants in the two cases of this study for their willingness to participate in this research. Thank you to the student member checkers for taking the time to review the detailed case study reports. Your feedback was invaluable. Thank you also to Sue Bennett for verifying my CMC content analysis.

Finally and most importantly, I wish to express my deepest gratitude to my family. To my parents, Bruno and Gemma, thank you for always being there for me. I would like to dedicate this work to my wonderful mother. You are a very special person. Without you, I could not have achieved this. To my daughter, Kara, thank you for your patience and understanding when Mamma had to work on “her thesis”. I hope that you will be proud of me. To my husband, Emidio, thank you for your unshakeable belief that I could do this. You always helped me to stay motivated especially during the times when it all seemed too hard. Thank you for always listening. Thank you for always being there. Thank you for putting up with so much for so long!

ABSTRACT

The educational technology literature is replete with claims that the use of the World Wide Web has the potential to revolutionise education, yet there is little research that substantiates these claims. The literature highlights a gap between visionary rhetoric and current practice. It is argued that such a gap exists because there is not enough detailed description provided about Web-based innovations at the level of interaction and pedagogy. This study addresses this gap by examining the interactions established among students and an instructor in a postgraduate subject delivered using World Wide Web and videoconferencing technologies. The purpose of the study is to inform the evolution of pedagogical strategies for Web-based learning environments. The method of inquiry was a collective case study comprising two cases, which were two implementation cycles of the same subject. Both cases involved two geographically separated groups of students and the technology was used to facilitate interaction between the two groups. The insights gained from the first case were used to redesign the teaching and learning environment for the second case. Data collection occurred through participant observation. Interviews and questionnaires were conducted; documents and artifacts were collected. Data analysis involved the identification of themes and computer-mediated communication (CMC) content analysis. Three questions guided the investigation. (1) What kind of interaction can be established in a technology-supported learning community? (2) What is possible in the technology-supported learning environment that is not possible without the use of technology? (3) What are the perceptions of the instructor and the learners in terms of the learning outcomes generated?

In both cases students interacted with the instructor, with each other and with the content. However, the way in which interaction occurred differed for each case. The role technology played, the subject structure and delivery, and the nature of the assessment tasks, surfaced as influential factors. The use of the technology facilitated opportunities for collaborative learning not easily achieved in conventional face-to-face settings. The instructor perceived effective learning outcomes were generated in both cases and the students in both cases viewed the subject as a positive learning experience although the learning process presented challenges.

The conclusions drawn from this study are: both cases represented a Web-based constructivist learning environment; the change in pedagogy from Case One to Case Two represented pedagogical re-engineering; computer conferencing should be considered in postgraduate subjects as a “means to an end” not an “end in itself”; and there is no single generically applicable CMC analysis technique—it depends on the context in which CMC is used.

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RATIONALE FOR THIS STUDY

Educators have developed many special classroom activities and collaborative projects based on the use of the World Wide Web....The vast majority of published work is descriptive of technology implementation in classrooms or tends to be intuitive analyses of what works and what doesn't work with students. The literature stops short of asking critical questions such as, "Are these practices helping students, and, if so, how?" or, "How is the introduction of this technology changing pedagogical practices?" (Windschitl, 1998, p. 28)

1.1 INTRODUCTION

This study examines the interactions established among students and an instructor in a postgraduate subject delivered using World Wide Web and videoconferencing technologies. The aim of this study is to inform pedagogical innovation. This aim addresses a fundamental gap in the educational technology research literature. That is, although the World Wide Web is being embraced by the educational sector as a revolutionary technology (Crossman, 1997; Owston, 1997), the rhetoric about its potential for educational use surpasses the analytic research available that explores the pedagogical strategies in which such a technology can be implemented. Windschitl (1998) explicitly states that a gap between rhetoric and research about the use of the Web exists within the K-12 education context. However, such a gap also exists within the higher education context (Reeves & Reeves, 1997) and is particularly prevalent in the Australian postgraduate arena (Beattie & James, 1997).

This chapter explains the need for this study and the context in which it is situated. The purpose statement and research questions are outlined; the research strategy is explained; how this study contributes to the existing body of literature is described; and the study's significance and limitations are also addressed. The chapter concludes by outlining the structure of the remaining chapters that comprise this thesis.

1.2 BACKGROUND

In 1989, Tom Berners-Lee, a physicist working at the European Particle Physics Laboratory in Geneva, developed the World Wide Web, which is generically defined as "an internet-based hypermedia initiative for global information sharing" (World Wide Web Consortium, 2000). Berners-Lee proposed that a hypertext information access system be created in which any information that resided on the Internet could be referred to by a single "Universal Document Identifier". The term "hypertext" was coined by Ted Nelson to refer to the non-sequential structuring of ideas (see Nelson, 1987, p. 22). Its application

in the World Wide Web was that specific information in one document could be directly linked to related information in other documents which were physically stored at different sites around the world. In 1990, Berners-Lee created the first point-and-click hypertext editor called “WorldWidEweb” (Berners-Lee, 1998). The first information retrieval tool, which allowed Web information to be retrieved from almost any hardware and operating system platform, was a “line mode” hypertext browser created by Nicola Pellow and was made available in 1991 (Berners-Lee, 1996). The incorporation of the “hypertext” concept into a digital information retrieval system marked the end of an “era of frustrating and debilitating incompatibilities between computer systems” (Berners-Lee, 1996, no pagination).

In 1993, the first graphical World Wide Web browser called NCSA Mosaic™ (developed by Marc Andreessen from the National Centre for SuperComputing Applications at the University of Illinois) became available (Berners-Lee, 1996). The arrival of NCSA Mosaic™ and the later more sophisticated browser software applications such as Netscape Navigator™, and Microsoft® Internet Explorer®, has facilitated the explosive growth of the World Wide Web that is known today. (Crossman (1997) and Starr (1997) provide a detailed history about the World Wide Web and the availability of browser software applications.)

By 1995, the World Wide Web, (hereafter also referred to as “the Web” or WWW) had become the most popular information access service on the Internet (Crossman, 1997; Maddux & LaMont Johnson, 1997). Its ability to display multimedia (for example, text, graphics, audio, and video); its relative ease of use in comparison with other Internet search and retrieval tools such as ARCHIE, GOPHER, and WAIS (Dyrli, 1993); and its transparency across computer platforms, has earmarked the Web as the fastest growing communication system in history (Crossman, 1997). As Crossman states:

Not only is it on the lips of every educator and business person, but also the Web is common knowledge in virtually every walk of life. We are all rushing to put up home pages, and to share our lives ...with the rest of the world. Many feel that the Web is the most important technology of our time. (p. 19)

Within the educational sector, the Web has generated unparalleled interest (Owston, 1997) and has been embraced with great enthusiasm. For example, Betty Collis, a leader in the field of educational technology stated:

During 1995 alone, technical breakthroughs in WWW technology and WWW browser and editor instrumentation are happening at an amazing rate. And what is further amazing, perhaps unprecedented, is the immediate exploitation of these developments by thousands of persons throughout the world, without “training courses”...without commercial advertising, without a direct profit motive, and often just by discovering and downloading a freely available tool. (Collis, 1996b, p. 557)

The Web's significance for education is that it represents an educational technology "unprecedented in its global access and methods of communication" (Bannan-Ritland & Kommers, 1998, p. 62). Crossman (1997) argues that the Web can influence how, when, and where education is delivered:

The Web has a curious effect on space and time. Most students, and indeed most teachers, go to a particular place at a particular time for a particular class on a particular topic. The Internet in general and the Web in particular are gradually changing the ways in which we relate to those places. (p. 20)

Collis (1996b) predicted that the Web would become the major tool used for tele-learning which she defines as "making connections among persons and resources through communication technologies for learning-related purposes" (p. 9). She stated: "the WWW, circa 1995 and its subsequent generations, is the breakthrough application for many forms of tele-learning—the application that can support and stimulate tele-learning for individual learners, in the teacher-led classroom, in the course-at-a-distance" (p. 559).

The Web holds particular promise for the higher education sector, which is currently in a phase of great change—pushed by the agenda of "flexible delivery" accompanied with the following interrelated discourses:

"Public sector and funding reform" (Cunningham, 1998; Darby, 1994)

"Quality assurance" (Baldwin, 1991; Gosper & Rich, 1998)

"Technologisation" (Nicoll, 1998)

"Marketisation and Commercialisation" (Nicoll, 1998; Turoff, 1997)

"Globalisation" (Cunningham et al. 1998; Mason, 1998a)

"A more learner-centred approach to education" (Bonk & Reynolds, 1997)

"A convergence between on- and off-campus delivery modes" (Hill, 1997)

Nicoll (1998) provides an apt description of the current context of the Australian higher education sector:

Many universities in Australia which have traditionally focused in campus- and discipline-based courses now seem to be reformulating and diversifying modes of delivery and content of course offerings. Within this environment forms of learning which were not previously central are increasingly brought to the fore. These forms of learning are variously named, for example, "distance", "open", "mixed-mode" or "flexible" learning...However, the word "flexibility" and term "flexible learning" seem to be used increasingly in relation to the kinds of reformulations of course offerings that are taking place. Such changes seem often to be driven through institution-wide administrative reformation and accompanied by the use of the languages of technologization, marketization and managerialism. (p. 291)

Many universities are looking to the Web as the vehicle to facilitate flexible delivery. Whilst the literature states that the Web has the potential to create learner-centred environments

(Bonk & Reynolds, 1997; Hill, 1997), the current challenge facing universities is how this can be realised in subject offerings. This is one issue that is examined in this study.

1.3 ISSUE THAT REQUIRES INVESTIGATION

Claims have been made that the Web has the potential to revolutionise teaching and learning. For example, Khan (1997a) states:

As the Information Age evolves, our society is undergoing massive changes that have tremendous impact on our educational systems. Advances in information technology, coupled with the changes in society, are creating new paradigms for education. Participants in this new educational paradigm require rich learning environments supported by well-designed resources...The Web, as a medium of learning and instruction, has the potential to support the creation of these well-designed resources. (p. 5)

Yet the literature highlights a gap between the rhetoric about the Web's potential for education and its implementation in current practice. For example, Reeves and Reeves (1997) agree with Crossman (1997) that the Web has the potential to break the reliance of fixed-time and fixed-place instruction. However, Reeves and Reeves argue that this is not being demonstrated in current practice as many educational Web sites are used to supplement conventional fixed-time and fixed-place instruction.

The literature calls for more research to examine how the Web can be implemented in education, as many implementations are a "re-packaging" of existing practice. This is illustrated in the following quotes:

Many of these uses [how educators are using the Web] are merely extensions of what is already being done with more established media. This is not surprising, because with any new technology, we tend to think it in terms of the frame of reference with which we are most familiar (eg., the automobile was first thought of as a "horseless carriage"). No doubt further research and development on the application on the Web to teaching and learning is needed. (Owston, 1997, p. 33)

Most course-based or learning sites simply post course materials. Use of the Web as merely an "electronic book" falls far short of the potential the medium affords...The Web has substantial potential for moving instruction away from a repository model to one where *active learning* can occur... (Hill, 1997, p. 75)

The Web has typically been used as a publishing environment characterized by a correspondence course model or a broadcast model of learning in which faculty post lecture notes or students post assignments online. (Harasim, Calvert, & Groeneboer, 1997, p. 152)

Arguments have been put forward that there is a need to "re-define" pedagogy that exploits the potential of the technology, not "re-package" existing pedagogy (Alexander, 1995; Collis, 1996a, 1996b). Yet there is an appreciation that there are few guidelines to inform practitioners on how such "re-packaging" can be realised. For example, Bannan-Ritland and Kommers (1998) state: "Only a few years in existence, the WWW is so new that educational professionals have not yet determined the appropriate mix of instructional

and media attributes that need to be included to constitute a quality instructional experience” (p. 61). Hedberg, Brown, and Arrighi (1997) present a similar argument: “It would be premature to posit an evaluation of the Web as learning tool [sic]—it may well take another decade to arrive at definitive theories in this context” (p. 52).

Windschitl (1998) argues that the key to pedagogical innovation is more analytic research that focuses on the detail of what occurs in a Web-based learning environment. He states that qualitative research is required that examines student and teacher interactions.

“Because technology, when used to its best advantage, helps reshape roles for teachers and learners and encourages new and different types of interactions in the classroom, qualitative approaches should be considered to investigate these phenomena” (p. 31).

Therefore, an exploratory research study into the use of the Web within a university environment is called for to examine the interactions that can be established in a teaching and learning environment that adopts this technology and how such interactions can inform pedagogy. The postgraduate context is of particular significance as whilst the use of flexible delivery modes in Australian postgraduate education is on the rise, their specific influence on postgraduate education has had little investigation (James & Beattie, 1996).

1.4 PURPOSE STATEMENT AND RESEARCH QUESTIONS

The purpose of this study is to examine the teaching and learning process when Internet and videoconferencing technologies were introduced in a postgraduate subject in order to inform the evolution of pedagogical strategies. The study focuses on the interactions established among students and between students and the instructor when using these technologies.

Interaction is viewed as one of the most important aspects in the learning process (Berge, 1995; Jonassen, Davidson, Collins, Campbell, & Haag, 1995). The ability for learners to interact among themselves and with the instructor is claimed to be the single most important activity in an online learning environment (Berge, 1998; McIsaac, Blocher, Mahes, & Vrasidas, 1999). Furthermore, Harasim, Calvert, and Groeneboer (1997, p. 150) and Windschitl (1998) claim that the use of technology, particularly for the online delivery of instruction, can support new forms of interactions. Thus, there is a need to explore how interactions can be established in an online environment, and how these forms of interaction can provide insight for the creation of new and different pedagogical strategies.

From a review of the literature, three questions emerged to guide this investigation:

1. What kind of interaction can be established in a technology-supported learning community?
2. What is new about this? That is, what is possible in the technology-supported learning environment that is not possible without the use of technology?
3. What are the perceptions of the instructor and the learners in terms of the learning outcomes generated?

1.5 RESEARCH STRATEGY AND RATIONALE

Given that this study focuses on an issue that has had little investigation and further understanding is sought, an exploratory research approach was deemed most appropriate. A qualitative research design in the form of case study research is most suited for this study as the outcome is to provide a detailed description of the interactions established in the technology-mediated learning environment—“thick description” (Lincoln & Guba, 1985), and report the lessons learned. Laurillard (1993) supports this research approach to inform pedagogical practice in the use of educational technology:

Implementation of a new medium or method cannot be expected to work perfectly, but probably provides some benefits along with its disadvantages. We need to learn the lessons of each implementation, and then use those lessons learned. In this way we slowly build a body of knowledge of how best to use educational media, and a teaching profession that knows what it is doing and why. (p. 8)

Lincoln and Guba (1995) provide an apt explanation as to why a qualitative approach is appropriate to further understanding about an issue:

If you want people to understand better than they otherwise might, provide them information in the form in which they usually experience it. They will be able, both tacitly and propositionally, to derive naturalistic generalizations that will prove to be useful extensions of their understandings. (p. 120)

The teaching approach implemented in the postgraduate subject that is investigated in this study stems from the theoretical perspective of Constructivism (Jonassen, Mayes & McAleese, 1993). Windschitl (1998) argues that the examination of such a learning environment is best approached as a case study. He explains that if learning is viewed “as a process of dialogue and negotiation of meaning from shared social experiences” (p. 31) rather than a process of transmitting knowledge from a source to a destination, then “case studies or ethnographies are particularly well suited to examine these perspectives in depth” (p. 31).

It is contended that the research issue being investigated, the research strategy proposed, and the educational theory that underpins the postgraduate subject that is the focus of this investigation, are congruent. This is argued by Lincoln and Guba (1985) to be essential for a research study to produce meaningful findings.

1.6 THE CONTEXT OF THIS STUDY

The Faculty of Education at the University of Wollongong had begun exploring the use of telecommunications technology in the higher education context several years prior to the commencement of this study. A number of pilot studies were under way to investigate the potential and significance of telecommunications technology for postgraduate education (Hedberg & Harper, 1993). The Faculty of Education had set up a “state-of-the-art interactive multimedia laboratory for research and....as a basis for the development of interactive multimedia materials and to support, through telecommunication systems, in-service and postgraduate studies for teachers” (p. 90).

At the commencement of this study in 1996, the use of the World Wide Web by academics on campus was increasing with intensity. Most faculties had access to the Internet and Netscape Navigator™ was the preferred WWW browser application over the previously used WWW browser NCSA Mosaic™. The Faculty of Education had begun to explore the use of the Web in its subjects. However, it was still early days. For example, the postgraduate subject examined in this study was one of the first courses offered by the University of Wollongong that had a subject Web site.

In terms of WWW infrastructure on campus, Web servers within faculties were not common. The Faculty of Education did not have a Web server. The University of Wollongong’s central educational development unit was beginning to explore the potential of Web-based delivery methods and thus had a dedicated Web server. This Web server was used for this study via consultation with an educational consultant from the unit.

Computer-mediated communication (CMC) tools were beginning to appear on the Web, either as downloadable software applications or tools that were bundled with Web server software. Web page production tools were also emerging, which enabled an easier interface to create Web page in comparison to writing raw HTML code. For example, in the first year of this study, the Graduate School of Education introduced the Web page editing software application Abode® PageMill® to students in an introductory Information Technology in Education graduate subject. The Web page production tool Claris Home Page was introduced to students in the following year.

The first Australian World Wide Web conference (AusWeb’95) was held the year before this study commenced. From an international viewpoint, the International World Wide Web conference was in its 3rd year (The Third International World-Wide Web Conference, 1995). An example that highlights the “sign of the times” is provided in the following two excerpts taken from a paper presented at the Asia-Pacific World Wide Web conference in

1995. These excerpts illustrate how the Web's potential for online interaction was in its infancy.

The WWW is dissimilar to other Internet applications insofar as it is only primitively interactive. Besides clicking on a hyperlink and filling out an electronic form, users largely cannot interact with the Web....There is some hope however. New initiatives in Web-based computer conferencing, Web chat systems...are under way. Time will tell if these programs will find acceptance or be truly useful to improving the WWW. (Archee & Duin, 1995, no pagination)

We believe that a social constructionist perspective is a somewhat alien starting to Web design/production due to the one-way nature of the extant WWW. To socially construct, one must be able to "see" fellow Web users. This is just not possible given the current state of WWW technology. From its inception the Web was primarily conceived for information delivery. It was not originally conceptualised as a means of interactive communication. (Archee & Duin, 1995, no pagination)

1.7 SIGNIFICANCE OF THE STUDY

This research study is significant for the following reasons:

1. It addresses a gap in the literature. That is, there is minimal research available that explores the implementation of Web-based learning environments. Therefore, this exploratory study contributes to the body of literature in the Educational Technology field focused on Web-based learning.
2. The findings from this study contribute to the knowledge base of technology use in higher education and are intended to be used as a foundation from which more sophisticated models can be produced as new interpretations emerge.
3. This study contributes to the body of knowledge in the Qualitative Research field. The research methodology employed demonstrates how the Naturalistic Inquiry paradigm (Lincoln and Guba, 1985) is operationalised in an educational technology context. It is envisaged that the methodology of this study may provide a framework to guide neophyte qualitative researchers.
4. This study contributes to the computer-mediated communication analysis literature, which is argued by Romiszowski and Mason (1996) to be sparse. The CMC analysis framework devised in this study represents a novel approach that provides a unique perspective in the CMC research literature.

1.8 LIMITATIONS OF THE STUDY

The limitations of this study are as follows:

1. This study is limited to adult learners in a postgraduate context that studied educational technology. Thus, whilst the research strategy employed may be applicable in other contexts and some of the findings may be transferable to other contexts, specific findings may also be unique to the environment studied.

2. The use of text-based computer-mediated communication is explored. It is envisaged that the findings from this study provide insight for future text-based CMC implementations. However, it is appreciated that developments in broadband communication technology will enable audio, graphics, and video to be transmitted over the Internet, which will permit a richer form of CMC. This in turn may lead to the emergence of new issues and thus, new research questions (Romiszowski & Mason, 1996).
3. This research study constitutes an interpretation. It is a reconstruction of what occurred in a postgraduate subject based on the researcher's observations and the participants' perceptions of what occurred. The outcome of the study was to provide further understanding to inform pedagogical innovation, not to control or predict. It is contended that the rigour in which this study has been conducted has enabled a sophisticated reconstruction to be produced.
4. This study informs pedagogical innovation and the indicator that suggests whether effective learning outcomes are generated from the pedagogical model employed is the perceptions of the students and the instructor. It is appreciated that participant perceptions should not be the sole indicator for determining effectiveness (Alexander, 1999). However, the determination of learning "effectiveness" was beyond the scope of this study.

1.9 THESIS STRUCTURE

This chapter has explained the rationale for this study. The issues raised are explored in more depth in the following chapter. Chapter Two provides a review of the literature that examines the use of the Web in higher education and presents the argument that more research is required at the level of interaction. Chapter Three explains and justifies the research methodology employed. Chapter Four and Chapter Five present the findings from this study. Chapter Six addresses the research questions outlined in this chapter and the final chapter, Chapter Seven, outlines the lessons learned from this research study.

2



THE USE OF THE WORLD WIDE WEB IN HIGHER EDUCATION

Major questions remain about whether or how the World Wide Web can be used to break the hegemony of the fixed instructional modes that limit pedagogical innovation in traditional academic settings. To date, most of the World Wide Web sites developed for education and training simply supplement traditional "fixed" approaches to teaching and learning. (Reeves & Reeves, 1997, p. 63-64)

2.1 INTRODUCTION

The World Wide Web has sparked unprecedented interest from educators on a global scale (Owston, 1997). The literature is replete with claims that the use of the Web has the potential to revolutionise instruction (for example Crossman, 1997; Khan, 1997a; Maddux & LaMont Johnson, 1997; Romiszowski, 1997) and has the potential to improve the quality and effectiveness of education (Rossner & Stockley, 1997). However, whilst many educational institutions are rushing to get on the WWW bandwagon, there is little research or evaluation evidence that substantiates such claims (Alexander, 1999; Owston, 1997; Reeves & Reeves, 1997). It is also argued that there is a considerable gap between the visionary rhetoric about the Web and how it is being used in current practice (Collis, 1998a). An excerpt from Reeves and Reeves (1997) that has been used as the opening statement for this chapter substantiates this view.

The purpose of this chapter is to explore these contentions. The chapter reviews the literature about the use of the Web in higher education by examining both the rhetoric and the research. This literature review is structured into five sections. The first section situates the implementation of the Web within the higher education sector. The second section examines the rhetoric about the use of the Web in education versus the research findings, and the research methods employed to date are also discussed. The third section defines the concept of Web-Based Learning (WBL) and discusses the various permutations of WBL offered in the literature. The fourth section argues that the research is particularly sparse in the area of learner interaction and pedagogy. The fifth and final section locates this research study in the postgraduate context and the chapter concludes by summarising how this study is situated in the body of literature presented, what gaps have been identified in the literature and how this study addresses these gaps.

The compilation of this literature review was completed towards the date of thesis submission. Thus, it has been written with the advent of hindsight as many of the findings reported in the research studies reviewed in this chapter surfaced after the completion of the data collection phase of this study.

2.2 ALL ABOARD THE WWW BANDWAGON

2.2.1 THE UNPRECEDENTED POPULARITY OF THE WEB

The World Wide Web has created unparalleled interest among educators on a global scale. The following two quotes exemplify the enthusiasm expressed in the educational literature about this technology:

I as an educational technologist have never seen such a rapid development as the WWW in terms of learning media. To me it is already a key tool for tele-learning in 1995 and will become more so during the next decade. (Collis, 1996b, p. 560)

Nothing before has captured the imagination and interest of educators simultaneously around the globe more than the World Wide Web. The Web is now causing educators, from pre-school to graduate school, to re-think the very nature of teaching, learning, and schooling. (Owston, 1997, p. 27)

Claims have been made that the Web “is a major revolutionary force that is reshaping the educational and training scenario” (Romiszowski, 1997, p. 34). This is primarily due to its affordances of “connectedness and accessibility to information” (Windschitl, 1998, p. 28). It has been suggested that the Web can make learning more accessible and has the potential to improve learning—both achievable in a cost-effective and efficient manner (Owston, 1997). Rossner and Stockley (1997) claim that the Web holds particular promise in the higher education context. They state that “over the past decade, Web-based instruction has come to be seen as an important and effective means to provide sustainable, high-quality instruction to more students, without necessarily requiring an appreciable increase in numbers of faculty” (p. 333).

2.2.2 THE CHALLENGE FACING UNIVERSITIES

Such claims are seen as “good news” particularly to a higher education sector that is in the midst of great change on a global scale. A dominant theme in the discourse about higher education in the 1990’s is that universities are or should be in a process of change (Collis, 1998b; Cunningham et al. 1998, p. 5). Perhaps the most significant change that is occurring within universities, particularly in Australia, is the “rush to embrace flexible and alternative teaching and learning approaches and delivery methods” (Corderoy, 1998, p. v). As Nicoll (1998) states, “flexibility in

learning has come to the fore as a newly dominant metaphor within the Australian university sector” (p. 301).

The concept of “flexibility” refers to providing learners with choice; choice about when, where, what and how to study to better meet their individual needs (Collis, 1998b; Gosper & Rich, 1998). A recent discourse about flexibility is one that aims to bridge the gap between on- and off-campus contexts by providing all students with substantially the same teaching materials and learning experiences (Hedberg & Corrent-Agostinho, 1998). This is significant because the off-campus mode of learning (commonly referred to as “distance education” in Australia) has been plagued with learner perceptions of isolation and limited opportunity for learner interaction (Hill, 1997, p. 76). Particularly within Australia, this mode of education has suffered a perception of “second best” among students—the “poorer cousin” to the on-campus full-time study mode (Cunningham et al. 1998, p. 22-24).

The term flexibility is discussed in the literature with the accompaniment of a range of jargon, namely “flexible learning”, “flexible delivery”, “open learning” and “distance education/learning”. These terms deserve definition as the literature demonstrates slight variances of meaning. For example, Cunningham et al. (1998); Taylor, Lopez and Quadrelli (1996); and Telford (1995) define each term slightly differently.

The following definitions reflect the researcher’s interpretation of these terms.

Distance education/learning refers to the “provision of programs of study which provide both content and support services to students who rarely, if ever, attend for face-to-face teaching or for on-campus access to educational facilities” (Cunningham et al. 1998, p. 23). It generically refers to a learning program in which all the students and the instructor are separated by time and place (McIsaac & Gunawardena, 1996, p. 403). Cunningham et al. explain that there is a differentiation of this term as used in Europe and North America from that of the traditional model implied in Australia:

In Europe or North America... ‘distance education/learning’ is the common and uncontentious term for any non-contiguous mode, and where commonly distance students are collected as a class in dedicated facilities...and are taught via video-/audio-conferencing. This differs from the ‘traditional’ distance educational model in Australia, predicated on isolated students. (p. 24)

Open learning refers to:

An organisational approach which...permits students, irrespective of previous credentials, to enrol in programs of study characterised by an element of

student choice in relation to time, place and pace of study, and ideally in relation to mode of learning (i.e. by print, audiovisual or aural means). (Cunningham et al. 1998, p. 23)

Open learning may entail a mixture of face-to-face and online learning experiences, although it has mainly been operationalised “as off-campus, often workplace, delivery of learning modules, mainly in print format” (Cunningham et al. 1998, p. 23).

Flexible learning and *flexible delivery* can be used interchangeably (although Cunningham et al. (1998) distinguish the two) to refer to an educational approach that within a context of conventional requirements for prior credentials, offers students choice in how, what, when and where to study. “It is operationalised as a mixture of face-to-face teaching (often in ‘block’ or intensive period) and independent learning” (Cunningham et al. 1998, p. 23). Flexible learning is premised on student-centred principles of education (Gosper & Rich, 1998) by catering for individuals needs. It is a term generically referred to how flexibility can be introduced into a university course that has been conventionally delivered using a face-to-face instructional approach. The implementation of telecommunications technology has become a trait associated with the term “flexible”. For example, Taylor et al. (1996) state that the term flexible is used to refer to “practices which utilise the capacities for learner-learner and teacher-learner interaction made possible through recent developments in communication and information technology (CIT) to provide increased ‘openness’ in both on- and off-campus delivery of educational programs” (p. xi).

Flexibility can be implemented in a variety of ways. Collis (1998b), Gosper and Rich (1998), and Nikolova and Collis (1998) explain a number of flexibility dimensions that can be introduced into a subject. Harasim, Hiltz, Teles and Turoff (1995, p. 77-87) describe three modes in which universities can integrate computer-mediated communication (CMC) into a subject: adjunct mode, mixed mode, and online mode. From a review of literature (Collis, 1998b; Gosper & Rich, 1998; Harasim et al. 1995; Nikolova & Collis, 1998), the following summary is provided of the ways flexibility can be introduced into a university subject.

Flexibility in time: Tuition is not restricted to a set schedule of events. Rather, students can choose a time that is convenient for them and their lifestyle.

Flexibility in place: Students are not restricted to physically attending teaching sessions on campus. Learning materials can be accessed from both on and off campus.

Flexibility in the content and instructional approach: Students can be provided with choices about the topics to cover in a course. Students can be given the option to work individually or as part of a group. Students can be given a wider choice of resources to best suit their particular learning needs. Students could also be given flexibility in assessment by negotiating assessment tasks and their submission due dates with the instructor.

Flexibility in pace: Students can progress through a course at their own pace in accordance with their academic background, and personal circumstances.

Flexibility in the use of CMC: There are three modes in which CMC activities can be implemented in a subject:

1. *Adjunct mode:* CMC functionality is used by students to support informal activities such as communication with the instructor and with other students outside the scheduled class time or instructor office consultation times. This use of CMC is regarded as an optional activity for students for purposes such as “extending opportunities for class discussion and debate, increasing access to instructors, submitting and/or exchanging class assignments...and expanding opportunities for informal group discussion and social interaction” (Harasim et al. 1995, p. 78). Harasim et al. add that an adjunct mode “is a good way for instructors to begin to explore the use of CMC” (p. 78) and as of 1995 it was the most common way CMC was being used in higher education worldwide.
2. *Mixed Mode:* CMC is integrated into the structured activities of the subject and CMC activities may form part of the assessment requirements. Thus, a subject that incorporates both face-to-face activities and scheduled online discussions is one example of mixed mode delivery.
3. *Online Mode:* CMC is the primary environment for content discussion and interaction. Presentation of information, student-student and instructor-student interaction, and group activities all occur online via CMC.

The World Wide Web has become one of the most popular means of flexible delivery (Nikolova & Collis, 1998). According to Ryan (1998), in Australia the term flexible delivery is becoming a synonym for “Web-based delivery”.

2.2.3 FACTORS DRIVING CHANGE IN UNIVERSITIES

The move towards a more flexible educational framework is being driven by several converging factors. Cunningham (1998) and Gosper and Rich (1998) provide the following syntheses that give an insight into why such change is afoot.

The impact of the forces of internationalisation and technological change has been felt widely throughout the world, most noticeable in a general shift in employment from manufacturing and commodity-based industries to service industries and those based on the deployment of higher-level skills and knowledge. In the so-called 'knowledge age', growing importance is attached to lifelong learning and the capacity of service providers to stay abreast of change and respond quickly to emerging markets. Growth in the power of communication and information technologies (CITs), and their convergence in the form of the Internet, is therefore assuming ever greater significance. These developments are unfolding against a backdrop of public sector reform in many countries, where governments have been seeking for some time to reduce the size of the public sector and to make publicly-funded agencies operate with greater efficiency and effectiveness....Universities, as producers and disseminators of knowledge, and in many cases publicly funded, are inevitably caught up in these developments. (Cunningham, 1998, p. 10)

Australian higher education has experienced major change since the early 1980s, with increasing student numbers, closer alignment to national political objectives, increasing government control, growing emphasis on 'quality' and 'value for money', organisational restructuring affecting all levels from system-wide to individual departments, and accelerating moves to recover costs from individual students. Policies introduced by the current Federal Government have encouraged competition between universities, with their growing differentiation an emerging outcome. (Gosper & Rich, 1998, p. 413)

A review of the following literature (Baldwin, 1991; Collis, 1998b; Cunningham, 1998; Cunningham et al. 1998; Flew, 1998; MackNight, 1996; McNaught, 1998; and Nicoll, 1998), indicates that the driving factors for change within universities seem to coalesce into the following set of interrelated issues:

1. The changing nature of the "university" and its client market
2. Economic and government policy pressures
3. The growing capability and importance of communication and information technologies
4. A growing sophistication in understanding of how students learn

Although these issues are discussed under separate headings, they are interrelated because they have both cause and effect influences. For example, the availability of the Internet is providing universities with the opportunity to explore a more expanded student market thus changing the nature of their client market. Economic pressures have been influenced by reduced government funding and policy changes, which particularly in Australia of recent, has given universities new freedom to

charge up-front fees (Flew, 1998) and thus has a subsequent influence on the nature of the client market.

2.2.3.1 The changing nature of the “university” and its client market

In the last two decades, developed countries have experienced a change in emphasis in their economies—from a predominant industrialised economy to an information and service-oriented economy (Cunningham et al. 1998). Accompanying this, is the changing profile of the “worker”. Increasing career mobility (Collis, 1998b) and “knowledge work” (Romiszowski, 1997) are employment traits that will be dominate in the 21st century. Lifelong learning will become a necessity (Collis, 1998b). Cunningham et al. (1998) state that lifelong learning is “both a catalyst for and a result of ‘the knowledge society’ (Drucker’s term) or ‘the information society’” (p. 32). Beattie and James (1997) see the advent of communication and information technology (CIT) as facilitating the implementation of the lifelong learning concept:

The learning society, an ideal founded on access to lifelong learning for all individuals, has been promoted since the early 1970s...In the 1990s, technological developments have opened up new possibilities for its realisation. In higher education, ready access to education irrespective of location - both before and beyond graduation - has been made possible by the capacity, undreamt of until recently, for rapid and widespread two-way communication of text, images and sound. There is no doubt that higher education has entered a remarkable era. (p. 177)

The demographics of the “university student” are changing. People diverse in age, educational background, cultures, and location in which they live relative to the university campus are enrolling in university programs (Collis, 1998b). The impact particularly on the higher education sector is that there will be an ever-increasing demand. Some claim the demand may outstrip supply (Richardson, 2000).

A study conducted by Cunningham et al. (1998) to investigate developments of global media networks entering the tertiary market, found that the rhetoric of globalisation and media involvement far outstripped the reality. The study, commissioned in 1997 by Australia’s Department of Employment, Education, Training and Youth Affairs (DEETYA), comprised approximately 140 interviews. People who were considered “key players” from government, industry, media networks and the higher education sector in ten countries including Australia and across Asia, Europe and North America were targeted. The study found that there was a great deal of enthusiasm and whilst many initiatives had been launched, very few have progressed beyond the earliest stages. For example, the study concluded: “It is obviously technologically feasible to offer global education, but there is no evidence at this stage that the global campus or the global course exists anywhere

other than in the imaginations of excited entrepreneurs or appalled academics” (p. 122).

The scene, however, has now changed. The recent announcement of the first joint venture between a media group and a university consortium—News Corporation and Universitas 21 (Richardson, 2000), provides a clear indication of where the future is headed. That is, the perception for long-term survival in the university sector in Australia is to embrace technology to facilitate a global strategy that attracts clients beyond the domestic market.

2.2.3.2 Economic and government policy pressures

Government policy changes have influenced the nature of the higher education sector. For example, in the policy statement for Australia’s higher education sector in 1991, the Baldwin report stated that “innovations in technology have expanded opportunities for developing alternative ways of delivering higher education programs to both on-campus and off-campus students” (Baldwin, 1991, p. 6).

The recent deregulation of higher education in Australia, accompanied with funding cuts due to policy changes under the Howard Liberal-National Party Government, has led Australian universities to “play the market” as a survival strategy (Flew, 1998). The government’s premise for deregulation, which according to Smith (2000) is: “higher education yields a considerable private gain, making a considerable private contribution appropriate in a higher education market” (p. 45), is an indication that students are becoming clients in a competitive environment.

2.2.3.3 The growing capability and importance of communication and information technologies

CITs encompass a range of disparate technologies relevant in the higher education context, such as cable, satellite, CD-ROM, video-conferencing and the Internet (Cunningham et al. 1998). The Internet in particular, has become one of the most popular forms of communication technology. There is an ever-increasing number of people accessing the Internet, which has permeated almost all walks of life (Crossman, 1997). For example, it is becoming common place for companies and mass media to utilise a Web site. The Australian Television Network—Channel Nine, has implemented a Web site (<http://ninemsn.com.au>) that complements many of its televised programs by providing additional information, facilitating online synchronous discussions and gauging public opinion through online polls. Cunningham et al. provide another example:

The second impact of communication and information technologies on media has been to promote the development of interactive multimedia forms of traditional media. The development of online news services is an example of this, as in many cases it has involved leaders in print and broadcast news services developing electronic versions of their material. A leading example of this, which moves beyond simply replicating traditional formats on the World Wide Web to the generation of truly interactive and multimedia formats, is the CNN Web site. (p. 14)

Such proliferation of a CIT in society acts both as a change catalyst and a change facilitator in the university content. CIT can be viewed as a catalyst for change as there is an increasing pressure on universities or an obligation by universities to educate their learners in the use of technology to prepare them for the real world. CIT can also be viewed as a facilitator of change as it is a mechanism by which alternate delivery strategies can be implemented and explored. For example, the World Wide Web, is being viewed as a technology which can facilitate new models of instruction that offer possibilities for more learner-centred, self-directed study (Bonk & Reynolds, 1997).

2.2.3.4 A growing sophistication in understanding of how students learn

There has been a shift in learning theory over the last few decades. Jonassen and Reeves (1996) state that “learning theory is in the midst of a revolution” (p. 695). Advances in cognitive science are changing the philosophy of learning from the previously practiced behaviourist model towards a constructivist view of learning. That is, instead of viewing the student as an “empty vessel” to fill with knowledge, there is a greater appreciation of the learner as an active participant in the learning process where learning occurs through the process of individual construction of knowledge. In turn, the field of instructional design has experienced a period of flux over the last two decades. In the higher education context, these new perspectives about learning are challenging conventional teaching approaches. For example, Cunningham et al. (1998) state:

The growing acceptance of new educational philosophies and practices, such as constructivism and action learning during the 1980s, have challenged the valence of the didactic lecture/tutorial/textbook model common in higher education, promoted the notions of the academic role as ‘a guide on the side’ rather than ‘the sage on stage’, and conceived of the student role as one of independent self-directed learner. (p. 25)

Another example which exemplifies that such shift has occurred, is that in the 1980’s, the philosophy and practice of constructivism was considered a radical perspective, whereas now it is the dominant perspective at most educational conferences (Ryder & Wilson, 1996).

2.3 "RHETORIC" VERSUS "RESEARCH"

2.3.1 INTRODUCTION

Jonassen et al. (1997) state that over the last five years, the Web is being both promoted and viewed in many educational contexts as the latest technological revolution and panacea. Bannan-Ritland, Harvey and Milheim (1998) claim that many educators "still believe that the mere use of this medium [the Web] constitutes an engaging learning experience" (p. 77). Both Jonassen et al. (1997) and Bannan-Ritland et al. (1998), however, affirm the opposite:

In the mid-1990s, the Web is being promoted as the latest technological revolution and panacea in many educational contexts. Public schools and universities are converting much of their instruction to the Web sites with the promise of providing on-demand, anytime, anywhere instruction....Is providing access to information sufficient for learning? Probably not. If the Web is to become more than a giant library or a commercial trading place, we need to explore how to represent and structure user interactions to facilitate learning. (Jonassen et al. 1997, p. 119-120)

The mere use of the World Wide Web in a specific course does not automatically imply effective instructional activities or quality instruction for the intended learners since many courses are simply a juxtaposition of a variety of instructional and non-instructional Web-based elements, with some courses utilizing the Web in a very limited manner and others using Web-based activities to provide a totally on-line instructional experience. In fact, while many instructional elements that exist in stand-alone Web pages or as parts of overall Web sites may serve valuable functions in supporting course interaction and/or providing administrative guidance, they may not, in and of themselves, significantly contribute to meaningful learning. (Bannan-Ritland et al. 1998, p. 77)

The issue of media itself influencing learning has been one of the most contentious topics in the field of educational technology (Thompson, Simonson & Hargrave, 1996). The debate has spanned the last two decades. It was sparked by the article: "Reconsidering research on learning from media" by Richard Clark in 1983 and in 1994, perhaps one of the most significant debates in the educational technology field occurred in the journal: *Educational Technology Research & Development* (Volume 42, Issue 2). Several convincing arguments were presented (for example Clark, 1994; Jonassen, Campbell, & Davidson, 1994; Kozma, 1994) and educational technologists today are still far from reaching a consensus about this issue. For example, in reference to distance learning, Bates (1995) disagrees with Clark's (1994) contention that all media is essentially "neutral". Bates swings more towards the argument presented by Kozma (1994) by claiming that "there are significant instructional and operational differences between different technologies" (p. 15). He outlines his assessment of the strengths and weakness of various technologies, such as radio, educational broadcast television, computer-based

learning, videoconferencing and CMC. His assessment is based on six criteria: access, costs, teaching and learning, interactivity and user-friendliness, organisational issues and speed in which content can be revised. Bates (1995) importantly acknowledges that his assessment may differ to others due to differences in context and values.

From this debate, one conclusion that has been drawn is that technology is essentially a tool and how it is used is one of the determining factors of its influence on the learning process. Bates (1995) argues: “concentrate on designing the learning experience, and not on testing the technology” (p. 14). The issue should not be focused on the technology. Instead the focus should be on what, where, and how you want your students to learn (Bates, 1995).

Owston (1997) argues that the question of relevance is not whether students can learn better with the Web, but how the Web can be best exploited for teaching and learning:

We cannot simply ask, “Do students learn better with the Web as compared to traditional classroom instruction?” We have to realize that no medium, in and of itself, will likely improve learning in a significant way when it is used to deliver instruction....The key to promoting improved learning with the Web appears to lie within how effectively the medium is exploited in the teaching-learning situation.” (p. 29)

In order to address this question, an examination of the features of the Web and the affordances it can facilitate in an educational context is required.

2.3.2 THE PERCEIVED “AFFORDANCES” THE WEB CAN FACILITATE

Hackbarth (1997) suggests that the Web has several distinctive “affordances” that permit the design of “uniquely superior learning activities” (p. 193). Yet Windschitl (1998) maintains that the Web is a collation of a range of existing software capabilities (eg. hypertext, multimedia) and the advantages of using the Web are in terms of efficiency and scope rather than unique “affordances”.

Khan (1997a) lists various hardware and software components of the Web that can be utilised for educational purposes—for “Web-based Instruction”. Some of these components include:

- Desktop computers (running Unix, DOS, Windows and Mactintosh operating systems) and Internet access provision (eg. via an Internet Service Provider)
- Dedicated Web servers

- Graphical Web Browser software that enables the delivery of multimedia (eg. Netscape Navigator, Microsoft Internet Explorer)
- Search engines accessible via browser software
- Computer-mediated communication tools (eg. asynchronous and synchronous text-based tools such as email and Internet Relay Chat)
- Web site authoring programs

Therefore, because the Web comprises a number of components, which Windschitl (1998) views as “simply extensions of existing software capabilities” (p. 29), it may be more appropriate to consider the Web as an infrastructure rather than as a medium. Ryder and Wilson (1996) support this view. They state the following about the Internet, however, the same can be said about the Web:

There is nothing inherent in the Internet that guarantees learning. But in a specific context involving learning activities, such as research, collaboration, self expression, and reflection, the Internet offers multiple affordances, so numerous that it may be a mistake for us to treat it as a medium. It is really an infrastructure which brings together media, tools, people, places and information, expanding the range of human capabilities. (p. 646-647)

According to Windschitl (1998, p. 28), the two main features of this infrastructure that characterises the Web as such a “promising educational tool” are: “connectedness” and “accessibility to information”.

Starr (1997) believes that the educational value of the Web is attributable to three key features: hypertext, delivery of multimedia and the Web’s facilitation of “true interactivity”.

Khan (1997a, p. 11-18) provides a comprehensive list of features that can be facilitated by the Web for educational purposes. His list of features can be coalesced into the following summary:

- Computer-mediated communication among people on a global basis.
- Device, distance and time independence to access of information and communication among people.
- Globally accessible up-to-date information—created and published by anyone that has access to a Web server; accessed via hyperlinks; world-wide information access and creation uniformity.

Lockyer, Patterson & Harper (1999) argue that the increased use of the Web within higher education is due to its perceived benefits that include:

- Direct access to a variety of international resources on a broad range of topics.
- Access to a learning environment that is not limited to scheduled lecture and tutorial hours.
- Greater opportunities for facilitating a variety of instructional strategies including small group discussion and collaborative projects.
- Exposure to a forum for expressing and sharing different ideas, beliefs and attitudes in a potentially less confronting environment.

They point out, however, that “these assumptions generally remain untested and it is timely to examine them in real world environments” (p. 233).

A summary of the features and perceived affordances the Web can facilitate is provided in Table 2.1. The table comprises a synthesis of the following literature: Crossman (1997), Dijkstra, Collis and Eseryel (1999), Hackbarth (1997), Hill (1997), Khan (1997a), Lockyer et al. (1999), Romiszowski and Mason (1996), Ryder and Wilson (1996), and Starr (1997). (Note that the work by Romiszowski and Mason (1996) was written before the advent of the Web. However, it has been included as it refers to computer-mediated communications—a feature of the Web-Based Instruction (Khan, 1997a).)

TABLE 2.1 The use of the World Wide Web in Education: Features and Affordances (The researcher’s synthesis of the literature)	
<i>Feature</i>	<i>Affordance</i>
Computer-mediated communication among people on a global basis (Khan, 1997a) “Connectedness” (Windschitl, 1998)	<ul style="list-style-type: none"> • The true potential of the Web is claimed to be the greater opportunity for students to interact with one another and with the instructor (Dijkstra et al. 1999). • “Highly interactive communication” (Romiszowski & Mason, 1996). “Unlike the limited interactivity available in other forms of computer-based learning such as CAI [computer-assisted instruction], the possibilities for interaction and feedback are almost limitless, being a function of the creativity and personal involvement of the participants in the on-line discussion” (p. 439). • Multi-way communication (Romiszowski & Mason, 1996). Communication may be two-way: two people exchanging online messages, or multi-way: all the participants of a group receive and respond to messages from all the other participants. • Synchronous (same time) and asynchronous (not at the same time) interaction among people (Romiszowski & Mason, 1996). • Greater opportunities for facilitating a variety of instructional strategies including small group discussion and collaborative projects (Lockyer et al. 1999). • Exposure to a forum for expressing and sharing different ideas, beliefs and attitudes in a potentially less confronting environment (Lockyer et al. 1999). • Can reduce social isolation in distance education contexts (Hill, 1997).

TABLE 2.1 The use of the World Wide Web in Education: Features and Affordances (The researcher's synthesis of the literature)	
Device, distance and time independence to access of information and communication among people. (Khan, 1997a)	<ul style="list-style-type: none"> • Ability to carry media from virtually anywhere. "As an instructional technology, the Web is unique in its ability to not only carry a variety of media, but to do so from virtually anywhere" (Crossman, 1997, p. 22). • Access to a learning environment that is not limited to scheduled lecture and tutorial hours (Lockyer et al. 1999). • Provides economic access to people and information "in ways unmatched by any other combinations of media" (Hackbarth, 1997, p. 193).
<p>Globally accessible up-to-date information—created and published by anyone that has access to a Web server; accessed via hyperlinks; worldwide information access and creation uniformity. (Khan, 1997a)</p> <p>"Accessibility to information" (Windschitl, 1998)</p> <p>"Cannot be controlled" (Ryder & Wilson, 1996)</p>	<ul style="list-style-type: none"> • Direct access to a variety of international resources on a broad range of topics (Lockyer et al. 1999). • An "open system" towards content. Content need no longer be pre-defined and controlled by the designer. "The designer has lost control....We no longer have to contrive interactive 'lessons' and exercises. The real world is waiting on the other side of the terminal" (Ryder & Wilson, 1996, p. 646). • Ease of updating and expansion (Starr, 1997). • Great potential for research (Ryder & Wilson, 1996). • Free expression; worldwide public expression (Ryder & Wilson, 1996); global sharing of resources (Hackbarth, 1997). • Authenticity in a learning context. "Constructivist researchers have stressed the importance of anchoring instruction to genuine tasks in situated contexts...The Internet offers countless affordances toward that instructional goal. Consider a seventh grade class learning English grammar, spelling and rhetoric....Imagine the possibility of our students providing a web page that is a genuine service to the Internet community....Writing for an audience of peers around the world is likely to elicit motivations that go beyond teacher expectations" (Ryder & Wilson, 1996, p. 649-650). • Multimedia such as audio, video, and animations can be delivered to many users at a one-time cost without degradation in quality (Starr, 1997). • Hypertext enables user control of information (Starr, 1997).

Ryder and Wilson (1996) alert to two difficulties associated with the affordances listed in the above table:

1. The affordance of "free expression" is accompanied with a fundamental constraint that involves the "accuracy, veracity and reliability of online information" (p. 648). The implications for education are that students need new skills. They require skills in assessing the accuracy and validity of information, and the skill of "abductive logic", that is, the ability to extract meaning from information and "adjust one's inquiry as new information unfolds" (p. 650).
2. It is difficult to restrict a learner's education to a "'sanctioned' body of literature" (p. 650) as information can now be accessed from a variety of online resources. This "loss of control" is argued by Ravitz (1997) to create "if not a problem, at least an added layer of complexity for designers and evaluators" (p. 362).

Ryder and Wilson (1996) conclude that the Internet is facilitating students to have more freedom of choice in their learning experience and an instructional model premised on that characteristic is one that will be most valued in the future:

The developments brought about by technology allow for new possibilities. We are seeing trends in education toward distributed, collaborative models of learning. Agency is shifting from center to periphery, from teacher to learner, from author to reader, from librarian to researcher, from curriculum to context. The affordances of public expression have exploded, allowing any school child to represent herself before a world-wide community of learners....The challenge for the postmodern educator is to discover the capabilities and natural constraints associated with distributed pedagogy for scaffolding learners in the age of information. (p. 651)

2.3.3 STATUS OF RESEARCH ABOUT THE USE OF THE WEB IN EDUCATION

2.3.3.1 The emergent research issues

The last sentence in the above quotation by Ryder and Wilson (1996) highlights the current research issue of significance. That is, *how* the affordances, summarised in Table 2.1, can be appropriately exploited in a learning environment via the implementation of instructional strategies, is the current challenge facing educational researchers. In the educational technology literature, the discourse about the research required into the use of Web in education (at the commencement of this study) can be synthesised into the following key issues:

1. *There is a lack of design principles to guide practitioners to devise instructional strategies that exploit the “affordances” the Web can facilitate.*
2. *The Web should not be used just for the sake of it—research should focus on determining its effectiveness in a learning environment.*
3. *More exploratory research is required to examine the Web’s potential—all its “affordances” have not yet been identified.*
4. *To better understand how the Web can be used, research is required that examines the nature of the online interaction and compares in what ways it differs or is similar to the conventional face-to-face form of interaction.*

2.3.3.1.1 Research is needed to establish design principles to guide practitioners

The early literature about the Web (circa 1996) stated that there was little research available to guide educational practitioners in the design of flexible delivery models utilising the Web. This is because it was a relatively new area and thus not well understood. The following excerpts from the literature exemplify this concern.

There is a much longer history in both research and practice of how to design courses around a model involving real-time audio-visual interaction among its

participants than there is for designing courses to be delivered asynchronously over a computer network. (Collis, 1996b, p. 447)

Few instructional design guidelines exist for the World Wide Web. Hence, the quality of instructional resources currently available via the internet varies, ranging from excellent to extremely poor. (El-Tigi & Branch, 1997, p. 23)

Academics are now commonly asking questions about flexible learning. However, turning to the education literature for answers affords little assistance as flexible learning has not been theorized to any great extent within the field of education. (Nicoll, 1998, p. 291)

We still are not in a position to be able to design CMC systems that will effectively implement particular group-learning strategies with the same amount of confidence that we have when designing a computer-based instruction package or a set of online reference materials as job-performance aids for a project geared towards the mastery of certain job skills. Nor are we yet as knowledgeable or skillful in the use of CMC as we are beginning to be in the organization of meaningful networks of information within the electronic communication networks that are beginning to link all parts of the world. (Romiszowski, 1997, p. 33)

However, even more recent literature raises similar concerns:

The value of a WWW-based course-support environment depends entirely on how the environment is designed and how it is integrated into the rest of the teaching-learning process. But because of the newness of the WWW, instructional design models for this are not yet well-known. (Dijkstra et al. 1999, p. 15)

A recently published report by the University of Illinois (Teaching at an Internet distance: the pedagogy of online teaching and learning—The report of a 1998-1999 University of Illinois faculty seminar, 1999) concluded that online teaching requires a shift from conventional teaching approaches:

Attempts are being made to use instructional technology such as real-time two-way videoconferencing in efforts to simulate the traditional classroom. With improvements in technology this mode may yet succeed, but from what we have seen, the leaders in this area recommend shifts from “traditional” teaching paradigms. Two new online paradigms that appear to work well are text-based computer mediated communication (CMC) for courses that are traditionally taught in the discussion or seminar mode, and interactive, graphically based material for courses that are traditionally taught in the lecture mode. Methods are by no means limited to these two. (no pagination)

Thus, the literature calls for research that investigates design models and design principles to assist practitioners to develop and implement online environments—particularly Web-based learning environments.

2.3.3.1.2 *Research is needed to determine the Web's educational effectiveness*

The literature also indicates a lack of research focused on determining the Web's educational effectiveness, in terms of its influence on student learning. In a recent special issue of *Higher Education Research & Development*, the guest editor John Bain stated that there is a "need for learning-centred evaluations in higher education" (Bain, 1999, p. 165). Owston (1997) states: "there is promising indication that the Web is a viable means to increase access to education. Evidence on how it can promote improved learning is not as forthcoming" (p. 29). Reeves and Reeves (1997) concur as they argue: "The World Wide Web has attracted the attention of people around the world, including that of educators and trainers. Despite all the interest, little research evidence exists to support claims for the effectiveness of Web-based instruction" (p. 59).

A two-year national study conducted by Alexander and McKenzie (1998) cited in Alexander (1999), revealed that whilst there is a need to determine effectiveness, there is currently a lack of effective evaluation being performed. The study was commissioned by the former Australian government body: The Committee for the Advancement of University Teaching (CAUT), to determine the student benefits of CAUT-funded information technology projects. From the outcomes of 104 reviewed projects, the study revealed that whilst in 87% of cases the projects reported to have the intention of improving learning outcomes, only one third of the projects were able to report this as an actual outcome. This, Alexander (1999) claims, is a major impediment for change in higher education:

The current lack of effective evaluation may be one reason why few CIT innovations are used outside the institution where they are developed...Few academics are likely to accept an innovation at face value or on anecdotal claims. Without effective, scholarly evaluation, even well designed innovations are unlikely to achieve wider dissemination, and the potential benefits of CIT for learning in higher education are unlikely to be realised. (p. 182)

A popular research strategy that has currently been employed in educational technology studies to determine "effectiveness" of a technology is to gauge how existing learning outcomes fare when the technological innovation is implemented in the learning environment. If the learning outcomes are equal to or superior than those generated in the pre-technology learning environment, then the claim is made the innovation was deemed "effective". Effectiveness is thus measured using current practice benchmarks. These studies have merit as they provide persuasive evidence to convince sceptical educators of the potential of technology use in education. However, it is contended that such research studies also exhibit a

somewhat limited perspective of effectiveness as the use of technology in education has the potential to generate different forms of learning outcomes. This contention is explained in the next section.

2.3.3.1.3 Research is needed to explore the Web's educational potential

Whilst the calls for design guidelines and effectiveness studies have merit, another argument raised in the literature is that there is a need to explore what technology can do before its effectiveness can be determined. For example, in a study that examined what occurred in a graduate subject online discussion, Zhu (1996) concluded:

This study has reported some pioneering efforts in using computer mediated communication tools in instruction....More studies need to be conducted to establish practical guidelines for incorporating computer mediated tools into classrooms, because before one can begin to look at effective implementation of a new technology, one must understand how that technology can be used both mechanically and pedagogically. (p. 842)

In reference to the Web, there are arguments that it is still very new and all the “affordances” it may be able to facilitate for education may not be yet identified. For example, Reeves and Reeves (1997) state:

Before collecting such evidence [evidence that supports claims for the effectiveness of WBI], it is essential to define the dimensions of interactive learning that can be enabled via the World Wide Web.... Although WBI may be more efficient or less costly than other vehicles, it is the learning dimensions that will determine its ultimate effectiveness and worth. (p. 59)

Many are predicting that the World Wide Web will revolutionize and dramatically improve the effectiveness of education and training. If the Web is to live up to its promise, we must strive to understand the basic dimensions that WBI can (and cannot) accommodate. (p. 65)

The calls for more exploratory research that examines the Web's use in education are particularly prominent in the higher education sector as the current climate is marked by an ever-increasing push for flexible delivery innovations. The following statement by Flew (1998) exemplifies this:

Empirical work is of the utmost importance for academics in Australian universities as they evaluate the pros and cons of flexible learning and online course delivery, in an environment where speculative futurism and self-interest are too often substituted for detailed case studies or what works and what doesn't, and what is to be gained from going online and what remains valuable in the on-campus, face-to-face teaching and learning experience. (p. 8)

By conducting exploratory research that investigates what technology has the potential to do, the results of such research may in fact generate different learning outcomes that can change the benchmark for evaluating learning effectiveness. For

example, a study conducted by James and Beattie (1996), which investigated the nature and extent to which new and alternative delivery options were being utilised in postgraduate coursework programs in Australia, pointed out the following:

One of the major conclusions we would draw from this investigation...is that new modes of delivery shape the postgraduate curriculum in many ways. They influence content, affect the way students approach their learning, and have the capacity to redefine the learning outcomes that are valued. New approaches to assessment are sometimes necessary to assess altogether different learning outcomes or, alternatively, the modes of delivery permit new approaches to assessment. (James & Beattie, 1996, p. 66)

McNaught (1998) raises a thought provoking argument that the use of CITs may be facilitating a shift in epistemological beliefs. She asks: “As we share our ideas in new ways and in new time frames, do our thinking patterns change?” (p. 940). In terms of the implications for universities, she concludes:

There are now a much greater number of options which are available for course design and delivery. It is hoped that the university of the future will use this flexibility to create a variety of pathways for students to follow. This may relate to the ways in which students mix on-campus and distance courses, to flexibility in the design of individual courses, to changes in assessment options and to altered relationships between the work place and university education. A time of intense exploration lies ahead. (McNaught, 1998, p. 945)

Thus, the literature highlights a need for a range of concurrent research—research that examines the effectiveness of a Web-based learning innovation and research that explores the potential of the Web’s use in education.

2.3.3.1.4 Research is needed to compare Web-based instruction with conventional teaching approaches

A preoccupation that has surfaced in the literature is that of comparing a Web-based learning environment with a conventional non-technology mediated learning environment in order to form a better understanding of how the Web can be used. Relan and Gillani (1997) explain similarities and differences between Web-based instruction and the traditional classroom and Hill (1997) claims that research should focus on conducting such comparisons:

A significant challenge in using the Web for instruction is the lack of understanding associated with emerging information systems....As the Web and other interactive technologies continue to grow, the need for research also expands...Several questions...can be considered for researching distance learning environments, including...What is the nature of communication and interaction online, and in what ways is it similar or different from other communications? (p. 78-79)

2.3.3.2 A "snapshot" of the research conducted to date (1996 to 2000)

This section provides a snapshot of research conducted about the use of the Web in the higher education sector particularly over the last five years. This review serves as a summary to highlight the main issues currently under investigation, the various research methods employed, and the major findings that have surfaced. It is by no means an exhaustive research study list, as over the last two to three years research about the Web and its pedagogical implications has proliferated in the educational technology literature. For example, one needs only examine the table of contents of recent yearly conference proceedings from ASCILITE (Australasian Society for Computers In Learning In Tertiary Education) and ED-MEDIA (World Conference on Educational Multimedia and Hypermedia) to see the vast amount of reflective practice research and evaluations being conducted for Web-based implementations in university subjects. However, whilst many studies are being conducted, the focus; the research approach; and the outcomes generated by several studies, raise concern about their usefulness to advance the cause of pedagogical reform (Reeves, 1999; Windschitl, 1998). This contention is elaborated in section 2.3.3.3.

When reviewing the research conducted about the use of the Web in higher education, three categories of research studies emerged:

1. Studies that examine/evaluate Internet-based learning implementations.
2. Studies that evaluate the effectiveness of Web-based learning implementations by determining the extent to which the same learning outcomes (which are designed for the pre-technology context of the same subject) are achieved.
3. Studies that specifically focus on the use of CMC in an Internet-based learning environment.

2.3.3.2.1 Studies that examine/evaluate Internet-based learning implementations

Research studies that examine and/or evaluate Internet-based learning implementations vary in their focus, the amount of analysis conducted, and the amount of detail provided when explaining the findings. A sample of research studies examined is outlined chronologically in Table 2.2. Studies such as Bostock (1998) and Dijkstra et al. (1999) describe the technology-mediated experience in terms of how a subject Web site was designed and implemented and student feedback is used to evaluate the innovation. Other studies, such as Dehoney and Reeves (1999), Hara and Kling (2000), LaMaster and Knop (1999), and Wulf and Schinzel (1998), focus more on the student and instructor perceptions about the innovation. Some studies present merely a descriptive account of an Internet-based

innovation and include little, if any, evaluation (a few examples which have not been included in the table below include Arnold, 1997; Godfrey, 1996; Hagel & Zulian, 1996; Hart & Gilding, 1997). Other studies, however, are more analytic in nature, in that, the analysis has been extended to identify emergent themes, for example, Harasim, Calvert, and Groeneboer (1997); and McIsaac, Blocher, Mahes, and Vrasidas (1999). Apart from the study conducted by Hara and Kling (1999), the studies reviewed did not provide a detailed explanation about the pedagogical strategies employed when implementing the Internet-based innovation.

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
<i>Study</i>	<i>Description</i>	<i>Findings</i>
"TeleScopia Project" cited in (Collis, 1996b, p. 446)	<p>"TeleScopia Project" —Operational in Europe during 1994 and 1995.</p> <p>Course designers from six countries were given the opportunity to "re-engineer" existing distance delivered courses to enrich the courses and make them accessible to a wider range of learners across Europe.</p>	<p>The findings from this study were:</p> <ul style="list-style-type: none"> • Adult learners appreciated flexibility in time, for example, asynchronous computer conferencing, more than having real-time video interaction. • Limited amount of pedagogical re-engineering was achieved, even though course designers were given many options for tele-learning (desktop multi-media conferencing, Internet access, etc). • Overall, course designers did not change the instructional balance of their courses. Tele-learning technologies were used to add more communication to the courses, but course designers did little to re-conceptualise, or pedagogically re-engineer their overall approach to instructional organization.
Ginige, Witana, and Yourlo (1996)	<p>A case study about the use of the Web in a new graduate Information Systems Engineering subject: "Hypermedia Technologies".</p> <p>The study was carried out by analysing Web access logs and student feedback to determine how the course notes available from a Web site were being used.</p> <p>Traditional lecturing was minimised with the aim to provide an active learning environment for students. A problem-based approach, hands-on labs, and student class presentations made up the class activities.</p> <p>All content material, reference material and student assignments were available from a subject Web site. The course notes were structured hierarchically with the main topics displayed on the first level of the hierarchy. Because the course notes</p>	<p>The findings from the study include:</p> <ul style="list-style-type: none"> • Most students accessed the course notes regularly throughout the semester. • Most students found the Web a useful resource. Many felt that the "use of the WWW in a practical manner as a hypermedia system was one of the best parts of the course" (p. 147). <p>From these findings, the authors concluded: "We found that method of delivery [the WWW]...was successful and that a well designed information repository can greatly enhance the delivery of education" (p. 140).</p> <p>(Based on the published findings, the conclusion drawn by the authors is somewhat questionable. The analysis focused on a quantitative measure of frequency and time duration to determine how the course notes were being used. The study, however, did not elaborate on the students' perceptions of the structure and nature of the content presented in the course notes. Also, the authors claim that the subject was designed to foster an active learning environment. It was unfortunate that the instructional strategies implemented to promote such a learning environment were not described.)</p>

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
	<p>"were bring presented in a novel manner" (p. 142), evaluation of the subject involved determining how the course notes were accessed by students and obtaining student feedback from a questionnaire.</p>	
Harasim, Calvert, and Groeneboer (1997)	<p>Virtual-U: A Web-based multimedia system to support collaborative learning for post-secondary education.</p> <p>It was initiated in 1994 and its main design goal was to support online pedagogy that fosters active learning, collaboration, multiple perspectives, and knowledge building through divergent thinking.</p> <p>This work provides a synthesis of the findings from a decade of data analysis conducted by the Ontario Institute for Studies in Education (OISE) online programs to situate the design principles employed in the developed of the Virtual U learning system.</p>	<p>The findings from a decade of data analysis of OISE online implementations include:</p> <ul style="list-style-type: none"> • The emergence of the following types of educational outcomes: <ol style="list-style-type: none"> 1. Active learning: in the form of student online participation. 2. Interactive learning: specifically in peer-to-peer discussions. The students rated group interaction intellectually stimulating and fun. The authors contend that students work harder and produce higher quality work online. 3. Multiple perspectives: students appreciate the exposure to a diverse range of perspectives. • In the early weeks of an online subject, many students felt "lost in space". <p>These findings led to the design of Virtual-U. One major design factor was the implementation of a spatial metaphor. "It is important that participants form mental models of the 'spaces' where they are working—the virtual seminar, the virtual discussion group, the virtual laboratory, the café for social interactions...This is important if they are to apply appropriate 'social factors' to their interactions" (p. 151).</p> <p>(This paper does not detail the pedagogical findings from subjects implemented using Virtual-U. The only finding reported is: "Observations from the use of early versions of Virtual-U suggest that a spatial metaphor is necessary to provide a sense of place and that is provides a useful mental model to assist navigation" (p. 157). Also, specific pedagogical strategies that can be implemented using the Virtual-U learning system to support collaborative learning were not elaborated.)</p>
Naidu (1997)	<p>An evaluation of the first offering of an online Internet-based graduate program in "Open and Distance learning".</p> <p>Students from anywhere around the world, with appropriate pre-requisites and access to the Internet can enrol in the Graduate Certificate.</p> <p>The role of the teacher in the program is one of facilitator "in engendering collaborative reflection on practice by learners" (p. 1334).</p> <p>Content is accessed from a</p>	<p>The findings from the student feedback include:</p> <ul style="list-style-type: none"> • Presentation of study material on the Web: Most students found the time, pace and place flexibility of the program best met their learning needs and allowed them to combine work with study. • Accessing material on the Internet: Most students had sufficient skills to search for relevant online resources. • Use of CMC: Some students found composing messages directly onto the computer initially cumbersome. "For most of the students, being able to express their thoughts directly onto the computer was more a matter of getting used to this mode of communication and interaction among peers, than being able to cope with the technology itself" (p. 1335). • All students claimed that the collaborative reflection encouraged in the subject motivated students to interact with others.

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
	<p>secured Web site and is presented in small “chunks” and via a set of graphics organisers. Students are required to study the content and reflect on it by partaking on online asynchronous discussions.</p> <p>Program evaluation comprised feedback from students and from the program development team.</p>	<p>The findings from the development team feedback include:</p> <ul style="list-style-type: none"> • The dynamic nature of the Web environment enabled instructors to change content easily. • The online environment enabled “much richer communication and interaction among participants which is foremost, asynchronous and as such more suitable and attractive for adult learners” (p. 1335). • The instructor can support students by rapidly responding to their queries.
Sherry and Wilson (1997)	<p>Reflective practice on the level of structure appropriate for Web-based instruction activities.</p>	<p>The findings from this study were:</p> <ul style="list-style-type: none"> • Unstructured activities, such as graduate students participating in CMC discussions or creating individual Web pages “tended to lead to irregularly dispersed knowledge with varying levels of expertise” (p. 70). Erratic differences were found in learning outcomes among participants. “Some members became experts in certain areas while others remained novices” (p. 70). • Structured activities, such as students participating in a case-based instruction project, or collaborative task of building an annotated bibliography “tended to lead to convergent outcomes with a more commonly shared knowledge base” (p. 70). <p>The conclusions drawn from this study include:</p> <ul style="list-style-type: none"> • A range of activities may be appropriate, depending on the prior knowledge and skills of the learners, the needs of the situation, and learning support available to students. “A committed instructor will explore different activities, adding bit by bit to his or her own storehouse of strategies, as different opportunities present themselves” (p. 71). • When should an instructor use a particular type of activity? Conclusion drawn: It depends on the instructor’s comfort level with the technology and pedagogical model, and the energy and time that can be devoted to the innovation. • The ultimate goal of Web-based instruction is for learners to assume more direction and control over the learning goals. To facilitate this, the instructor needs to shift focus from teaching to support.
Bostock (1998)	<p>A case study about the constructivist design of an undergraduate subject delivered using a Web site, email and video.</p> <p>Approximately 300 humanities students were enrolled in the on-campus subject. The subject was about the Internet and the learning objectives were that students could search the Internet and retrieve resources, and be able to participate in online discussions about issues</p>	<p>The findings from this study were:</p> <ul style="list-style-type: none"> • Most students commented they had more freedom in the learning process than in other subjects. • Enthusiasm for non-assessable group work waned. In the next subject offering, students were given a group task that required online discussion and students were assessed on their individual contribution to the online discussion. • For subjects with large numbers of students, a “mild” form of constructivism—where some didactic instruction is given may be most appropriate.

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
	<p>such as electronic networking and society.</p> <p>The study describes the design, implementation and evaluation of the subject.</p> <p>The subject was designed according to 5 principles that characterise a constructivist approach:</p> <ol style="list-style-type: none"> 1. Authentic assessment: The conventional examination was replaced with a final subject report. 2. Student responsibility and initiative: Students were given choice about content and type of task. 3. Generative learning strategies: Students created Web pages, contributed to online discussions and produced a concept map. 4. Authentic learning contexts: Students used the Internet to learn about it. 5. Co-operative support: Students were encouraged to work together. 	
Wulf and Schinzel (1998)	<p>A case study of a pilot project that connected five German universities to teach a computer science subject: "Computers and Society" using a Multicast backbone videoconferencing tool-set over the Internet.</p> <p>Subject involved 19, 90 minute weekly synchronous sessions. 12 sessions were structured as lecture presentations, and seven sessions were structured as tutorials.</p> <p>The telelecture comprised a conventional lecture and additional information was available on the Web. The average number of students in each site for the telelecture was 15.</p> <p>Teletutorial comprised question and answer sessions between lecturer and students and students also engaged in some small group discussions. The average</p>	<p>The findings from this study include:</p> <ul style="list-style-type: none"> • Speed of lecturing was reduced. "We were not able to present as many topics as in a face-to-face lecture" (p. 1519). • Participants from the remote locations reported a lower level of attention compared to face-to-face lectures. • A low level of interaction occurred between the lecturer and the students. For example, the first question asked by a student occurred after two months. • Students appreciated the exchange of ideas with students from the other universities. • Students reported a feeling of anonymity and emotion distance towards each other. • On-campus students were more dissatisfied with telelearning experience than remote students. The authors suggest that to encourage the on-campus students' motivation "one has to provide benefits to them like increased asynchronous availability of the lecturers or didactically elaborated material" (p. 1520). <p>The conclusions drawn from this study are:</p> <ul style="list-style-type: none"> • Telelecturing resulted in a lower level of attention of the remote participants and a lower level of interactivity between lecturers and students, than in a face-to-face environment. "It is doubtful whether it [synchronous telelecturing] will be more lecturer-time efficient than traditional face-to-face approaches" (p. 1521).

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
	number of students in each site for the teletutorial was 11.	<ul style="list-style-type: none"> • “Telelecturing implies the loss of social control which typically is imposed by the physical presence of the lecturer. Thus, the lecturer faces a stronger competition for the attention of the participants” (p. 1519). • It is crucial to plan and prepare telelearning subjects well in advance. • Telelearning requires new teaching and learning approaches.
Dehoney and Reeves (1999)	<p>An ongoing qualitative examination of instructional uses of the Web at The University of Georgia.</p> <p>The aim of the study is to describe how early-adopter instructors (those without technical training or instructional design support) use the Web to support instruction and to describe how the instructors perceive the impact of their pages on instruction.</p> <p>A selected sample of 25 Web sites, which was accessible from the university home page, was analysed.</p>	<p>The findings from this study include:</p> <ul style="list-style-type: none"> • Most Web sites served two roles: <ol style="list-style-type: none"> 1. Information bank: Sites provided static subject-related information such as content material, class schedule and procedural information. 2. Task manager: All sites served subject management functions conveying class schedules, instructor availability and required reading information. • There were four social aspects of classes that instructors conveyed in their Web sites: <ol style="list-style-type: none"> 1. Behavioural expectations of students, ie: attendance requirements, etc. 2. Subject philosophy: instructor perception of teaching and learning, and student-instructor interaction. 3. Class community: demonstration of site supporting the class as a community. 4. Instructor personality • Instructor perceptions included: <ol style="list-style-type: none"> 1. Web site helped students to develop Web skills. 2. Reduced note taking during lectures (due to summaries being available on site) and higher quality questions during lectures. 3. Novelty effect may be working to their benefit. <p>The conclusion drawn from the study is: “Our work thus far suggests to us that, though instructors’ stated goals are functional and pragmatic, outcomes exceed expectations seemingly in proportion to the degree instructors use the unique qualities of the Web. Similarly, while instructors may want their pages to perform ‘housekeeping’ functions as a baseline, they are interested in understanding the more substantive instructional functions that their pages may potentially...perform” (p. 38).</p>
Dijkstra, Collis, and Eseryel (1999)	<p>Description of a Web-based course-support environment implemented in a graduate subject about Instructional Design.</p> <p>The Web site was developed using the University of Twente TeleTOP database-generated course-support system. Three key principles drove the design:</p> <ol style="list-style-type: none"> 1. Support and amplify student-student, student-teacher communication 2. Increase opportunity for 	<p>The conclusions drawn from this study include:</p> <ul style="list-style-type: none"> • Online discussions should form part of assessment in order to encourage participation: “In order to get a critical mass of discussion activity, students were given points for their contributions” (p. 12). “In the next cycle of the course, points will be part of the design to acknowledge participation in the discussions” (p. 13). • Students need to be shown how to use the features of the Web site and the CMC tools—students do not read the user manuals provided (p. 12). <p>Ten design guidelines surfaced from the study. These are detailed in Table 2.10.</p>

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
	<p>instructor to coach individual students</p> <p>3. Encourage more student self-responsibility.</p>	
LaMaster and Knop (1999)	<p>The study identified pedagogical concerns from the instructor's perspective in an undergraduate subject (for 200 students) that was changed from traditional learning to Web-based asynchronous learning.</p> <p>There were two weekly meeting times where the instructor was available, but no on-campus student attendance was required. Instructor-student interaction occurred in the weekly meeting times, via email and telephone.</p>	<p>The pedagogical issues that emerged from this study include:</p> <ul style="list-style-type: none"> Concerns about content: "The question arose, how to provide focus and content emphasis for students" (p. 1333). Concerns about testing students: There was an examination component and issues of honesty and integrity arose since students sat for the exam using a computer. Concerns about how to provide quality communication with students: Students used email, had two weekly one hour sessions where the instructor was available, and access to the instructor during office hours. "These strategies seemed to be sufficient, yet students were constantly phoning and visiting the instructor outside of these prescribed times. Previously identified suggestions for instructors of Internet courses include 'don't be available to your students all the time'...Results from this study indicated that further examination of this web based course should occur" (p. 1333).
McIsaac, Blocher, Mahes, and Vrasidas (1999)	<p>A summary of student and teacher perceptions of CMC interaction from six Web-based subjects taught at Arizona State University between 1996 and 1998.</p> <p>The Web-based course support software system FirstClass was used.</p>	<p>The themes that emerged from the teachers' feedback include:</p> <ul style="list-style-type: none"> The teaching style in the distance setting differs from the traditional face-to-face setting. Instructors are more concerned about encouraging student participation online than in a traditional class. Teachers usually initiate CMC. Teachers felt that responding to students' online contributions enhanced their effectiveness as teachers. Quality of interaction with students is perceived to be better online than in a traditional face-to-face class. Interaction was mainly asynchronous. More time is spent teaching a distance class than a traditional class. Teachers however felt it was worthwhile. Teaching style and background affected the subject design and structure. Flexibility of time and place was perceived important to the productivity and quality of teaching. <p>The themes that emerged from the students' feedback include:</p> <ul style="list-style-type: none"> Student interactions were goal-oriented: online interaction took place when students wanted to achieve a task or meet a need. Examples of goal-oriented interaction include sharing information, asking for technical help, submitting homework, participating in online discussions, and socialising. Lack of immediate feedback contributed to feelings of isolation and dissatisfaction. <p>Recommendations from this study include:</p> <ul style="list-style-type: none"> Teachers should provide immediate feedback to students and the feedback should be personalised. Teachers should participate in the online discussions. Students felt the teachers were the

TABLE 2.2 Examples of research studies that examine/evaluate Internet-based learning implementations in university subject offerings		
		<p>experts and thus would have added credibility to the discussions.</p> <ul style="list-style-type: none"> • Promote student interaction and social presence to give the sense of community. An initial face-to-face meeting could be useful. • Collaborative learning should be encouraged. Students did not interact among themselves as much as the teachers expected. Recommended activities include group assignments and online group debates. (However, how these strategies can be integrated with the other components of the subject, ie: content, assessment requirements, etc, was not elaborated).
Hara and Kling (2000)	<p>A qualitative case study of a Web-based distance education graduate subject at a major United States university. The study revealed the students' distressing experiences such as frustration, anxiety and confusion due to communication breakdowns and technical difficulties. There were eight students in the subject.</p> <p>The major focus of the study was to understand the experience of participating in an asynchronous text-based course run over the Web from the students' perspectives.</p> <p>The subject was taught via a Web site that included reading resources, activities and discussion questions. Assessment comprised five tasks:</p> <ol style="list-style-type: none"> 1. Reading responses (10%) 2. Online discussion participation (15%) 3. Internet address book (10%) 4. Portfolio (50%) 5. Project (15%) <p>It was the instructor's first distance education teaching experience.</p>	<p>Student "distress" surfaced for the following reasons:</p> <ul style="list-style-type: none"> • Some students found the fast pace of communication in a MOO virtual space activity overwhelming and were not familiar with the CMC genre in this environment. • Ambiguous instructions about the subject activity and vague instructions about the assessment tasks was a major contributor towards student frustration. The instructor's intent was to give students flexibility however some students wanted more structure and clearer direction. • Students wanted prompt unambiguous feedback and they perceived it was not forthcoming. • Email was used for the online discussions and many students found the volume of email messages overwhelming and could not keep up. This was exacerbated due to online participation being part of the assessment. • Technical problems surfaced and the lack of availability of technical support contributed to the students' frustration. <p>Conclusions drawn from this study include:</p> <ul style="list-style-type: none"> • Teaching online is not the same as face-to-face. • Students and instructors need to learn how to manage their expectations of when they can receive and provide "prompt feedback". • Each cohort of students should negotiate a discourse protocol when using online discussions. "In many other courses...participants don't explicitly question and negotiate meta-communicative conventions, even when they are confused and frustrated" (no pagination). • More research is required that examines the complexities of learning and teaching with "new media".

2.3.3.2.2 Studies that evaluate the effectiveness of Web-based learning

An issue that is a preoccupation in the educational research literature is evaluating the effectiveness of Web-based learning implementations in terms of the learning outcomes such innovations generate. The research strategy to investigate effectiveness of learning outcomes has been predominantly based on determining the extent to which the same learning outcomes that were designed for the same

subject in the pre-technology context, are achieved in the Web-based implementation. Bain (1999) and Alexander (1999) argue that currently there is little research being done in this area and thus more research needs to focus on this issue. Table 2.3 provides three examples of recent studies (presented chronologically) that examine effectiveness in terms of learning outcomes. These three studies have been chosen to illustrate the varying degrees of research design sophistication. It is contended that the Lockyer et al. (1999) study exemplifies “good research design” as the Web-based innovation extends pedagogy beyond what is achievable in the conventional face-to-face classroom setting. The study’s rigorous formative and summative evaluation of the Web-based innovation provides valuable additional detail to the learning outcomes measurement. The other two studies do not represent such research design sophistication. A critique is provided for these two studies in the table.

TABLE 2.3 Examples of research studies that evaluate the effectiveness of Web-based learning		
<i>Study</i>	<i>Description</i>	<i>Findings</i>
McIntyre and Wolff (1998)	<p>The study examined the use of interactive learning on the Web in an “Introduction to C Programming” undergraduate subject at Cleveland State University by comparing results with the same subject taught using no interactive Web-based learning component.</p> <p>The experimental design to test the effectiveness of the Web-based innovation was based on learning C pointers. One class used a Web-based interactive learning tool developed for the subject. The other class was taught via the conventional face-to-face approach.</p> <p>Students used the Web-based tool both in and outside class time. Students were encouraged to “intermix interactive WWW learning sessions, with textbook reading, and discussions with friends (possibly sitting around the screen)” (p. 262).</p> <p>The determination of effectiveness of the Web-based innovation was based on the results of a quiz that was given to both classes and</p>	<ul style="list-style-type: none"> • Results from the quiz showed higher grades for the students who used the WWW interactive learning tool. “It is clear from the results that the ability to leisurely interact with several examples during out of classroom time appeared to significantly raise grades on the identical quiz” (p. 262). • A student survey completed by students after the quiz indicated that the majority of students thought the Web-based intervention used as a supplement to their classroom learning was a significant benefit to their learning. The majority of students thought that the Web-based intervention should not be considered as a total replacement of the classroom setting. • As a prototype to explore the efficacy of WWW interactive learning as an enhancement to classroom learning, “the results were very encouraging” (p. 263). <p>(This study represents a research design similar to that presented by Kozma (1994). That is, the technology was implementing using a different instructional strategy than that implemented in the conventional subject. Thus, it is contended that the findings from this study are dependent on the instructional strategy implemented. However, the study has merit because it resulted in a positive pedagogical change of the subject.)</p>

TABLE 2.3 Examples of research studies that evaluate the effectiveness of Web-based learning		
	student feedback obtained from a survey.	
Lockyer, Patterson, and Harper (1999)	An investigation that examined and compared the effectiveness of collaborative discussion activities carried out in both a Web-based learning environment and a face-to-face class situation in an undergraduate health education subject.	<ul style="list-style-type: none"> The major finding was that the collaborative learning activities were significantly more effective in the Web-based environment than in the face-to-face setting. Students perceived the Web-based environment to be as effective or more effective than the face-to-face learning environment because of the following reasons: <ol style="list-style-type: none"> Convenience and flexibility in engaging in the Web-based tutorials. Novelty—it was something new and different for the students. The asynchronous aspect of the online setting fostered the opportunity for reflection.
Johnson, Aragon, Shaik, and Palma-Rivas (2000)	<p>A comparative analysis of learner satisfaction and learning outcomes in a graduate subject about Instructional Systems Design (ISD) that was delivered both face-to-face and entirely online.</p> <p>The same content and the <i>same</i> instructional treatment of the content was delivered in both the face-to-face and online environments.</p> <p>Content presentations (which comprised one topic per week) were delivered face-to-face as a lecture aided with a PowerPoint presentation and handouts. In the online setting, pre-recorded streamed audio lectures with synchronized PowerPoint slides were used and handouts were posted to the subject Web site. The online students could discuss the content with the instructor via weekly one-hour synchronous online chat sessions.</p>	<p>The findings from this study include:</p> <ul style="list-style-type: none"> In terms of instructor quality and subject quality, the face-to-face group held more positive views than the online group. The study, however, was not able to elaborate reasons for this difference. “Although the face-to-face group provided a slightly more positive rating of the quality of the instructor than the online group, the reasons for this difference are not evident” (p. 44). In terms of student-student, and student-instructor interaction, the face-to-face group held significantly more positive views than the online group. The face-to-face group rated instructor support higher than the online group. There was no significant difference in learning outcomes. The indicator of effectiveness was the degree to which students reached the learning objectives. The quality of subject projects, subject grades, and the students’ self-assessment of their understanding of the content was analysed for differences between the two groups. <p>(The usefulness of this type of study is questionable. Whilst the study concluded that the online learning environment demonstrated learning outcomes equal to the face-to-face context, it does little to inform pedagogy on how the online environment can be appropriately designed. Berge (1998) argues that “designers and teachers should not try to duplicate on-line what they do in place-based, face-to-face classrooms and instruction” (p. 72). Yet, this study demonstrates the opposite. In terms of suggestions to improve opportunities for student-student and student-instructor interaction for the online subject offering, the study is only able to conclude: “it appears that designers of online environments need to devote much more effort to this area” (p. 45).)</p>

2.3.3.2.3 Studies specifically focused on the CMC aspect of an Internet-based innovation

Computer-mediated communication (CMC) has become a generic term for communication that takes place among people by means of computer networking

systems (Romiszowski & Mason, 1996). The most common communications technologies that facilitate this online communication include email and computer conferencing tools.

The various applications of CMC have led to variances in definition as to what CMC encompasses. For example, Romiszowski and Mason (1996, p. 438) include Computer Supported Cooperative Work (CSCW) as an application of CMC. Jonassen et al. (1995, p. 15), however, differentiate Computer Supported Collaborative Work from CMC. Santoro (1995) defines CMC as “the use of computer systems and networks for the transfer, storage, and retrieval of information among humans” (p. 11). Santoro’s (1995) definition encompasses three main applications:

1. Direct person-to-person communication.
2. Use of the computer as a repository of information “which originates with human contributors and is utilized by human retrievers” (p. 15).
3. Use of the computer as teacher or guide—Computer-assisted instruction (CAI).

Romiszowski and Mason (1996) exclude the use of the computer as an information repository and CAI from CMC as they argue that CMC is confined to intentional person-to-person discussion.

Other variances in definition are in terms of the form in which person-person communication takes place. McLoughlin (1996) constrains CMC to text-based interaction. Romiszowski and Mason (1996) appreciate that technological developments are enabling the incorporation of graphics, audio and video which are expanding the potential “for a much richer form of CMC” (p. 441). They state however, that most of the research conducted has been focused on the text-based forms of CMC.

Thus, for the scope of this thesis, CMC is defined as follows:

The use of computer networks to allow learners in different geographical locations to interact with one another in a text-based environment either in synchronous (same time) or asynchronous (delayed/different time) mode for the purpose of communication.

CMC is perhaps the most significant feature the Web affords as it facilitates the opportunity for students to interact and work together as a community of practitioners—irrespective of time and place. This opportunity for interaction among students is argued by Jonassen et al. (1995) to be “the most valuable activity in a classroom of any kind” (p. 7).

CMC is not itself a new concept. The first computer conference developed dates back to 1970 (Hiltz & Turoff, 1978). Today, however, CMC is one of the fastest growing areas in educational technology research and development (Romiszowski, 1997). It is becoming one of the most popular concepts for implementation in the education sector namely due to claims that it can facilitate the following desirable educational traits (McLoughlin, 1996, p. 269):

- The development of a sense of community among participants
- Greater autonomy in learning, collaborating and exchanging ideas
- New roles for teachers as facilitators
- Online environment for students to socialise and exchange ideas
- Authentic context for learning
- Access to a global audience
- Teleapprenticeship through interaction with skilled collaborators
- Peer interaction and sharing of views.

Its perceived educational benefits and limitations are well documented in the literature. For the use of CMC in higher education, the benefits seem to outweigh the limitations (Ellsworth, 1995). Table 2.4 summarises the benefits and limitations presented in the following literature: Bates (1995); Hara, Bonk, & Angeli (2000); Harasim, Hiltz, Teles, and Turoff (1995); and McLoughlin (1996).

TABLE 2.4 Computer-mediated communication—Perceived educational benefits and limitations	
<i>Benefits</i>	<i>Limitations</i>
<ul style="list-style-type: none"> • Removal of time and space restrictions (Hara et al. 2000). • Asynchronous or delayed capabilities increases ‘wait-time’ and provides opportunities for reflective learning (Hara et al. 2000; Harasim et al. 1995). • Provides a permanent discourse transcript for student reflection and debate (Hara et al. 2000). • Academic discourse can be developed. Students can develop skills in “analysis, constructing and defending an argument, assembling evidence in support of an argument, and critiquing the work of other 	<ul style="list-style-type: none"> • Removal of time constraints can create overload for instructor and students “with ceaseless opportunities to learn and work” (Hara et al. 2000, p. 116). • Students can experience difficulty in keeping up with all computer conferencing messages (Bates, 1995). • Lack of visual cues and limited symbolic representation in text-based CMC systems can impede interaction (Bates, 1995; Hara et al. 2000). • Users often are not aware of “active listeners”—lurkers who read but do not respond to conferencing messages (Bates,

TABLE 2.4 Computer-mediated communication—Perceived educational benefits and limitations	
<p>learners” (Bates, 1995, p. 207).</p> <ul style="list-style-type: none"> • Provides an instructor with useful tools for tracking student development (Hara et al. 2000). • Collaborative work can be facilitated (Bates, 1995; Harasim et al. 1995). • Increased equity of participation—more democratic participation (Bates, 1995; McLoughlin, 1996). • Written mode of communication may overcome inhibitions experienced in face-to-face communication (McLoughlin, 1996). • A community of inquiry where participants question one another facilitates the development of higher order learning skills (McLoughlin, 1996). • Can overcome social isolation for distance learners and in turn foster emotional involvement (Bates, 1995). • Direct contact and interaction between students and instructor (Bates, 1995). • Cross-cultural participation can be facilitated (Bates, 1995). • Facilitates active learning (Harasim et al. 1995). 	<p>1995; Hara et al. 2000). (This depends on the software application.)</p> <ul style="list-style-type: none"> • Text-based CMC systems may place students with lower verbal skills at a distinct disadvantage (Hara et al. 2000). • Emotional absorption—addictive nature of online communication (Bates, 1995). • Not entire transparent in use—first time users need training (Bates, 1995).

These published benefits and limitations are open to interpretation as new insights are gained from research. For example, although a perceived benefit of CMC is that it can facilitate democratic participation, a recent study by Markel (1999) found that this did not occur in an online computer conference as gender was not masked in the text-based CMC discussions. Markel (1999) concludes: “We need not perpetuate the myth that all Internet communications and virtual participants are treated equally. They are not. Nor are their genders or linguistic indicators of social status masked” (p. 336).

In 1995, Harasim et al. (1995) stated outright that CMC “makes learning and teaching richer and more effective” (p. 12) and “the quality of the interaction is also improved” (p. 12). They further claimed that the most important characteristic for student success in a CMC learning environment is motivation:

The most important characteristic for student success in this medium is motivation. If the student wants to learn the subject enough to make the time to sign on and if the student has adequate reading and writing skills, the outlook is for success. There is no subject matter that cannot benefit from being taught partially or wholly online. A second factor is the creativity and effort of instructors to create a course design that involves active learning by the students and incorporates collaborative learning components. (p. 27)

Fostering motivation in students to partake in online discussions and engage in online collaborative learning is the current challenge for educators, as it is an issue

that is still not well resolved. Romizowski (1997) states that there is not enough known about how CMC can be incorporated into a collaborative learning instructional strategy. In a recent CMC study conducted by Hara et al. (2000), they conclude: “There clearly is a pressing need to develop pedagogy that motivates students to electronically participate in class discussions beyond standard course requirements. Such pedagogical issues must be addressed before anyone can claim electronic learning success” (p. 141).

Thus, questions such as: “How should CMC be incorporated into a subject offering?” and “What instructional strategies should be devised and how should they be implemented?”, are as significant today as when the Web was first introduced.

Pioneering work in the area of online distance learning conducted by both the Ontario Institute for Studies in Education (OISE) (Harasim et al. 1997) and the Open University (OU) (Mason & Bacsich, 1998) has provided considerable insight into how graduate subjects can be delivered entirely online using CMC. Harasim et al. state:

The educational approach taken reformulated collaborative learning activities for a networked environment characterized by five key attributes: an asynchronous, place-independent, many-to-many, text-based computer-mediated system... These five attributes have subsequently proven to be both constraints and opportunities for enabling effective collaborative learning online. The educational design, tested and refined by ongoing research, has proven robust and effective in over ten years of iterations and has been adopted by educators and institutions worldwide. (p. 150)

Mason and Bacsich (1998) present the following guidelines that have been formulated from over a decade of evaluation studies about the use of computer conferencing by the OU:

- Structure online interactions
- Link CMC with online assignments—make computer conferencing a vehicle for carrying out assignments
- Limit the asynchronicity of the medium
- Use strategies such as digital student photos, synchronous chat sessions, and student-only conferences, to enhance the social environment
- Train the tutors
- Use computer conferencing to provide feedback

However, how a CMC component can be utilised in flexible delivery modes (where face-to-face interaction is also available), has not been privy to such “robust” and “effective” design guidelines as claimed by Harasim et al. (1997) to be the case for the total online delivery mode.

In their review of CMC research, Romiszowski and Mason (1996) stated that whilst CMC has gained popularity, the majority of research available has been conducted by pioneers in the field to explore its potential and overall, educational CMC research is relatively sparse:

One notable current debate that impacts on the role of CMC in education is the “constructivism vs. objectivism” debate....Another, not so recent, debate that has been revived in relation to the use of CMC is the “humanism vs. mechanism” issue....Other groups of theorists argue for CMC from the social constructivist standpoint of learning as “conversation.”....All of these different theoretical and philosophical viewpoints are interesting but are largely unresearched. Some current research is beginning to address certain issues in this field, but much further research is necessary in order to validate the claims and counterclaims and to develop a robust set of principles for the selection, design, and use of CMC environments in education and training. (p. 441-442)

In addition, Romiszowski and Mason (1996) claimed that few studies have been conducted using qualitative techniques and there are very few analytical techniques applied to the CMC transcripts:

There is little use to date, in the study of CMC, of qualitative approaches based on observation and interviewing (either in person or over the telephone). This is so for several reasons: (a) the labor intensity of qualitative research study, (b) the expense and difficulty of contacting ex-CMC users, and (c) the newly emerging acceptance of qualitative research in education....Nevertheless, the most glaring omission in CMC research continues to be the lack of analytical techniques applied to the content of the conference transcript. Given that the educational value of computer conferencing is much touted by enthusiasts, it is remarkable that so few evaluators are willing to tackle this research area. One of the pioneers in this field is Henri (1992)....Another is Mason (1992). (p. 443)

Romiszowski and Mason (1996) present a summary of the CMC issues that have been investigated. Their summary is synthesised in Table 2.5.

Since 1996, there has been increased intensity of educational CMC research and there has been a growing emphasis towards the examination of the CMC conferencing transcript. A sample of studies conducted between 1996 and 2000 is outlined chronologically in Table 2.7. These studies highlight the range of research approaches employed in current educational research on CMC.

TABLE 2.7 Research on CMC—A snapshot of research conducted from 1996 to 2000		
<i>Study</i>	<i>Description</i>	<i>Findings</i>
Mowrer (1996)	<p>A content analysis of student and instructor computer conferencing interaction in an undergraduate subject.</p> <p>The content of each student's and instructor's posting was analysed to determine the number and type of topics discussed.</p> <p>This study presents a detailed quantitative analysis of the online postings.</p>	<p>The conclusion drawn by this study is that computer conferencing can be a beneficial teaching tool and can improve the quality of student learning. The reasons given are:</p> <ul style="list-style-type: none"> • The instructor can increase "teaching time" by addressing specific student issues and providing CMC activities as a supplement to classroom instruction. • CMC serves as a diagnostic tool as students can provide invaluable feedback to the instructor about the nature and effectiveness of classroom activities and assignments. The instructor can then alter the teaching style to reflect such feedback. • Students have opportunity to bond together. • The instructor can review the CMC transcripts to obtain a picture of the dynamics of the class. This

TABLE 2.7 Research on CMC—A snapshot of research conducted from 1996 to 2000		
		<p>provides useful feedback that can be used to improve the subject.</p> <p>The paper concludes by stating: “It is recommended that instructors attempt to engage students in written exchanges by planning activities that will encourage them to read postings regularly and to become active contributors to the forum” (p. 238-239).</p>
Ruberg, Moore, and Taylor (1996)	A case study that describes student interaction and participation in a CMC environment in an experimental offering of a undergraduate plant science lab subject.	<p>Successful use of CMC activities requires:</p> <ul style="list-style-type: none"> • A classroom social environment that encourages peer interaction. • Selection of engaging tasks that are structured just enough to minimise confusion but still allow spontaneity and experimentation. • Instructors need to find ways to directly link the CMC discussions to prior and upcoming learning activities “so that students will see the value in creating a discourse that they will want to refer to and use in other class activities” (p. 243).
Zhu (1996)	<p>The study investigated the patterns of student online discussion and knowledge construction practices in a graduate subject.</p> <p>Discussion of weekly readings took place in the form of CMC. A “starter-wrapper” strategy was implemented. A new topic was discussed each week and the online discussion comprised four components:</p> <ol style="list-style-type: none"> 1. Instructor introductory questions and reading advice 2. Weekly starter comments 3. Participant comments 4. Weekly wrapper comments <p>Student online participation was worth 25 percent of the final grade and students were required to participate each week.</p> <p>A specific CMC coding scheme was devised for this study. Vygotsky’s learning theory and theories of cognitive and constructive learning underpinned the design of the content analysis model.</p>	<p>The findings from this study include:</p> <ul style="list-style-type: none"> • Using a “wrapper” for each week’s discussion was not beneficial to students as most students ignored the wrapper’s comments. • Students did not focus the discussion around the introductory questions set by the instructor. • Students were actively involved in their learning as they exhibited activities such as planning, self-monitoring and self-regulation. “Students decided how to participate in the discussion, how to learn, and what to learn” (p. 841). • The role of the instructor became a mentor and facilitator of students’ learning. Several approaches used to guide students’ learning were: <ol style="list-style-type: none"> 1. The starter/wrapper strategy 2. Build on students’ posting by adding comments to generate more conversation or push students to defend their opinions. 3. The use of role-play. Students were assigned a role and had to participate online assuming that role.
Gunawardena, Lowe, and Anderson (1997)	An analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing.	<p>This study developed a CMC interaction analysis framework based on a constructivist perspective. The interaction analysis model was devised to examine the social construction of knowledge in a computer conference. The developed model comprised five phases or categories to which each online posting was coded against. The five phases are:</p> <ol style="list-style-type: none"> 1. Sharing/comparing of information

TABLE 2.7 Research on CMC—A snapshot of research conducted from 1996 to 2000		
		<ol style="list-style-type: none"> 2. The discovery and exploration of dissonance or inconsistencies among ideas, concepts or statements. 3. Negotiation of meaning/Co-construction of knowledge 4. Testing and modification of proposed synthesis or co-construction 5. Agreement statement(s)/Applications of newly constructed meaning.
McDonald and Campbell Gibson (1998)	<p>A content analysis to describe the patterns of interpersonal interactions relating to group development in asynchronous computer conferencing.</p> <p>The content analysis framework by Henri (1992) was adapted to meet the needs of this study.</p>	The main finding from this study was: "People meeting, discussing, and collaborating as a group via computer conferencing have similar interpersonal issues, at comparable stages and proportions, as reported in the literature for face-to-face groups. The fact that communication and interaction is computer-mediated does not seem to have a discernible effect on group development in online courses" (p. 20).
Benbunan-Fich and Hiltz (1999)	<p>A field experiment was conducted to test the effectiveness of an asynchronous online collaboration versus the traditional face-to-face method of individuals and groups discussing and solving the same case study.</p> <p>Effectiveness was determined based on:</p> <ol style="list-style-type: none"> 1. Quality of the case study solution. 2. Length of the student group reports. 3. Student satisfaction with the interaction process. 	The findings indicate that the online groups produced better and longer solutions to the case study task, but were less satisfied with the interaction process.
Hillman (1999)	<p>The study examined patterns of interaction in face-to-face classrooms and in an online setting.</p> <p>The text of all spoken and written discourse was analysed from four face-to-face subjects and two CMC-based subjects were analysed.</p>	<p>A new coding scheme was designed for this study. The coding scheme classified each sentence on three levels:</p> <ol style="list-style-type: none"> 1. Purpose of sentence: Organising, Lecturing, Eliciting, Responding, Humanising, Idling, Not Clear 2. Mechanism of sentence: Fact-Stating, Explaining, Opining, Performing, Repeating, Rating, Rhetorical Device, Filler, Not Clear. 3. What was discussed: Person, Action, Procedure, Content, Supplies, Not Clear. <p>Results indicated that the interaction patterns in the CMC subjects resembled discussion, whereas the interaction patterns in the face-to-face subject resembled recitation.</p>
Hara, Bonk, & Angeli (2000)	<p>The study analysed the online conferences that supplemented face-to-face class discussion within a traditional graduate level educational psychology subject.</p> <p>The study's purpose was to</p>	<p>The findings from this study include:</p> <ul style="list-style-type: none"> • Student participation rates: <ol style="list-style-type: none"> 1. Students dominated the discussion, not the instructor. This indicated the conference was student-centred and the roles of starter and wrapper helped foster student responsibility for each discussion. 2. Most students posted just one message per week in order to satisfy the minimum course requirement.

TABLE 2.7 Research on CMC—A snapshot of research conducted from 1996 to 2000		
	<p>explore how students interact online in a student-centred environment. The study was not focused on individual student learning and achievement outcomes, but was intended to document how CMC can encourage higher-order cognitive and metacognitive processing.</p> <p>The online strategy employed was called the starter-wrapper technique.</p> <p>Content analysis based on the framework developed by Henri (1992) was conducted.</p>	<ul style="list-style-type: none"> • Students' online comments became more interactive over time but were highly dependent on the directions of the discussion starter. • Student messages became less formal as the semester progressed. • The content analysis revealed the following: <ol style="list-style-type: none"> 1. While students tended to post just the one required comment per week in the conference, their messages were lengthy, cognitively deep, embedded with peer references and indicative of a student-centred environment 2. In terms of metacognitive components in the student messages, the "reflection on experience" category was the most dominate. 3. Most of the messages analysed were fairly deep in terms of information processing. <p>The pedagogical recommendations made were in terms of improving the improving the starter-wrapper instructional strategy. Three suggestions were offered:</p> <ol style="list-style-type: none"> 1. Give students access to past examples of starter and wrapper. 2. Instructor can praise students to foster electronic interaction. 3. Require students to participate 15-25 times during the semester, but this participation could be concentrated in those weeks of most personal interest. <p>The overall conclusion drawn from this study was the need to develop strategies that foster more student interaction. "What is certain is that educators need to develop more online conferencing tasks and strategies that enhance two-way interaction and opportunities for extended dialogue and knowledge negotiation" (p. 146).</p> <p>(The pedagogical recommendations provided by this study are stated only in the context of improving the existing instructional strategy—the starter-wrapper technique. These recommendations are couched within a fixed-weekly face-to-face delivery mode. The study did not elaborate or explore how CMC could be implemented in the subject to break the reliance of the fixed weekly face-to-face instructional mode.)</p>
Sherry, Billig, and Tavalin (2000)	The study presents an analysis of CMC conversations from a Web-based innovation titled: "The WEB Project" which involves 12 secondary schools.	Several recommendations are made for "good online conversation". One recommendation made that is significant to this thesis is: "The online component of instruction should be closely aligned with what is happening in the classroom" (p. 124).

A significant theme that has surfaced from this review of CMC research literature is that more research is required to investigate instructional strategies appropriate for flexible delivery models of instruction. The findings from research (Collis, 1996b; Ruberg et al. 1996; Sherry et al. 2000) suggest that the successful use of CMC in a subject is dependent on how meaningful students find the online task in relation to

the other tasks in the subject. However, the conclusion drawn from a recent study (Hara et al. 2000) highlights that there is still little known about the appropriate instructional strategies that should be implemented to foster such online success. Thus, the development of instructional strategies to foster student interaction and online collaboration in a subject that comprises both online and face-to-face components is an area that is still not well resolved.

2.3.3.3 The agenda for future research—Focus on “improving” rather than “proving”

The previous section has highlighted that research to investigate the use and potential of the Web in education has been predominantly descriptive and anecdotal (Windschitl, 1998). Windschitl (1998) argues that educational research about the Web should not be constrained to descriptive studies. Instead, research needs to go one step further to enlighten practitioners on how to change pedagogical practices:

Much of the published work...has been anecdotal description of such activities as setting up on-line mentoring or how to get students involved in collaborative Web activities with other schools. These tend to be intuitive analyses of what works logistically and what doesn't at the level of classroom implementation. Unfortunately, much of the literature stops short of asking critical questions such as, “Are these practices helping students, and if so, how?” or “Is the introduction of this technology changing pedagogy?” (p. 28)

Harasim et al. (1997) state that “online delivery of courses can enrich and expand traditional educational activities and outcomes; perhaps more importantly, networking has demonstrated the potential to support entirely new types of educational interaction and outcomes” (p. 150). Windschitl (1998) supports this view and states that the use of technology can foster different types of teacher and learner interactions not previously exhibited in the classroom. Thus research studies should be investigating such phenomena to inform the design of pedagogical strategies.

Collis (1996a, 1996b) explains that tele-learning innovations have been predominantly couched in existing practices, and she too, calls for research that focuses on pedagogical re-engineering:

While much is going on...with tele-learning, when the broad picture is looked at the educational system is more likely to “do the same things differently than to do different things”...Tele-learning is still often equated with “distance education” in its “first-generation model”, that of trying to replicate the existing face-to-face classroom as much as possible for students who are not fortunate enough to be there. The assumption is that the face-to-face model, as traditionally practiced, remains the ideal. (Collis, 1996b, p. 564)

Reeves (1999) states that the future research agenda should be developmental type research that is focused on improving pedagogical practice rather than constrained to proving hypotheses:

As we enter the new millennium, I maintain that our research and evaluation efforts should be primarily developmental in nature, i.e., focused on the invention and improvement of creative approaches to enhancing human communication, learning, and performance through the use of interactive learning technologies. The purpose of such inquiry should be to improve, not to prove. Further, developmental research and evaluation should not be limited to any one methodology. Any approach, quantitative, qualitative, critical, and/or mixed methods is legitimate as long as the goal is to enhance education. (p. 18)

A specific example that illustrates Reeves' (1999) argument is the CMC study conducted by Benbunan-Fich and Hiltz (1999). The findings from this study confirmed the central hypothesis, that is, students who worked in groups in the asynchronous online environment produced better and longer solutions to a case study task. However, it was also found that the students who participated in the online task were less satisfied with the interaction process than the students who interacted with each other in the face-to-face groups. Unfortunately, the study did not elaborate on how the online interactions within the groups took place. Thus, recommendations on how practice could be improved, so that the subsequent group of students may not experience the same level of dissatisfaction, could not be made. One conclusion drawn from the study was:

With respect to process satisfaction, consistent with the literature (Wilson et al. 1997), online groups were the least satisfied with the process due to the nature of asynchronous interaction, characterized by delayed feedback (Rice, 1984) and "login-lags" (Dufner et al. 1994). Apparently, groups working in an asynchronous environment had more difficulties coordinating the distribution of work and had to work harder than face-to-face groups. (no pagination)

One recommendation made was: "One of the challenges for designers of ALN's [asynchronous learning networks] is to provide effective coordination tools (such as agenda, voting, and polling) for structuring asynchronous interaction and overcome the inherent limitations of the medium" (no pagination).

The lack of detail provided by this study and the lack of explanation given on how to implement "effective coordination tools" was disappointing and thus limits this study to the "prove" agenda rather than an "improve practice" agenda.

Reeves (1991) claims research that provides a detailed description about what is happening in a technology-mediated learning environment is more useful to guide practice and decision making than solely determining if a statistically significant

effectiveness difference exists between the technology-mediated and conventional face-to-face learning approach:

Think about what Apple would do with the three possible outcomes of a comparative study. If the results showed that the IMM treatment outperformed the old course, the developers would get a pat on the back, but they would have little basis for understanding what worked and what did not, nor would they have much information about how to improve their next IMM training program. If the results showed that the old training outperformed the IMM method...the decision-makers would be faced with the dilemma of choosing among several options including returning to the old training program, revising the IMM program, or attempting the development of a new approach. Finally, if the most likely result of “no significant differences” was found, no one would have a basis for decision making....The descriptive approach, on the other hand, will provide Apple with the information needed to “evolve” to a higher level of design and implementation of IMM for training. (p. 90)

Although this work was published almost a decade ago, it is interesting that comparative media studies (for example, Johnson et al. 2000) are still being conducted.

Research about the use of the Web in education is thus still in its infancy. There are many questions and challenges facing educational practitioners—the main challenge being how to most appropriately implement the Web in order to exploit its affordances. In terms of the delivery of university subjects, the literature indicates that there is little consensus about how a subject Web site should be designed and integrated with other components such as content material, assessment tasks, student attendance requirements, etc. The amount of synchronous versus asynchronous CMC interaction that instructors should incorporate into their subjects is another issue not well resolved. An attributable factor to this lack of consensus is that the Web can be implemented in a learning environment in very many different ways. Thus, the design is dependent on the context in which the Web is used.

2.4 THE MANY FACES OF WEB-BASED INSTRUCTION

2.4.1 INTRODUCTION

Web-Based Instruction (WBI) or Web-Based Learning (WBL) (which will be used interchangeably hereafter) is defined vaguely in the literature. For example, Khan (1997a) defines WBI as “a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported” (p. 6). He does go on to provide a little more detail such as: “A WBI learning environment should include many resources, support collaboration, implement Web-based activities as part of the learning framework, and support both novices and experts” (Khan, 1997a, p. 6).

Relan and Gillani (1997) attribute such vagueness in definition to the newness of Web-based instruction. They state: “in educational literature, the term ‘Web-based instruction’ has seen frequent usage, and on account of its novelty, is interpreted broadly as any form of instructional delivery in which the World Wide Web is included as a tool” (p. 41).

Section 2.3.3.1.1 provided excerpts from the literature that state there is a lack of design principles to guide practitioners in the development of Web-based learning/instruction. However, it has also been illustrated (via the research studies described in Tables 2.2 and 2.3) that the Web can be used in a number of ways. Thus, whilst the call by practitioners for research to develop design guidelines and determine learning effectiveness is merited, it is also challenging because the Web is being used in many different contexts and the instructional design suggestions presented in the literature are based on many variables. Some of these variables include:

- The various contentions of how learning takes place
- The learning outcomes desired
- The degree in which the “Web-based instruction” component of a subject is the major focus of the learning.

For example, the amount of instruction that WBI provides in a learning environment varies among educational applications of the Web. Jonassen et al. (1997) describe a WBI module based on cognitive flexibility theory. This WBI module contains much of the instruction and thus is integral to the learning of the content. The work by Betty Collis on Web-based course support systems (for example, De Boer & Collis, 1999) differs somewhat as the Web is used to support a flexible delivered subject where instruction is given both from the subject Web site, via face-to-face lessons, and through paper-based reading resources. Lockyer et al. (1999) demonstrates another example of how instruction can be provided outside as well as inside the WBI component. A subject Web site was used primarily to support the online collaborative tutorial activities within a face-to-face tutorial framework.

Thus, the extent to which WBI is the major focus of learning can range along a continuum from *integral*, where WBI is the central focus, to *integrated*, where WBI is complemented with other instructional delivery forms. Figure 2.1 illustrates this continuum.

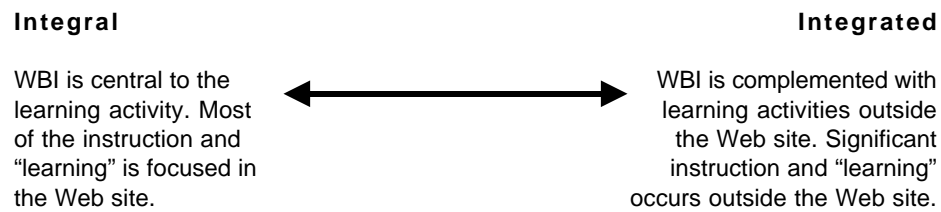


FIGURE 2.1 A continuum that illustrates the role WBI can play in a learning environment

It is therefore contended that there is no one generic design model that can be applied to the development of Web-based instruction. It depends on how the Web is used in the learning environment. Thus, the context in which the Web is to be used, underpinned with the contentions about how learning occurs, drives the design:

What is unique about WBI is not its rich mix of media features such as text, graphics, sound, animation, and video, nor its linkages to information resources around the globe, but the pedagogical dimensions that WBI can be designed to deliver. In short, the World Wide Web is only a vehicle for these dimensions. (Reeves & Reeves, 1997, p. 59)

Various terms have been used to describe Web-based learning environments. Each term highlights the particular emphasis for which the Web is used:

- Web-based course-support environment (Dijkstra et al. 1999)
- Online learning environment (Gibbs, 1998)
- Virtual Learning Community (McLellan, 1998)
- Computer-mediated communication environment (Ruberg et al. 1996)
- Collaborative Learning Environments (Schrum, 1997).

2.4.2 FRAMEWORKS THAT ILLUSTRATE THE PERMUTATIONS OF WEB-BASED LEARNING

Reeves and Reeves (1997) present a model to guide practitioners in the development, implementation and evaluation of WBI. The model comprises ten dimensions. Each dimension is structured as a continuum and represents a component or variable that can be considered when designing WBI and when categorising existing WBI. The authors however note that the model “is by no means exhaustive, and enhancements to strengthen its utility are expected” (p. 59). The ten dimensions are presented in Figure 2.2.

The framework developed by Bannan-Ritland et al. (1998) also highlights the various ways in which the Web can be used in a university subject. Bannan-Ritland et al. present a categorisation scheme of various types of WBI applications, which form a continuum ranging from information delivery to a “cognitively ‘immersive’

instructional experience” (p. 77). The six categories are ordered from an objectivist orientation “where instructional elements are previously organized and simply provided to the learner” (p. 78) to a more constructivist orientation “where learners are encouraged to reorganize, manipulate, and personally synthesize course content” (p. 78). Their augmented categorisation scheme (Table 2.8) includes an additional fifth column, which is not present in their framework, to highlight some examples of the different categories of WBI.

FIGURE 2.2 Ten dimensions of WBI (Reeves & Reeves, 1997)

TABLE 2.8	Framework that illustrates the various applications of Web-Based Instruction (Based on Bannan-Ritland et al. 1998)
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Thus, the frameworks presented by and Bannan-Ritland et al. (1998) and Reeves and Reeves (1997) illustrate the various functions and permutations in which the Web can be used. In both of these frameworks the Web is not the focal point but rather the instructional strategy in which the Web is incorporated. Therefore, the design of Web-based instruction is dependent on the context in which it is to be implemented.

2.4.3 DIFFERENT LEARNING CONTEXTS AFFORD DIFFERENT DESIGN MODELS

The fundamental reason why a robust set of generically applicable WBI design principles to guide educators is not forthcoming from the literature is because of the

many ways in which the Web can be used in a learning context. Different applications thus afford different design models. For example, in the Web-Based Instruction anthology edited by Khan (1997b), various design principles are presented. However, these design principles are dependent on how the proponents wish to use the Web and how these proponents perceive “learning” to occur. By way of illustration, Table 2.9 presents a few examples that have been selected from Khan (1997b) to show how variations in design principles are based on educational theory and the context in which WBI is to be implemented. Table 2.10 presents some examples outside the Khan (1997b) anthology.

TABLE 2.9 Web-based Instruction design models—Examples from Khan (1997b)

TABLE 2.10 Examples of design model principles from the literature	
<i>Author(s)</i>	<i>Description</i>
Berge (1998)	<p>Provides eight guidelines to assist Web-based instructional designers. These are categorised into pedagogical, technical/support and social recommendations. These principles are based on constructivist theory.</p> <p>Pedagogical guidelines:</p> <ol style="list-style-type: none"> 1. Define/describe and list the purpose(s) for each activity, level and type of social and instructional interactivity, and feedback that is desired. 2. Define the level of teacher-control, guided-teacher-control, student-control and group-control that is desired regarding each activity. 3. Density of content should be inversely related to the amount of synchronous communication within the Web-based learning environment. <p>Technical/support guidelines:</p> <ol style="list-style-type: none"> 1. Recognise that while online environments permit multiple media, currently text and

TABLE 2.10 Examples of design model principles from the literature	
	<p>graphics are the easiest to use.</p> <ol style="list-style-type: none"> 2. Use the principle of technological minimalism. 3. Adequate technical support and training for both student and instructor is essential. <p>Social guidelines:</p> <ol style="list-style-type: none"> 1. Create cooperation and trust among students and the instructor. 2. Synchronous communication is more expensive than asynchronous. Both modes of communication are important in teaching and learning.
Bonk and Cummings (1998)	<p>Provide 12 recommendations of how student-centred learning can be facilitated via Web-based learning. These recommendations have a pedagogical focus and a constructivist underpinning.</p> <p>Some recommendations include:</p> <ul style="list-style-type: none"> • Establish a safe environment and a sense of community. • Exploit the potential of the medium for deeper student engagement. • Facilitate, don't dictate. • Let there be a choice. • Use public and private forms of feedback. • Employ recursive assignments that build from personal knowledge. • Use student Web explorations to enhance subject content.
Collis and Winnips (1998)	Provides guidelines to design a Web-based learning environment for a subject that teaches Instructional design principles for Web-based learning.
Dijkstra et al. (1999)	<p>Ten guidelines are provided for consideration when designing Web-based course support environments. Six are pedagogical guidelines and four relate to the Web site user interface.</p> <p>Pedagogical guidelines:</p> <ol style="list-style-type: none"> 1. A Web-based course support environment should extend the boundaries of traditional classroom-based teaching. 2. It should support and challenge students' thinking. 3. It should include a resource centre for the investigation of a variety of information. 4. It should support online discussions and they should form part of the graded activities. 5. It should allow the students to organise and restructure information as well as create and contribute. 6. It should present a convenient way for students to participate in collaborative work. <p>User interface guidelines:</p> <ol style="list-style-type: none"> 1. The subject Web site should allow students and the instructor to enter comments, and upload and download files, without having to know any technical aspects of the process. 2. Access to the Web site should be through the usual WWW browser. 3. All resources should be integrated within the single Web environment. 4. Students should be co-builders of the content resources. The Web site will then grow based on student entries and thus must be flexible technically to manage this growth.
Shotsberger (1996)	<p>Provides three general guidelines when designing Web pages:</p> <ol style="list-style-type: none"> 1. Less is more 2. Be consistent with the Web site look at navigation. 3. Don't waste the user's time. Minimise redundant material to be included in the Web site.
Starr (1997)	Presents general design recommendations of how to organise and develop an instructional Web site. There is little focus on the pedagogical strategies that can be employed.

2.4.4 A WEB-BASED CONSTRUCTIVIST LEARNING ENVIRONMENT SEEMS TO BE THE ULTIMATE GOAL

It is claimed the Web is particularly conducive for the implementation of constructivist learning environments (Jonassen et al. 1997; Starr, 1997). Jonassen et al. (1993) argue that constructivist learning environments are most effective for advanced knowledge acquisition, which is mostly required and promoted in university education. Yet, what constitutes a “constructivist learning environment” is contentious. Whilst the philosophy of constructivism has gained respect and popularity, much of the discourse has proliferated the educational technology literature mostly at the level of cliché (Duffy & Cunningham, 1996). The underlying premise that purports a constructivist approach is the epistemological belief that knowledge is not an objective reality, that is, exists “outside the mind” but rather, it is internally constructed. Knowledge is a function of how an individual creates meaning from past experiences; it is not a function of what someone else says is true (Jonassen et al. 1993). Apart from this premise, “constructivists differ as to the nature of reality, the role of experience, what knowledge is of interest, and whether the process of meaning making is primarily individual or social” (Merriam & Caffarella, 1999, p. 261). Reaching a consensus, however, may not even be possible due to the interpretative nature underlying the principles of constructivism.

Much current educational technology literature has been devoted to the issue of constitutes a constructivist approach to teaching and learning—particularly in a technology-based learning environment. Many frameworks have been presented (for example, Duffy & Cunningham, 1996, p. 177; Jonassen et al. 1995, p. 13-14; Jonassen et al. 1993; Jonassen, Peck, & Wilson, 1999, p. 2-7, 193-201; Robyler, Edwards & Havriluk, 1997, p. 70-72). Several generic principles of a constructivist educational approach surface from this literature:

1. Learning is a process of construction. Learners are provided the opportunity to create their own meaning from their current and past experiences and prior knowledge rather than “learning” the instructor’s interpretation of the content.
2. Learning occurs through social negotiation of meaning. Learners are able to collaborate with peers.
3. Learning is contextually mediated. Learners are immersed in authentic contexts.
4. Reflective thinking is an ultimate goal.

The degree in which these generic principles are manipulated has given rise to various interpretations of constructivism ranging from “mild” (Boudourides, 1998) or “trivial” (von Glasersfeld, 1993 cited in Geelan, 1997) constructivism to “radical constructivism” (von Glasersfeld, 1995). Perkins (1991) states: “Almost all educators and psychologists are constructivists of some stripe these days. But battles rage concerning just how constructive one should be” (p. 20). Phillips (1995) claims: “As in all living religions, constructivism has many sects...” (p. 5). Several frameworks for comparing the different forms of constructivism are presented in the literature (for example, Boudourides, 1998; Geelan, 1997; Perkins, 1991; Phillips, 1995; Roblyer et al. 1997). Perkins (1991) differentiates two forms of constructivism: *Beyond the information given* (BIG), and *Without the information given* (WIG). These two forms are based on the amount of intervention provided by the instructor. Phillips (1995) presents a complex comparison framework made up of three dimensions: i. The individual construction of knowledge versus the construction of human knowledge in general (p. 7); ii. “Humans the creators versus nature the instructor.” (p. 7) That is, is individual knowledge created actively in the mind or imposed from the outside; iii. The active construction process can be described in terms of individual cognition or in terms of social and political process (p. 9). Geelan (1997) provides a synthesis of six different forms of constructivism based on a two-dimensional comparison model: i. Individual versus social learning; ii. Epistemological belief, that is, objectivism versus relativism. Roblyer et. al. (1997, p. 65-70) describe various degrees of constructivism in the form of different learning theories and the amount of intervention provided. For instance, they claim that cognitive flexibility theory is a form of radical constructivism as it suggests little direct instruction. Boudourides (1998) presents various “streams” of constructivism along a continuum from “mild” to “radical”.

Petraglia (1998) presents a different argument with respect to the application (or as he states “misapplication”) of constructivism. Petraglia claims that “educational technologists have fundamentally misunderstood the challenges posed by constructivism. This is seen in an approach to contextualising learning that I call *preauthentication*” (p. 58). He goes on to explain:

A problem with the goal of authenticating learning arises when we remember that constructivism argues that the world is not understood independently of our experiences, and that, therefore, any sense of authenticity can be neither predetermined nor preordained.....educational technologists have responded to this epistemological dilemma by creating problems and environments that they have determined to be authentic; we might call this practice *preauthentication*. (p. 58-59)

Therefore, although proponents of constructivism argue that the Web should be implemented according to constructivist principles, the different “flavours” of constructivism add complexity to the design process as different theoretical views promote different design models.

2.4.5 A GAP EXISTS BETWEEN VISIONARY RHETORIC AND CURRENT PRACTICE

Whilst there are claims that the Web can be used to create constructivist learning environments, many argue that in current practice the Web is not being used to its potential (Owston, 1997; Reeves & Reeves, 1997). Instead, the Web is predominantly being used as a supplement to conventional instructional approaches. This is exemplified in the following statements.

The World Wide Web is becoming one of the fastest growing resources available to a wide variety of professionals today....In education, however, the Web is only beginning to be utilized in any substantive manner for instructional purposes. While teachers are beginning to use the Web-based resources for research and/or information-gathering, they have not yet begun to use the instructional potential that the Web can offer for actually teaching students in diverse locations or at times different than when a teacher is currently available (asynchronous). (Bannan & Milheim, 1996, no pagination)

Many universities are making substantial investments in new technologies for teaching purposes. The increasing ease of use and improved presentational and interactive features of technologies such as the World Wide Web are leading many academics to use technology for teaching for the first time in a significant manner. However, although there has been widespread adoption of new technologies for teaching in the last few years, they have yet to bring about major changes in the way teaching is organized and delivered. (Bates, 1997, no pagination)

Clearly, we need more student-centered studies of distance education that are designed to teach us how the appropriate use of technology and pedagogy could make distance education more beneficial for more students. In addition, we need ways to translate the best of such research into the practitioner literature. Unfortunately, a large percentage of the popular and practitioner articles about computer-mediated distance education emphasize the potentials of new technology, and understate the extent to which instructors may need to develop new pedagogies as well as different approaches to communication practices in their on-line courses. (Hara & Kling, 2000, no pagination)

To date, most WBI sites are designed to support didactic roles, e.g., professors may put a syllabus and other materials for traditional courses on the Web so that students have easier access to those materials. In the near future...WBI can be designed to provide learners with course content as well as assignments and problems to solve, with the teachers or trainers playing the roles of facilitators, coaches, mentors, and guides. (Reeves & Reeves, 1997, p. 62)

Collis (1998a) argues that there is a gap between vision and current practice. She contends this is due to a number of change barriers practitioners face:

- Difficulty in changing embedded practice
- Lack of ideas for how to integrate new technologies into teaching
- Lack of adequate support
- Lack of adequate staff training and ongoing support
- Lack of reward structures
- Lack of adequate organisation and system-wide changes
- Lack of time

In another work, Collis (1998b) elaborates on the first two change barriers:

Although there are many anecdotal examples of interesting ways to enrich one's teaching in higher education using technologies such as the WWW and other forms of computer-mediated communication reported at international conferences and in scholarly journals, the majority of university instructors appear to make little or no use of these technologies in their instructional practice. (p. 374)

It appears that one reason for this situation is that there is not enough thick description being provided about Web-based innovations at the level of interaction and pedagogy.

2.5 INTERACTION AND PEDAGOGICAL STRATEGIES

2.5.1 DETAILING THE NATURE OF INTERACTIONS IS REQUIRED

There is not enough description being provided in the research literature about the interactions that can be established when using the Web and the pedagogical strategies used to facilitate those interactions. Windschitl (1998) provides an eloquent explanation of this situation:

Unfortunately, the kind of research-based information that educators count on for pedagogical guidance seems (in the case of the WWW) undifferentiated from information gathered informally from evaluations and nonscientific publications (newspapers, magazines). The aura around technology will attract a certain readership of these often superficial descriptions of Web-based instruction—a readership much larger than, for example, cooperative learning or reciprocal teaching. The research community must offer descriptive research that includes those devilish but enlightening details lying behind the hype of a well-pitched front-page story. (p. 32)

Hara and Kling (2000) concur with Windschitl (1998) by stating that there is little research that delves into the details and complexities of online learning environments. “Unfortunately, little of the practitioner literature and even less of the popular literature about distance education (in any of its modes) effectively identifies the complexities of working and communicating with ‘new media’” (no pagination). Jonassen et al. (1997) also state that research is needed at the level of

interaction. They argue that research is needed to explore how to structure learner interactions to facilitate learning.

Two examples that exemplify the lack of detail about the interactions established and the specific pedagogical strategies adopted in Web-based university subjects are published works by Harasim et al. (1997) and Dijkstra et al. (1999). These works focus on a macro level, that is, they describe their Web-based innovation in terms of the design and implementation of the Web site. Yet they do not elaborate at the micro level, that is, there is little, if no, explanation about the kinds of interaction established or the pedagogical strategies employed in the Web-based learning environment.

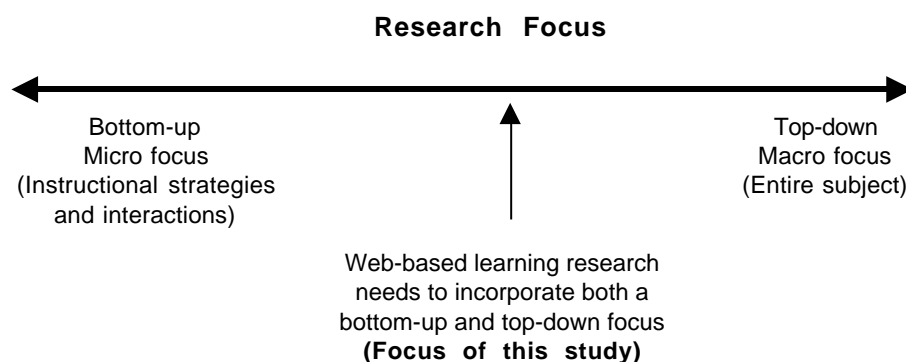
2.5.2 MORE "BOTTOM-UP" RESEARCH WITH SOME "TOP-DOWN" CONTEXT IS NEEDED

There is insufficient thick description at the level of interaction to guide practitioners in the formation of specific instructional strategies. For example, the discussion about CMC research, which was presented earlier in this chapter, indicated a shortfall of instructional strategy examples that serve as guidance for educators. Blumenfeld, Marx, Soloway, and Krajcik (1996) support this contention as they argue that there is little research, and thus few recommendations, about how collaborative work can be supported by technology. They state: "effective instructional strategies are needed to help students use such systems [technological tools for collaboration] productively. While considerable research has examined small-group collaboration, there is no comparable body of experience for the use of technology-supported small groups" (p. 39). More "bottom-up" research, that is, research that explores interaction at a detailed level, is needed.

There has, however, been an increase in the amount of bottom-up research conducted in the area of CMC. Many studies have been conducted that examine the nature of the student-student and student-instructor interaction within a CMC component of a subject. A CMC analysis technique that has gained popularity in the last few years (that is, from 1996 onwards) has been content analysis (Henri, 1992). This analysis is applied to de-construct and interpret what occurs in online discussions. But, it is contended that some CMC studies have taken too much of a focus on the CMC component of a subject and have not considered any "top-down" context, that is, how the CMC component (one element of the subject) is integrated within the whole subject. Thus, pedagogical recommendations suggested by these studies are constrained to that one aspect of the subject that has been examined. An example is the recent study by Hara et al. (2000). Their study solely focused on the CMC

There is little research that delves into the interactions established during an entire subject when World Wide Web technology is used. Many studies focus on one aspect—one piece of a Web-based subject offering, such as the computer conferencing component, or the design of the subject Web site, or the online collaborative task component. There are few studies that examine an entire Web-based subject implementation from a holistic perspective—examining the entire subject as a teaching and learning “package”. Yet, Windschitl (1998) argues that this type of holistic research is necessary in order to explore the potential of the Web:

Therefore, if the ultimate aim is to inform pedagogical innovation so that the quality of educational practice can be improved, which according to Barone and Eisner (1997) and Reeves (1999) should be the aim of educational research, then a balance between top-down and bottom-up research is required. This is represented as a continuum in Figure 2.3.



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2.6 INTERACTIONS IN A POSTGRADUATE CONTEXT

2.6.1 RESEARCH FOCUS OF THIS STUDY

The central argument raised in this literature review is that in order for pedagogical innovation to occur in the field of Web-based learning, Web-based innovations need to be examined from a holistic perspective—as an entire “package”, and detailed description of the interactions established and pedagogical strategies employed is required.

The research approach for this study incorporates both a “bottom-up” and “top down” focus—the balancing point of Figure 2.3.

This study examines the teaching and learning process when Internet and videoconferencing technologies were introduced in a postgraduate subject. The entire subject “package” is examined to understand how students and the instructor used these technologies during the subject. The nature of the interactions established among the students and the instructor is also explored.

2.6.2 WHY A POSTGRADUATE CONTEXT WAS CHOSEN FOR INVESTIGATION

A postgraduate context was pertinent because the demand for postgraduate study is on the rise (Richardson, 2000) yet to date, there has been little investigation of flexible delivery implementations in Australian postgraduate programs. In the study conducted by James and Beattie (1996), which is also reported in Beattie and James (1997), the extent to which flexible delivery approaches were being implemented in Australian postgraduate programs was examined. The study’s findings highlight the need for more research in the postgraduate area in light of the increase of flexible delivery implementations: For example specific conclusions reached are stated as follows:

The use of open and flexible modes of delivery in Australian postgraduate education is on the rise. Nevertheless, while the effectiveness of new, and not-so-new modes of teaching and learning in higher education has been the subject of considerable recent discussion...their specific influence on postgraduate education has been little investigated. (Beattie & James, 1997, p. 178)

The study raised the issue that the nature of postgraduate study is somewhat different to undergraduate study in that postgraduate study requires higher-order thinking and self-motivated strategies. How a flexible delivery strategy facilitates the development of these learning outcomes is a significant area for further research as little is currently known. This is elaborated in the following statements:

The major question is how new approaches to teaching and learning affect the development of the higher order skills expected at advanced levels of study. As well, it is important to examine how the daily work of academics involved with the introduction of new delivery methods is affected. These are critical steps towards understanding how new delivery options can be integrated with current teaching methods and used effectively at postgraduate level. (James & Beattie, 1996, p. 15)

The educational implications of non-traditional delivery methods at postgraduate level are not yet well understood. A major question is whether advantages of access and flexibility are accompanied by trade-offs in learning experiences and outcomes. (Beattie & James, 1997, p. 177)

The need for detailed research and the examination of interactions established by students and instructors in flexible delivery learning environments was also pointed out:

The need for more detailed evaluation, in different discipline contexts, of delivery methods, and particularly of their effects on postgraduate students' study habits and development of learning skills, was apparent from our investigation. (Beattie & James, 1997, p. 192)

The introduction of flexible delivery methods often acts as a catalyst for redesigning instruction and changing emphases. New modes of teacher-learner interaction define to some extent what is learnt, as well as how it is learnt....These relationships deserve closer examination. (Beattie & James, 1997, p. 180)

When the study by James and Beattie (1996) was conducted, Internet-based flexible delivery programs were only starting to emerge. "To date, only a handful of Australian postgraduate coursework subjects are available on the Internet. However, we discovered many plans afoot, and the number of postgraduate courses from Australian universities at least partly over the Internet will soon explode" (Beattie & James, 1997, p. 189). Thus, the study concluded it is timely that research be conducted to explore the potential of flexible delivery for postgraduate study.

2.7 CONCLUSION

The scene for this study has now been set. This chapter has reviewed the literature about the use of the World Wide Web in higher education and the current research base. This review highlighted the following gaps in the literature:

- Little is known about how Web-based learning environments can be implemented in postgraduate education.
- Little is known about how constructivist principles can be applied in a Web-based learning context.
- Little is known about how CMC can be integrated with face-to-face instruction in a university subject.

- There is little research that examines Web-based learning environments from a holistic perspective and at the level of interaction and pedagogy, thus providing the detailed description that has been argued is vital for pedagogical innovation.
- There is little research that has been conducted on CMC from a qualitative research perspective.

This study addresses all of these gaps. The next chapter explains how the research methodology employed for this study represents a qualitative approach. Chapters Four and Five present the detailed findings from this study.

3



RESEARCH METHODOLOGY

Qualitative research is many things to many people. (Denzin & Lincoln, 1994, p. 4)

3.1 INTRODUCTION

Due to the exploratory nature of this investigation, a qualitative research approach was deemed most appropriate. The method of inquiry was a collective case study (Stake, 1994, 1995, 1997) whereby the researcher was a participant observer in the postgraduate subject: *Implementation and Evaluation of Technology-Based Learning* offered by the Graduate School of Education at the University of Wollongong during 1996 and 1997.

The introduction of internet and videoconferencing technologies in the 1996 subject offering enabled students to experience the use of technology whilst learning about its use in an educational context. There were two geographically separate classes. Eight students met on campus and six students met in Sydney (80 kilometres north of Wollongong). Both classes were held on the same evening for three hours over a semester of fourteen weeks. Videoconferencing and a subject Web site facilitated interaction between the two geographically separate classes. The instructor physically attended each separate class on alternate weeks except in Week 11 when the instructor was absent. The researcher physically attended every on-campus class. In the last week of semester all the students, the instructor and the researcher met face-to-face in Sydney for the final class.

The insights gained from this subject implementation were used to redesign the teaching and learning environment for the 1997 subject offering.

In 1997, the subject was implemented using internet technology. There were two geographically separate classes. Eleven students met on campus and six students met in Sydney. The two classes ran on different evenings for three hours. During the fourteen week semester, students attended eight class meetings (Weeks 1, 2, 4, 6, 8, 10, 11 and 14) and participated in asynchronous and synchronous online discussions during the non-meeting weeks. A Web site facilitated interaction among the students and instructor outside class time. The instructor physically attended

every face-to-face meeting. The researcher attended the face-to-face classes held on campus.

This study contributes to the knowledge base of technology use in higher education. It is intended that the findings be used to inform pedagogy by providing a foundation for more sophisticated instructional strategies.

This chapter explains the process of inquiry undertaken in this study, the rationale for adopting a qualitative research framework, the background for the selection of the two cases, and the process of data collection and data analysis. A discussion about how this study demonstrates rigour is provided and the criteria for assessing the quality of this research study are also addressed.

3.2 RESEARCH CONTEXT—THE EMERGENCE OF THE TWO CASES

3.2.1 CASE ONE

As part of the initiative by the University of Wollongong to investigate flexible delivery strategies (University of Wollongong—Learning and Teaching Strategic Plan, 1999), the postgraduate subject: *Implementation and Evaluation of Technology-Based Learning* (subject code: EDGA957) was chosen in 1996 as a pilot study to explore the use of internet and videoconferencing technologies. EDGA957 was an elective subject in the Information Technology in Education and Training strand of the graduate program offered by the Graduate School of Education. The decision to select this particular subject was made in consultation with the Head of Graduate School (also the instructor of the subject) and the Educational Development centre of the University. Situated on campus, one of the current objectives of the Educational Development centre is “to encourage and support faculties to increase the number of subjects offered flexibly” (University of Wollongong—Centre for Educational Development and Interactive Resources Mission, 2000).

EDGA957 was considered suitable as a pilot study for two main reasons:

1. The subject addressed issues regarding the use of technology for education and training. Thus, it was seen as an opportunity by the instructor to allow students to learn about technology through the use of it in their learning environment.

The subject, by its very nature, requires students to implement and evaluate technology-based learning. Delivery of the subject using the technologies provides opportunities for these students to experience first hand how both synchronous and asynchronous technologies can be used in education. (Initial Pilot Report—provided in Appendix A)

2. The subject had previously been offered as two separate classes, one held on campus and the other held in Sydney. The use of internet and videoconferencing technologies would allow both classes to be held on the same evening freeing the instructor from attending duplicate classes.

The pilot served as a test-bed for both the Graduate School of Education and the Educational Development centre to gain expertise in the development of Web-based learning environments. This subject enabled the Educational Development centre to experience developing a Web site for a university subject for the first time. The Graduate School of Education had begun to explore Web page production with students in 1995 and the first Web site developed specifically for a subject was implemented in 1996, for the postgraduate subject: *Information Technology in Education and Training*. Although Web site production had begun within the faculty, the integration of computer mediated communication (CMC) tools in subject Web sites was in its infancy.

An educational consultant from the Educational Development centre was allocated to the pilot at no cost to the Graduate School of Education. The consultant was also enrolled as a student in EDGA957 as part of her doctoral studies. Her responsibility as the educational consultant was to provide instructional and technical support to the instructor for the duration of the subject and submit an evaluation report to her management upon completion of the pilot. She managed the production of the Web site for EDGA957 and the selection and installation of several CMC tools. She also ensured appropriate computer, Internet and videoconferencing facilities were available for the class held in Sydney.

3.2.2 CASE TWO

At the end of 1996, a meeting was held with the researcher and her two doctorate supervisors to review the research study progress. It was decided that the researcher participate in a second cycle of the same subject and assist the instructor to redesign the subject for the 1997 implementation based on the insights gained from the pilot study.

In the second implementation, the instructor schedules the two EDGA957 classes (one held on campus, the other held off campus—Sydney) on separate evenings.

This decision was made for several reasons. Student feedback from Case One indicated a preference towards face-to-face meetings with the instructor. Unlike the pilot study, the use of videoconferencing would incur a significant additional cost to the subject. The lessons learned from Case One indicated that asynchronous interaction be further explored.

The researcher and instructor worked collaboratively to redesign the subject outline and modify the subject Web site. The researcher modified the subject Web site used in 1996 for the 1997 subject offering. Support resources from the Educational Development centre were not used in this second implementation.

In the 1997 subject offering, the researcher assumed the roles of a participant observer and an informal assistant to the instructor. For example, the researcher presented the first on-campus class assisted in marking one of the assessment pieces. However, apart from the first on-campus class, the researcher contributed in class as a fellow student.

As the subject progressed, the researcher regularly updated and maintained the subject Web site. For example, a “Notices” message space, which informed students of tasks and reading that were to be completed during each week, was updated weekly. The researcher monitored the evolution of the subject Web site and also facilitated the evolution. The researcher participated as a student and became the informal support resource for the instructor. In this second cycle of the subject, the researcher became part of the researched—a reflexive perspective.

3.3 RESEARCH DESIGN

3.3.1 INTRODUCTION

Because the researcher was involved in two consecutive implementation cycles of the same subject, this study can be categorised as a collective case study comprising two cases. A research proposal was presented and approved by the Faculty of Education in July 1996. The preliminary research design included Case One and the emergent characteristic of the study's design was explicitly stated.

3.3.2 NUANCES IN DEFINITION IN THE LITERATURE

It is pertinent to explain the researcher's interpretation of the terms *qualitative research* and *case study*, as the literature presents variances of meaning.

Qualitative research is a complex and evolving field of inquiry. It is complex because it embraces multiple perspectives from the human disciplines (Denzin & Lincoln, 1994). Although it has gained respectability and increased popularity as a legitimate form of inquiry in educational research (Jaeger, 1997; Lancy, 1993), the literature demonstrates a lack of consensus as to what constitutes *qualitative research* (Creswell, 1994; Lancy, 1993). As Denzin and Lincoln (1994) conclude: “an embarrassment of choices now characterizes the field of qualitative research. There have never been so many paradigms, strategies of inquiry, or methods of analysis to draw upon and utilize” (p. 11).

Qualitative research is an evolving field of inquiry because it remains largely underdeveloped due to its relatively short history in comparison to conventional scientific research (Erlandson, Harris, Skipper, & Allen, 1993, p. x). Paradoxically, the field of qualitative research will remain to evolve by the very nature of its underpinning philosophy from which its definition is derived. Denzin and Lincoln (1994) categorise the current phase of the historical evolution of qualitative research as “The Fifth Moment”. They state: “we are in a moment of discovery and rediscovery, as new ways of looking, interpreting, arguing, and writing are debated and discussed” (p. 11).

Although more recent works demonstrate a maturity towards the qualitative form of inquiry by explicitly attempting to define and categorise various approaches of qualitative inquiry (for example, Creswell, 1998), the literature is replete with confounding use of jargon. (This in turn contributes to its complexity—especially for the neophyte.) For example, the term *qualitative research* has been used synonymously with case study (see Neuman, 1994, p. 321), ethnography (see Goetz & LeCompte, 1984, p. 3), grounded theory (see Neuman, 1994, p. 322), phenomenology (see Burns, 1991, p. 9; Lancy, 1993, p. 9) and naturalistic inquiry (see Lincoln & Guba, 1985). *Qualitative research* is also predominantly used in the literature as an umbrella term to depict research conducted in a natural setting to investigate a social or human issue in contrast to the opponent positivist approach (Burns, 1991; Creswell, 1994, 1998; Denzin & Lincoln, 1994; Lancy, 1993; Neuman, 1994).

Guba and Lincoln (1994), however, argue that the term *qualitative* “ought to be reserved for a description of types of methods...both qualitative and quantitative methods may be used appropriately with any research paradigm” (p. 105). Egon Guba in Erlandson et al. (1993) states: “studies that are based exclusively on

qualitative methods but designed in terms of positivist assumptions remain positivist studies” (p. x). Erlandson et al. (1993) iterate this stance by stating:

Much has been written and said about the respective merits of quantitative and qualitative methods for conventional and naturalistic-constructivist studies. In fact, the two paradigms are often classified by their methodologies: the conventional research paradigm as the quantitative paradigm and the naturalistic paradigm as the qualitative paradigm. We believe that such a classification is in error and unnecessarily confuses a very important issue. Mainstream researchers use qualitative methods, and naturalistic researchers will often use quantitative methods. (p. 35)

Lancy (1993) attempts to clarify this discourse by explicitly stating that the definition of qualitative research is dependent on the viewpoint from which it is discussed, that is: the philosophical viewpoint, the strategy or method of inquiry used or the instrumentation employed to collect data.

Hence, before one discusses what is or is not qualitative research one must first establish whether the discussion is occurring at the level of paradigm, method, or technique. To sum up: When one follows the qualitative paradigm, one buys into an entire philosophy of inquiry...that stands in sharp contrast to the tenets underlying quantitative research; one may follow a particular qualitative research method (e.g., case study) that deviates somewhat from the purest form of the paradigm and; one can work entirely within the quantitative paradigm and yet, occasionally, use a qualitative technique such as conducting open-ended interviews as a preliminary step in the design of a standardized survey instrument. (Lancy, 1993, p. 8)

3.3.3 SITUATING THE METHODOLOGY OF THIS STUDY WITHIN THE QUALITATIVE RESEARCH LITERATURE

In order to situate the research methodology of this study within the qualitative research literature, a theoretical framework is presented in Table 3.1. This framework is based on work presented by Creswell (1998), Denzin and Lincoln (1994), and Lancy (1993).

TABLE 3.1 Theoretical framework to situate this research study within the Qualitative Research literature		
<i>Perspective of the process of inquiry</i>	<i>Rationale and illustrative quotes</i>	<i>This research study</i>
The underlying philosophy	<p>“Questions of method are secondary to questions of paradigm, which we define as the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways” (Guba & Lincoln, 1994, p. 105).</p> <p>“Qualitative researchers approach their studies with a certain paradigm or worldview, a basic set of beliefs or assumptions that guide their inquiries. These assumptions are related to the nature of reality (the ontology issue), the relationship of the researcher to that being researched (the epistemological issue), the role of values in a study (the axiological issue), and the process of research (the methodological issue)” (Creswell, 1998, p. 74).</p>	<p>Naturalistic Inquiry (Lincoln & Guba, 1985)</p> <p>More recently coined: Constructivist Inquiry (Guba & Lincoln, 1994)</p> <p>Also generically labelled as: Interpretive Social Science (Neuman, 1994)</p>

TABLE 3.1 Theoretical framework to situate this research study within the Qualitative Research literature		
Strategy, method, or tradition of inquiry The Strategy	<p>“A strategy of inquiry comprises a bundle of skills, assumptions, and practices that researchers employ as they move from their paradigm to the empirical world. Strategies of inquiry put paradigms of interpretation into motion” (Denzin & Lincoln, 1994, p. 14).</p> <p>A tradition of inquiry “is an approach to qualitative research that has a distinguished history in one of the social science disciplines and that has spawned books, journals, and distinct methodologies” (Creswell, 1998, p. 256).</p> <p>The researcher supports the argument presented by Creswell (1998)—that the method of inquiry implies not only the process in which the inquiry is undertaken but also the focus and outcome of the research. (See Creswell, 1998, p. 37, 63, 65.)</p>	Case Study (Collective)
Data collection and analysis techniques The Tactic(s)	<p>“Strategies of inquiry connect the researcher to specific methods of collecting and analyzing empirical materials” (Denzin & Lincoln, 1994, p. 14).</p> <p>“Many omnibus research methods texts...consider qualitative research to be no more than a set of otherwise unrelated techniques such as “content analysis,” “open-ended interviews,” and “behavior observation” where the subject’s possible responses are relatively unconstrained, compared to say, multiple choice tests, rating scales, and the like” (Lancy, 1993, p. 8).</p>	<p>Data collection techniques: Participant observation, interview, questionnaire, reflexive journal</p> <p>Data analysis techniques: data abstraction into themes and categories (Merriam, 1988), content analysis (Henri, 1992)</p>

To summarise, the tenets of the Naturalistic Inquiry paradigm (Lincoln & Guba, 1985)—more recently coined *Constructivist Inquiry* (Erlandson et al. 1993; Guba & Lincoln, 1994) have been adhered to in this study. The method of inquiry employed was a collective case study because the focus of the study was to provide an in-depth analysis of the two cases and the outcome was to report the *lessons learned* (Creswell, 1998) from the two cases. The predominant data collection technique used was participant observation. Interviews and questionnaires were conducted; documents and artifacts were collected. Data analysis, which was conducted during and after data collection, involved the identification of dominant themes and the clustering of themes into categories (Merriam, 1988). Content analysis, based on the framework presented by Henri (1992) was an additional technique used that assisted the researcher to de-construct what occurred in the online environment when synchronous and asynchronous discussions were held during both implementations of the subject.

3.3.4 RATIONALE FOR ADOPTING THE NATURALISTIC INQUIRY PARADIGM

Conventional forms of inquiry are couched within the positivist paradigm whereby the concept of reality is viewed as existing *out there*, is ever unchanging and external to the inquirer—coined as *naïve realism* (Guba & Lincoln, 1994). Such a perspective assumes that all people experience the world in the same way and thus the goal of conducting social science research is to learn more about how the world works so that phenomena can be controlled or predicted.

Opponents to positivism, view reality not as a separate and external entity from the individual but as internally constructed. People perceive the world differently therefore reality is relative to each of us. Consequently, multiple constructions of reality exist and these constructions can change over time as people socially engage in their world and become more informed. Thus, the purpose of social science research is to understand and reconstruct the constructions people initially hold in order to form a consensus. However, the findings from such research are open to further interpretation as information and sophistication improves.

It is the latter ontological assumption that the Naturalistic Inquiry paradigm purports. Lincoln and Guba (1985) conclude “for virtually all instances of sociobehavioral inquiry, the naturalistic paradigm is the paradigm of choice” (p. 260). They elaborate by stating that the Naturalistic Inquiry Paradigm is the paradigm of choice when:

1. The paradigm *fits* with the focus of the inquiry, and
2. The substantive theory (if selected) *fits* with the inquiry paradigm.

They also state that: “problem...paradigm, theory, *and* context must exhibit congruence (value-resonance) if the inquiry is to produce meaningful results” (p. 38).

It is contended that the focus and context of this study, which is the examination of student and instructor interaction in a Web-based postgraduate subject, and the constructivist teaching approach adopted by the instructor in the subject, is well suited to Naturalistic Inquiry. Thus, the issue being investigated, the context of the subject, the educational theory which underpins the delivery of the subject, and the research paradigm are congruent achieving a state of *value resonance* (Lincoln & Guba, 1985).

To claim that this study adheres to the Naturalistic Inquiry assumes the three mandatory requirements for labelling a study *Naturalistic* have been fulfilled (Lincoln & Guba, 1985). Table 3.2 and Table 3.2.1 outline the three mandatory requirements and illustrate how these requirements have been operationalised in this study.

**TABLE 3.2 Naturalistic Inquiry Paradigm—The three mandatory requirements
(Based on Lincoln & Guba, 1985)**

**TABLE 3.2.1 Naturalistic Inquiry Paradigm—The five axioms
(Based on Lincoln & Guba, 1985)**

* *It is difficult to isolate characteristics of this study specifically to each axiom as there is overlap, that is, interdependence. However, it is provided in this format simply as an overview.*

3.3.5 RATIONALE FOR LABELLING THIS STUDY A COLLECTIVE CASE STUDY

The qualitative research literature illustrates various interpretations for case study research. As a method of inquiry, Stake (1994) indicates that “some case studies are qualitative studies, some are not” (p. 236). In terms of defining *qualitative case study* Lincoln and Guba (1985) state “while the literature is replete with references to case studies and with examples of case study reports, there seems to be little agreement about what a case study is” (p. 360). Merriam (1988) adds that the term *case study* “has been used interchangeably with fieldwork, ethnography, participant observation, exploratory research, and naturalistic inquiry” (p. xii). In terms of describing the process of inquiry undertaken in qualitative case study research, some authors support the positivist paradigm (see Lancy, 1993, p. 139-143; Yin, 1993, p. xvi), whilst others support a postpositivist (Lincoln & Guba, 1985, p. 28) perspective (for example, Creswell, 1998; Merriam, 1988; Stake, 1995). Lincoln and Guba (1985, p. 360-362) however, view *case study* not as a method of inquiry but as a form of writing or presentation for reporting the results of a naturalistic inquiry.

Table 3.3 summarises the characteristics of case study research as described by Creswell (1998), Lancy (1993), Merriam (1988), and Stake (1994, 1995, 1997). The table does not provide an exhaustive list of characteristics. It serves to highlight the different interpretations from these four authors. The characteristics presented have been tabled according to six themes that surfaced when analysing these works. The six themes are outlined as follows.

1. The underlying process of inquiry philosophy supported by the author (This refers to the “paradigm” perspective presented in Table 3.1.)
2. The author’s definition of *case study*
3. The focus of case study research
4. The process by which case study research is conducted
5. The intended outcome from case study research
6. The presentation of the case study report

TABLE 3.3 Characteristics of Qualitative Case Study Research				
<i>Themes</i>	<i>Merriam (1988)</i>	<i>Lancy (1993)</i>	<i>Stake (1994, 1995, 1997)</i>	<i>Creswell (1998)</i>
Paradigm/philosophy (See Table 3.1)	Considers the term qualitative from the paradigm perspective.	Considers the term qualitative from method perspective.	Considers the term qualitative from paradigm perspective.	Considers the term qualitative from paradigm perspective.
Definition	“A qualitative case study is an intensive, holistic description and analysis of a single instance, phenomenon, or social unit” (p. 21).	“Case study is a qualitative method” (p. 142). “It is the direct policy implications of their research that sets those who do case studies apart from other qualitative researchers” (p. 140).	“It is a something that we do not sufficiently understand and want to—therefore, we do a case study” (Stake, 1995, p. 133). “The case is something deemed worthy of close watch. It has character, it has a totality, it has boundaries. It is not something we want to represent by a score....It is a complex, dynamic system. We want to understand its complexity” (Stake, 1997, p. 406).	“In qualitative research, this is the study of a ‘bounded system’ [meaning bounded by time and place] with the focus being either the case or an issue that is illustrated by the cases (or cases) (Stake, 1995). A qualitative case study provides an in-depth study of this ‘system,’ based on a diverse array of data collection materials, and the researcher situates this system or case within its larger ‘context’ or setting” (p. 249).

TABLE 3.3 Characteristics of Qualitative Case Study Research				
Focus	<p><i>Particularistic</i></p> <p>"Case studies focus on a particular situation, event, program, or phenomenon" (p. 11).</p>	<p><i>Examination of an innovation or intervention and research is often commissioned.</i></p> <p>"The case study...is the method of choice for studying interventions or innovations" (p. 140).</p> <p>"Case studies are often undertaken 'under contract.' Hence, the researcher's motives are primarily pecuniary rather than a quest for knowledge for its own sake. Thus, the 'typical' case study tends to be rather narrowly focused" (p. 143).</p>	<p><i>Focus may be intrinsic or instrumental.</i></p> <p><i>Intrinsic case study:</i> "The case itself is of interest" (Stake, 1994, p. 237).</p> <p><i>Instrumental case study: The case is used to explore an issue.</i></p> <p>"A particular case is examined to provide insight into an issue or refinement of theory" (Stake, 1994, p. 237).</p>	<p><i>Stake's (1995) intrinsic/ instrumental focus theme is supported.</i></p> <p>"The focus may be on the case that, because of its uniqueness, requires study (intrinsic case study), or it may be on an issue or issues, with the case used instrumentally to illustrate the issue (an instrumental case study) (Stake, 1995)" (p. 61-62).</p>
Process	<p><i>Inductive</i></p> <p>"Discovery of new relationships, concepts, and understanding, rather than verification or predetermined hypotheses, characterizes qualitative case studies" (p. 13).</p>	<p><i>Deductive and researcher assumes an evaluative stance.</i></p> <p>"Case study does not adhere to the qualitative <i>paradigm</i>. Questions or issues are at least partly predetermined. What one studies is carefully delimited in advance. One adopts a realist rather than phenomenological stance, and one is not concerned particularly with <i>grounded theory</i>" (p. 142).</p> <p>"[The researcher] will explicitly or implicitly compare what she observes with some standard..." (p. 143)</p>	<p><i>Inductive, and noninterventive, yet Stake (1995) concedes:</i></p> <p>"There are many, many ways to do case studies" (p. xii).</p> <p>"We tout case study as being noninterventive and empathic....we try not to disturb the ordinary activity of the case, not to test, not even to interview, if we can get the information we want by discrete observation or examination of records" (Stake, 1995, p. 12).</p> <p>"The best research questions evolve during the study" (Stake, 1995, p. 33).</p>	<p><i>Inductive, requiring extensive data collection and various types of analysis can be selected.</i></p> <p>"The data collection is extensive, drawing on multiple sources of information" (p. 62).</p> <p>"The type of analysis of these data can be a holistic analysis of the entire case or an embedded analysis of a specific aspect" (p. 63).</p> <p>"When multiple cases are chosen...a typical format is to first provide a...within-base analysis, followed by a...cross-case analysis" (p. 63).</p>

TABLE 3.3 Characteristics of Qualitative Case Study Research				
Outcome	<p><i>Heuristic</i></p> <p>"Case studies illuminate the reader's understanding of the phenomenon.... They can bring about the discovery of new meaning, extend the reader's experience, or confirm what is known" (p. 13).</p> <p>"It [the case study] can explain why an innovation worked or failed to work" (p. 14).</p>	<p><i>Policy and/or practice implications</i></p> <p>"The primary audience for the case study is more likely to be those in authority—government bodies, school boards, administrators—than teachers, parents, or students" (p. 143).</p> <p>"The researcher is obligated to draw pointed conclusions from the case study, explicitly or implicitly making recommendations that will alter policy and/or practice" (p.143).</p>	<p><i>Naturalistic generalisations</i></p> <p>"Naturalistic generalizations are conclusions arrived at through personal engagement in like's affairs or by vicarious experience so well constructed that the person feels as if it happened to themselves" (Stake, 1995, p. 85).</p>	<p><i>Lessons learned</i></p> <p>"In the final interpretive phase, the researcher reports, as Lincoln and Guba (1985) mention, the 'lessons learned' from the case" (p. 63).</p>
Product	<p><i>Descriptive yet no standard format applies.</i></p> <p>"The end product...is a rich, 'thick' description of the phenomenon under study" (p. 11).</p> <p>"There is no standard format for reporting case study research" (p. 193).</p>	<p><i>A written report is not essential.</i></p> <p>"One may meet one's 'professional responsibility' as a researcher without necessarily publishing the results of the case study....an oral report to one's client may be a more effective way of presenting the results than a written report" (p. 143).</p>	<p><i>Conventional research report is not appropriate.</i></p> <p>"The traditional research report of statement of the problem, review of literature, design, data gathering, analysis, and conclusions, is particularly ill-fitting for a case study report" (Stake, 1995, p. 128).</p> <p>"It is useful for the writer to contemplate certain alternatives...then to work out...her approach to portraying the case" (Stake, 1995, p. 128).</p> <p><i>Stake (1995) suggests a rhetorical structure (p. 23) and presents a checklist for a case study report (p. 131).</i></p>	<p><i>Narrative report</i></p> <p>"The overall intent of the case study undoubtedly shapes the larger structure of the written narrative" (p. 186).</p> <p><i>The rhetorical structure and checklist presented by Stake (1995) is supported and encouraged.</i></p>

The characteristics of this study are compliant with the case study interpretation presented by Merriam (1988) and Creswell (1998). However, a study labelled as a “case study” need not demonstrate all case study characteristics presented by any one author. It depends on the context of the research. For example, the claim by Lancy (1993) that case study is the method of choice for examining an innovation or intervention is supported for this study, although the other characteristics he presents are not applicable. Creswell (1998) cites Stake (1995) as a significant reference in his discussion about case study yet the suggestion by Stake (1995, p. 12) that the process of inquiry be undertaken in a *noninterventive* manner was not appropriate for this study.

Therefore, in summary, the method of inquiry adopted for this research is case study because a *bounded system* (Creswell, 1998) was examined. Two cases were used *instrumentally* (Creswell, 1998; Stake, 1994, 1995, 1997) to investigate the nature of the teaching and learning process when Internet and videoconferencing technology was introduced in a postgraduate subject. An inductive approach was adopted as the Naturalistic Inquiry paradigm (Lincoln & Guba, 1985) underpinned the process of inquiry. The outcome is to advance understanding by firstly describing what occurred in the two cases and then outlining the *lessons learned* (Creswell, 1998) from the two cases. Because this study is situated within an educational context, it is intended that the findings may have implications for *practice* (Lancy, 1993).

The term *collective case study* has been coined by Stake (1994, 1995, 1997) and Table 3.4 illustrates three definitions. These definitions create ambiguity in terms of the chronological order in which multiple cases are examined. For example, the definition presented by Stake (1994) implies that the term *collective* refers to several cases that are examined within the same period of time. Yet the definitions presented in Stake (1995, 1997) imply that the term *collective* can refer to several cases that are examined within the one study/work/project (which may or may not occur within the same period of time).

The term *collective case study* has been used in this study because the two subjects in which the researcher was involved as a participant observer, are two cases that are systemically related as the findings from the first case were used as input for the second case.

TABLE 3.4 Definition of Collective Case Study presented by Stake (1994, 1995, 1997)

Stake (1997) cautions the use of a collective case study design as it may affect the inherent qualities of a case study.

Some graduate students design a larger dissertation package by doing multiple case studies, sometimes called collective case study. Such a design diverts the basic thinking away from what is essential about the individual case to what is common across cases...The strength of case study is its attention to the individuality and complexity of the single case. (Stake, 1997, p. 412-413)

Because the researcher examined the two cases in a cyclic manner, that is, Case One followed by Case Two, the concern stated by Stake (1997) is not warranted. In fact, due to the researcher being involved in two consecutive implementation cycles of the same subject it is contended that the findings reflect a more informed and sophisticated reconstruction than if only one cycle, that is, one case, was examined.

3.4 THE PROCESS OF DATA COLLECTION AND DATA ANALYSIS

For clarity of presentation, the data collection process is firstly described followed by an explanation of how the data was analysed. Data analysis, however, began at the commencement of data collection.

3.4.1 DATA COLLECTION

With respect to data collection, Erlandson et al. (1993) state:

The primary purpose of gathering data in naturalistic inquiry is to gain the ability to construct reality in ways that are consistent and compatible with the constructions of a setting's inhabitants....For this reason the naturalistic researcher will gather data from a variety of sources and, preferably, in a variety of ways. (p. 81)

Data collection was undertaken with a similar perspective. During the two cases, the researcher was aware of the need for triangulation and facilitation for "thick description" (Lincoln & Guba, 1985) in the reporting of the findings. As such, several data gathering techniques (as stated in Table 3.1) were utilised. Participant observation was the predominant technique across both cases. Interviews with both

the students and the instructor were conducted and a questionnaire enabled student feedback to be obtained for each case. Several documents and artifacts were also collected from the two cases. Examples include student assignments, an electronic copy of the subject Web site, computer conferencing transcripts and email messages.

The data collected from this study can be summarised into five categories: observation, interview, questionnaire, document, and artifact. These types of data are defined in Table 3.5. This table has been compiled for two reasons. Firstly, it serves as a clarification as there are variances in the qualitative research literature in respect to the classification of data. For example, Creswell (1998, p. 121) classifies data into four types: observation, interview, document, and audio-visual material. Erlandson et al. (1993, p. 85) state that data can be obtained from four sources: observation, interview, document, and artifact. Lancy (1993, p. 17) presents three data categories: observation, interview, and artifact. Merriam (1988, p. 68) classifies data into three categories: observation, interview, and document. Secondly, questionnaires were utilised yet the questionnaire is conventionally considered a quantitative technique and is generally not discussed in qualitative research texts as a potential data source. It is contended that research studies that are qualitative from the paradigm perspective (refer to Table 3.1) can employ both qualitative and quantitative data collection techniques.

TABLE 3.5 The five types of data collected in this study		
<i>Data Type</i>	<i>Examples</i>	<i>Rationale and illustrative quotes</i>
Observation	Fieldnotes (during class time) Fieldnotes (outside class time, eg., changes to subject Web site) Meetings Reflexive journal	“Observation allows the researcher to discover the here-and-now interworkings of the environment via the use of the five human senses” (Erlandson et al. 1993, p. 94). “A record needs to be kept on the primary human instrument that is being used....This human instrument, the researcher, is governed by both thoughts and emotions and will certainly change, and hopefully grow, throughout the study. Some record of this change is needed, both because it is important to note the interaction with the setting and because the researcher’s growth, along with that of the setting’s stakeholders, is an important product of the research. For this purpose, we recommend a simple daily log...one that documents the researcher’s own feelings, attitudes, learnings, and insights and which chronicles the researcher’s growth over time” (Erlandson et al., 1993, p. 108).

TABLE 3.5 The five types of data collected in this study		
Interview	<p>Unscheduled and informal during class time—researcher physically present with interviewee)</p> <p>Unscheduled and informal outside class time—via email</p> <p>Scheduled and semistructured after completion of subject—researcher physically present with interviewee</p>	<p>“Interviews may take a wide variety of forms...from those that are very focused or predetermined to those that are very open-ended, and nothing is set ahead of time. Most common...is the semistructured interview that is guided by a set of basic questions and issues to be explored, but neither the exact wording nor the order of questions is predetermined” (Erlandson et al. 1993, p. 86).</p> <p>The researcher spoke with participants during class—engaging in a dialogue with them.</p> <p>The researcher interviewed participants via email. For example, a list of questions were tailored to individual participants and sent as an email message.</p> <p>Data is classified as an interview if the researcher was either physically present with the interviewee or maintained email correspondence with participants.</p>
Questionnaire	<p>End-of-subject questionnaire</p> <p>Individually tailored email questionnaire</p>	<p>The end-of-subject questionnaire took was in the form of a paper-based list of questions which students could answer anonymously, and a Web-based form which students could submit electronically.</p> <p>A list of generic questions to solicit demographic or background information from students and sent as an email message is categorised as a questionnaire. (Each email message is tailored to the individual participant.)</p>
Document	<p>Subject outline</p> <p>Subject reading resources</p> <p>Student assignments</p>	<p>A document is defined as paper-based textual and/or graphic information that has been produced either prior to, or during the study for reasons other than the research.</p>
Artifact	<p>Email messages</p> <p>Subject Web site</p> <p>Online discussion transcripts</p> <p>Recorded class sessions on audio tape</p> <p>Recorded videoconferencing sessions</p>	<p>“The material artifacts of a research setting that give insight into the culture’s technology, social interaction, and physical environment. Artifacts can be technological devices (e.g., computer printouts and disks), works of art, writing instruments, tools, and almost any other physical evidence” (Erlandson et al. 1993, p. 100).</p> <p>Artifacts include electronic material that is produced for reasons other than the research and electronic material produced by the researcher such as an online discussion thread to gather data from participants.</p>

The process by which data was collected is described under the following headings:

1. Ethics Committee approval
2. Role of the researcher during data collection
3. The data collected and the tools used for data collection

3.4.1.1 Ethics Committee approval

Approval for the research was sought by submitting appropriate documentation to the University of Wollongong Human Research Ethics Committee. A letter of

consent was distributed to all students in Case One and Case Two (see Appendix B and C). All participants signed the letter and the consent forms have been archived. Information about the nature of the research and the role of the researcher in the subject was provided. Participants were ensured anonymity and it was explained that withdrawal as a participant was possible at any time. Withdrawal of student participation would be accounted for by removing all reference to the student(s) requesting withdrawal in the data analysis and reporting stage of the study. Where possible, data that makes reference to the particular student(s) would also be excluded during the data collection process. Total exclusion, however, would be somewhat difficult given the nature of certain artifacts, for example, the online discussion transcripts and the recorded videoconferencing sessions.

Pseudo names for the instructor and students have been used to maintain participant anonymity.

3.4.1.2 Role of the researcher during data collection

Participant observation was deemed an appropriate data gathering technique as it enabled the researcher to interact with the students as a peer. The researcher exhibited a non-threatening, non-authoritarian presence. This facilitated the building of rapport and trust with the student participants. Physical observations were made in the on-campus class.

In Case One, the researcher entered the setting with no previous experience with the use of videoconferencing, creating Web pages, and using Web-based CMC tools. The researcher observed how the students and the instructor interacted via the technology-based media and experienced the use of the technology as she also interacted with fellow students and the instructor using the technology. The student participants were aware of the research study and because the content of the subject was of a similar focus to the research, the researcher was able to discuss observations with them. The researcher's objective during this case was to observe phenomena and not deliberately influence the process of events.

The researcher entered Case Two with insight gained from Case One. The researcher interacted with the student participants as a peer yet also assumed the informal role of assistant instructor, that is, a teacher-aid. This role was of an informal nature because much of the instructor assistance occurred "behind the scenes", that is, outside class time. For example, the researcher modified the Web site during the subject based on student feedback and emergent themes from the researcher's observations. The researcher emailed ideas to the instructor. In class,

the researcher physically sat among the students and made contributions like a fellow student. Thus, in Case Two, the researcher observed phenomena and deliberately influenced the process of events.

According to Burns (1991, p. 235) and Merriam (1988, p. 92-93) there are four possible research stances for a participant observer:

1. *The complete participant*: The researcher is a full participant and secretly observes.
2. *The complete observer*: The researcher is entirely removed from interaction with those under observation. An example may be the use a two-way mirror.
3. *The observer-as-participant*: The researcher's identity is known to the other participants but the researcher does not establish a close relationship with them, thus remaining a relative "stranger".
4. *The participant-as-observer*: The researcher's identity is known to the other participants and the researcher becomes more closely involved with them.

Table 3.6 outlines the research stance taken by the researcher as a participant observer in Case One and in Case Two.

TABLE 3.6 Role of the researcher during data collection	
<i>Case One</i>	<i>Case Two</i>
<i>Participant- as-observer</i> with participants in on-campus class.	<i>Participant- as-observer</i> with participants in on-campus class.
<i>Observer-as-participant</i> with participants in Sydney class.	<i>Observer-as-participant</i> with participants in Sydney class.
The researcher physically attended every on-campus class thus it was not possible to physically attend the Sydney class.	The researcher physically attended every on-campus class and attended one Sydney class.

In Case One, the researcher physically met all the students from the Sydney class in the early weeks of session at a Graduate School of Education gathering. Apart from the videoconferencing sessions and the CMC that transpired during class time, the researcher utilised email to maintain contact with the Sydney students outside class time. She met with them face-to-face in the last week of session. The researcher did not know any of the student participants (both in the on-campus class and the off-campus Sydney class) prior to commencement of the study.

In Case Two, the researcher physically attended the Sydney class in Week 11 and met five of the six Sydney students for the first time. Apart from the CMC that occurred during class time, the researcher utilised email to maintain contact with the

Sydney students outside class time. The researcher interacted face-to-face with all the Sydney students in a final session dinner. The researcher did not know any of the students (both in the on-campus class and the off-campus Sydney class) prior to commencement of Case Two.

In both cases, the researcher is not aware of the nature of the verbal discussion that took place in the Sydney class (apart from Week 11 in Case Two). The researcher's interpretation of the findings is based on what was directly observed and what the researcher was able to infer from the CMC transcripts.

3.4.1.3 The data collected and tools used for data collection

Pen and paper, a tape recorder, audio tapes, computer diskettes, telephone, email, and the subject Web site from both cases, were the tools employed by the researcher to capture data. Most of the data collected was stored electronically.

Because each case represents a postgraduate subject, data for each case was collected in three chronological stages:

1. Data collected prior to the commencement of the subject
2. Data collected during the subject
3. Data collected after completion of the subject

The data collected for each chronological stage is now detailed.

3.4.1.3.1 Data collected prior to commencement of each subject

Table 3.7 summarises the data collected in each case before the subject commenced.

TABLE 3.7 Data collected prior to commencement of each subject			
Case One		Case Two	
<i>Data Type</i>	<i>Details</i>	<i>Data Type</i>	<i>Details</i>
Observation	Meetings: Researcher attended two meetings with the instructor and the educational consultant to discuss the subject's structure and delivery.	Observation	Meetings: Researcher attended three meetings with the instructor to discuss the subject's structure and delivery.
	Reflexive journal.		Reflexive journal: Changes made by researcher to the subject Web site were recorded.
Document	Initial pilot report, produced by educational consultant (Appendix A).	Document	Subject outline and reading resources: Outline revised by instructor and researcher.
	Subject outline and reading resources: Outline devised by the instructor.	Artifact	Email messages: Correspondence between instructor and researcher.

TABLE 3.7 Data collected prior to commencement of each subject			
Artifact	Email messages: Correspondence among instructor, educational consultant and researcher.		Audio recording: Two of the three meetings.

3.4.1.3.2 Data collected during each subject

In both cases, during the face-to-face classes the researcher compiled hand-written observations in a notebook. During each face-to-face class, a series of contextual observations were recorded, such as, participant seating layout, absent participants, and the perceived mood of the participants. The researcher recorded the events of the evening and as each observation was recorded, the current time was added in the left-hand margin of the page. This time stamp served as invaluable data when triangulating observations made in the fieldnotes with the synchronous CMC that transpired during class time. All hand-written observations and recorded audio tapes were transcribed into word processed files. In Case One, interactions that occurred in the videoconferencing sessions that the researcher deemed significant were also transcribed.

The researcher introduced the tape recorder as a data gathering tool in Week Seven in Case One. It was felt that significant comments were being made by students during class and were difficult to capture in hand written form. The use of a tape recorder freed the researcher from the pressure of frantically recording observations and enabled her to participate in the class discussions. It was always made explicitly clear to students when the tape recorder was switched on. If students felt uncomfortable, the tape recorder was switched off. All participants were reassured that the recorded audio tapes would only be used by the researcher for data analysis purposes. The tape recorder became a significant data capturing tool for the entire study.

In Case One, the researcher visited the subject Web site every few days to monitor changes and particularly on the day of class for the following purposes:

- Ensure the Web site worked correctly and to provide feedback to the educational consultant. For example, activities performed included: testing speed of graphics to load from a slow speed dial-in access, reporting errors such as problems with submissions of Web-forms, informing the educational consultant of Web site maintenance issues such as the archiving or deleting of outdated messages.
- Monitor student contributions to the Web site, such as: student seminar Web pages, CMC discourse.

In Case Two, the subject Web site and the computer conferencing tools were reviewed on a daily basis (often several times during the day) to monitor any online discourse and any changes made to the Web site.

In Case One, the researcher created an online discussion thread as an attempt to solicit feedback from participants about the use of technology in the subject. A discussion thread titled *The EDGA957 Class Forum!* was created in Week Eight and all participants were informed about its existence via email. The message read as follows:

Hi everyone! I don't know about you all but this session is flying! Now that we are a little more than half way through I thought it would be a good idea to set up a group forum so that we can talk about our class. By that I mean anything you may want to raise ranging from specific content questions to comments on how you think we are all progressing with using the various technologies/communication methods, what you like, what you don't like in terms of this class - what's working and what's not working, etc. I had the idea of setting up this forum because I feel that many of us have made interesting comments so far about certain aspects of this class and I thought it would be good to be able to have a medium to continue such discussion...I realise you are all very busy with you study load. This is purely optional. But I think this forum could serve several purposes: 1. it could enable you to raise any questions that you weren't able to raise during class (this is supposedly a great advantage of using such technology!)...3. Can assist you in writing your assignment ie: the reflective piece 4. It would greatly help me in my research!!! So I look forward to any comments you have and hope we can get a great discussion happening!!”

One student provided insightful feedback in this discussion thread.

Overall, during Case One, the researcher experienced two main difficulties during data collection. One difficulty entailed the saving of the synchronous CMC transcripts. The synchronous CMC tool used did not automatically archive messages and the message screen window displayed a maximum of approximately 50 messages at any one time with the oldest messages being deleted. Thus, the online transcripts had to be manually saved and when synchronous class discussion occurred, the researcher had to execute a manual save approximately every five minutes, otherwise the entire online transcript would not be captured. As a result, in two online synchronous class discussions, the researcher missed out on saving some discourse. In Week 5, the initial 10 minutes was lost because the researcher was not familiar with how to save the transcript. In Week 6, the initial 15 minutes was lost because the researcher was held up after the videoconferencing session (which preceded the online synchronous discussion).

The second difficulty experienced was ensuring that all the appropriate data was being collected whilst at the same time participating in the content discussed in class. This often proved difficult for the researcher and on occasions the online synchronous discourse became difficult to follow.

Table 3.8 and Table 3.9 summarise the data collected during the subject in Case One and in Case Two respectively.

TABLE 3.8 Case One: Data collected during the subject (14 weeks plus a two-week semester break)																
Data Type	Details	1	2	3	4	5	6	7	8	9	10	SB	11	12	13	14
Observation	Fieldnotes: during class time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Fieldnotes: outside class time, eg., changes to Web site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reflexive journal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Meeting: Researcher and educational consultant—design of subject Web site	✓														
	Meeting: Instructor, educational consultant and researcher—review of first class		✓													
	Meeting: Researcher and two doctorate supervisors—review of research					✓										
	Meeting: Instructor, consultant and researcher—reflection of the subject															✓
Interview	Unscheduled, informal with students: during class time		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
	Unscheduled, informal with students: Formal Graduate School gathering		✓													
	Unscheduled, informal with students: outside class time via email												✓			
Questionnaire	Individually tailored email (see Appendix D)										✓		✓			
Document	Additional content material distributed in class				✓			✓			✓					
Artifact	Online discussion transcripts from the following CMC tools:															
	Ircle (hard copy)			✓												
	Yak! (hard copy)				✓											
	Live Chat (hard copy for Weeks 5 & 6)					✓	✓	✓	✓	✓	✓			✓	✓	
	BSCW Workspace		✓	✓				✓	✓	✓						

TABLE 3.8 Case One: Data collected during the subject (14 weeks plus a two-week semester break)																	
	BSCW Workspace (created by researcher)								✓								
	Discussion Forum									✓	✓			✓	✓	✓	
	Email (small group task - approximately 80 messages)			✓													
	Email (approximately 300 email messages)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Recorded videoconferences	✓	✓	✓				✓	✓					✓	✓	✓	
	Recorded audio tapes							✓	✓	✓	✓			✓	✓	✓	
	Changes to subject Web pages (hard copy)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Photographs of on-campus class setting													✓			

TABLE 3.9 Case Two: Data collected during the subject (14 weeks plus a two-week semester break)		1	2	3	4	5	6	7	8	9	10	SB	11	12	13	14
Data Type	Details															
Observation	Reflexive journal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Fieldnotes: Face-to-face classes	✓	✓		✓		✓		✓		✓		✓			✓
	Fieldnotes: Non-meeting weeks, eg., online discussions, changes to Web site			✓		✓		✓		✓		✓		✓	✓	
	Meeting: Instructor and researcher—review of first class	✓											✓			
	Telephone calls: students with researcher	✓			✓											
	Meeting: Researcher assisted a student							✓								
Interview	Unscheduled, informal with students in face-to-face class	✓	✓		✓		✓		✓		✓		✓			
	Unscheduled, informal with students in the lab during the non-meeting weeks			✓						✓						
Artifact	Online discussion transcripts from the following CMC tools: Live Chat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Discussion Forum	✓	✓	✓						✓	✓		✓	✓	✓	
	DISCUS			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Class email listserver							✓	✓	✓	✓	✓	✓	✓	✓	✓
	Email (approximately 260 email messages)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Recorded audio tapes—Wollongong students (face-to-face class and outside class time)			✓	✓		✓		✓		✓		✓			✓
	Recorded audio tapes—Sydney face-to-face class												✓			

TABLE 3.9 Case Two: Data collected during the subject (14 weeks plus a two-week semester break)																
	Electronic backup of entire subject Web site					✓				✓				✓		
	Changes to subject Web site (hard copy)	✓	✓	✓	✓		✓		✓	✓	✓	✓				✓
	Researcher review of student Web Study Guides											✓				
	Researcher review of student group presentations and proposals															✓
Document	Student Assignments: Web Study Guide evaluations, and Group evaluation proposal												✓			✓

3.4.1.3.3 Data collected upon completion of each subject

Upon completion of the subject in Case One, the following data was collected.

Student assignments: As part of the assessment requirements of the subject, students were to conduct an evaluation about a technology-based learning implementation. The students who wished to evaluate the subject itself were to maintain a reflective journal so that they could refer to this when writing their evaluation report. Students were to decide on the documentation format of their reflective journal as specific instructions or requirements on how to maintain and record this reflective journal were not provided.

Ten students evaluated the subject itself (six students from the Sydney class and four students from the Wollongong class). Three students (two from the Sydney class and one from the Wollongong class) included their reflective journal (structured as a weekly chronicle of the subject) as part of their assignment. One student supplemented his personal view of the subject by circulating a questionnaire (via email) asking for students' reaction to the media used.

The ten student evaluation reports plus the three detailed reflective journals proved invaluable as the honesty and frankness of the student feedback was a source of data to gauge student perceptions about their experiences in the subject.

Student evaluation questionnaire: The questionnaire was designed by the researcher and reviewed and revised by the instructor and the educational consultant. (It is provided in Appendix E.) It was distributed to students in the last face-to-face class. Students were asked to supply their name. Only four students (from 14) returned the questionnaire to the instructor. The four responses came from three

students from the Sydney class and one student from the Wollongong class (the educational consultant).

Student interviews: Upon reviewing the student feedback obtained from the evaluation assignment and the questionnaire, the researcher decided to interview a select number of students. The students for selection included those students who did not evaluate the subject as part of their assignment, a student from the Sydney class in order to gain an insight into what occurred during the face-to-face class sessions, and the educational consultant to gauge her perception about the subject. Overall, four student interviews were conducted. They comprised:

- Two students from the Wollongong class that did not evaluate the subject
- One student from the Sydney class
- An interview with the educational consultant

The interview was structured as an open-ended informal meeting. All interviews were recorded on audio tape and transcribed. The interview structure and sample questions are provided in Appendix F. The questions asked were tailored specifically to each student.

Upon completion of the subject in Case Two, the following data was collected.

Student evaluation questionnaire: Two questionnaires were designed. The researcher and the instructor designed a Web-based form which students were asked to complete online (see Appendix G). It was to serve as student feedback for the instructor. Students were not asked for their name, just the class they attended. Four responses were obtained from this data form (three students from the Wollongong class and one student from the Sydney class).

Based on the poor response rate from the end-of-subject questionnaire in Case One and because students were not required to keep a reflective journal (as in the previous case), the researcher decided to design a questionnaire solely for the research study. It was developed by the researcher and piloted on three students. The questionnaire was revised based on the student feedback and the paper-based questionnaire accompanied with an opening letter was mailed to every student (see Appendix H). The students did not have to supply their name on the questionnaire. A stamped self-addressed enveloped was provided for the students' convenience. 15 responses were obtained from the 17 students. Based on the comprehensive

feedback obtained from this data form, it was felt that student interviews (as conducted in Case One) were not required.

Instructor interview: The researcher spoke with the instructor about the subject frequently during the research study. However, upon completion of the two subject implementations, two formal interviews were scheduled with the instructor in order to gauge the instructor's perception of the two implementation cycles of the subject and obtain contextual information about how the subject is situated in the overall educational technology graduate curriculum. The structure and questions from the two interviews are provided in Appendix I and Appendix J. Both interviews were recorded on audio tape and transcribed.

Table 3.10 summarises the data collected after completion of each subject.

TABLE 3.10 Data Collected for both cases after completion of each subject			
Case One		Case Two	
<i>Data Type</i>	<i>Details</i>	<i>Data Type</i>	<i>Details</i>
Questionnaire	End-of-subject evaluation: designed by the researcher, instructor and educational consultant. Obtained 4 from 14 responses.	Questionnaire	End-of-subject evaluation: designed by the researcher. Obtained 15 from 17 responses.
Observation	Reflexive journal	Questionnaire	End-of-subject Web-based evaluation form: designed by the researcher and the instructor. Obtained 4 responses.
Interview	Student interviews: 4 scheduled, informal interviews	Observation	Reflexive journal
Artifact	Recorded audio tapes—student interviews	Interview	One semi-structured, informal interview was scheduled with two students from the Wollongong class to pilot end-of-subject evaluation questionnaire.
Artifact	Student evaluation assignments (10)	Artifact	Recorded audio tapes—the student scheduled interview.
Document	Student grades	Artifact	Complete electronic backup of subject Web site.
		Document	Student grades
		Interview	First Instructor interview: Scheduled, semi-structured, informal.
		Interview	Second Instructor interview: Scheduled, semi-structured, informal.
		Artifact	Recorded audio tapes—the two instructor interviews
		Artifact	Researcher's review of student's WSGs, WSG evaluation reports and the final group Evaluation Proposal assignment.

3.4.2 DATA ANALYSIS

The essence of qualitative data analysis is to make sense of the data collected by pulling it apart and putting it back together in more meaningful ways (Creswell, 1998, p. 154; Merriam, 1998, p. 127). Creswell (1998) argues that such an analysis process “presents a formidable task for qualitative researchers” (p. 139). A contributing factor for the difficulty experienced by the researcher in the data analysis process was the lack of consensus in the qualitative research literature about how to perform an analysis of qualitative data (Creswell, 1998, p. 140). The literature does present a series of guidelines, tactics, and strategies that can be used (for example see: Creswell, 1998, p. 146-155; Lancy, 1993, p. 20-22; Merriam, 1988, p. 127-146; Strauss & Corbin, 1990). However, these data analysis techniques and strategies are all dependent upon the purpose, focus, and outcome of the research. This is justified by Merriam (1998): “The amount of interpretation one strives for depends on the purpose of the study as well as the end product desired” (p. 130-131).

It was Merriam’s (1988) data analysis discussion for case study research that shed light for the researcher on how to proceed with the analysis of this study. Merriam (1988) states that there are various levels of analysis that can be used in case study research. The first level of analysis, which constitutes a narrative account of the findings, is a *Descriptive Case Study*. The next level of analysis, which involves the identification of themes and categories—that is, it constitutes more interpretation of the findings, is an *Analytical Case Study*. The third level of analysis, or the highest level of data abstraction, is when categories are linked to tentative hypotheses. This level of data analysis constitutes the development of theory—a *Grounded Theory Case Study*.

This study represents an Analytical Collective Case Study. Merriam’s (1988) explanation enabled the researcher to develop a conceptual framework to understand how the analysis strategies presented by other authors “fit” into the whole qualitative data analysis schema and enabled the researcher to determine the level of analysis required for this study. The framework developed by the researcher is based on Merriam’s (1988) interpretation of case study data analysis and is presented in the Table 3.11. The framework represents a continuum of the “process of data consolidation” or “the amount of data abstraction” that a researcher can achieve when performing case study research. The associated data analysis techniques that can be performed to achieve each level of data abstraction are outlined and techniques suggested by other authors are included to illustrate the

researcher's interpretation of how the various data analysis techniques presented in the qualitative research literature fit together.

**TABLE 3.11 Level of analysis that can be performed in Case Study Research—A framework developed by the researcher
(Based on Merriam, 1988)**

TABLE 3.11 Level of analysis that can be performed in Case Study Research—A framework developed by the researcher (Based on Merriam, 1988)			
<i>Grounded Theory</i> Development of theory	Linking categories to working hypotheses. “When categories...are reduced and refined and then linked together by tentative hypotheses, the analysis is moving toward the development of a theory to explain the data’s meaning....A theory grounded in the data also contains elements of control and prediction” (Merriam, 1988, p. 146). “Thinking about one’s data— <i>theorizing</i> —is a step toward developing a theory that explains some aspect of educational practice and allows one to draw inferences about future activity.” (Merriam, 1988, p. 140-141)	6. Link conceptual categories together with tentative hypotheses: Negative Case Analysis (Erlandson et al. 1993; Lincoln & Guba, 1985) is conducted more rigorously here than in Step 5 to test/refine the working hypotheses. “Negative case analysis involves addressing and considering alternative interpretations of the data, particularly noting pieces of data that would tend to refute the researcher’s construction of reality....Hypotheses are revised until there are no substantive differences in understanding between the hypotheses and the data” (Erlandson et al. 1993, p. 121). (Strauss & Corbin, 1990 suggest specific techniques to generate a grounded theory such as Axial and Selective coding, etc.)	Grounded Theory (Creswell, 1998; Strauss & Corbin, 1990) The testing of working hypotheses.

In this analytical collective case study, data analysis was conducted by following Steps 1 to 5 detailed in Table 3.11. It is appreciated that the researcher’s interpretation of qualitative data analysis presented in Table 3.11 may differ from other interpretations in the following ways:

- Creswell (1998) discusses Grounded Theory as a separate form of inquiry to Case Study, whereas in Merriam’s (1988) work, Grounded Theory is implicated as a level of analysis performed in Case Study Research.
- A topic of confusion for the researcher has been the discourse about Negative Case Analysis. Lincoln and Guba (1985) define Negative Case Analysis as an “activity aimed at refining working hypotheses as more and more information becomes available” (p. 301) and thus increases the credibility of the findings—a “trustworthiness” technique (this is explained in the following section). Creswell (1998) also supports this view, however, Erlandson et al. (1993) do not list Negative Case Analysis as a trustworthiness technique. Instead they discuss it as a data analysis technique. Another concern for the researcher about Negative Case Analysis is the extent to which it is applied depends of the level of data abstraction required. For example, in this study the researcher refined working hypotheses as the study advanced from Case

One to Case Two. Also, when conducting Step 5 in Table 3.11, Negative Case Analysis was performed to refine each category. However, Kidder (1981) cited in Lincoln and Guba (1985, p. 206) contends that Negative case analysis is a data analysis technique used to devise Grounded Theory. The conclusion thus reached about Negative Case Analysis is as follows. It can be viewed as both a data analysis technique and a trustworthiness measure. How rigorously it is applied is dependent on the level of data abstraction required—the more rigorously it is applied, the more the analysis tends towards developing Grounded Theory.

- Erlandson et al. (1993), Lincoln and Guba (1985), and Merriam (1988) view triangulation and member checks as trustworthiness techniques. The researcher views these techniques as both data analysis and trustworthiness techniques. Triangulation of data was conducted as part of the data analysis to identify themes and cluster themes. Member checks were carried out during the data analysis process refine the researcher's interpretation of the findings.

Because the first case preceded the second case in this collective case study, the chronological process in which data analysis occurred in this study is represented metaphorically as an “enlarging spiral”. Creswell (1998) and Neuman (1994, p. 319) describe the data analysis process in qualitative research as a non-linear spiral metaphor—“the process of moving in analytic circles rather than using a fixed linear approach” (Creswell, p. 142).

Figure 3.1 summarises the analysis process undertaken in this study. Each revolution of the spiral signifies a progression of analysis based on the chronological sequence of the study. Through each progression, several analysis procedures/techniques were employed and several analysis products were produced. These are also outlined in Figure 3.1. The enlargement of the spiral signifies that the data analysis conducted during each progression embraced the analysis products from the previous progressions. That is, data analysis was conducted from a holistic perspective.

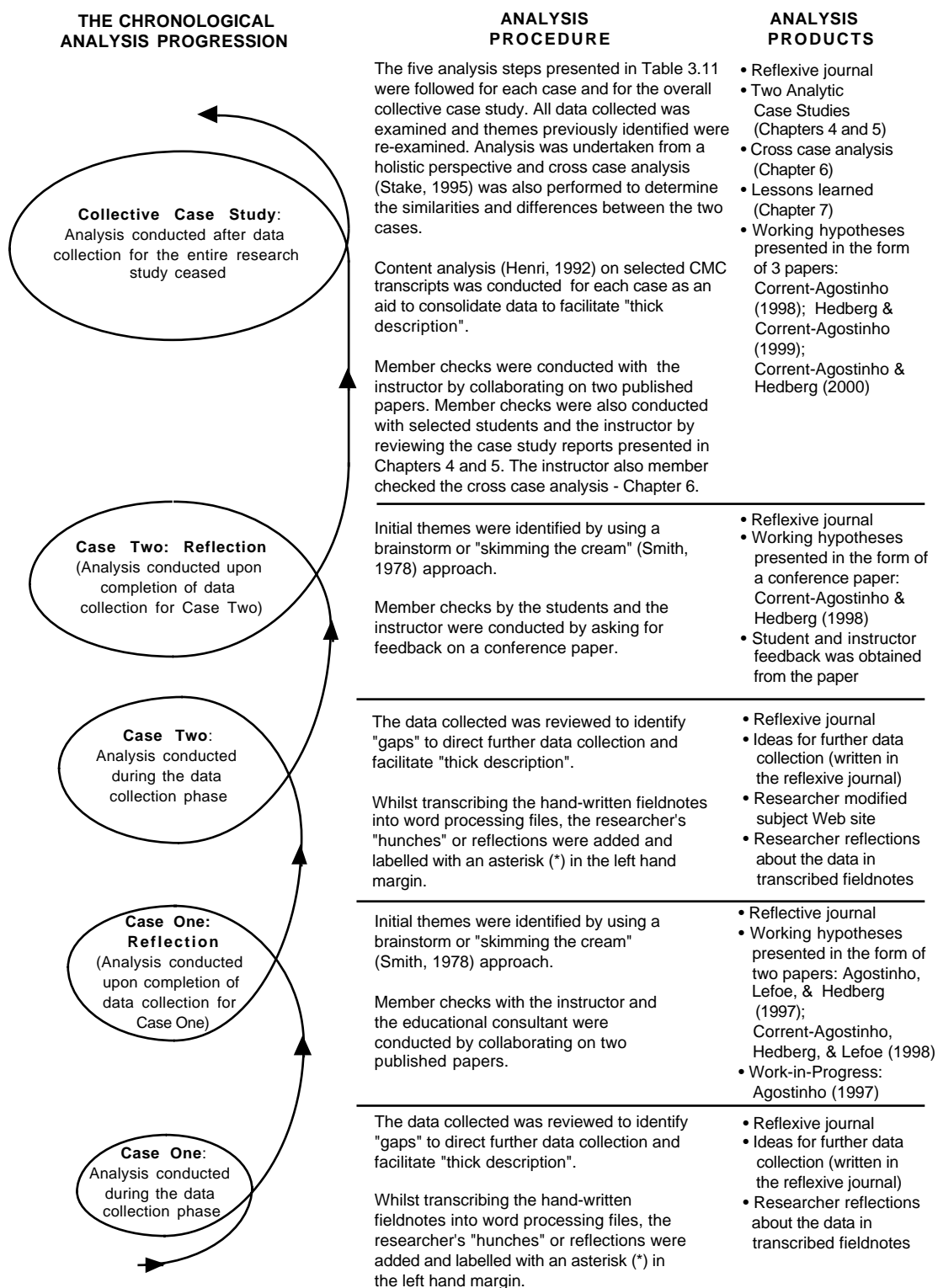


FIGURE 3.1 The chronological analysis process conducted in this study

3.5 RATIONALE FOR JUDGING THE “QUALITY” OF THIS STUDY

3.5.1 A FRAMEWORK TO DISCUSS “QUALITY”

Due to the complex and evolving nature of qualitative research (explained in section 3. 3), the criteria for judging the *quality* or *goodness* of a qualitative inquiry is not well resolved. The following authors explicitly state this: Creswell (1998, p. 194-197), Guba and Lincoln (1994, p. 114), Lancy (1993, p. 24-29). Lancy (1993) elaborates:

The major problem we face is not that there is poor work being done under the auspices of qualitative research but that we still have no widely shared language to use in discussing the worth of a piece of qualitative research....There is, therefore, a pressing need to develop a set of standards which can be used to evaluate completed studies, to guide neophyte researchers, and to stimulate improvement in the quality of research. (p. 27)

Creswell (1998) supports this view and frames the issue about *quality* as an “emerging discourse”. He concludes his discussion about quality standards in the following way:

The evolving perspective on qualitative validity is consistent with my views; it is impossible to reach a consensus. In addition, rather than a standard protocol for qualitative validity, I am moving toward a better understanding of multiple perspectives so that students and researchers can choose among many types. (p. 216-217)

From the researcher’s immersion in the qualitative research literature, assessing the *quality* of a qualitative research study seems dependent on three factors:

1. The *design* of the research
2. The *process* in which the inquiry is undertaken
3. The *outcome* of the research

Table 3.12 elaborates the researcher’s construction of this issue by providing examples from the literature. This table serves as the framework to demonstrate how the issue of *quality* has been addressed in this study.

TABLE 3.12 <i>Quality criteria for a qualitative inquiry—A framework developed by the researcher*</i>			
Theme	Proponent	Quality criteria	Rationale and illustrative quotes
Design <i>Appropriateness of the research design</i>	Lincoln and Guba (1985)	Paradigm, substantive theory and context <i>fits</i> with focus of inquiry.	“Problem...paradigm, theory, <i>and</i> context must exhibit congruence (value-resonance) if the inquiry is to produce meaningful results” (p. 38).

TABLE 3.12 <i>Quality criteria for a qualitative inquiry—A framework developed by the researcher*</i>			
	Shulman (1997)	"Disciplined inquiry"	"Good research is a matter not of finding the one best method but of carefully framing that question most important to the investigator and the field and then identifying a disciplined way in which to inquire into it that will enlighten both the scholar and...her community" (p. 4).
Process—Rigour <i>Demonstration of rigour—how well the research process leads to "truthful" and accurate findings</i>	Creswell (1998)	Eight verification procedures—at least two need to be conducted in any study	<p>"From a review of major studies...I...present a classification of procedures found irrespective of perspectives and terms" (p. 201).</p> <p>The eight procedures proposed are:</p> <ol style="list-style-type: none"> 1. Prolonged engagement and persistent observation 2. Triangulation 3. Peer review or debriefing 4. Negative case analysis 5. Clarifying researcher bias 6. Member checks 7. Rich, thick description 8. External audits <p>"Examining these eight procedures as a whole, I recommend that qualitative researchers engage in at least two of them in any given study" (p. 203).</p>
	Creswell (1998)	Quality standards <i>fit</i> with tradition of inquiry	Creswell (1998) maintains that quality criteria is dependant on the type of qualitative inquiry: "I recommend that one finds standards of quality <i>within a tradition</i> and present them in the qualitative report and reflect on how the study meets these standards" (p. 215).
	Erlandson et al. (1993); Lincoln and Guba (1985);	Trustworthiness and Authenticity	<p>Trustworthiness: "Conventional trustworthiness criteria (internal and external validity, reliability, and objectivity) [are] inconsistent with the axioms and procedures of naturalistic inquiry....there exist substitute criteria (called credibility, transferability, dependability, and confirmability)...that adequately...affirm the trustworthiness of naturalistic approaches" (Lincoln & Guba, 1985, p. 42-43).</p> <p>Table 3.12.1 provides a summary of the conventional trustworthiness criteria versus the naturalistic inquiry trustworthiness criteria.</p> <p>Table 3.12.2 outlines the trustworthiness techniques proposed by Lincoln and Guba (1985) and explains how these techniques were operationalised in this study.</p> <p>Authenticity: "The naturalistic paradigm, valuing as it does the separate realities that have been created by individuals, must also value the way these realities are responded to and the ways in which they enable individuals to respond productively to their environments. Guba and Lincoln (1989) have identified the standards by which this responsiveness to multiple realities is judged as authenticity criteria" (Erlandson et al., 1993, p. 131-132).</p>

TABLE 3.12 <i>Quality criteria for a qualitative inquiry—A framework developed by the researcher*</i>			
Outcome <i>Usefulness of the research product to the community</i>	Barone and Eisner (1997)	Further human understanding to enhance quality of life	"The primary aim of all research is to further human understanding. The aim of <i>educational</i> research is to further human understanding so that the quality of educational practice can be improved. The achievement of such an aim, in turn, increases the probability that students will be able to lead an enhanced quality of life" (p. 85).
	Lancy (1993)	"Unselfishness"	"One standard to apply is that the research should be unselfish. That is, it must satisfy something in addition to the author's own selfish purposes" (p. 27).
	Reeves (1995); Reeves (1996)	"Social responsibility"	In an ITFORUM listserver online discussion, Professor Tom Reeves stated: "In my humble opinion, the foremost criteria for establishing a research agenda in the field of educational technology should be 'social responsibility.' Socially responsible research addresses problems that detract from the quality of life for individuals and groups in society, especially those problems related to learning and human development" (Reeves, 1996).
	Shulman (1997)	Communication to foster understanding	"Researchers must be capable of communicating their discoveries to a community of peers in education. Research begins in wonder and curiosity but ends in teaching. The work of the researcher must always lead to a process in which we teach what we have learned to our peers in the education community. Our work is neither meaningful nor consequential until it is understood by others" (p. 6).

* This table does not provide an exhaustive elaboration about quality criteria. Its purpose is to provide examples to illustrate the researcher's interpretation.

3.5.2 QUALITY CRITERIA 1: APPROPRIATENESS OF THE RESEARCH DESIGN

It is contended that this aspect of quality has been sufficiently addressed in section 3.3.

3.5.3 QUALITY CRITERIA 2: DEMONSTRATION OF RIGOUR

Benchmarks of rigour for conventional scientific inquiry, that is, internal and external validity, reliability and objectivity, are based on the ontological belief of scientific realism. Such assessment criteria are noncommensurable with the Naturalistic Inquiry paradigm (Lincoln & Guba, 1985). There are multiple perspectives in the qualitative research literature with respect to rigour (Creswell, 1998). Some authors discuss the issue of rigour using the conventional terms but apply different definitions to these terms (for example, see Burns, 1991, p. 245-249; Creswell, 1998, p. 200; Merriam, 1988, p. 163-184; Neuman, 1994, p. 355-357). Other authors have adopted alternative labels (see Creswell, 1998, p. 200 for a summary).

The most convincing argument for the researcher has been presented by Erlandson et al. (1993), Guba and Lincoln (1994), and Lincoln and Guba (1985), through their use of the alternative labels *trustworthiness* and *authenticity*. Lincoln and Guba (1985) stress the following: “To suggest that persons engage in naturalistic inquiry because it is so much easier and less rigorous than conventional inquiry is to betray ignorance of what is actually involved” (p. 288). Table 3.12.1 provides a comparative summary of the trustworthiness rubrics used in conventional scientific inquiry and naturalistic inquiry.

TABLE 3.12.1 Comparative summary of “Trustworthiness” rubrics used in conventional scientific inquiry and naturalistic inquiry (Adapted from Erlandson et al. 1993; Lincoln and Guba, 1985)				
<i>Criterion</i>	<i>Conventional Term</i>	<i>Conventional Assessment</i>	<i>Naturalistic Term</i>	<i>Naturalistic Assessment</i>
Truth value <i>The degree of confidence in the “truth” of the findings</i>	Internal validity	Assessed according to how well the findings are isomorphic with “reality”. That is, do the findings represent a subset of reality?	Credibility	“Credibility needs to be established with the individuals and groups who have supplied data for the inquiry. It is assessed by determining whether the description developed through inquiry in a particular setting ‘rings true’ for those persons who are members of that setting. Because these persons represent different constructed realities, a credible outcome is one that adequately represents both the areas in which these realities converge and the points on which they diverge. A credible inquiry generally has the effect on its readers of a mosaic image, often imprecise in terms of defining boundaries and specific relationships but very rich in providing depth of meaning and richness of understanding” (Erlandson et al. 1993, p. 30).

TABLE 3.12.1 Comparative summary of “Trustworthiness” rubrics used in conventional scientific inquiry and naturalistic inquiry (Adapted from Erlandson et al. 1993; Lincoln and Guba, 1985)				
Applicability <i>The extent to which the findings can be applied in other contexts or with other participants</i>	External validity	Measured by what extent the findings can be generalised so that prediction and control of phenomena is possible.	Transferability	<p>"At best only working hypotheses may be abstracted, the <i>transferability</i> of which is an empirical matter, depending on the degree of similarity between sending and receiving contexts" (Lincoln & Guba, p. 297).</p> <p>"It is...not the naturalist's task to provide an index of transferability, it is...her responsibility to provide the data base that makes transferability judgements possible on the part of potential appliers" (Lincoln & Guba, p. 316).</p> <p>"The result of the [naturalistic] study is a description that will not be replicated anywhere. The 'thick description' that has been generated, however, enables observers of other contexts to make tentative judgments about applicability of certain observations for their contexts and to form 'working hypotheses' to guide empirical inquiry in those contexts" (Erlandson et al. 1993, p. 32-33).</p>
Consistency <i>Evidence to support the findings are repeatable if the inquiry is replicated in a similar context with similar participants</i>	Reliability	Measured by what extent the study is replicable. That is, is the data reliable enough so that the same findings will result if the study is repeated?	Dependability	<p>"Consistency is conceived in terms of 'dependability,' a concept that embraces both the stability implied by 'reliability' and the trackability required by explainable changes (Guba, 1981, p. 81). Dependability is communicated through a dependability audit" (Erlandson et al. 1993, p. 34).</p>

TABLE 3.12.1 Comparative summary of “Trustworthiness” rubrics used in conventional scientific inquiry and naturalistic inquiry (Adapted from Erlandson et al. 1993; Lincoln and Guba, 1985)				
Neutrality <i>The extent to which the findings are based on focus of inquiry, not the researcher’s biases</i>	Objectivity	Assessed according to how well the researcher acts as a neutral observer insulating observations from personal biases.	Confirmability	<p>"The issue is no longer the investigator's characteristics but the characteristics of the data: Are they or are they not <i>confirmable</i>?" (Lincoln & Guba, 1985, p. 300).</p> <p>"The naturalistic researcher does not attempt to ensure that observations are free from contamination by the researcher but rather to trust in the 'confirmability' of the data themselves. 'This means that data (constructions, assertions, facts and so on) can be tracked to their sources, and that the logic used to assemble the interpretations into structurally coherent and corroborating wholes is both explicit and implicit' (Guba & Lincoln, 1989, p. 243). Confirmability, like dependability, is communicated through an audit." (Erlandson et al. 1993, p. 34-35).</p>

Because this study has adopted a qualitative research approach from the paradigm perspective and has adhered to the Naturalistic Inquiry paradigm, it is felt appropriate that *rigour* should be discussed according to the naturalistic process quality criteria of *trustworthiness* and *authenticity*. In Table 3.12, Creswell (1998) provides eight verification procedures and recommends that a qualitative researcher should engage in at least two of them in a research study. His suggested procedures encompass the trustworthiness criteria presented by Lincoln and Guba (1985).

3.5.3.1 How “Trustworthiness” was established

Trustworthiness was established based on the framework presented by Lincoln and Guba (1985). Table 3.12.2 outlines the trustworthiness techniques applied, followed by a description of how each technique was operationalised in this study. The table highlights that excluding the procedure of “Referential Adequacy”, and the dependability and comfirmability audits, all other techniques proposed by Lincoln and Guba (1985) have been applied. The table also highlights that this study has gone well beyond the minimum requirements suggested by Creswell (1998) as seven of his eight verification procedures have been operationalised.

TABLE 3.12.2 Establishing Trustworthiness—Techniques applied in this study (Based on Lincoln and Guba, 1985)		
<i>Trustworthiness Criteria</i>	<i>Operational procedures/ techniques</i>	<i>Illustrative quotes</i>
Credibility	1. Prolonged engagement	<i>"Prolonged engagement</i> , is the investment of sufficient time to...learning the 'culture,' testing for misinformation...and building trust" (Lincoln & Guba, 1985, p. 301).
	2. Persistent observation	"The purpose of persistent observation is to identify those characteristics...most relevant to the problem or issue being pursued and focusing on them in detail. If prolonged engagement provides scope, persistent observation provides depth" (Lincoln & Guba, 1985, p. 304).
	3. Triangulation	<p>"Triangulation leads to credibility by using different or multiple sources of data (time, space, person), methods (observations, interviews, videotapes, photographs, documents), investigators (single or multiple), or theory (single versus multiple perspectives of analysis)" (Erlandson et al. 1993, p. 137-138).</p> <p>"The degree of convergence attained through triangulation suggests a standard for evaluating naturalistic studies. In other words, the greater the convergence attained through the triangulation of multiple data sources, methods, investigators, or theories, the greater the confidence in the observed findings. The convergence attained in this manner, however, never results in data reduction but in an expansion of meaning through overlapping, compatible constructions emanating from different vantage points" (Erlandson et al. 1993, p. 139).</p>
	4. Peer debriefing	<p>"Peer debriefing helps build credibility by allowing a peer...who has some general understanding of the study to analyze materials, test working hypotheses and emerging designs, and listen to the researcher's ideas and concerns. In such sessions, the researcher thinks aloud and explores various hypotheses, while the peer debriefer asks probing questions, plays devil's advocate, and provides alternative explanations. Such sessions also allow the researcher to vent frustrations and emotions that may cloud the research. The peer debriefer can listen sympathetically to these feelings, defusing as many as possible, and help the inquirer devise coping strategies" (Erlandson et al. 1993, p. 140).</p> <p>"There is no formula to prescribe how a debriefing session should be conducted" (Lincoln & Guba, 1985, p. 308).</p>
	5. Negative case analysis	<p>"Negative case analysis may be regarded as a 'process of revising hypotheses with hindsight.' The object...is continuously to refine a hypothesis until it <i>accounts for all known cases without exception</i>" (Lincoln & Guba, 1985, p. 309).</p> <p>"The researcher refines working hypotheses as the inquiry advances...in light of negative or disconfirming evidence. The researcher revises initial hypotheses until all cases fit, completing this process late in data analysis" (Creswell, 1998, p. 202).</p>

TABLE 3.12.2 Establishing Trustworthiness—Techniques applied in this study (Based on Lincoln and Guba, 1985)		
	<p>6. Member checks</p> <ul style="list-style-type: none"> • Informal (during data collection) • Formal (after findings are written) 	<p>“The member check, whereby data, analytic categories, interpretations, and conclusions are tested with members of those stakeholding groups from whom the data were originally collected, is the most crucial technique for establishing credibility....Member checking is both informal and formal, and it occurs continuously” (Lincoln & Guba, 1985, p. 314).</p> <p>“Member checking may be conducted at the end of an interview....may be conducted in interviews by verifying interpretations and data gathered in earlier interviews....may be conducted in informal conversations with members” (Erlandson et al. 1993, p. 142).</p> <p>“Before submission of the final report, a member check should be conducted by furnishing entire copies of the study to a review panel of respondents and other persons in the setting being studied” (Erlandson et al. 1993, p. 142).</p>
Transferability	7. Thick description	<p>“The description must specify everything that a reader may need to know in order to understand the findings (findings are not part of the thick description, although they must be interpreted in the terms of the factors thickly described)” (Lincoln & Guba, 1985, p. 125).</p> <p>“The question of what constitutes ‘proper’ thick description is, at this stage in the development of naturalist theory, still not completely resolved....the criteria that separate relevant from irrelevant descriptors are still largely undefined” (Lincoln & Guba, 1985, p. 316).</p>
Dependability and Confirmability	<p>8. Access to an audit trail</p> <ul style="list-style-type: none"> • Dependability audit • Confirmability audit 	<p>“The audit trail leads to dependability and confirmability by allowing an auditor to determine the trustworthiness of the study. It is important that adequate records be kept during the study” (Erlandson et al. 1993, p. 148).</p> <p>“To provide for a check on dependability, the researcher must make it possible for an external check to be conducted on the processes by which the study was conducted. This is done by providing an ‘audit trail’ that provides documentation (through critical incidents, documents, and interview notes) and a running account of the process (such as the investigator’s daily journal) of the inquiry.” Erlandson et al., 1993, p. 34)</p> <p>“The audit trail...also enables an external reviewer to make judgments about the products of the study. An adequate trail should be left to enable the auditor to determine if the conclusions, interpretations, and recommendations can be traced to their sources and if they are supported by the inquiry.” Erlandson et al., 1993, p. 35)</p> <p>Lincoln and Guba (1985, p. 319-320) describe six categories of records that should be made available. Erlandson et al. (1993, p. 148-151) also provides a description of audit trail data.</p> <p>Table 3.14 explains the structure of the electronic audit trail compiled for this study.</p>

TABLE 3.12.2 Establishing Trustworthiness—Techniques applied in this study (Based on Lincoln and Guba, 1985)		
Credibility Transferability Dependability Confirmability	9. Reflexive journal	"[The reflexive journal is] a kind of diary in which the investigator...records a variety of information about <i>self</i> ...and <i>method</i> ...that include the following: (1) the <i>daily schedule and logistics of the study</i> ; (2) a <i>personal diary</i> that provides the opportunity for catharsis, for reflection...and for speculation about growing insights; and (3) a <i>methodological log</i> in which methodological decisions...are recorded. Entries should be made on a daily basis in the daily schedule and personal diary, and as needed in the methodological log" (Lincoln & Guba, 1985, p. 327).

3.5.3.1.1 Prolonged engagement

Prolonged engagement was demonstrated as follows:

- The researcher was involved as a participant observer for the entire duration of the subject in both cases.
- Two cycles of the same subject were examined which facilitated the production of a more sophisticated reconstruction than if only one cycle of the subject was examined.

3.5.3.1.2 Persistent observation

Persistent observation was demonstrated through the diligent recording of the face-to-face classes, the videoconferencing sessions and the online interaction for the entire duration of both subjects.

3.5.3.1.3 Triangulation

Triangulation was exhibited during the data collection and data analysis phases of this study.

During data collection, different types of data were collected, such as researcher observations (which were time stamped to correlate with the CMC transcripts), CMC transcripts, videoconferencing recorded sessions, recorded audio of face-to-face classes, interviews with participants, and student-produced artifacts.

During data analysis, different types of data were used to refine and substantiate emergent themes. Different data analysis techniques were performed during the study that led to a high degree of convergence. For example, the “skimming the cream” analysis approach and the member checks that were performed during data collection (see Figure 3.1) were triangulated with the more rigorous analysis conducted after the completion of data collection (the steps outlined in Table 3.11). In addition, the content analysis performed on the CMC transcripts was triangulated with the fieldnotes.

3.5.3.1.4 Peer debriefing

Peer debriefing occurred informally during this study. The researcher had the opportunity to discuss the emergent findings, as well as the process of inquiry of this study, with a colleague from the Faculty of Education. She had a PhD in Education and had conducted a qualitative study for her dissertation. She became the researcher's peer debriefer for most of this study's duration. She provided inspirational support to the researcher, namely in the form of empathy as she understood the emotional frustration that qualitative research can afford.

Table 3.13 provides a few examples of the peer debriefing sessions conducted.

TABLE 3.13 Examples of peer debriefing sessions held during the study		
<i>Date</i>	<i>Stage of study</i>	<i>Purpose of debriefing sessions</i>
September 17, 1997	Data collection phase: Case Two	<ul style="list-style-type: none">• Discussion about the emergent themes from Case One and Case Two• Discussion about the methodology of this study.
October 13, 1997	Data collection phase: Case Two	<ul style="list-style-type: none">• Discussion of research methodology issues
February 25, 1998	Data analysis of the collective case study	<ul style="list-style-type: none">• Discussion about case study research• Discussion about the emergent themes from the collective case study
March 30, 1998	Data analysis of the collective case study	<ul style="list-style-type: none">• Critique of researcher's initial synthesis of the collective case study• Discussion of research methodology issues
December 9, 1998	Data analysis of the collective case study	<ul style="list-style-type: none">• Discussion of researcher's interpretation of the findings and working hypotheses.
March 16, 1999	Data analysis of the collective case study	<ul style="list-style-type: none">• Discussion about how the findings from the study relate to the educational technology literature.
April 14, 1999	Data analysis of the collective case study	<ul style="list-style-type: none">• Discussion about the research methodology of this study.

3.5.3.1.5 Negative Case Analysis

Negative Case Analysis was applied during the data analysis to refine the clustering of themes into categories. This is explained in the data analysis section (section 3.4.2).

3.5.3.1.6 Member checks

Member checking was conducted both informally—during the data collection phase of this study, and formally—after data collection was completed.

Informal member checks: For Case One, the researcher in collaboration with the instructor and educational consultant synthesised the findings and working hypotheses that emerged from the case into a publication format. This enabled the researcher to perform informal member checks with the instructor and the educational consultant. For Case Two, the researcher submitted a paper about the findings and working hypotheses from the case to a virtual conference. She then

informed all the students about the paper and requested feedback. The researcher received feedback from one student from the Wollongong class. The student acknowledged that the findings presented in the paper were an accurate interpretation:

Hi...Thought your paper was very interesting and covered all the sorts of points we were all discussing with each other and at class. (Email message sent to researcher, Tuesday 7 April 1998)

After all the data collection was completed, informal member checking was performed with the instructor in the form of collaboration in writing publications about the findings from this study.

Formal member checks: When the case study draft reports were completed, a comprehensive member check was conducted with several students. For Case One, the researcher selected the educational consultant and the instructor to conduct member checks. For Case Two, two students (one from the Wollongong class and one from the Sydney class) plus the instructor conducted member checks. The researcher prepared an information packet as suggested by Lincoln and Guba (1985, p. 375-376). The covering letter and consent form that accompanied the draft case reports for the member checks of the two cases are illustrated in Appendix K and Appendix L.

3.5.3.1.7 Thick Description

It is contended that appropriate context-rich “thick description” about the two cases is presented in Chapter Four and Chapter Five.

3.5.3.1.8 Accessibility to an Audit Trail

According to Lincoln and Guba (1985, p. 319-320, 382-384), a research audit trail comprises six categories of information:

1. Raw data. Examples: written fieldnotes, audio and video recordings.
2. Data reduction and analysis products. Examples: summaries, theme identification, working hypotheses.
3. Data reconstruction and synthesis products. Examples: clustering of themes into categories, interpretations, final report.
4. Process notes. Examples: methodological notes and trustworthiness notes.
5. Information about intentions and disposition. Examples: the research proposal and personal notes.
6. Instrument development information. Examples: questionnaire design, semi-structured interview questions.

An audit trail, which includes these six categories, was compiled for this study and is available from the researcher in electronic CD-ROM form. The organisational structure of this electronic audit trail is explained in Table 3.14.

TABLE 3.14 Organisational structure of electronic research audit trail compiled for this study	
<i>Audit Trail categories presented on the CD-ROM</i>	<i>How these categories comply with the audit trail categories presented by Lincoln and Guba (1985, p. 382-384)</i>
1. Research Proposal	5. Intentions and dispositions
2. Data Collection	<p>Comprises the following audit trail categories:</p> <p>1. Raw data The raw data is organised in chronological order as explained in section 3.4.1.3. (Raw data not in digital form is not included in the electronic audit trail. Such data includes:</p> <ul style="list-style-type: none"> • audio tape recordings • videoconferencing sessions recorded on VHS tapes • original handwritten fieldnotes • paper-based artifacts, such as student assignments <p>2. Data reduction and analysis. Examples include:</p> <ul style="list-style-type: none"> • typed field notes • initial theme identification and ideas • summaries as data collection progressed <p>6. Instrument development. Examples include:</p> <ul style="list-style-type: none"> • interview questions • questionnaire design and pilot feedback
3. Data Analysis	3. Data reconstruction and synthesis. Examples include: <ul style="list-style-type: none"> • identification of themes and categories • questionnaire data analysis
4. PhD Diary	4. Process notes. The PhD Diary includes methodological notes and trustworthiness notes. For example, the daily activities during the entire study have been recorded. All peer debriefing meetings and all informal member checking incidents with the instructor are included.
5. Publications and Presentations	3. Data reconstruction and synthesis. Examples include: <ul style="list-style-type: none"> • findings and conclusions • working hypotheses
6. PhD Thesis	<p>Chapters 1 and 2 serve as evidence for the audit trail classification: 5. Intentions and dispositions.</p> <p>Chapter 3 serves as evidence for the audit trail classification: 4. Process notes.</p> <p>Chapters 4, 5, and 6 serve as evidence for the audit trail classification: 3. Data reconstruction and synthesis</p>

3.5.3.1.9 Reflexive journal

A reflexive journal (which is defined in Table 3.12.2) was maintained for the entire study. Known as the *PhD Diary*, it was initially intended as a central repository for ideas, thoughts, and literature references. However, it became the backbone of recording this entire study. It has served as an outlet for emotions and as a product it

represents a detailed chronological historical account of the entire research and thesis production process.

3.5.3.1.10 *Final thoughts about "Trustworthiness"*

It is contended that the criteria for establishing trustworthiness in this study have been appropriately met. It is fitting, however, to conclude this discussion about trustworthiness with the following statement:

Naturalistic criteria of trustworthiness are open-ended; they can never be satisfied to such an extent that the trustworthiness of the inquiry could be labeled as unassailable....naturalistic inquiry operates as an *open* system; no amount of member checking, triangulation, persistent observation, auditing, or whatever can ever compel; it can at best *persuade*. (Lincoln & Guba, 1985, p. 329)

3.5.3.2 How "Authenticity" was facilitated

Erlandson et al. (1993) provide the following argument for "authenticity":

Trustworthiness is not sufficient as a measure of quality in a naturalistic study....naturalistic inquiry takes its strength from the separate realities that have been constructed by different individuals. These separate realities must be given status in the lives of those individuals, in the contexts in which they operate, and in reports of inquiry....The award of such status is recognized as 'authenticity.' It is the duty of the naturalistic researcher to enable it. (p. 151)

During both cases, the researcher discussed the research topic and emergent themes with the students. At the commencement of both cases, the researcher introduced herself and the explained the nature of the research to the students. As the subject progressed, the researcher interacted with the students and maintained a dialogue with them about their ideas and perceptions about the subject and about the issues that surfaced for the researcher.

3.5.4 QUALITY CRITERIA 3: USEFULNESS OF THE RESEARCH PRODUCT

It is contended that Chapter One and Chapter Two provide a convincing argument about how this study demonstrates "social responsibility" (Reeves, 1996) and "unselfishness" (Lancy, 1993). Furthermore, the research strategy proposed for this study is aimed at "further human understanding" (Barone & Eisner, 1997). In terms of communicating the research results (Shulman, 1997) the researcher has thus far attempted to communicate the findings of this research by publishing and presenting works-in-progress. These are analysis products outlined in Figure 3.1.

3.6 SUMMARY

To summarise, the method of inquiry adopted for this study is a collective case study comprising two cases. The Naturalistic Inquiry paradigm underpins this process of

inquiry. Data collection occurred through participant observation, interviews, and end-of-subject questionnaires. Data analysis involved content analysis of CMC, the identification of themes, and the clustering of themes into categories.

It is contended that this study represents “quality” research for three reasons. Firstly, the research design is congruent with the research focus. Secondly, the study demonstrates rigour through its establishment of trustworthiness and authenticity. The trustworthiness criteria of credibility, transferability, dependability and confirmability were operationalised by conducting the following nine activities: prolonged engagement, persistent observation, triangulation, peer debriefing, negative case analysis, member checks, providing thick description of the two cases, compiling an electronic audit trail stored on CD-ROM, and maintaining a reflexive journal for the entire duration of the study. Authenticity was demonstrated through the open dialogue that occurred between the researcher and the students. Thirdly, the need for this study, which was identified in the first two chapters, suggests that this research represents a useful contribution to the educational technology literature.

4



CASE ONE

EDGA957 — 1996

EDGA957 was a valuable learning experience despite the technical glitches, periodic support problems and communication difficulties. We learnt as much about implementation of technology-based learning through the failed attempts to innovate as we did through the more traditional presentations and reading. There was a very heavy workload and a real danger of cognitive overload in this course. It challenged us to extend ourselves, perhaps unrealistically in terms of our part-time status and work commitments, but we mostly rose to the occasion. (An excerpt from one student's evaluation of the subject)

4.1 INTRODUCTION

The findings from Case One are presented in this chapter. The first section provides contextual background of the case. The second section describes what occurred during the subject and the third section discusses the themes that emerged and the lessons learned from the case.

4.2 CONTEXT

4.2.1 BACKGROUND

Implementation and Evaluation of Technology-Based Learning (subject code: EDGA957) was a postgraduate subject offered by the Graduate School of Education at the University of Wollongong. The aim of the course was to prepare students to implement and evaluate learning in various technology-based learning (TBL) environments.

This subject was introduced in 1995 after a restructure of the Graduate School of Education Information Technology (IT) curriculum. The restructured program offered an introductory core subject, which was designed to address a breadth of issues, followed by a series of subjects that examined educational technology issues in more depth. The introductory core subject was *Information Technology in Education and Training* (subject code: EDGA950), and EDGA957 was one of the elective subjects. Figure 4.1 illustrates where EDGA957 was positioned within the postgraduate IT curriculum.

All subjects offered by the Graduate School were delivered in fourteen-week semesters. There were two semesters per year. EDGA950 was offered in the first session and EDGA957 was offered in the second session.

The instructor for EDGA957, James, was an Associate Professor in the Faculty of Education and a leading local and international expert in the field of evaluation and implementation of technology-based learning. He was responsible for the postgraduate IT curriculum restructure and for the development of EDGA957.

FIGURE 4.1 Subjects offered in the IT strand of the education postgraduate curriculum (Taken from the EDGA950 subject outline)

In 1995, EDGA957 was delivered as a face-to-face subject in two locations. The one instructor attended two classes on separate evenings. One class was held on campus and the other held in Sydney (80kms north from the Wollongong campus). The subject outline for EDGA957 in 1995 is provided in Appendix M.

The Graduate School of Education utilised the University of Wollongong's facility in the Central Business District of Sydney in order to capture a broader graduate student market.

4.2.2 EDGA957 IN 1996

In second semester of 1996, EDGA957 was selected as a pilot study by the university's educational development unit to trial flexible delivery technologies. An educational consultant from this unit was allocated to the pilot to provide

instructional and technical support to the instructor. The educational consultant, Margaret, was also enrolled as a student in the subject as part of her doctoral studies.

The subject was structured so that the two geographically separate classes were held on the same evening. Students attended a three-hour class every Tuesday evening for fourteen weeks. (A two-week semester break occurred between weeks ten and eleven.) The Wollongong class commenced at 4.30pm and the Sydney class commenced at 5.30pm. Interaction between the two sites was facilitated by the use of videoconferencing and a subject Web site. The instructor physically attended each site on successive weeks except in Week 11 when he was absent. In the last week (Week 14) all the students, the instructor and researcher met face-to-face in Sydney.

The Wollongong students met in the Faculty of Education's Interactive Multimedia Laboratory. The videoconferencing facilities were provided in another building on campus, which was a few minutes walk from the lab. The Sydney class met in the computer laboratory situated on the ground floor of the University Centre and videoconferencing sessions were held on the 8th floor. Macintosh computer equipment was provided in the laboratory facilities in each site. Appendix N illustrates the room layout and details the computer facilities provided in each site. Appendix O outlines the videoconferencing facilities of each site.

The educational development unit developed the subject Web site. The educational consultant, a programmer, and a graphic artist made up the development team. The Web site resided on the centre's Macintosh World Wide Web server, which ran WebStar Version 2.0 server software. Two meetings took place between the instructor and the educational consultant before the subject started to discuss the design for the Web site. A preliminary Web site was produced for the first week of the subject. The Home Page consisted of an image map that provided links to information such as the subject outline and reference materials. A computer-mediated communications (CMC) tool was not available in the first week as Margaret and her staff were searching and testing various tools. In the second week of the subject the Web site was revised to include a CMC tool and text hyperlinks were added to the Home Page to enable faster access for low bandwidth modem Internet connections. Figure 4.2 illustrates the subject Web site Home Page.

FIGURE 4.2 Case One: Subject Web site Home Page

The *Aims and Overview* section provided static information about the subject. It mirrored the hard copy subject outline. The *Week-by-Week* space allowed students to access content material presented in class and weekly class agendas. The *Student Profiles* area stored student background information and contact details. Students entered their information and were able to review the details of other students. The *Archives* area provided access to public domain internet software, for example plug-in software, electronic mail software and internet relay chat software. Hyperlinks to external Web sites relevant to the subject content were also available in this area. The *Workspace* area provided access to CMC tools and student Web pages. Several CMC tools were introduced during the subject and those accessible from the *Workspace* area were:

- *Live Chat*—a synchronous non-archive chat facility. (Appendix P provides a description of the tool's features.)
- *Discussion Forum*—a threaded and archived conference system. (Appendix Q provides a snapshot of the interface.)
- *Basic Support for Cooperative Work (BSCW) site*—a collaborative work tool designed for asynchronous use. It enabled the creation of workspaces from which students could exchange messages and share electronic documents such as word processed files, Web pages, etc. (Appendix R provides a snapshot of the interface.)

The *Messages from the Lecturer* was a space where the instructor could post general notices or discussion questions for the class. The *References* area mirrored the references listed in the subject outline and also allowed students to add references by submitting the electronic form that was provided.

Both the instructor and the students (including Margaret—the educational consultant) did not have direct access to the subject Web site. When changes were required to the subject Web site, Margaret informed the computer programmer in her area and he updated the Web site. The instructor would email Margaret with the information he wanted added to the Web site. During the subject, students submitted their Web pages to Margaret to have them stored on the Web site. When students entered their profile information in the first week of the subject, the details were emailed to the programmer who then posted it to the Web site.

4.2.3 SUBJECT DESIGN

The objectives, content structure and assessment requirements for the EDGA957 1996 implementation resembled the 1995 subject offering. The EDGA957 1996 subject outline is provided in Appendix S.

The experimental strategy was outlined in the subject outline as follows:

This subject will take the form of an exploration of a number of methods of technology based learning. As part of the learning process there will be class sessions employing computer mediated communications, World Wide Web interactions and video conferencing....The process itself will be examined to determine the effectiveness of different technologies and the learning outcomes they generate. The instructor will alternate between Sydney and Wollongong and each group will be asked to lead discussion and create activities that establish links between the two sites. As the strategy is experimental, it may be necessary to undertake some additional work outside the normal class time.

For assessment purposes, students were required to complete three tasks.

1. Present a seminar on an agreed topic. (Due: During the subject. Worth 30% of final grade.)

The instructor suggested that this task be conducted as a collaborative exercise between two students, one from each site. The students were to provide the class with a learning experience that linked the two sites for the entire evening. The instructor expected that a Web page about the topic be produced for each seminar and that students giving the seminar would devise their own strategies to structure the learning experience. It was expected that for a graduate

program, students would be able to facilitate a class discussion. Assessment was based on a theoretical paper that was required from each student about the topic they presented.

2. Develop a portfolio of resources relating to implementation and evaluation of TBL relevant to each student. (Due: Last week of subject. Worth 40% of final grade.)
3. Evaluate the implementation of EDGA957 as a TBL project or evaluate an educational software package of their choice. (Due: Last week of subject. Worth 30% of final grade.)

If students chose to evaluate the subject for this assessment task, then they were required to maintain a reflective journal.

The content material was structured so that a new topic was addressed each week. Reading material was provided in the form of a hard copy handbook. The first five weeks of the subject were instructor led and consisted of a review of relevant literature in the form of class discussions. The following nine weeks consisted of student led seminar presentations.

4.2.4 PARTICIPANTS

Fourteen students participated in the subject. There were eight students (six female and two male) in the Wollongong class and six students (all male) in the Sydney class. Eight students were enrolled in the Master of Education program, five were Doctoral students and one student was completing a postgraduate certificate in Education. Two female students from the Wollongong class were international students from non-English speaking backgrounds. Most of the students within each class knew each other from the introductory subject (EDGA950) held in the previous semester. However, students from each site did not know each other.

The use of a subject Web site and CMC tools was a new experience for most students. Apart from one student the use of videoconferencing was also a new experience for all students. Most students knew how to use email and had used the World Wide Web using Netscape® WWW browser software and learnt about Web page production in the introductory subject. Three students had not completed the introductory subject. Two of these three students had little if no previous experience with Web page production. Table 4.1 presents a profile of each student in the Wollongong class. Table 4.2 presents a profile of each student in the Sydney class.

The instructor's theoretical orientation was consistent with the constructivist philosophy. One of the reasons why he selected this subject as a pilot study was that

it allowed students to experience first hand the process of implementation and evaluation. Another reason was that the instructor wanted to experience and evaluate the technologies himself. Although he was well versed with the use of the internet and CMC tools, he had not delivered a subject using a Web site and had not used videoconferencing for teaching.

TABLE 4.1 Case One: Student profile of the Wollongong class			
<i>Student</i>	<i>Age Range</i>	<i>Course Enrolment and Progress Status</i>	<i>Background</i>
Joan	46-50	Doctorate of Education (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Joan worked full-time in the Aboriginal Education Centre at the University of Wollongong. She previously held a position as a lecturer in Mathematics at another university. She was familiar with HTML code and had used email extensively in her teaching. Videoconferencing and the use of CMC tools were new to her.
Mei	20-25	Master of Education in IT and TESOL (Full-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Mei was an overseas student from Taiwan. She completed an Early Childhood program in Taiwan and came to the University of Wollongong to advance her education. Mei was familiar with the internet and production of Web pages from previous subjects. The use of videoconferencing and CMC tools, however, was a new experience for her.
Margaret	40-45	Doctorate of Education (Part-time) Commenced 1 st session, 1996. Did not take EDGA950 in 1 st session, 1996.	Margaret was the educational consultant allocated to this pilot project. She worked full-time at the central educational development unit of the university. She joined the University of Wollongong in 1996 and had previously worked as a consultant for the Department of Education. Margaret was familiar with the internet but had little experience with CMC tools and Web page production. She had not used videoconferencing before although she had worked extensively with teachers using audio conferencing in her previous position.
Martin	30-35	Doctorate of Education (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Martin worked in the Training and Development department of a manufacturing company. He had access to email from his workplace but apart from his exposure to the internet and Web page production in EDGA950, he had little internet experience. Videoconferencing and the use of CMC tools were also new experiences for him.
Mary	46-50	Masters of Education in IT (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Mary was a Computer Based Training Developer for a retail outlet and worked full-time. She returned to formal study after ten years. This form of study was very beneficial for her employment. Apart from her exposure to the internet and Web page production in EDGA950 she had no previous experience with the internet. Videoconferencing and the use of CMC tools were also new experiences for her.
Richard	20-25	Master of Education in IT (Full-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Richard developed Web pages for the Faculty of Education on a part-time basis. He had completed a Bachelor of Education the previous year and decided to continue his studies by enrolling in the Masters program. Richard was experienced with the use of the internet, the use of email and Web page production. He had little experience with videoconferencing and with the specific CMC tools used in the subject.

TABLE 4.1 Case One: Student profile of the Wollongong class			
Robyn	46-50	Doctorate of Education (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Robyn was a secondary schoolteacher. She had little experience with the Macintosh computer platform and apart from her exposure to the internet and Web page production in EDGA950 she had no previous experience with the internet.
Chi	36-45	Postgraduate Certificate in Education (Full-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Chi was an overseas student from China. She worked as a Teacher and Administrator in a College of Education in China. She came to the University to advance her education and employment potential. Chi had been involved with computer and foreign language training for over ten years. Apart from her exposure to the internet and Web page production in EDGA950 she had no previous experience with the internet. Videoconferencing and the use of CMC tools were also new to her.

TABLE 4.2 Case One: Student profile of the Sydney class			
<i>Student</i>	<i>Age Range</i>	<i>Enrolment</i>	<i>Background</i>
Anthony	31-35	Masters of Education in IT (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Anthony worked full-time as an Educational Coordinator for a private language college. He was well versed with the internet, Web page production, email and Internet Relay Chat (IRC) programs. Videoconferencing was a new experience for him and apart from his experience with IRC tools, he had no previous experience with the specific CMC tools introduced in the subject.
Charles	46-50	Masters of Education in IT (Part-time) Commenced 2 nd session, 1996. EDGA957 was his first subject.	Charles worked full-time as a secondary schoolteacher. He was also the computer coordinator at his school. EDGA957 was his first subject in the Masters program. Charles had no knowledge of Web page production and little experience with the use of the internet. The use of a subject Web site and CMC tools were a new experience for him. He had however, experienced videoconferencing before this subject.
David	46-50	PhD in Education (Part-time) Commenced 2 nd session, 1996. EDGA957 was his first subject.	David worked full-time as a Librarian at another university. He was well versed with the internet and use of email due to his occupation. He had, however, little experience with the Macintosh computer platform. EDGA957 was his first subject. David had no previous experience with Web page production, videoconferencing and CMC tools.
Simon	40-45	Masters of Education in IT (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Simon was a designer of mechanical interactives for museums. He attained a diploma in Film and Television and was interested in the development of multimedia. He was not working in paid employment during the subject. Apart from his exposure to Web page production in EDGA950, Simon had no previous experience with the internet, use of email, videoconferencing and the use of CMC tools.
Walter	36-40	Masters of Education in IT (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	Walter worked full-time as an English language teacher for migrants and overseas students. He was interested in the use of multimedia for language teaching. Walter used email at work. Apart from his use of email and his exposure to the internet and Web page production in EDGA950 he had no previous experience with CMC tools and videoconferencing.

TABLE 4.2 Case One: Student profile of the Sydney class			
William	36-40	Masters of Education in IT (Part-time) Commenced 1 st session, 1996. Completed EDGA950 in 1 st session, 1996.	William had changed employment during the subject. His new full-time job involved training and development within the Department of Education. Apart from his exposure to Web page production in EDGA950, William had no previous experience with the internet, use of email, videoconferencing and the use of CMC tools.

4.3 THE PROCESS

4.3.1 INTRODUCTION

Different strategies and different CMC tools were implemented during the subject. The instructor implemented various strategies, and the students themselves created different strategies to provide weekly learning experiences for the class. It is thus appropriate that each week be described as the establishment of interaction differed from week to week. However, due to length, a detailed description of what occurred during Weeks 1, 3, 5, 7, 8, 10, 12, and 13 is provided in this chapter (as they illustrate the key interactions that occurred) and the description for Weeks 2, 4, 6, 9, and 11 is provided in Appendix T. The last week of the subject (Week 14) is excluded because all the students and the instructor met face-to-face in Sydney. A summary including critical incidents is firstly presented followed by the selected weekly descriptions of the subject. All student comments (verbal and online text) are provided verbatim.

4.3.2 SUMMARY

The model that emerged from this subject is depicted in Figure 4.3. It highlights the following features.

- Two of the three pieces of assessable work were due at the end of the semester.
- The assessable task for the seminar presentation was the theoretical paper that was required to be submitted three weeks after the students presented their seminars or by the end of semester, whichever was sooner. Thus, the first assignment was due between Weeks 9 and 14 and therefore some students submitted their first assignment earlier than others.
- New content was delivered each week. The first five weeks were instructor driven and the remaining nine weeks were student driven.
- Apart from one asynchronous online group task that occurred in the early weeks of the subject, online tasks were synchronous and occurred during class time.

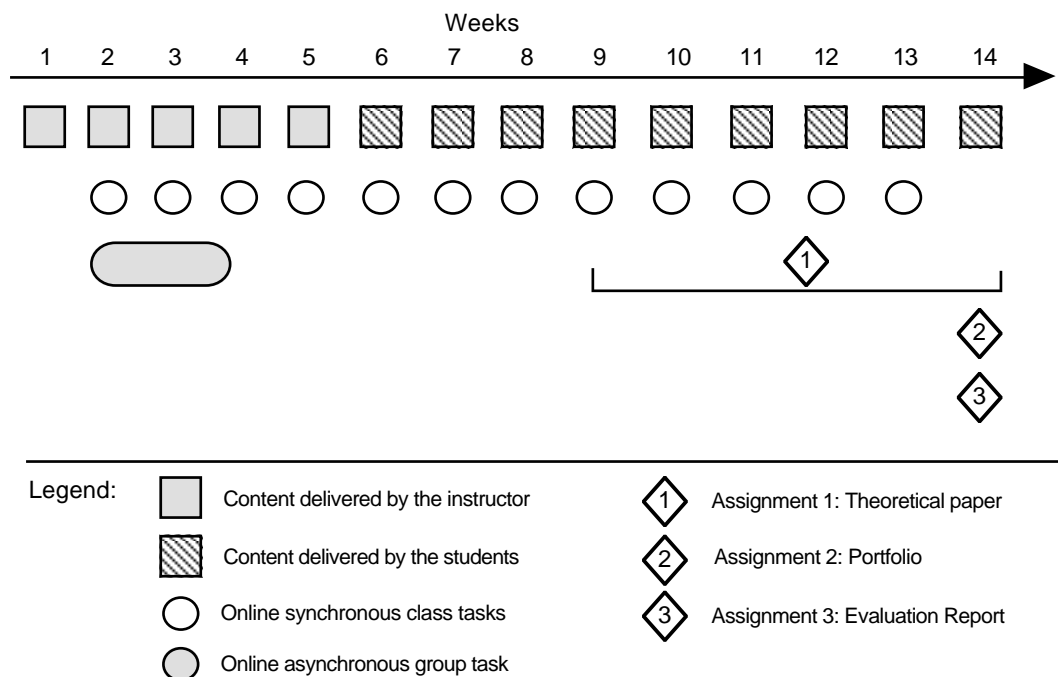


FIGURE 4.3 The model that emerged in Case One

Table 4.3 summarises the combination of tools that were used each week, either during class time or in preparation for the weekly class discussion. The instructor-led weeks were structured as videoconferences followed by an online CMC task. The students implemented different strategies. However, the combination of using a videoconference followed by an online CMC task became a popular delivery strategy.

TABLE 4.3 Case One: Summary of discursive tools used during the subject						
Weeks 1 to 5 — Instructor led weeks						
Week	VC *	BSCW Site	IRCLE	Yak!	Live Chat	Discussion Forum
1	✓					
2	✓	✓				
3	✓	✓	✓			
4	✓			✓		
5	✓				✓	
Weeks 6 to 13 — Student led weeks						
Week	VC *	BSCW Site	IRCLE	Yak!	Live Chat	Discussion Forum
6					✓	
7	✓	✓			✓	
8	✓				✓	
9					✓	
10		✓			✓	✓
11	✓					✓
12	✓				✓	✓
13	✓	✓			✓	✓

* Videoconferencing

Email was also used during the subject. It became a popular communicative medium among students and between students and the instructor.

The critical incidents that influenced student interaction during the subject are summarised in Table 4.4.

TABLE 4.4 Case One: Critical incidents that influenced student interaction	
Weeks 1 to 5 — Instructor led weeks	
<i>Week</i>	<i>Incident</i>
1	<p>The two geographically separate classes agreed to commence at different times. From Week 2, the Wollongong class met from 4.30 - 7.30pm and the Sydney class met from 5.30-8.30pm. The students in the Wollongong class were accustomed to starting at 4.30pm. The Sydney students preferred to start at 5.30pm due to work commitments and traffic delays entering the city.</p> <p>William and Robyn were not present for the first class and thus missed out on information regarding the subject delivery and assessment requirements, which was verbally presented in the videoconference.</p>
2	<p>The BSCW site was introduced to the class and was used for the online asynchronous group task. Students had to learn how to use the tool themselves.</p> <p>Charles, Robyn and William did not have an operating email account and internet access outside class time which meant they could not participate in the online asynchronous group task using the BSCW site.</p> <p>Several students from the Wollongong class physically met several students from the Sydney class at a Graduate School of Education function.</p>
3	An Internet Relay Chat program called IRCLE was introduced in class. The Wollongong students installed it successfully in class and conducted an online discussion among themselves. The Sydney students were unable to install it successfully and thus online interaction between the two sites did not occur.
4	A synchronous CMC tool called Yak! was trialed in class. Both sites were able to interact online only for a few minutes as the software program crashed.
5	A synchronous CMC tool called Live Chat was introduced. For the first time both sites were able to interact online.
Weeks 6 to 14 — Student led weeks	
<i>Week</i>	<i>Incident</i>
6	The two sites interacted using the Live Chat tool. The Wollongong students commenced the online synchronous discussion before the Sydney students. This resulted in the Sydney students experiencing difficulty in participating in the online discussion.
7	Due to the slow access students experienced when using the BSCW German site, Margaret downloaded the BSCW site to a local WWW server.
8	Charles requested that the class exercise more online "order" when using the Live Chat tool. A scribe from each site was nominated to post messages in the Live Chat space.
9	<p>The University of Wollongong Microsoft Mail system crashed on the day of class. This resulted in Walter not being able to present his seminar. He had emailed his Web page to Margaret in the afternoon of class but Margaret did not receive the email in time.</p> <p>The Discussion Forum CMC tool was added to the subject Web site at the end of Week 9.</p>
10	Margaret was unable to attend class but participated in an online synchronous class discussion from a remote site.
11	The instructor was absent from class and suggested that an asynchronous discussion be organised due to his absence. The students delivering the seminar (David and Robyn), however, opted for a synchronous approach.
12	Mary was unable to attend class but participated in an online synchronous class discussion from home.

4.3.3 THE WEEKLY CHRONICLE

4.3.3.1 Summary of strategies employed

Table 4.5 summarises the strategies implemented by the instructor and the tools used in the first five weeks of the subject.

TABLE 4.5 Case One: Strategy and tools used by the instructor in the first five weeks of the subject				
<i>Week</i>	<i>Theme of the weekly session</i>	<i>Instructor Attendance</i>	<i>Tools used</i>	<i>Strategy</i>
1	"Introductions"	Sydney class	Videoconference with PowerPoint slides	A two-hour videoconference was scheduled to introduce the subject to the class.
2	"The start of an online asynchronous group task"	Wollongong class	Videoconference BSCW Site	A one-hour videoconference was conducted to discuss a task to be conducted in small groups using the BSCW Site. Students began the task after the videoconference.
3	"Student frustration begins to surface"	Sydney class	Videoconference IRCLE	A one-hour videoconference was used to continue class discussion about the group task. The Internet Relay Chat software program: IRCLE was trialed after the videoconference.
4	"The Successmaker Group Presentations"	Wollongong class	Videoconference Yak!	The four student groups presented their group task in a one-hour videoconference. The CMC tool: Yak! was used to discuss a separate task.
5	"A synchronous chat tool that finally works!"	Sydney class	Videoconference Live Chat	A one-hour videoconference was used to discuss a reading from the students' handbook. This discussion continued after the videoconference in the Live Chat space.

Students presented their seminars in the remaining nine weeks of class. During these weeks the instructor assumed the role of "guide on the side". At the end of each seminar, the instructor usually facilitated a "debrief" session in the class he physically attended to reflect on the content and the process of the evening. Table 4.6 summarises the strategies employed by the students and the tools the students used.

TABLE 4.6 Case One: Strategies and tools used by students to provide the class with a learning experience					
<i>Week</i>	<i>Theme of the weekly session</i>	<i>Instructor Attendance</i>	<i>Seminar Presenter(s)</i>	<i>Tools used</i>	<i>Strategy</i>
6	"The entire evening delivered online—Chi's Live Chat session"	Wollongong class	Chi	Web page Live Chat	<p>A Web page provided the class with content and questions to consider.</p> <p>Students addressed three questions in an online synchronous class discussion using the Live Chat tool.</p> <p>Both Chi and the instructor facilitated the online synchronous discussion.</p>
7	"The Martin and Simon Show"	Sydney class	Martin and Simon	BSCW Workspace Videoconference with PowerPoint slides Web page Live Chat	<p>A BSCW workspace was created one week before the seminar for student input about the topic.</p> <p>A 30-minute videoconference was conducted to present the topic.</p> <p>A Web page provided additional content material, as well as summarised student input from the BSCW workspace, and an explanation of the online task.</p> <p>Students were to address one question using the Live Chat tool. Students from both sites formed two groups and each group participated in an online synchronous discussion with a group from the other site. A group name was used to differentiate messages in the Live Chat space. Martin and Simon both facilitated the online group discussions.</p> <p>A face-to-face session in each site concluded the evening.</p>
8	"Charles requests more online ORDER!"	Wollongong class	Joan and Charles	Videoconference with Powerpoint slides Web page Live Chat	<p>The topic and task for the evening was presented in a 50-minute videoconference.</p> <p>A Web page mirrored the content presented in the videoconference.</p> <p>A face-to-face activity was conducted in each site. Communication between the two sites occurred in the Live Chat space via two "online scribes".</p>

TABLE 4.6 Case One: Strategies and tools used by students to provide the class with a learning experience					
9	"Not all goes according to plan for Walter"	Sydney class	Mei and Walter	BSCW Site Email Web page Live Chat	Walter wanted to use the Live Chat tool to broadcast instructions to the class. He wanted to direct the class to several electronic resources and then facilitate an online synchronous discussion about these resources in the Live Chat space. Mei and Walter produced separate Web pages.
10	"Mary uses a new CMC tool—Discussion Forum"	Wollongong class	Mary	BSCW Site Web page Email Discussion Forum Live Chat	A Web page provided the class with content and a case study to consider. Email was used to inform students about the structure of the online task. Students in each site were to form small groups and post their answers about the case into a discussion thread that Mary had created in the Discussion Forum. It was intended that the Live Chat space be used for off - task discourse.
11	"David and Robyn opt for a synchronous approach"	Absent	David and Robyn	Email Videoconference with PowerPoint slides Web page Discussion Forum	The topic was presented to the class as a 40-minute videoconference. Robyn and David produced separate Web pages. The Web pages mirrored the content presented in the videoconference. David's Web page outlined a case study that the class was to discuss. Three discussion threads were created in the Discussion Forum and students from both sites were to form three groups and discuss the case study in one of the three discussion threads provided.

TABLE 4.6 Case One: Strategies and tools used by students to provide the class with a learning experience					
12	"Margaret demonstrates planning, organisation and structure"	Sydney class	Margaret	<p>Videoconference with PowerPoint slides</p> <p>Web page</p> <p>Live Chat</p> <p>Discussion Forum</p>	<p>The topic was presented to the class as a 50-minute videoconference.</p> <p>A Web page provided additional content material and described three case studies.</p> <p>One discussion thread for each case study was created in the Discussion Forum. Students from each site were allocated to a discussion thread and participated in an online synchronous discussion on their particular case study.</p> <p>The Live Chat space was used to summarise the group discussions.</p>
13	"It felt like one class in the video-conference"	Wollongong class	Anthony and Richard	<p>BSCW Site</p> <p>Videoconference with PowerPoint slides</p> <p>Web page</p> <p>Live Chat</p> <p>Discussion Forum</p>	<p>A one-hour videoconference was conducted to present the content.</p> <p>A Web page outlined the content presented in the videoconference and described a case study.</p> <p>A BSCW workspace provided links to external Web sites relevant to the topic.</p> <p>Three discussion threads were created in the Discussion Forum. Students from each site were allocated to a discussion thread and participated in an online synchronous discussion about the case study.</p> <p>It was intended that the Live Chat space be used for off - task discourse.</p>
14	"The entire class met face-to-face"	Sydney	William		All the students met face-to-face in Sydney at William's workplace. William demonstrated several educational technology products produced by his organisation.

The details of what occurred during Weeks 1, 3, 5, 7, 8, 10, 12, and 13 in terms of the interactions established among the participants are presented as follows.

4.3.3.2 Week 1: Introductions

4.3.3.2.1 Context

The instructor structured the first class as a two-hour videoconference to introduce the subject and explain how videoconferencing and a subject Web site would be used to communicate between the two sites during the semester.

The instructor managed the videoconference from the Sydney site and Margaret managed the videoconference from the Wollongong site. They were briefly shown how to use the PictureTel system before the videoconference. The technical officer on campus showed Margaret how to establish a connection with a remote site and explained features such as panning, zooming, setting the mute function, storing preset camera positions, and displaying graphics from the connected Macintosh computer. The University Centre Manager in Sydney provided the instructor with a similar briefing. Margaret established the link with the Sydney site. The instructor had sent Margaret a PowerPoint presentation via email the day before class and Margaret operated the PowerPoint slides during the videoconference.

Simon's reflection of this first videoconference sets the scene.

The two groups assembled at their respective locations, and sat, rather awkwardly, in anticipation of the live link-up. Before us were two large monitors. Monitor One displayed our own panel seated at a V shaped table. Prof. [Instructor] sat at the apex, furthest from the camera....Monitor One was also used to display Power Point lecture notes....Monitor Two showed the Wollongong Panel. Both parties waited for late comers to arrive. The Wollongong group appeared somewhat 'stuffed' or inanimate (as no doubt we did....We could ignore them without any sense of exclusion. The session began with a formal introduction...and was followed by...personal introductions....This took place reasonably smoothly but was punctuated with lighthearted moments as the operators of the remote camera controllers struggled with the unfamiliar interface. This became a familiar feature of the 2 hr. session. A course outline, assessment criteria and collaborative projects were explained by Prof. [Instructor] who invited questions along the way. The evening concluded with a promise of further sessions, the next being chaired by Prof.[Instructor] from Wollongong. Our first experience of real time distance education. (Simon, Reflective Journal, Week 1)

4.3.3.2.2 Highlights

The interaction that occurred during the videoconference: Little interaction transpired in the first videoconference. An example of a "light hearted" moment that Simon referred to occurred when David introduced himself. The instructor had positioned the camera to the right side of the room where Simon and David were seated and he was thus not visible on camera. The instructor then pointed his finger over David's head and said: "The last person at this end is David. He's this person." Several students from the Wollongong class began to laugh as Simon,

David and instructor's pointed hand above David's head was all that could be seen on the monitor. The instructor hearing the giggles responded by saying: "I'll get used to this camera driving. Next week by the way...these guys sitting around the table will be driving this end and I'll be down the other end..."

The following vignette is a sample from the second hour of the videoconference. It illustrates some of the interaction that took place and how the PictureTel system was used.

The instructor discussed the fourth slide and had the camera positioned on himself. From the Wollongong site, only Richard, Mary and Joan were in camera view. The instructor spent two minutes explaining the concept of the slide and then asked for any comments. Simon asked a question (the instructor used the preset to position Simon on the screen and then zoomed in on him). The instructor then positioned the camera on himself and answered Simon's question. David then asked a question (the instructor used the preset camera position to bring him into view). David, whilst speaking looked mostly at the camera and looked to the instructor occasionally. He moved forward in his chair when he spoke. The instructor asked the class if there were any comments. He asked the question without moving the camera onto himself. The camera was positioned on Simon and David. The instructor then specifically addressed the Wollongong site with a question (he positioned the camera back onto himself). After a brief pause, Mary from the Wollongong site responded. After a few seconds that Mary started talking, Margaret zoomed in on Mary so she was the only one in view of the camera. Mary spoke about her experience at work. The instructor then asked Mary a question. The instructor and Mary were the only two visible on the monitors. Their discussion continued for three minutes. Margaret then moved the camera to the preset position with Richard, Mary and Joan in view. The instructor moved the camera to his preset position to view the Sydney class and said: "Just to show you that we're all still here and awake!" Margaret replied: "You might notice that we're not." The Wollongong class laughed. (Videoconference transcript, Week 1)

The review of this first videoconference by Mary and Margaret is provided below.

Confusion reigns. I'm not at all sure how we are going to achieve all this, and I get the impression that no one else is either. But time will tell. We have been given a number of readings for discussion...I am beginning to think this might be an "eye opening" subject. (Mary, Reflective Journal, Week 1)

Initially (Week 1) the interaction was quite stilted. Some students did not speak and were embarrassed to see themselves on the screen. After the videoconference a number of students indicated they found it difficult to follow the discourse. Students who spoke English as a second language had found the discussion particularly unclear and did not understand the assignments. (Margaret, Evaluation Assignment)

4.3.3.3 Week 3: Student frustration begins to surface

4.3.3.3.1 Context

The instructor attended the Sydney class and the one-hour videoconference focused on the Successmaker task. The Wollongong students met in the lab one hour before the videoconference. In response to the instructor's request to find a CMC tool that facilitated synchronous discussion Margaret had found an Internet Relay Chat program called IRCLE. She used the time before the videoconference to show students how to install it on the Macintosh computers and explain how it worked.

During the videoconference, the instructor discussed the Successmaker task and allocated a number of readings for students to complete for the following week. Students from the Wollongong class expressed concern over the amount of work required for the following week. Due to several students not having access to the BSCW site, the four student groups for the Successmaker task were reallocated.

After the videoconference the Sydney and Wollongong class attempted to communicate using IRCLE.

4.3.3.3.2 Highlights

The interaction that occurred during the videoconference: Richard controlled the Wollongong site and Anthony controlled the Sydney site. (Margaret showed Richard how to use the keypad a few minutes before the videoconference started.) The videoconference ran quite smoothly. Anthony was diligent in his use of the videoconferencing keypad. For example, when someone spoke he ensured they were in camera view and when the person finished speaking he positioned the camera to view the entire Sydney class. He also controlled the PowerPoint slides for the instructor. Robert, being his first time, managed quite well. For the first time, the "them and us" group structure was not as obvious as in previous weeks. It felt like one class. The following excerpt, taken from the videoconferencing transcript and fieldnotes, provides a sample of the interaction that occurred.

When the instructor had asked a question, someone from Wollongong responded. The instructor then said: "Come on guys", referring to the Sydney group. Mary and some of the Sydney students then responded. The instructor asked another question and Richard and Margaret responded (although they were not seen on camera). The camera is focused on the instructor in Sydney and on Mei, Mary and Joan in the Wollongong class. It feels like one class tonight. Joan interjected with a comment about Successmaker. The only restriction is that when someone interrupts, they usually have to repeat themselves as their initial comment was not heard. Even Robyn wanted to ask a question. She called out James but he didn't hear her. She didn't ask again. Everyone seems to be involved. Although Chi and Mei are not saying anything they still are involved. The instructor is facilitating the discussion

but is not waiting silent pauses for feedback as in the past two weeks. Perhaps this has occurred because students are more prepared, that is, they have started to work on the exercise so they know what the instructor is talking about. Richard moved the camera over to Mary, Joan and Martin. Richard made a comment and made sure the camera was focused on him when he spoke. After he finished he then focused the camera onto the middle preset - Mei, Mary, Joan. Then Charles made a comment and looked at the instructor while making his comment. Anthony moved the camera onto Charles. The instructor then asked: "Did everybody get that?" Margaret replied no. The instructor briefly summarised the comment. Then Joan added a comment. The discussion seems to be flowing quite well. It's now 22 minutes into the VC. (Videoconferencing transcript and fieldnotes, Week 3)

Students were confident to ask questions and make comments than in previous weeks. Everyone seemed to be engaged in the discussion. For the first time, students even asked other students questions without requesting "permission to speak" from the instructor. Anthony's reflection of the videoconference is provided below.

The PictureTel conference went much more smoothly, this could be due to a number of factors:

1. Lecturer present delivering Learner- centred discussion from our end.
2. Discussion members' familiarity with the medium and the requirements of the discourse.

Being the controller of the conference and taking part at the same time proved to be challenging. It was hard to keep track of each level of activity, ie, contributing, listening, watching the other group and controlling the camera to zoom onto the group members as appropriate. (Anthony, Reflective Journal, Week 3)

Frustration surfaced over the Successmaker task and the seminar presentation: At the beginning of the videoconference, the instructor discussed the seminar presentation task. He said: "Several of you have indicated a certain degree of concern about how that actually will work." He suggested that everyone select a topic of their choice and the collaboration with the other student at the other site would involve deciding what aspect of the content each student was to present. He expected that each seminar be accompanied with a Web page. The instructor assumed that all the students knew how to produce a simple Web page.

In the videoconference, the instructor outlined a number of articles that he wanted students to read for the following week. When he explained what he wanted students to do, several students from the Wollongong class became distressed as to the amount of work that was required for the following week. Richard exclaimed: "Oh my God!" and Mary added: "That's for next week?!"

Margaret expressed concern about the Successmaker task because two members in her group did not have email addresses and thus were unable to use the BSCW site.

After the videoconference, Joan mentioned to the Wollongong class that she was considering withdrawing from subject.

Only the Wollongong class used IRCLE: A specific task was not assigned. The Wollongong students posted messages in IRCLE about the Successmaker task. The following sample illustrates the frustration students were experiencing.

Richard: Does anyone know what to do about this task for next week?
Mary: Which one of the mountains is that?
Richard: The presentation
Mary: I could tell you that if I could make contact with the other people in my group.
Richard: Could we just not do it as it's worth nothing?
Mary: That's a thought.
(IRCLE transcript, Week 3)

The Sydney students were not able to interact with the Wollongong students using IRCLE. Reflections of the evening provided by Anthony and Mary summarise what occurred.

Started using Ircle tonight. What a fiasco!! Not very satisfactory. The Sydney group are still having problems getting on. We had intruders entering the space and jamming the works. Not a technology I would want to use for training.
Conclusion: Implementation lesson for tonight - when using a new technology, make sure it works first! Trying to use Ircle was so frustrating, more so for the Sydney guys as they just couldn't get it going.
(Mary, Reflective Journal, Week 3)

Collaborative group interaction in the lab still didn't work very well due to :

- a) lack of members having a direct e-mail connection in the lab.
- b) lack of Ircle IRC program being set up and clear directions to each member to have it set up before the session so that time was not wasted trying to download it etc.
- c) confusion of members over how to join the BSCW site and to access their respective group work spaces.
- d) the speed of the network and the speed of the BSCW site did not help the overall dynamic of the group.
- e) we resorted to phone contact between the two groups to communicate problems in setting up.

(Anthony, Reflective Journal, Week 3)

The Successmaker online collaborative task was a challenge: The student groups were re-allocated as follows:

Group A: Joan, Martin, Margaret, Anthony, Simon and William

Group B: Richard, Robyn, Charles and Walter

Group C: Mary, Mei, Chi, David and researcher

Group A used email and a BSCW workspace to interact with each other. Nine messages were posted in their BSCW workspace. The last message was posted by Martin and read as follows:

Gang, I'm frustrated beyond wildest belief!!! This technology doodah doesn't seem to be a happening thing. Joan and I have considered the easiest option which seems to be good old fashioned face-to-face discussion!
I've just read the Email's and I'll be meeting with Joan at her place on Monday 7:00pm. I hope if you guys are free we can all get together or at least we'll set up a chat space that night.
Joan and I have had a bit of a discussion already and have some ideas.
Anyway, hope to catch up with you guys soon, MARTIN
(Martin, BSCW Workspace, Week 3)

The group met at Joan's house the night before class to work on their proposal. William did not participate in the task.

In Group B, the Wollongong students did not collaborate with the two Sydney students. Richard said he did not receive any response from Charles or Walter so he worked on the task with Robyn face-to-face.

Walter and Charles collaborated with each other via email. After the task was completed, they told the researcher that their collaborative effort was not a success. Their feedback is provided below.

I was unable to convince Charles that he was looking at the topic in completely the wrong way. He wanted to talk about Successmaker as a package, rather than generate a plan for evaluating it. I ended up surrendering the whole thing to his viewpoint. This was an excellent example of how teams sometimes don't work.
(Walter, Email, Week 10)

I have done a lot of collaborative stuff and come unstruck twice. It has not worked for me. Unless it's marked they do not collaborate....I've done a lot of work and no ones knows about it the other half did not delevier. did nothing.
(Charles, Email, Week 10)

Group C used email to collaborate on the task. Email was used synchronously on several evenings. Mary became the leader of the group. Chi and Mei did not have access to email off campus thus they did not participate in the online synchronous email discussion that took place between Mary and David in the evenings. David found the exercise extremely frustrating. He said it was difficult to collaborate via email.

4.3.3.4 Week 5: A synchronous chat tool that finally works!

4.3.3.4.1 Context

A synchronous CMC tool called *Live Chat* was introduced to the class. The instructor attended the Sydney class and a one-hour videoconference was used to discuss a reading from the students' handbook. The discussion about the reading continued after the videoconference in the Live Chat space. The Wollongong students met in the lab one hour before the videoconference and chatted among themselves. Joan attended the Sydney class this week.

The instructor posed three questions to the class about the article students had read. Two questions were addressed in the videoconference and the third question was addressed after the videoconference in the Live Chat space. The question was: What advice would you give to a new distance education provider who is starting from scratch?

4.3.3.4.2 Highlights

The interaction that occurred during the videoconference: The videoconference ran relatively smoothly although "participants still needed practice in turn taking and dialogue collisions were still frequent." (Anthony, Reflective Journal, Week 5) Most of the students had read the article and both sites participated in a class discussion. The "them and us" feel to the interaction was not as apparent as in previous weeks.

The interaction that occurred in the Live Chat space: All the students were enthusiastic to try this new CMC tool and they hoped that it would work. It did! And the pace of the messages posted was fast. Margaret commented during the online discussion that she "can't even keep up reading it!" The Wollongong students participated in the live chat session individually, that is, they each used a computer and typed their own message. Margaret, Chi, Martin, Richard and Robyn sat next to each other. Mei sat on the other side of the room. There was little face-to-face talk in the lab. Everyone was busy typing messages. There was the occasional giggle or laugh when someone sent a humorous message.

This was the first time that both sites were engaged in one online synchronous discussion. The online discussion lasted for approximately one hour.

The following incidents occurred during the online synchronous discussion:

- Students entered the Live Chat space at different times.
- Multiple threads of conversation occurred.
- Many students directed messages specifically to other students.
- Many messages posted were not related to the task and several students posted flippant messages. For example, at 7.07pm, Margaret verbally stated to the Wollongong students: “Can we start discussing the serious stuff please. I have to go shortly”. Richard verbally responded: “Well, I have been trying to”. William used different online aliases such as “Wheat man”, “Polly girl” and “Polly Waffle” and was responsible for many flippant and off-task messages posted.
- Some students were unclear as to what was supposed to be discussed.
- Spelling and grammatical errors were apparent in the discourse.
- There was no moderator assigned to the online discussion.
- Mei stopped participating in the online discussion at 7.10pm and worked on another subject. Mei experienced difficulty following the dialogue after such a long period. (She had been noted to review a dictionary sometimes to identify word meanings.)
- The online synchronous discussion did not “formally” conclude. Instead, the discussion just “fizzled”. For example, at 7.30pm, most of the Wollongong students had left and Joan informed the remaining Wollongong students that the Sydney class was having a face-to-face discussion with the instructor.

The following two excerpts from the Live Chat discourse illustrate these incidents in this first online synchronous class discussion.

Excerpt 4.1 illustrates eight minutes of online discourse. This excerpt represents the online discourse that occurred approximately 10 minutes after the online discussion commenced.

Richard - 08/13/96:18:55:	Does anyone have anything to contribute to what we are supposed to be discussing?
Wheat man - 08/13/96:18:55:	read richard
Chi - 08/13/96:18:55:	Hello, everyone!
Anthony - 08/13/96:18:55:	The is a need for technical support and phone help desk support
Wheat man - 08/13/96:18:55:	hi sue
Martin - 08/13/96:18:55:	Gang, it looks (sounds?) like chaos theory to me
Wheat man - 08/13/96:18:55:	Chi boy girl?
CHARLES - 08/13/96:18:55:	An expert provider, installer, does the lot all you do is turn the key or power
Richard - 08/13/96:18:56:	I'm not Wheat man, I suggest it might by Simon?
Joan - 08/13/96:18:56:	Martin I stuffed up a bit about tomorrow. I am actually lecturing at the time I arranged to meet with the EMS people. Will you and Linda still go or should I change to another time.
Wheat man - 08/13/96:18:56:	It's always sunny in the wheat belt

Anthony & David - 08/13/96:18:56: What issue was that Joan?
 Martin - 08/13/96:18:56: Who is Bundy Bear?
 Mei - 08/13/96:18:57: Hi! everyone!
 Chi - 08/13/96:18:57: Who is Wheat man?
 Joan - 08/13/96:18:57: Really important stuff Anthony so never you mind.
 Richard - 08/13/96:18:57: IS James supervising you lot up there, or does he just want us to play.
 Martin - 08/13/96:18:57: Simon my email address is [address provided]
 Walter - 08/13/96:18:57: Yes, Richard, James is here
 Joan - 08/13/96:18:58: He can't get on yet so ...while the cat's away....
 Anthony & David - 08/13/96:18:58: It is important to match the tech/medium with the content and methodology.
 Richard - 08/13/96:18:59: Some content though is presented differently by different teachers, so it may need to reflect the teachers teaching style as much, if not more than the content.
 Martin - 08/13/96:18:59: Joan, I think I can still go tomorrow. I'll need to contact Linda though to check
 Chi - 08/13/96:18:59: James, When would you like to talk to me tomorrow? I will be in room 102, Bld 23.
 Martin - 08/13/96:18:59: Joan, I'll probably email you by tomorrow about tomorrow!
 Anthony & David - 08/13/96:19:00: It is important that istit. Relise that dist ed is not a cheap mode of instruction, it needs to built into the inst. strategic planning with approp resources devoted to the info structure
 Joan - 08/13/96:19:00: Chi James says you can come to his office at 11.00?
 Martin - 08/13/96:19:00: Simon I'll try and email you tomorrow to touch base about the presentation
 Martin - 08/13/96:19:01: Who is Chi James?
 Chi - 08/13/96:19:01: OK, I will be there at 11:00.
 Polly girl - 08/13/96:19:01: HI all are you guys from Australia?
 Richard - 08/13/96:19:02: And training for staff, which is another cost, of course.
 Polly Waffle - 08/13/96:19:02: I'm not!
 Polly girl - 08/13/96:19:02: Pw where are you from
 James - 08/13/96:19:02: Margaret, Have you got my email? Some of the comments here should be on email.
 Mei - 08/13/96:19:02: is anyone also do the presentation about "interface" on week 9 ?
 Polly Waffle - 08/13/96:19:02: Lithuania
 Polly girl - 08/13/96:19:02: Is it cold
 Mei - 08/13/96:19:02: Who are you?
 Walter - 08/13/96:19:03: Yes, Mei, I am. We can talk a bit more about that later.

EXCERPT 4.1 Synchronous Live Chat online discussion conducted in Week 5

Excerpt 4.2 illustrates five minutes of discourse. This excerpt represents the online discourse that occurred approximately 20 minutes after the online discussion commenced.

Anthony & Simon - 08/13/96:19:09: We are discusted with the lot of you talk on the topic or else
 Richard - 08/13/96:19:10: Now its gone from the frame
 Martin - 08/13/96:19:10: Has anybody considered James's questions?
 CHARLES - 08/13/96:19:10: Hay guys say on task and discuss the topic
 Simon - 08/13/96:19:11: William has been adopting several personas. FLAME HIM
 Polly girl - 08/13/96:19:11: Who is wheat man?
 Polly Waffle - 08/13/96:19:11: Wheat man?
 Anthony & David - 08/13/96:19:11: Wheat man is showing us how to hijack someone's name and make other comments..a problem in this format but not on irc we you can't use another persons nickname
 David - 08/13/96:19:11: If an institution is to go into distance education it must be built into the overall strategic plan.This will ensure that it is seen as a

	major component of the institution's activities and appropriately resourced.
Chi - 08/13/96:19:12:	What topic which relate to the course are we going to talk tonight, Joan?
Richard - 08/13/96:19:12:	Yes, I agree, but what sought of things do they need to consider in setting up those resources?
Polly girl - 08/13/96:19:12:	Yes unfortunately they need to agree on a system then implement it. This could take time in a bearacracy byt he time they implement it could be defunct
David - 08/13/96:19:12:	The resource commitment is essential to fund appropriate technological infrastructure and technical/pedagogical support for students and teachers.
Martin - 08/13/96:19:12:	David. I agree. They should spend considerable time discussing its role - and not over emphasise it
Margaret - 08/13/96:19:13:	Anthony we've got a few guesses now as to who you are
Martin - 08/13/96:19:13:	Support and education for both teachers and students is essential
Simon - 08/13/96:19:13:	Mark-Merle Conyer- has an article in Australian Journal of Educational Technology
Joan - 08/13/96:19:14:	Chi we are talking about advice to give someone starting in distance education
Martin - 08/13/96:19:14:	Simon, do you have it?
Anthony & David - 08/13/96:19:14:	this is the original Anthony that was trying to be task focused!

EXCERPT 4.2 Synchronous Live Chat online discussion conducted in Week 5

4.3.3.5 Week 7: The Martin and Simon Show

4.3.3.5.1 Context

Martin and Simon worked together on the topic: User and Usability Testing and they chose to focus on the usability of videoconferencing technology.

One week prior to their seminar, Martin and Simon created a BSCW workspace to ask for student feedback about videoconferencing. The question read:

We would like your general impressions or strong reactions to the use of Video Conferencing over the last 6 weeks of the course. Consult your journals, and before FRIDAY 23 rd write 1 or 2 short paragraphs in this workspace. We will be examining your responses as part of our presentation next week. Thanks for your help.

You are contributing to the good of humanity and life as we know it
MARTIN & SIMON
(BSCW Workspace, Week 6)

Simon produced a Web page that provided content material, a summary of student feedback from the BSCW workspace and detailed instructions about an online task that Martin and Simon wanted students to conduct in class.

The instructor attended the Sydney class. Martin and Simon scheduled a 30-minute videoconference to introduce the topic to the class. After the videoconference, all the students read the task from the Web page and entered Live Chat space. The online task involved forming two groups in each site and engaging in an online

synchronous discussion. The two groups in the Sydney class were referred to in the Live Chat space as *MUNSTERS* and *SIMPSONS* (upper case) and the two groups in the Wollongong class were identified as *munsters* and *simpsons* (lower case). Students were required to work collaboratively with their corresponding remote group on an assigned question. The instructor also was a member of a group and took part in the online discussion. The questions were provided in the Web page as follows:

“How useful is this [referring to the student feedback requested in the BSCW workspace prior to the seminar] as a method of data gathering. Would the questions change if the context was different.” (MUNSTERS in Sydney) & (munsters in Wollongong)

“You are an Expert Reviewer. Generate three specific questions you might ask novice users of Video Conferencing. Assume the context is similar to our own.” (SIMPSONS in Sydney) & (simpsons in Wollongong)

The online discussion took place for approximately 40 minutes. Martin and Simon facilitated a face-to-face discussion in their respective site for half an hour followed by another 15 minutes of online discussion. When the Wollongong students left for the evening, the Sydney students continued a face-to-face discussion with the instructor.

Several extensive excerpts are provided to illustrate the interaction that occurred, and illustrate student perceptions about the use of videoconferencing and CMC tools in this subject.

4.3.3.5.2 Highlights

Before the videoconference: The Wollongong students chatted informally among themselves in the lab while Martin conversed in the Live Chat space with Simon. Simon had arrived early to class to make final preparations for their seminar presentation. Joan, Mary and Robyn posted messages in the Live Chat space to make contact with their respective collaborative partners for their seminar presentation.

The interaction that occurred during the videoconference: William operated the Sydney site and Chi operated the Wollongong site. Martin and Simon presented content for the entire videoconference. The camera at the Wollongong site was focused on Martin and the camera at the Sydney site was focused on Simon for most of the videoconference. Although the students from the Wollongong site could not see the students at the Sydney site it did feel like one class. The presentation style worked well. Little interaction minimised confusion and little movement of the camera allowed the presentation to flow. Joan commented after the videoconference

that it was the first time she was able to concentrate on the content. It felt like one community.

The Live Chat Munsters and Simpsons online task: Three samples of Live Chat discourse are provided to illustrate the issues that surface from the online task.

Excerpt 4.3 illustrated five minutes of discourse. It represents the start of the online discourse. The following contextual factors set the scene.

- Not all the students start the task at the same time.
- Shelley is an Associate Professor in Education from another university that accessed the Live Chat space from a remote site.
- William and Mary posted messages that were not related to the task. This annoyed Simon (who responded as Simpson Bart).
- Mei and Chi worked together and were very enthusiastic to contribute to the online discussion.
- Note the Munsters task is ambiguous and open to interpretation.
- Spelling and grammatical errors characterise the discourse.

Shelley - 08/27/96:18:16:	Has anyone been following the discussions on the Virtual University in the virtual conference?
Martin - 08/27/96:18:21:	Simon are you there?
Shelley - 08/27/96:18:22:	It seems it's just me here at present
Martin - 08/27/96:18:22:	Simon!
Martin - 08/27/96:18:22:	hello Shelley. How are you
MUNSTER W - 08/27/96:18:22:	Well fellow munsters are you there?
Martin - 08/27/96:18:22:	munsters are here
Shelley - 08/27/96:18:23:	Quite well ... although suffering tired eye syndrome, since I've been here since 6.30am
MUNSTER 1 in Sydney - 08/27/96:18:23:	Try the background paper about useability!
SIMPSON W - 08/27/96:18:23:	Hey simpsons are you there?
Martin - 08/27/96:18:23:	what backgorund paper?
Richard - 08/27/96:18:23:	Shelley - where is the virtual Uni discussion?
Mei & Chi - 08/27/96:18:23:	What a exciting presentation it is!
William - 08/27/96:18:24:	Mary are you in wool?
MUNSTER 1 in Sydney - 08/27/96:18:24:	Our question is how useful is the Videoconferencing as a method data gathering?
Martin - 08/27/96:18:24:	Ziggy we'll start the web presentation in about 5 mins
Shelley - 08/27/96:18:24:	The URL is http://www2.openweb.net.au/TT96University/ ... you can see the discussion by going in to digest
Mary - 08/27/96:18:24:	Is that you William????
Martin - 08/27/96:18:25:	Not all are here yet. S
SIMPSONS - 08/27/96:18:25:	Questions might include: Did the videoconferencing affect your level of dicsussion in the group? You might relate it to your experience of face to face discussion.
Martin - 08/27/96:18:25:	okay
William - 08/27/96:18:25:	I've just found out we are working together. I have been lost since missing the first night. Did you know we were working together

MUNSTER 1 in Sydney - 08/27/96:18:25:	The problem is breaking into a flow and establishing the focus away from the speaker
Mei & Chi - 08/27/96:18:26:	agree!!!
Mary - 08/27/96:18:26:	Yes, but I hear you haven't got email yet. Is that right?
William - 08/27/96:18:26:	Mary, We need to swap details so before you go can we please do so?
Martin - 08/27/96:18:26:	roger. We 'll be using the web page in a sec
SIMPSONS - 08/27/96:18:26:	Were you inhibited by the lack of non-verbal cues in deciding when to speak?
William - 08/27/96:18:26:	I will be getting it next week so they keep saying but I do have a phone
Mary - 08/27/96:18:27:	My email address - [email address], my phone [phone number]
SIMPSON Bart - 08/27/96:18:27:	William and Mary you are invading my space do you business outside my time

EXCERPT 4.3 Synchronous Live Chat online discussion conducted in Week 7

Excerpt 4.4 represents online discourse that occurred approximately 20 minutes into the online discussion. It illustrates how students were focused on their group task. It also presents student perceptions of their use experience with videoconferencing and CMC tools. Other points highlighted from this sample include:

- Several threads of dialogue occurred and students were able to follow their group thread.
- The facilitators of the discussion, (Martin and Simon) communicated with each other using the pseudo names: “Ziggy” and “Zorro”.
- Chi and Mei were active participants in the online discussion
- Students identified themselves in different ways. Some put their names in brackets, whilst others used the names of Simpsons TV characters.
- Once again the issue of spelling is raised.

simpson homer - 08/27/96:18:47:	Q3 How long into the video conferencing session did you feel you were comfortable with it, if at all?
simpson maggie - 08/27/96:18:47:	Question 3 : Did you find you could concentrate on the content being presented (fix this up please simpsons)
SIMPSON Marge - 08/27/96:18:47:	Ziggy are you not guilty of hypocrisy?
MUNSTER 2 (Walter) - 08/27/96:18:47:	I think we might find that given enough practice, IRC and videoconferencing could be equally easy.
munster(L&S) - 08/27/96:18:47:	the video conferencing is a kind of face-to-face communication.
MUNSTER 1 (James) - 08/27/96:18:48:	The video conferencing requires a seeking of turns and we cannot use the usual visual cluesw to break in.
MUNSTERS - 08/27/96:18:48:	does anyone think VC can be use effectibvely by first time users?
munsters - 08/27/96:18:48:	yes. no worries
munster(L&S) - 08/27/96:18:48:	no!!!
MUNSTER 1 (James) - 08/27/96:18:48:	The context should be not lost if we have a focused decision to make then maybe it would work
munsters - 08/27/96:18:49:	why not?
MUNSTER 2 (Walter) - 08/27/96:18:49:	Right, but I would predict that a new method of turntaking will evolve. After all, if you watch groups of deaf people
Ziggy - 08/27/96:18:49:	Zorro I think I prefer Face to Face this like talking in noisy pub.

Shelley - 08/27/96:18:49:	I saw a very elaborate videoconferencing system at another university recently and was very impressed until I found out that the attrition rate was 60%
simpson homer - 08/27/96:18:49:	Sorry about the number of questions Zorro and Ziggy - we got carried away with such an interesting topic
munsters - Mary - 08/27/96:18:49:	MUNSTER James - disagree, seeking of turns is only because we are not used to the delay in comms over distance - we can treat a VC as a normal conversation if we treat it as "all in one room".
MUNSTER 2 (Walter) - 08/27/96:18:49:	signing, they appear to keep a really good flow going with relatively few cues.
MUNSTER 1 (James) - 08/27/96:18:49:	Is that the videodisc Physic class?
SIMPSONS (D) - 08/27/96:18:49:	Another question: how important is it to have a powerpoint display in conjunction with the videoconferencing if a presentation is on the agenda?
zorro - 08/27/96:18:49:	i'll meet you in the pub in 5 mins!
munsters - Mary - 08/27/96:18:49:	YEA WALTER!! I'm with you!
zorro - 08/27/96:18:50:	ziggy - give it another 3 mins and move to the next bit
Ziggy - 08/27/96:18:50:	Rodger
munster(L&S) - 08/27/96:18:50:	Some times we are confused because specking is not smoothly flowing.
simpson homer - 08/27/96:18:50:	Wouldn't that be covered in the answer to question 2?
MUNSTER 2 (Walter) - 08/27/96:18:51:	Sorry, Mary, but I'm not with you. I don't agree that it is possible to regard vVC as being in one room. I just think that different discourse mechanisms will evolve.
Ziggy - 08/27/96:18:51:	Zorro cut the text from here and paste into a email to James.
SIMPSON Marge - 08/27/96:18:51:	very important a little music and activity based stuff would also help but how?
SIMPSONS (D) - 08/27/96:18:51:	An interesting comment on chat-I cannot remember what question 2 was.
MUNSTER 1 (James) - 08/27/96:18:51:	This chat space does allow all to contribute faster
munsters - Mary - 08/27/96:18:51:	This is the [problem with this form of comms - chat is disjointed and there's noise on the screen in this IRC form. You have to be a really fast typer!!!
simpson homer - 08/27/96:18:52:	Q2 was about their view of the use of the visual aids, such as power point and the document camera
zorro - 08/27/96:18:52:	ziggy we are about to move on
MUNSTER 1 (James) - 08/27/96:18:52:	I like the multiple dialogues and maybe this is really a pub conversation
munsters - Mary - 08/27/96:18:52:	You also have to be able to ignore someone else's conversation and track your own. That would be hard for someone who needs to translate to and from a second language!
MUNSTER 2 (Walter) - 08/27/96:18:52:	I agree, Mary, the discourse problems in IRC are much greater than in VC.
simpsons - 08/27/96:18:52:	Is Shelley visiting or is this a pseudonym for James
Shelley - 08/27/96:18:52:	No .. it's me ... just visiting

EXCERPT 4.4 Synchronous Live Chat online discussion conducted in Week 7

Excerpt 4.5 excerpt represents online discourse that occurred towards the end of the online discussion. Some interesting issues that rose from this excerpt are as follows:

- There were eight threads of conversation taking pace at the one time. Whilst quite a complex threaded discussion, the students managed well as they focused on the dialogue of their respective remote group.
- The live chat facility facilitated "flexible interactivity". For example, notice how one group was able to review and participate in the dialogue of the other

group. Also, a member of one group can join the discussion of another group or send a message to a member in another group without disturbing the flow of discourse.

- The facilitators of the discussion, that is, Ziggy and Zorro, were able to participate in multiple roles. For example, when they needed to communicate with each other they assumed the aliases of Zorro and Ziggy. When they needed to facilitate the discussion they wrote the instructions in upper case and they were also able to participate in the discussions under the *simpson* and *MUNSTER* aliases (although this is not illustrated in the above excerpt).
- The pace of the discussion allows incorrect spelling and grammar to be tolerated. The informality of the tone of conversation enables humour to surface. Such elements seem to enhance class bonding. When the message from David was posted, the Wollongong class roared with laughter. These emotions were also conveyed in the discourse by the inclusions of “Wow oooh!!” and “OOOOOOOHHHHHHH!!!!”.
- Chi and Mei contributed to the discussion and when phrases or incorrect spelling were not understood, they asked for clarification and received prompt replies from others in the live chat session.

simpson homer - 08/27/96:18:53:	Shelley - what do you think about the qwuality of dialogue going on here?
simpson maggie - 08/27/96:18:53:	I still want a question on content because I find it very had to concentrate on the content of most presentations (not tonights of course)
SIMPSON Marge - 08/27/96:18:53:	Mary before we go when will you call or when will I call?
Shelley - 08/27/96:18:53:	I'm not sure in what context it is taking place, so am finding it iddiffcult to pick up the threads
munsters-Robyn - 08/27/96:18:54:	I think using video conferencing helps in gathering data very quickly. The nt However , the human interaction is not present. I am quite amazed with the use of technology on how to reach people. It saves time and the worry of poeple that has to trav el
munsters - Mary - 08/27/96:18:54:	L&S the contextual clues are not on the IRC - seeing the person you are talking to is much better.
simpsons - 08/27/96:18:54:	I think the content is important too - We often focus on the technology and forget the discussion
SIMPSONS (JC) - 08/27/96:18:54:	Robyn, I much preferred chatting at dinner to you.David.
zorro - 08/27/96:18:54:	ziggy. are you there in spirit?
HOUSTON - 08/27/96:18:54:	TO ALL. GO ON TO NEXT TASK> WATCH THE VIDEO THEN DO ANALYSIS.
munster(L&S) - 08/27/96:18:55:	agree!!!
simpson homer - 08/27/96:18:55:	Shelley - visit this site to put it in context [Simon provided the URL for their seminar web apge]
simpson maggie - 08/27/96:18:55:	Wow oooh!!
munsters - Mary - 08/27/96:18:55:	OOOOOOOHHHHHHH!!!!
simpson homer - 08/27/96:18:55:	No ones asked me to dinner
zorro - 08/27/96:18:55:	okay!
SIMPSON Marge - 08/27/96:18:55:	blahhhhhh
zorro - 08/27/96:18:55:	children children!
simpsons - 08/27/96:18:56:	Robyn and David, Is having dinner virtual collaboration?

munster(L&S) - 08/27/96:18:56:	We think that VC is better than IRC beause we can see each other.
simpson homer - 08/27/96:18:56:	?
simpson maggie - 08/27/96:18:56:	James's Dating Service
Shelley - 08/27/96:18:56:	But I don't have a camera and wouldn't be able to participate
munster(L&S) - 08/27/96:18:56:	What is happen now?
munsters - Mary - 08/27/96:18:57:	Someone please explain to Chi!!!!
munsters - Mary - 08/27/96:18:58:	We're leaving to look at the video now guys, talk to you later!!!!
munster(L&S) - 08/27/96:18:58:	Thank you, Mary.

EXCERPT 4.5 Synchronous Live Chat online discussion conducted in Week 7

Simon's reflection of the evening is illustrated in the following vignette:

LIVE CHAT: This is where I personally had some difficulty with the gulf between my personal commitment to the assignment and my perceived view of others engagement with the topic. This was brought to light when William was conducting a chat (online) but off the topic during our assigned task. I actually got quite angry for a minute or so, but I do admit that the weight of responsibility for the evening and wanting to create a successful event were perhaps impinging on my sense of humour. However, it does point to a problem with the technology, whereas in live conversation or group meeting it would be possible and even beneficial to have asides of that nature in the confines of the line by line chat space I find those intrusions break the flow.

Video Conferencing is to my mind a presentation medium. That is why Martin and I chose to use it on this occasion. We felt it would set the direction for the evening, help mentally bond the two groups and build a spirit of collaboration. (Simon, Reflective Journal, Week 7)

4.3.3.6 Week 8: Charles requests more online ORDER!

4.3.3.6.1 Context

Joan and Charles presented a seminar about Rapid Prototyping. The topic was introduced in a 50-minute videoconference. A Web page mirrored the content presented in the videoconference.

After the videoconference, students in each site conducting a face-to-face activity. One person from each site acted as a "scribe" and communicated synchronously with the remote site in the Live Chat space. The online synchronous interaction between the two sites occurred through these two nominated scribes.

The instructor met with the Wollongong class one hour before the videoconference. An informal face-to-face discussion occurred and students read the seminar Web page.

4.3.3.6.2 Highlights

The interaction that occurred during the videoconference: Mary operated the Wollongong site and Anthony operated the Sydney site. Social interaction characterised the first few minutes of the videoconference. For example, David had arrived to class but left the videoconferencing room to get a cup of tea. His umbrella was on the desk. When the instructor asked if David had arrived Anthony zoomed the camera onto David's umbrella. When David returned he sat down and said: "Let's not get into the technology, let's get into the content." Anthony quickly replied: "We're focusing on your umbrella actually. The Wollongong students laughed. In response, David opened his umbrella. Again the Wollongong class laughed with Martin commenting: "Thank you Mary Poppins". This example illustrates how the visual aspect of the technology facilitated social rapport between the two sites.

Joan was the dominant speaker during the videoconference. Charles interjected occasionally. Although Joan and Charles did not ask the class specific questions the Sydney students contributed comments and asked Charles questions. The Wollongong students were silent for the duration of the videoconference.

Charles wanted more online "order": When Charles explained the task students were to conduct after the videoconference he outlined a strategy for more order in the Live Chat space. The following excerpt taken from the videoconference transcript illustrates his idea.

Charles: "Can we just try something a little different tonight? Now I've talked to Joan on the phone this morning, I believe this chat is not working and it might be a limited number for it to successfully work. So, maybe we should control what we're typing tonight and put your questions through Joan and myself and see if we can answer them so people can keep the thread of the arguments. If we can't answer them well we can't do it. Secondly, we're going to break off into groups and see if we can do a bit of rapid prototyping ourselves and if we lose the line then someone in the group will write it up and post it off. Is that alright?"

Charles: "I just thought we could have some order in it."
A few of the Sydney group started to hackle - "facist, facist!" David said.
Charles also grinned and continued. The Wollongong group also started to laugh. So did the instructor.

Charles: "And put the questions through the chair - put the questions through Joan and myself and see if we can answer them, and if we can't, see how it goes for 10 minutes to see if people can sit back and politely join the argument by having some sort of classroom protocol I mentioned that to you before. It seems to me that once you're on that keyboard that everybody is shouting out and in a normal class scene that wouldn't work and maybe we should just keep our fingers off and run things in an orderly way. See how that goes."

The instructor responded: "Can I suggest a slight variation on that protocol. Maybe somebody from Sydney and somebody from Wollongong might act as scribes while the two of you actually ran the process because I think trying to act as the Gatekeeper and running the process as well might be a bit tough".
(Videoconference transcript, Week 8)

How the Live Chat space was used: Students in each site conducted a face-to-face group activity and a "scribe" was assigned from each site to communicate with the remote site in the Live Chat space. William was the nominated scribe in Sydney and Mary was the nominated scribe in Wollongong. William and Mary used the Live Chat tool to inform each other of their site's progress with the activity.

The online "scribe" strategy resulted in the following:

- The two sites conducted separate face-to-face discussions.
- The instructor discussed issues about the topic verbally with the Wollongong students and Mary had difficulty scribing the discussion in the Live Chat space. For example, for approximately 15 minutes the instructor led a face-to-face discussion in the Wollongong class about the topic presented. Mary commented: "The guys in Sydney are feeling very left out. I've been trying to convey some of it across."
- The instructor dictated to Mary what he wanted to say to the Sydney students. The computer screen displaying the Live Chat space was projected on the wall so the Wollongong class could see the messages posted. Towards the end of the class, the Wollongong students were seated around the table in middle of the room reading the Live Chat messages and the instructor facilitated the online discussion by asking the Sydney group questions.

Excerpt 4.6 illustrates a sample of the Live Chat interaction that occurred online.

Mary - 09/03/96:19:10:	Discussion taking place here about prototyping on "real" projects.
William - 09/03/96:19:10:	How about you let us know the highlights
Walter - 09/03/96:19:10:	Is anyone in Wollongong participating in this?
Mary - 09/03/96:19:11:	James is talking about the fit between the underlying requirements and the strategy employed
[6 messages were posted here but have not been included in this excerpt]	
Mary - 09/03/96:19:13:	Sorry guys, it's really hard to keep up with the discussion and translate it across.
Richard - 09/03/96:19:14:	I think you guys in Sydney are being left out because of Charles's idea to limit the no. of people transmitting.
Mary - 09/03/96:19:14:	Totally agree with Richard.
Mary - 09/03/96:19:14:	The game mechanism doesn't always match up with learning task - strategy not right.

Mary - 09/03/96:19:15:	So much of the work done in schools is just busy stuff - need to stop and question why are we doing this.
Mary - 09/03/96:19:15:	Stuff being developed just for sake of 'using computers
Walter - 09/03/96:19:16:	Actually, Mary and Richard, there is a whoel different discussion going on here
Richard - 09/03/96:19:16:	So we're missing out too.

EXCERPT 4.6 Synchronous Live Chat online discussion conducted in Week 8

Simon's reflection provides an insight from the Sydney site. Below is an sample from his reflective journal.

Charles decided to break the group up into sub groups and for each group to appoint a scribe whose job it was to post the comments into the chat space. This may have been efficient but it meant the scribe missed out on the group discussion as they became focused on the replies arriving from the other end.

Charles seems the least enamoured with the use of the technology in learning and at times exhibits significant degrees of frustration. This evening he seemed resigned to the poor qualities of the communication that the technology allows. "They can't hear me"

An incident tonight reminded me of one of Gayeski's tenets "A user will use technology if it helps them express themselves". During Joan's delivery to the class Charles remained largely silent, occasional nodding and occasionally shaking his head. At one point Joan after a brief leading statement asked if Charles would like to speak about that statement. His reply was a minimalist "No". I guess he felt that the Power Point slide that was on the screen could do the job as well as he could. So why bother. It obviously wasn't helping him express himself.

(Simon, Reflective Journal, Week 8)

4.3.3.7 Week 10: Mary uses a new CMC tool—Discussion Forum

4.3.3.7.1 *Context*

At the end of Week 9 Margaret found another CMC tool to add to the subject Web site. It was called Discussion Forum and it enabled students to create discussion threads (conferences spaces) and archive messages within each thread (see Appendix Q). Its interface was clear and easy to use. This CMC tool was much easier to use than the BSCW workspace.

Margaret contacted Mary the day before class to inform her about the Discussion Forum facility and that she was not able to physically attend class but would log onto the Live Chat space. Mary agreed to use the Discussion Forum tool at such short notice because it was an opportunity for students to experience a new CMC tool. Mary was supposed to present jointly with William but he was unable to present due to work commitments.

Mary's topic focused on creating Teams in technology-based learning implementations. A Web page provided background to the topic and described a

case study that students were to discuss in class. The Web page was available from the subject Web site a few days before class. (This was the only student Web page that was available more than 24 hours before class.) Mary had also created a BSCW workspace one week prior. In the workspace, she asked students to read an article from their readings and answer several questions about the article. None of the students contributed to this workspace.

The case study dealt with a technology-based learning project that Mary was involved with at her workplace. Mary had outlined the staff resources available for the project and wanted students to discuss what implementation teams should be formed.

Mary sent an email to the students the day before her seminar to explain the strategy for her seminar. The email message read as follows:

Hi Guys,

The workshop for this week is going to be a little different. Unfortunately William can't be with us as he has to work, so I'm on my own. As there is no videoconference I suggest we do it this way...

Between 4.30 and 5 pm we'll start in Wollongong with a discussion on teams and implementation in general. Margaret will join us on the live chat space at around 5 so I'll bring her in on the discussion then, if anyone in Sydney is in the lab they are welcome to join in too.

Then at 5.30 I'd like everyone to go into the new discussion facility that is on the workspace menu. We'll use that facility for the beginning of the case study.

In both Sydney and Wollongong I suggest that you form groups of two/three. Assign your group a title and under that name, tackle the questions in the case study, putting your first thoughts into the discussion space. Use the live chat to ask me for any clarifications or more information regarding the case study.

Then, when all four questions have had a first cut, we'll read them and move to the live chat space. The groups will then negotiate and come up with a consensus solution to the case study.

At about 7, I'd like to hand over to Walter to fill us in on anything he'd like to follow up from last week, now that the page is up.

So - please read the web page, and come with some thoughts on the case study.

We'll see how using both spaces goes.

Regards

Mary

(Email message by Mary, Week 10, Monday, September 16 1996, 7:57pm)

Mary created two discussion threads. The first one was titled: *Creating Teams* and she created it to test the Discussion Forum system. The message read: “This is practice for tonight. Please ignore”. (Unfortunately, this tool did not allow discussion threads to be deleted.) The second discussion thread was titled: *Case Study*. It was this discussion thread that Mary wanted to use in class and Mary posted one message that provided additional information about the case study in this thread.

A few hours before her seminar Mary sent another email to the students to inform them that she had created two discussion threads but wanted them to use the *Case Study* thread.

4.3.3.7.2 Highlights

The hour before the Sydney class came online: Mary conducted a face-to-face presentation in the Wollongong class. The researcher acted as scribe in the Live Chat space to inform Margaret about the class discussion. Scribing was difficult to perform, as the researcher had to communicate with Margaret in the Live Chat space and listen and scribe what Mary was saying to the class. The content Mary presented in class was in addition to the content presented in her Web page, so, in effect, the Sydney students missed out on part of the presentation.

The interaction that occurred using the Discussion Forum: Most of the Sydney students had not read Mary’s email messages before coming to class and were not aware of how the task was to be conducted. The following excerpt of messages taken from the Live Chat space illustrates this.

Walter - 09/17/96:17:38:	Hello everyone.
Margaret - 09/17/96:17:39:	Hi Walter
Mary - 09/17/96:17:43:	Hi Walter, have you read your email today?
Chi & Mei - 09/17/96:17:44:	Hi! Walter how are you?
David - 09/17/96:17:44:	What are we discussing?
Walter - 09/17/96:17:44:	No, sorry, I haven't logged on since last Friday.
Chi & Mei - 09/17/96:17:44:	case study
Mary - 09/17/96:17:48:	Hey guys! You should be logged onto the Discussion Forum in the Workspace on EDGA957.
Mary - 09/17/96:17:48:	From there, click on Topics, then Case Study. You should then enter your answers to the cxase study,

EXCERPT 4.7 Synchronous Live Chat online discussion conducted in Week 10

Simon posted messages about the task in the test thread: *Creating Teams*. Margaret and Martin then began to work on the task with Simon in this thread. Six messages were posted until Mary intervened with the following message:

Thread: Creating Teams
Subject: Mary Urgent guys please read!!

Date: September 17, 1996 (17:38)

You are working in a different space to the rest of us - please move over to Case Study. Click on topics, then Case Study, then Thread.

The Discussion Forum tool was used for almost two hours and 53 messages were posted in the *Case Study* discussion thread. While most students used this discussion thread to discuss the task with the rest of the class, some students, such as Joan and Richard, collaborated in pairs and used the *Case Study* discussion thread as a space to post their answers. David did not contribute to the *Case Study* thread. Instead he created two additional discussion threads and posted one message in each of these two threads.

In an attempt to regain focus to the task, Mary suggested that students move to the Live Chat space.

Thread: Case Study
Subject: Mary - Urgent please read now!!
Date: September 17, 1996 (18:13)

We seem to be skirting around the issues and not getting down to the questions. Can we revert to the live chat for a while. I'm crossing over now, when you've crossed over would you register your presence please.

Some students moved to the Live Chat space while others continued to work on the task in the *Case Study* discussion thread. Mary found herself juggling between the Live Chat space and the Discussion Forum trying to determine student progress on the task.

Several students, for example, Joan and Richard managed to finish the task whilst others, such as, Mei, Chi and Charles were confused about what was required. Some student feedback is provided below.

Researcher: "OK, tell me the truth, do you know what's going on?"
(Researcher whispered to Mei and Chi who were working together)
Chi: (after a brief pause) "No" (Mei agreed and they both giggled.)
(Week 10, 6.15pm, Fieldnotes, p. 36)

Charles - 09/17/96:18:52: Whats going on? Where are we in this discussion?
(Live Chat, Week 10)

David - 09/17/96:19:17: James, I think people found it hard to stay motivated with the alternating technologies. We lost the thread iof discussion a bit. David.
(Live Chat, Week 10)

Although relatively easy to access and use, it requires some thought and organisation if the group is to have a productive learning experience....If all students contributed to one thread discussion became fragmented. The most

successful discussions were likely to occur when students were in small groups; had clarity about the task and some help from a facilitator. (David, Evaluation Assignment)

Mary's reflection of the evening concurs with the researcher's observation and it provides an insightful reflection of how the technology could have been used differently.

Well, my seminar didn't go as I had hoped it would. William's little fiasco really threw me. However, the use of the discussion space was interesting.

Well, I should have set up three separate spaces for the groups, because we got very confused. People were following threads in all directions. The live chat space could have been used as a drawing together, but no one was watching it. Well, I learnt some valuable lessons here.

Conclusion: Using the discussion space and the chat space, I felt had great potential, but I hadn't thought it out well enough. The strategy had been clear when there was someone to control the remote site, but when it was just me, I needed to have very clear instructions and everything set up to run like clockwork, and I didn't. I would use this differently next time. And I would be less likely to use the Forum "live", but rather as a long term "add-on" type of discussion that took place over time. (Mary, Reflection Journal, Week 10)

4.3.3.8 Week 12: Margaret demonstrates planning, organisation and structure

4.3.3.8.1 Context

Margaret dealt with Maintenance Evaluation as her topic. She did not collaborate with another student on her seminar presentation. She organised the evening as a videoconference followed by an online synchronous task using the Discussion Forum tool and the Live Chat tool. Margaret's Web page was available from the subject Web site on the morning of the class. Her Web page was structured as a Web site. The Home Page outlined the structure of the site. The content material was very comprehensive and was supported with links to external Web sites. The online task for the evening was also provided.

Planning and structure were demonstrated in the way Margaret organised the online task. She wanted students to address three questions relating to the topic. Unlike in previous weeks where students were asked to form small groups, Margaret divided the class into three small groups and allocated each student to a particular group, ensuring there was a mix of Sydney and Wollongong students in each group. Each group was allocated a different scenario in which to address the three assigned questions. The groups and the scenario were documented in the Web page. The scenarios Margaret created were based on several students' workplace projects so

she deliberately assigned the student who was familiar with the background of the scenario in that particular group.

Prior to commencement of class, Margaret created three discussion threads in the Discussion Forum. They were titled: *Maintenance Evaluation Team 1*; *Maintenance Evaluation Team 2* and *Maintenance Evaluation Team 3*. The first message within each thread outlined the scenario, the questions to address and the students in the team.

The three groups were to conduct an online synchronous discussion in their respective discussion thread and then summarise the answers to the three questions in the Live Chat space. Margaret wanted to use the Live Chat tool towards the end of class for the three groups to come together as an entire class and summarise the evening's discussion.

Mary was unable to physically attend class, she participated in the online synchronous task from home.

4.3.3.8.2 Highlights

The interaction that occurred during the videoconference: Robyn controlled the videoconferencing keypad and Joan managed Margaret's PowerPoint presentation. The instructor operated the videoconferencing keypad from the Sydney site. Margaret's videoconference presentation mirrored much of the content that was provided in her Web site. She also explained how the task after the videoconference was to proceed.

Margaret looked into the camera whilst speaking and encouraged interaction by asking questions throughout her presentation. However, the students were not familiar with the content and thus her questions were often followed by long silent pauses. One example occurred 18 minutes into the videoconference when Margaret asked a question. She waited for five seconds and not hearing any response said: "People in Sydney are you awake? Speak to me!" Twenty seconds of silence followed. William finally made a comment followed by Charles then Richard. Also, because Margaret looked into the camera when speaking it seemed that her questions were directed specifically to the Sydney students. For example, 27 minutes into the videoconference Margaret asked a question relating to the information presented in the PowerPoint slide. She said that the answer was in her Web page. It seemed that the question was specifically addressed to the Sydney class as the camera was focused on Margaret and the Wollongong students were not

in view. After a few seconds of silence, Margaret said: “Anyone in Wollongong?”. Twenty-two seconds of complete silence followed. Margaret then rephrased the question and Richard finally made a comment.

There was however a small window of time when it felt like one class. This occurred towards the end of the videoconference for approximately 10 minutes. Simon made a comment that then led Anthony and David to make comments. Margaret replied to David’s comment and Joan added a comment. Both sites were interacting as one class until Margaret interrupted by stating: “Can we move on because we’re fairly well over time.”

The interaction that occurred during the online synchronous task: The three groups were structured as follows:

Team 1: Joan, Chi, Mary, Anthony and Simon. (Mary participated in the online task from home as she was unable to attend class.)

Team 2: Richard, Robyn, Walter, and Charles.

Team 3: Mei, Martin, William and David.

The three groups collaborated on the task and students were more engaged with the online task than in previous weeks. There were a total of 67 messages posted in the Discussion Forum during the evening. Of these, 53 messages dealt specifically with the content and 16 messages related to the process of the task or were of a social nature. Table 4.7 provides a breakdown of the messages and includes some examples from the discussion threads.

TABLE 4.7 Case One, Week 12: Messages posted in the Discussion Forum (67 messages posted in total)		
<i>Discourse Category</i>	<i>Examples</i>	<i>No. of messages</i>
On task—content focus	<p>“Firstly, we need to identify the problems. One might be...” (Robyn & Richard, Team 2)</p> <p>“We seem to be on a similar track here. Other questions we need to ask relate...” (Walter & Charles, Team 2)</p> <p>“William - Sometimes giving specific questions, can direct user answers down the wrong garden path...” (Mei & Martin, Team 3)</p> <p>“...Your suggestion for tools is good. I would suggest...” (Mary, Team 1)</p>	53

TABLE 4.7 Case One, Week 12: Messages posted in the Discussion Forum (67 messages posted in total)		
On task—process focus	<p>“Anthony, I’m flying by the seat of my pants here, what does Margaret want us to do?” (Mary, Team 1)</p> <p>“Margaret do we go to live chat?” (Anthony & Simon, Team 1)</p> <p>“Margaret says to chat here for another 10 mins as we had trouble getting online here.” (Chi & Joan, Team 1)</p> <p>“Should we start summarising - if so does anyone know how we do it.” (Chi & Joan, Team 1)</p>	8
Off task—social	<p>“Signing on from home - are the rest of the team there?” (Mary, Team 1)</p> <p>“Where are you all??” (Chi & Joan, Team 1)</p> <p>“Hi It took us a while to get here, but now we’ve arrived.” (Walter & Charles, Team 2)</p> <p>“Sorry we were so long, we’ve had hassles with the network here...” (Robyn & Richard, Team 2)</p>	7
Off task—process focus (reflective)	<p>“There is a tendency for people to get lost with different threads of the one discussion in this systemIf four of us are in the group one might persist with one aspect of the issue while the other three are on another.Listing messages by person rather than the subject of the message is a problem.We need to evaluate the impact of this on the effectiveness of the discussion.” (David, Team 3)</p>	1

The discourse that occurred in the Discussion Forum was not of the “flippant” nature that had occurred in past weeks. The content focused messages (as shown in Table 4.9) illustrate that students collaborated with each other and tried to build on previous messages. It was not just a “posting of answers” as had occurred in Week 10. This was especially apparent in Mary’s messages. She accessed the task from home and when she posted her messages she made an effort to interact with the students. Examples include: “Your suggestion for tools is good.” (Team 1, Message No. 15) “Chi and Joan - Hi! Good one 99!!!!” (Team 1, Message No. 25)

Margaret facilitated the discussion in the Live Chat space by asking each group to briefly summarise their discussion. All three teams provided a summary in the Live Chat space. Most of the students thought Margaret’s strategy for the evening worked well. Many students posted messages of thanks to Margaret in the Live Chat space for a productive evening. For example:

Anthony&Simon - 10/15/96:19:38: Well done Margaret!

Walter - 10/15/96:19:39: Thanks Margaret, it went really well. Are you all disappearing now?

Mary- 10/15/96:19:42: Thanks Margaret - well done.

David thought Margaret's strategy for using the Discussion Forum was the most effective use in the subject:

"The most successful use of Interaction occurred when the organiser of the discussion had carefully thought out the tasks and allocated students to specific groups." (David, Evaluation Assignment)

Mary found participating online from home was a very valuable experience:

I couldn't get into uni for tonight's seminar and so joined the group by computer from home.

It wasn't hard to join in the chat on both the live space and the discussion. I like the switch between them, I found it reassuring to see other people on the line, and it definitely helped to be able to put faces and personalities to the responses.

It is disconcerting to have silence down the line though. You need the reassurance that someone out there is listening to you. Addressing responses to particular people is really good. The technology worked, the discussion worked, good stuff!!!

Conclusion: This was an invaluable experience. If we are to implement this sort of learning it really helps to know what the student goes through. It would be a good experience to have everyone log on and work remotely in isolation at least once during the subject.
(Mary, Reflective Journal, Week 12)

4.3.3.9 Week 13: It felt like one class in the videoconference

4.3.3.9.1 Context

Anthony and Richard presented a seminar on Intellectual Property. They used the Live Chat space to discuss preparations for the seminar. Their presentation was structured as a videoconference followed by an online synchronous activity. Anthony created a BSCW workspace in Week 8 to provide the class with a range of online resources about Intellectual Property. Richard created a Web page for the seminar and it was available from the subject Web site on the afternoon of the class. Richard sent an email to the class a few days prior to the seminar to inform the class about the structure of their seminar.

Anthony wanted to use the Internet Relay Chat program IRCLE for the online task. However, due to a misunderstanding, Richard had not installed the software on the computers in the lab. This caused some delay after the videoconference as Richard and Margaret tried to install IRCLE on the computers. At 7pm Anthony decided not to pursue IRCLE and Richard created the discussions threads in the Discussion Forum. The structure of the online task was similar to Margaret's online activity in the previous week. The class was divided into three groups and each group was given a scenario about Intellectual Property to consider. Richard created three

discussion threads in the Discussion Forum and each group discussed their scenario online.

4.3.3.9.2 Highlights

The interaction that occurred during the videoconference: Martin operated the Wollongong site and Simon operated the Sydney site. Walter managed Anthony's PowerPoint presentation. Anthony was the dominant speaker throughout the videoconference. He looked into the camera when he spoke and appeared relaxed and his presentation went relatively smoothly. Again, as in past videoconferences, the transmission of PowerPoint slides affected the flow. For example Anthony made comments such as: "It's a bit hard to get synchronised with these slides. Have you got the next one?" and "which slide are you up to now".

The significance of this videoconference was the unintentional interaction that occurred between the two sites. During the videoconference Anthony facilitated class discussion by asking questions. However, several students asked Anthony and Richard questions about intellectual property. Some of the students, such as, Margaret, Joan, Martin, Walter, and David, were familiar with intellectual property issues and they contributed their experiences to the class. An unintentional class discussion continued for approximately 20 minutes. Anthony had to interrupt the class discussion by saying: "We're running out of time." The videoconference concluded by Anthony and Richard explaining the online task for the evening.

Although limitations to the discourse structure were still apparent, for example, when David spoke he awkwardly leaned forward towards the microphone, the discourse flow was not disjointed as in other videoconferences. Simon claims that the class had become used to the medium:

As a group we are comfortable with the shortcomings of the medium or should I say, we have lowered our expectations and no longer feel agitated by the loss of visual and audio cues. (Simon, Reflective Journal, Week 13)

The interaction that occurred during the online synchronous task:

Students were assigned to the following three groups:

Group 1: Joan, Chi, Researcher, William and David

Group 2: Margaret, Mei, Martin, Simon and Walter

Group 3: Robyn, Mary, James and Charles

While Richard and Margaret were trying to install IRCLE, Mary decided to tackle her group's task in the Live Chat space. Mary and Charles started to discuss the

task but William joined the Live Chat space and posted off task messages breaking the flow of the discourse.

Group 1 and Group 2 discussed the task in the discussion forum. The discussion thread for Group 1 consisted of 11 messages, and 20 messages were posted in Group 2.

Anthony's reflection of the evening is provided below.

I had the same problem with the Powerpoint presentation, that is, 3 people helping to operate it made it very cumbersome.

I also found that I yelled most of the time as the TV was a long way from my seat and the volume was very low.

Problems in the workshop at the end were not helped by the fact that the relevant software had not been set up at the other end. It is important to have backup ideas (which I did), but it doesn't make any difference if other people do not carry out your requests. (Anthony, Reflective Journal, Week 13)

Mary's reflection of the evening provides an insight into how the Discussion Forum tool could be used differently:

We have now seen a number of ways to use the discussion facility - they are all effective. But I still think the best way is over a period of time to gather lots of thought and discussion points and then use live chat to really talk about it. (Mary, Reflective Journal, Week 13)

4.4 THEMES THAT EMERGED

The emergent themes from this case were identified by conducting the following analysis. (The analysis process described here correlates with the data analysis steps 3,4, and 5 outlined in Chapter 3, Table 3.11.)

- The data collected for each week of the subject was reviewed and recurring issues that surfaced were recorded as weekly themes. The data reviewed included transcribed interaction highlights from the recorded videoconferences; weekly fieldnotes; email messages transmitted each week; and the CMC discussion transcripts. The online discussion transcripts were analysed from a holistic perspective and triangulated with the weekly fieldnotes. That is, the weekly online transcripts were reviewed in conjunction with the weekly fieldnotes to determine the context in which the CMC occurred.
- Data collected from the students, for example post-subject interviews, student questionnaires, and student artifacts (such as reflective journals and evaluation assignments), was also examined to identify themes. When examining the

evaluation reports, if an issue was raised by three or more students, then that issue was classified as a theme. The reflective journals were examined and served as supportive evidence for the themes that surfaced in the evaluation assignments.

- The weekly themes and the themes that surfaced from the student feedback were then clustered into categories and the raw data was examined to find evidence to support these categories.

Ten themes surfaced from this case and are summarised as follows.

1. Students were immersed in an authentic problem-based setting.
2. The technology was as much the message as the medium.
3. Student accessibility to the technology affected the interaction.
4. Technical support (or the lack thereof) surfaced as a student issue.
5. The subject Web site became a repository of students' seminar Web pages.
6. The need for online interaction was driven by the fixed weekly class structure.
7. Videoconferencing was used predominantly as a presentation medium.
8. Time, task and tool influenced the nature of the CMC interaction.
9. The assessment tasks were peripheral to the online interaction.
10. The technology facilitated flexibility in student attendance patterns.

Although each theme is structured as a separate heading in the following discussion, it is important to note that several themes overlap and are interrelated. For example, the first two themes represent holistic themes that overlap with the other themes.

4.4.1 STUDENTS WERE IMMersed IN AN AUTHENTIC PROBLEM BASED SETTING

The students learnt about implementation and evaluation issues by experiencing implementation and evaluation first hand. They were the recipients of a technology-based learning implementation.

Students in this course have been able to experience first hand the true dilemmas of implementing technology based learning and the day to day problems which occur in the implementation phase. (Margaret, Evaluation Assignment)

The pilot nature of the subject's delivery created a community of learners (including the instructor and the educational consultant). The students not only experienced using the technology they were also given an opportunity to design their own instructional strategies by delivering weekly seminar presentations. Thus, the students were not only recipients of a technology-based learning implementation,

they also designed a technology-based learning experience. The students were able to assume the role of the instructor on a smaller scale (that is, on a weekly basis). They learnt by doing. Martin alerted to the power of this experience during Week 9 in an email message he sent to the researcher:

I guess one of my own observations about this course is that most of us spend a great deal of time discussing the technology and its use. This breaks us from the 'formal' side of discussion in the classroom and I think is a statement about the power of what we are doing. I'm not quite sure why this is happening though. I think this in itself is marvellous as we all seem to share the same concerns/thoughts etc. In my book, these discussions are worth more than gold because isn't that what Uni etc is all about?

The other interesting observation from my conversation's with others is that everyone seems to be trying really hard to use the technology to it's capacity. The last few seminars I think have been markedly different and successful in their own rights. It really seems that a variety of approaches can be taken with VC etc. We really seem to be gently pushing the boundaries and experimenting - great stuff!...

At the end of the day, I hope that the course and process ends up by being one huge experiment whereby we can reflect on VC, social interaction and learning. Perhaps we can also reflect on what technology really is capable of doing because we've been there.

(Martin, Email message, Week 9, 10 September, 1996, 5:08pm)

In an interview after the subject, Margaret indicated a similar benefit of the subject:

Margaret: When you consider that the subject was about implementation of technology-based learning, I think using those kind of tools is really important for people to realise, when they are implementing new technology in a different situation, the kind of things that they should expect.

The difficulties that we encountered are just the kind of difficulties that if you've ever implemented new technology anywhere that you'll find....there is still the same structural problems, it's still the organisational problems, it's still getting people used to using the technology and it doesn't matter how advanced the technology is...people have just as many problems with the implementation of use of audio conferencing as they did with using the internet.

Question: So because people were situated in this learning environment it does help people realise to deal with implementing technology in their workplace?

Margaret: So for Mary now to go and implement that stuff in her [workplace], she's going to be much more aware of the kinds of things to expect as she does her implementation than if she walked in [referring to EDGA957], everything was seamless, she didn't have any problems at all and just became second nature - so then she could go off into her workplace thinking that was going to happen when the reality is it doesn't.

And I don't think that you can learn it any other way than the way we did in that course...is to experience it. So in that respect I think it was very valuable.

The majority of students viewed EDGA957 as a positive learning experience. The opportunity to experience technology whilst learning about its educational implementation implications surfaced as the dominant factor towards this positive learning outcome. Table 4.8 provides some student feedback about the subject.

TABLE 4.8 Case One: Student feedback about the subject being a positive learning experience	
<i>Student</i>	<i>Feedback</i>
Anthony	Practical tasks in applying the theory through strategies helped to make the participants more aware of the enormous area covered by the subject. (Evaluation Assignment)
David	EDGA957 was a valuable learning experience despite the technical glitches, periodic support problems and communication difficulties. We learnt as much about implementation of technology-based learning through the failed attempts to innovate as we did through the more traditional presentations and reading. (Evaluation Assignment)
William	This course has opened my eyes as to the availability and variety of communication channels....The strategies and mediums used in this course stimulated experimentation and a range of interesting uses. Towards the end of the course these uses lost their variety. (Evaluation Assignment)
Joan	Question: Do you think you learnt much from this course? Response: I don't think I learnt it from the content as such but I learnt it because we were doing, we were doing what we were meant to be learning about so in that way yes. (Interview conducted after the subject)
Margaret	I found it really stimulating. I enjoyed it. There were some areas that I hadn't looked into before but I don't know whether some of that came from the job I was doing with the course as well as being a student, because it was a very steep learning curve for me not only learning about video conferencing (VC) but also about asynchronous delivery and a whole lot of other stuff. And I was learning as I went. (Interview conducted after the subject)
Mary	I feel the subject went a good way to preparing me to implement projects using a variety of technology based learning. When the subject started, my concept of technology based learning was CBL packages...That has certainly changed. I am also now aware of the issues that confront a person charged with the implementation of such a programme... (Evaluation Assignment)
Martin	I think this course was the best thing since sliced bread! If you get rid of all those issues and problems we had with the technology....you'd get bugger all out of it... (Interview conducted after the subject)
Chi	It has enlightened the area of technology-based learning. The students achieved the goals not only the content of the course but also technology itself. A traditional-based course could not be as effective as this course. (Evaluation Assignment)
Robyn	The use of communication technologies such as e-mail, videoconferencing and chat line had good impact on my professional work... (Subject evaluation questionnaire)
Mei	In this course, we have experimented with a range of communication tools. This was a excellent experience for one to gain access, learning with all these high technology interactive learning media. (Evaluation Assignment)

Some students commented that the content of the subject heavily weighed towards “implementation”. For example:

As to evaluation - I don't know that I now know all about evaluation - but I know where to start, and I have the tools, and I know where to go to find out... (Mary, Evaluation Assignment)

Question: Do you think you learnt much from this course?

Response: How do to an evaluation - No. But what evaluation should involve and what you need to think about - Yes. (Martin, Interview conducted after the subject)

Although students may not have explicitly learnt evaluation models they implicitly experienced evaluation. They were the recipients of the technology and they personally evaluated how the technology was working for them. This is demonstrated via the reflective journals and the evaluation assignments produced by the students.

Whilst the learning outcome of the subject was viewed as positive, many students found the teaching and learning process frustrating and stressful. Attributes that contributed to the frustration and stress included:

- The exploratory nature of the weekly class sessions. (Although the subject was structured according to weekly topics, the way in which the content issues were addressed each week was exploratory. Students were encouraged to experiment with the technology and explore potential instructional strategies.)
- Problems with access and use of the technology
- The experience of cognitive overload
- Difficulties associated with online collaboration

The previous section illustrated the student frustration that arose during the subject. Table 4.9 provides comments made by the students at the end of the subject.

TABLE 4.9 Case One: Student feedback about the frustration and stress experienced during the subject	
<i>Student</i>	<i>Feedback</i>
Anthony	The use of distance education modes of delivery provided an interesting and sometimes frustrating insight into the technologies and methods involved. Valuable lessons were learnt by participants while being forced to use unfamiliar technologies. (Evaluation Assignment)
Anthony	A little more direction/guidance may have helped the class to be more cohesive. Some members were thrown by the 'uncharted water' nature of the course. (Subject evaluation questionnaire)
Anthony	Learning from the process involved in "distance" collaboration is quite useful in itself, although many find it quite disconcerting and stressful. Problems such as fear of new media/mediums, technology problems, new and unfamiliar discourse, and new paradigms. This is compounded by the fact that there is a wide level of understanding and knowledge background within each group, some do not have access to computers and e-mail at home or at work. (Reflective Journal, Week 3)

TABLE 4.9 Case One: Student feedback about the frustration and stress experienced during the subject	
Charles	<p>I have found the course both stimulating and frustrating, and at the same time tedious toward the end because of the sameness of presentation.</p> <p>Variety is essential in distant education.</p> <p>I am still very optimistic about the technology even with its many hiccups and steep learning curves. I feel the expectations of the technology are over-rated as to what it can actually deliver.</p> <p>Learning new applications during a course leads to technology overkill without reflecting on what has to be learnt. It was bloody hard work putting a tutorial together and learning a new application.</p> <p>I found the lecturer style...vague, loose and unstructured. In some tutorials I really had no idea of what was going on, or what was expected of me. I feel I was not alone. I found this style frustrating and annoying. (Evaluation Assignment)</p>
David	<p>There was a very heavy workload and a real danger of cognitive overload in this course. It challenged us to extend ourselves, perhaps unrealistically in terms of our part-time status and work commitments, but we mostly rose to the occasion.</p> <p>In my case I had to master Powerpoint, html, group discussion software and the intricacies of videoconferencing on top of the actual subject content of my presentation. This was extremely stressful.</p> <p>EDGA 957 was organised in a student centred collaborative learning mode with the role of the lecturer varying from traditional presentations in lecture mode over the videoconference and group facilitation during the first five weeks to a very low key support role in the last nine weeks when students took centre stage....Some students had significant difficulty with the non-directive mode of learning and the minimal contact with the lecturer who rotated between the two locations on successive evenings. (Evaluation Assignment)</p>
Joan	<p>Question: What did you think of the course from a content perspective?</p> <p>Response: I honestly got lost with that. I really don't know. I mean, I felt like I knew the topic that I presented and the research and that was about it....In the first ones when we had discussions about papers I got some of it...I felt I lost the plot along the way I don't know what half the thing was about. (Interview conducted after the subject)</p>
Mei	<p>This subject can be said as a self-learning class 50% of the time in that without the VC we have to organise discussion, arrange time and cope with all the technology problems by ourselves if James was not at this end. (Evaluation Assignment)</p>
Mary	<p>How well did the strategy work? I have mixed feelings on this. At times I think the strategy worked very well for me. I was able to experience the different technologies...At other times I felt the frustration levels were very high...</p> <p><i>Spend some time familiarising people with the tools they must use before throwing them in at the deep end.</i> — I was lucky, I have a lot of experience with various kinds of hardware, especially modems, albeit in a PC world. I still found some of the technology difficult to come to terms with. People like Robyn, who have had little or no exposure to the hardware or to data communications can get lost, discouraged and distressed if left to sink or swim alone. (Evaluation Assignment)</p>
Simon	<p>The whole subject is dry but I like how James teaches it. I know not everyone likes his method. (Interview conducted after the subject)</p>
Simon	<p>In response to Question 3 which asked: Please make any comments about the teaching and learning processes used in this course, Simon replied:</p> <p>"Enjoying the stress of self directed learning" (Subject evaluation questionnaire)</p>

Margaret indicated that she experienced frustration during the subject namely due to assuming dual roles, that of student and that of educational consultant. She frequently could not participate in the subject as a student because her other role

consumed much of her time in and outside class time by providing technical support to both the instructor and the students.

Mary was one particular student that rose to the occasion that the subject threw her into. Her reflective journal, email messages and conversations with the researcher during the subject demonstrated how she was “learning” from the subject and how she was transferring her experiences from the subject into ideas for her work. The following table shows some examples.

TABLE 4.10 Case One: Mary rises to the challenge—she saw the transferability of her experiences in the subject to her workplace. She realised during the subject that she was learning by doing.	
<i>Examples</i>	
There's one thing about all these hiccups. They make you think and you really learn how to cope with things that don't work and strategies to try to make them work. The language starts to become familiar too - I've learnt about URLs, and DNS files that might be corrupt and TCP files, and how to set up Config files for the modem. (Mary, Reflective Journal, Week 3)	
Mary:	I get cheesed off with it [referring to the technology]. Other people get cheesed off with it and pull out.
Mary:	I don't give up. A lot of people don't get past the technology - it's still new to them.
Mary:	But, what it's doing is showing me that when we put technology into our stores, we are going to have people who are going to find it very difficult to get past the technology.
Mary:	I'm learning HEAPS about what we have to do to help some people. I've actually come up with a whole project...that's going to the board next week.
Question:	Have you learnt from the problems you've experienced in this class?
Mary:	Partly, from that, partly from starting to think about technology and learning and education and what we're doing...
(Fieldnotes, Week 7)	
I can see lots of implications for us at [Mary's workplace] in terms of how else we could be using technology for computer based learning. There are ways in which [Mary's Manager] could be using workspaces and email to work with his trainees. It would give them better support than they are getting from him now....But from our experiences in this subject, there are issues that must be dealt with before implementation and training in the technology....Implementation, I think, will be a matter of making the staff comfortable with the hardware and software. (Mary, Reflective Journal, Week 11)	
James, I thought you might be interested in some unexpected and unplanned outcomes of EDGA957....Over the past semester it became apparent that there were real implications in this technology for the work we do at [Company Name]...	
[The MIS Manager] will support us every step of the way in the use of the Internet, email, chat and discussion spaces whether it be via the WAN or through a service provider. To say that we are excited at this turn of events is an understatement! The support is coming from the place we had thought it would be least likely to come...	
So, there you are - it looks as if 957 is going to have been a big influence on the way we do business at [Company Name]...	
(Email message from Mary sent to the instructor and the researcher after the completion of the subject, 14 November 1996, 22:18)	

Despite the frustration, all the students demonstrated a commitment to the subject. There was a lot of effort put into the preparation and presentation of their seminars and each week the majority of students were enthusiastic to participate in the online discussions and trial the different CMC tools. For example, Simon and Martin spent several days together just to prepare their seminar presentation in Week 7. “We

were spending all weekend: 9am until midnight Saturday and Sunday on the team work” (Simon, Interview conducted after the subject). When Walter’s seminar did not go according to plan in Week 9, Joan commented in class:

Joan: Here you’ve got people who are bending over backwards to use the technology and try it out and we keep on going through situations like this and we’re still coming back next week to try. (Fieldnotes, Week 9)

At the end of the subject Charles provided the following feedback in his evaluation assignment.

All the students put a tremendous amount of effort into their tutorials, although the media had become excruciatingly stale and boring.

How many students would sit, wait and discuss topics for 2 hours when the Server was down? How many...students would write up a report of their group discussion and send it off by email at a latter date? Were we just too polite to leave? Maybe, after spending one hour travelling into town and spending big bucks on this course we were just hoping it would get better? I found it difficult to come to grips with nights like this but, it did encourage student bonding in a strange way. (Evaluation Assignment)

4.4.2 THE TECHNOLOGY WAS AS MUCH THE MESSAGE AS THE MEDIUM

Due to the pilot nature of the subject delivery, a strong theme that surfaced from this case was the non-transparency and novelty factor associated with the use of the technology. Table 4.11 provides some student feedback.

TABLE 4.11 Case One: Student feedback about the use of technology in the subject	
<i>Student</i>	<i>Feedback</i>
Mei	We may pay too much attention to the media since the content of the tutorials was less focused....I have doubts about how many people really learnt the content of each presentation when they were busy at play or lost in the media. (Evaluation Assignment)
Margaret	The focus on problem based learning has meant that many students concentrated more on the technology than on the content, something that can occur in any technology based learning environment until the students are comfortable with the technology. (Evaluation Assignment)
Martin	Considering the course was about evaluation, its intent was about evaluation, content was poor, because we really didn't talk of that a lot...because we spent so much of the time wrestling with the technology... (Interview conducted after the subject)
Walter	Overall, if people are aware of the limitations of the media, then they will be able to work around them. In this course, we found out the limitations as we went along, sometimes with disastrous results. Training at the outset will help to avoid these traps, and will make people much more comfortable using technology in learning situations. (Evaluation Assignment)

The technology infrastructure for the subject was not all pre-planned. Although a subject Web site was developed before the subject started, different CMC tools were introduced during the subject. For example, the BSCW Site was introduced in Week 2; the Internet Relay Chat tool called IRCLE was trialed in Week 3; Yak! was trialed in Week 4; Live Chat was introduced in Week 5; and the Discussion Forum tool

was available from Week 10. Margaret looked for CMC software applications that could be implemented in the subject in response from the instructor who wanted to trail and evaluate different CMC tools as part of the content focus of the subject.

I was physically searching and looking to see if there were any new tools. I was monitoring discussion groups and listservers where people were coming up with suggestions with new tools and ways of doing things. That's how we found that discussion forum.
(Margaret, Interview conducted after the subject.)

The onus was on each of the students to learn the tools by themselves. This affected interaction as the technology was not transparent in the subject. Students were coming to grips with using a new tool and experiencing a new delivery strategy as well as learning the content. Some students appreciated the significance of this. For example, William provided the following statement in his evaluation assignment.

In general I believe it fulfilled most students expectations. When discussing strategies with others not involved with the course it became obvious that many of the problems we faced were due to the fact that little work has been done in this area. In fact the subject is at the cutting edge. (William, Evaluation Assignment)

Charles commented on the novelty factor by stating:

I can appreciate the benefits of email, access to world wide information, group collaboration...BUT, the major problem I see is that you must have something intelligent to say....The media was often used as a toy. (Charles, Evaluation Assignment)

The technology became as much the message as the medium in this subject. For example, students discussed features of the technology whilst using it. Consider the following samples of discourse provided in Table 4.12.

TABLE 4.12 Examples of online discourse that demonstrates that the technology was often in the message as well as being the medium.	
<i>Medium</i>	<i>Example</i>
Videoconferencing	By the way, sorry guys, but we...have a novice driver at this end. (James, Videoconference Transcript, Week 2) How do we get the snapshot from the computer to the screen? (Anthony, Videoconference Transcript, Week 11)
BSCW Site	I found - after lots of trials and errors and consultation with Margaret - that you have to save wp docs as text with lines. If you save it as text it sends okay but goes on and on...the one line. (Joan, BSCW Workspace, Week 2)
Yak!	Hi we're still haveing problems getting into the system. William, Simon andd I...can't get on. (Walter, Yak!, Week 4)
Live Chat	Richard - 08/13/96: 19:08: We can't scroll back, every time we do, someone posts a new message, that takes up to the top of the screen. (Richard, Live Chat, Week 5)
Discussion Forum	This doesn't look too bad Margaret. I'm just wondering if this one should complement what we've already got, instead of replacing them. (Richard, Discussion Forum, Week 9) There is a tendency for people to get lost with different threads of the one discussion in this system....Listing messages by person rather than the subject of the message is a problem... (David, Discussion Forum, Week 12)

William saw the value of allowing the technology to be the message. For example he commented in his evaluation assignment:

After an initial learning curve [referring to the use of videoconferencing] the learning plateaued. Students repeated the same techniques and format week after week. Students should be encouraged to experiment with other ideas to explore what the medium is capable of. (William, Evaluation Assignment)

4.4.3 STUDENT ACCESSIBILITY TO THE TECHNOLOGY AFFECTED THE INTERACTION

David presented an apt summary of technology accessibility issues that students experienced during the subject:

One of the major problems with EDGA 957 was that students had variable access to the technology based tools and wide variations in skill level in utilising them....Some EDGA 957 students had access to sophisticated work facilities....Others had to rely on marginal home computers, commercial Internet providers and the limited access to the computer laboratory at University House in Sydney. If one's skills were PC based then the Mac laboratory at University House presented a further hurdle. The network link between Sydney and Wollongong was also a problem with very slow response times when the whole class was communicating on some occasions. The University of Wollongong server was also down or inaccessible on numerous occasions... (David, Evaluation Assignment)

All students had access to computer facilities either from home, from campus, or from their workplace. Apart from David, who owned an IBM compatible computer and whose computer skills were based on the IBM platform, all students were familiar with the Macintosh platform and used Macintosh computers.

Five students had Internet access from a private Internet Service Provider, two students had Internet access from their workplace, and the remaining seven students used the University of Wollongong Internet service.

Twelve of the fourteen students had Internet access from home or from their workplace and email accounts, either before the subject commenced or by the first few weeks of the semester. Two students, Robyn and William, had difficulty accessing the Internet outside class time. William only gained Internet access and an email account from his workplace in Week 9. Robyn, although she had an email account she did not use it nor accessed the Internet outside the campus lab for the entire semester.

Table 4.13 outlines Internet access for each student.

TABLE 4.13 Case One: Internet access details for each student	
<i>Students in Sydney class</i>	
<i>Student</i>	<i>Internet Access</i>
Anthony	Private Internet Service Provider
Charles	Private Internet Service Provider (Charles wanted to use the University of Wollongong's Internet service but he did not know how to configure the communications software on his computer, thus he subscribed to an ISP.)
David	Workplace Internet connection
Simon	Private Internet Service Provider
Walter	Private Internet Service Provider
William	Workplace Internet connection (Internet access was not available until Week 9)
<i>Students in Wollongong class</i>	
<i>Student</i>	<i>Internet Access</i>
Joan	University of Wollongong
Mei	University of Wollongong
Margaret	University of Wollongong
Martin	University of Wollongong
Mary	Internet Service Provider (Mary used the University of Wollongong's Internet service for the first two weeks but due to access difficulties she subscribed to an ISP in week 3.)
Chi	University of Wollongong
Richard	University of Wollongong
Robyn	University of Wollongong (Robyn did not access the Internet outside class time for entire subject.)

Several students who accessed the Internet from home using the University of Wollongong's Internet service complained of their difficulty in obtaining a connection. Mary out of frustration of not being able to dial-in as the number was always engaged subscribed to an ISP. Richard and Mei also commented they experienced the "engaged tone" and opted to check their email and access the subject Web site from campus. The following feedback was offered by Mary:

One of the most frustrating things about this subject has been the inability to enter the Uni server from home. If we are teaching technology based learning, and its use in distance learning is a large benefit of TBL, then we must allow people access from remote sites and isolated sites, as well as labs. They need to experience dial in as well as network use. Not being able to get on, then not being able to use it to its potential negates the benefit to the subject. The expense, when using commercial providers, is a deterrent to signing on at regular intervals to fulfil the subject requirements. (Mary, Evaluation Assignment)

Charles was another student who like Mary raised the issue of equity (in respect to the use of technology).

The initial cost of distance education makes general implementation near-impossible (I have spent around \$5000+ on this course-new computer, university fees, modem, connection fees...and this raises equity problems. Education and this mode of delivery is not cheap. (Charles, Evaluation Assignment)

4.4.4 TECHNICAL SUPPORT (OR THE LACK THEREOF) SURFACED AS A STUDENT ISSUE

The need to provide technical support to students surfaced as a major issue. Overall, students felt that there was a lack of technical support in the subject. Three of the six Sydney students perceived an inequity of support between the two groups. There was also an expectation that Margaret was to provide the technical support during the subject. Table 4.14 illustrates some of the student comments about the issue of technical support.

TABLE 4.14 Case One: Student feedback about technical support provided in the subject	
<i>Student</i>	<i>Feedback</i>
David	Technical assistance was essential....For the Sydney group the problems were compounded by communication difficulties when the technical support was based in Wollongong....In my case the Wollongong support person was away most of the week prior to my seminar....There seems to be a critical need to define the essential infrastructure and support required for optimal learning in EDGA 957 and to ensure it is provided. (Evaluation Assignment)
Robyn	Re: Accessing the Internet. I did not get to use it although Richard helped me. Someone from the technical section in the uni could have helped me. Access to technical people is impossible. As if you are always begging for help. If a class will be set up using this type of communication technology, there should be a policy and procedure in place instead of messing around to get an e-mail address. (End of subject evaluation questionnaire)
Simon	The Sydney group was decidedly disadvantaged by the lack of technical support and training....I would suggest that a technical support person who can explain and train students, set up email accounts and familiarise students with the use and protocols of the Chat and Workspaces should be available for at least the first six weeks of the course. This person could also twiddle the knobs in the VC sessions. (Evaluation Assignment)
William	As the only technical support was based in Wollongong...it enhanced the feeling of inequitable access for the Sydney students when compared to the opportunities and support allowed to the Wollongong students. A suggestion to avoid this perceived lack of access by Sydney students would be to inform the technical support of the situation. They must be made aware of the difficulties faced by the Sydney student and be aware that they are sensitive to a lack of support. (Evaluation Assignment)

4.4.5 THE SUBJECT WEB SITE BECAME A REPOSITORY OF STUDENTS' SEMINAR WEB PAGES

During the subject, the subject Web site was used mainly as a repository for the student seminar Web pages and a pointer to the online discussion tools. Six issues surfaced in respect to the use of the Web site in the subject:

1. Email became the predominant communicative medium
2. There was no central place to post messages
3. The Web site was not regularly updated
4. The interface became unclear
5. Weekly class agendas and content material usually appeared on the day of class
6. The "anchor" point for the class was the weekly meetings not the Web site

The conclusion drawn by Mary provides an apt summary:

The web page is still, to my mind the disappointment of the semester, I think it had lots of unfulfilled potential.
(Mary, Reflective Journal, Week 13)

If the Web page is a part of the subject use it and update it very regularly.

It is most frustrating to be told that there will be this that and the other used on a web page and to log onto it every week and find that there are no week by weeks after week 6, that there are no updates other than the web pages for seminars, no messages from the lecturer and so on.

People stop accessing it if there's nothing new, and then when you need to send them a message, they don't see it. (Mary, Evaluation Assignment)

It is contended that many of the issues that surfaced about subject Web site were related to the fact that the participants (Margaret included) did not have direct access to the Web site. Thus, an intermediary person, being the programmer who worked in Margaret's area, was required to make changes to the site.

4.4.5.1 Email became the predominant communicative medium

Email became a popular medium to contact students. Margaret used email to inform the class of new discussion tools added to the Web site. Several students, for example, Mary, David and Richard, used email to notify the class about their seminar presentation. Some students for example, Mary, Simon and Walter, notified the class of changes in email addresses via email instead of updating their personal information in the Student Profile section of the Web site.

4.4.5.2 There was no central place to post messages

"House keeping" messages for the class were posted in a variety of locations. For example, in Week 2 a notice appeared for students in the *Messages from the Lecturer* area. In Week 8, the instructor posted the following message in the Live Chat space.

James - 09/03/96:16:42: Teleconference will be from 5:30 to 6:30 Tonight!

In Week 10, notices were posted at the bottom of the Home Page (which resulted in many students not seeing those messages). Mei provides an apt description.

If you want to check what's happening next week, you either get an Email or you have to check if something new is on the BSCW site, or in the Discussion forum, or in the Week-by-week section on our web page, or down the bottom of the screen on the front of our home page, or in the messages from the lecturer. There are too many places to look. (Mei, Evaluation Assignment)

4.4.5.3 The Web site was not regularly updated

The *Week-by-Week* area was only used for the first five weeks. The *Messages from the Lecturer* section was not updated after Week 2.

The *Student Profile* section was not regularly updated. For example, Mary, Simon and Walter informed the class of their changed email addresses yet these details were not updated in the *Student Profile* area. When William finally obtained an email account his email address was not added to the *Student Profile* area.

4.4.5.4 The interface became unclear

The weekly student seminar Web pages were stored in the *Workspace* section. This caused some confusion for students and they thought the student seminars would be found in the *Week-by-Week* area. For example, in Week 6, Joan said she had accessed the *Week-by-Week* section looking for Chi's seminar paper. She didn't think it would have been put in the *Workspace* section. Margaret stated in her evaluation assignment that a disadvantage of the site was that the "interface was unclear. The headings did not always reflect the content of pages".

4.4.5.5 Weekly class agendas and content material usually appeared on the day of class.

During the instructor-led weeks, the agenda for the class was usually available on the day of class (except in Week 5 when the agenda was posted to the site the day after the class).

Apart from Mary, all student seminar Web pages were available from the Web site on the day of the presentation. Interestingly, even David, who had made several requests to the class in previous weeks to have the content on the Web site well in advance, was not able to have his seminar Web page ready before the day of his presentation.

4.4.5.6 "Anchor" point for the class was the weekly meetings not the Web site.

The subject Web site became a complement to the weekly class. The Web site was not the central point for communication and interaction among students and between the students and the instructor. The class meetings were the central point.

In Week 4, Joan commented in class that she did not access the subject Web site. Instead, she bookmarked the BSCW site in Netscape and directly accessed the BSCW site. Apart from the verbal dictation of the URL address of the subject Web site in the first videoconference, there was no other information about its existence. It was not included in the hard copy subject outline. It was not bookmarked on browser software installed on the computers in the lab.

4.4.6 THE NEED FOR ONLINE INTERACTION WAS DRIVEN BY THE FIXED WEEKLY CLASS STRUCTURE

4.4.6.1 Weekly class focus

The weekly class meetings drove the need for students to interact with each other. Students came to class each week expecting something to happen for the class duration of three hours. The use of the technology and the online tasks “fitted” into the weekly class framework. As such, online interaction was predominantly synchronous and occurred in class time.

In the first videoconference the instructor suggested an asynchronous approach be used in the seminar presentations. He suggested that students moderate an asynchronous class discussion during the week and then use the class time to summarise the discussion. All the students, however, devised synchronous delivery strategies. As David concluded:

Irrespective of the collaborative tools being used for student presentations in the second half of the course, no one managed to initiate meaningful computer-mediated discussions prior to the presentations...
(David, Evaluation Assignment)

Even in Week 11 when the instructor was absent, David and Robyn went ahead with a synchronous presentation.

The difference in start time for the Wollongong and Sydney class became problematic. Several students in the Wollongong class felt that the first hour was wasted when the instructor was not physically present. For example, When the instructor did not attend the Wollongong class the first hour was usually spent as an informal chat session. When the instructor did attend the Wollongong class the Sydney students were often disadvantaged, as they would miss out on what was discussed in the hour before they arrived to class.

The fact that UOW group meets an hour earlier than the Sydney group causes problems in synchronising the collaborative sessions. It takes our team until 7 - 7.30 to set up and by that time the other group has gone home.
(Anthony, Reflective Journal, Week 3)

"I think that a lot of time was wasted as the Sydney group was left without clear direction and purpose because 50% of the class had left.
(Anthony, Evaluation Questionnaire)

Much of the social interaction occurred in the physical class not online. The description for Week 9 provides an apt example.

4.4.6.2 Discrete weekly structure of the discourse

The subject was designed to present new content each week. The online interaction that took place each week was characterised as synchronous and discrete with little student preparation before class. There was no follow through of content from week to week and thus no build up of online discourse occurred.

4.4.7 VIDEOCONFERENCING WAS USED PREDOMINANTLY AS A PRESENTATION MEDIUM

Table 4.15 provides a summary of the use of videoconferencing in Case One.

TABLE 4.15 Case One: The use of videoconferencing			
<i>Weeks 1 to 5 — Instructor led weeks</i>			
<i>Week</i>	<i>Duration</i>	<i>Operators</i>	<i>Purpose</i>
1	Two hours	Sydney site: Instructor Wollongong site: Margaret PowerPoint slides: Margaret	Introduction to the subject.
2	One hour	Sydney: William Wollongong: Joan PowerPoint slides: Joan	Introduction to the online task: Successmaker.
3	One hour	Sydney: Anthony PowerPoint slides: Anthony Wollongong: Richard	Class discussion about the Successmaker task.
4	One hour	Sydney: Walter Wollongong: Margaret PowerPoint slides: Margaret	Presentation of the Successmaker student group proposals.
5	One hour	Sydney: Instructor Wollongong: Margaret	Class discussion about an allocated reading.
<i>Weeks 6 to 14 — Student led weeks</i>			
7	30 minutes	Sydney: William Wollongong: Chi PowerPoint slides: Margaret	Content presentation by Martin and Simon.
8	50 minutes	Sydney: Anthony Wollongong: Mary PowerPoint slides: Mary	Content presentation by Charles and Joan.
11	30 minutes	Sydney: Simon PowerPoint slides: Anthony Wollongong: Margaret	Content presentation by David and Robyn.
12	50 minutes	Sydney: Instructor Wollongong: Robyn PowerPoint slides: Joan	Content presentation by Margaret.
13	One hour	Sydney: Simon PowerPoint slides: Walter Wollongong: Martin	Content presentation by Anthony and Richard.

The table illustrates that apart from Weeks 3 and 5, videoconferencing was used predominantly as a presentation medium. The main purpose a videoconference served was to present content and act as a support to the online CMC activity that was conducted by the class after the videoconference. David and Simon made the following comments about this in their evaluation assignments.

Although some students attempted to be adventurous most stuck to the proven formula of a videoconference complemented by live chat or an Interaction Threaded Discussion. It was important to have a videoconference presentation to communicate some of the main points re a topic and also to give a sense of focus and occasion to the event. (David, Evaluation Assignment)

VC is effective as a means of orienting the group around a discussion topic which is to be followed up in a Live Chat session immediately afterwards. It means the whole message is received by the whole class simultaneously and any fine points made clear. In a sense it energises the endeavour. Using VC means that one person has to do all of the preparation and the other students can come in 'cold' to the topic and quickly come up to speed. Video Conferencing is in my opinion, a presentation medium, suited to well prepared deliveries over short periods. 30 - 40 mins is optimum... (Simon, Evaluation Assignment)

Apart from the occasional incidents of student interaction, for example, in weeks 3, 5 and 13, in summary, little spontaneous student interaction occurred during the videoconferences.

It is contended that this pattern of interaction was influenced by six factors:

1. Organisational factors
2. Nature of the discourse structure
3. Student familiarity with the content presented
4. Personal profile of the student cohort
5. Technical features of the technology
6. Videoconferencing room layout

4.4.7.1 Organisational factors

The videoconferencing facility was available for use by EDGA957 for one hour per week and each videoconference needed to be scheduled a few days in advance. (The use of technology incurred a fee, however, it was subsidised for EDGA957 due to the pilot nature of the subject.) The time constraint associated with the use of the technology and the need for pre-scheduling led to sessions that were mainly presentation based. David commented in his evaluation assignment that "this means of interaction inhibits informal chat". In the evaluation assignment produced by

Simon, he commented: “Time is a valuable commodity in an expensive medium like VC”.

4.4.7.2 Nature of the discourse structure

Two issues affected the interaction during the videoconferencing sessions:

1. The participants’ unfamiliarity with the discourse structure imposed by the use of videoconferencing. This issue surfaced early in the subject, for example see the description for Week 2. Discourse etiquette or a protocol for use was not established in the subject. Walter mentioned the need for this as early as Week 2. In Week 5 Martin commented to the researcher that a discourse etiquette tailored to the class’s needs should have been established. He added that such discourse etiquette is cohort specific. By Week 13 the class had become accustomed to the use of videoconferencing and Simon stated that this was because the class had lowered its expectations about the medium:

As a group we are comfortable with the shortcomings of the medium or should I say, we have lowered our expectations and no longer feel agitated by the loss of visual and audio cues. (Simon, Reflective Journal, Week 13)

2. Due to the pilot nature of the subject, students were encouraged to operate the videoconferencing controls therefore each videoconference was operated by different students.

Walter was quite vocal about this issue during the subject and the following two excerpts taken from his contribution to the BSCW workspace created by Martin and Simon and his evaluation assignment provide a comprehensive summary.

In the video-conferencing medium we miss out on a whole range of meta-communication. In a live meeting I can choose whom to look at, regardless of who is speaking, and as a result I am at liberty to interpret the wealth of non-verbal communication that is being given out by the others in the room. In a video conference I can only get cues from what's on camera. Using this medium, I have lost both the opportunity to be informed by a whole range of non-verbal cues, and the ability to select whose cues I want to focus on. With the bandwidth that our video conference has been operating on facial expressions are not a reliable source of communication, even when the camera is focused on one individual.
(Walter, BSCW workspace, Week 7)

Difficulties with the discourse included the need on some occasions to use the mute button. On a couple of occasions early in the course people felt the need to exclude the group at the other end from their comments - there was a them-and-us atmosphere in the group. I noted in our fourth session that the use of the mute button had not been agreed, and that this meant that more people were frustrated by it. In fact, we didn't really agree any protocols for using the medium at the outset.

In Sydney there was a different operator most weeks, so that almost everyone got a chance to operate the equipment. This was good, in terms of exposure, but bad in that it led to the camera being incorrectly focused for uncomfortable lengths of time. Initial training in how to operate the system was lacking - we were just thrown straight into it.

The video camera tended to dominate the speaker's attention, with the result that relatively little attention was paid to the people in the same room as the speaker. A speaker who moved his head around to address the people in the same room tended to look unfocused and agitated at the other end. So speakers are forced to focus directly on the camera if they want to use the medium effectively.

For a novice, this is quite difficult when there is a television screen in the room with his own face on it. In the first few weeks, people were continually looking off-camera, to where one assumed the television screen was located.

The medium doesn't allow users to make effective observations of participants' body-language and non-verbal cues. In a real meeting, it is often more interesting to watch the people who aren't speaking, to observe their physical reactions to what is being said, and to get an idea of their interactions with others in the room. With VC, this is simply not possible, and a lot of effective communication is lost here.

Overall, I would say that the use of video-conferencing in the course was a positive experience...
(Walter, Evaluation Assignment)

4.4.7.3 Student familiarity with the content presented

When students were familiar with the content presented they were more likely to contribute to the class discussion. Table 4.16 provides some examples.

TABLE 4.16 Case One: Examples that illustrate how student familiarity with content influenced the interaction that occurred in the videoconferencing sessions	
<i>Week</i>	<i>Example</i>
1	In the first videoconference little interaction occurred. In a meeting held in the second week of the subject, Margaret suggested to the instructor that he allow more interaction in the videoconference. The instructor said it was difficult to encourage interaction in the first week when students have not read any content material. (Fieldnotes: Meeting, Week 2)
2	The Wollongong class had discussed the Successmaker task in a face-to-face session with the instructor prior to the videoconference. In the videoconference, several of the Sydney students were confused about the task, as it had not been explained to them. (See the description for Week 2.)
3	Most of the students had commenced working on the evaluation task about Successmaker. The instructor used the videoconference to further discuss issues about the task. Student interaction occurred and it felt like one class. (See the description for Week 3.)
12	Margaret led the videoconference. Although she encouraged interaction by asking questions, little interaction occurred because students had not read her Web page prior to coming to class. Here is an excerpt from the videoconference. (See the description for Week 12.)
13	The videoconference by Anthony and Richard presented a topic that most students in the class were familiar with. Towards the end of the videoconference there was a time span of approximately 20 minutes where students from both sites were engaged in discussion. Questions were both asked and answered by students other than the presenters. Anthony had to interrupt the discussion stating that time was running out. (See the description for Week 13.)

4.4.7.4 Personal profile of the student cohort

In Week 2, Mary stated in her reflective journal that the interaction that occurred in the videoconference might be attributable to the personalities of the students in the class:

Video conferencing tonight was better. I think we're becoming more used to the experience although there are some in the group who prefer to be out of camera range and who have little to say. Mind you, they are by nature a little shy and reticent to join in discussion, so this may not be the Video Conference. (Mary, Reflective Journal, Week 2)

By Week 7 her views were unchanged, as illustrated by her contribution to the BSCW workspace created by Martin and Simon:

I get the strong feeling that one or two in the group, who are camera shy or inclined to embarrassment at seeing themselves on the screen, probably find the medium inhibiting. This creates "noise" that gets in the way of communication and inhibits discussion. (Mary, BSCW Workspace, Week 7)

David also raised the issue about personality and its relationship to interaction in the videoconferences:

Group discussion was largely left to the more assertive/articulate members of the two groups although this may not be much different from a face-to-face tutorial. (David, Evaluation Assignment)

The perceptions held by David and Mary are consistent with the data. For example, Chi and Mei, apart from their personal introductions in Week 1, did not make any contributions in the videoconferences. However, they both thought of their experience with videoconferencing as positive. Chi replied to an email sent by Margaret stating that she felt comfortable using videoconferencing although she stated: "I prefer [sic] to see somebody else on the screen but myself" (Chi, Email, Week 14). Mei stated in her evaluation assignment that videoconferencing was "the most exciting interactive communication learning network in this subject for me because I never experience this kinds of high technology before". However, she went on to state: "Not every one can feel confident and comfortable when talking in front of camera. That is one of the reasons that I did not utilise VC for my week 9's presentation".

Walter, from the Sydney class, stated that he felt uncomfortable using videoconferencing, although from the class observations, he contributed frequently to the discussions.

I find the video-conferencing very uncomfortable. First, when I have something to say, choosing between addressing the camera, and the more powerful urge to address the people sitting in the same room as me gives rise to a huge dilemma: my instincts make me want to talk to the room, yet my head knows that I will be communicating more effectively if I talk at the

camera. I feel that I end up coming across to the remote group as unfocused and insincere, while to the people in the room with me I am evasive and scatty. I suspect that the room in Wollongong (with a long side facing the camera) is set up better to avoid this problem, because most of the group is outside the speaker's field of view. In Sydney, because we are sitting at a V-shaped table, in order to put the half of the group opposite out of view (and thereby speak directly at the camera, we have to turn away and seemingly ignore them. Not easy. (Walter, BSCW workspace, Week 7)

Charles, who was known to the class as the one who wanted “classroom order”, thought videoconferencing was a success yet he didn’t make many contributions. Even in his seminar presentation, Joan did most of the talking.

Two way video conferencing (VC) was a great success....VC proved itself to be a very ‘strong’ and reliable communication link. The equipment did not fail once and was easily manipulated after a few minutes of trial and error by staff and students. By week 5...the inhibitions of video shyness had virtually disappeared and the group was in Speak Easy mode. VC was also used as a stimulus to continue face to face or computer mediated conferencing...which is did with great success. (Charles, Evaluation Assignment)

The above examples indicate that the personality and their perception of the purpose that the videoconferences were to serve influenced the interaction that occurred.

4.4.7.5 Technical features of the technology

The fact that one person operated the equipment at each site affected the interaction as control was relinquished to two people. Often students signalled the operators before making comments.

Several technical problems were experienced and this influenced the interaction. Problems such as, delays in transmission of PowerPoint slides, and delays in visual image transmission (which resulted in the audio and visual image to be out of sync), affected the flow of the videoconference, which in turn affected the spontaneity of the interaction. Consider Walter’s feedback:

The discourse in a video conference is considerably affected by the medium. In our particular case, there is a short delay in the connection, which means that, for example, if someone makes a joke, the laugh comes back about about one second later than expected - delay enough to make you feel a moment of dread that your joke has fallen completely flat. Because of this delay problem, everyone has to take very polite turns in the conversation, and nobody talks until they are sure that the previous speaker has finished. This often makes the conversation very stilted and formal. (Walter, BSCW Workspace, Week 7)

The delays in the visual image transmission often created cognitive noise. The visual capability of videoconferencing required high levels of concentration. David supported this by stating:

This is probably true in terms of both assimilating the content of a discussion and observing group interactions and determining when to intervene.
(David, Evaluation Assignment)

Margaret raised this issue in the interview conducted after the subject:

Videoconferencing takes a lot more concentration than face-to-face....And that first one where he went for two hours was just simply exhausting. I was exhausted...I'm sure everyone else was too and video conferencing is more tiring because people have really got to concentrate..."
(Margaret, Interview after the subject)

The visual capability however, enabled social interaction to occur. This usually occurred at the beginning and end of the videoconference. The visual aspect did facilitate class bonding. For example, Simon commented: "The ability to see each other does create some kind of bond." (Evaluation Assignment) However, there was a distinct "them and us" feel during all the videoconferences. In Week 13, Martin commented that the Sydney group were "like TV characters". In the interview conducted after the subject Martin stated that he established a close bond with the Wollongong students but did not feel as part of one class community.

Simon indicated that the videoconferencing keypad was not intuitive.

Technology Issues: I was controlling the camera movement and data transfer from the Sydney end. I hadn't used it since the first or second evening and then only once. Whilst I have a lot of experience behind a camera and am reasonably literate with electronic gadgetry, I find the controls on the console not user friendly. They are too complex, the icons are meaningless in that they are not at all intuitively understood or if they are recognised, ie a camera, you don't really know which camera or which camera function it refers to.
(Simon, Reflective Journal, Week 11)

4.4.7.6 Videoconferencing room layout

Three aspects of the physical environment influenced the interaction in the videoconferences: lighting, air-conditioning and seating arrangement of the room. Student feedback about the videoconferencing room layout is provided in Table 4.17. (Not that William and Walter differ in their opinion about the seating arrangements.)

TABLE 4.17 Case One: Student feedback about the videoconferencing room layout	
<i>Student</i>	<i>Feedback</i>
Mei	Classroom environment is one of the VC issues that one should consider. From week 1 until week 5, it was usually hard to recognise people's face from the screen due to the lack of light and the table setting that cause a problem for the camera. It could not clearly fit all the faces into the screen at once. It is important to arrange the VC's environment so it is natural and bright, ensuring that the camera can focus clearly on every one. (Evaluation Assignment)

TABLE 4.17 Case One: Student feedback about the videoconferencing room layout	
Simon	The evening had some comic relief provided by lots of clothes coming off. The air-con was turned up too high and we were all sweltering. So it worth remembering that peripheral issues such as comfort and lighting contribute to the success of the medium. (Reflective Journal, Week 8)
Simon	Increase the ambient light level and install individual overhead spots on each chair. (Evaluation Assignment)
Walter	The lighting is poor in both sites. The seating arrangement in the Sydney site was more appropriate than in the Wollongong site. (Fieldnotes, Week 2)
William	The seating at Sydney was not only uncomfortable but was against occupational health and safety standards in its set up. The table ensures that most participants twist in one direction for an extended period of time....This was reflected to a lesser extend at Wollongong. Individual microphones would also prevent people for leaning towards one main output area. (Evaluation Assignment)

4.4.8 TIME, TASK AND TOOL INFLUENCED THE NATURE OF THE CMC INTERACTION

Except for the Successmaker asynchronous online activity scheduled at the beginning of the subject, all online CMC activities were conducted synchronously and in class time. The synchronous class discussions occurred using the Live Chat and Discussion Forum tools. Different strategies were devised to engage students in an online activity. Table 4.18 summarises the strategies employed using Live Chat and the Discussion Forum.

TABLE 4.18 Case One: Strategies employed when using the Live Chat and Discussion Forum tools				
<i>Week</i>	<i>Tool</i>	<i>Mode</i>	<i>Task</i>	<i>How students worked on the task</i>
5	Live Chat	Synchronous	Discuss one question.	Each student used a computer to post individual messages in the Live Chat space. There was no online discussion moderator.
6	Live Chat	Synchronous	Discuss three questions.	Each student used a computer to post individual messages in the Live Chat space. Both the instructor and the student giving the seminar facilitated the online discussion.
7	Live Chat	Synchronous	Discuss one question.	Two student groups were formed in each site and allocated a group name. Each group collaborated online with their respective group from the other site. The group name was used to differentiate the messages in the Live Chat space. For example, The two Sydney student groups were named "MUNSTERS" and SIMPSONS" (upper case). The two Wollongong student groups were named the same but in lower case. The two students who presented the seminar facilitated the online group discussions.
8	Live Chat	Synchronous	Communicate on progress of face-to-face activity that occurred in both sites.	An "online scribe" was nominated from each site. Communication between the two sites occurred in the Live Chat space via these two scribes.

TABLE 4.18 Case One: Strategies employed when using the Live Chat and Discussion Forum tools				
9	Live Chat	Synchronous	Follow presenter's instructions, then conduct an online discussion.	<p>Each student used a computer to post individual messages in the Live Chat space.</p> <p>The seminar presenter wanted to use the Live Chat space to broadcast instructions to the class. He wanted to direct the class to external Web sites and then facilitate an online discussion about these resources.</p>
10	Discussion Forum Live Chat	Synchronous	Read a case study and discuss several questions.	<p>Students in each site were to form small groups and post their answers about the case study into one discussion thread that were created in the Discussion Forum.</p> <p>Some students posted group messages but most students posted individual messages.</p> <p>The Live Chat space was used for off -task discourse.</p> <p>The seminar presenter facilitated the online discussion.</p>
11	Discussion Forum	Synchronous	Read a case study and discuss several questions.	<p>Students from both sites were to form three groups and discuss the case study in one of the three discussion threads that were created in the Discussion Forum.</p> <p>Some students posted individual messages and some posted group messages.</p> <p>One of the two seminar presenters facilitated the online discussion.</p>
12	Discussion Forum Live Chat	Synchronous	Read one of three case studies and discuss several questions.	<p>One discussion thread for each case study was created in the Discussion Forum. Students from each site were allocated to a discussion thread and collaborated online on their particular case study.</p> <p>The Live Chat space was used to summarise the group discussions.</p> <p>The seminar presenter facilitated the online discussion.</p>
13	Discussion Forum Live Chat	Synchronous	Read a case study and discuss several questions.	<p>Three discussion threads were created in the Discussion Forum. Students from each site were allocated to a discussion thread and discussed the case study online.</p> <p>Some students posted group messages, although most posted individual messages.</p> <p>It was intended that the Live Chat space be used for off -task discourse.</p>

The CMC environment was used mainly to perform the content specific activities. Little social interaction occurred in the Live Chat and Discussion Forum environment.

The following issues affected the quality of the interaction that occurred:

1. Time spent on the online task
2. Structure and clarity of the online task
3. Face-to-face discussion in the two student groups
4. Student motivation and incentive to participate in the online task
5. Familiarity with the tool

Provided below is David's and Margaret's conclusion about the online activities:

It would be my contention that the EDGA 957 students never realised the full potential of the collaborative tools provided because of acute time constraints, an associated unwillingness to invest large amounts of time in mastering the tools and support problems. (David, Evaluation Assignment)

There was concern expressed by a number of students that the discussion lacked the rigour one expected in a postgraduate course. This may have been influenced by a number of things. The learning environment was based more on a constructivist model than the usual instructivist post graduate class. Some students thought they could slide into their seats and be filled with wisdom by the lecturer. These students need more support or scaffolding in the environment to take on more responsibility for their learning. This was often obvious in student seminars where other students had not read about the topic before the presentation and consequently found it difficult to join in the discussion afterwards. Some students like to give consideration about their response before posting and time was usually critical. This could have been overcome by continuing the discussion on the forum until the following week then debriefing at the start of the next videoconference.

The technology itself had a significant impact on student discourse, There were a number of issues involved....the discussion forum and chat space provided avenues for usually shy students to speak up....However as in any class there were still some lurkers who preferred to watch rather than participate. (Margaret, Evaluation Assignment)

4.4.8.1 Time spent on the online task

The time constraint associated with discussing new content for one class session during class time affected the quality of the interaction because students were often not familiar with the content and were not able to reflect on or digest the material before discussing it.

At some points, people were often not ready for discussion because they could not read the "Web pages" beforehand....That is one of the reasons that we could not have really strong and fully interactive discussion. (Mei, Evaluation Assignment)

We have now seen a number of ways to use the discussion facility - they are all effective. But I still think the best way is over a period of time to gather lots of thought and discussion points and then use live chat to really talk about it. (Mary, Reflective Journal, Week 13)

The nature of synchronous discourse requires that users are proficient typists and are able to express themselves via text. This was a challenge for several students.

Consider the following student feedback:

Aristotle once said, 'That writing stops the thinking process'. He could be right if you are a slow typer and poor speller....CMC is hampered by slow typing speeds and I am very conscious of spelling, composition and grammar. I find writing a reflective process because of its permanency.
(Charles, Evaluation Assignment)

The chatting mainly relies on writing skills, and that ability is a big challenge for one as an ESL student. Chi and myself usually take longer than others in order to understand and respond to the conversation. In addition, the content of the chat often includes some slang that one cannot pick up immediately....That can be seen as my personal weakness, yet that is the main issue which arises from the assessment of using Live Chat. (Mei, Evaluation Assignment)

It is contended that online synchronous discussion is not beneficial for students from non-English speaking backgrounds.

If synchronous discussions are conducted perhaps they may be beneficial for short periods of time. For example Charles concluded: "I don't think you could communicate for more than 1 hour on this media anyway (chat)" (Evaluation Questionnaire). David provided the following comment: "Overall this collaborative tool [Discussion Forum] was a success but it is noticeable that there is a definite limit to how long students can sustain a focused discussion on this medium" (Evaluation Assignment).

Overall, the textual discourse structure requires more time than a face-to-face discussion. Consider Simon's reflection about collaborating on the seminar topic online:

I do find personally that collaborative projects are more difficult when the parties are remote than when proximate. Part of the problem is that to communicate in a textual form such as email, means taking time to preparing a convincing argument, drafting and redrafting. By comparison a face to face showdown will be full of half finished sentences, interruptions, tonal textures, facial gestures and body language and have aired the issue and vented the emotion in a fraction of the time. (Simon, Reflective Journal, Week 13)

4.4.8.2 Structure and clarity of the online task

Online discussions were more focused when students were assigned to small online groups, were clear about the task and used the CMC tools to collaborate on the task. This was demonstrated in Week 7 in the "Munsters and Simpsons" Live Chat discussion and in Week 12 (Margaret's seminar). David provided the following feedback about Margaret's online activity:

The most successful use of Interaction [Discussion Forum] occurred when the organiser of the discussion had carefully thought out and allocated students to specific groups. If all students contributed to one thread discussion became fragmented. The most successful discussions were likely to occur when students were in smaller groups; had clarity about the task and some help from a facilitator. (David, Evaluation Assignment)

When small groups were formed yet the same task was discussed, the online discussion was not as focused (see the description for Weeks 10 and 11).

Several students attempted to restrict the interaction among the two groups. This was seen in Weeks 8, 9 and 10. Charles devised the “scribe” strategy in Week 8 and it was implemented in by Walter in Week 9 (although not successfully) and at the beginning of Mary’s seminar in Week 10. Margaret’s thoughts about the effectiveness of such a strategy are outlined below.

I don't think the one person recorder is giving people the opportunity for discussion. By the same token I can see the difficulties with the chat space related to so many people on line. Interesting how people have to have control...Margaret
(Email message by Margaret, Week 10, Tuesday 17 September 1996 9:21am)

Margaret - 09/17/96:17:09: Shirley [researcher] - for your notes - its quite difficult being involved from here with just a scribe because I can't really be involved. It would seem chat works best when several are chatting, Other wise might as well just be recorded notes. (Live Chat, Week 10)

Online activities that involved the entire class often led to discourse that was confusing and fragmented, for example, Week 5.

Synchronous activities require that all students commence the activity at the same time. This proved difficult at time due the different starting times of the two student groups and consequently the online discussion was not focused. This was illustrated in Weeks 5 and 6.

The Live Chat tool was used as a complement to the Discussion Forum tool and was used for off-task interaction.

4.4.8.3 Face-to-face discussion in the two student groups

The structure of the class as two geographically separate groups resulted in much of the social interaction occurring within each face-to-face group. Week 9 is one example. Face-to-face discussion was a dominant factor that influenced the interaction that occurred online. The instructor conducted face-to-face discussions with the class he physically attended.

The online environment provided a vehicle for information exchange. The face-to-face environment provided the social aspect of the interaction.

4.4.8.4 Student motivation and incentive to participate

Feedback provided by several students indicated that there was little intrinsic incentive or motivation to participate in the weekly online discussions. Online participation was driven by an extrinsic need to engage the class for a fixed period of time each week. Simon elaborated with the following feedback:

Martin and I put a lot of work into thinking about and preparing our presentation.(usability).Yet I found that during the evening's presentation I was quite stressed. There was a disparity between my level of commitment and the other students' level of engagement with the subject, which is NOT A CRITICISM. What interests me is that this disparity exists at all. Is it because we (Martin and I) are at the centre of the learning experience and our audience are on the periphery. Our motivation is certainly more real than theirs. I would suggest Martin and I were the main benefactors of the evening. Even though we built student-centered activities into the evening, it seems that the subject was not 'real enough to them', to engage them to the point where they might have actually taken anything of value home. (Simon, BSCW Workspace created by the researcher, Week 7)

Martin thought the focus of the seminar presentations was more on the seminar presenter than on the students to participate in the online discussions. In an interview after the subject, Martin was asked whether he read the student Web pages before coming to class. He replied: "I think the fact that they posted it was the issue not the fact that we were to read it and learn from it..."

4.4.8.5 Familiarity with the tool

4.4.8.5.1 *The asynchronous CMC tools were used synchronously*

An issue that surfaced was that asynchronous tools were used synchronously in the subject. This was realised by several students as the following feedback suggests.

The discussion forum was an interesting use of technology in that it was an attempt to use an asynchronous technology in a synchronous way. This did not work and was extremely frustrating to the Sydney participants. (Anthony, Evaluation Assignment)

The discussion software also had many shortcomings in relation to its use in class, mainly because it seems to be for asynchronous discussions, and we were trying to use it in real time. (Walter, Evaluation Assignment)

4.4.8.5.2 *Students had to learn the tool by themselves*

Students had to learn the tool themselves. This caused frustration for many students. For example, Mei and Walter provided the following feedback about the Live Chat tool.

The chat space has a lot of shortcomings which led to people's frustrations:

To enter the chat space and browse through the discussion, you have to first post a message. (Walter, Evaluation Assignment)

No one seemed to know that when you first go into Live chat and see the "clock" icon - which is not loading anything - you just need to type in any character in the name section and click "say it". This was very annoying as I only worked it out a few weeks back! (Mei, Evaluation Assignment)

The BSCW workspace tool caused much confusion. Students were not familiar with how it worked. For example, Martin and Mary both produced a BSCW workspace for their seminar presentations. They assumed an email was sent to all students informing them that the workspace was created. This was not the case as an email was only sent to students that were invited to a workspace but were not registered on the BSCW site.

4.4.8.5.3 The Successmaker task — too much, too soon

The asynchronous task about Successmaker was too much to do in too little time for no extrinsic gain (it was not assessable). Students were not clear about the task. Students had to learn how to use the BSCW site, they had to know about the evaluation models, think about how to prepare an evaluation proposal and had to collaborate online with people they didn't know.

Time constraints played a big part in the ultimate failure of this exercise. It was valuable as a warm up and in future I will feel more at ease, especially as the tone of the exchanges does not have to be so academically rigid. (Simon, Reflective Journal, Week 3)

Researcher: Why do you think the collaboration using the technology didn't work?

Joan: Because we hadn't had experience using it, the technology. There wasn't the time to do it....I think the main problem was we didn't have a clue what we were really doing. (Joan, Interview after the subject)

The critical factor was we were not really sure what we were meant to be doing. So if the task had been clearer in the first place, I think we probably could have done it...asynchronously much quicker. (Margaret, Interview after the subject)

4.4.9 THE ASSESSMENT TASKS WERE PERIPHERAL TO THE ONLINE INTERACTION THAT OCCURRED DURING THE SUBJECT

4.4.9.1 Online tasks were not linked to assessment tasks

The online interaction that occurred each week was not related to assessable tasks. This is described above in section in 4.8.4.

Anthony, David and Simon suggested changes to the Assessment.

I feel that smaller assignments due throughout the course would be more helpful.
(Anthony, Evaluation Questionnaire)

If the technology based learning is built around collaborative projects it may be worth exploring the merit of explicit recognition of group performance in the assessment procedures.
(David, Evaluation Assignment)

Perhaps the tasks could come under one major project which runs the 14 weeks and encompasses all the topics. The whole class could form one team and individuals be responsible for various parts. It should relate to a real client. (Simon, Evaluation Questionnaire)

4.4.9.2 Grading of assessment based on individual work

The collaboration activity for the Successmaker task was not an assessable piece of work. This affected the motivation for doing it.

4.4.9.3 Assessment criteria was open-ended

Specific assessment criteria were not provided. The assignments were open-ended and tailored to the individual. For example, the portfolio was based on individual student relevance. There was no set format for the evaluation report discussed. These two assessments were very individual in nature. It was left to the students to decide how to approach the task. Such “open-endedness” caused concern for several students. For example in Week 9 Joan mentioned in class that she thought a lot of work was required for the 30% grade given to the seminar presentation. A Web page had to be developed, a online task had to be organised as well as writing a formal paper. She was concerned that if this was required for a 30% grade then how big was the portfolio assignment to be since it was allocated 40% of the assessment grade. By Week 13, some students were still not clear as to what was required for the portfolio assignment. Joan asked the instructor: “The number of resources we need in our resource folio is pretty open? Or do we sort of weigh it, or...?”

4.4.10 THE TECHNOLOGY FACILITATED FLEXIBILITY IN STUDENT ATTENDANCE PATTERNS

The use of videoconferencing and CMC tools allowed some students to participate in the class discussions even though they were not able to physically attend class. For example, in Week 5, Joan attended the Sydney class. In Week 10, Margaret joined the online class discussion whilst on an inter-state work trip. In Week 12, Mary joined the class discussion from home.

Both Mary and Margaret commented that they it was different experience to participate in the online class discussion from a remote site than within the class.

They both thought it was a valuable experience and they were both focused on the activity.

4.5 DISCUSSION

The ten themes that surfaced from this case study may be further clustered into three categories. The role that *technology* played in the subject; the synchronicity of the subject structure; and the nature of assessment, were the three key factors that influenced the interaction that occurred in EDGA957. Figure 4.4 illustrates how the ten themes have been clustered.

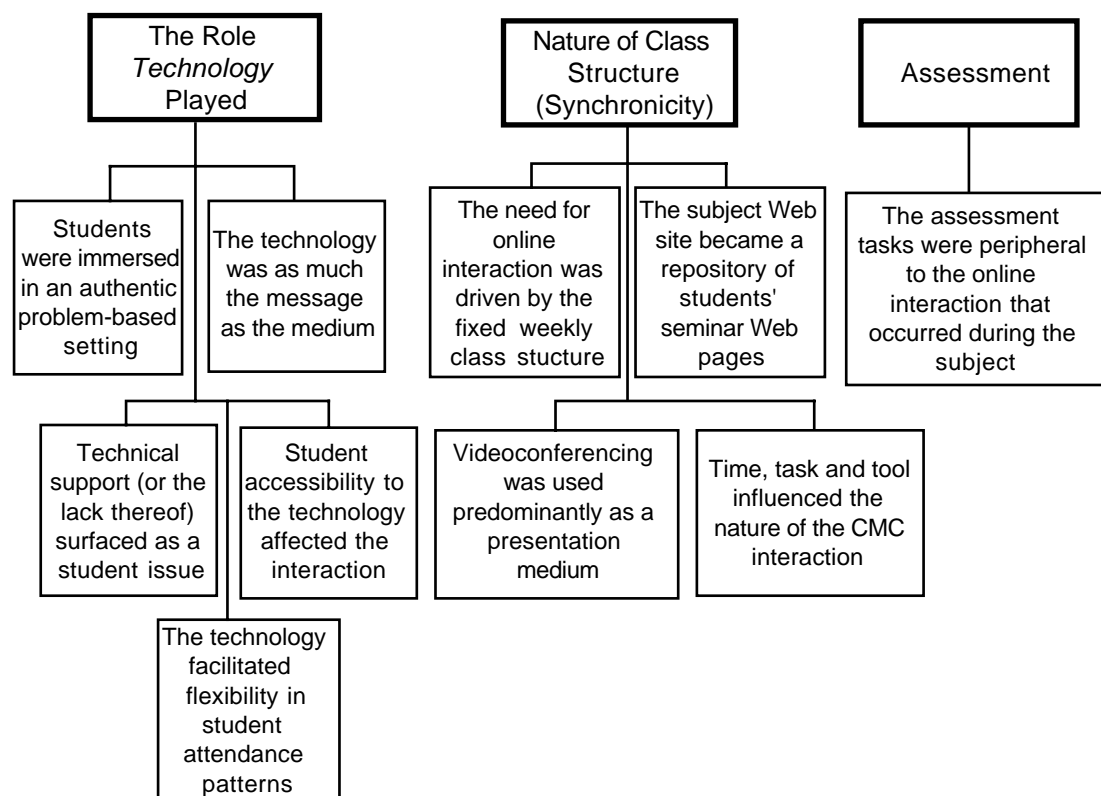


FIGURE 4.4 Case One: The ten emergent themes clustered into three categories

The lessons learned from this case that can inform the pedagogy for the subsequent implementation of EDGA957 are provided below.

4.5.1 CHANGE THE ROLE OF THE TECHNOLOGY

4.5.1.1 Make the technology more transparent

In this case, the technology was the vehicle that drove the learning. The role technology played in the subject was *message* and *medium*. Students learnt about technology-based learning through the actual experience of it. The pilot nature of the subject created an environment whereby the students and the instructor assumed a research community to explore the potential of the technology and reflect on their

own learning and teaching processes. As such, the technology was not transparent and integrated seamlessly into the subject; it was as much the focus as the content material. The student seminar task exemplifies this. Students were recipients of a technology-based learning experience and were able to reflect on the implementations of previous weeks to create their own technology-based learning experience.

Whilst the learning outcomes from this subject were rated as an overall positive by the students, it was accompanied with high levels of frustration and stress. All the students demonstrated great enthusiasm and commitment to the subject, however many also demonstrated intolerance for ambiguity (Jonassen & Grabowski, 1993). Jonassen and Grabowski define ambiguity tolerance as “an individual’s willingness to accommodate or adapt to encounters with ambiguous situations” (p. 333). They describe ambiguous situations as novel experiences that have no familiar cues, or complex situations that have many cues to be considered, or unstructured situations. Thus learners who are intolerant of ambiguity have difficulty with learning situations that have “unknown goals or expectations, unstated criteria for success, or unclear procedures on how to perform” (p. 333). The pressures associated with postgraduate study, especially for students who worked full-time, and being immersed in an ambiguous situation—the exploratory nature of the subject’s delivery, became too much for some.

Therefore, a more transparent approach to the technology could be considered. This may be achieved by implementing scaffolds for the students so that they can become familiar with the technology. Mary noted in her reflective journal for Week 2 that students should be given an opportunity to “play” with the technology. Scaffolds could be structured in the form of small online tasks that students could perform at the beginning of the subject to become comfortable with the CMC tools. The Successmaker task implemented in this case was an example of an online task that was too much too soon. In terms of the content; the task required; and the nature of the task (that is, an asynchronous task using the BSCW tool—which students had to learn how to use themselves); it was scheduled too early in the subject.

From the ten evaluations of the subject produced by the students, eight included recommendations for technical support and student training in future subject offerings. These eight evaluations implicitly suggested an increase in the transparency of the technology. Some examples of student suggestions are provided in the following table.

TABLE 4.19 Case One: Examples of suggestions for improvement offered by students in their evaluation of the subject
<i>Student Feedback</i>
Be totally prepared before using the technology....Have backup proven technologies to use if the new technologies don't work as you expect them to. (Anthony, Evaluation Assignment)
The training of students in the use of technology is essential. You cannot assume that students are competent in the technology. I recommend an introductory training program...
I would prefer if the students could purchase "turn key packages"... (Charles, Evaluation Assignment)
Spend some time familiarising people with the tools they must use before throwing them in at the deep end. I was lucky, I have a lot of experience with various kinds of hardware, especially modems, albeit in a PC world. I still found some of the technology difficult to come to terms with. People like Robyn, who have had little or no exposure to the hardware or to data communications can get lost, discouraged and distressed if left to sink or swim alone. (Mary, Evaluation Assignment)
Student training to use the technology. This may need to be the focus of the first week or provided as an optional additional meeting....(Margaret Evaluation Assignment)
I would suggest that a technical support person who can explain and train students, set up email accounts and familiarise students with the use and protocols of the Chat and Workspaces should be available for at least the first six weeks of the course. This person could also twiddle the knobs in the VC sessions. (Simon, Evaluation Assignment)
Orientation training should be carried out in each of the media to be used. (Walter, Evaluation Assignment)

4.5.1.2 Provide technical support to students

The lack of technical support surfaced as a dominant theme. For future subject offerings, technical support could be provided in several ways, such as:

- A technical staff resource could be allocated to the subject
- Skilling workshops could be scheduled.
- Students could be encouraged to discuss technical concerns in face-to-face meetings and students could assist each other.
- A technical support space could be designed on the subject Web site whereby student could post technical "tips", questions or concerns.

4.5.2 CHANGE THE DELIVERY STRUCTURE OF THE SUBJECT

4.5.2.1 Explore a more flexible asynchronous model

In her evaluation assignment, Margaret demonstrated insight in her comment.

To utilise the benefits of different delivery methods requires a change, not only in the technology being used but in the structure of the course.
(Margaret, Evaluation Assignment)

The strategies implemented to encourage student interaction in the subject were couched within a current practice, that is, the traditional university lecture framework of fixed weekly meetings. The technology was used to facilitate the weekly synchronous "classroom" and little asynchronous discussion transpired. Computer-mediated communication tools were used within a conventional classroom delivery model.

Computer-mediated communication, however, enables students to communicate with other students and with the instructor in an electronic mode over a distance. The technology used in EDGA957 creates options for delivery not previously possible—namely, the physical class meeting no longer needs to be only vehicle for student interaction.

Therefore features of asynchronous communication could be further explored. The reliance of fixed-weekly meetings could be reduced. In an asynchronous mode students could spend more time discussing an issue and contributions to an online discussion could occur outside the fixed synchronous class time. The face-to-face component could then be used to summarise discussions, discuss student concerns or reflect on student constructions of meaning. Workshops could be scheduled to provide students with technical "skilling".

The adoption of a more asynchronous model could reduce or even eliminate the need for videoconferencing as the instructor now has more options to structure his/her physical attendance with students. Options may include organising workshops where students from Sydney and Wollongong could attend, or scheduling Sydney and Wollongong face-to-face classes not on a weekly basis but scheduled according to the needs of students. Perhaps this could involve initial negotiation with students or schedule the classes according to the assessment requirements.

In summary, this case investigated the use of technology to facilitate synchronous communication from different physical locations. The next subject offering could be structured to explore asynchronous communication possibilities.

4.5.2.2 The subject Web site could be used differently

The subject Web site could be further utilised to facilitate an asynchronous delivery model. It could facilitate a change in the way content is delivered in the subject and a change in the way student feedback about the subject can be obtained. The content material for EDGA957, both in its pre-technology implementation—1995 and in the pilot implementation case—1996, was available in hardcopy format, via a subject handbook, and presented verbally each week in class. The content delivery followed a sequential format. Different content was presented each week and all students had to cover the same content at the same time. However, with the use of a subject Web site, content resources can be stored electronically in a common place and can be accessible by students at any time. All students no longer need to address the same

content at the same time. The “seminar presentation” task could be changed to reflect more a creation of a content resource. This would enable all students to submit work at the same time rather than at various times throughout the semester as seen in this case. In turn, this may lead to a “fairer” system as all students could have the same amount of time to work on a task, unlike the student seminar presentations in this case.

Content resources could be provided by the instructor and by the students. The Web pages produced by the students in this case can be considered electronic resources. Subsequent students could then use the electronic resources as content material.

Students could post comments, questions or concerns about any aspect of the subject to the Web site.

In this case, the weekly class was the focal point of the subject. The subject Web site simply became a content storage medium and a pointer to the CMC tools. If the face-to-face meetings are no longer scheduled on a weekly basis, it is contended that the subject Web site may become the focal point. It is therefore critical that, unlike in this case, the subject Web site be regularly updated and that all “housekeeping” messages or subject notices be available in one central location. Also, students should have easier access to the Web site so that two-way communication is possible rather than a one way bulletin board mode of interaction.

4.5.2.3 Synchronicity may still be considered in an asynchronous delivery model

When considering synchronous online discussions, the need for synchronicity must be examined. From the issues that surfaced in this case from the synchronous online tasks, the following contentions are made.

- Synchronous online discussion may be effective when participants are prepared, start at the same time and when it is used to consolidate or summarise content.
- Synchronous discussion may not be a suitable strategy for non-English Speaking backgrounds.
- Synchronous online communication may be effective to generate class bonding, that is, a community presence. In this case, the face-to-face classes facilitated class bonding. However, Margaret’s and Mary’s commitment and focus to the online task when they participated from a remote site indicated

that perhaps motivation to participate online may be greater when students do not have the face-to-face social peer group support.

- Synchronous discussion may be effective if used with small groups.

If adopting synchronous discussions, the following suggestions may be considered.

- Ensure that all participants start the online task at the same time.
- Ensure that the task is clear and is achievable in the allocated time.
- Use synchronous chat tools. In this case, the Discussion Forum asynchronous tool was used in synchronous mode. This affected the flow of the interaction.
- Perhaps have the task description and instructions available outside the chat space for easy reference.

4.5.3 CHANGE THE NATURE OF THE ASSESSMENT

It is contended that the incentive and motivation for students to engage in meaningful online discussion in this case was influenced by the non-assessable nature of the online tasks. The weekly online tasks were peripheral to the assessment requirements. The assessment was based on individual work and most of it was due at the end of the subject. During the online tasks, although students were very self-motivated, it was seen in many weeks that students trivialised the task. Simon's feedback supports this.

The learning process needs to be driven by an intrinsic need not an extrinsic force. In this case the content and the weekly meetings drove the learning process. Student online interaction was driven by the need to engage the students during class time session rather than on an intrinsic need to learn the content. Assessment tasks that are integrated with online activities may provide the intrinsic motivation to participate in online discussion.

Several students offered suggestions for change to the assessment tasks. For example, Anthony suggested that smaller tasks be dispersed throughout the subject. Simon suggested the weekly content be more closely integrated with the assessment work. David suggested that collaborative online projects be assessed.

Therefore, for the next subject offering a more integrated approach towards content, online tasks and assessment could be considered. In doing so, the assessment tasks could become the driving force for the learning process.

5



CASE TWO

EDGA957 — 1997

The changes that we made...that I think are quite good...were the staged nature of the assignments....I thought that the nature of the course imposes much more structure on a group of students. (Instructor, Post-subject interview)

5.1 INTRODUCTION

Based on the insights gained from Case One, the instructor and the researcher redesigned the postgraduate subject: *Implementation and Evaluation of Technology-Based Learning* and implemented the changes in the 1997 subject offering. This chapter describes the changes made and their effect on the teaching and learning process in terms of the interactions established among the students and between the students and the instructor.

5.2 CONTEXT

5.2.1 CHANGES MADE TO THE SUBJECT

Changes were made in terms of subject delivery, assessment, structure of the online tasks and the technological tools used. The content topics presented and reading material distributed to students as a hard copy handout were similar to the previous implementation (Case One). The revised subject outline is provided in Appendix V.

5.2.1.1 Subject delivery: A combination of synchronous and asynchronous delivery

The subject delivery was restructured to encourage asynchronous online interaction. As in Case One, there were two geographically separate classes. One class was held on campus in the Faculty of Education's Interactive Multimedia Laboratory and the other class was held at the University Centre in Sydney (80kms north) in the computer laboratory situated on the ground floor. The classes, however, were scheduled on different evenings and the instructor met with each class face-to-face. The on-campus class (in Wollongong) was held on Monday evenings from 4.30 - 7.30pm and the off-campus class (in Sydney) met on Tuesday evenings from 5.30 - 8.30pm. The instructor decided to schedule each class on a separate evening so that he could physically attend each class as student feedback from Case One indicated a preference for the instructor's physical presence at each site.

Students did not meet face-to-face every week. Instead, during the fourteen-week semester, students attended eight class meetings. These were scheduled in Weeks 1, 2, 4, 6, 8, 10, 11 and 14. During the non-meeting weeks students were encouraged to participate in asynchronous and synchronous online class discussions. A subject Web site facilitated interaction among the students from both sites and between the students and the instructor. (This subject was the first in the Faculty to implement a more flexible face-to-face meeting strategy.)

5.2.1.2 Assessment: Four assignments were staggered throughout the subject

The assessment structure underwent a major change from the previous subject implementation. The assessment tasks were structured as four assignments that were completed progressively during the subject. The first three tasks were to be completed as individual pieces of work and the last task was completed as a group project. The requirement for each assignment is provided below.

1. Theoretical paper. (Due: Week 4. Worth 30% of final grade.)
Students had to prepare a paper based on class and online discussion which compares and contrasts a number of evaluation theories and discuss how the theories can be employed in evaluation of technology-based learning.
2. Web Study Guide. (Due: Week 8. Worth 30% of final grade.)
Each student produced a Web Study Guide (WSG) on an agreed topic. Its purpose was to facilitate learning on the topic and provide students with a hands-on experience in producing Web-based learning materials. Each student's WSG was placed on the subject Web site to be accessed by all students. Each WSG was to include the key issues of the topic; how these issues relate to the implementation and evaluation of technology-based learning; and provide enough content material to allow the user between two to four hours of study.
3. Web Study Guide Evaluations. (Due: Week 11. Worth 10% of final grade.)
Evaluation criteria were discussed in class and each student produced an evaluation report of every other student's Web Study Guides.
4. Group project: Evaluation Proposal and Presentation. (Due: Week 14. Worth 30% of final grade.)
Students formed small groups and presented and submitted a proposal to evaluate a technology-based learning project. The group presentations were held in the last week of semester and were accompanied with a written evaluation proposal. This piece of assessment was graded as a group project.

The instructor structured the assessment tasks so that the first three tasks could be used as resources for the final group project. Content material was delivered during the subject to support students in completing the assignments. The Successmaker evaluation proposal exercise, which was introduced in the early weeks in Case One as a non-assessable task, became the final group project. The instructor wanted the final assignment to be conducted as a collaborative online group task with students from each site collaborating in small groups. The first assignment was intended to provide students with the theoretical background that could be practically applied in the final assignment. The Web Study Guide assignment replaced the need for content to be presented in a weekly sequence during class time. Instead content could now be available in electronic form and accessible at a time and place convenient to the students. The introductory subject (EDGA950), held in the previous semester, introduced the concept of a Web Study Guide and students learned how to design and develop these Web-based learning materials. The instructor assumed that all students had completed this subject in the previous semester and were familiar with the concept of a Web Study Guide. The third assignment, the Web Study Guide evaluation task, was designed with two purposes. One, to provide an evaluation experience for students. Two, to expose students to content material that may assist them with the final assignment.

5.2.1.3 Online tasks: Asynchronous and synchronous discussions conducted during the non-meeting weeks

Several non-assessable online tasks were woven into the subject. The first online task was designed to assist students in completing the first assignment. Students formed small groups and participated in an online asynchronous discussion about the content required for the first assignment. Each group worked on a different aspect of content and posted a summary of their discussions to the subject Web site. The intention was that students could use the summaries produced by the different groups as resources for the first assignment. Other online tasks included synchronous and asynchronous online class discussions about content literature. These online discussions occurred during the non-meeting weeks.

5.2.1.4 Technology tools: A subject Web site, CMC tools, but no videoconferencing

A subject Web site, which incorporated several CMC tools, was the main vehicle to encourage interaction between the two geographically separate classes. Because the two classes met on different evenings and the instructor physically attended each

class meeting, the use of videoconferencing technology (as implemented in Case One) was not required.

The subject Web site used in Case One was transferred to the Faculty of Education's World Wide Web server (which ran WebStar Version 2.1 server software). This now enabled the instructor and the researcher to have direct access to the Web site. The instructor and the researcher with the technical assistance of the administrator of the Faculty's Multimedia Laboratory redesigned the Web site. Figure 5.1 illustrates the revised subject Web site Home Page.

FIGURE 5.1 Case Two: Subject Web site Home Page

The changes made to the subject Web site are summarised below.

Home Page: The large graphic "imagemap" was replaced with smaller icons and text hyperlinks to reduce load time.

Message bar: A message bar that appeared on the Home Page replaced *The Messages from the Lecturer* space. The message bar was a graphic file (message.gif). The instructor posted a new message by modifying the text using a

graphics package and then copied the updated message.gif file into the subject Web site folder/directory located on the Web server.

Classes and Topics: Unlike the previous *Week-by-Week* section which was modified on a weekly basis, the *Classes and Topics* section provided an overview of the entire subject and weekly content topics from the beginning of the subject.

Resources: Electronic resources such as articles, links to journals and previous students' Web pages were added in this section of the Web site.

Collaborative Workspace: The Live Chat and Discussion Forum CMC tools, which were used in Case One, were used again. Another asynchronous CMC tool called DISCUS was made available from section of the Web site from Week Four. (Appendix W details its features and interface.)

5.2.2 PARTICIPANTS

Seventeen students participated in the subject. There were eleven students (five female and six male) in the Wollongong class and six students (three female and three male) in the Sydney class. Nine students were enrolled in the Master of Education program, four were Doctoral students and four students were working towards a Graduate Certificate in Computer Based Learning. (There were two additional students in both the Wollongong class and the Sydney class at the beginning of the subject, however, they withdrew from the subject in the early weeks of the semester.)

Most of the students within each class knew each other from the introductory subject held in the previous semester. Students from each site, however, did not know each other.

The students were at different stages in terms of their studies. For some, this subject was their first, for others it was their last to complete their course. Although the instructor had assumed that all students had completed the prerequisite subject EDGA950 in the previous semester, this was not the case. For example, two students had not completed EDGA950 and a few students in the Wollongong class had taken EDGA950 in the previous year where the assessment tasks were different.

In terms of "internet literacy", all students were familiar with using the World Wide Web yet none of the students had previously experienced the specific CMC tools used in this subject. Whilst the majority of students knew how to construct a Web

page and connect Web pages to form a simple Web site, four students had no previous experience in creating Web pages. Most students knew how to use email.

During the subject, nine students accessed the subject Web site mostly from home using an external Internet Service Provider. Five students accessed the subject Web site whilst on campus and three students used their workplace Internet connection.

Table 5.1 and Table 5.2 provide a summary description for each student.

TABLE 5.1 Case Two: Student profile of the Wollongong class (on-campus class)			
<i>Student</i>	<i>Age Range</i>	<i>Course Enrolment and Progress Status</i>	<i>Background</i>
Daniel	41-45	Graduate Certificate in Computer Based Learning (Full-time) EDGA957 was his last subject.	Daniel was a full-time student who was also enrolled in a postgraduate Journalism program. Daniel knew how to construct Web pages, however had no previous CMC experience, including email.
Frank	26-30	Master of Education (Full-time) Commenced the Masters program in the previous semester	Frank was an overseas student from the Maldives. He was a trainer in a Management Training institution in the Maldives. Frank knew how to construct Web pages. Apart from using email he had little CMC experience.
Gerald	31-35	Doctorate of Education (Full-time) EDGA957 was his first subject.	Gerald was an overseas student from Indonesia. He was new to the education field. His background was in mathematics and computer science. He had no previous experience in creating Web pages and apart from using email he had no CMC experience.
Grant	26-30	Doctorate of Education (Part-time) Midway through the coursework component	Grant was a schoolteacher and was involved in teaching teachers how to use the internet. He had limited Web page design experience and had only experienced CMC in the form of email and listservers.
Isabel	21-25	Master of Education (Full-time) EDGA957 was her first subject.	Isabel was an overseas student from the USA. She had recently graduated as a schoolteacher and wanted to further her studies. She had no previous experience at constructing Web pages. She had experience with email, listservers and had used internet relay chat tools.
Jonathon	46-50	Master of Education (Part-time) EDGA957 was his last subject.	Jonathon was a registered nurse. He wanted to further his studies. He completed the introductory IT subject in the previous semester and thus had some exposure to the internet and Web site construction. Apart from using email, he had no previous CMC experience.
Lauren	26-30	Ph.D Candidate (Full-time) Commenced in the previous semester.	Lauren was an overseas student from Canada. She had an extensive IT background and was very proficient in the use of the internet and use of CMC tools. She gained experience in Web site construction from the introductory IT subject in the previous semester.

TABLE 5.1 Case Two: Student profile of the Wollongong class (on-campus class)			
Lorraine	31-35	Master of Education (Part-time) EDGA957 was her last subject.	Lorraine was a teacher in a college and taught PC software applications. She was a proficient at using computers and the internet. She knew how to create a Web site from completing the introductory IT subject in the previous semester. Apart from using email she had no CMC experience.
Nicola	36-40	Master of Education (Part-time) Commenced the Masters program in the previous semester.	Nicola was a schoolteacher who worked on a casual basis. She had limited computer experience. She learned how to construct a Web page from the introductory IT subject in the previous semester. She had no CMC experience, including email.
Paula	36-40	Doctorate of Education (Part-time) Midway through the coursework component	Paula was a schoolteacher and was on sabbatical to concentrate on her studies. She had experience in multimedia production, internet use and Web site construction. Apart from using email she had no CMC experience.
Ryan	31-35	Masters of Education (Honours) Midway	Ryan worked as a schoolteacher full-time. He was a proficient internet user and had experience in Web site construction. Apart from using email he had limited CMC experience.

TABLE 5.2 Case Two: Student profile of the Sydney class (the off-campus)			
<i>Student</i>	<i>Age Range</i>	<i>Course Enrolment and Progress Status</i>	<i>Background</i>
Angela	31-35	Graduate Certificate in Computer Based Learning (Part-time) EDGA957 was her last subject.	Angela worked full-time as an instructional designer for an organisation that produced flexibly delivered education for higher education institutions, secondary schools and the corporate sector. She did not know how to construct a Web page and apart from using email had no CMC experience.
George	36-40	Masters of Education (Honours) Midway	George was an instructional designer who worked in the same organisation as Angela. He did not know how to construct a Web page and apart from using email had no CMC experience.
Hugh	46-50	Masters of Education (Part-time) EDGA957 was his second last subject.	Hugh was a computer studies teacher at a college. He was currently on leave without pay to concentrate on his studies. He was a proficient internet user and had experience in Web site construction. Apart from using email, he had limited CMC experience.
Patricia	31-35	Masters of Education (Part-time) Midway	Patricia was a Project Manager in the Training Department of a telecommunications company. She was currently working on an Intranet training project. She had extensive IT experience and was proficient in using the internet and designing Web sites. However, apart from using email she had limited CMC experience.
Ros	36-40	Graduate Certificate in Computer Based Learning (Part-time) EDGA957 was her last subject.	Ros worked in the Training Department in the same organisation as Patricia. She was proficient in using the internet and had gained experienced in Web site design from the introductory IT subject held in the previous semester. Apart from using email, she had no CMC experience.

TABLE 5.2 Case Two: Student profile of the Sydney class (the off-campus)			
Thomas	46-50	Graduate Certificate in Computer Based Learning (Part-time) EDGA957 was his last subject.	Thomas was a lawyer who taught at a college. He used the internet both at home and at work and had experience in Web page design from a previous subject. Apart from using email, he had no CMC experience.

5.3 THE PROCESS

5.3.1 INTRODUCTION

This section provides a detailed description of what occurred during the subject. A chronological and conceptual summary of the subject is provided first followed by a summary of the CMC tools that were used. Then the incidents that occurred in the subject are reported in the form of seven subject episodes.

5.3.2 SUMMARY

5.3.2.1 The emergent model

A chronological summary of the subject is presented in the following table.

TABLE 5.3 Case Two: Chronological representation of the subject structure				
<i>Week</i>	<i>Class Mode*</i>	<i>Issues discussed</i>	<i>Activities</i>	<i>Assessment</i>
1	Face-to-face	<ul style="list-style-type: none"> • Introduction to subject • Content for Assignment 1 	<ul style="list-style-type: none"> • Introduction to the CMC tools 	
2	Face-to-face	<ul style="list-style-type: none"> • Content for Assignment 1 	<ul style="list-style-type: none"> • Asynchronous online group summary task 	
3	Online	<ul style="list-style-type: none"> • Content for Assignment 1 	<ul style="list-style-type: none"> • Group summary posted to Web site 	
4	Face-to-face	<ul style="list-style-type: none"> • Content for Assignment 2 • Student reflection about online summary task 		Assignment 1: Theoretical Paper
5	Online	<ul style="list-style-type: none"> • Reading from subject handout 	<ul style="list-style-type: none"> • Synchronous and asynchronous online class discussion about the allocated reading • Web Study Guide production 	
6	Face-to-face	<ul style="list-style-type: none"> • Content for Assignment 2 • Instructor feedback about Assignment 1 	<ul style="list-style-type: none"> • Web Study Guide production 	
7	Online	<ul style="list-style-type: none"> • Reading from subject handout 	<ul style="list-style-type: none"> • Asynchronous online class discussion about the allocated reading • Web Study Guide production 	
8	Face-to-face	<ul style="list-style-type: none"> • Content for Assignment 3 • Instructor feedback about online class discussions • Student reflection about the online class discussions 	<ul style="list-style-type: none"> • Web Study Guide production 	Assignment 2: Web Study Guide
9	Online	<ul style="list-style-type: none"> • Student issues about Assignment 3 	<ul style="list-style-type: none"> • Web Study Guide evaluations 	

TABLE 5.3 Case Two: Chronological representation of the subject structure				
10	Face-to-face	<ul style="list-style-type: none"> • Content for Assignment 3 • Instructor feedback about Assignment 2 • Student reflection about Assignment 2 	<ul style="list-style-type: none"> • Web Study Guide evaluations 	
2 week break	Online		<ul style="list-style-type: none"> • Web Study Guide evaluations 	
11	Face-to-face	<ul style="list-style-type: none"> • Content for Assignment 4 • Student reflection about Assignment 3 • More instructor feedback about Assignment 2 	<ul style="list-style-type: none"> • Face-to-face group collaboration for Assignment 4 	Assignment 3: Web Study Guide Evaluations
12	Online	<ul style="list-style-type: none"> • Student issues about Assignment 4 		
13	Online	<ul style="list-style-type: none"> • Student issues about Assignment 4 		
14	Face-to-face	<ul style="list-style-type: none"> • Assignment 4: Group presentations • Student reflection about Assignment 4 • Instructor feedback about verbal presentation of Assignment 4 		Assignment 4: Evaluation Proposal and Presentation

* The instructor attended the Wollongong class on Monday evenings and the Sydney class on Tuesday evenings, except in the last week where all the students attended class on campus.

Table 5.3 highlights the following features:

- The sequence in which content material was presented was dependent on the assignments. That is, content material was presented to assist students in completing each assignment. There was an explicit relationship between the content material discussed and the assessment tasks.
- Most of the activities were related to the assessable tasks. The only activities that were not specifically related to the assessment tasks were the online class discussions that occurred during Weeks Five and Seven. These online class discussions focused on general issues regarding implementation and evaluation of Technology-Based Learning.
- During the subject, the instructor provided feedback to the students about their performance in the assessment tasks.
- The instructor encouraged students to reflect on their experience in completing each assignment and students discussed their experiences during the face-to-face class meetings.
- During the two-week semester break (between Weeks 10 and 11), students were able to interact with the instructor and other students online if they so wished.

The integrative nature of the content with the assessment tasks and most of the activities can be conceptually represented into four distinct phases of the subject. This is illustrated in Figure 5.2.

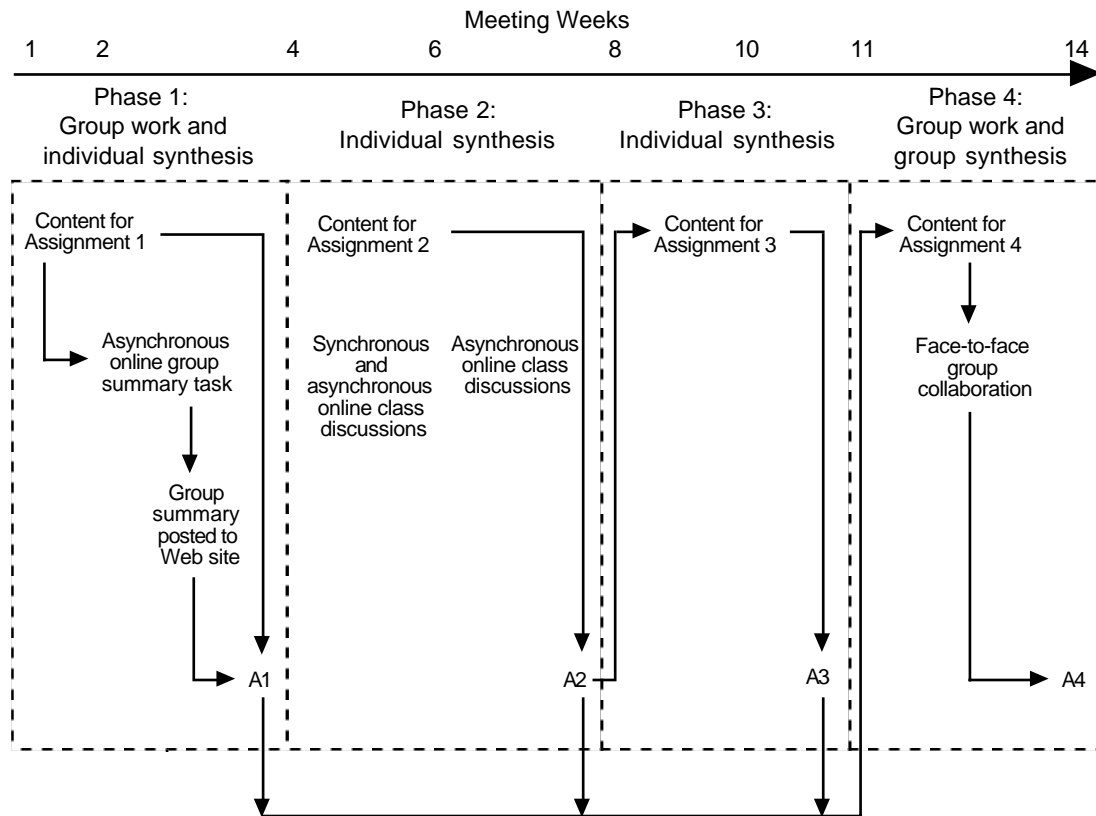


FIGURE 5.2 Case Two: Conceptual representation of the subject

The features highlighted in this conceptual representation are:

- The pattern of student interaction with other students and with the content differed in each phase of the subject. In the first phase students engaged in group work to produce a group summary. Students were then able to access the online summary to assist in their individual synthesis of content for the first assignment. The second and third phase of the subject entailed an individual student effort where students produced their own Web Study Guides and then evaluated everyone else's WSG. The final phase of the subject consisted of group collaboration and a group synthesis of content to produce an evaluation proposal.
- Student produced work was used as content resources. For example, the online summary was available to students to help them with the first assignment. Web pages produced by the student cohort in Case One became content resources to assist students in producing their Web Study Guides.

The WSGs were then used as the content resources to complete the WSG evaluation task.

- The first three assessment tasks served as scaffolds for the final group task as the content covered in those three tasks were relevant to the last assignment.
- Whilst the first asynchronous online task was directly related to the first assessment task, the remaining online discussion tasks were designed to encourage class discussion and were not specifically related to the assessment tasks.

5.3.2.2 The CMC tools used

Five CMC tools were used in the subject. There were four asynchronous tools: DISCUS, Discussion Forum, Email, Email subject listserver, and one synchronous tool: Live Chat. Table 5.4 summarises the CMC tool usage pattern during the subject (the table excludes email). The formal online asynchronous class discussions took place in DISCUS and in the Discussion Forum. DISCUS was introduced in Week 4 and became the asynchronous tool used for the remainder of the semester. The subject email listserver was used as an informal communicative medium. (Appendix X provides a summary of all the asynchronous discussion threads created during the subject.) Apart from one scheduled synchronous class discussion, the Live Chat tool was used for informal class interaction. The students and the instructor mostly used email for one-to-one communication.

TABLE 5.4 Case Two: Summary of CMC tools used during the subject				
<i>Week</i>	<i>Live Chat</i>	<i>Discussion Forum</i>	<i>DISCUS</i>	<i>Email Listserver</i>
1	✓	✓		
2	✓	✓		
3	✓	✓		
4			✓	
5	✓		✓	
6	✓		✓	
7	✓		✓	✓
8				
9			✓	✓
10				
Semester break				✓
11				✓
12				✓
13				✓
14				

5.3.3 THE SEVEN SUBJECT EPISODES

In Case One, the interactions established among the participants occurred predominantly during class time on a weekly basis and thus the reporting of the interactions was structured as a weekly chronicle. However, the interactions

established among participants in this case were not confined to a weekly class structure. Upon analysis, the interactions that occurred during the subject can be reported in the form of seven episodes. The subject chronology presented in Table 5.3 is coalesced to seven episodes. Table 5.5 summarises the seven episodes and specifies the time frame in which each episode occurred during the subject.

TABLE 5.5 Case Two: Seven Subject Episodes		
<i>Subject Episode</i>	<i>Summary of Episode</i>	<i>Time frame of Episode</i>
Episode 1: "Play time"	Students were introduced to the CMC tools and given time to become familiar with the tools.	Week 1
Episode 2: "An asynchronous online group task assists students with the first assignment"	Four student groups were formed. Each group partook in an online asynchronous discussion about one aspect of Assignment 1. Each group then posted a summary of their discussion to the Web site. All students could then access these summaries to assist them to complete Assignment 1.	Weeks 2 and 3
Episode 3: "The synchronous online class sessions didn't go according to plan"	Two synchronous online sessions were scheduled in Week 5. A specific task was not assigned and the instructor did not participate online. A social discussion with little content focus transpired.	Week 5
Episode 4: "An asynchronous online class discussion resulted in a 'posting of answers'"	In the first asynchronous online class discussion, which was about one of the subject readings, although many students contributed, little actual discussion transpired. Students posted their views about the reading but did not discuss other students' viewpoints.	Weeks 4, 5 and 6
Episode 5: "The Web site Home Page is re-designed"	The researcher modified the subject Web site. A class Notices section, a student feedback section (Your Say/Tool Tips) and student photos from both classes were added.	Week 6
Episode 6: "Web Study Guide production and evaluation—No time for online discussion!"	Students were to conduct an asynchronous online class discussion about an assigned reading. Only one student contributed to the online class discussion.	Weeks 6 to 11
Episode 7: "All is quiet online whilst the final group project is under way"	Little online interaction transpired in the final weeks of the subject.	Weeks 11 to 14

A discussion of how the online discourse was analysed is firstly provided followed by a detailed description of each episode. Due to length, Episodes 2, 3, 4 and 7 are described in this chapter (as they represent key episodes of the subject) and Episodes 1, 5 and 6 are presented in Appendix Y. Student online contributions, written and oral feedback are reported verbatim.

5.3.3.1 Rationale for the online interaction analysis conducted

5.3.3.1.1 *Situating the use of online interaction analysis in this study*

The purpose of this case was to examine the online interaction that was established among participants in this subject in order to inform the evolution of pedagogical strategies when implementing flexible learning environments. Seven episodes characterise this case and several episodes involved online synchronous and

asynchronous class discussions. In order to examine the interactions that occurred in these episodes and be able to 1) Provide a rich description of what occurred in a (somewhat paradoxically) succinct manner; and 2) Offer plausible interpretations from the analysis of the online interactions, a review of literature dealing with the analysis of computer-mediated communication discourse was undertaken. To situate this form of data analysis in the research methodology adopted in this study, referring back to Table 3.1 in Chapter 3, the analysis of online interactions falls into the *Data collection and analysis techniques* category. Such an analysis technique assists the researcher to understand the intricacies of the online interactions that occurred. However, the overall inquiry strategy is Case Study. Whilst a specific analysis of the online interactions was conducted, this online interaction analysis is complemented by other data, such as observations made by the researcher and feedback obtained from the students, to provide a rich “picture” of what occurred. Waggoner (1992) supports this approach when examining computer conferencing interactions:

The understanding of such complex interactions [resulting from the use of computer conferencing in collaborative learning]...does not emerge from a particular analytic approach, be it statistical manipulation, content analysis, or other single quantitative or qualitative technique. Rather, an encompassing approach is needed to provide a comprehensive view and broader insight into the multifaceted phenomenon that occurs when a group of individuals, embarking on a collective task, mediate their communication through a computer conferencing system. A case study approach is proposed that combines selected quantitative and qualitative techniques. (p. 137)

5.3.3.1.2 Existing analysis models for examining computer conferencing interactions

From the literature review, two analysis models served as a starting point for the researcher: the content analysis framework developed by Henri (1992) and a more recent interaction analysis model presented by Gunawardena, Lowe & Anderson (1997).

The Henri (1992) model is premised on a cognitive view of learning. That is, the focus is on the “process” of learning. According to Henri, a computer conference can be analysed according to five dimensions: participative, cognitive, social, interactive, and metacognitive. The participative dimension provides quantitative information about the number of participants and number of messages transmitted by each participant in a computer conference. The other four dimensions can provide insight into the nature of the online interaction. The content analysis is applied by dividing each message into discrete message units and each message unit is categorised according to one of the four dimensions. The “interactive” aspect of a computer conference is examined in terms of how the content of the individual

messages posted in an online conference “connect” with other messages. Henri (1992, p. 129) distinguishes between interactive and non-interactive (eg. independent statements) and explicit and implicit interaction. The operational definition of “interaction” is explained as a three step process: 1) communication of information, 2) a first response to this information, 3) a second answer relating to the first (Henri, 1992, p. 128).

This content analysis model has become a widely adopted analysis technique. Many studies have used Henri’s (1992) model as a basis for their analysis of computer conferencing interactions (for example, Hara et al. 2000; McDonald & Campbell Gibson, 1998); McLoughlin & Oliver, 1995; and Newman, Johnson, Webb, & Cochrane, 1997). Other studies (for example, Oliver, Omari, & Herrington, 1997), have applied Henri’s content analysis model to explore student face-to-face interactions when engaged in collaborative Web-based activities. In particular, the adaptations of the Henri (1992) model presented by McLoughlin and Oliver (1995) and McDonald and Campbell Gibson (1998) were closely examined.

The interaction analysis framework presented by Gunawardena et al. (1997) uses a holistic approach when examining the computer conferencing interactions. Their interaction analysis model was developed after they discovered limitations using existing analysis models (one of which was Henri’s) when analysing interactions that occurred in a global online debate. The debate was part of an adult professional development exercise and the objective of the analysis was to examine the social construction of knowledge in computer conferencing. Rather than examining each individual message, the entire computer conference transcript was examined to identify the “moves” or “phases” of cognitive thought within a conference. They view “interaction” as what occurs in the entire computer conference:

Generally speaking all the messages in a conference are linked; all respond to each other and to the emerging totality of constructed knowledge, regardless of whether a message can be identified as responding to another specific message or group of messages....“Interaction,” should be viewed as the totality of interconnected and mutually-responsive messages, which make up the conference, and perhaps more: “interaction” is the entire gestalt formed by the online communications among the participants. The participants are not speaking in the same virtual space by chance and regardless of each other’s presence; they are acting in relation to each other. (p. 407)

After examining these two computer conferencing analysis models plus the adaptations of the Henri model applied by McLoughlin and Oliver (1995) and McDonald and Campbell Gibson (1998), the researcher reached the following conclusions:

1. The analysis models have been developed and applied in a distance education learning context which is made up of the following characteristics:
 - The computer conference participants are separated geographically and all participant interaction takes place within the computer conference.
 - The participants are familiar with the computer conferencing technology.
 - The interaction is of an asynchronous nature.
 - The task assigned for the computer conference is structured and understood by all participants.
 - Discussion within the computer conference is facilitated by an assigned “moderator”, or by the instructor(s).
2. The nature of the task drives the nature of the analysis. For example, in the Gunawardena et al. (1997) study, the debate genre facilitated the development of cognitive moves within a computer conference: “the debate format...imposed an organizational structure which influenced the interactions” (p. 403).
3. It all depends on how one views interaction. The discussion above explained the difference in the definition of interaction presented by Henri (1992) and Gunawardena et al. (1997). However, even those that have applied Henri’s model have modified the definition of interaction. For example, in the study by McDonald and Campbell Gibson (1998), of which the purpose was to describe the patterns of interpersonal interactions relating to group development in an asynchronous computer conference, they stated:

This definition [referring to Henri’s definition of interaction] was difficult to implement in computer conferencing since messages are rarely directed at, received by, and responded to by a single person. Most messages are directed to the group as a whole and responded to by many people. Therefore, the definition for interactivity for this study had more to do with intention of the speaker than number of volleys between speakers. (p. 13)

5.3.3.1.3 Context of the online interaction that transpired in this case

As explained in section 5.2.1.3 of this chapter, this case is characterised by computer-mediated communications of different “forms” and “shapes”. Students experienced both synchronous and asynchronous forms of online interaction. Some online discussions were structured and involved small groups, other online tasks were less structured and involved the entire class. There was also little online facilitation provided by the instructor. As postgraduate students, the instructor expected that they could initiate discussion, negotiate among themselves how tasks would be completed and facilitate the direction of an online discussion based on their needs and level of understanding. Added to this, all the students had no previous experience with the CMC tools offered in this subject.

5.3.3.1.4 *The online interaction analysis strategy adopted*

The complex context that characterises this case does not lend itself easily to the application of one generic computer conferencing analysis model. The researcher did attempt to apply Henri's model to examine the online transcripts and several limitations were discovered. Two examples are provided.

Example 1: The online transcripts from the first asynchronous online task (Episode 2) were analysed according to Henri's model, taking into account the addition of the "Organisational" dimension presented in Henri (1996). A similar limitation as noted by Gunawardena et al. (1997) was experienced. The researcher could not apply Henri's (1992, p. 127) "Implicit Interaction" category. It was ambiguous as all the messages within an online discussion were related to each other. All the messages could be categorised as *implicit interaction* thus the result of the content analysis did not provide any significant meaning.

Example 2: In the synchronous online discussion (Episode 3), there was little task focus. In fact, several topics were discussed, and participants joined the online discussion at different times. Although the researcher attempted to code each line in the Live Chat transcript according to the Henri (1992) model, it was realised that the analysis shed little light in providing the reader with a description of what actually occurred. Thus, the researcher reviewed the transcripts from a holistic perspective. For example, rather than examining each message, the entire online transcript was reviewed and it was discovered that there were several "moves" or "themes" in the online session.

From this exercise, the researcher realised that her analysis was based on the same definition of interaction as defined by Gunawardena et al. (1997). Thus the researcher decided to adopt an eclectic approach when analysing the online interactions that transpired in this case. The context of the online task drove the type of analysis. For some online tasks, elements of Henri's content analysis model were applied. For others, such as in Example 2 described above, the analysis framework by Gunawardena et al. (1997) was considered. However, for all the subject episodes the researcher's observations and student feedback were used to produce a comprehensive "picture".

This adopted framework is similar to that presented in Henri (1996). Although Henri still advocates her content analysis model, she adds that the specific nature of the task, the structure of the learning process, the virtual environment and the types

of learners need to be described when undertaking computer conferencing analysis (Henri, 1996, p. 57-63).

The researcher coded the online transcripts, which were analysed using Henri's content analysis model. The researcher reviewed the coded transcripts several times. To verify coding reliability, a segment of the CMC transcripts from this case were also coded by a postgraduate student. The process undertaken was as follows:

1. The CMC transcript from one of the four groups in Episode 2 and the CMC transcript from Episode 4 were selected for coding verification. The first CMC sample comprised 20 messages and the second sample comprised 29 CMC messages.
2. The researcher explained the content analysis framework to the coder.
3. The coder verified the content analysis and presented the results accompanied with feedback about the nature of the online discussion exhibited in the two CMC samples and the content analysis framework developed.

The results achieved were an 80% coding reliability for the first sample and 93% coding reliability for the second sample. The feedback provided by the coder included:

- A difference in cognitive engagement was evident in the two samples. The first sample (from Episode 2) represented surface processing of information (Henri, 1992, p. 130) because students posted messages about information they had found yet little discussion about the information itself occurred. The second sample represented more in-depth processing (Henri, 1992) as students posted messages about what they thought about an assigned reading.
- The content analysis framework involved decomposing messages into messages units (explained in section 5.3.3.3.2). The coder thought this was appropriate and was a contributing factor to the ease of applying the coding framework.
- The discourse category "Metacognitive" (Henri, 1992), was included in the coding framework for the second sample and whilst the coder claimed this category of discourse was evidenced, it was difficult to spot.

5.3.3.2 Episode 2: An asynchronous online group task assists students with the first assignment

5.3.3.2.1 Students are given an online collaborative challenge

In the second week of the subject, the instructor devised an online activity for the students with the intention that it could help students write their theoretical paper on evaluation theories, which was due in Week 4. The instructor created four discussion threads in the Discussion Forum. Each discussion thread focused on one evaluation theorist. A question was posted in each thread. Table 5.6 illustrates the four discussion threads.

TABLE 5.6 Case Two, Week 2: Four discussion threads created by the instructor in Discussion Forum	
<i>Title of Discussion thread</i>	<i>The first message</i>
Week 2 Tyler's Model	"What were the strengths of this model and why was it important historically?"
Week 2 Scriven's Goal Free approach	"When Michael Scriven approached the task of evaluation, why did he suggest a 'goal-free' approach? What other concepts did Scriven give to our understandings of Evaluation?"
Week 2 Stufflebeam and decision-making	"When Daniel Stufflebeam looked at the evaluation task, what did he focus upon? What was evaluation seeking to do within his framework? What concepts did he contribute to our understanding of evaluation?"
Week 2 Other models	"Consider some of the following authors, what have they to add to the discussion about evaluation models? Names such as Stake, Guba, Kirkpatrick, and Patton."

The instructor divided the entire class into four groups. He randomly allocating each student to a group and then allocated each group to one discussion thread. Each of the four groups comprised students from both the on-campus and off-campus classes. Each group was to discuss their allocated question online and post a summary of their group discussion to the Web site by the middle of Week 3.

To enable students to post their online group summaries to the subject Web site, the researcher modified the home page to include a *Summary of Discussions* space. This is illustrated in Figure 5.3. (A provision for accessing the Web Study Guides was also made on the home page, however the hyperlink was not yet available.) From the *Summary of Discussions* space, the groups could submit their summary via an electronic form (illustrated in Figure 5.4).

FIGURE 5.3 Case Two: Web site modified in Week 2 to include *Summary of Discussions*

FIGURE 5.4 Case Two: Group online summary submission form—accessible from *Summary of Discussions*

The students within each group negotiated how to complete the task and decided who would post the summary. Also, the students from each class did not know which students from the other class were assigned to each group, thus several online transactions consisted of student introductions.

All four groups posted their summaries to the Web site on time, however, this online activity proved to be a challenge for many students. Several reasons that surfaced are noted as follows.

1. A few students expressed confusion over the nature of the task. Some students were not sure what was required. For example:

Jonathon - 07/31/97:13:19: Hi! Could anybody enlighten me as to how we should be approaching discussions on the major evaluation models? I understood that we should take the model that was allocated to us and discuss it on the web with our chosen groups. I am still in the dark...
(Live Chat, Thursday, Week 2)

Thomas - 08/04/97:18:49: James everything is fine at my place. I am not sure of what is going on. Some of Wollongong group have added to thread etc but I am not sure as to when we have to have the group report finished? You must be about to close shop.
(Live Chat, Monday, Week 3)

For me, as the only member of the Sydney group, I found it difficult to know what to contribute.
(Sydney student, End-of-subject questionnaire)

2. Some students experienced technical difficulties with accessing the online tools and sending files between IBM and Macintosh platforms. For example:

Jonathon - 08/04/97:13:36: Hi! Is anybody having difficulty getting on to the discussion forum? Jonathon - 08/04/97:15:30: Is anybody having problems accessing the discussion forum? I have been trying all afternoon!
(Live Chat, Monday, Week 3)

If any of you are out there I am trying to get onto Live Chat but the proxy server push file is taking forever to download. Hopefully I will join you soon.
(Lorraine, Discussion Forum, Monday Week 3, Thread: Week 2 Tyler's Model, Message: 8)

Big difficulty for IBM users to send documents to Apple Mac users even though using WORD.
(Wollongong student, End-of-subject questionnaire)

Synchronous chat wasn't reliable (my machine would freeze) - the other was fine.
(Sydney student, End-of-subject questionnaire)

3. The online task negotiation process was challenging for most students. Organising how the task was to be completed among students that did not know each other, time scheduling and perceived lack of participation from group members were expressed problems. Table 5.7 illustrates the student feedback obtained from the end-of-subject questionnaire. (Fifteen of the seventeen students completed the questionnaire.)

TABLE 5.7 Case Two: Student feedback from end-of-subject questionnaire (Question 14) (The feedback illustrates how the first online asynchronous task was a challenge for most students in terms of online task negotiation.)	
<i>Feedback from the on-campus class (Wollongong students):</i>	<p>"I found this an extremely frustrating exercise as it was very difficult to get all group members together. Again as there were <u>no</u> marks allocated some students were reluctant to participate."</p> <p>"Our Sydney person didn't ever get on line to interact so we wrote our summary ourselves in W'gong."</p> <p>"Personality clashes, meeting times were difficult to organise."</p> <p>"Once the group got organised it seemed to come together."</p> <p>"Each member of the group had very different views in understanding the problems and we failed to cope with that."</p> <p>"Not a lot of collaboration was done."</p>
<i>Feedback from the off-campus class (Sydney students):</i>	<p>"Unequal work contributions."</p> <p>"Division of tasks and responsibilities not clear within my group."</p> <p>"Not much collaboration took place..."</p> <p>"I think one person did most of the work. As a first experience of on-line collaboration it was reasonable beneficial."</p>

The findings suggest that this task may have been too much, too soon, and in too little time. (This sounds similar to the Successmaker group exercise in Case One.) Students within the groups did not know each other very well, if at all. Within a ten-day period (from Week 2 to Week 3), students had to determine how to make contact with the members of their group, research the content to answer the assigned questions and negotiate who would produce and post the summary to the Web site.

Despite the difficulties, ten students responded in the end-of-subject questionnaire that they thought the online activity was a useful strategy to assist them with the first assignment. The instructor organised the task so that each group dealt with only one aspect of the assignment. Thus, this online instructional strategy was only of benefit if all the groups posted their summary so that all the students could then access content summary material that pertained to the whole assignment. One student from the Wollongong class, raised this as a motivating factor for completing the summary task. In the end-of-subject questionnaire, she commented that the strategy of posting a summary was useful "because others were counting on your output so I was motivated to participate". Table 5.8 summarises the student feedback obtained in the end-of-subject questionnaire about the online summary activity.

TABLE 5.8	Case Two: Student feedback from end-of-subject questionnaire about the usefulness of the first online asynchronous group task (Question 14) (From 15 responses: 10 stated the task was useful to assist with the first assignment; 3 stated the task was not useful; 2 made no comment.)
<i>Examples of feedback from students that thought the task was useful:</i>	<p>“Good to do first assignment as a group as you have support and are not on your own....People seem to make more of an effort when working in a group so they don’t let the group down.” (Wollongong student)</p> <p>“I liked it more than the pointless on line discussions. At least we had some structure....I felt slightly prepared but many summaries were badly written and I couldn’t understand the concepts.” (Wollongong student)</p> <p>“I personally didn’t use the information as much as I should have.” (Wollongong student)</p> <p>“The essay was based on the information provided in the Web site since there was a limited source in the library.” (Wollongong student)</p> <p>“I found it quite useful and I used (and quoted) some of the summary info.” (Sydney student)</p> <p>“I did use the information. Would have liked a bit more class discussion to follow then to write my essay.” (Sydney student)</p>
<i>Examples of feedback from students that thought the task was not useful:</i>	<p>“It would have been as if not more useful to simply go and research in library on my own.” (Wollongong student)</p> <p>“I was rather confused as to the nature of that particular exercise. Consequently I did not gain much benefit from it.” (Wollongong student)</p>

5.3.3.2.2 Four student groups—four different processes

Each of the four groups used different strategies to produce their summary. After examining the data (which involved reviewing the fieldnotes; analysing the online discourse using a content analysis model based on Henri (1992, 1996); examining the summary artifact posted on the Web site; and considering the feedback obtained from several students about their experience in conducting the activity), the process each group undertook to produce their online summary can be summarised as follows:

Group 1—Predominantly synchronous online interaction with face-to-face collaboration

Group 2—Asynchronous online interaction with no collaboration

Group 3—Asynchronous online collaboration

Group 4—Asynchronous online interaction, some face-to-face collaboration, and summary produced by one person

The objective of the content analysis was to examine the nature of the interaction that occurred online within each group. Henri’s (1992) content analysis model was applied but adapted due to the context of the online activity. For example, the context

of the online activity was that the instructor formed four student groups and each group had a specific question to answer in their allocated discussion thread. If Henri's content analysis model was generically applied, then all the messages within in each thread could be categorised as *implicit interaction* (Henri, 1992) thus rendering the content analysis meaningless as was noted earlier. Also, there was online discussion about the *process* of the task. This is not accommodated in the Henri (1992) model but added in Henri (1996) as a category labelled: "Organizational". Furthermore, there were messages posted in the discussion threads about technical issues. This is a dimension that is not made explicit in the Henri (1992, 1996) frameworks. Thus, upon examining the online transcripts, four discourse categories emerged as representative of what occurred online. The four categories are content, process, social and technical, and are defined in Table 5.9.

TABLE 5.9 Case Two: Discourse categories that emerged in the first online asynchronous group task (Based on Henri, 1992, 1996)		
<i>Discourse Category</i>	<i>Definition</i>	<i>Example</i>
Content	A comment relating to the topic under discussion.	"Tyler's approach to evaluation is..." "This is what I have come up with...make comments..."
Process	A comment relating to how the task is to be completed.	"Group X is going to meet online at 4.30pm." "I will try to log on Monday, however I can post messages late in the evening."
Social	A comment that does not contain formal content of the subject matter but is social in nature. For example, verbal support, self-introduction, expression of feelings.	"Thank you Paul" "Isabel - well done! Sounds great" "Hi everyone" "That sounds like a great book!"
Technical	A comment relating to technical difficulty in conducting the task online. A comment relating to experimenting with the online tool.	"I've had difficulty logging on" "This is an experiment to see if this works."

Several messages contained more than one discourse category therefore individual messages were divided into message units that represented a discourse category. This is elaborated in the following two examples.

Example 1:

Hello Angela, good to hear from you. That sounds like a great book. I'm still trying to get onto the Live Chat space but without success.

This message is divided into two message units. The first two sentences are classified as *Social*; the last sentence is categorised as *Technical*.

Example 2:

Hello Angela, good to hear from you. I'm still trying to get onto the Live Chat space but without success. That sounds like a great book.

In this message, although the last sentence is categorised as *Social* and is separated from the first sentence which is also social discourse, the message is still divided into two message units; one *Social* and one *Technical*.

Group 1—Predominantly synchronous online interaction with face-to-face collaboration: Group 1 was allocated to the *Week 2 Tyler’s Model* discussion thread and comprised the following students:

Wollongong students: Grant, Isabel, Lorraine and Paula
 Sydney students: Angela and Ros

The Wollongong students decided to work on the task in a synchronous online mode. Their strategy was to work on the summary task synchronously from 4.30 to 7.30pm on Monday evening in Week 3, which was a non-meeting week. Grant and Lorraine were to access the Discussion Forum and Live Chat space from their homes, and Isabel and Paula organised to work together in the lab on campus and inform the group of their progress in the Discussion Forum and Live Chat space.

In total, 21 messages were posted in this discussion thread. (One message was a repeated message and has been excluded from the content analysis.) The first seven messages were posted during Week 2. The remaining messages were posted in synchronous mode on the Monday evening in Week 3. Figure 5.5 presents a participation analysis.

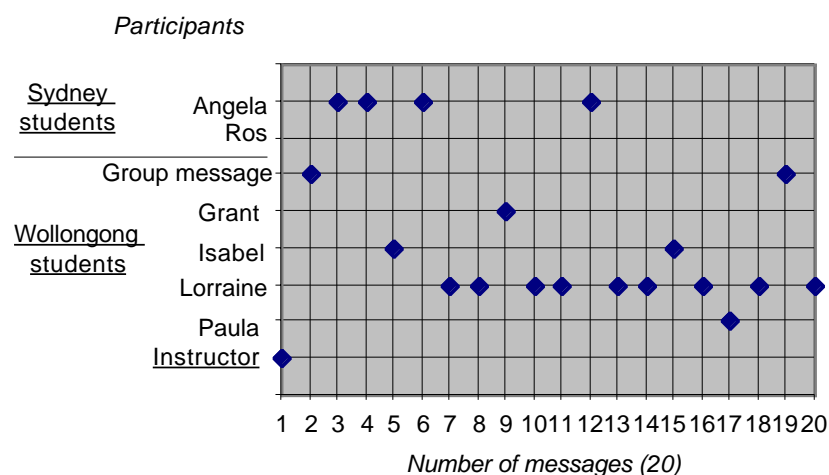


FIGURE 5.5 Case Two, Subject Episode 2: Group 1 Participation analysis

Of the two Sydney students, only Angela contributed to the online discussion. Ros was on holidays during Week 2 and did not make any contributions to the online discussion. The two group messages were posted from the Wollongong students whilst in the multimedia lab. The first group message was posted in class time in

Week 2. The second group message was posted on Monday in Week 3 by Paula, Grant and Isabel to Lorraine who accessed the discussion thread from home.

During the Monday evening in Week 3, the Wollongong students also used the Live Chat tool to organise tasks among themselves. Excerpt 5.1 illustrates how the group negotiated the process and how Grant eventually surrendered to face-to-face interaction!

Isabel and Paula - 08/04/97:16:39:	Hello ...anyone from group 1?
Grant - 08/04/97:16:40:	Anyone from Group 1 there
Grant - 08/04/97:16:40:	Isabel and Paula are you still there
Isabel and Paula - 08/04/97:16:41:	yes Grant...we are still here
Grant - 08/04/97:16:41:	Ok we're here what are we going to do
Isabel and Paula - 08/04/97:16:41:	should we wait to see if the others show up?
Isabel and Paula - 08/04/97:16:42:	i got alot of info from the library but I haven't had time to put it up on
Isabel and Paula - 08/04/97:16:42:	the forum
Isabel and Paula - 08/04/97:16:42:	did you find any info?
Grant - 08/04/97:16:43:	Does that mean our work has been done??????
Isabel and Paula - 08/04/97:16:43:	no!!!
Grant - 08/04/97:16:43:	No I have had trouble finding any references to Tyler on the web
Isabel and Paula - 08/04/97:16:43:	put the coffee cup and tim tam down and get to it!
Grant - 08/04/97:16:44:	Unfortunatley we don't have any Tim Tams
Isabel and Paula - 08/04/97:16:44:	we will summarise the library notes into the forum and then you can read and comment
Grant - 08/04/97:16:45:	Sounds great see you in the forum
Isabel and Paula - 08/04/97:16:45:	can you access the library and do an eric?
Grant - 08/04/97:16:45:	yes
Isabel and Paula - 08/04/97:16:46:	wait for a second..don't leave
Isabel and Paula - 08/04/97:16:46:	because it will take us probably 20-30 minutes to write it up, what do you want to do while we do that (and be serious!!)
Isabel and Paula - 08/04/97:16:48:	grant are you there?
Grant - 08/04/97:16:50:	I will go back to the web and follow some leads, we should make a time to meet back here to organise our notes
Grant - 08/04/97:16:50:	sorry my connection dropped out I had to log on again
Grant - 08/04/97:16:51:	Are you guys still there
Joanthon - 08/04/97:16:53:	
Grant - 08/04/97:16:53:	Paula and Isabel are you still there
Jonathon - 08/04/97:16:54:	Daniel or Gerald, are you there? I have made my contribution in the forum- would you like to make any comments or criticism?
Paula - 08/04/97:17:00:	Hello Angela
Jonathon- 08/04/97:17:00:	Im going to take a break. If any of my group wishes to contact, feel free!
Researcher - 08/04/97:17:02:	Hi all. Just checking out what's happening!
Daniel - 08/04/97:17:02:	Whats happening
Paula - 08/04/97:17:04:	Grant or Angela please answer
Researcher - 08/04/97:17:04:	How is everyone going with their group discussions?
Researcher - 08/04/97:17:05:	Any comments to make re: the discussion forum tool, finding resources assignment, etc...
Paula - 08/04/97:17:06:	Grant there is a little confussion over who is where. Lets get this clear.
Paula - 08/04/97:17:07:	Hello Shirley [researcher] I don't know if I have time for idle chat but I can talk for a sec
Paula - 08/04/97:17:08:	Shirley we have lost Grant in cyber space (the library !!) and don't know where he are.
Daniel - 08/04/97:17:09:	Jonathon, is there anything specific you want. I'm at the U,0 Gerald is not here but he has left a reasonable sized document on the forum

Paula - 08/04/97:17:11:	Grant if you get back here this is the plan. Check out what you can in the lrary and then get back on to check and chat at about 5.20pm today. I will wait for a minute to see if you answer and then if not I will come back and check later.
Paula - 08/04/97:17:18:	Grant, Lorraine or Angela. Isabel and Paula are in the IMM lab summarising. We are putting this up in the forum now.
Grant - 08/04/97:17:19:	
Grant - 08/04/97:17:23:	Sorry I left but I went to the library there seems to be a couple of tylers books on the self that would be of use but obviously the catalogs provide no other information
Paula - 08/04/97:17:25:	Hello , Hello , Hello
Paula - 08/04/97:17:27:	I think that Isabel has done a pretty thorough 'in the flesh' search of the library anbd is no summarising her findings
Grant - 08/04/97:17:27:	
Paula - 08/04/97:17:28:	That should say and is NOW summarising. GRANT why are there no words??
Grant - 08/04/97:17:28:	Paula are you still there
Paula - 08/04/97:17:28:	Grant. . for you yes I am
Paula - 08/04/97:17:29:	OK G Do you agree to us writing the summary up now on behalf of the group?
Grant - 08/04/97:17:29:	Lorraine has left messages in the forum and is trying to get to the live chat but is having trouble getting on
Grant - 08/04/97:17:30:	Would you like me to drive in to Uni and help
Paula - 08/04/97:17:30:	OK . Yes that would be great if you feel like it. There are about 6 people here and I am keen to get this done
Grant - 08/04/97:17:31:	If I leave now I will see you in twenty minutes

EXCERPT 5.1 Synchronous Live Chat online discussion conducted in Week 3

The scheduled synchronous time was inconvenient for Angela due to family commitments but she did manage to access the Discussion Forum during that time and posted a message to the group. Lorraine could not access the Live Chat space and thus made all her contributions in the Discussion Forum. Table 5.10 provides a breakdown of the messages according to the discourse categories outlined in Table 5.9 and includes some examples from the discussion thread. Figure 5.6 illustrates the chronology of the discourse categories.

TABLE 5.10 Case Two, Subject Episode 2: Group 1—Messages posted in the Discussion Forum (Thread: <i>Week 2 Tyler's Model</i>; total number of messages posted: 20)		
<i>Discourse Category</i>	<i>Examples</i>	<i>Message units (33)</i>
Content	<p>"What were the strengths of this model and why was it important historically?" (Instructor, Message No. 1)</p> <p>"A major disadvantage seems to be that this model..." (Angela, Message No. 3)</p> <p>"Not a lot of information on the Web about Tyler. Found some in a textbook...According to Owen..." (Lorraine, Message No. 10)</p> <p>"I haven't had much luck finding information about Tyler on the Web but I've e been reading a chapter....According to which:..." (Angela, Message No. 12)</p> <p>"This is a summary that group 1 can start to work with..." (Isabel, Message No. 15)</p> <p>"I'm back again Here's something else for you..." (Lorraine, Message No. 20)</p>	10

TABLE 5.10 Case Two, Subject Episode 2: Group 1—Messages posted in the Discussion Forum (Thread: <i>Week 2 Tyler's Model</i>; total number of messages posted: 20)		
Process	<p>"Since posting my first message James has explained this process of group discussion. At the moment I'm the only one in the Sydney Group 1 but hopefully Ros will be back from holidays next week and will be able to join in..." (Angela, Message No. 4)</p> <p>"Group 1 from Wollongong will meet on Monday the 4th at 4.30pm online to discuss the summary that is to be submitted. If the Sydney group could join us that would be great. (or just leave any ideas in the forum)" (Isabel, Message No. 5)</p> <p>"I will try to log on Monday from 4.30 but it's not a great time for me as I will have a three year old demanding my attention. However, I can certainly post messages in response later in the evening or on Tuesday." (Angela, Message No. 6)</p> <p>"We...were all going to concentrate on different search engines to see if we could find anything else. If you'd like to look for information on objectives-based models...rather than Tyler you might have some more luck. Happy hunting." (Lorraine, Message No. 7)</p> <p>"Group 1: This is what I have thrown together...make comments..add subject matter...etc.!" (Isabel, Message No. 15)</p> <p>"Dear Lorraine, If you are still having trouble getting into the live chat could you please reply to the following idea here. Isabel, Grant and I are proposing that we type up the Tyler summary on behalf of the group now (Monday, 4/8/97 5:40)....If you have anything to add please contact us through this forum..." (Paula, Message No. 17)</p>	11
Social	<p>"Hello Group 1 Wollongong (By the way who are you?)" (Angela, Message No. 6)</p> <p>"Hallo Angela Sorry, I thought you were being informed as to who we all were - there's Isabel who's over from the States..." (Lorraine, Message No. 7)</p> <p>"Lorraine are you still there I was talking to Isabel and Paula on the live chat but I lost them" (Grant, Message No. 9)</p> <p>"Hello Lorraine and whoever else is there (I haven't tried the live chat yet, I just thought I'd post a quick message while I have the chance." (Angela, Message No. 12)</p> <p>"That's about all I've come up with so far. Hope you've had some more luck." (Lorraine, Message No. 13)</p> <p>"Angela, Good to hear from you." (Lorraine, Message No. 14)</p>	8
Technical	<p>"if any of you are out there I am trying to get onto Live Chat but the...file is taking forever to download." (Lorraine, Message No. 8)</p> <p>"Am still waiting for this silly program to download..." (Lorraine, Message No. 11)</p> <p>"I'm still trying to get onto Live Chat and not having any success..." (Lorraine, Message No. 14)</p> <p>"Lorraine Are you sure that you have entered your name and a message and pressed send on the LIVE CHAT. If you don't you wont refresh the screen???" (Paula, Grant and Isabel, Message No. 19)</p>	4

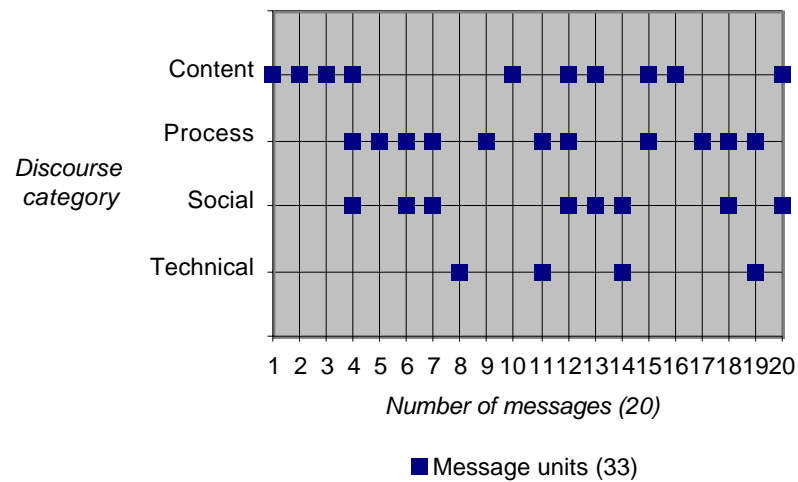


FIGURE 5.6 Case Two, Subject Episode 2: Group 1 Content analysis

Little discussion about the content itself occurred in the discussion thread. As each student found some information, they posted the content or the reference in the thread. Apart from Isabel, who posted a summary she had compiled for the group to consider, all the other content message units were postings of information that students had found about their allocated evaluation theorist.

Isabel, Grant and Paula decided to compile the summary face-to-face in the lab. They notified the group in the discussion thread. They printed all the messages from their discussion thread and they around the tables, which were in the lab, to discuss what they were going to include and exclude in their summary. Isabel typed and posted the summary on the subject Web site. Interestingly, upon examination of the posted summary, content that Lorraine and Angela had provided in the discussion thread, such as quotations and references, was not included.

After Isabel posted the summary, Paula, Grant and Isabel then created an additional discussion thread in the Discussion Forum (titled *4/8/97 Group 1's Summary*) and posted one message to inform the group that the summary had been posted to the Web site.

Several issues surfaced from this group's collaborative effort:

- One Wollongong student from this group commented in the end-of-subject questionnaire: "Our Sydney person didn't ever get on line to interact so we wrote our summary ourselves in W'gong." However, Angela did make a

concerted effort to participate and she provided the group with several references (which were not included in the summary).

- Isabel, Grant and Paula talked about their experience conducting this activity with the researcher during the Monday evening in Week 3. (The researcher was in the lab during the evening.) They expressed limitations with the Discussion Forum tool and with the text space available on the Summary submit form. Paula provided the following feedback:

What we're all trying to do is get together and come to some kind of consensus on what our summary would be but we're handling such large pieces of text that it's really hard to handle. It's kind of cumbersome and just heavy handling to do something useful with it and also to try and link up everybody at the same time. We don't think that we'll be able to get a real true consensus on our summary before Wednesday because if everybody is handling the same amount of text it's as if the spaces that are available aren't quite right for what we need to do. Because it is a scrolling 15cm piece of white [referring to the Summary submit form]...
(Fieldnotes, Week 3, p. 5)

- Grant experienced a heavy cognitive load with this online task. When he arrived in the lab on Monday evening in Week 3, he made the following comments to the researcher:

Grant: They were here [referring to Isabel and Paula] and you'd go off to try and do something. I just couldn't get anything, my thoughts organised. I don't know why. It was really hard to organise and to try and get your thoughts together, because there are five of us, with different ideas and different sources of information and to try and find a space there to gel it all back together in one—that was really difficult.

Researcher: So do you think it is the actual tool that is the issue?

Grant: Yeah, I think so. I mean I could type my paragraph up. Lorraine can type her paragraph up. Paula can type her paragraph up. But the point is you've got to gel the group together and that's really hard. Well, we found that really hard when we were so separated...it was like you want to sit round a table and have that immediate contact—"take out that line and put this line in". And meanwhile they're not on the discussion or the chat at the moment they're typing in their own paragraph so you can't tell them that "oh look we're going to leave out that paragraph".

Grant: As a collaborative tool, I don't know whether it is not as efficient or whether I'm just not used to it yet. I have an internal feeling it is not as efficient but also feel that I just haven't used it enough yet and maybe in the next ten weeks when the subject finishes I may say OK I still don't find it efficient but I can use it much more efficiently.

(Fieldnotes, Week 3, p. 6-7)

Group 2—Asynchronous online interaction with no collaboration: Group 2 was allocated to the *Week 2 Scriven's Goal Free approach* discussion thread and comprised the following students:

Wollongong class: Daniel, Gerald and Jonathon

Sydney class: Hugh and Patricia

Figure 5.7 illustrates who participated in the Discussion Forum and how many messages each student posted.

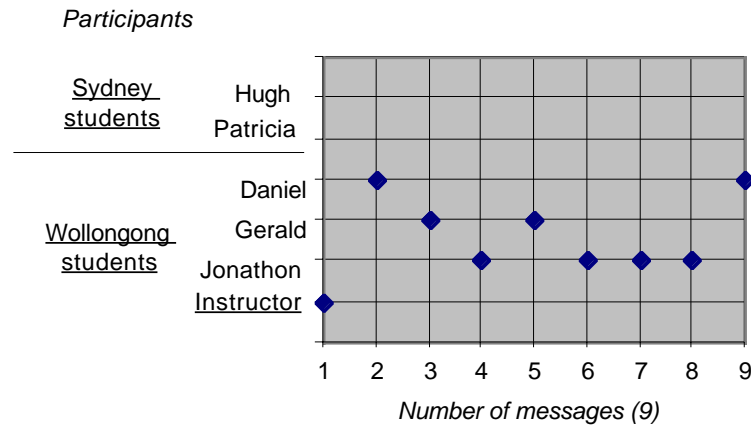


FIGURE 5.7 Case Two, Subject Episode 2: Group 2 Participation analysis

Figure 5.7 shows that the two Sydney students did not make any contributions to the discussion thread. Nine messages were posted in total. Table 5.11 provides a breakdown of the discussion according to discourse categories and Figure 5.8 illustrates the chronology of the discourse categories.

TABLE 5.11 Case Two, Subject Episode 2: Group 2—Messages posted in the Discussion Forum (Thread: <i>Week 2 Scriven's Goal Free approach</i>; total number of messages posted: 9)		
<i>Discourse Category</i>	<i>Examples</i>	<i>Message units (10)</i>
Content	<p>"When Michael Scriven approached the task of evaluation, why did he suggest a 'goal-free' approach?..." (Instructor, Message No: 1)</p> <p>"Scriven was more concerned with whether the goals were worth achieving." (Daniel, Message No. 2)</p> <p>"Answer: He argued that the most notable errors in goal setting involved..." (Gerald, Message No. 5)</p> <p>"References Scrivens Goal Free Model..." (Jonathon, Message No. 7)</p>	9
Process	"Would anybody like to debate these comments on the chat line?" (Jonathon, Message No. 8)	1

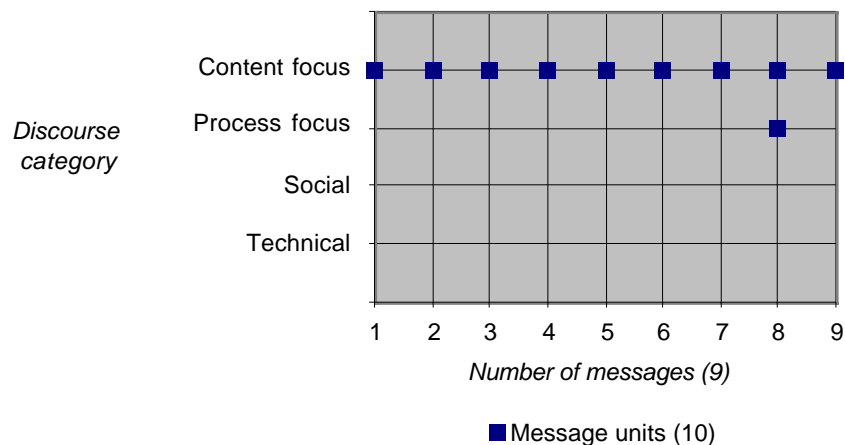


FIGURE 5.8 Case Two, Subject Episode 2: Group 2 Content analysis

Table 5.11 and Figure 5.8 highlight that the majority of messages posted were focused on the content. Daniel, Gerald and Jonathon posted their answers to the question the instructor had assigned. Whilst Daniel and Gerald posted theoretical answers, Jonathon demonstrated, through one of his messages, that he was trying to relate the evaluation theory to his past practice. For example, his message read:

I have already taken a subject dealing with conventional models of evaluation...which I applied to my work situation. I discovered that I was using an “eclectic” approach, in that I was using different formats from different models....If my memory serves me well...Scrivens model takes a non-participatory role, which was not suitable for what I was doing...
(Message 4)

This group demonstrated no online social interaction. For example, unlike Group 1, there were no “Hi there” or “Here’s what I found” phrases in the messages. Jonathon attempted to encourage discussion among the group but to no avail. For instance, during the Monday evening in Week 3, Jonathon accessed the Live Chat space and posted the following messages:

Jonathon - 08/04/97:16:54: Daniel or Gerald, are you there? I have made my contribution in the forum- would you like to make any comments or criticism?
Jonathon- 08/04/97:17:00: Im going to take a break. If any of my group wishes to contact, feel free!

Daniel was in the lab during that evening and replied to Jonathon with the following message:

Daniel - 08/04/97:17:09: Jonathon, is there anything specific you want. I’m at the U,0 [university] Gerald is not here but he has left a reasonable sized document on the forum

After receiving this reply, which Jonathon perceived to be quite abrupt, Jonathon did not make any response to Daniel. Instead, the following day he attempted to encourage discussion among the group by posting a message in the Discussion Forum and a few messages in the Live Chat space. In the Discussion Forum, he posted a very lengthy content summary and concluded his message by asking:

Would anybody like to debate these comments on the chat line?
(Jonathon, Thread: Week 2 Scriven's Goal Free approach, Message No. 8,
August 5, 16:18)

He then posted the following messages in the Live Chat space hoping to hear from the Sydney students that were in his group:

Jonathon - 08/05/97:16:23: Hi Sydney! If anybody who is in the group
discussin Scrivens Goal Free Approach would
like to contact me, I would be pleased to discuss
the topic. I have left some information in the
disussion forum with a few comments.

Jonathon - 08/05/97:17:22: is anybody there

A few minutes later he posted his last message regarding this task in the Live Chat space:

Jonathon - 08/05/97:17:29: Thankyou and Goodbye! I think I might have
more luck communicating with the dead!

Jonathon was frustrated that he had not received any reply from anyone in his group. He decided to compile the summary on his own and post it to the Web site.

In the end-of-subject questionnaire, one of the Sydney students from this group stated that "not much collaboration took place" and suggested a possible solution was "perhaps making someone responsible among the student groups".

In the Wollongong class held in Week 4, the students discussed their experience in conducting the online collaborative summary task. Jonathon indicated the frustration he experienced with the online summary task by stating: "It has put me off collaborative learning for the rest of my life".

Group 3— Asynchronous online collaboration: Group 3 was allocated to the *Week 2 Stufflebeam and decision-making* discussion thread and comprised the following students:

Wollongong class: Frank, Paul and Ryan
Sydney class: Flavia and George

Flavia withdrew from the subject in Week 3 and did not make any contributions to the online discussion. The group decided to work on the task in a synchronous

mode during the non-scheduled meeting time of Monday evening in Week 3. However, a precise time to meet online was not arranged. Consequently, the students logged onto the Discussion forum at different times during the Monday evening and did not succeed in communicating synchronously in the Discussion Forum or in the Live Chat space. However, they did manage to interact asynchronously during the week. Twenty-three messages were posted in the Discussion Forum. Figure 5.9 illustrates who participated in the Discussion Forum and how many messages each student posted.

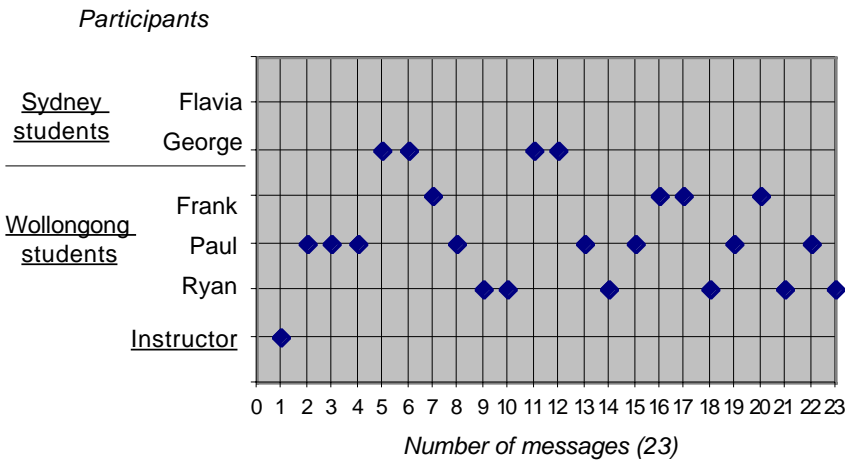


FIGURE 5.9 Case Two, Subject Episode 2: Group 3 Participation analysis

Table 5.12 provides a breakdown of the discussion according to discourse categories and Figure 5.10 illustrates the chronology of the discourse categories.

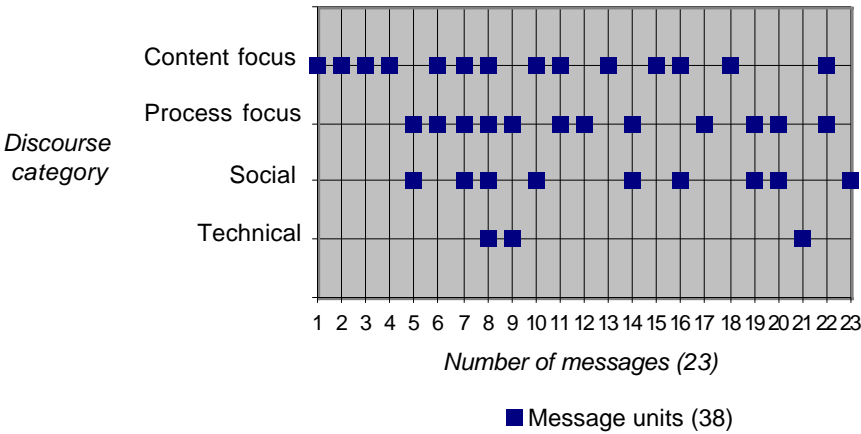


FIGURE 5.10 Case Two, Subject Episode 2: Group 3 Content analysis

TABLE 5.12 Case Two, Subject Episode 2: Group 3—Messages posted in the Discussion Forum (Thread: <i>Week 2 Stufflebeam and decision-making</i>; total number of messages posted: 23)		
<i>Discourse Category</i>	<i>Examples</i>	<i>Message units (38)</i>
Content	<p>"When Daniel Stufflebeam looked at the evaluation task, what did he focus upon? What was evaluation seeking to do....What concepts did he contribute...?" (Instructor, Message No. 1)</p> <p>"From the Alexander and Hedberg paper to save us typing it again; Stufflebeam responsible for the CIPP...model..." (Paul, Message No. 2)</p> <p>"My ERIC search has found some good stuff. It is apparent that Stufflebeam's theory still enjoys currency..." (George, Message No. 6)</p> <p>"I have done reading on Stufflebeam and the main point I found was that the purpose of his model..." (Frank, Message No. 7)</p> <p>"Here is the definition of evaluation taken from the Evaluation Centre where Stufflebeam is the Director..." (Ryan, Message No. 18)</p> <p>"Here is a draft summary..." (Paul, Message No. 22)</p>	14
Process	<p>"I have now had a chance to read all the other group messages and some of them are meeting online on Monday afternoon. I might be able to do that..." (George, Message No. 6)</p> <p>"I have read the message from George and I am happy to communicate on Monday if all could do it..." (Frank, Message No. 7)</p> <p>"I'm happy to meet on line tomorrow. I'm hoping to post more info in the wee hours of tonight. I've contacted Stufflebeam at The University of Western Michigan...I've made contact with the Assistant Director...Email directly at...if there is a question you want me to ask the Assist Director. I will check my mail regularly." (Ryan, Message No. 9)</p> <p>"I waited until 5.07 tonight (Monday) but as no contact I have to leave now...I can be contacted by phone...I will not have access to the internet site until Thursday...If you there at Wollongong can summarise what has been written..." (George, Message No. 12)</p> <p>"After I've fed, bathed and put the kids to bed, I will then be on line for as long as this takes, or till we all fall asleep in Stufflebeam dreams." (Ryan, Message No. 14)</p> <p>"If you guys can draft a summary tonight then that will be terrific. If not I will draft something tomorrow night for everyone to look at." (Paul, Message No. 19)</p> <p>"Here is a draft summary - if any one of you is happy with it please post it - its due today!!!" (Paul, Message No. 22)</p>	12

TABLE 5.12 Case Two, Subject Episode 2: Group 3—Messages posted in the Discussion Forum (Thread: <i>Week 2 Stufflebeam and decision-making</i>; total number of messages posted: 23)		
Social	<p>"Flavia and I are apparently in this group which James says is group 3." (George, Message No. 5)</p> <p>"Hello Everyone. I am a member of this group. I am in the Wollongong group. I am from the Maldiv Islands..." (Frank, Message No. 7)</p> <p>"Sorry about the spelling mistakes last time." (Ryan, Message No. 10)</p> <p>"Its Ryan and I'm online. Sorry I'm late but I was held up at school." (Ryan, Message No. 14)</p> <p>"I hope this information would help in the summary." (Frank, Message No. 16)</p> <p>"Hi all I am retiring hurt at 17:54 - I have a cold and am going home to bed....Sorry to bail out." (Paul, Message No. 19)</p> <p>"Thankyou Paul." (Ryan, Message No. 23)</p>	9
Technical	<p>"Cheers Paul ps above is experiment to see if you can embed HTML in discussion board messages." (Paul, Message No. 8)</p> <p>"Sorry I've been away sorting out my internet setup..." (Ryan, Message No. 9)</p> <p>"Is the server down/overloaded?" (Ryan, Message No. 21)</p>	3

Every student who participated in the online task suggested ideas about how the task should be approached; all students in the group contributed content; and the online group was informed as to whom would produce the summary. There was more online collaboration demonstrated in this group than in the other groups. Similar to Group 1, as each person found information about the evaluation theorist they posted it in the discussion thread. There was also a social component exhibited in the interaction as demonstrated in phrases such as: "Sorry about the spelling mistakes", "I hope this information would help in the summary", "I have a cold....Sorry to bail out".

The students showed commitment to the task. For example, Ryan emailed the Evaluation Theorist Stufflebeam direct and requested information, and students posted several lengthy messages in the discussion thread. Consider the following examples:

- Message No. 10, posted by Ryan, consisted of 37 lines of text (approximately 580 words).
- Message No. 13, posted by Paul, consisted of 41 lines of text.
- Message No. 16, posted by Frank, consisted of 46 lines of text.
- Message No. 22, posted by Paul, consisted of 90 lines of text. (The content of this message was the summary that was subsequently posted to the Web site.

It incorporated the information that was posted by other members of the group.)

Two students from this group responded to the end-of -subject questionnaire. One was from the Sydney class, the other from the Wollongong class. Interestingly, when asked whether they felt that this online collaborative exercise was a success, one responded: “As an example to analyse-yes” the other responded: “No, not a lot of collaboration was done”.

Group 4— Asynchronous online interaction, some face-to-face collaboration and summary produced by one person: Group 4 was allocated to the *Week 2 Other models* discussion thread and comprised the following students:

Wollongong class: Lauren, Nicola and Vicky
 Sydney class: Thomas and Ian

This group had to produce a summary about four evaluation theorists. Twelve messages were posted in their discussion thread. Figure 5.11 illustrates who participated in the discussion thread and how many messages each student posted.

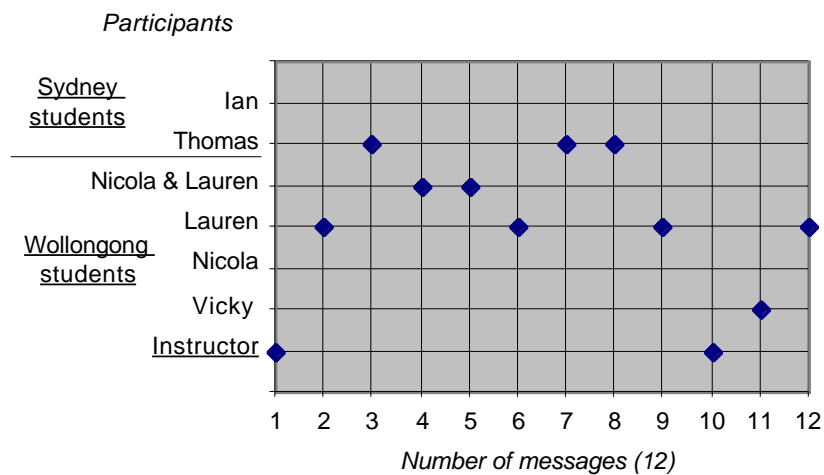


FIGURE 5.11 Case Two, Subject Episode 2: Group 4 Participation analysis

Ian withdrew from the subject in Week 4 and did not make any online contributions in the thread. During class in Week 2, the Wollongong students decided to work on the summary task in a synchronous face-to-face mode from 4.30pm on Monday evening in Week 3. Lauren posted a message in the thread during class in Week 2 to inform the Sydney students:

Nicola, Vicky, and Lauren saying hello to our Sydney topic team member. We'll be here, online, Monday from 4:30 to chat and come up with a group summary. We'll see you there is you can make it! (Message 2)

Lauren, Nicola and Vicky met face-to-face in the lab and during that time Vicky conducted a WWW search on one evaluation theorist whilst Nicola and Lauren discussed content about another evaluation theorist. Nicola and Vicky did not post any individual messages during the evening. Nicola sat next to Lauren who posted the two “Nicola & Lauren” messages. Nicola had limited computer and internet experience and did not feel confident to use the CMC tools. Lauren also posted the information Vicky had found to the discussion forum. For example: “Info on Kirkpatrick thanks to super sluth Vicky!...” (Message No. 6). The messages posted in the thread by the Wollongong group during their face-to-face meeting consisted of information that they had found about the evaluation theorists. Thomas did not participate synchronously in the Discussion Forum. Instead, he posted two messages later that evening. Table 5.13 provides a breakdown of the discussion according to discourse categories and Figure 5.12 illustrates the chronology of the discourse categories.

TABLE 5.13 Case Two, Subject Episode 2: Group 4—Messages posted in the Discussion Forum (Thread: <i>Week 2 Other models</i>; total number of messages posted: 12)		
<i>Discourse Category</i>	<i>Examples</i>	<i>Message units (17)</i>
Content	<p>“Consider some of the following authors, what have they to add to the discussion about evaluation models? Names such as Stake, Guba, Kirkpatrick, and Patton.” (Instructor, Message No. 1)</p> <p>“Some info on Egon Guba’s model which I got off the net...” (Thomas, Message No. 3)</p> <p>“More on Guba...” (Nicola & Lauren, Message No. 4)</p> <p>“From James’s ‘Decisions etc [an electronic resource provided by the instructor]...” (Thomas Message No. 7)</p>	9
Process	<p>“We’ll be here, online, Monday from 4:30 to chat and come up with a group summary.” (Lauren, Message No. 2)</p> <p>“I just collected our notes and am in the process of summarizing...” (Lauren, Message No. 12)</p>	2
Social	<p>“Nicola, Vicky, and Lauren saying hello to our Sydney topic team member.” (Lauren, Message No. 2)</p> <p>“Sorry but I do not have enough info to expand on above. Besides its Saturday night and i’ve got a Fever (I wanna go out!)” (Thomas, Message No. 3)</p> <p>“Info on Kirkpatrick thanks to super sluth Vicky!” (Lauren, Message No. 6)</p> <p>“Lauren, you are spot on!” (Instructor, Message No. 10)</p>	6

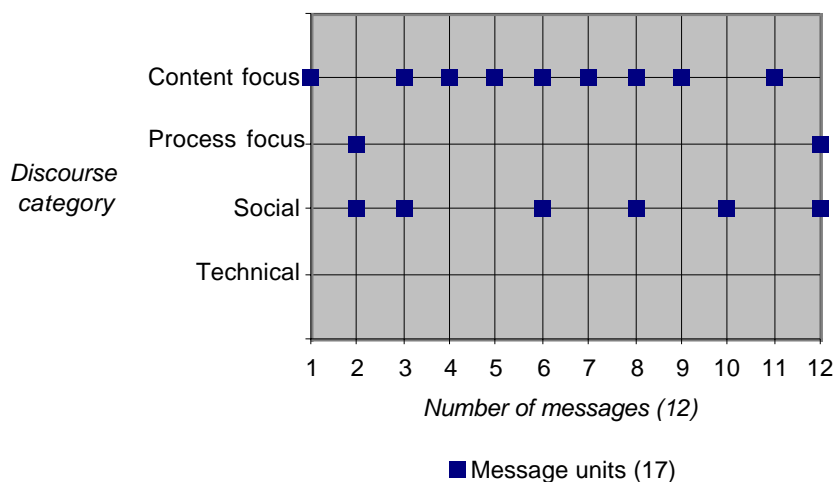


FIGURE 5.12 Case Two, Subject Episode 2: Group 4 Content analysis

Lauren, Nicola and Vicky did not produce a summary during their face-to-face meeting. Instead, the summary task was assigned to Lauren. The last message in the discussion thread, which was posted by Lauren towards the end of Week 3 illustrates this:

Hi Guys, I haven't forgotten about us, I just collected our notes and am in the process of summarizing... (Message No. 12)

Lauren also posted the summary to the Web site.

5.3.3.2.3 Discussion

The analysis of this online activity illustrates that although the instructor devised the same online activity for each group, all four groups conducted the activity in very different ways. The content analysis of the online transcripts highlighted the nature of interaction that occurred for each of the four groups. The analysis showed that whilst all the messages posted in the four discussion threads were task focused, there was a difference among the groups in how the online discussion about the task took place. Two groups experienced technical problems whilst working on the task (Groups 1 and 3) whilst the other two groups (Groups 2 and 4) did not post any messages of a technical nature. Three of the four groups (Groups 1, 3, and 4) exhibited a social dimension in their online contributions whereas Group 2 did not establish any online social rapport. All groups discussed online how to approach the task, although the students in Group 1 and in Group 3 discussed the process of the task more so than the students in Group 2 and Group 4. All groups posted content focused messages in their discussion thread, however, the nature of the content messages differed among the groups. For example one student in Group 1 (Isabel) and one student in Group 3 (Paul) posted a preliminary summary in their discussion

thread for the rest of the group to consider, whereas this did not occur in the other two groups. In Group 2 and Group 4, the summary was produced by one person and was not made available in the discussion thread for the rest of the group to review before being posted to the Web site.

It is contended that the findings from the analysis of this subject episode are dependent on the context of the activity. Although the online activity was assigned and structured by the instructor, the process through which students had to complete the task was open to student negotiation. The onus was placed on the students to participate and negotiate the process with others in the group. Also, there was no direct assessment applicable to this task. Whilst most students showed commitment to the task and applied themselves to complete it, there were some students who did not partake in the activity (for example, several of the Sydney students). Furthermore, for most students this activity was their first online collaborative experience thus they had to contend with learning new content as well as engaging in a new instructional strategy.

The findings suggest that those groups that demonstrated content discourse accompanied with social and process dimensions experienced a more meaningful learning experience than the groups that exhibited little or no social elements and little process discussion. For example, consider the non-collaborative effort exhibited by Group 2. Little process and no social rapport occurred online and as a result several group members were not satisfied with the collaborative effort.

A contention made from the analysis of this online activity is that the online activity did not generate much student discussion about the content itself. The computer-mediated environment was used more as an information posting and exchange rather than content discussion. Students did not critique or discuss the content in any great length, they simply posted the information that they had found. This suggests that students may have engaged in surface processing rather than in-depth processing (Henri, 1992, p. 130) of the content. The verification coder supports this contention. Time allocated to the online activity may have been an influential factor as students commented to the researcher that they were busy looking for information and had little time left to synthesise the information. Thus an implication that may be drawn is students need appropriate time to complete an online task. Alternatively, perhaps the students could have been given some assistance by the instructor by having ready access to more reading resources relevant to the task.

Other issues that surfaced from this subject episode are:

Three of the four groups wanted to work on the task in a synchronous mode: For most of the students, this was their first online collaborative experience and it was interesting to notice that three of the four groups wanted to work on the task in a synchronous mode. Two conjectures are made. Perhaps the students adopted a synchronous approach to group work because it was a strategy with which they were most familiar. Thus a question drawn is, did they couch the use of CMC within a conventional fixed-place and fixed-time pedagogical practice? Or perhaps the use of a synchronous approach stemmed from the need for social introductions which the CMC literature (Berge, 1995, p. 26) claims is required in the early stages of computer conferencing.

Groups could monitor other groups' progress: Students were able to view other group's progress. Several students acknowledged that they had read the other discussion threads. For example, Lorraine (Group 1) and Nicola (Group 4) commented in class in Week 4 how they were impressed that Ryan (Group 3) had emailed the evaluation theorist Stufflebeam direct. George (Group 3) posted a message in his group's discussion thread that he had read all the other groups' threads:

"I have now had a chance to read all the other group messages and some of them are meeting online on Monday afternoon..."

Inter-group monitoring by students is difficult to achieve in conventional face-to-face group work. An implication for pedagogy is that although one group can work on a task, the archiving ability of the online environment affords the students the opportunity to review other groups' work. The students not only have access to more resources but resources produced by the students themselves.

Learning about implementation of technology through its use: The reflective feedback provided by Grant and Paula, about their experiences using the Live Chat and Discussion Forum CMC tools to complete the online summary task, illustrates they were thinking about technology implementation issues through the use of technology.

Four separate groups or the formation of an online community? The summary products from the online task were of benefit to the entire class because students produced resources that other students could then utilise. This was a motivating factor for some students to participate (eg. "others were counting on your output so I was motivated to participate"). This strategy accompanied with the

ability for students to monitor other groups' online discussions suggests that although students worked in small groups, they were interacting in an online community. At the end of the subject, one student suggested that a weekly "buddy" strategy could be implemented online. Two students could discuss an issue online and post a summary to the Web site for the whole class to review.

5.3.3.3 Episode 3: The synchronous online class sessions didn't go according to plan

5.3.3.3.1 *The theme of discourse in the Live Chat during the first few weeks was: "Is anyone out there?"*

The Live Chat space was available for students to use from the beginning of the subject. Apart from experimental use in the first class and it being used by Group 1 (in Episode 2), the main theme of discourse in the Live Chat space during the first three weeks of semester was "Is anyone out there?". Most of the students were enthusiastic to use the Live Chat tool and wanted to experience synchronous online discussion. The examples provided in Table 5.14 illustrate how the students and the instructor attempted to facilitate informal synchronous online discussion in the Live Chat space during the first three weeks of semester.

TABLE 5.14 Case Two: Excerpts from the Live Chat space from Weeks 1 to 3 (Each excerpt is provided in its entirety, that is, no interim messages have been deleted)		
<i>Week and day</i>	<i>Live Chat excerpts</i>	
Week 1, Saturday	Thomas - 07/26/97:18:00: Ian - 07/26/97:23:46:	I'm just experimenting really. Is anyone out there? Just checking in. Wouldn't it be nice if we could see the messages without sending something first?
Week 2, Monday	George - 07/28/97:11:13: George - 07/28/97:11:16: Jonathon - 07/28/97:12:28: Jonathon - 07/28/97:12:31: Jonathon - 07/28/97:15:47: Gerald - 07/28/97:16:22: Grant - 07/28/97:23:19: Grant - 07/28/97:23:20:	Hello is anyone out there I agree Ian , it would be good to see messages first. Its like sending something into the void. If this is the extent of on-line discussion on which we are to base part of our first assignment , it is going to be a short assignment. Just catching up on the gos! Ian, I quite agree with your statement, as we are taking "pot luck" whenever we log on Anyone here? Good day, I am a new student. Nice to meet you. Is anyone out there Ian I'm another onw who agrees with you
Week 2, Tuesday	Angela - 07/29/97:17:45: Thomas - 07/29/97:17:46: Grant - 07/29/97:19:24: Ian - 07/29/97:22:31: Ian - 07/29/97:22:33:	Thomas, are you there? beam me up Is anyone there Good evening. Would anybody like to set a time for an online discussion? If so, e-mail me on [email address]

TABLE 5.14 Case Two: Excerpts from the Live Chat space from Weeks 1 to 3 (Each excerpt is provided in its entirety, that is, no interim messages have been deleted)		
Week 2, Thursday	George - 07/31/97:13:03: Jonathon - 07/31/97:13:19:	Just checking in to see what has been said (written) in the past few days Hi! Could anybody enlighten me as to how we should be approaching discussions on the major evaluation models? I understood that we should take the model that was allocated to us and discuss it on the web with our chosen groups. I am still in the dark...
Week 2, Friday	Jonathon - 08/01/97:13:08:	Is there anybody there who would like to make contact?
Week 2, Sunday	Grant- 08/03/97:16:03:	Hello anyone there
Week 3, Monday	Nicola - 08/04/97:12:55: Jonathon - 08/04/97:13:36 Jonathon - 08/04/97:13:38: Jonathon - 08/04/97:14:12:	Hi! This is all very new to me. I'm not too comfortable talking to an anonymous audience. I'm a people person and I enjoy conversation. I thought I'd try this out, and see how I find it. Please talk back to me! Hi!is anybody having difficulty getting on to the discussion forum? Hi Nicola, this is "Skippy Jon", are you still there? Is anybody around?
Week 3, Monday evening	Thomas - 08/04/97:18:53: James - 08/04/97:18:54: James - 08/04/97:18:55: James - 08/04/97:18:55: Thomas - 08/04/97:18:57:	Thanks James [instructor]. Resources are progressing (slowly) I've pulled out Anglin's text. Are we supposed to be chatting tomorrow night at normal lecturt times? Good point, I will not be able to be there for long, but if you care to spread the word, why don't we all get on line from 5:30 to 6pm tomorrow? I am signing off now and will check in later and Tomorrow Tomorrow night, any last minute questions, I would be happy to answer. James,I will try and be here tomorrow . Not sure how to let others know but will try. Bye for now.

By Week 3, it was evident that although students wanted to engage in online synchronous discussion, they had had little success. On the Monday evening in Week 3, Nicola was in the lab working with her group on the summary task. Nicola was not confident with the technology and did not feel comfortable using it. However, she was enthusiastic to learn. Earlier that day she had posted a message in the Live Chat space (her message is included in Table 5.14). This was the first message she posted online from home. Below is an excerpt from an informal interview that took place between Nicola and the researcher. Nicola explained how she felt using the Live Chat tool.

- Nicola: I feel very uncomfortable typing into the computer to an anonymous audience. I like to have the personal contact rather than working through a screen.
- Nicola: I'm afraid of what's out there, who's out there and I'm not sure what they'll do with it when they receive it, whether somebody will think I'm not very sensible....and the fact that...maybe nobody will get it at all. Maybe it will get lost and just sending out messages to no one.
- Nicola: I would prefer it to be more interactive. It's not interactive enough, it's not happening fast enough for me. I don't like having to wait. I like a conversation being fluent and I like it to be relayed and that's the way I feel about it.

Researcher: What would you think if you tried the chat space with other people on it?

Nicola: I'd probably enjoy that so long as, as there was a reaction and there were people. Though, I've only tried chat spaces with people sitting beside me chatting through two separate computers. I haven't tried it at home chatting to someone else. But I'd like to try it.

(Nicola, Fieldnotes, Week 3, p. 4)

Failed attempts to engage in online synchronous discussion caused signs of frustration to surface in the Live Chat space, particularly from Jonathon. Excerpt 5.2 illustrates messages posted on Tuesday, Week 3.

Jonathon - 08/05/97:17:29:	Thankyou and Goodbye! I think I might have more luck communicating with the dead!
James - 08/05/97:17:30:	Hello Folks I am online! Any problems?
James - 08/05/97:17:31:	Sorry I missed you Jonathon!
Researcher - 08/05/97:17:33:	Hi James. More than half the class "physically" attended class last night. Re: this live chat space people are getting a bit frustrated as there is usually noone to talk to. (cont.)
Researcher - 08/05/97:17:34:	So, a few suggested that we perhaps should organise set times that everyone can be online.
James - 08/05/97:17:36:	Yes I said to some that I would be here from 5:30 to 6pm tonight

EXCERPT 5.2 Live Chat, Week 3, Tuesday

Late Tuesday evening in Week 3, the researcher managed to initiate a brief online chat with one of the Sydney students and an interesting comment was raised:

Ian - 08/05/97:20:26: Yes, it's fantastic to finally see something happening. Shirley, what's next. I guess it's a little silly, but I've been so preoccupied with finding somebody, that I don't really know what we're meant to talk about.

Based on this feedback, the researcher sent an email to the instructor on Monday in Week 4 stating some ideas about the class. Below is an excerpt from that email message:

Many in the class are keen to use our live chat space but are disappointed that there's noone to talk to. (I check in regularly and there's always someone trying to see if anyone else is there.) So, if we schedule a set time for both classes to be online say for 20-30 minutes - could we set up a qstn or issue to talk about - in order to give this form of CMC a go?

(Researcher, Email message to instructor, Monday 11 August, 1997, Week 4, 7:54am)

The feedback received by the instructor from both the students and the researcher resulted in the scheduling of two synchronous online discussion opportunities for the students.

5.3.3.3.2 *Two synchronous online sessions are scheduled by the instructor for Week Five*

In the on-campus class in Week 4, the student's current use of the Live Chat space was discussed. Paul made the comment:

So far...the chat space hasn't for us been a solution to a real problem. We don't have any real need, or haven't so far had any real need to use it.
(Paul, Fieldnotes, Week 4, p. 16)

The instructor agreed with Paul. The instructor however, wanted the students to experience an online synchronous discussion and thus suggested that the class meet online at a common time. The class agreed to be online on both Monday and Tuesday evening in Week 5 for 30 minutes (from 5.30pm to 6pm). The discussion was to focus on the reading that was assigned for that week (Gayeski, D. (1989). Why information technologies fail? *Educational Technology*, 29(2), 9-16.) and resolve any student issues. The instructor informed the Sydney class of the scheduled synchronous online session when he attended that class on the following evening.

5.3.3.3.3 *A new asynchronous tool, DISCUS, is introduced in class in Week Four*

Also discussed during class in Week 4 was a new asynchronous CMC tool, DISCUS, which was added to the subject Web site. DISCUS was available for use at no cost, and was a CMC tool recommended from one of the Web site development listservers to which the researcher subscribed. DISCUS differed from the Discussion Forum tool in the following ways:

- Coloured text, symbols and graphics could be inserted in messages.
- All messages in a discussion thread were displayed as one single Web page.
- A range of administrative functions was available. For example, moderators and users could be assigned to an overall discussion topic. Moderators could then delete messages, edit existing messages, change discussion thread titles, and move messages to different threads.

DISCUS was demonstrated to the students in both classes and first discussion thread created titled: *Using this Computer Conference tool* was used by the students during class in Week 4 to post test messages to become familiar with the tool.

It was agreed that during the non-meeting week (Week 5), in addition to the online synchronous sessions, an online asynchronous discussion about the article written

by Diane Gayeski: “Why information technologies fail?” would take place in DISCUS.

5.3.3.3.4 *The two synchronous online sessions fizzle*

On the Monday evening in Week 5, four of the six Sydney students (Angela, Patricia, Ros and Thomas) signed onto the Live Chat space. From the Wollongong class, only two of the eleven students joined the synchronous discussion (Isabel and Lauren). The two students were both in the lab on campus and the researcher was also present. The instructor was not online during this synchronous session.

The scheduled 30 minute chat session continued for more than 90 minutes. What occurred is summarised as follows.

A total of 118 messages were posted and the participants joined and exited the synchronous discussion at different times and they alerted their entry and exit by posting a message. Table 5.15 summarises entry and exit times for each participant, total time spent online and the number of messages each participant posted. (Entry time was determined at the time the participant acknowledged their presence in the Live Chat space. Exit times were determined by the last messages posted by each participant).

TABLE 5.15 Case Two: Synchronous Live Chat session, Monday Week 5—Participant entry and exit times, time spent online and number of messages posted by each participant (Total number of messages posted: 118)				
<i>Participant</i>	<i>Live Chat entry time</i>	<i>Live Chat exit time</i>	<i>Time spent online</i>	<i>No. of messages posted</i>
Isabel (Wollongong class)*	17:33	18:52	1 hr, 19 mins	38
Researcher	17:33	19:09	1 hr, 36 mins	21
Lauren (Wollongong class)	17:33	18:09	36 mins	19
Ros (Sydney class)	17:33	18:04	31 mins	13
Angela (Sydney class)	17:42	18:19	37 mins	11
Patricia (Sydney class)	17:54	18:23	29 mins	2
Thomas (Sydney class)	18:07	19:06	59 mins	14

** Isabel, exited the chat space at 18:10 but then returned to the online discussion thirty minutes later.*

The above table illustrates that the researcher was an active participant in the synchronous online session.

Most of the participants were not sure of the purpose for the synchronous online gathering. This is illustrated in the following three excerpts from the Live Chat session.

Ros - 08/18/97:17:39:	so whats the plan with the Chat space - do we have an assigned topic or is this a cosy little forum for getting to know each other.
Isabel - 08/18/97:17:40:	That's a good question, Ros. I wish I knew the Answer
Isabel - 08/18/97:17:41:	I thought everyone was suppose to be on at this time

EXCERPT 5.3 Live Chat, Week 5, Monday, Messages: 8 - 10

Patricia - 08/18/97:17:54:	Hi Everybody, Is there a chat topic we are supposed to be discussing or are we just generally getting familiar with the technology today??
Isabel - 08/18/97:17:54:	hmm...the question of the night!
Isabel - 08/18/97:17:55:	I think the idea was to do both...but I am not sure how it is working out

EXCERPT 5.4 Live Chat, Week 5, Monday, Messages: 50-52

Thomas - 08/18/97:18:07:	calling in
Angela - 08/18/97:18:09:	Hi Thomas. You need to share deep and meaningful thoughts about Gayeski and why technologies fai, (ggod way to practise your typing). technology doesn't
Lauren - 08/18/97:18:09:	okay, now that my computer has crashed and is back up, I'm going to sign off, see ya everybody!
Isabel - 08/18/97:18:10:	I am with Lauren. See ya!
Angela - 08/18/97:18:10:	Sorry about my typos, I've got the three year old on my lap. It also seems quite difficult to read what I've just written.
Thomas - 08/18/97:18:10:	Hi Angela I thought that we were supposed to talk about Gay (oops!) in the other thing (threads)
Angela - 08/18/97:18:12:	Well we are but now is the time to take the opportunity to discuss any unresolved issues!

EXCERPT 5.5 Live Chat, Week 5, Monday, Messages: 72-78

Two students explicitly expressed their expectation of the instructor to facilitate the discussion. One student commented online: "I think it will be REALLY important to have the instructor take the role of facilitator on actively, in order to ensure the discussion proceeds". Another student responded: "Hey James, where are you?".

The students did try to initiate a formal content discussion, and a brief discussion (approximately 10 minutes in duration) about the Gayeski article did occur. Angela initiated the discussion and acted as a facilitator. The following two excerpts illustrate how Angela moderated the brief content-focused discussion. Excerpt 5.6 illustrates Angela's first attempt to focus the online discussion on the Gayeski article whilst being immersed in online social and technical "chit-chat". Excerpt 5.7 illustrates Angela's reply to Lauren's question that subsequently led into the brief (and only) concentrated discussion about the assigned reading.

Isabel - 08/18/97:17:46:	I am doing my Masters. I am here for atleast a year...after that I don't know
Ros - 08/18/97:17:47:	was living in Sarnia for a little while - wild times down there!
Angela - 08/18/97:17:47:	Hmmm, this could get confusing. Anyone got anything profound to say about Gayeski?
Lauren - 08/18/97:17:48:	Ros, are you in Sydney Centre or at home...gosh, Sarnia's got to be as wild as Wollolongong
Isabel - 08/18/97:17:48:	I am a big chat fan! Too much free time on my hands I guess
Lauren - 08/18/97:17:48:	Chat's better on a unix machine where you don't have to hit return, you just see the letters as they are typed
Ros - 08/18/97:17:49:	mm similar - Im at work at the moment

Lauren - 08/18/97:17:49:	I think the "say:" window should be larger for long-winded people like me
Isabel - 08/18/97:17:50:	Lauren, do you have a wumpus account?
Ros - 08/18/97:17:50:	what an earth is a wumpus?
Lauren - 08/18/97:17:50:	yeah, and I use it to talk with one or two friends back home, not many people I know have access to a unix server
Isabel - 08/18/97:17:50:	a server....for email accounts
Isabel - 08/18/97:17:51:	do you use ytalk? or irc?
Isabel - 08/18/97:17:51:	I am trying to think of something profound to say about Gayeski
Lauren - 08/18/97:17:51:	I've never used IRC, just talk... I've been experimenting with MOOs though
Isabel - 08/18/97:17:52:	I used IRC a lot at home...but I can't seem to get access here
Lauren - 08/18/97:17:52:	Would Gayeski call internet chat a success or failure for educational purposes?

EXCERPT 5.6 Live Chat, Week 5, Monday, Messages: 28 to 44

Angela - 08/18/97:17:55:	Well, given Gayeski's fairly limitd view of what has een successful, internet chat would probably not feature in her success list!
Isabel - 08/18/97:17:55:	good point angela
Isabel - 08/18/97:17:56:	I think it was interesting that the internet is such a big issue today but not mention by Gayeski
Lauren - 08/18/97:17:58:	yeah, but the article was written in '89, I remember doing my Master's in '91/92 and the only ply people that seemed to be using the net were lengineering, comp sci, and library sic (that's what I did) students
Angela - 08/18/97:17:59:	We talked about that last week (the Internet not mentioned) and pointed out that the WWW has only been available the last few years.
Researcher - 08/18/97:17:59:	Yeah Lauren - I remember back in '93 I had jsut sort of heard of it
Isabel - 08/18/97:17:59:	But I think it is amazing that a few years ago not many people had heard of it and today almost everyone has
Isabel - 08/18/97:18:00:	Or atleast everyone in the academic world
Lauren - 08/18/97:18:00:	yeah, and http addresses are everywhere, even printed on Jacques Villeneuve's F1 car
Ros - 08/18/97:18:01:	Guess its been around a long time - it just wasn't made available to we common civilians!
Angela - 08/18/97:18:02:	So, given its rapid rise to fame,what are the implications for the likes of us?
Ros - 08/18/97:18:02:	Time consuming
Isabel - 08/18/97:18:02:	quicker communication (lower phone bill for me!)
Isabel - 08/18/97:18:03:	I think some times it is time consuming other times I think it can be time saving
Ros - 08/18/97:18:04:	agreed - also very convenient

EXCERPT 5.7 Live Chat, Week 5, Monday, Messages: 55 to 69

Although the entire online discussion was not very content focused, it at least enabled the students to experience being involved in a synchronous online discussion. Several students reflected on this experience during the online session. Below are examples from Isabel and Lauren, who commented about the technical limitations of the Live Chat tool, and from Ros who reflected on her online experience from a pedagogical viewpoint.

Isabel - 08/18/97:17:45: I hate that you have to hit the Say It! Button everytime
 Lauren- 08/18/97:17:45: Yeah, the return key should do it
 (Message No. 20-21)

Ros - 08/18/97:17:55: think you would need a totally multi-tasking brain to glean educational info from a chat space - topics are very diverse!

(Message No. 54)

An aspect of computer-mediated communication that surfaced from this synchronous online discussion was the ability for students to interact with each other whilst situated in their home environment. Consider the following message:

Angela - 08/18/97:18:10: Sorry about my typos, I've got the three year old on my lap...

(Message No. 76)

Because students entered the online synchronous session at different times and were not sure what was to be discussed, upon examining the entire online transcript five themes or “moves” categorise the online discourse. Table 5.16 provides a chronology of these themes. Each theme overlaps so it was not possible to divide the themes into discrete message chunks.

TABLE 5.16 Case Two: Synchronous Live Chat session, Monday Week 5—The five discourse “moves” that occurred online		
<i>Themes or “moves” that occurred online</i>	<i>Summary of discourse that transpired</i>	<i>Examples of messages posted</i>
“Waiting for everyone to log on”	The discourse at the beginning of the online session was predominantly of a social nature as students waited for other students to enter the Live Chat space.	<p>Angela - 08/18/97:17:42: Hello, I'm here! (Message No. 13)</p> <p>Isabel - 08/18/97:17:43: So Lauren, Where did you do your undergrad degree?(small talk to pass the time) (Message No. 15)</p> <p>Ros - 08/18/97:17:43: Was feeling lonely! Hows the 3 year old Angela? (Message No. 16)</p>
“Reflecting on the technology”	After social introductions were made, the online discourse changed to a technical discussion. Students discussed their experience with using CMC tools.	<p>Lauren - 08/18/97:17:48: Chat's better on a unix machine where you don't have to hit return, you just see the letters as they are typed (Message No. 33)</p> <p>Isabel - 08/18/97:17:52: I used IRC a lot at home...but I can't seem to get access here (Message No. 43)</p> <p>Ros - 08/18/97:17:55: think you would need a totally multi-tasking brain to glean educational info from a chat space - topics are very diverse! (Message No. 54)</p>
“Discussing the Gayeski article”	There was a brief window of time (10 minutes) where the online discourse focused on subject content. (That is, what the students were supposed to discuss.)	<p>Angela - 08/18/97:17:55: Well, given Gayeski's fairly limitd view of what has been successful, internet chat would probably not feature in her success list! (Message No. 55)</p> <p>Isabel - 08/18/97:17:56: I think it was interesting that the internet is such a big issue today but not mention by Gayeski (Message No. 57)</p>

TABLE 5.16 Case Two: Synchronous Live Chat session, Monday Week 5—The five discourse “moves” that occurred online		
“Some students logged off and other students logged on”	Thomas joined the online discussion more than 35 minutes after the scheduled start time. Other students, for example, Angela, Isabel, Patricia and Lauren decided to exit the Live Chat space.	<p>Thomas - 08/18/97:18:07: calling in (Message No. 72)</p> <p>Lauren - 08/18/97:18:09: okay, now that my computer has crashed and is back up, I'm going to sign off, see ya everybody! (Message No. 74)</p> <p>Isabel - 08/18/97:18:10: I am with Lauren. See ya! (Message No. 75)</p> <p>Angela - 08/18/97:18:19: My computer crashed and now I have to go, see you! (Message No. 82)</p> <p>Patricia - 08/18/97:18:23: Night all, talk to you tomorrow (Message No. 85)</p>
“The researcher chats with the remaining online participants”	Towards the end of the online synchronous session, the researcher informally “chatted” with Thomas and Isabel (who returned to the Live Chat space). These two students were the only active participants left in the Live Chat space.	<p>Shirl - 08/18/97:18:24: Tim - I'm still here (Message No. 87)</p> <p>tim miles - 08/18/97:18:35: Shirley, if you're still there how important is this aspect of human contact as Gayeski points out. Does the Internet go further than previous technologies in allowing human contact? (Message No. 89)</p>

On the subsequent evening, (Tuesday, Week 5), little online synchronous discussion occurred during the scheduled time. The instructor did not log on. From the Wollongong class, only Lauren and the researcher signed on. From the Sydney class, only Angela and Hugh signed on. During a 40-minute time period, 17 messages were posted of which 9 were posted by the researcher. This brief synchronous exchange is presented in Excerpt 5.8.

Researcher - 08/19/97:17:15:	Hi all!
Researcher - 08/19/97:17:24:	just checking
Lauren - 08/19/97:17:33:	Hi Shirley
Researcher - 08/19/97:17:41:	Gee there's just sooo many of us here tonight!!!!
Hugh - 08/19/97:17:44:	Hello any one there?
Researcher - 08/19/97:17:48:	Hello! Yes I'm here! Where are you - at home, work, etc? I'm in the lab in Wollongong
Hugh - 08/19/97:17:49:	I just put up some comments in DISCUS. Any body like to discuss?
Researcher - 08/19/97:17:53:	Just read it and agree with what you're saying - so it's not the technology per se - it's how it's used - do you agree?
Hugh - 08/19/97:17:56:	I find the display confusing. My messages is the top one then I see a later message somewhere in the middle?
Researcher - 08/19/97:17:57:	Sorry - are you talking about this live chat tool or DISCUS?
Hugh - 08/19/97:17:58:	Hello Shirley, some order now! I am calling from home for the first time. Yes, I agree.
Angela - 08/19/97:17:59:	Hi! I'm here.
Researcher - 08/19/97:18:01:	Hi Angela! Are you at home or at work?
Hugh - 08/19/97:18:05:	It seems to be working now (the chat) but I am not very clear on how to use it. Logging off.

Researcher - 08/19/97:18:06:	Angela are you still there? Should we call it a night? I'm quite happy to get home to my 2 year old!
Angela - 08/19/97:18:07:	I'm at home...I've just been reading the discussion on DISCUS. Yes, lets call it a night..dinner is waiting to be cooked. Bye!
Researcher - 08/19/97:18:08:	OK - bye!! I'm signing off as well.

EXCERPT 5.8 Live Chat, Week 5, Tuesday

5.3.3.3.5 Student feedback points to lack of task clarity, task purpose and technical difficulties

Feedback from Paula in Week 5 and feedback from Grant in Week 11 indicated that they had simply forgotten to log onto the synchronous online class session.

Lorraine experienced problems accessing the Live Chat space. She was using another WWW browser program, Microsoft Internet Explorer, and that browser program conflicted with the Live Chat software. In the face-to-face meeting in Wollongong in Week 6 Nicola and Jonathon commented that they thought the online task was to take place in DISCUS. Nicola said: "I was waiting at home saying where's everybody else? Why aren't they talking?" The following discussion during class illustrates the students' confusion.

Nicola: I'm sorry but I was waiting for all this action! I thought everybody was going to be talking at the same time.

The researcher then commented to the instructor that there seemed to be a misunderstanding of what tool was supposed to be used for the online chat session on Monday and Tuesday 5.30 - 6pm.

Instructor: When it's real time, synchronous time, the chat space is the place to go to because it, it refreshes faster.

Instructor: You can see it all happening, whereas the DISCUS and the threaded discussion are really meant to be asynchronous so you can add to them over the period....you can do it in real time but it doesn't really work.

Jonathon: I understood that the DISCUS was going to replace the chat, chat space.

Nicola: Yeah, that's what I thought too.

Instructor: Oh, OK, no that wasn't the intention. Because, I think you need two different sorts of ways of communicating.

(Fieldnotes Week 6, p. 10)

Two students from the Sydney class made the following comments in the end-of-subject questionnaire about the scheduled online synchronous sessions:

I think this was a problem partly because we didn't have a particular topic to discuss, partly because of the nature of the software - it seems difficult to 'discuss' anything in depth because people's comments appear on screen at random.

(End-of-subject, questionnaire, Question 9a)

Often, due to work, I couldn't get on at that time.

(End-of-subject, questionnaire, Question 9a)

The student feedback thus suggests that the online synchronous class sessions did not work well for the following reasons:

- There was a lack of task focus and structure. Although the students were to discuss the assigned Gayeski article, the instructor did not structure a specific task such as a question or issue to discuss. Thus, students had to initiate their own discussion and structure the online session themselves. As can be seen from the data, whilst some students attempted to initiate content discussion, the online session resulted in little content focus.
- The use of the CMC technology was not transparent to students. For example, Jonathon and Nicola were confused as to which CMC tool to use for the synchronous discussion, ie: the Live Chat space or DISCUS. Angela commented that the Live Chat space was a cumbersome tool to use to discuss content issues in any depth. Some students experienced technical problems using the Live Chat. For example, Lorraine could not access the Live Chat space, Lauren experienced temporary computer crashes and Hugh (in the second synchronous session) was not sure how to use the Live Chat tool and subsequently logged off.
- Lack of incentive to participate in the online discussion is suggested both from the feedback by Paula and Greg and the lack of participation from the Wollongong class. Students, perhaps, did not perceive a need to participate in the online synchronous session.

5.3.3.3.6 Discussion

Parallels can be drawn with what occurred in this subject episode to some of the online synchronous incidents that occurred in Case One (particularly Week 6). That is, students entered an online synchronous discussion at different times and there was little task focus. The results generated were similar—little online discourse about the content occurred. The suggestions made in the previous case included ensure that all participants start the online task at the same time, and ensure that the task is clear. If these were implemented, perhaps the results from this subject episode may have been different. These suggestions concur with recommendations offered in the CMC literature. Berge (1995) states “ensure that all students begin in unison and in an organized fashion” (p. 27). The importance of this recommendation was demonstrated in this subject episode and in Case One. The CMC literature also recommends that an online activity (be it synchronous or asynchronous) requires structuring (Mason & Bacsich, 1998); needs facilitation by an assigned moderator (Berge, 1995) —a role assumed by the instructor (Collins & Berge, 1996); and students need an incentive to participate (Mason & Bacsich, 1998; Ruberg et al. 1996). The findings from this subject episode highlight the validity of these recommendations. In this subject episode, students expected the instructor to

facilitate the online discussion, yet the instructor expected the students to manage the process themselves. Perhaps the instructor could have been more explicit in explaining to the students his expectation of their role in the online synchronous task (Berge, 1995, p. 27).

5.3.3.4 Episode 4: An online asynchronous class discussion resulted in a 'posting of answers'

5.3.3.4.1 Context of the online asynchronous task

Between Weeks 4 and 6, students were to participate in online asynchronous discussion in DISCUS that focused on the Gayeski article (described in Episode 3). Plus, they were to begin working on their Web Study Guides (which were due in Week 8).

The allocated reading by Gayeski was not specifically relevant to the Web Study Guide assessment task, but it covered broad issues for students to think about in terms of implementation and evaluation of technology in education. The instructor created the DISCUS discussion thread: *Why information technologies fail? Article by Gayeski* and participation in the asynchronous discussion was voluntary, that is, there was no marks allocated for participation.

The instructor posted the first three messages in the DISCUS discussion thread. These three messages explained the structure of the task:

Hi there, This week we will discuss the Web study guides and start discussion about the Gayeski article.
(Message No. 1)

After reading the article by Gayeski, consider that it was written about 10 years ago and reflect on the following questions.
1. How relevant is her allocation of success or failure today?
2. What general criteria has she used or ignored about the role of technology in supporting learning outcomes?
3. What advice would you give to a new distance education provider who is starting from scratch?
(Message No. 2)

By the way you should be discussing this at times other than on Monday and Tuesday nights!
(Message No. 3)

Over the two-week period, a total of 34 messages were posted in the discussion thread. Five messages were repeat messages and have been excluded from the analysis. (Several students did not see their posted message due to not clearing the cache in the Netscape browser.)

Most of the Wollongong students (8 of 11) and half of the Sydney students (3 of 6) contributed to the online asynchronous discussion in DISCUS. Figure 5.13 presents a participation analysis of the online asynchronous discussion held in DISCUS.

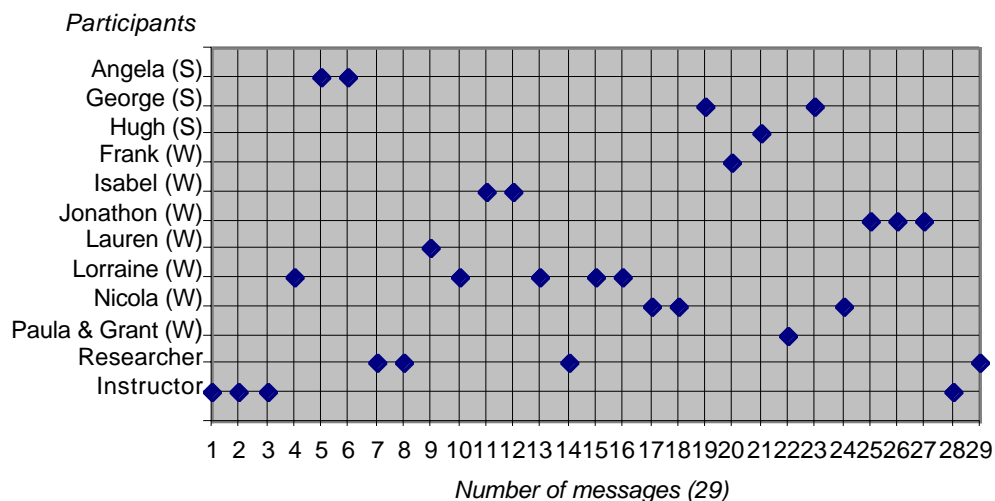


FIGURE 5.13 Case Two, Subject Episode 4: Participation analysis

A content analysis using the discourse categories defined in Table 5.9 is presented in Figure 5.14 and Table 5.18. An additional discourse category is included in the content analysis. It emerged upon examination of the online transcript. It is labelled *Metacognitive* (Henri, 1992) and is defined in Table 5.17.

TABLE 5.17 Case Two, Subject Episode 4: An additional discourse category—Metacognitive emerged in the online asynchronous class discussion about the article by Gayeski. (Based on Henri, 1992, 1996)		
<i>Discourse Category</i>	<i>Definition</i>	<i>Example</i>
Metacognitive	A comment that expresses self-awareness about the process and strategies adopted when participating in an online environment.	<p>"I fully agree on the need for personal contact...however I am prepared to try other avenues...this is one of them."</p> <p>"I personally don't mind the lack of human contact all the time. I think this class is a good example."</p>

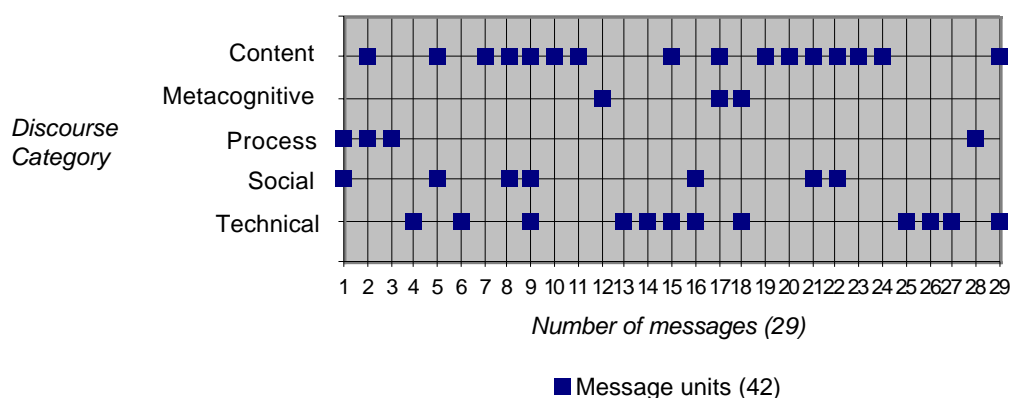


FIGURE 5.14 Case Two, Subject Episode 4: Content analysis

TABLE 5.18 Case Two, Subject Episode 4: Asynchronous online class discussion about the article by Gayeski. (Total number of messages posted: 34; 5 repeat messages; messages analysed: 29)		
<i>Discourse Category</i>	<i>Examples</i>	<i>Message units (42)</i>
Content	<p>"1. How relevant is her allocation of success or failure today? 2. What general criteria has she used or ignored about the role of technology in supporting learning outcomes? 3. What advice would you give a new distance education provider who is starting from scratch?" (Instructor, Message No. 2)</p> <p>"The first two things that struck me about this article were: ..." (Angela, Message No. 5)</p> <p>"My initial thoughts on the Gayeski article:..." (Lauren, Message No. 9)</p> <p>"I thought it was interesting that Gayeski pointed out one of the problems with getting people to accept some of the technology was the lack of face-to-face contact..." (Lorraine, Message No. 10)</p> <p>"One central mistake in her assessment is the idea that you can generalise about technologies..." (George, Message No. 20)</p>	16
Metacognitive	<p>"Sure I don't want to sit in my flat and go to Uni on the computer but I think with proper implementation it could work. I think this class is a good example. Meeting on the Web every other week is convenient. I don't think anyone is going to be that upset that we all didn't meet this week in person. With a little experience, communicating on the web is going to be second nature to everyone (in my opinion...but then again I am a big internet fan!)" (Isabel, Message No. 12)</p> <p>"I fully agree on the need for personal contact and communication on a face-to-face level...however I am quite prepared to try new avenues...this is one of them. This is very convenient!" (Nicola, Message No. 18)</p> <p>"Yes we must evaluate them [referring to technology] and the most appropriate method for evaluation is the 'hands-on approach'" (Nicola, Message No. 19)</p>	3

TABLE 5.18 Case Two, Subject Episode 4: Asynchronous online class discussion about the article by Gayeski. (Total number of messages posted: 34; 5 repeat messages; messages analysed: 29)		
Process	<p>"This week we will discuss the Web study guides and start discussion about the Gayeski article." (Instructor, Message No. 1)</p> <p>"After reading the article by Gayeski, consider that it was written about 10 years ago and reflect on the following questions." (Instructor, Message No. 2)</p> <p>"By the way you should be discussing this at times other than on Monday and Tuesday nights!" (Instructor, Message No. 3)</p>	4
Social	<p>"Hi! Looks like I'll be the first..." (Angela, Message No. 5)</p> <p>"I thought I'd enter some of my thoughts and I'd be interested to see what the rest of you think. Look forward to talking online with you later on!" (Researcher, Message No. 8)</p> <p>"See ya (read ya?) at 5:30" (Lauren, Message No. 9)</p> <p>"Hi everybody!" (Hugh, Message No. 22)</p>	7
Technical	<p>"Am just seeing if this works from home" (Lorraine, Message No. 4)</p> <p>"The first time I posted my last message I couldn't see it then I saw the same thing had happened to Shirley...I followed her instructions (in the other thread) about clearing the cache and it worked! So if you've posted as message and can't see it, go to: ..." (Angela, Message No. 6)</p> <p>"It's great being able to add all this formatting but, it should be easier and faster to do!" (Lauren, Message No. 9)</p> <p>"As you can see, I had difficulty locating the cache, I could not post my message. It came up twice." (Nicola, Message No. 19)</p> <p>"I am just attempting to access the system after receiving a new password" (Jonathon, Message No. 30)</p> <p>"I have posted this message on behalf of Lorraine as she has had trouble using DISCUS Via the Internet Explorer browser." (Researcher, Message No. 34)</p>	12

The online discussion that occurred can be summarised as a posting of answers. There was no build up of discourse. Each student posted his or her individual viewpoint about the article. The online transcript illustrated that students had read the article and had thought about the issues it raised. However, there was very little online discussion among the students about the article. There were only two examples of students explicitly responding online to a previous message. One message was posted by Frank, who began his posting: "I agree with Isabel that..." (Message No. 20). The other message was posted by the researcher who responded to Lorraine's technical problem: "Lorraine, go to the...and we can talk about the problem you're having" (Message No. 14). Two students explicitly stated that they had read the discussion thread before making their contribution, but their message was a compilation of their ideas, not a critique of what other students had written. To illustrate, the message began as follows:

This message is from Paula and Grant....On checking the site we noticed that some people had posted tonight...so we thought we might join the discussion....There seems to be a range of observations and reactions to the Gayeski article. I'm not too sure of every word of every message so if I repeat what has been said consider it great minds thinking alike..." (Message No. 22)

There was no final outcome achieved in the online discussion. The three questions assigned by the instructor were not summarised. The instructor did not facilitate the discussion. Apart from posting the initial questions his only other contribution was the second last message which read: "This is the end of the Gayeski Discussion move now to the next topic!".

5.3.3.4.2 Discussion

In the end-of-subject questionnaire, students were asked why little online discussion occurred for this asynchronous task. They highlighted three reasons:

- Lack of motivation to participate
- Nature of the online discussion
- Student personalities

Student feedback is illustrated in Table 5.19.

TABLE 5.19 Case Two: Student feedback from end-of-subject questionnaire about possible reasons for the lack of online discussion that occurred (Question 9a)	
<i>Theme</i>	<i>Student feedback</i>
Lack of motivation to participate	<p>"Because there was no mark allocated to this expectation - most people seemed to use these as weeks off rather than an opportunity to communicate electronically." (Wollongong student)</p> <p>"I don't feel everyone took it seriously. It didn't really factor into our grade." (Wollongong student)</p> <p>"Most of us, likely, focused on the current assignment." (Wollongong student)</p> <p>"I'm not sure - perhaps the subject matter - people weren't motivated enough to contribute." (Sydney student)</p>
Nature of the online discussion	<p>"No real protocol for meeting "on-line"." (Sydney student)</p> <p>"I think the actual discussion should start during the meeting and some sort of exercise should be given to follow it up. This would have worked??!! (Wollongong student)</p> <p>"Because face to face talking allows the flow of natural conversation. Written conversation is unnatural and awkward." (Wollongong student)</p>
Student personalities	<p>"I think it has to do with the personalities of the people in the group. There was little discussion on a face-to-face level to begin with - which may explain the situation when it came to on-line discussion." (Wollongong student)</p>

Other issues that surfaced from this online asynchronous discussion task were:

Learning about implementation of technology through its use: From examining the online discourse, the reflective comments made by Isabel and Nicola illustrate they were thinking about implementation and evaluation issues regarding technology-based learning by experiencing a form of technology-based learning, that is an asynchronous online discussion. The task of discussing content online was a vehicle for them to think about implementation and evaluation issues from a more holistic perspective.

"No contribution" does not equate to "non-participation": Although some students did not post any message to the discussion thread and those that did gave little explicit feedback about other contributions, it cannot be assumed that the students did not read or think about the other student contributions. For example, Thomas did not make any contributions to the discussion thread, yet he told the researcher during class in Week 11 that he found the online discussion very useful. Thus it cannot be assumed that "non-contributors" equates to "non-participation". Bates (1995) and Hara et al. (2000) claim that "active listeners" or "lurkers" is a key disadvantage of CMC.

5.3.3.5 Episode 7: All is quiet online whilst the final group project is under way

5.3.3.5.1 Description

The instructor envisaged the final assessment task to be conducted in small online collaborative groups between the Sydney students and the Wollongong students. However, the Sydney students wanted to work on the final project among themselves. They were a close knit group and indicated a preference not to collaborate with people that they did not know, that is, the Wollongong students. Consequently, four face-to-face student groups were formed for the evaluation project.

During the final weeks of the subject, (Weeks 11 to 14) very little online discourse transpired among students in the Live Chat space or in DISCUS. In the class meeting held in Week 11, Paula said to the researcher that she was not going to access the subject Web site for the remainder of the semester as there was no need. She knew what she had to focus on—the final assignment. Any concerns about the final assignment could be resolved through face-to-face discussion in her group.

To assist students with the group assignment, the researcher created a discussion thread in DISCUS titled: *Successmaker Project - issues, concerns, discussion...* and posted the following message:

This discussion space has been created so that if anyone wishes to discuss any aspect of the Successmaker Project with the rest of the class - this is the place to do it!
Please post any questions, concerns, or issues you may have regarding this group project. We could start by stating who is in what group!

Five messages were posted in this thread, four of which were posted by the researcher, mainly to inform students of relevant information for the assignment. Below are samples of messages posted by the researcher.

Hi everyone. Hope you are all progressing well with your evaluation project. I attended the Sydney class last week and just for the benefit of the Wollongong class I thought I'd share with you what we covered in terms of Successmaker....
(Message No. 4)

The following questions were covered in the Sydney class re: your evaluation proposal for Successmaker. John provided the following answers:....
(Message No. 5)

All four groups met face-to-face to work on the final assignment. Some groups also communicated among themselves using email. In the last week (Week 14), all the Sydney students attended the on-campus class and group presentations of the Successmaker project were given. After the class, an end-of subject dinner was held. The researcher attended and made an interesting observation: the Sydney students sat together on one end of the table and the Wollongong students sat together at the other end of the table!

5.3.3.5.2 Discussion

The findings suggest that little online discussion occurred in this subject episode because student issues were resolved within the face-to-face groups and apart from email communication that occurred within some groups, students did not perceive a need for online class interaction.

Thus, a working hypothesis generated from the findings is: *If there is no perceived need to participate in online discussion then little or no online interaction will occur.* This was prominently illustrated in this subject episode as well as in Episode 3 and Episode 6. This concurs with the findings presented by Mason and Bacsich (1998).

5.4 THEMES THAT EMERGED

Three themes surfaced from this case:

1. The assessment tasks drove the learning process.
2. The subject Web site became a student support mechanism.
3. The technology became more the medium than the message.

These themes were identified by conducting a similar analysis as conducted in Case One, and conducting a comparative analysis with Case One.

5.4.1 THE ASSESSMENT TASKS DROVE THE LEARNING PROCESS

A dominant theme that emerged from this case was that assessment drove the learning. Unlike in Case One where the fixed weekly meeting times drove the learning process, this case demonstrated that assessment became the driving force. The following sub-themes surfaced:

- The assessment tasks served as cognitive scaffolds for students. They were completed progressively throughout the subject and the first three tasks were “stepping stones” to assist students with the final assignment.
- The nature of the computer-mediated communications established among students was influenced by the assessment tasks.
- The assessment structure influenced the nature of the face-to-face meetings.

5.4.1.1 The assessment tasks served as cognitive scaffolds

The conceptual representation of the subject presented in Figure 5.2 illustrates how the assessment tasks were staggered throughout the subject and how content and some of the online tasks were integrated to form an “assessment chunk”. For example, content material and the online summary activity supported students in the production of the first assignment (Episode 2).

Unlike in Case One where all the assignments were broad in scope, open-ended in terms of assessment criteria and mostly due at the end of the semester, each assessable piece of work in this case had a specific focus and assessment criteria. All the assignments in this case were linked to each other. The first three tasks assisted in the completion of the last assignment. The Web Study Guide evaluation (Assignment 3) could not have been performed unless all students produced a Web Study Guide (Assignment 2).

In Case One, many students experienced a high cognitive load as they were constantly reflecting on their own hands-on experience of implementation and evaluation of technology-based learning whilst learning about implementation and

evaluation of technology-based learning via reading literature and class discussions. Reflective thinking was encouraged via the open-ended nature of the assessment tasks and their recursive characteristic. For example, the subject evaluation assignment allowed students to evaluate the subject itself. The student seminars also provided opportunity for reflection as students could refine their implementation strategy after reviewing other student seminar strategies. In Case Two, it is contended that the phased assessment structure alleviated some of the cognitive load for students as they focussed on one assignment at a time. Reflective thinking was encouraged because students still experienced technology-based learning whilst learning about it (student comments that reinforces this were seen in Episode 2 and Episode 4). However, the findings suggest that reflective thinking was predominantly isolated to each assessment task. Table 5.3 illustrates that the face-to-face meetings were used as discussion sessions for student reflection about assignments and online activities.

Students were asked in the end-of-subject questionnaire if they thought the structure of the assessment tasks was appropriate. From 15 respondents, the majority of students (9) felt that the sequence of the assignments provided a gradual learning experience; five students did not think the assessment structure was appropriate; and one student did not comment. Of the five students that thought the assessment structure was not appropriate, four specifically mentioned that the first assignment was too difficult to complete in the time given whilst one student (from the Sydney group) stated that the assignments were: “too heavy and too many”.

Several students commented that they did not see the relevance of some of the topics the instructor had assigned for the Web Study Guides, for example, one Sydney student stated: “Sometimes it wasn’t clear to me why they [WSG topics] were topics at all” (End-of-subject questionnaire). Two students from the Wollongong class, who were schoolteachers, felt that the final assignment had no relevance to them. One of these two students commented: “The course did not cover implementation or evaluation in any real context” (End-of-subject questionnaire). This feedback implies that there was some disparity between the instructor’s perception of the relationship among the assessment tasks with that of the students’ perceptions.

In Case One, students were immersed in an authentic problem-based setting due to the pilot nature of the subject’s delivery. Thus, the “real world” context was the subject itself. The instructor did not predetermine the problems students encountered in the subject. In Case Two, the “real world” context was provided in the last

assignment. The instructor predetermined an implementation and evaluation problem for the students in the form of an evaluation proposal project. The assignment was based on a real case study thus the instructor deemed this task as being authentic. This suggests that in Case Two, students were immersed in a preauthenticated problem based setting (Petraglia, 1998). The assessment tasks were intended as cognitive scaffolds and were predetermined and sequenced by the instructor.

5.4.1.2 The assessment tasks influenced the nature of the online interaction

The findings suggest that if online activities specifically related to the assessment tasks (as seen in Episode 2), then online interaction among students occurred. If the online tasks did not specifically relate to the assessment tasks (as seen in Episodes 3, 4, and 6), then little online interaction among students occurred.

5.4.1.3 The face-to-face classes became student reflection and issue resolution sessions

In Case One, the weekly face-to-face classes were used to deliver content material. Students came to class each week expecting to be “taught” something during the three-hour class session. In Case Two, the face-to-face class sessions assumed a different role. They became a meeting time where students could discuss content issues, assignments or reflect on their online interaction experiences during the non-meeting weeks. The instructor put the onus on the students to initiate and focus the discussions in the face-to-face meetings. Although content topics for the class meetings were provided in the subject outline and content was discussed in class, the face-to-face meetings tended to be more informal discussion sessions where the instructor encouraged students to facilitate discussion. The Sydney students welcomed and enjoyed such a learner-centred approach. Several of the Wollongong students, however, were frustrated by the lack of instructor direction in the face-to-face classes. These students expected the instructor to “teach” during the face-to-face meetings. Students were asked in the end-of-subject questionnaire what they thought about the instructor’s involvement in the subject. Five of the six Sydney students who responded to the questionnaire provided favourable feedback (comments included “Excellent”, “James, just great!”, “Usually very informative”). Of the 10 of the 11 Wollongong students who responded to the questionnaire, six students expected the instructor to have been more involved in the subject. Some student feedback includes:

“The instructor seemed to have little or no interest in teaching the course.”

“Minimal, not very effective, unprepared, pleasant but not much teaching.”

“The instructor's involvement was very limited in main discussion of general topics/areas.”

“I think a little bit more involvement would help the students understand what they are supposed to do.”

5.4.2 THE SUBJECT WEB SITE BECAME A STUDENT SUPPORT MECHANISM

In Case One, the subject Web site was a complement to the weekly class. The weekly class meetings became the focus for the students and the Web site became a repository for the student's seminar Web pages. In this case, the opposite occurred. Because the face-to-face meetings did not occur on a fixed weekly basis, the Web site became the mechanism that brought the entire class together. The face-to-face meetings became a complement to the Web site. Students accessed the Web site regularly to be kept informed of subject information. This suggests that the subject Web site became the main support mechanism for students. Students could access the various CMC tools to interact with other students. Electronic resources (such as Web Study Guides and student Web pages from Case One) were available from the Web site for use by students. The subject Web site provided an adaptable support mechanism as the *Notices* section was updated on a weekly basis based on the students' needs and their feedback given in the face-to-face class.

However, the face-to-face class sessions were another support mechanism for students. The findings suggest that because the instructor attended each physical class this affected the utility of the Web site to act as an interaction support mechanism between the two classes as little inter-class online interaction occurred. Students discussed issues with the instructor face-to-face within each class and did not perceive a need to interact with students from the other class. In the end-of-subject questionnaire, students were asked if they thought collaboration between the two classes was necessary. From 15 responses, 10 students thought it was not necessary. Some comments include:

“Why not let both groups work independently. There was no need for them to work together.” (Wollongong student)

“It was an experiment/a good idea but not necessary.” (Wollongong student)

“I don't think it was essential but since the classes were small it could be beneficial.” (Wollongong student)

“Not necessary but a good thing.” (Sydney student)

One student commented:

“In the end it did not matter. But it was necessary if the student needs to understand the full potential of the technology.” (Wollongong student)

From the five students who thought the collaboration between the two classes was necessary, the main reason that surfaced was the sharing of different ideas. For example:

“Good to get ideas from all types of different occupations, job descriptions of Sydney people vastly different from Wollongong group.” (Wollongong student)

“It can be quite insightful sharing ideas/views/experiences with many different people. As the groups were quite different, I think it was worthwhile. Also, the Sydney group was quite small, so it was good to get a wider range of experience/opinions.” (Sydney student)

5.4.3 THE TECHNOLOGY WAS MORE THE MEDIUM THAN THE MESSAGE

Comparing this case with the previous case, the use of technology moved from a mechanistic mode of use to a more routine form of use. Students were given opportunity to become familiar with the CMC tools (Episode 1) before online asynchronous participation was encouraged. Thus, the technology became more transparent. However, several students did experience technical difficulties when using the CMC tools and when developing the Web Study Guides. (Technical difficulties experienced during the online discussions in Episode 2 and Episode 4 were highlighted in the content analysis discourse category *Technical*.)

In Case One students frequently discussed features of the CMC tools whilst using them (see Chapter 4, Table 4.12). This also occurred in Case Two, however, not with the same intensity. Some examples include:

Ian - 07/26/97:23:46: Just checking in. Wouldn't it be nice if we could see the messages without sending something first?

George - 07/28/97:11:16: I agree Ian , it would be good to see messages first. Its like sending something into the void...
(Live Chat, Week 2)

Angela - 08/05/97:18:12: I can't get on to the live chat. Am I doing something wrong? Al I get is the space to write in, but I can't see anyone's messages.
(Live Chat, Week 3)

The first time I posted my last message I couldn't see it then I saw the same thing had happened to Shirley...I followed her instructions (in the other thread) about clearing the cache and it worked! So if you've posted as message and can't see it, go to: ... (Angela, DISCUS, Discussion Thread: Why information technologies fail? Article by Gayeski)

It's great being able to add all this formatting but, it should be easier and faster to do!” (Lauren, DISCUS, Discussion Thread: Why information technologies fail? Article by Gayeski)

As you can see, I had difficulty locating the cache, I could not post my message. It came up twice.” (Nicola, DISCUS, Discussion Thread: Why information technologies fail? Article by Gayeski)

Several students experienced technical “literacy” difficulties when developing their Web Study Guides. For example, Nicola had extreme difficulty in developing her Web Study Guide. She was not familiar with the Web page production tool Claris Home Page and the researcher provided assistance to develop her Web Study Guide. One student from the Sydney class commented in the online subject evaluation:

“I really think there should be some opportunity for the “non technocrats” to develop basic skills in TBL in conjunction with subjects such as EDGA 957
- It would relieve a lot of stress”

Thus in Case Two, the technology became semi-transparent.

5.5 DISCUSSION

A comparison between Case One and Case Two leads to the following conclusion: Case One was a pilot in technology and Case Two was a pilot in pedagogy.

5.5.1 A PILOT IN PEDAGOGY

What was “new” in Case One was the technology. The pedagogy did not alter. A conventional fixed weekly synchronous face-to-face class model was employed. In Case Two, the instructor and the researcher were more informed about the features and capabilities of the technology and changed the subject delivery, content and assessment structure to better utilise the technology. Thus, what was “new” in Case Two was the change in pedagogy. The “novelty factor” for students and the instructor in Case One was experiencing the technology itself. In Case Two the “novelty factor” for students and the instructor was experiencing a different way of learning and teaching by virtue of using technology.

This collective case study has described how the implementation of technology has moved from a mechanistic form of use in Case One to a more routine form of use in Case Two (Hall & Hord, 1987). In terms of pedagogy, however, this study has highlighted the reverse. A change occurred from implementing routine or conventional instructional strategies (Case One) to rethinking the whole learning and teaching process (Case Two) and implementing new and “untried” instructional strategies—“pedagogical re-engineering” (Collis, 1996a, 1996b).

5.5.2 EMERGENT ISSUES

The lessons learned from this case include the following issues:

- Breaking the reliance of fixed-time and fixed-place instruction
- The evolving nature of the online environment
- The changing role of the instructor and the student
- The creation of more avenues for feedback and flexibility for both instructors and students.

5.5.2.1 Breaking the reliance of fixed-time and fixed-place instruction

5.5.2.1.1 Integrating online discussion with flexible meeting times

This subject was the first postgraduate subject offered by the Graduate School of Education that enabled flexibility in meeting times and encouraged asynchronous online interaction between two geographically separated groups of students who would have otherwise interacted with the instructor as two discrete classes. The data presented illustrates that many students viewed the non-meeting weeks as a “week off” and utilised the extra time to work on assignments. In the end-of-subject questionnaire, students were asked what they thought about the concept of not having to attend weekly face-to-face classes. The majority of respondents (11 of 15) thought the concept had potential. Some thought it was good because they had more time to complete their assignments, others liked the concept but felt it could have been better implemented. Four respondents commented that the flexible meeting strategy did not work well for them and reasons given were, they missed the classroom contact; it was considered a week off; it caused a lack of group cohesion; and it required more self-directed learning. Student feedback is provided in Table 5.20.

TABLE 5.20	Case Two: Examples of student feedback from end-of-subject questionnaire that illustrate what the students thought about the concept of the non-meeting weeks (Question 8) (The majority of students thought the concept had potential but could have been better implemented.)
<i>Feedback from students who thought the concept of flexible meeting times had potential</i>	<p>“The concept has potential - but there needs to be some motivation (10% of marks) for people to be involved - I think most people (including myself) felt like it was a week off.” (Wollongong student)</p> <p>“Good but shame wasn't utilised properly” (Wollongong student)</p> <p>“These worked well - especially when I knew what I was doing.” (Wollongong student)</p> <p>“I like the concept and think it could be helpful. It saves time and cost, It allows you to get experience with the Internet which is part of technology we are studying It gives you personal experience which can help you understand strengths and weaknesses.” (Wollongong student)</p> <p>“The concept is good. I don't know if everybody gave it a chance.” (Wollongong student)</p> <p>“Good concept as long as students understand what is required outside of face-to-face meeting time or have specific outcomes to achieve.” (Wollongong student)</p> <p>“Good -time to do assignments.” (Sydney student)</p> <p>“Good for part time students with busy schedules” (Sydney student)</p>

TABLE 5.20 Case Two: Examples of student feedback from end-of-subject questionnaire that illustrate what the students thought about the concept of the non-meeting weeks (Question 8) (The majority of students thought the concept had potential but could have been better implemented.)	
<i>Feedback from students who thought the concept of flexible meeting times did not work</i>	"Didn't work and caused a lack of group cohesion." (Wollongong student) "It represented more individual learning of the participants. I prefer to have class" (Wollongong class) "I did not think it fulfilled its purpose for me except when there is an assignment due. I had a break otherwise." (Wollongong student) "Missed classroom contact." (Sydney student)

All the respondents from the end-of-subject questionnaire thought that the concept of asynchronous online discussion was a beneficial strategy to discuss subject content. They offered several improvement suggestions such as provide more time to a discussion; allow students more time to become familiar with the concept of interacting via CMC; and provide more structure and focus to the online task. Table 5.21 provides some of the student feedback. The student suggestions concur with the CMC implementation recommendations presented by Berge (1995, 1998) and Mason and Bacsich (1998).

TABLE 5.21 Case Two: All respondents in end-of subject questionnaire thought asynchronous online discussion can assist in the learning process
<i>Student feedback</i>
"Has potential - BUT most seemed to prefer to use face to face meeting to raise discussion. I think it would work better in a course where there are NO meeting weeks and the only way to communicate is electronically." (Wollongong student)
"Good although face-to-face discussions seem to produce more involvement but on-line means Sydney group can join in." (Wollongong student)
"It is good, and an important strategy. However discussions need to be: structured somehow, guided somehow, organised, focussed, or it's a shambles." (Wollongong student)
"With patience, I think it could be effective. The advantage of using a discussion forum is that people can take time to think about other's responses and form their own responses." (Wollongong student)
"This strategy is interesting. Moreover, it would be effective if sufficient time was allocated." (Wollongong student)
"Good idea but requires a number of people to have "done their homework" which doesn't always happen (but this is in any time of group discussion strategy)" (Wollongong student)
"The strategy is very good but it will work if the students have some background knowledge. Also some feedback is required during non-required meetings so that the students will have a better understanding." (Wollongong student)
"I think it is potentially very useful, but perhaps students need more incentive to join in, particularly in the early stages." (Sydney student)
"Perhaps it is the maturity of tool, perhaps it is the nature of people who take classes - they need social interaction, perhaps our habits and comfort zone. Don't throw the idea out, just perhaps introduce it and use it in a different way, maybe." (Sydney student)

5.5.2.1.2 New ways of delivering and learning content

This case demonstrated a different approach to delivery and learning of content than in Case One, in that the delivery of content changed from presentation of content during class time (Case One) to the production and subsequent utilisation of resources (Case Two). Such a strategy is consistent with the Resource-Based

Learning literature which states that resource-based learning environments enable resources, which are designed for one purpose, to be used to support other purposes (Hannafin, 1997). The Web Study Guide production and evaluation assessment tasks are one example of how the concept of resource-based learning was implemented. Through the availability of Web Study Guides, students were able to review content at a time and place convenient to them. More than half of the class thought that reviewing the Web Study Guides was an effective learning strategy in comparison to sitting in class listening to the traditional student seminar presentation. As Hugh reflected in class: “I don't think without this exercise we would have had a chance to read so many different subjects and different ways of presenting those subjects”. Student comments from the end-of-subject questionnaire such as “easier to take in, can keep going back to get info”; “worked at your own pace, information is always there for you to reference”; “the Web Guides remain in permanent form”; and “you can access it at your convenience”, purport a more learner-centred focus. Table 5.22 illustrates student feedback obtained from the end-of subject questionnaire in response to a question about the Web Study Guides:

If you were to use the Web Study Guides to learn about the various topics, do you think this is an effective learning strategy in comparison to each student presenting a topic in a class presentation/seminar? Yes/No. Please state why.
(Question 16c, End-of-subject questionnaire)

TABLE 5.22 Case Two: Results from Question 16c in end-of-subject questionnaire		
<i>Students who answered “Yes” (9)</i>	<i>Students who answered “No” (3)</i>	<i>Students who answers “Yes” and “No” (2)</i>
Easier to take in, can keep going back to get info. (Wollongong student)	The Web will really only work when there are no face to face meetings...otherwise I don't see the point as I find face to face teaching far more successful. (Wollongong student)	Yes - You can access it at your convenience. No Because you can't ask it any questions.
I think it is a good way to present content. But using the tool and the internet brings new dimensions which MUST be considered. (Wollongong student)	I believe both have a place in learning. (Wollongong student)	Both can be boring. The breadth of topics used in this assignment could make a whole course on its own. Having to review so many became boring. The learning started to stop as the brain went into overload. A lot of work for just 10%.
Worked at your own pace, information is always there for you to reference (Wollongong student)	No, because I cannot find any deep description/explanation of the topics. (Wollongong student)	
Not everybody gets it right on the night! (Wollongong student)		

TABLE 5.22 Case Two: Results from Question 16c in end-of-subject questionnaire	
Much more can be included without any peer pressure or inability discrimination (Wollongong student)	
Because you can take your own time to learn and a vast amount of resources can be linked. (Wollongong student)	
Although they are both effective, the Web Guides remain in permanent form. (Sydney student)	
I think it's possible to deal with the topic in more depth in a WSG and we can look at/read them at our leisure. (Sydney student)	
Yes - some unevenness (Sydney student)	

In the face-to-face class held in Week 11, both classes reflected on the Web Study Guide production and evaluation tasks. Students described their experiences about reviewing the content presented in the Web Study Guides and how they conducted their evaluations. The following issues surfaced from the class discussions:

- Several students thought the concept of a Web Study Guide was a useful medium to learn about a topic:

“I used it so I could learn something from the topic. I just saw it as another medium instead of having them standing up the front to give a seminar...”
(Ryan, Wollongong Class, Week 11 Fieldnotes, p. 5)

“I suppose I thought of it as...trying to gather all the sorts of information about the different topic in one spot so if someone was looking for something about that topic, then here are all the different areas you can go off to rather than having to sit there and search through everything yourself.
(Lorraine, Wollongong class, Week 11, Fieldnotes, p. 9)

“I think for me it's a great, I know Hugh said before that it's better to read a book but I really think to me it's much better to do these guides than have to do all that research yourself...”
(Thomas, Sydney class, Week 11, Fieldnotes, p. 32)

I don't think without this exercise we would have had a chance to read so many different subjects and different ways of presenting those subjects.”
(Hugh, Sydney class, Week 11, Fieldnotes, p. 33)

- The instructor perceived the activity of reviewing Web Study Guides was more learner-centred:

If you think about it. We could get up there and do 15 presentations night after night and you might think it's tough going through 15 Web study guides but it's tougher listening to 15 presentations. So in a sense it's shifting the information...to a thing that you can drive.
(James, Sydney Class, Week 11 Fieldnotes, p. 33)

- Patricia thought that the Web Study Guide evaluation task was too demanding for the percentage of the grade given.

I didn't like assessing them...as the amount of time and commitment for 10% of our mark was very heavy.

(Patricia, Sydney class, Week 11, Fieldnotes, p. 28)

- Ideas for incorporating Web Study Guides in future subject offering were discussed. The concept of “constructing” an electronic resource on the Web and how students could then use such resources to help them create a mental model of not just one topic (as covered in their Web Study Guides) but of the entire course content was discussed. The following excerpt was taken from Wollongong class discussion:

Instructor: Imagine this scenario. That you take on your Web study guide topic. You have your...space...into which you place your study guide as well as which everyone else places their study guides and then you have to resolve the interconnectedness and all the rest of it within that space.

Researcher: It's a different strategy as opposed to just reading and absorbing someone else's. You're actually constructing your model and how you perceive things...

Instructor: There's two issues. There's the way in which the site is actually constructed, and then there's your understanding of the concepts that that site represents.

Lorraine: So are you sort of doing a contents page and linking...sites you think are important?

Instructor: Well, you could do it that way. Everybody could create their own index page that links to all the other bits. So you could end up with a sort of a map of the Web site which is sort of like...

Lorraine: A mind map?

Instructor: Well, yes.

(Week 11, Fieldnotes, p. 16-17)

As Web authoring tools become easier to use, it may be possible for students to use such tools to construct their own interpretation of the course content. In this way, the Web may be used as a cognitive tool (Jonassen & Reeves, 1996).

5.5.2.2 Evolving nature of the online environment

5.5.2.2.1 Learning on the shoulders of others

One student commented in the end-of-subject questionnaire that the online asynchronous discussions strategy “is a smart way of creating an info bank of people's ideas about the course literature”. Electronically stored resources enable subsequent cohort of students to access previous student products and online discussions, which can facilitate the concept of “learning on the shoulders of others”. Students can learn from their predecessors taking “learning” to a new plateau (Hedberg, Brown, Larkin & Agostinho, in press).

This has implications for the design and maintenance of online environments and the role of the instructor in that the instructor needs to update resources after each implementation. This may also involve changing assessment tasks and class activities so as not to overlap with previous student work. In terms of assessment, if resources from previous student cohorts are used, then tasks need to be constantly updated. The instructor needs to be creative and dynamic in order to integrate previous student resources into the current online environment. The instructor in this case realised this issue:

What I think we might have to do as time goes by is actually identify more specific assessment tasks...So, if you're looking at the ongoing development, you're actually trying to fill in the slots, so the next group of students will have to choose from a set of predefined topics that are not well represented within the resources we've got. Consequently we will fill the gaps, so over time the Web site will become a better body of resources...
(Instructor, Post-subject interview)

5.5.2.2 Implications for lifelong learning

In Week 11, Paula asked the researcher if the subject Web site would be accessible after the semester as she wanted to opportunity to access the content after the completion of the subject. Perhaps students could be given an electronic resource, such as a mirrored version of the Web site on a CD-ROM, at the beginning of the subject and then be given access rights to the subject Web site after the subject is finished. That way, students could review the content offered in subsequent subject implementations.

5.5.2.3 The changing role of the instructor and the learner

5.5.2.3.1 The instructor becomes a change agent and provides pedagogical support for students

Many students considered the non-meeting week as a week off and most expected the instructor to facilitate the online discussions. For example:

“Off campus weeks need to be more regimented—they tended to just fade away.”
(Wollongong student, End-of-subject questionnaire, Question 6)

“I would have liked more on-line contact (I think it might have helped to stimulate discussion)”
(Sydney student, End-of-subject questionnaire, Question 6)

“My own idea about graduate level subjects and my own learning style is to have an instructor as a guide rather than require that person to be everything all the time. BUT I think if Web Based Instruction and online communication is going to work at this early stage in its implementation as an instructional strategy, the instructor has to be a leader in convincing those students who might not have the initial interest in the mode of the delivery.”

(Wollongong student, End-of-subject questionnaire, Question 6)

However, one student made the following insightful comment:

“I suppose the instructor was attempting to encourage involvement within the group through the use of the interactive multimedia. I don't want to be critical because in hindsight the methods used are what I consider to be part of an innovative teaching practice which is still in its initial stage.”

(Wollongong student, End-of-subject questionnaire, Question 6)

Within an online learning community the instructor is no longer “in charge” but takes the role of a facilitator (Sherry & Wilson, 1997). However, when students are not familiar with such learning environments the instructor needs to act as a change agent to increase the transparency of the pedagogy. This may be achieved by providing more “hand holding” in the early stages of the subject in the form of explicit communication by the instructor of his/her ideas and expectations of students as well as providing adequate time for students to become comfortable with the technology (Berge, 1995). Also, a lot of facilitation may be required to direct and focus the online discussions. The instructor could provide this facilitation or the students could be selected to assume the role of online moderator.

5.5.2.3.2 The instructor becomes a Web site maintainer and resource manager

Both Case One and Case Two demonstrated the changing nature of the subject Web site and illustrated the need for regular maintenance. For example, information notices for students about the subject required regular updating, electronic resources produced in Case One were added to the Web site in Case Two, and online discussions needed to be managed (eg. concluding threads). Thus, the instructor assumes the role of Web site maintainer. The instructor also becomes the manager of electronic resources as student work and external Web sites can be incorporated in the Web site for subsequent cycles of the same subject. One implication is that just as students require training and technical support, so do instructors (Berge, 1998).

5.5.2.3.3 Instructors need to consider online assessment administration procedures

The use of communication and information technologies enables students to submit assessable work in an electronic form. As the submission format for assessment tasks thus expands from conventional paper-based assignments to electronic student products, the issue about how instructors manage the assignment submission process is raised. For example, in this case each student had access to a password protected electronic folder/directory (on a server in the Faculty of Education

Multimedia Laboratory) to submit their Web Study Guide. The instructor and the researcher then linked each student's Web Study Guide to the subject Web site. Faculties may need to consider developing procedures for the submission of electronic assignments and the acknowledgment of their receipt.

5.5.2.3.4 The changing role of the student

This case demonstrated how learners were encouraged to take more responsibility for their learning. Some students welcomed the challenge whilst others expected to be "taught".

5.5.2.5 Flexibility for both students and the instructor

Students were afforded flexibility in the following ways:

- Flexible attendance patterns. For example, Ryan commented in Week 11 that he would not have been able to complete the subject if it was delivered in the conventional fixed weekly format due to his work commitments.
- Flexible access to content. For example, the Web Study Guides.
- Flexible discussion formats. For example, asynchronous online discussion allowed students to contribute a time convenient to them and also students could think about their response. "The advantage of using a discussion forum is that people can take time to think about other's responses and form their own responses" (Wollongong student, end-of-subject questionnaire, Question 9b).
- A student had more avenues to express himself/herself. For example, the face-to-face meetings, asynchronous class discussions, the "Your Say" area on the Web site, personal email to the instructor, and personal email to other students.

The instructor was afforded flexibility in the following ways:

- Flexible attendance patterns.
- More avenues to obtain student feedback about the subject.
- More indicators to gauge and guide student "learning". For example, the CMC discourse provided an avenue for the instructor to review students' progress. Importantly, the instructor can make changes as the subject progresses to meet the needs of students. If feedback mechanisms are put in place for example, via the Web site, then the instructor can use such feedback as an indicator to monitor how students are coping with the subject.

5.5.3 CONCLUSION

The emergent issues from this case concur with Mason's (1998b) view of the current pedagogical approaches being explored in the higher education sector:

Current approaches to teaching and learning in higher education are dominated by the following: the importance of interactivity in the learning process, the changing role of the teacher from sage to guide, the need for knowledge management skills and for team working abilities, and the move towards resource-based rather than packaged learning. All of these elements figure strongly in the literature of online educators. (no pagination)

6



OUTCOMES FROM THE COLLECTIVE CASE STUDY

Doing different things versus doing things differently. (Thornburg, 1995)

6.1 INTRODUCTION

The purpose of this research study was to investigate the teaching and learning process in a postgraduate subject that was supported with World Wide Web and videoconferencing technologies. The interactions established among the participants were examined to further our understanding of how such technology-supported learning environments, particularly Web-based learning environments, can be designed and implemented.

Using a collective case study method (Stake, 1997), the researcher was a participant observer in the postgraduate subject, offered by the Graduate School of Education at the University of Wollongong, over two years. A major outcome from this collective case study was the change in pedagogy that occurred from one implementation cycle to the next.

Chapters Four and Five each presented a detailed case study for each implementation cycle of the subject. The findings for each case have been elaborated in detail by describing what occurred, identifying the themes that surfaced, and discussing the lessons learned. This chapter draws these two cases together by firstly summarising the context of each case and then addressing the following research questions that guided this exploratory investigation:

1. What kind of interaction can be established in a technology-supported learning community?
2. What is new about this? That is, what is possible in the technology-supported learning environment that is not possible without the use of technology?
3. What are the perceptions of the instructor and the learners in terms of the learning outcomes generated?

The following and final chapter, Chapter Seven, discusses the lessons learned from this collective case study.

6.2 CONTEXT SUMMARY OF THE TWO CASES

As part of an initiative by the Faculty of Education at the University of Wollongong to investigate flexible delivery strategies, in 1996 the postgraduate subject:

Implementation and Evaluation of Technology-Based Learning was chosen as the subject to pilot the use of internet and videoconferencing technologies. The insights gained from this pilot implementation afforded the restructure of the subject for the 1997 offering.

6.2.1 CASE ONE

In the first case, there were two geographically separated classes. Eight students met on campus and six students met at another site 80 kilometres away. Both classes were held on the same evening for three hours over a semester of fourteen weeks. Videoconferencing, a subject Web site and computer-mediated communication tools facilitated interaction between the two sites. The instructor physically attended each site on alternate weeks.

The content was structured so that a new topic was discussed each week. The first five weeks were structured as instructor-led sessions delivered via videoconferencing and computer-mediated communication tools. The remaining nine weeks were structured as student-led sessions. Assessment requirements were based on individual student work and consisted of three assignments. The first assignment was a seminar presentation that was to be conducted as a collaborative exercise between two students, one from each site. Seminar presentations began from Week 6. Students were to facilitate a discussion for the entire evening and had to create a Web page and provide online activities to engage both sites as one class. A grade was given based on a theoretical paper that accompanied the presentation. The last two assignments were due at the end of the semester. They involved developing a portfolio of resources, that each student found relevant in terms of the content of the subject, and producing an evaluation report of the implementation of the subject as a technology-based learning project or of an educational software package of the students' choice.

The lessons learned from this implementation were used to redesign the teaching and learning environment for the subject offering in the following year (Case Two).

6.2.2 CASE TWO

In the second case, there again were two geographically separated classes. The subject was implemented using World Wide Web technology. Videoconferencing was not used. Eleven students met on campus and six students met at the same off-

campus site as in Case One. The two classes were held on different evenings for three hours. During the fourteen-week semester, students attended eight class meetings, scheduled approximately every second week, and participated in asynchronous and synchronous online discussions during the non-meeting weeks. A Web site facilitated interaction among the students and instructor outside class time. The instructor physically attended every face-to-face meeting.

The assessment requirements were redesigned from the first case and comprised four assignments. The first assignment involved writing a paper about evaluation theory and its relevance to technology-based learning. The second assignment involved developing a Web Study Guide on an agreed topic. Students evaluated all the Web Study Guides for their third assignment. The last assignment involved developing and presenting an evaluation proposal and was graded as a group project.

The assessable tasks were structured so that the first three tasks could be used as resources for the final group project. Content was provided to help with the completion of an assessment task. The concept of a Web Study Guide replaced the need for content to be presented in a weekly sequence during class time, as it was available in electronic form accessible at a time and place convenient to the students.

The instructor incorporated several online tasks during the semester. The first online task involved students working in small groups to asynchronously discuss the content required for the first assignment. Each group worked on different content and posted a summary of their discussions to the subject Web site. The intention was that students could use the summaries produced by the different groups as resources for the first assignment. Other online tasks included synchronous and asynchronous discussions about selected readings.

6.2.3 PEDAGOGICAL PROFILE SUMMARY

A pedagogical profile summary for each case is presented in Table 6.1.

TABLE 6.1 Pedagogical Profile of the Two Cases		
	<i>Case One</i>	<i>Case Two</i>
<i>Subject structure</i>	14 week semester	14 week semester
<i>Delivery mode</i>	Synchronous: Weekly face-to-face classes and weekly online activities.	Synchronous and asynchronous: Eight face-to-face classes supplemented with online synchronous and asynchronous activities.

TABLE 6.1 Pedagogical Profile of the Two Cases		
<i>Student and instructor attendance patterns</i>	<ul style="list-style-type: none"> Two geographically separated face-to-face classes held on the same evening. (The on-campus class commenced one hour before the off-campus class.) Instructor physically attended each site on alternate weeks. (Instructor was absent from class in Week 11.) In the last week, all participants attended a face-to-face meeting off campus. 	<ul style="list-style-type: none"> Two geographically separated face-to-face classes held on different evenings. Instructor physically attended every face-to-face class. In the last week, all participants attended a face-to-face meeting on campus.
<i>Communication and Information Technologies (CITs) used to support delivery mode</i>	<ul style="list-style-type: none"> Videoconferencing Subject Web site CMC tools, eg. Live Chat, Discussion Forum, Email 	<ul style="list-style-type: none"> Subject Web site CMC tools, eg. DISCUS, Discussion Forum, Live Chat, Email, Email class listserver
<i>Assessment requirements</i>	<p>Three individually produced assignments:</p> <ol style="list-style-type: none"> Theoretical paper that accompanied a seminar presentation Due: During the semester Portfolio of resources Due: End of semester Evaluation report Due: End of semester 	<p>Four assignments: three individual pieces of work plus one group assignment.</p> <ol style="list-style-type: none"> Theoretical paper Due: Week 4 Web Study Guide Due: Week 8 Web Study Guide evaluations Due: Week 11 Group Evaluation Proposal Due: End of semester
<i>Content structure and presentation</i>	<ul style="list-style-type: none"> A new topic was addressed each week during class. Content was presented by the instructor in the first five weeks and then by the students in the last nine weeks. 	<ul style="list-style-type: none"> Content was delivered to assist in the completion of the assessment tasks. Content was discussed by the instructor and the students in the face-to-face meetings and online. Students accessed Web-based resources produced by students in Case One. Students produced Web-based resources that were then used by the class to assist in the completion of assignments.

6.3 QUESTION 1: WHAT KIND OF INTERACTION CAN BE ESTABLISHED IN A TECHNOLOGY-SUPPORTED LEARNING COMMUNITY?

6.3.1 INTRODUCTION

Collins and Berge (1996) state there are essentially two kinds of interaction in reference to learning. One kind of interaction involves an individual activity. That is, a learner can interact with content on an individual basis. The other kind of interaction involves a social activity. That is, a learner can interact with others about the content. Both types of interaction are claimed by Collins and Berge (1996) to be necessary for efficient, effective and affective learning.

These two kinds of interactions were exhibited in the two cases of this study. However, the way in which the two forms of interaction were catered for in the two cases differed significantly. The most significant difference is that the pedagogical model implemented in Case One afforded predominantly synchronous “class focused” interaction whereas Case Two afforded more asynchronous “individual focused” interaction. The findings from this study highlight the role that technology played, the way in which the subject was structured and delivered, and the nature of the assessment tasks, were the factors that influenced interaction in the two technology-supported learning environments.

6.3.2 CASE ONE

Both face-to-face and online interaction occurred among the participants in Case One. A major finding was that the interaction was predominantly of a synchronous nature and occurred mostly during class time. The strategies implemented to encourage interaction among the participants were couched within a conventional fixed-time and fixed-place delivery model. The technology was used to facilitate a weekly synchronous “classroom” and the weekly class meetings drove the need for students to interact with each other. As such, the online interaction that occurred among the participants can be characterised as predominantly synchronous and class driven.

Within this predominant synchronous model of interaction, four kinds of interaction were exhibited. They are Learner-Instructor interaction, Learner-Learner interaction, Learner-Content interaction, and Class-Class interaction. Each is described below and Table 6.2 summarises how these kinds of interaction were established in Case One.

6.3.2.1 Learner-Instructor interaction

The instructor interacted with the students in and outside class time. During class time, both face-to-face and online interaction occurred. Outside class time, students frequently interacted with the instructor via email. The instructor designed the subject with the intent that the students could facilitate class discussion. Thus, whilst the instructor presented the first few class sessions he became more of a “guide on the side” as the subject progressed.

6.3.2.2 Learner-Learner interaction

The on-campus students interacted with the off-campus students on a weekly basis during class time. Some of the on-campus students met face-to-face with some of the off-campus students to work on group activities, for example, the seminar

presentation and the Successmaker group presentation. Also, some online asynchronous interaction occurred among some students. Various synchronous strategies were implemented each week to encourage interaction among the students. A popular strategy was the use of a videoconference to introduce content followed by a CMC task. It is contended that the learner-learner interaction established in this case was of a collaborative nature. Students discussed ideas and initiated and facilitated self-managed face-to-face class discussions when the instructor was not physically present. However, the findings suggest that there was more extrinsic motivation to interact online than intrinsic need. Also, the findings indicate that the online environment was used mostly for content related interaction and social interaction took place mostly in the face-to-face classes.

6.3.2.3 Learner-Content interaction

The learner-content interaction that was established in this case can be characterised as synchronous, sequential, discrete, student produced, and reflexive.

Synchronous: Each week, all the students covered the same content topic at the same time.

Sequential: New content was divulged each week in class, thus the delivery of content was sequential in nature. For example, if a student was interested in content presented in Week 9, they had to wait until Week 9 for the content to be delivered. Apart from the paper-based reading handout given to students at the beginning of the subject, content resources for the weekly topics were not available prior to class. (Although students were encouraged to have their Web pages ready for access well before their seminar presentation, most were only available from the subject Web site a few hours before class.)

Discrete: A different topic was discussed each week.

Student produced: The student seminar presentations enabled students to interact with content that was researched and produced by the students themselves.

Reflexive: Because the content of the subject was inherently related to the delivery of the subject, the very act of students interacting online with each other provided a means through which they thought about and reflected on the content of the subject.

6.3.2.4 Class-Class interaction

Due to both geographically separated classes being held on the same evening, this case highlighted several occasions when the interaction among participants assumed a “them and us” feel. It was particularly prevalent in the videoconferencing sessions and occurred in the CMC environment when the “scribe” strategy was implemented.

6.3.2.5 Summary of interaction established in Case One

A summary of the interaction established in Case One is provided in Table 6.2

TABLE 6.2 Summary of interaction established in Case One					
<i>Event</i>	<i>Delivery mode and method</i>	<i>Kind of interaction established</i>			
		<i>Learner-Instructor</i>	<i>Learner-Learner</i>	<i>Learner-Content</i>	<i>Class- Class</i>
Weekly class time	Synchronous: Face-to-face	√ (On alternate weeks)	√	√	
	Synchronous: Videoconferencing	√	√	√	√ (Eg. “them and us”)
	Synchronous: CMC	√	√	√	√ (Eg. “scribe” strategy)
Consultation with instructor outside class time	Synchronous: Face-to-face	√			
	Synchronous: Telephone	√			
	Asynchronous: CMC (eg. Email)	√			
Instructor providing information for both classes	Asynchronous: Subject Web site	√			
Group work (eg. Successmaker evaluation proposal)	Synchronous: Face-to-face		√	√	
	Asynchronous: CMC (eg. Email, BSCW workspace)	Potential but did not occur	√	√	
Pair work (eg. seminar preparation)	Synchronous: Face-to-face		√	√	
	Synchronous: CMC		√	√	
	Synchronous: Telephone		√	√	
	Asynchronous: CMC (eg. Email)		√	√	
	Asynchronous: Facsimile		√	√	
Student preparation before class	Asynchronous: Subject Web site (Eg. Access student Web page prior to class)			√ (did not occur much)	
	Asynchronous: CMC (Eg. One student provided content resources in BSCW workspace prior to his seminar presentation)			√	

6.3.2.6 The three factors that influenced the nature of the interaction

6.3.2.6.1 The role technology played in the postgraduate subject

World Wide Web and videoconferencing technologies were introduced so that the students (as well as the instructor) could learn about technology-based learning through an authentic application of technology-based learning. The pilot nature of the subject created an environment whereby the participants assumed a research community to explore the potential of the technology and reflect on their own teaching and learning processes. Thus, one motive to establish online interaction between the two geographically separated classes was for the participants to experience online interaction first hand and think about appropriate instructional strategies that could be implemented to provide learning experiences that involved the two sites. New CMC tools were introduced during the subject and all the participants had to learn how to use the tools as they were introduced. As such, the technology was not transparent. It became as much the message as the medium. The lack of technology transparency influenced the nature of the online interaction as technical obstacles often created “noise” to the online discourse. The variable access to the internet by the students and the perceived lack of technical support were additional variables that hindered online interaction. This case demonstrated a mechanistic form of use of the technology.

6.3.2.6.2 The “synchronicity” of the subject structure

As previously stated, the interaction that occurred in this case was couched in a traditional fixed-time and fixed-place delivery framework. The weekly class meetings drove the need for students to interact with each other. Students came to class each week expecting something to happen during the three hours. It is thus contended that student interaction was driven by an extrinsic motivation to engage the students during class time. This case illustrated how various synchronous instructional strategies were implemented using videoconferencing and CMC to encourage online interaction between the two sites. The following findings were concluded from the analysis of the online interactions:

Videoconferencing was used predominantly as a presentation medium and little spontaneous student interaction occurred: This finding supports Laurillard’s (1993) contention that videoconferencing is more popularly used as a presentation medium than a discursive medium.

Six factors influenced this kind of interaction:

1. *Organisational:* Videoconferencing was only available for one hour each week and the participants had access to CMC tools. Thus, videoconferencing was mostly used to present content and CMC was used to discuss content.
2. *Discourse structure:* A discourse etiquette or protocol was not established and due to the pilot nature of the subject, students took turns to operate the videoconferencing controls. These factors hindered the flow of the interaction.
3. *Student familiarity with the content presented:* More interaction occurred when students were familiar with the content.
4. *Personality profile of the student cohort:* Some students were shy and reticent to participate in class discussion both in face-to-face and videoconferencing environments.
5. *Technical features of the technology:* Out of sync audio with visual image often hindered interaction.
6. *Physical layout of the room:* The lighting and the seating arrangements influenced interaction. Students commented that the lighting was poor and it was difficult to see all the participants at the remote site due to the seating arrangements.

The nature of the online interaction was influenced by time, task and tool:

1. *Time:* The time constraint associated with discussing new content each week during a three-hour class and having little preparation before class limited student reflection about the content. The findings also suggest that the synchronous strategies implemented in this case may not have been beneficial for students from non-English speaking backgrounds.
2. *Task:* The online discussions were more focused when students were assigned to small online groups, were clear about the task and started synchronous discussion at the same time! Also, much of the social interaction occurred in the face-to-face classes whilst the online environment provided a vehicle for information exchange.
3. *Tool:* Students had to learn how to use the tool themselves and the tools designed for asynchronous use were used synchronously.

6.3.2.6.3 The assessment tasks were peripheral to the online interaction

There was little association between the online tasks and the assessment tasks. Although students participated in the online tasks, several indicated that there was little intrinsic motivation to participate. The extrinsic motivation to participate often led to online discourse that was off-task.

6.3.3 CASE TWO

In Case Two, once again both face-to-face and online interaction occurred among the participants. However, this case demonstrated a more integrated approach of the use of technology with the subject delivery structure and the assessment tasks. The flexible class attendance patterns facilitated the opportunity for online asynchronous interaction. Thus, the online interaction that was established among the participants was predominantly of an asynchronous nature. Some synchronous components such as face-to-face class meetings and two scheduled online class discussions were incorporated into this asynchronous delivery model.

The major finding that surfaced from this case is that the assessment tasks drove the learning process. It is contended that the staggered nature of the assessment completion structure influenced the nature of the online interaction that was established among the participants.

Three kinds of interaction were exhibited in Case Two. They are Learner–Instructor interaction, Learner-Learner interaction, and Learner-Content interaction. They are described below and Table 6.3 summarises how each of these kinds of interaction was established in Case Two.

6.3.3.1 Learner-Instructor interaction

Students had various means to interact with the instructor during the subject, for example, face-to-face class meetings, email, telephone, the “Tool Tips and Your Say” area on subject Web site and the CMC content discussions. Unlike in Case One where the instructor interacted synchronously with both geographically separate classes on a weekly basis, in this case the instructor physically met with each class. The instructor directed the class discussions in the first two weeks but expected the students to initiate and facilitate their own discussion as the subject progresses. As such, the face-to-face class meetings became student reflection and issue resolution sessions rather than content presentation sessions as had occurred in Case One. The instructor used the face-to-face classes to provide student feedback on assignments. This was possible as the assignments were completed at various points in the subject, unlike in Case One where most of the assignments were due at the end of semester. In terms of the interaction that occurred online, apart from organising the online content discussions, the instructor provided little online facilitation.

6.3.3.2 Learner-Learner interaction

Unlike in Case One where the on-campus class interacted online with the off-campus class on a weekly basis, little class-class interaction occurred in this case.

Student photos were provided on the subject Web site to assist students in building rapport between the two classes but the majority of students thought that there was little need for inter-class collaboration. The on-campus students only met the off-campus students at the end of the semester. Several students stated that perhaps an entire class meeting at the beginning of semester may have assisted the development on online rapport between the two classes. Thus, in the face-to-face class meetings, student interaction was confined to the students in the physical class and the student interaction that occurred online was predominantly asynchronous and of an “individual focus”.

The instructor devised the online tasks and the students were encouraged to participate. The online interaction that occurred was task driven. This is illustrated in the content analysis. For example, the discourse categories that emerged from the content analysis performed in Case Two indicates that all the online discourse was related to the specified task. This differs from the findings in Case One as the content analysis illustrates that “off-task” discourse occurred online. The findings from Case Two illustrate that little self-initiated student online interaction occurred and online interaction was more prominent when the online task was directly related to an assessment task. This suggests that there may have been more intrinsic motivation to interact online than extrinsic motivation as suggested that occurred in Case One.

6.3.3.3 Learner-Content interaction

The learner-content interaction that was established in this case can be characterised as asynchronous and assessment task focused. The significant change that occurred in this case from the previous case is that content was delivered during the subject to assist with the completion of the tasks and students produced electronic content resources which could then be accessed by other students in an asynchronous mode. A reflexive characteristic, as found in Case One, was also present in this case but with less intensity. It was demonstrated in this case mainly in the face-to-face reflective discussions and via the content analysis discourse category: *Metacognitive* that surfaced in one of the asynchronous online discussions.

6.3.3.4 Summary of interaction established in Case Two

A summary of the interaction established in Case Two is provided in Table 6.3.

TABLE 6.3 Summary of interaction established in Case Two				
<i>Event</i>	<i>Delivery Mode and Method</i>	<i>Kind of interaction established</i>		
		<i>Learner-Instructor</i>	<i>Learner-Learner</i>	<i>Learner-Content</i>
Scheduled class meetings	Synchronous: Face-to-face	√	√	√
	Synchronous: CMC (Eg. student practise with CMC tools during face-to-face class)	Potential but did not occur	√	√
Consultation with instructor outside class time	Synchronous: Face-to-face	√		
	Synchronous: Telephone	√		
	Asynchronous: CMC (Eg. Email)	√		
Instructor providing information for both classes	Asynchronous: Subject Web site (Eg. Notices)	√		
Group work (Eg. Online summary task)	Synchronous: Face-to-face		√	√
	Synchronous: CMC (Eg. Live Chat)		√	√
	Asynchronous: CMC (Eg. Discussion forum threads)	√ (only 1 message)	√	√
Students accessing online summaries to assist in completing their first assignment.	Asynchronous: Subject Web site			√
Online content discussions during the non-meeting weeks	Synchronous: CMC (Eg. Live Chat)	√	√	√
	Asynchronous: CMC (Eg. DISCUS, Discussion Forum)	√	√	√
Assessable group work (Eg. Final assignment - Successmaker evaluation proposal)	Synchronous: Face-to-face		√	√
Students evaluating other students' Web Study Guides	Asynchronous: Subject Web site			√
Student feedback about subject (Student can remain anonymous)	Asynchronous: Subject Web site (Eg. Your Say section)	√	√	
	Asynchronous: Subject Web site (Eg. Web subject evaluation questionnaire)	√		

6.3.3.5 The three factors that influenced the nature of the interaction

The nature of the interaction was influenced by the following three factors.

6.3.3.5.1 The role technology played in the postgraduate subject

In this case, the technology became more the medium than the message. The use of the technology moved from a mechanistic mode of use to a more routine mode of use. Students were given the opportunity to become familiar with the CMC tools before engaging in online discussion. The technology became more transparent than in Case One. However, some technical difficulties were encountered which often

hindered online interaction. This was highlighted in the content analysis of the online interactions via the emergence of the discourse category: *Technical*.

6.3.3.5.2 *The "asynchronicity" of the subject structure*

Because the face-to-face meetings did not occur on a fixed weekly basis, the subject Web site became the mechanism that brought the entire class together. Also, the face-to-face meetings became a complement to the subject Web site. However, the face-to-face class sessions provided another support mechanism for students and because the instructor attended each physical class, the findings suggest that this effected the utility of the Web site to act as an interaction support mechanism as little inter-class online interaction occurred.

6.3.3.5.3 *The assessment tasks drove the online interaction*

The findings indicate that if the online tasks were specifically related to the assessment tasks then more online interaction among students occurred. If the online tasks were not specifically related to the assessment tasks then little online interaction among the students occurred. Also, it is contended that the online interaction was driven more by an intrinsic need to participate rather than an extrinsic force as evident in Case One. The evidence to support this is that the online discourse that did occur was all on-task. There was little off-task discourse experienced in this case as compared with Case One.

6.3.4 DISCUSSION

Table 6.4 summarises the discussion about the interaction established in the two cases of this study. Moore (1989) states that three types of interaction: Learner-Instructor, Learner-Learner, and Learner-Content, are essential in distance education. The findings illustrate that these three types of interaction were exhibited in this study. Furthermore, Hillman, Willis, and Gunawardena (1994) argue that Learner-Interface interaction, which is the interaction between the learner and the technology, is a critical component that needs consideration in the discourse of online learning. This type of interaction was also addressed in this study as the role technology played was discussed as a factor that influenced interaction.

TABLE 6.4 Summary about the interaction established in both cases		
	Case One	Case Two
<i>Summary of interaction established</i>	<ul style="list-style-type: none"> • Interaction occurred within the constraints of the conventional fixed time and place lecture framework. It was predominantly synchronous with a “class” focus. • Both face-to-face and online interaction was established. • Some asynchronous online components (which mainly involved small groups of students) were incorporated into the synchronous model. • There were four kinds of interaction exhibited: learner-instructor, learner-learner, learner-content, and class-class. 	<ul style="list-style-type: none"> • The nexus of fixed-time and fixed-place instruction was broken. Interaction was predominantly asynchronous with an “individual student” focus. • Both face-to-face and online interaction was established. • Some synchronous components were incorporated into the asynchronous model such as face-to-face class meetings and online class synchronous discussion. • There were three kinds of interaction exhibited: learner-instructor, learner-learner, and learner-content.
<i>Role that technology played in the establishment of online interaction</i>	<ul style="list-style-type: none"> • Videoconferencing and WWW technologies were introduced so that the instructor and the students could learn about technology-based learning through an authentic application of technology-based learning. It was an experimental form of use of technology. Thus, one motive to establish online interaction between the two geographically separated classes was so that the instructor and students could experience online interaction and explore instructional strategies that could provide links between the two sites. • The technology was used to facilitate synchronous online interaction between two geographically separated classes. • Technology was as much the message as the medium. • Technology was non-transparent. • The use of technology exemplified a mechanistic form of use (Hall & Hord, 1987). 	<ul style="list-style-type: none"> • Interaction was encouraged among students to help them complete the assignments and also allow them to experience CMC. Thus, when the online tasks were not specifically related to the assessment tasks, not much online interaction occurred. • The technology was used to facilitate interaction among students and between students and online content, eg. students interacted with content by themselves when reviewing the Web Study Guides. • Little interaction took place between the two classes. It was viewed as unnecessary as the instructor attended each physical class. • Technology was more medium than the message. • Technology became semi-transparent. • The use of technology exemplified a shift to a more routine form of use (Hall & Hord, 1987).
<i>How the subject structure and delivery influenced the establishment of interaction</i>	<ul style="list-style-type: none"> • Students came to class expecting to be “fed” information. The face-to-face weekly class sessions became content presentation/delivery sessions. • Students initiated and facilitated self-managed discussion. Students had to manage their own time. • Class bonding occurred. Social interaction was prevalent when the instructor was not present. 	<ul style="list-style-type: none"> • Face-to-face sessions became student resolution sessions. • Students were not given the autonomy to initiate self-managed discussion (as in Case One) because the instructor was always present in the face-to-face meetings. • Class bonding in the Wollongong class was not as prevalent as in Case One.
<i>How the nature of the assessment tasks influenced the establishment of interaction</i>	<ul style="list-style-type: none"> • Online tasks were not related to assessment tasks. Online interaction was driven by an extrinsic motivation to engage students during class time. • Nature of the online interaction was often off-task. 	<ul style="list-style-type: none"> • The first online task was related to assessment task. Online interaction was driven by an intrinsic motivation to participate. • Nature of the online interaction was mostly on-task.

The two cases in this study illustrated the various ways in which computer-mediated communication was integrated into a university subject. The literature presented in Chapter 2 about CMC stated that in order for CMC to be claimed as a successful instructional mechanism, the content discussed in the CMC component of a subject should be meaningful to the rest of the subject. Collins and Berge (1996) also emphasize this: “where computer conferencing is not the primary method of course delivery, it is crucial to the success of the enterprise that the content of the conference be tightly and meaningfully integrated with the balance of the course and course materials” (no pagination).

However, there is little in the way of guidelines that inform how such a “link” should be implemented. Recent literature points to the strategy of allocating a percentage of the overall grade for student online participation as one answer to promote successful use of CMC. For example, Collins and Berge (1996) state that successful use of CMC can be “accomplished by delivering ‘dense’ content on recorded media...and all the discussion of the material takes place in the computer conference with a grade attached to the student’s participation” (no pagination). The recent study by Dijkstra et al. (1999) recommends allocating marks to encourage student online participation in discussions:

The site was used as a support for the course. Students could decide for themselves what extra material they wish to select and study. The goal was to support their responsibility for learning. But students sometimes need a push or a reward to motivate them. In the next cycle of the course, points will be part of the design to acknowledge participation in the discussions. (p. 13)

Yet, the study did not elaborate on the details of the other assessment tasks and how they were related to the CMC tasks.

In the content analysis study conducted by Hara et al. (2000), students were required to make one posting per week to the weekly online computer conference. The online discussions made up approximately 10% of students’ final grade. The paper did not elaborate on the other assessable tasks. The study found that most students only made the one required weekly posting. It was concluded that more research is necessary to develop pedagogical strategies to motivate students to participate in CMC beyond the minimal subject requirements. The Hara et al. (2000) study highlighted that although marks were allocated for online participation, the desired result of encouraging students to participate in CMC discussions beyond minimal requirements was still not achieved.

This is the challenge facing current practice. That is, how to best integrate online components especially with face-to-face components. This collective case study has provided an insight to this problem. The studies by Dijkstra et al. (1999) and Hara et al. (2000) demonstrate the encouragement of extrinsic motivation to asynchronous online participation through the allocation of marks. Thus, the online discussions are considered as an “end in themselves”. Also, these two studies did not consider the relationship of the CMC tasks with the assessable tasks. The assessment requirements were not stated in the published works. This study however, highlighted if online discussions are integrated as a stepping stone to complete an assessable piece of work, then that provides the intrinsic motivation for students to participate in CMC. Case Two demonstrated an attempt to use online collaboration as a way to facilitate and support the learning process, not as a specific requirement to get a mark. This study demonstrated a strategy that incorporates CMC as a “means to an end”. That is, a stepping stone to the completion of an assessable task rather than just an end in itself, which is promoted via the strategy of allocating marks to online discussions. Case Two illustrated how this can be implemented. The first online summary task was a stepping stone to the first assignment. By encouraging students to participate in this task, it was envisaged that it would assist them complete their first assignment. It is via this strategy that a collaborative environment was created—students discussed their ideas and negotiated among themselves to produce a summary, and then produced common resources which could then be used by everyone in the completion of an individual piece of assessable work. The study by Ruberg et al. (1996) reported similar findings: “the on-line discourse should be integrated into subsequent class activities so that what is discussed in the computer-mediated discussion is brought back into the context of face-to-face and individually assigned assignments” (p. 265).

The insight that has surfaced from this study suggests that CMC research needs to consider the context in which the CMC is implemented in a learning environment if pedagogical re-engineering (Collis, 1996b) is to occur. The Hara et al. (2000) study, focused solely on examining a piece of CMC within a conventional weekly face-to-face class framework. Their pedagogical recommendations were thus constrained to suggesting ways of “tweaking” the existing CMC instructional strategy. However, if the entire learning environment was examined to determine how the CMC component was integrated with other components of the subject, particularly how the CMC component was linked with the assessable tasks, then perhaps more significant pedagogical changes could have been recommended. This collective case study illustrated that examining the entire context of the subject enabled pedagogical re-engineering to occur.

6.4 QUESTION 2: WHAT IS POSSIBLE IN THE TECHNOLOGY-SUPPORTED LEARNING ENVIRONMENT THAT IS NOT POSSIBLE WITHOUT THE USE OF TECHNOLOGY?

6.4.1 INTRODUCTION

Dijkstra et al. (1999) claim that communications technology can facilitate an amplification of interaction between an instructor and student and among students.

We believe that the integration of computer technology with data communication, called telematics in Europe, creates new possibilities to support and amplify the communication between a teacher and the students and among the students themselves. Furthermore it increases the opportunities for the instructor to coach students on an individual basis and provides them with the possibility of becoming more self-reliant in their approach to studying, while still retaining the benefits of the familiar face-to-face class setting and textbook. (p. 5)

The findings from this study concur with these views. The integration of the Web in the postgraduate subject: *Implementation and Evaluation of Technology-Based Learning* facilitated new possibilities to interact among students, between students and the instructor, and with the content that would not have been possible in a conventional non-technology mediated, fixed-time and fixed-place face-to-face learning environment. The most obvious kind of interaction that the use of the technology supported was the opportunity for students to interact with other students and the instructor irrespective of time and place via CMC. This study demonstrated how the hegemony of the fixed-time and fixed-place instructional model was broken and a more flexible approach to physical attendance patterns and online interaction was achieved. The two cases demonstrated various pedagogical strategies that were implemented to facilitate such online interaction. Case Two highlighted strategies that encouraged asynchronous online interaction whereas Case One illustrated different instructional strategies to exploit synchronous online interaction. Overall, this study showed (particularly in Case Two) that the use of the Web facilitated a more flexible learning approach for students and a more flexible teaching approach for the instructor.

This study also provided some insight into how Web technology can be integrated into a subject as a cognitive tool and as an intellectual partner (Jonassen & Reeves, 1996). Jonassen and Reeves (1996) state the following about the potential of the use of cognitive tools to facilitate critical thinking and higher order learning:

Cognitive tools are essential components of a learning environment in which learners are required to think harder about the subject-matter domain being studied or the task being undertaken and to generate thoughts that would be impossible without these tools. (p. 697)

Some of the best thinking results when students try to represent what they know. Representing knowledge as a mindful task can be enabled by cognitive tools such as hypermedia construction software...Such cognitive tools require students to think in meaningful ways to use the application's capabilities and features to represent what they know. (p. 696)

Students were given the opportunity to utilise Web site construction software as a cognitive tool through their construction of Web pages (Case One) and Web Study Guides (Case Two). Furthermore, the context in which the technology was implemented facilitated its use as an intellectual partner as students learned about implementation and evaluation issues of technology-based learning through the hands-on experience with the technology.

A summary of the kind of Learner-Instructor, Learner-Learner, and Learner-Content interaction that was facilitated in this study via the use of the subject Web site and CMC tools, that would not be possible without technology mediation is provided below.

6.4.2 LEARNER-INSTRUCTOR INTERACTION

The interaction between a student and the instructor was not restricted to the face-to-face classroom. Students were able to ask questions and discuss issues with the instructor outside class time in an asynchronous online mode. Thus, students had more opportunity for one-on-one asynchronous interaction with the instructor than would be possible in conventional non-technology supported learning environments.

The message archiving capability provided by asynchronous CMC tools gave the instructor an added mechanism to gauge students' understanding of the subject content. The instructor could monitor students' individual conceptions in an online discussion or the processes undertaken by a group in an online collaborative activity. This feature enabled the instructor to provide specific feedback to students in a "just-in-time" mode. Glimpses of this were illustrated in Case Two where the instructor occasionally provided some online feedback to students. In Case One, during the student-led class sessions, the instructor interacted with the students in multiple capacities. For example, in the online synchronous environment, he contributed to the online discussions as a fellow student, yet in the class where he was physically present, he often concluded the class session by putting on his "instructor hat" and facilitating a de-brief discussion.

In Case Two, because content was discussed online, the face-to-face class meetings were used as an opportunity for students to discuss issues of concern with the

instructor rather than content presentation sessions led by the instructor. Thus, the face-to-face class sessions enabled more in-depth interaction to occur between the students and the instructor. Some students, however, expected the instructor to present content during the face-to-face sessions and thus the opportunity for student-centred discussion was not exploited as much as it could have been.

6.4.3 LEARNER-LEARNER INTERACTION

6.4.3.1 Interaction among students who are physically separated

The possibility to incorporate CMC in both synchronous and asynchronous modes opened a new avenue for interaction among students not previously available. The obvious capability made possible by the use of technology in this study was the opportunity for interaction between the two geographically separated groups of students.

Whilst the literature points out that CMC provides an opportunity for students to participate in class discussions, who may otherwise be reticent to speak in a face-to-face class, the synchronous mode of interaction in Case One hindered online interaction for non-English speaking backgrounds.

6.4.3.2 New opportunities for cooperative and collaborative learning

Blumenfeld et al. (1996) state that there is little research available that delves into the instructional strategies suitable to support online small groups. Bonk and Reynolds (1997, p. 172) argue that the Web “offers extensive opportunities for collaboration and cooperative learning” and suggest a number of cooperative learning techniques that can be applied in Web-based learning environments. A summary of their suggested techniques is provided in Table 6.5.

**TABLE 6.5 Summary of suggest cooperative learning technique for the Web
(Bonk & Reynolds, 1997, p. 173)**

**TABLE 6.5 Summary of suggest cooperative learning technique for the Web
(Bonk & Reynolds, 1997, p. 173)**

Both cases in this study demonstrated several collaborative and cooperative learning strategies. Before providing examples of how collaborative and cooperative learning was encouraged in this study, it is important to explicitly state the researcher's interpretation of the terms: "collaboration" and "cooperation", as they are often used interchangeably in the literature. Collaboration refers to a group process in which two or more students work together on an activity rather than on separate components of the problem (Anderson, Mayes, & Kibby, 1995). Collaborative learning can be self-initiated by the students or can be encouraged by the instructor. Collaborative learning suggests that the group process is somewhat informal in nature and students do not usually produce a common product. Instead students interact on a peer level to develop understanding and then are assessed on individually produced work. Cooperative learning entails students working together to accomplish a common or shared goal (Johnson and Johnson, 1996). This group approach suggests much more structure and is characterised as instructor-initiated (Tang, 1993). Cooperative teams typically divide a task into components and each student works on a particular component to produce a common product (Anderson et al. 1995).

In Case One, the predominant strategy implemented by students in their seminar presentations was similar to what Bonk and Reynolds (1997) refer to as the "Synchronous Conferencing" technique. For example, students presented content to the class (via their Web pages and videoconferencing sessions) and then devised online synchronous small group activities to discuss the content. A summary of the synchronous strategies implemented by students in Case One is provided in Table 4.6. Perhaps the most novel synchronous collaborative strategy implemented in Case One was illustrated in Week 7—the "Munsters and Simpsons" online chat. This strategy demonstrated a form of small group collaboration unique to the online environment because although students worked in small groups, they utilised a common online chat space that enabled them to view the progress of other groups

and contribute to the other groups. The facilitators of the online group activity process were able to participate in multiple roles by using different online aliases.

In Case Two, asynchronous conferencing was the predominant online collaborative learning technique used. The online group summary task (Episode 2) illustrates a strategy similar to the Group investigation technique (Bonk & Reynolds, 1997), although a group product was not produced. The online group summary strategy is suggested as unique to the online environment because it demonstrated collaborative and cooperative learning processes not easily achieved in a non-technology supported learning environment. Small student groups produced a common resource (an online summary) which was then stored on the subject Web site. A common pool of resources was then available for all students to access and assist them in completing their first assignment. Figure 6.1 provides a graphical representation of this instructional strategy that was implemented in Case Two.

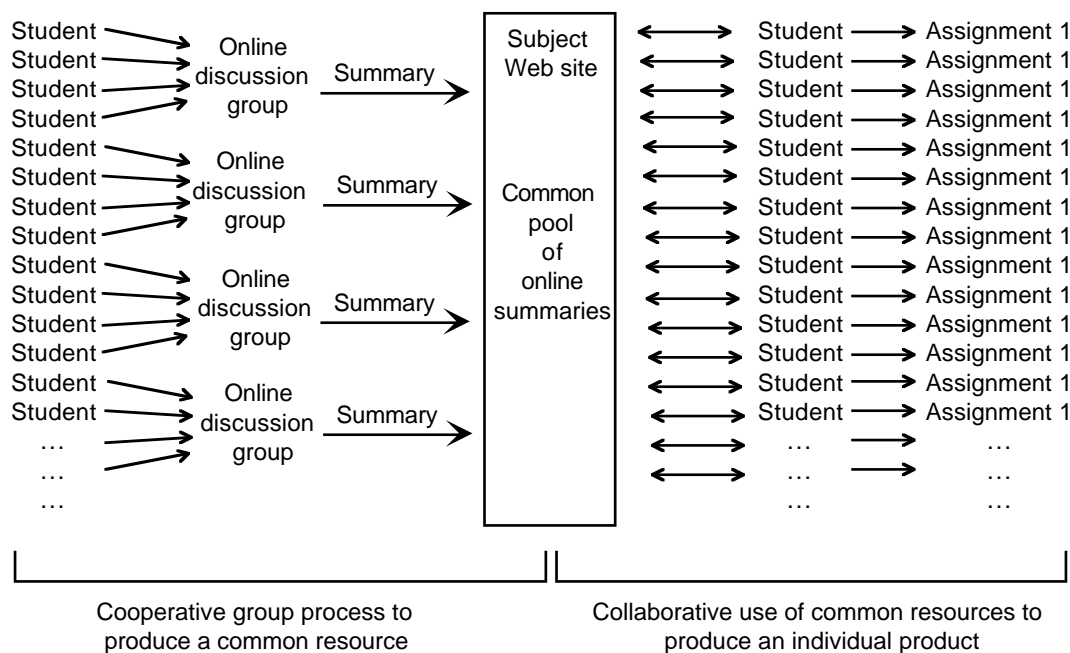


FIGURE 6.1 Graphical representation of Case Two, Subject Episode 2

Another activity that could not have been implemented without the technology was the Web Study Guide evaluation task. Students were able to evaluate a technology-based learning artifact that was produced by the students themselves. Figure 6.2 provides a graphical representation of this process.

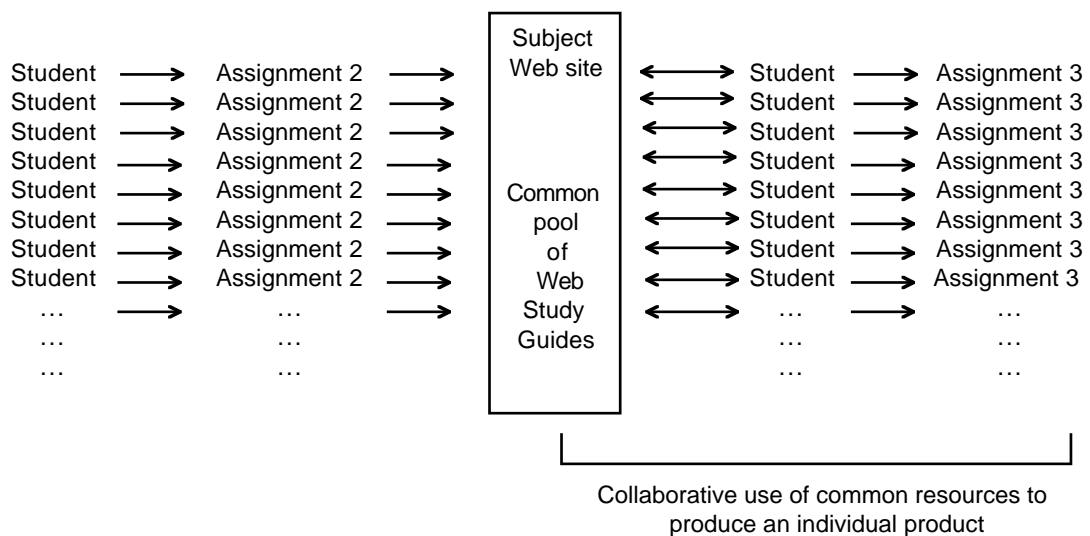


FIGURE 6.2 Graphical representation of Case 2, Subject Episode 6

6.4.4 LEARNER-CONTENT INTERACTION

6.4.4.1 Learning with technology—the use of technology as a cognitive tool

6.4.4.1.1 Reflexive nature of Learner-Content interaction

A capability that the use of technology afforded in the subject, which was quite significant in the context of this study, was that students were able to learn about implementation and evaluation of technology-based learning by being the recipients of a technology-based learning implementation. The technology afforded an authentic learning environment. This allowed students to engage in a metacognitive process—a process advocated in the literature as a necessary component for knowledge construction (Duffy & Cunningham, 1996).

6.4.4.1.2 Empowering learners to design and produce their own knowledge representations

Students were given the opportunity to design and produce their own knowledge representations in both cases. In Case One, students produced a Web page and had to design an online activity to engage to class during class time. In Case Two, students produced Web Study Guides. These activities enabled the students to experience being the “designer” (Jonassen & Reeves, 1996). In the end-of-subject questionnaire in Case Two, students were asked if they felt they had learned about their topic through constructing a Web Study Guide (Question 15c). All responded that they had learned about their topic and one student stated: “Yes, I did learn about my topic – perhaps differently than if I’d written an essay as I had to consider how

to present the topic to others”. This supports the contention that whilst technology can be used as a cognitive tool, the pedagogy that encases the use of technology (eg., the production of a Web Study Guide that other students can then access) can enhance the potential of the cognitive tool (Jonassen & Reeves, 1996).

6.4.4.1.3 Resource-Based Learning

Students produced content resources that were then added to the common pool of resources. Students, thus had access to multiple representations of content. The use of the subject Web site facilitated the re-use of student produced work as content resources. For example, the student seminar Web pages produced in Case One were used as content resources in Case Two. The Web Study Guides produced in Case Two were used as content resources for the Web Study Guide Evaluation assignment. In Case Two, students could access content (via the Web Study Guides) at a time and place convenient to them, unlike the sequential nature of content delivery exhibited in Case One. The findings support a resource-based learning approach (Hannafin, 1997). Resource-based learning environments enable resources, which are designed for one purpose, to be used to support other purposes and students can access resources relevant to their needs creating a more learner-centred experience. Hannafin (1997) argues that the learner is a fundamental component in a resource-based learning environment as they are “an active participant in the generation of unique structures and resources” (p. 260).

Students can reflect on CMC transcripts after a discussion is complete. This capability was not utilised in this study but the potential is there. As one student from Case Two commented, the online discussions are a “smart way of creating an info bank of people’s ideas about the course literature”. This implies that the content resources for a subject expand beyond conventional forms of published journal articles and books. CMC discussion forums can serve as content resources and can be an enrichment to the existing resource base (McNaught, 1998). One implication, however, is that students need to become more critical in their evaluation of the quality of content resources.

Another implication from the evolving nature of Web-based resources is that subsequent groups of students can access previous student products and online discussions. Thus, students can build on previous students’ understandings and interpretations facilitating the concept of “learning on the shoulders of others” (Hedberg et al. in press).

6.4.4.2 The nature of the assessment tasks changes

James and Beattie (1996, p. 66) concluded from their investigation about flexible delivery approaches in Australian postgraduate coursework programs that new modes of delivery permit new approaches to assessment. This was demonstrated in this study. For example, the seminar presentation in Case One was replaced with the production of a Web Study Guide in Case Two. Also, the assessment criteria for some assignments changed due to the nature of the assignment. For example, in Case One students were required to write a seminar paper comprising a maximum of 2500 words. In Case Two, the equivalence for “length” of the Web Study Guide was stipulated as “two to four hours of study”.

6.5 QUESTION 3: WHAT ARE THE PERCEPTIONS OF THE INSTRUCTOR AND THE LEARNERS IN TERMS OF THE LEARNING OUTCOMES GENERATED?

6.5.1 LEARNING OUTCOMES

The aims of the subject: *Implementation and Evaluation of Technology-Based Learning* were:

- To prepare the student to implement projects and evaluate teaching and learning materials produced using a variety of technology-based learning environments.
- To review the impact of change theory on implementation of technology-based learning systems.
- To review current literature on the evaluation of technology-based learning.

In Case Two, an additional learning goal was added to the subject outline:

- To explore the role of computer-mediated communication in learning.

Harasim et al. (1995) contend that online learning environments can promote learning outcomes that are equal or superior than the learning outcomes that result from a face-to-face conventional learning situation:

The traditional face-to-face classroom learning situation is generally assumed to be the best to support learning, with other learning modes perhaps perceived as less effective. There is no evidence to support this assumption. In fact, quite the opposite is true: Online environments facilitate learning outcomes that are equal or superior to those generated in the face-to-face situation. (p. 27)

This statement is somewhat contentious as the learning outcomes generated depend on how the online learning environment is implemented. In a later work, Harasim et

al. (1997) state that from the analysis of implementations of entirely delivered and partially delivered online graduate and undergraduate subjects, learning outcomes that have surfaced include active learning, interactive learning (specifically peer-peer interaction), multiple perspectives, and divergent thinking. Some of these learning outcomes also surfaced in this study.

James and Beattie (1996) claim that modes of delivery, which differ from the traditional face-to-face situation predominant in university education, have the potential to redefine learning outcomes that have been previously valued. Thus, this study did not set out to determine how effectively the aims of the subject were met via the use of Web and videoconferencing technologies. Instead, the instructor and student perceptions about the learning outcomes generated were sought as these perceptions can provide valuable insight into how each case supported learning. Such insight can aid in improving pedagogy rather than just proving if the same learning outcomes (as in the pre-technology subject offering) were achieved (Reeves, 1999).

6.5.2 INSTRUCTOR PERCEPTIONS

6.5.2.1 Effective learning outcomes were generated in each case

The main reason why the instructor implemented Case One as a pilot to explore internet and videoconferencing technologies was to enable students to learn about implementation and evaluation issues of technology-based learning by experiencing first hand a technology-based learning environment. The instructor contends that effective learning outcomes were achieved in both cases, however, there was a difference in their emphasis. Case One fostered exploration with the technology and afforded students to reflect on their own practice. As such, the learning outcomes generated were directly attributable to the amount of reflective thinking performed by the students. In Case Two, the staggered nature in which the assessment tasks were completed served as learning scaffolds for students. They were able to deal with one content issue at a time thus the learning process was compartmentalised into manageable “chunks”. The students in Case Two were still given the opportunity to explore the technology. For example, students were challenged to think about how the Web could be used as an instructional medium through the Web Study Guide production and evaluation tasks. The use of CMC, however, was not as exploratory in nature as in Case One.

6.5.2.2 The change from seminar presentation to Web Study Guide was more equitable for students

The instructor perceived that the change in the way students presented content, that is, the change from a weekly seminar presentation in Case One to the production of a Web Study Guide in Case Two, was more equitable for students. The submission date for the Web Study Guide was the same for all students, unlike the seminar presentations in Case One where some students presented several weeks before other students. It was also beneficial for the instructor and he could access the Web Study Guides simultaneously rather than having to listen to all the seminar presentations sequentially and remember the comparative comments.

6.5.2.3 Online resources fostered a richer learning environment

The instructor commented in the post-subject interviews that the use of a subject Web site and the ability to collect and thus provide online resources to students fostered a richer learning experience for students. Students had ready access to a broader range of content materials, including external Web sites and listservs, as well as student-produced resources. In both cases students were able to review other student-produced work. This enabled students to view content from multiple perspectives. The students in Case Two had the added advantage of being able to review the student Web pages produced in Case One.

6.5.2.4 Instructor wanted the students to facilitate the online environment

Both cases of this study demonstrate an online learning environment where students were encouraged to manage, control, lead, facilitate or moderate, depending on their needs. Whilst the instructor did provide some online facilitation (this was especially apparent in the early videoconferencing sessions in Case One), he encouraged students to explore the possibilities of the online CMC tools.

The CMC literature alerts the need for instructor online facilitation (Berge, 1995, 1996; Harasim et al. 1995). This, however, is dependent on the context and purpose for which CMC is used. The nature of the subject examined in this study called for the exploration of various online strategies. Even in Case Two, where the instructor devised the online tasks, his perception was that the students were to facilitate the scheduled computer conferences and even create their own online discussions to discuss content issues and concerns. Whilst engaged in this process, the instructor envisaged that students would explore the use of computer-mediated communication.

6.5.2.5 Case Two represented a more flexible learning environment for both students and instructor

Overall, the instructor thought that both subject implementations generated positive learning experiences. However, Case Two facilitated more flexibility for both students and the instructor. This is highlighted in the following statement made in one of the two post-subject interviews held with the instructor:

I don't think the quality [of learning] is improved necessarily by doing it this way. But it is making something accessible to people that probably would not do the course if it wasn't accessible this way....It has increased the flexibility for me in the sense that I... can go away for a week to a conference in the middle of all this and go online at night and still contribute to discussions.... So, it has given me more flexibility. I don't think it has made life any easier because I think it's a lot easier to spend three hours with a group than to actually go online and spend three hours, because there is time in responding, there's feedback, etc. I think it is really a question of providing something that gives options for the instructor but also options for the students and does not degrade their understanding of what evaluation and implementation is all about. (Instructor, Post subject interview)

6.5.3 LEARNERS' PERCEPTIONS

6.5.3.1 Case One

The majority of students viewed the subject as a positive learning experience. One of the major factors that influenced this perception was the opportunity students were given to experience a technology-based learning (TBL) environment whilst learning about implementation and evaluation issues surrounding TBL. Table 4.10 provides examples of student feedback. However, whilst the subject overall was perceived as a positive learning experience, most students experienced periods of frustration and stress. From the analysis of this case, four attributes surfaced as contributors towards the stress and frustration experienced. They are outlined as follows and Table 4.11 provides examples of student comments.

1. The exploratory nature of the weekly class sessions.
2. Problems associated with the use of technology and access to the subject Web site and CMC tools.
3. Cognitive overload, due to: new topics being presented each week; learning new CMC tools; students having to devise their own strategy to engage the class for a three-hour seminar by developing a Web page and using videoconferencing and/or CMC tools.
4. Difficulties experienced in the first online collaboration task (preparation of an evaluation proposal for Successmaker).

Despite these challenges, all the students demonstrated commitment to the subject. Much effort was put into the seminar presentations and all students were enthusiastic to participate in the online discussions and trial the various CMC tools. Some students rose to the challenge the subject offered by reflecting on their experiences in the subject and thinking how the implications from their experience could be transferred into their workplace (see Table 4. 12). Other students, however, became overwhelmed with the workload and technical difficulties and thus experienced high levels of frustration.

The suggestions for improvement of the subject that surfaced from the student feedback point to the following issues. They are ordered in level of intensity in which each issue surfaced.

1. Provide more technological support and training
2. Provide pedagogical training on the use of the technology
3. Change class structure and delivery
4. Provide more cognitive scaffolds

These issues and specific suggestions proposed by the students are summarised in Table 6.6.

TABLE 6.6 Student feedback—Suggestions for subject improvement in Case One	
<i>Issue</i>	<i>Suggestions</i>
<i>Provide more technological support and training</i>	<ul style="list-style-type: none"> • Technology should be setup and tested prior to commencement of subject. (Some students, however, appreciated the pilot nature of the subject. One student commented: "In general I believe it fulfilled most students expectations. When discussing strategies with others not involved with the course it became obvious that many of the problems we faced were due to the fact that little work has been done in this area. In fact the subject is at the cutting edge".) • Students should be given appropriate technical training before using the technology. Eg. organise a weekend workshop. • Technical support person should be made available for duration of subject. • A technical support person should operate the videoconferencing sessions. • Ensure all students have access to the technology. Eg. implement a hardware "hire" scheme. • Provide a list of technical requirements.
<i>Provide pedagogical training on the use of the technology</i>	<ul style="list-style-type: none"> • When using videoconferencing, agree on a camera use and discourse protocol. • When using CMC, agree on a protocol for staying on a topic or branching to another chat forum. • Provide a handbook of suggested models of use for each tool.
<i>Change class structure and delivery</i>	<ul style="list-style-type: none"> • Commence both classes at the same time • Have a tutor at the site where instructor is physically absent. • Give students the opportunity to experience remote site access, eg. all students log in from home for a session. • Change structure of course to utilise benefits of different delivery methods.

TABLE 6.6 Student feedback—Suggestions for subject improvement in Case One	
<i>Provide more cognitive scaffolds</i>	<ul style="list-style-type: none"> • A clear structure for each class session is required. Clear aims and objectives need to be stated. • Instructor could summarise the content in the weekly class sessions. • Mentors could be assigned to students. • Start with a smaller online collaborative task. • Make assessment requirements clearer. • Have smaller assignments throughout the subject. • Individual assessment tasks could relate to one overall class project.

Overall students claimed the subject provided them with a positive learning experience namely due to the authenticity the learning environment afforded. The predominant theme that surfaced to improve the subject was a request for more technical support.

6.5.3.2 Case Two

The authentic nature of the learning environment was viewed as a positive aspect of the subject by the students in Case Two. The feedback obtained from the end-of-subject questionnaire indicated that the “hands-on” approach students experienced in the subject facilitated their understanding of the content. Students were engaged in active learning as they experienced implementation and evaluation issues first-hand. Examples of student feedback are provided in Table 6.7.

TABLE 6.7 Examples of student feedback from end-of-subject questionnaire in Case Two.	
Question 18: During this course you experienced a form of TBL. Do you think this gave you a greater appreciation of the issues regarding implementation and evaluation of TBL? (15 of 17 students responded to questionnaire; 14 out of 15 responded: Yes to this question)	
<p>“Yes. Because I was involved in the process.” (Wollongong student)</p> <p>“Yes. I experienced both the benefits and problems first hand which is a very good learning process!” (Wollongong student)</p> <p>“Yes. It was a form of hands-on experience. It allowed us to see what some of the problems and advantages are to using technology.” (Wollongong student)</p> <p>“Yes. It allowed me to understand the importance of evaluation and how it could be done throughout the design and implementation.” (Wollongong student)</p> <p>“Yes. Because from this course I got a lot of ideas in how to implement technology (computer) in education.” (Wollongong student)</p> <p>“Yes. Personal experience beats reading about things.” (Sydney student)</p> <p>“Yes. Using the internet technology to learn about TBL was a very authentic experience.” (Sydney student)</p> <p>“Yes. It is always a good form of learning that gets you to do it, to ‘walk in the other shoes for a while’. Nothing like first hand experience.” (Sydney student)</p>	

However, whereas in Case One where students mainly requested more technical support, in Case Two, the main theme to surface was students wanted more hand-holding from the instructor in the form of more didactic instruction and more guidance of what was expected of them. Overall, student perceptions about the subject in Case Two can be rated as positive, being mainly attributable to the authenticity and flexibility the learning environment afforded. However, the unfamiliarity with both the teaching approach and the flexible delivery of the subject, posed several challenges for students, which resulted in some students wanting to be told what to do.

The specific issues that emerged from the student feedback, which support the above contention are:

- Most students appreciated the flexible attendance pattern but indicated that more guidance would have been beneficial.
- Some students expected the instructor to “teach”.
- The majority of students found the Web Study Guide task a beneficial learning experience.
- Most students found the staggered nature of the assignment due dates facilitated their learning.
- Some students experienced technical difficulties.
- Some students requested more “hand-holding”.

Most students appreciated the flexible attendance pattern but indicated that more guidance would have been beneficial: All the students who responded to the questionnaire thought that the flexible attendance pattern of the subject, that is, reduced face-to-face meetings complemented with online discussions, was a positive aspect of the subject. Many students appreciated the convenience of not having to attend weekly classes and to be able to focus on completing their assignments. Examples of student comments include:

Good for part time students with busy schedules. (End-of-subject questionnaire, Sydney student)

Good -time to do assignments. (End-of-subject questionnaire, Sydney student)

These worked well - especially when I knew what I was doing. (End-of-subject questionnaire, Wollongong student)

Sure I don't want to sit in my flat and go to Uni on the computer but I think with proper implementation it could work. I think this class is a good example. Meeting on the Web every other week is convenient. I don't think anyone is going to be that upset that we all didn't meet this week in person. With a little experience, communicating on the web is going to be second

nature to everyone (in my opinion...but then again I am a big internet fan!)
(CMC online discussion using DISCUS)

I fully agree on the need for personal contact and communication on a face-to-face level...however I am quite prepared to try new avenues...this is one of them. This is very convenient! (CMC online discussion using DISCUS)

One student, who did not respond to the questionnaire, told the researcher that he would not have been able to complete the subject if it were not for the flexible meeting structure because of his work and family commitments.

The flexible attendance pattern of the subject, however, proved challenging for some students. The main reason that surfaced was that the students were not sure what was required of them during the non-meeting weeks. For example, one student commented: "The course seemed extremely disjointed, it was very hard to follow from week to week where we were actually heading" (End-of-subject questionnaire, Wollongong student). Other students commented that the online discussions during the non-meeting weeks could have been more structured. Comments included: "Off campus weeks need to be more regimented - they tended to just fade away" (End-of-subject questionnaire, Wollongong student), and "Good concept as long as students understand what is required outside of face-to-face meeting time or have specific outcomes to achieve" (End-of-subject questionnaire, Wollongong student).

All students that responded to the end-of-subject questionnaire thought that the concept of incorporating online asynchronous discussion was an effective strategy to discuss content. However, most students realised that in order for the concept to work successfully, student preparation is required and there needs to be an incentive to participate:

Good idea but requires a number of people to have 'done their homework' which doesn't always happen. (End-of-subject questionnaire, Wollongong student)

The strategy is very good but it will work if the students have some background knowledge. (End-of-subject questionnaire, Wollongong student)

Make participation in online discussions required. (End-of-subject questionnaire, Wollongong student)

People need an incentive to participate especially since collaboration through online discussion is new for many people. (End-of-subject questionnaire, Wollongong student)

One student suggested that online participation could be encouraged by allocating marks for the online discussion. "Because there was no mark allocated to this expectation - most people seemed to use these as weeks off rather than an

opportunity to communicate electronically” (End-of-subject questionnaire, Wollongong student). Tables 5.22 and 5.23 provide further student feedback about the non-meeting weeks and the online asynchronous discussions.

Overall, the feedback highlights that whilst students thought the concept of having non-meeting weeks had potential to assist their learning, students wanted more direction and guidance of what was required of them in the online environment during the non-meeting periods.

Some students expected the instructor to “teach”: The type and amount of instructor involvement was an issue that raised mixed reactions from the students. The feedback obtained from the end-of-subject questionnaire highlights a disparity between the Sydney students’ and Wollongong students’ perceptions of the instructor’s involvement. The Sydney students were overall very pleased with the instructor’s involvement in the subject, although one student commented: “I would have liked more on-line contact (I think it might have helped to stimulate discussion)”. However, from the 10 Wollongong students who responded to the questionnaire, 6 students expected more involvement from the instructor, namely in the form of providing more “teaching” during the face-to-face meetings. Example feedback includes:

“The instructor's involvement was very limited in main discussion of general topics/areas.” (End-of-subject questionnaire, Wollongong student)

“The instructor seemed to have little or no interest in teaching the course.” (End-of-subject questionnaire, Wollongong student)

“Minimal, not very effective...pleasant but not much teaching.” (End-of-subject questionnaire, Wollongong student)

This feedback plus the researcher's interaction with the Wollongong students suggests that most of the students in the Wollongong class preferred a didactic teaching style and were less motivated to be independent learners. One student, however, appreciated the instructor’s lack of dominance over the class and commented in the Web-based evaluation form that what was liked most about the subject was its informal nature.

“Relaxed and friendly - didn’t feel intimidated - could say what you like. And learned something. Not lectured at. Good class activities.” (Web-based evaluation form, Wollongong student)

Another student appreciated what the instructor was trying to do.

“I suppose the instructor was attempting to encourage involvement within the group...I don’t want to be critical because in hindsight the methods used are what I consider to be part of an innovative teaching practice which is still in its initial stage”. (End-of-subject questionnaire, Wollongong student)

The majority of students found the Web Study Guide task a beneficial learning experience: The majority of students viewed the Web Study Guide production and evaluation assessment tasks as beneficial learning experiences. “Convenience”, “ability to review content multiple times”, and the “ability to view other student work”, were the main reasons that surfaced. (Table 5.22 provides specific student feedback.)

Most students found the staggered nature of the assignment due dates facilitated their learning: Most students felt that the assessment structure was appropriate and helped them deal with the content. However, a few students, felt that the first task was too-much, too-soon:

“The first assignment was far too big to take all the concepts in, in the early stages of the subject.” (End-of-subject questionnaire, Wollongong student)

“I felt the first assignment was too early to have formed any views in the subject.” (End-of-subject questionnaire, Sydney student)

One student thought the workload in the subject was overall too heavy:

“Too heavy and too many assessment tasks.” (End-of-subject questionnaire, Sydney student)

Two students from the Wollongong class (who were schoolteachers) commented that they did not find the content of the last group assignment relevant.

Some students experienced technical difficulties: Technical difficulties did surface but were not as prominent as in Case One. Only three students (from the Wollongong class) had some initial difficulty using the CMC tools and some students experienced difficulties in producing their Web Study Guides.

Some students requested more “hand-holding”: Calls for more pedagogical and technical support is exemplified in the following feedback. Students wanted more “hand-holding”.

“I think a little bit more involvement would help the students understand what they are supposed to do.” (End-of-subject questionnaire, Wollongong student)

“More spoon feeding about technology rather than assuming we know it all.” (End-of-subject questionnaire, Wollongong student)

“I think if Web Based Instruction and online communication is going to work at this early stage in its implementation as an instructional strategy, the instructor has to be a leader in convincing those students who might not have the initial interest in the mode of the delivery.” (End-of-subject questionnaire, Wollongong student)

6.5.4 DISCUSSION

In terms of learning outcomes generated, Case One focused more on the implementation issues of TBL, whereas in Case Two, the assessment tasks provided more opportunity to explore evaluation theory and issues. Both cases provided students with an authentic learning environment. The quality of the learning outcomes generated depended on the metacognitive ability of the students, that is, their ability to reflect on their own experience and withstand the frustration that such a reflexive experience affords. The degree to which students exercised metacognition differed between the two cases. In Case One, reflective thinking was encouraged via the open-ended nature of the tasks and the recursive nature of the tasks. The evaluation assignment of the course itself enabled students to reflect on their experience during the course. The student seminars also provided opportunity for reflection as students could refine their implementation strategy after reviewing other seminar strategies. In Case Two, the reflective thinking component was isolated within each task. The instructor encouraged students to reflect on their experience in completing each assignment during the face-to-face class discussions.

In Case Two, the staggered nature of the assessment tasks provided scaffolding for the students, and as a result, the learning outcomes generated were more structured and focused. The cognitive overload, which was experienced by the students in Case One, did not surface as a contributing factor to the frustration experienced by students in Case Two.

Important lessons can be learned from both cases. Although the pedagogy changed from one case to the next, both cases afforded significant learning outcomes to be generated. The instructor's and students' perceptions suggest that learning outcomes were maintained across the two cases and Case Two enabled such learning outcomes to be achieved in a more flexible environment with less apparent overload of tasks and issues happening simultaneously.

6.6 SUMMARY

This chapter addressed the three questions that guided this study. The answer provided for each question is summarised as follows.

Question 1: Both face-to-face and online interaction among participants was exhibited in the two cases. Students interacted with the instructor, with each other, and with the content. However, the way in which the interaction was encouraged differed in each case. In Case One, interaction occurred within the constraints of a conventional fixed-time and fixed-place classroom framework. The interaction

model that emerged for Case One was predominantly synchronous with a “class” focus. Some asynchronous online activities were incorporated within this synchronous model. Four kinds of interaction were exhibited: Learner-Instructor, Learner-Learner, Learner-Content, and Class-Class. Case Two represented a predominantly asynchronous interaction model in which some synchronous components, such as face-to-face meetings and online discussions were incorporated. Case Two illustrated how the reliance of fixed-time and fixed-place interaction was broken. Three kinds of interaction were exhibited: Learner-Instructor, Learner-Learner, and Learner-Content.

Three factors influenced the nature of the interaction established in each case: the role technology played, the way in which the subject was structured and delivered, and the nature of the assessment tasks. The use of technology in Case One exemplified a mechanistic form of use. It became as much the message as the medium. In Case Two, the technology became more the medium than the message. Its use modelled a more routine form of use. The weekly class structure in Case One drove the need for students to interact with each other, thus online interaction was predominantly synchronous and extrinsically motivated. In Case Two, little online interaction between the two classes occurred. The assessment tasks were peripheral to the online interaction established in Case One, yet in Case Two, the assessment tasks drove the online interaction, thus it is contended that the online interaction was more intrinsically motivated.

Question 2: The use of the Web in both cases facilitated new possibilities for interaction among students and between students and the instructor that would not have been possible without technology mediation. The technology supported the ability for students to interact with other students and with the instructor irrespective of time and place, thus creating a more flexible learning approach for students and a more flexible teaching approach for the instructor. The use of a subject Web site and CMC tools facilitated opportunities for collaborative and cooperative learning not easily achieved in conventional face-to-face classroom settings. The ability to store electronic resources produced by students on the Web site facilitated their re-use for other purposes. The study also shed some insight into how the technology could be used as a cognitive tool. Of particular significance to the context of this study, the technology afforded the use as an intellectual partner as students were able to learn about technology-based learning through the use of technology-based learning tools.

Question 3: The instructor perceived effective learning outcomes were generated in each case yet there was a difference in their emphasis. Case One encouraged exploration of the use of technology and afforded students to reflect on their own practice. Case Two provided learning scaffolds for students via the progressive nature of the assessment tasks. Thus in terms of learning outcomes generated, Case One focused more on implementation issues and Case Two enabled students to focus more on evaluation issues.

Student feedback indicates that overall both cases were viewed as positive learning experiences. However, the learning process in each case was fraught with challenges. In Case One, the main issue that surfaced in the students' recommendations to improve the subject was the need for more technical support. In Case Two, student feedback highlighted the need for more hand-holding from the instructor in the form of more didactic instruction and more guidance of what was required of them.

7



LESSONS LEARNED

The “lessons to be learned” from the study....are *not* generalizations but “working hypotheses” that relate to an understanding of the site. (Lincoln & Guba, 1985, p. 362)

7.1 INTRODUCTION

The previous chapter answered the research questions that guided this investigation. This chapter presents six lessons learned from this collective case study. They are outlined as follows:

1. This study represents an example of pedagogical re-engineering
2. The two cases parallel constructivist learning theory
3. Effective learning outcomes were achieved in the two cases
4. Students require scaffolding in the midst of technological and pedagogical change
5. Several Web-based learning design principles emerged from this study
6. There is no single generically applicable CMC analysis technique

Implications for practice, limitations of the study, and directions for further research are also addressed.

7.2 THIS STUDY REPRESENTS AN EXAMPLE OF PEDAGOGICAL RE-ENGINEERING

Pedagogical re-engineering (Collis, 1996b) resulted from reflective practice. “Reflective practice allows one to make judgments in complex and murky situations—judgments based on experience and prior knowledge” (Merriam & Caffarella, 1999, p. 232). Case One was a pilot in the use of technology. The focus of the innovation was on how the technology could be used for teaching and learning. The technology was introduced into an existing practice. The insights gained from Case One allowed the instructor and the researcher to redesign the pedagogy for Case Two. Thus pedagogical innovation resulted from reflective practice.

Understanding how the technology works allowed change in pedagogy to occur. Pedagogical re-engineering, that is, doing different things rather than doing the same

things differently, came about by trialing new technology using existing strategies; seeing what was possible; then re-designing strategies to take advantage of the new possibilities. Thus, in Case Two, the focus of the innovation was on the pedagogy and how the technology could support the pedagogy. Burnett (1998) presents a similar argument: “Technology and the practical use to which we put technology always exceeds the intentional structures that we build into it. It is within and through this excess that we learn....If we are able to more fully understand the technology, then perhaps we will make better use of it” (p. 49).

This study demonstrates reflective practice in several dimensions. The instructor and the researcher reflected on Case One to redesign Case Two. However reflective practice was evidenced within Case One as several students devised their seminar presentation strategies after experiencing other students’ seminars.

Implications for practice: The entire context and the interaction established among participants need to be examined and described in detail when implementing different modes of delivery. Wolcott (1995) supports this reflective approach: “Reflecting on the nature of and interaction among the context, the learners and methods in a distance education environment is requisite to further planning” (p. 42).

7.3 THE TWO CASES PARALLEL CONSTRUCTIVIST LEARNING THEORY

In Chapter 2, four generic constructivist principles and a discussion about the various forms/strengths/“flavours” of constructivism were presented. Both cases exhibited the four generic principles and the model that emerged from each case parallels two theoretical constructivist frameworks. The model that surfaced from Case One correlates with a radical constructivist approach and the model that emerged from Case Two maps with the Beyond the Information Given (BIG) constructivist framework (Perkins, 1991).

7.3.1 CASE ONE—RADICAL CONSTRUCTIVISM; CASE TWO—BIG

Both cases are described in terms of how the four generic constructivist principles were implemented in practice and how the technology was incorporated.

7.3.1.1 Learning is a process of construction

7.3.1.1.1 Case One: Characteristics

- In the first implementation, although the subject content material was pre-determined, the pilot nature of the subject delivery afforded students the opportunity to experience a “real-life” technology-based learning implementation, that is, an ill-structured knowledge domain. Different CMC were introduced during the subject and the entire class (instructor included) was learning about the technology by experiencing it.
- The role technology played was as much the message as the medium. Students were introduced to the technology to learn about it. As such, the use of technology was not transparent. It was as much the focus as the content of the subject.
- Students demonstrated intolerance for ambiguity (Jonassen & Grabowski, 1993). They had to manage their own learning experience and had to facilitate their own discussion when the instructor was not physically present. Whilst some students rose to the occasion, others found the teaching and learning process daunting.
- All assessment was based on individual work and was not used to scaffold the learning process. Specific assessment criteria were not provided. The assignments were open-ended and tailored to the individual.

7.3.1.1.2 Case Two: Characteristics

- The second implementation was structured so that the assessment tasks drove the learning process. The assessment tasks acted as scaffolds as each task informed the next subsequent task.
- The technology was integrated into the learning process. CMC tools were introduced at the beginning of the subject and students were given the opportunity to learn how to use the tools before online discussions took place. The technology was used as a vehicle for students to interact with each other. It became more transparent in this case. The technology was more the medium than the message.
- There was more a focus on class collaboration than on individual learning (eg. the first online task encouraged collaborative work and the final assignment was structured as a group project).
- Students demonstrated intolerance for ambiguity. Student frustration was experienced, as most students were not accustomed to the flexible class meeting structure. However, factors such as the instructor being physically present at each class, and the assessment criteria being more stringently

defined than in Case One, afforded a less ambiguous learning situation than exhibited in Case One.

7.3.1.2 Learning occurs through social negotiation of meaning

7.3.1.2.1 Case One: Characteristics

- The technology was used for synchronous interaction. Students interacted synchronously during class time and discrete content “chunks” were discussed each week.

7.3.1.2.2 Case Two: Characteristics

- The technology was used for both synchronous and asynchronous discussions. Students could raise different issues at different times during the subject. The structure of the asynchronous online discussions allowed students to build on the discussion during the subject.

7.3.1.3 Learners are immersed in authentic contexts

7.3.1.3.1 Case One: Characteristics

- The “real world” task was the subject itself. Students experienced implementation and evaluation of technology-based learning via the pilot nature of the subject delivery. Students were immersed in an authentic setting for the entire duration of the subject. Because students were recipients of an exploratory technology-based learning implementation, they experienced problems that were not pre-determined.

7.3.1.3.2 Case Two: Characteristics

- The “real world” context was provided in the final group assessment task. This task was deemed by the instructor as being authentic, thus the students were immersed in a preauthenticated (Petraglia, 1998) context.

7.3.1.4 Reflective thinking is an ultimate goal.

7.3.1.4.1 Case One: Characteristics

- Reflective thinking was encouraged via the open-ended nature of the tasks and the recursive nature of the tasks. For example, the final evaluation assignment allowed students to evaluate the subject itself. The student seminars also provided opportunity for reflection as students could refine their implementation strategy after reviewing other seminar strategies.

7.3.1.4.2 Case Two: Characteristics

- Reflective thinking was isolated within each task.

Implications for practice: The two cases demonstrated two pedagogical approaches that fall under the banner of “Constructivism” and the different emphasis in learning outcomes each generated. The two cases also demonstrated the range of options that the advent of Web-based learning technologies can infuse into a subject. A significant implication from this study is that educational technology was used to teach an educational technology subject. Dehler and Porras-Hernandez (1998) claim that this pedagogical approach promotes experiential learning and is a most apt approach for postgraduate study about educational technology:

Educational technology courses provide the ideal setting in which to explore and evaluate some of the emerging teaching and learning paradigms that are currently being promoted in education. By providing students with the opportunity to *experience* the incorporation of technology into the curriculum, rather than merely discussing it as a subject of study, these new paradigms become better established and possibly improved. (p. 53)

The radical constructivist approach can generate a high cognitive load for the student. However, it may be a suitable approach to implement in educational technology subjects as students can experience and explore the potential of learning about educational technology through its use. An implication for postgraduate education may be that instructors, rather than embarking on a solitary journey of innovation when teaching educational technology subjects, can invite students to experience the journey, thus producing a community of learners and researchers. The maturity of each student cohort however, greatly influences the outcome and the learning experience. Instructors need to consider this when designing these kinds of learning environments.

7.4 EFFECTIVE LEARNING OUTCOMES WERE ACHIEVED IN THE TWO CASES

This study has illustrated two different constructivist learning environments. The instructor contends that effective learning outcomes were achieved in both cases, however, there was a difference in their emphasis. Case One fostered exploration and afforded students to reflect on their own practice. As such, the learning outcomes were directly attributable to the amount of reflective thinking performed by the students. In Case Two, students were able to compartmentalise their learning into manageable “chunks” that were more clearly identifiable than in Case One and the sense of exploration was diminished.

The learning outcomes generated from both cases represent higher-order cognition, metacognition, and motivation. Jonassen and Tessmer (1996) argue that it is these kinds of learning outcomes that are essential for meaningful learning. They add that these learning outcomes result from constructivist learning environments and are not catered for in the classical learning taxonomies such as Gagné (1977) and in the conventional instructional design models, such as those presented in Seels and Glasgow (1990) and Smith and Ragan (1993).

The following table outlines the six classes of learning outcomes proposed in the Jonassen and Tessmer (1996) taxonomy and examples are provided to illustrate how each set of learning outcomes was demonstrated in this study.

TABLE 7.1 Demonstration of learning outcomes generated in this study (Based on the learning outcome taxonomy developed by Jonassen & Tessmer, 1996)		
<i>Set of learning outcomes</i>	<i>Characteristics</i>	<i>Example of how this outcome was demonstrated in this study</i>
Ampliative skills	Uses rules of logic and imagination to draw conclusions, explain implications, imagine possibilities.	<p>Ampliative skills were evidenced in the assessment products in the two cases.</p> <p>In Case One, the evaluation reports produced by the students, particularly those that evaluated the subject itself, and student reflective journals demonstrated that students could extend and integrate knowledge on their own. Students also demonstrated that they could apply knowledge to a different context as many students had ideas of how the lessons learned from their experience in the subject could be transferred to their work environments.</p> <p>In Case Two, the final assessment task (the group evaluation proposal), required students to produce a product beyond the information given in the subject. They had to construct an argument about how they would tackle an evaluation project and they had to produce this argument in the form of a tender proposal.</p>
Structural knowledge	A thematic set of propositions, images, concepts, or rules interconnected by various types of relationships.	<p>Structural knowledge was demonstrated in both cases.</p> <p>This was demonstrated in Case One in the students' Portfolio assignments, the theoretical paper that accompanied the seminar presentation, and the seminar presentation itself.</p> <p>In Case Two, this was demonstrated in the students' first assignment, where they were required to write theoretical paper about evaluation theorists, and in the production of their Web Study Guides.</p>

TABLE 7.1 Demonstration of learning outcomes generated in this study (Based on the learning outcome taxonomy developed by Jonassen & Tessmer, 1996)		
Self-knowledge	Uses reflection and self-examination skills to identify cognitive and affective strengths and weaknesses.	Metacognition was exhibited by students in both cases. In Case One, it was demonstrated in the online discussions, students' reflective journals and evaluation assessment product. In Case Two, students illustrated metacognitive awareness in the online discussion and in the face-to-face meetings.
Situated problem solving	Emphasises problem solving in authentic performance contexts. Identifies the suboutcomes of problem solving (identification, decomposition, etc.).	Students demonstrated situated problem solving in both cases because they were learning about implementation and evaluation issues of technology-based learning through the direct experience and immersion in a technology-based learning environment.
Executive control	Focuses upon controlling internal learning and problem solving processes.	In both cases students had to negotiate and manage the learning process. In Case One, students had to initiate and facilitate class discussion both in the face-to-face setting (as the instructor was not always present in the face-to-face class) and online as they had to devise their own online discussions strategies. The online summary task in Case Two is an example of how students had to manage and negotiate the process of producing the online summary among themselves.
Motivation	Involves the wilful manipulation of task attention, effort, and enthusiasm. Has distinct sub-outcomes of willingness, persistence, and effort.	Student motivation was demonstrated in both cases through their willingness and enthusiasm to try new CMC tools; in their persistence to solve technical problems; through their participation in collaborative tasks; and in the quality of the assessment products produced.

Because the learning outcomes generated from this study have been demonstrated according to the Jonassen and Tessmer (1996) framework, the contention can be made that effective learning outcomes were achieved in this study, even though this was not a focus or expected outcome from the study.

7.5 STUDENTS REQUIRE SCAFFOLDING IN THE MIDST OF TECHNOLOGICAL AND PEDAGOGICAL CHANGE

The findings suggest that students in Case One required more technical support and students in Case Two wanted more pedagogical support. In both cases, students experienced some levels of frustration and stress. Several students in Case Two expected the instructor to “teach” in the face-to-face sessions.

Implications for practice: Åkerlind and Trevitt (1995) explain that these types of learning environments may conflict with students' past educational experiences thus causing stress and a resistance to change. One suggestion offered by Åkerlind and Trevitt (1995) is that the instructor needs to be up-front with the students and

explain the rationale for the teaching and learning approach adopted. Thus students can be provided with scaffolding in the form of the instructor explicitly communicating the rationale for the teaching approach. In terms of technical scaffolding, students could experiment with the technology by conducting small tasks until the technology becomes transparent.

7.6 SEVERAL WEB-BASED LEARNING DESIGN PRINCIPLES EMERGED

The Web was implemented in this study to support a flexible delivery approach. Thus, the context in which the Web was implemented was in a subject that included a face-to-face component and the Web site was used as a course support system. Several design principles can be extrapolated from this study. These design principles are to serve as an “advance organiser” to guide practitioners when designing university subjects for flexible delivery. The framework generated to discuss these design principles consists of four phases: Design; Set Up; Maintain; and Evolve. Figure 7.1 illustrates the cyclic nature of the four phases. These phases emerged due to the researcher experiencing two iterations of the same subject. In Case One, the researcher experienced the Design, Set Up and Maintain phases. The Evolve phase emerged in Case Two, as student and instructor feedback and student-produced reusable resources led to the re-design of the subject and Web site.

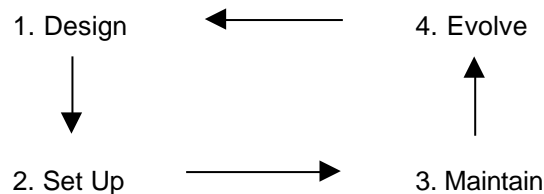


FIGURE 7.1 A Framework for Incorporating a Web Site in a Subject

The following assumptions underpin the design principles that follow.

Pedagogical: Learning occurs through social negotiation of meaning. Thus, student collaboration and sense of “community” is encouraged in the learning environment.

Organisational: A strategic direction for the implementation of flexible learning programs has been chosen. Flexible delivery for on-campus programs of study are encouraged.

7.6.1 DESIGN

- Examine the subject from a holistic perspective. Consider content, assessment and online activities as an integrated whole rather than as separate elements of a subject.
- Consider using assessment tasks to drive the learning process. For example, design several assessment tasks that are to be completed at various stages throughout the subject and consider scaffolding student learning by organising earlier assessment tasks as “stepping-stones” to a final assignment.
- Consider linking the use of computer conferencing with assessment tasks by structuring the online discussions as scaffolds to assist students in completing their assignments. Structure the online discussions as activities that are a “means to an end” not an “end in itself”. Students may then be more intrinsically motivated to participate in online discussions. Avoid the temptation of allocating marks for online participation as this is an extrinsic form of motivation to engage students in class discussions.
- Consider organising the face-to-face meeting opportunities as problem-resolution sessions for students. Enable students to drive these meetings by allowing them to raise and discuss issues and concerns.
- When designing online cooperative and/or collaborative tasks, provide students enough time to complete the task.
- Consider a mix of synchronous and asynchronous interaction. It depends on the subject context to determine how much online synchronicity to include. Synchronous online interaction may be beneficial for distance learners to reduce feelings of isolation. However, in this study the students’ need for interaction with peers were met in the face-to-face class, thus scheduled synchronous online sessions were not deemed necessary.

7.6.2 SET UP

- Create a subject Web site where the Home Page does not change throughout the subject. Password protect the Web site, making access available to current and past student cohorts and the instructor. Suggested components of the Web site include:

Aims and overview of the subject: This could also include selected paper-based reading references.

Class schedule and topic structure: This serves as an advance organiser for students.

A task/activity area where the student activities are explained: This section can evolve during the subject. Not all activities need be predetermined.

CMC tool access: This part of the Web site can allow students to directly enter the CMC application or if more than one CMC tool is used this area serves as a pointer to the various CMC tools.

“Notices”: All current information about the subject can be posted in this area.

A “student profile” area: All students can enter information about themselves such as background and contact details.

A “Your say” area: Students can provide feedback about the subject.

- The ultimate goal is to make the technology transparent (Berge, 1998, p. 74). Suggestions to facilitate this are provide practice activities to ensure all participants are confident with the technology and have a support person available that students can contact to resolve any technical problems.
- If synchronous online components are included, ensure that the task is clear and that all participants start at the same time. Also encourage students to prepare for the online discussion (eg. read assigned articles).
- Consider the subject Web site as a collaborative support tool. Figures 6.1 and 6.2 illustrate two examples of how this was achieved in Case Two.

7.6.3 MAINTAIN

- Consider allowing student activities and tasks to evolve. They need not all be predetermined. The class schedule and topic structure may be predetermined but the specific activities for each week can evolve based on student feedback. Mason (1998b) describes a similar design principle as the collective construction of a course.
- Update the Notices area of the Web site regularly, eg. once a week. Archive the old notices in a separate section.
- When devising online group activities, the instructor could monitor the discussion and if little online discussion occurs, the instructor could post messages to encourage students to participate.

7.6.4 EVOLVE

- Design the assessment tasks in such a way that the product produced by the students can be re-used as content resources in other assessment tasks and by other student cohorts. In this way, multiple perspectives of content are generated, creating a rich databank of online resources.

- Assessment tasks for each subsequent implementation cycle may need to be re-examined based on the resources produced by the students in the previous implementation cycle.
- Allow provisions for students to have access to the subject Web site after completion of the subject so that they can have access to updated resources and engage in lifelong learning.

7.7 IN WEB-BASED LEARNING THE INSTRUCTOR “WEARS SEVERAL HATS”

Students participate in one cycle of a Web-based learning environment but the instructor is involved in multiple interactions. An instructor that implements the Web in a university subject assumes new roles such as Web site maintainer, resource manager of online resources, and administrator of electronic assignments.

Implications for practice: The profile of the university instructor is changing. An instructor needs to wear many “hats”. Whether an instructor should wear all these hats or whether a model of team teaching (where different instructors can be involved in the one subject and assume different roles) should be considered, is an issue that will continue to evolve.

7.8 THERE IS NO SINGLE GENERICALLY APPLICABLE CMC ANALYSIS TECHNIQUE

Hara et al. (2000) state that minimal research exists in the area of CMC content analysis. “One reason for this dearth of content analysis research is the time required to perform such analyses. Secondly, researchers still lack a reliable instrument for content analysis of online discussion” (p. 119). Unfortunately, as the CMC analysis in this study has shown, it does not appear that “a reliable instrument for content analysis” may be forthcoming. Instead, the conclusion made is that CMC analysis is very much dependent on the context in which the CMC is used. Hara et al. (2000) also draw this conclusion: “Unfortunately, since every computer conference will have its own unique attributes, researchers may have to design electronic discussion group evaluation criteria on a case by case basis” (p. 143).

Implications for practice: From the experience gained in this study, the following recommendations are offered when analysing online interaction. They are based on the view that the purpose for conducting online interaction analysis is to improve pedagogical practice.

1. Consider the entire context of the subject to understand how CMC is used. Ensure a comprehensive picture of what occurs is described.
2. Use a combination of analysis techniques. For example, Mason (1992) describes a number of techniques used in evaluating computer conferencing. Rather than view each evaluation technique as mutually exclusive, consider implementing a combination of techniques. In this study, content analysis was performed but it was encased within a case study approach. The more recent work by Henri (1996) offers a similar insight.
3. Be prepared to create a tailored content analysis framework based on the context of what occurs online.

7.9 RECOMMENDATIONS FOR FURTHER RESEARCH

This study was exploratory in nature. It was exploratory in both the mode of investigation and how the subject (that was investigated) was delivered. The study investigated the kinds of interactions that were established in a postgraduate Web-based learning environment between two geographically separate groups of students and their instructor using communication technologies. It focused on how students and an instructor used the Web and computer-mediated communication tools during the period of 1996 and 1997—a time where these technologies and the pedagogy to exploit the potential of such technology were emerging. Whilst this study has answered some questions, it has raised many more and some directions for future research are presented below.

The recommendations for further research draw upon both the findings and limitations of this study. The following list is by no means exhaustive but serves as a guide for future research endeavours in the area of Web-based learning and flexible delivery.

The role of the technology in an online learning environment: A limitation of this study was the context in which the technology was introduced and implemented. Students used the technology not only to interact with geographically separated peers and with the instructor, but to learn about implementation and evaluation issues of educational technology through the hands-on use of educational technology. In Case One, the technology was not transparent and the online tools were not pre-determined. Students were encouraged to explore online strategies and trial various tools. As such, although the failures of the technology hindered online interaction, it served as a positive learning experience for students (somewhat frustrating for some) as they assumed a research community to explore the potential of the technology. An area for further research is to investigate the nature of online

interaction in a learning environment where the subject content is not inherently related to the subject delivery and where the technology infrastructure is in place prior to commencement of the subject.

The role of the instructor in an online learning environment: This study showed that the instructor assumed multiple roles in an online learning environment such as Web site maintainer, online facilitator, resource manager of online resources, etc. However, the instructor in this study was technology literate and an expert in the field of educational technology. Should an instructor assume all these roles or could a team teaching model be implemented? This issue requires further exploration.

Determining the effectiveness of constructivist online learning environments: A limitation of this study was that the instructor was confident to take a risk in Case One by embarking on a journey of innovation with his students. While a more organised and structured approach (as demonstrated in Case Two) might appear more “responsible” to foster higher-order learning outcomes, students perceived the radical constructivist approach implemented in Case One as a valuable learning experience. However, the issue of learning outcomes in a constructivist learning environment and determining their effectiveness is currently not well resolved and needs further examination. This is supported by Harper, Hedberg, and Wright (2000) who argue that conventional instructional design models need re-examination:

If we are to design [constructivist] learning environments...appropriate learning outcomes associated with this view of learning will need to be devised, and it is thus no longer appropriate to rely on the behavioural bias of commonly-used instructional design models. (p. 165)

The use of communication technologies as cognitive tools: This study provided a glimpse of the potential use of the Web as a cognitive tool. However a limitation of this study was that the quality of the student assignments was not investigated. The effect that computer-based cognitive tools have on learning outcomes needs further exploration and pedagogical strategies that support the use of cognitive tools need to be investigated in order to guide practitioners.

The use of computer-mediated communication: This study was limited to text-based CMC. As advances in communications technology facilitate the convergence of synchronous visual media with desktop computer networking technology, these richer forms of CMC require close examination to inform pedagogy. A lesson learned from this study is that research about CMC needs to address the entire context of a subject in which the CMC takes place if pedagogical

re-engineering is to occur. Thus, qualitative methodologies that capture the complexity of the learning environment should be employed when investigating such learning environments.

An idea generated from this study is: structure online discussion activities as a “means to an end” not an “end in themselves”. Further investigation of this working hypothesis is required.

Also, this study was limited to online discussion activities that were predominantly question-answer based. Whether a more complex or problem-based activity would have generated more meaningful discussion is an area for further investigation.

Transferability of Web-Based Learning Design Principles: A limitation of this study was that a third iteration of the same subject was not conducted. Whether the Web-based learning design principles that have surfaced from this study could be applied in other online learning contexts is an issue that could be further explored.

7.10 CONCLUSION

Bain (1999) states, “progress with complex human endeavours is usually made in small steps” (p. 170) and this study represents one of those small steps. That is, one small step forward in the quest for further understanding of flexible delivery models using World Wide Web technology in postgraduate education.

To summarise, four main issues emerged from this study:

1. Each of the two cases represented a Web-based constructivist learning environment. It is contended that effective learning outcomes were achieved in both cases.
2. The investigation of a Web-based learning environment from a holistic perspective, that is, examining the subject as an entire “package”, enabled pedagogical re-engineering to occur.
3. CMC should be implemented in a postgraduate Web-based learning environment as a “means to an end” not an “end in itself”.
4. There is no single generically applicable CMC analysis technique—it depends on the context in which the CMC is used.

Sherry and Wilson (1997) argue that the ultimate goal educators should strive for when designing Web-based learning environments is to create a learning community where participants share existing knowledge and create new knowledge:

The ultimate concept of Web-based instruction is to set up a structure where all members of the learning community come to share knowledge and skills, to learn how to access necessary resources, to create new knowledge, and to disseminate it throughout both the local and global learning community. Needless to say, this is a very value-laden concept. Not every instructor is willing to surrender control, to give up the idea of being the information provider. Web-based instruction is bound to upset the existing system; it will either force change or cause resistance. By bringing new capabilities into existing instruction, however, the Web is redefining the rules and expanding the frontiers of curriculum and instruction. (Sherry & Wilson, 1997, p. 72)

This ideal was explored in this study and “expanding the frontiers of curriculum and instruction” was certainly achieved.

Chapter 2 highlighted several gaps in the literature about the use of the Web in higher education. It is contended that this study has addressed those gaps. The contribution made to the Educational Technology knowledge base is as follows:

- The study contributes to the Web-based learning literature as it demonstrated how Web-based learning environments can be implemented in postgraduate education.
- The study demonstrated how flexible delivery was implemented in a postgraduate subject.
- This collective case study provided “thick description” of the interactions established and the pedagogical strategies employed in a postgraduate subject. This has been argued in the literature as urgently required to guide educational practitioners towards pedagogical reform.
- The study demonstrated how a constructivist learning environment was designed, developed, implemented and evaluated. It also illustrated the learning outcomes generated from such a learning environment.

The contribution made to the Qualitative Research and Computer-Mediated Communication Research knowledge base is as follows:

- The study demonstrated how the Naturalistic Inquiry Paradigm (Lincoln & Guba, 1985) was operationalised in an educational technology research context.
- The study represents an example of how CMC research was conducted from a qualitative research perspective.
- The study adopted an eclectic approach to online interaction analysis, which was driven by the context in which the CMC occurred. Thus, the study presented another way of analysing CMC.

This thesis draws to a close on the eve of the next phase in university delivered education, that of university globalisation via university—media network consortiums (Richardson, 2000). The future is somewhat uncertain as these new developments are “uncharted-waters” with new horizons, new possibilities and new research questions to explore. What is certain however, is that an exciting new era of online higher education lies ahead!



REFERENCES

- Åkerlind, G., & Trevitt, C. (1995). Enhancing learning through technology: When students resist the change. In J. M. Pearce, & A. Ellis (Eds.), *ASCILITE'95 Conference Proceedings, The 12th Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education* (pp. 1-9). Victoria, Australia: The University of Melbourne.
- Agostinho, S. (1997, July). *Using the World Wide Web as a collaborative tool*. A Work-in-progress presented at the annual Graduate School of Education Research Student Colloquium, University of Wollongong, Australia.
- Agostinho, S. (1998, December). *Facilitating learning using the World Wide Web and Video Conferencing: Instructional strategies used in a postgraduate course*. A Work-in-progress presented at ASCILITE'98, The 15th Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education, Wollongong, Australia.
- Agostinho, S., Lefoe, G., & Hedberg, J. (1997). On-line collaboration for learning: A case study of a post graduate university course. In H. Ashman, P. Thistlewaite, R. Debreceeny, & A. Ellis (Eds.), *Proceedings of AusWeb97, the Third Australian World Wide Web Conference* (pp. 230-237). Lismore, Australia: Southern Cross University Press. Available URL:
<http://ausweb.scu.edu.au/proceedings/index.html> [Accessed July 1997]
- Alexander, S. (1995). Teaching and learning on the World Wide Web. *AusWeb95, The First Australian World Wide Web Conference*, Ballina, Australia. [Online]. Available URL: <http://www.scu.edu.au/ausweb95/papers/education2/alexander/> [Accessed May 1996]
- Alexander, S. (1999). An evaluation of innovative projects involving communication and information technology in higher education. *Higher Education Research & Development*, 18(2), 173-183.
- Anderson, A., Mayes, J. T., & Kibby, M. R. (1995). Small group collaborative discovery learning from hypertext. In C. O'Malley (Ed.), *Computer supported collaborative learning* (pp. 23-38). Heidelberg: Springer-Verlag.
- Archee, R., & Duin, A. H. (1995). The World Wide Web and distance education: Convergence or cacophony? *AUUG '95 and Asia-Pacific World Wide Web'95 Conference & Exhibition*, Sydney, Australia. [Online]. Available URL:
<http://www.csu.edu.au/special/conference/apwww95> [Accessed November 1995]
- Arnold, M. (1997). Using the Web to augment teaching and learning. In R. Kevill, R. Oliver, & R. Phillips (Eds.), *ASCILITE' 97 Conference proceedings, The 14th*

- Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education* (pp. 37-41). Perth, Australia: Curtin University.
- Bain, J. D. (1999). Introduction. *Higher Education Research & Development*, 18(2), 165-172.
- Baldwin, P. (1991). *Higher Education: Quality and diversity in the 1990's*. Canberra: Australian Government Publishing Service.
- Bannan, B., & Milheim, W. D. (1996). Design, development and delivery of instructional materials over the Internet. *WebNet 96*, San Fransisco. [Online]. Available URL: <http://aace.virginia.edu/aace/conf/webnet/html/117.htm> [Accessed February 1998]
- Bannan-Ritland, B., & Kommers, P. (1998). Editorial. *Educational Media International*, 35(2), 61-62.
- Bannan-Ritland, B., Harvey, D. M., & Milheim, W. D. (1998). A general framework for the development of Web-based instruction. *Educational Media International*, 35(2), 77-81.
- Barone, T., & Eisner, E. (1997). Arts-based educational research. In R. M. Jaeger (Ed.), *Contemporary methods for research in education* (2nd ed.) (pp. 73-116). Washington, DC: American Educational Research Association.
- Bates, A. W. (1995). *Technology, open learning and distance education*. London: Routledge.
- Bates, A. W. (1997). *Restructuring the university for technological change* [Online]. Available URL: <http://bates.cstudies.ubc.ca/strategies.html> [Accessed October 1998]
- Beattie, K., & James, R. (1997). Flexible coursework delivery to Australian postgraduates: How effective is the teaching and learning? *Higher Education*, 33, 177-194.
- Benbunan-Fich., & Hiltz, S. R. (1999). Educational applications of CMCs: Solving case studies through asynchronous learning networks. *Journal of Computer-Mediated Communication*, 4(3) [Online]. Available URL: <http://www.ascusc.org/jcmc/vol4/issue3/benbunan-fich.html> [Accessed April 2000]
- Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology*, 35(1), 22-30.
- Berge, Z. L. (1996). *The role of the online instructor/facilitator*. [Online]. Available URL: http://cac.psu.edu/~mauri/moderate/teach_online.html [Accessed October 1996]
- Berge, Z. L. (1998). Guiding principles in Web-based instructional design. *Educational Media International*, 35(2), 72-76.

- Berners-Lee, T. (1996). *The World Wide Web: Past, present and future*. [Online]. Available URL: <http://www.w3.org/People/Berners-Lee/1996/ppf.html> [Accessed May 2000]
- Berners-Lee, T. (1998). *The World Wide Web: A very short personal history*. [Online]. Available URL: <http://www.w3.org/People/Berners-Lee/ShortHistory.html> [Accessed May 2000]
- Blumenfeld, P. C., Marx, R. W., Soloway, E., & Krajcik, J. (1996). Learning with peers: From small groups cooperation to collaborative communities. *Educational Researcher*, 25(8), 37-40.
- Bonk, C. J., & Reynolds, T. H. (1997). Learner-centered Web instruction for higher-order thinking, teamwork, and apprenticeship. In B. H. Khan (Ed.), *Web-based instruction* (pp. 167-178). New Jersey: Educational Technology Publications, Inc.
- Bonk, C. J., & Cummings, J. A. (1998). A dozen recommendations for placing the student at the centre of Web-based learning. *Educational Media International*, 35(2), 82-89.
- Bostock, S. J. (1998). Constructivism in mass higher education: a case study. *British Journal of Educational Technology*, 29(3), 225-240.
- Boudourides, M. A. (1998). Constructivism and education: A shopper's guide [Online]. Available URL: <http://www.duth.gr/~mboudour/mab/constr.html> [Accessed: October 1999]
- Burnett, R. (1998). Technology, information and learning. *Australian Universities' Review*, 41(1), 46-49.
- Burns, R. B. (1991). *Introduction to research methods in education*. Melbourne: Longman Cheshire Pty Limited.
- Clark, R. E. (1994). Media will never influence learning. *Educational Technology Research & Development*, 42(2), 21-29.
- Collins, M., & Berge, Z. (1996). *Facilitating interaction in computer mediated online courses* [Online]. Available URL: <http://jan.ucc.nau.edu/~mpc3/moderate/flcc.html> [Accessed April 2000]
- Collis, B. (1996a, June). Pedagogical re-engineering: Design issues and implementation experiences with the WWW as a learning environment. Paper presented as Invited Speaker Presentation, *ED-MEDIA 96 & ED-TELECOM 96, World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications*, Boston, MA.
- Collis, B. (1996b). *Tele-learning in a digital world: The future of distance learning*. London: International Thomson Computer Press.
- Collis, B. (1998a). *Implementing innovative Teaching across the faculty via the WWW*. In S. McNeil, J. Price, S. Boger-Mehall, B. Robin, & J. Willis. (Eds.),

- Proceedings of SITE'98, Society for Information Technology and Teacher Education, 9th International Conference* (pp. 1328-1335). Washington, DC: Association for the Advancement of Computing in Education. Available URL: http://www.coe.uh.edu/insite/elec_pub/HTML1998/keynote.htm [Accessed April 2000]
- Collis, B. (1998b). New didactics for university instruction: why and how? *Computers & Education*, 31(4), 373-393.
- Collis, B., & Winnips, K. (1998). Design guidelines for teaching about design guidelines for educational WWW sites. In T. Ottman, & I. Tomek. (Eds.), *Proceedings of ED-MEDIA & ED-TELECOM 98, 10th World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications* (pp. 215-220). Freiburg, Germany: Association for the Advancement of Computing in Education.
- Corderoy, R. M. (Ed.). (1998). *Proceedings of ASCILITE'98, The 15th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education*, Wollongong, Australia: University of Wollongong.
- Corrent-Agostinho, S., & Hedberg, J. (1998). Creating a postgraduate virtual community: Issues for authors and students as authors. *Open Learning Australia Virtual Conference, "Online Development: issues for authors and students"* [Online]. Available URL: <http://www.ola.edu.au/virtcon/> [Accessed: March 1998][Accessed: May 1998 as archived site]
- Corrent-Agostinho, S., & Hedberg, J. (2000). Radical constructivism and Beyond the Information Given: Emergent models from a postgraduate Web-based course. In J. Bourdeau, & R. Heller. (Eds.), *Proceedings of ED-MEDIA 2000, World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 209-214). Montreal, Canada: Association for the Advancement of Computing in Education.
- Corrent-Agostinho, S., Hedberg, J., & Lefoe, G. (1998). Constructing problems in a web-based learning environment. *Educational Media International*, 35(3), 173-180.
- Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks: Sage.
- Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks: Sage.
- Crossman, D. M. (1997). The evolution of the World Wide Web as an emerging instructional technology tool. In B. H. Khan (Ed.), *Web-based instruction* (pp. 19-23). New Jersey: Educational Technology Publications, Inc.
- Cunningham, S. (1998). Technology and delivery: Assessing the impact of new media on "borderless" education. *Australian Universities' Review*, 41(1), 10-13.

- Cunningham, S., Tapsall, S., Ryan, Y., Stedman, L., Bagdon, K., & Flew, T. (1998). *New media and borderless education: A review of the convergence between global media networks and higher education provision*. Evaluations and Investigations Program 97/22. Canberra: Australian Government Publishing Service.
- Darby, J. (1994). A vision of higher education in the Year 2000. In M. Ryan (Ed.), *Proceedings of APITITE 94, Asia Pacific Information Technology in Training and Education Conference and Exhibition* (pp. 15-18). Brisbane, Australia.
- De Boer, W. & Collis, B. (1999). How do instructors design a WWW-based course-support environment? In B. Collis, & R. Oliver (Eds.), *Proceedings of ED-MEDIA 99, World Conference on Educational Multimedia, Hypermedia & Telecommunications* (pp. 299-304). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Dehler, C., & Porras-Hernandez, L. H. (1998). Using computer mediated communication (CMC) to promote experiential learning in graduate studies. *Educational Technology*, 38(3), 52-55.
- Dehoney, J., & Reeves, T. C. (1999). Instructional and social dimensions of class web pages. *Journal of Computing in Higher Education*, 10(2), 19-41.
- Denzin, N. K., & Lincoln, Y. S. (1994). Introduction: Entering the field of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp.105-117). Newbury Park, CA: Sage.
- Dijkstra, S., Collis, B., & Eseryel, D. (1999). Instructional design for tele-learning. *Journal of Computing in Higher Education*, 10(2), 3-18.
- Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implication for the design and delivery of instruction. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (pp. 170-198). New York: Macmillan.
- Dyrli, O. E. (1993, October). The Internet: Bringing global resources to the classroom. *Technology and Learning*, 51-58.
- Ellsworth, J. H. (1995). Using computer-mediated communication in teaching university courses. In Z. L. Berge, and M. P. Collins (Eds.), *Computer mediated communication and the online classroom, Volume one: Overview and perspectives* (pp. 29-36). New Jersey: Hampton Press Inc.
- El-Tigi, M., & Branch, R. M. (1997). Designing for interaction, learner control, and feedback during Web-based learning. *Educational Technology*, 37(3), 23-29.
- Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing naturalistic inquiry: A guide to methods*. Newbury Park, CA: Sage.
- Flew, T. (1998). New media and borderless education. *Australian Universities' Review*, 41(1), 7-9.

- Gagné, R. M. (1977). *The conditions of learning* (3rd ed.). New York: Holt, Rinehart and Winston.
- Geelan, D. R. (1997). Epistemological anarchy and the many forms of constructivism. *Science & Education*, 6, 15-28.
- Gibbs, W. J. (1998). Implementing on-line learning environments. *Journal of Computing in Higher Education*, 10(1), 16-37.
- Ginige, A., Witana, V., & Yourlo, Z. (1996). Use of the world-wide-web in the delivery of education: A case study. In C. McBeath, & R. Atkinson (Eds.), *The learning superhighway: New world? New worries? Symposium proceedings, 3rd International Interactive Multimedia Symposium* (pp. 140-148). Perth, Australia: Promaco Conventions.
- Godfrey, R. (1996). The World Wide Web: A replacement, displacement, supplement or adjunct of traditional methods? In A. Christie, P. James, & B. Vaughan (Eds.), *ASCILITE' 96 Conference proceedings, The 13th Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education* (pp. 221-233). Adelaide, Australia: University of South Australia.
- Goetz, J. P., & LeCompte, M. D. (1984). *Ethnography and qualitative design in educational research*. San Diego, CA: Academic Press, Inc.
- Gosper, M. V., & Rich, D. C. (1998). Introducing flexibility into educational programs: The Macquarie University experience. In T. Ottman, & I. Tomek. (Eds.), *Proceedings of ED-MEDIA & ED-TELECOM 98, 10th World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications* (pp. 413-418). Freiburg, Germany: Association for the Advancement of Computing in Education.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Newbury Park, CA: Sage.
- Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research*, 17(4), 397-431.
- Hackbarth, S. (1997). Web-based learning activities for children. In B. H. Khan (Ed.), *Web-based instruction* (pp. 191-212). New Jersey: Educational Technology Publications, Inc.
- Hagel, P., & Zulian, F. (1996). Value adding: adapting a paper-based teaching case for the WWW environment. In A. Christie, P. James, & B. Vaughan (Eds.), *ASCILITE' 96 Conference proceedings, The 13th Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education* (pp. 259-274). Adelaide, Australia: University of South Australia.

- Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the process*. Albany, NY: State University of New York Press.
- Hannafin, M. J. (1997). Resource-based learning environments: Methods and models. In R. Kevill, R. Oliver, & R. Phillips (Eds.), *ASCILITE' 97 Conference Proceedings, The 14th Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education* (pp. 255-262). Perth, Australia: Curtin University of Technology.
- Hara, N., Bonk, C. J., & Angeli, C. (2000). Content analysis of online discussion in an applied educational psychology course. *Instructional Science*, 28, 115-152.
- Hara, N., & Kling, R. (2000). *Students' distress with a Web-based distance education course* [Online]. Available URL:
<http://www.slis.indiana.edu/CSI/wp00-01.html> [Accessed February 2000]
- Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online*. Cambridge, MA: MIT Press.
- Harasim, L., Calvert, T., & Groeneboer, C. (1997). Virtual-U: A Web-based system to support collaborative learning. In B. H. Khan (Ed.), *Web-based instruction* (pp. 149-158). New Jersey: Educational Technology Publications, Inc.
- Harper, B., Hedberg, J. G., & Wright, R. (2000). Who benefits from virtuality? *Computers & Education*, 34, 163-176.
- Hart, G., & Gilding, A. (1997). Virtual tutorials, virtual lectures, virtual prisons? In R. Kevill, R. Oliver, & R. Phillips (Eds.), *ASCILITE' 97 Conference Proceedings, The 14th Annual Conference of the Australasian Society for Computers In Learning In Tertiary Education* (pp. 263-268). Perth, Australia: Curtin University of Technology.
- Hedberg, J., Brown, C., & Arrighi, M. (1997). Interactive multimedia and Web-based learning: Similarities and differences. In B. H. Khan (Ed.), *Web-based instruction* (pp. 47-58). New Jersey: Educational Technology Publications, Inc.
- Hedberg, J. G., Brown, C., Larkin, J. L., & Agostinho, S. (in press). Designing practical web sites for interactive training. In B. H. Khan (Ed.), *Web-based training*. New Jersey: Educational Technology Publications, Inc.
- Hedberg, J., & Corrent-Agostinho, S. (1999). Creating a postgraduate virtual community: Assessment drives learning. In B. Collis, & R. Oliver (Eds.), *Proceedings of ED-MEDIA 99, World Conference on Educational Multimedia, Hypermedia & Telecommunications* (pp. 1093-1098). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Hedberg, J. H., & Harper, B. (1993). Supporting and developing teachers through telecommunications. *Educational Media International*, 30(2), 89-93.

- Henri, F. (1992). Computer conferencing and content analysis. In A. Kaye (Ed.), *Collaborative learning through computer conferencing: The Najaden papers* (pp. 117-136). Berlin: Springer-Verlag.
- Henri, F. (1995). Distance learning and computer-mediated communication: Interactive, quasi-interactive or monologue? In C. O'Malley (Ed.), *Computer supported collaborative learning* (pp. 145-161). Berlin: Springer-Verlag.
- Henri, F. (1996). Collaborative distance learning and computer conferencing. In T. T. Liao (Ed.), *Advanced educational technology: Research issues and future potential* (pp. 45-76). Berlin: Springer-Verlag.
- Hill, J. R. (1997). Distance learning environments via the World Wide Web. In B. H. Khan (Ed.), *Web-based instruction* (pp. 75-80). New Jersey: Educational Technology Publications, Inc.
- Hillman, D. C. A. (1999). A new method for analyzing patterns of interaction. *The American Journal of Distance Education*, 13(2), 37-47.
- Hillman, D. C., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education*, 8(2), 30-42.
- Hiltz, S. R., & Turoff, M. (1978). *The network nation: Human communication via computer*. Reading, MA: Addison-Wesley.
- Jaeger, R. M. (Ed.). (1997). *Contemporary methods for research in education* (2nd ed.). Washington, DC: American Educational Research Association.
- James, R., & Beattie, K. (1996). *Expanding options: Delivery technologies and postgraduate coursework*. Canberra: Australian Government Publishing Service.
- Johnson, D. W., & Johnson, R. T. (1996). Cooperation and the use of technology. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (pp. 1017-1044). New York: Macmillan.
- Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research*, 11(1), 29-49.
- Jonassen, D. H., Campbell, J. P., & Davidson, M. E. (1994). Learning with media: Restructuring the debate. *Educational Technology Research & Development*, 42(2), 31-39.
- Jonassen, D. H., Davidson, M., Collins, C., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *The American Journal of Distance Education*, 9(2), 7-26.
- Jonassen, D. H., Dyer, D., Peters, K., Robinson, T., Harvey, D., King, M., & Loughner, P. (1997). Cognitive flexibility hypertexts on the web: Engaging

- learners in meaning making. In B. H. Khan (Ed.), *Web-based instruction* (pp. 119-133). New Jersey: Educational Technology Publications, Inc.
- Jonassen, D. H., & Grabowski, B. L. (1993). *Handbook of individual differences, learning, and instruction*. Hillsdale, NJ: Lawrence Erlbaum.
- Jonassen, D., Mayes, T., & McAleese, R. (1993). A manifesto for a constructivist approach to uses of technology in higher education. In T. M. Duffy, & D. H. Jonassen (Eds.), *Designing environments for constructive learning* (pp. 231-247). Berlin: Springer-Verlag.
- Jonassen, D. H., Peck, K. L., & Wilson, B. G. (1999). *Learning with technology: A constructivist perspective*. Upper Saddle-River, NJ: Prentice-Hall.
- Jonassen, D. H., & Reeves, T. C. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (pp.693-719). New York: Macmillan.
- Jonassen, D. H., & Tessmer, M. (1996). An outcome-based taxonomy for instructional systems design, evaluation, and research. *Training Research Journal*, 2, 11-46.
- Khan, B. H. (1997a). Web-based instruction (WBI): What is it and why is it? In B. H. Khan (Ed.), *Web-based instruction* (pp. 5-18). New Jersey: Educational Technology Publications, Inc.
- Khan, B. H. (Ed.). (1997b). *Web-based instruction*. New Jersey: Educational Technology Publications, Inc.
- Kirkley, J. R., & Duffy, T. M. (1997). Designing a Web-based electronic performance support system (EPSS): A case study of literacy online. In B. H. Khan (Ed.), *Web-based instruction* (pp. 139-148). New Jersey: Educational Technology Publications, Inc.
- Kozma, R. B. (1994). Will media influence learning? Reframing the debate. *Educational Technology Research & Development*, 42(2), 7-19.
- LaMaster, K., & Knop, N. (1999). Pedagogy reflections: Teaching a Web based course. In B. Collis, & R. Oliver (Eds.), *Proceedings of ED-MEDIA 99, World Conference on Educational Multimedia, Hypermedia & Telecommunications* (pp. 1332-1333). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Lancy, D. F. (1993). *Qualitative research in education: An introduction to the major traditions*. New York: Longman.
- Laurillard, D. (1993). *Rethinking university teaching*. London: Routledge.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

- Lockyer, L., Patterson, J., & Harper, B. (1999). Measuring effectiveness of health education in a Web-based learning environment: a preliminary report. *Higher Education Research & Development*, 18(2), 233-246.
- McDonald, J., & Campbell Gibson, C. (1998). Interpersonal dynamics and group development in computer conferencing. *The American Journal of Distance Education*, 12(1), 7-25.
- McIntyre, D. R., & Wolff, F. G. (1998). An experiment with WWW interactive learning in university education. *Computers & Education*, 31, 255-264.
- McIsaac, M. S., Blocher, J. M., Mahes, V., & Vrasidas, C. (1999). Student and teacher perceptions of interaction in online computer-mediated communication. *Educational Media International*, 36(2), 121-131.
- McIsaac, M. S., & Gunawardena, N. C. (1996). Distance education. In D. H. Jonassen (Ed.), *Handbook of research of research on educational communications and technology* (pp. 403-437). New York: Macmillan.
- McLellan, H. (1997). Creating virtual learning communities via the Web. In B. H. Khan (Ed.), *Web-based instruction* (pp. 185-190). New Jersey: Educational Technology Publications, Inc.
- McLellan, H. (1998). The Internet as a virtual learning community. *Journal of Computing in Higher Education*, 9(2), 92-112.
- McLoughlin, C. (1996). A learning conversation: Dynamics, collaboration and learning in computer mediated communication. In C. McBeath, & R. Atkinson (Eds.), *The learning superhighway: New world? New worries? Proceedings of the 3rd International Interactive Multimedia Symposium* (pp. 267-273). Perth, Australia: Promaco Conventions.
- McLoughlin, C., & Oliver, R. (1995). Analysing interactions in technology supported learning environments. In R. Oliver, & M. Wild (Eds.), *Learning without limits: proceedings of the Australian Computers in Education Conference 1995* (pp. 49-61). Claremont, Australia: Educational Computing Association of Western Australia (ECAWA).
- MackNight, C. B. (1996, December). *Changing educational paradigms*. In A. Christie, P. James, & B. Vaughan (Eds.), *Proceedings of ASCILITE'96, the 13th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education* (pp. 16-33). Adelaide, Australia: University of South Australia.
- McNaught, C. (1998, June). The impact of information technology on practices and policy in higher education. In T. Ottman, & I. Tomek (Eds.), *Proceedings of ED-MEDIA & ED-TELECOM 98, 10th World Conference on Educational Multimedia and Hypermedia & World Conference on Educational*

- Telecommunications* (pp. 940-945). Freiburg, Germany: Association for the Advancement of Computing in Education.
- Maddux, C. D., & LaMont Johnson, D. (1997). The World Wide Web: History, cultural context, and a manual for developers of educational information-based Web sites. *Educational Technology*, 37(5), 5-12.
- Markel, S. (1999). Gendered voices: Provocateur in an on-line virtual conference course for In-Service teachers. In J. D. Price, J. Willis, D. A. Willis, M. Jost, & S. Boger-Mehall (Eds.), *Proceedings of SITE 99, Society for Information technology and Teacher Education* (pp. 332-336). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Mason, R. (1992). Evaluation methodologies for computer conferencing applications. In A. Kaye (Ed.), *Collaborative learning through computer conferencing: The Najaden papers* (pp. 105-116). Berlin: Springer-Verlag.
- Mason, R. (1998a, October 14). *Collaborative activities in a global environment: Designing Web based instruction*. Paper presented at a videoconference arranged by the Centre for Educational Development and Interactive Resources, University of Wollongong, NSW, Australia.
- Mason, R. (1998b). Models of online courses. *ALN Magazine* 2(2) [Online]. Available URL: http://www/aln.org/alnweb/magazine/vol2_issue2/Masonfinal.htm [Accessed May 2000]
- Mason, R., & Bacsich, P. (1998). Embedding computer conferencing into university teaching. *Computers & Education*, 30(3-4), 249-258.
- Merriam, S. B. (1988). *Case study research in education: A qualitative approach*. San Francisco: Jossey-Bass.
- Merriam, S. B., & Caffarella, R. S. (1999). *Learning in adulthood: A comprehensive guide* (2nd ed.). San Francisco: Jossey-Bass.
- Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education*, 3(2), 1-6.
- Mowrer, D. E. (1996). A content analysis of student/instructor communication via computer conferencing. *Higher Education*, 32, 217-241.
- Naidu, S. (1997). Collaborative reflective practice: A teaching and learning architecture for the Internet. In T. Müldner, & T. C. Reeves (Eds.), *Proceedings of ED-MEDIA & ED-TELECOM 97, 9th World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications* (pp. 1334-1335). Calgary: Association for the Advancement of Computing in Education.
- Nelson, T. (1987). *Computer lib/ Dream machines*. Redmond, WA: Tempus Books of Microsoft Press.

- Neuman, W. L. (1994). *Social research methods: Qualitative and quantitative approaches* (2nd ed.). Massachusetts: Allyn and Bacon.
- Newman, D. R., Johnson, C., Webb, B., & Cochrane, C. (1997). Evaluating the quality of learning in computer supported co-operative learning. *Journal of the American Society for Information Science*, 48(6), 484-495.
- Nicoll, K. (1998). "Fixing" the "Facts": Flexible learning as policy invention. *Higher Education Research and Development*, 17(3), 291-304.
- Nikolova, I., & Collis, B. (1998). Flexible learning and design of instruction. *British Journal of Educational Technology*, 29(1), 59-71.
- Oliver, R., Omari, A., & Herrington, J. (1997). Exploring student interactions in collaborative World Wide Web learning environments. In T. Müldner, & T. C. Reeves (Eds.), *Proceedings of ED-MEDIA & ED-TELECOM 97, 9th World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications* (pp. 812-817). Calgary: Association for the Advancement of Computing in Education.
- Owston, R. D. (1997). The World Wide Web: A technology to enhance teaching and learning? *Educational Researcher*, 26(2), 27-33.
- Perkins, D. N. (1991). Technology meets constructivism: Do they make a marriage? *Educational Technology*, 31(5), 18-23.
- Petraglia, J. (1998). The real world on a short leash: The (mis)application of constructivism to the design of educational technology. *Educational Technology Research and Development*, 46(3), 53-65.
- Phillips, D. C. (1995). The good, the bad, and the ugly: The many faces of constructivism. *Educational Researcher*, 24(7), 5-12.
- Ravitz, J. (1997). Evaluating learning networks: A special challenge for Web-based instruction. In B. H. Khan (Ed.), *Web-based instruction* (pp. 361-368). New Jersey: Educational Technology Publications, Inc.
- Reeves, T. C. (1991). Ten commandments for the evaluation of interactive multimedia in higher education. *Journal of Computing in Higher Education*, 2(2), 84-113.
- Reeves, T.C. (1995). Questioning the questions of instructional technology research. In M.R. Simonson, & M. Anderson (Eds.), *Proceedings of the Annual Conference of the Association for Educational Communications and Technology, Research and Theory Division* (pp. 459-470), Anaheim, CA.
- Reeves, T. (1996, October 24). Media and learning. *ITFORUM* [Online]. Available e-mail: LISTSERV@UGA.CC.UGA.EDU
- Reeves, T. C. (1999). A research agenda for interactive learning in the new millennium. In B. Collis, & R. Oliver (Eds.), *Proceedings of ED-MEDIA 99, World Conference on Educational Multimedia, Hypermedia &*

- Telecommunications* (pp. 15-20). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Reeves, T. C., & Reeves, P. M. (1997). Effective dimensions of interactive learning on the World Wide Web. In B. H. Khan (Ed.), *Web-based instruction* (pp. 59-66). New Jersey: Educational Technology Publications, Inc.
- Relan, A., & Gillani, B. B. (1997). Web-based instruction and the traditional classroom: Similarities and differences. In B. H. Khan (Ed.), *Web-based instruction* (pp. 41-46). New Jersey: Educational Technology Publications, Inc.
- Richardson, J. (2000, May 17). News and unis link in global venture. *The Australian*, p. 39.
- Ritchie, D. C., & Hoffman, B. (1997). Incorporating instructional design principles with the World Wide Web. In B. H. Khan (Ed.), *Web-based instruction* (pp. 135-138). New Jersey: Educational Technology Publications, Inc.
- Robyler, M. D., Edwards, J., & Havriluk, M. A. (1997). *Integrating educational technology into teaching*. Upper Saddle-River, NJ: Prentice-Hall.
- Romiszowski, A. J. (1997). Web-based distance learning and teaching: Revolutionary invention or reaction to necessity? In B. H. Khan (Ed.), *Web-based instruction* (pp. 25-37). New Jersey: Educational Technology Publications, Inc.
- Romiszowski, A. J., & Mason, R. (1996). Computer-mediated communications. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 438-455). New York: Macmillan.
- Rossner, V., & Stockley, D. (1997). Institutional perspectives on organizing and delivering Web-based instruction. In B. H. Khan (Ed.), *Web-based instruction* (pp. 333-336). New Jersey: Educational Technology Publications, Inc.
- Ruberg, L. F., Moore, D. M., & Taylor, C. D. (1996). Student participation, interaction, and regulation in a computer-mediated communication environment: A qualitative study. *Journal of Educational Computing Research*, 14(3), 243-268.
- Ryan, Y. (1998). Time and tide: Teaching and learning online. *Australian Universities' Review*, 41(1), 14-19.
- Ryder, M., & Wilson, B. (1996). Affordances and constraints of the Internet for learning and instruction. In M. R. Simonson, M. Hays, & S. Hall (Eds.), *18th Annual proceedings of selected research and development presentations at the 1996 Convention of the Association for Educational Communications and Technology* (pp. 642-654). Indianapolis, IN: AECT Publications.
- Santoro, G. M. (1995). What is computer-mediated communication. In Z. L. Berge, & M. P. Collins (Eds.), *Computer mediated communication and the online*

- classroom, Volume one: Overview and perspectives* (pp. 11-28). New Jersey: Hampton Press Inc.
- Schrum, L. (1997). Creating collaborative learning environments: The challenge for distant learners. . In T. Müldner, & T. C. Reeves (Eds.), *Proceedings of ED-MEDIA 97 & ED-TELECOM 97, World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications* (pp. 946-951). Calgary: Association for the Advancement of Computing in Education.
- Seels, B. & Glasgow, Z. (1990). *Exercises in instructional design*. Columbus: Merrill.
- Sherry, L., Billig, S. H., & Tavalin, F. (2000). Good online conversation: Building on research to inform practice. *Journal of Interactive Learning Research*, 11(1), 85-127.
- Sherry, L. & Wilson, B. (1997). Transformative communication as a stimulus to Web innovations. In B. H. Khan (Ed.), *Web-based instruction* (pp. 67-73). New Jersey: Educational Technology Publications, Inc.
- Shotsberger, P. G. (1996). Instructional uses of the World Wide Web: Exemplars and precautions. *Educational Technology*, 36(2), 47-50.
- Shotsberger, P. G. (1997). Emerging roles for instructors and learners in the web-based instruction classroom. In B. H. Khan (Ed.), *Web-based instruction* (pp. 101-106). New Jersey: Educational Technology Publications, Inc.
- Shulman, L. S. (1997). Disciplines of inquiry in education: A new overview. In R. M. Jaeger (Ed.), *Contemporary methods for research in education* (2nd ed.) (pp. 3-69). Washington, DC: American Educational Research Association.
- Smith, B. (2000, May 17). Market sinks postgrads. *The Australian*, p. 45.
- Smith, L. M. (1978). An evolving logic of participant observation, educational ethnography, and other case studies. *Review of Research in Education*, 6, 316-377.
- Smith, P. L., & Ragan, T. J. (1993). *Instructional design*. New York: Macmillan Publishing Company.
- Stake, R. E. (1994). Case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 236-247). Newbury Park, CA: Sage.
- Stake, R. E. (1995). *The art of case study research*. Thousand Oaks: Sage.
- Stake, R. E. (1997). Case study methods in educational research: Seeking sweet water. In R. M. Jaeger (Ed.), *Contemporary methods for research in education* (2nd ed.) (pp. 399-446). Washington, DC: American Educational Research Association.
- Starr, R. M. (1997). Delivering instruction on the World Wide Web: Overview and basic design principles. *Educational Technology*, 37(3), 7-15.

- Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
- Tang, K. C. C. (1993). Spontaneous collaborative learning: A new dimension in student learning experience? *Higher Education Research and Development*, 12(2), 115-130.
- Taylor, P. G., Lopez, L., & Quadrelli, C. (1996). *Flexibility, technology and academic' practices: Tantalising tales and muddy maps*. Canberra: Australian Government Publishing Service.
- Teaching at an Internet distance: the pedagogy of online teaching and learning—The report of a 1998-1999 University of Illinois faculty seminar. (1999). [Online]. Available URL: http://www.vpaa.uillinois.edu/tid/report/tid_report.html [Accessed January 2000]
- Telford, A. (1995). Mixed-mode delivery: the best of both worlds? In D. Thomas (Ed.), *Flexible learning strategies in higher and further education*. London: Cassell.
- The Third International World-Wide Web Conference. (1995). [Online]. Available URL: http://www.igd.fhg.de/archive/1995_www95/ [Accessed November 1995]
- Thompson, A. D., Simonson, M. R., & Hargrave, C. P. (1996). *Educational Technology: A review of the research* (2nd ed.). Washington DC: AECT.
- Thornburg, D. D. (1995). Welcome to the communication age. *Internet Research: Electronic Networking Applications and Policy*, 5(1), 64-70. Available URL: <http://www.emerald-library.com/brev/17205af1.htm> [Accessed April 2000]
- Turoff, M. (1997, April). *Alternative futures for distance learning: The force and the darkside* [Online]. Available URL: <http://eies.njit.edu/~turoff/Papers/darkaln.html> [Accessed: March 1998].
- University of Wollongong—Centre for Educational Development and Interactive Resources Mission. (2000). [Online]. Available URL: <http://cedir.uow.edu.au/CEDIR/help/plan.html>
- University of Wollongong—Learning and Teaching Strategic Plan. (1999). [Online]. Available URL: http://www.uow.edu.au/about/teaching/LTStrategic_plan.html [Accessed July 1999]
- von Glasersfeld, E. (1995). *Radical constructivism: A way of knowing and learning*. London: Falmer Press.
- Waggoner, M. (1992). A case study approach to evaluation of computer conferencing. In A. Kaye (Ed.), *Collaborative learning through computer conferencing: The Najaden papers* (pp. 137-146). Berlin: Springer-Verlag.

- Welsh, T. M. (1997). An event-oriented design model for Web-based instruction. In B. H. Khan (Ed.), *Web-based instruction* (pp. 159-166). New Jersey: Educational Technology Publications, Inc.
- Windschitl, M. (1998). The WWW and classroom research: What path should we take? *Educational Researcher*, 27(1), 28-33.
- Wolcott, L. L. (1995). The distance teacher as reflective practitioner. *Educational Technology*, 35(1), 39-43.
- World Wide Web Consortium. (2000). [Online]. Available URL: <http://www.w3.org/People/Berners-Lee> [Accessed May 2000]
- Wulf, V. & Schinzel, B. (1998). Lecture and tutorial via the Internet - Experiences from a pilot project connecting five universities. In T. Ottmann, & I. Tomek (Eds.), *Proceedings of ED-MEDIA 98, 10th World Conference on Educational Multimedia, Hypermedia & Telecommunications and World Conference on Educational Telecommunications* (pp. 1516-1521). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Yin, R. K. (1993). *Applications of case study research*. Newbury Park, CA: Sage.
- Zhu, E. (1996). Meaning negotiation, knowledge construction, and mentoring in a distance learning course. In M. R. Simonson, M. Hays, & S. Hall (Eds.), *18th Annual proceedings of selected research and development presentations at the 1996 Convention of the Association for Educational Communications and Technology* (pp. 821-844). Indianapolis, IN: AECT Publications.



APPENDIX A

CASE ONE: INITIAL PILOT REPORT

(PRODUCED BY EDUCATIONAL CONSULTANT)

IMPLEMENTATION AND EVALUATION OF TECHNOLOGY- BASED
LEARNING - EDGA 957, ASSOCIATE PROFESSOR [INSTRUCTOR NAME]

The links between educational theory, teaching and learning practices and information technologies are investigated in this subject.

Many students enrolled in this subject reside or work in Sydney. Time and work limitations created difficulties for some students to travel to Wollongong in order to meet subject times. Other students live and work in Wollongong or south of Wollongong and have the same limitations.

The subject, by its very nature, requires students to implement and evaluate technology-based learning. Delivery of the subject using the technologies provides opportunities for these students to experience first hand how both synchronous and asynchronous technologies can be used in education.

Duplication of postgraduate classes with small numbers can be avoided by presenting the subject in this way.

Videoconferencing will be used for one hour per week to provide opportunity for interaction between the lecturer and students at both centres.

Information will be provided via web pages for the students to access asynchronously. This will include such things as course information, student profiles and tutorial introduction to each week. Students will also present seminar work on the web for discussion during videoconference sessions.

For collaborative group work between the two centres, email, desktop video conferencing, Internet Relay Chat, audiographics (*Electronic Classroom*) will be trialed. Students will also use email and web chat to discuss issues throughout the course.

Most of the mentioned technologies are currently available. There are some difficulties to be overcome concerning e-mail and access via UNIX with which the majority of students are unfamiliar. Internet Relay Chat and desktop videoconferencing also present problems for the network.

The lecturer will attend the different sites on alternate weeks. One hour of each week will involve videoconferencing. The other two hours will be used for discussions, seminars and collaborative project work. The students will be formed into collaborative groups, made up of one person from the Sydney centre and two from the Wollongong centre.

EMS [Educational Media Services] will support the project through the provision of an educational consultant, a programmer and graphic artist, and through technical assistance in using the various technologies.

Evaluation of the project will be determined.



APPENDIX B

CASE ONE: STUDENT CONSENT FORM

University of Wollongong
Human Research Ethics Committee
CONSENT FORM

Research Title

Interactivity and Network Learning:
Instructional strategies used in educational World Wide Web sites.

Researcher's Name

This research project is being conducted as part of a Ph.D supervised by Associate Professor John Hedberg and Associate Professor Barry Harper in the department of Education at the University of Wollongong.

I will be a participant observer within the EDGA 957 (Implementation and Evaluation of Technology-Based Learning) class. I will be observing the interactions that take place within the class when a range of technology-based learning media such as asynchronous and synchronous computer-mediated communications, WWW interactions, Internet Relay Chat, PictureTel videoconferencing and QuickTime conferencing will be used.

The data I collect will be used to assist me in devising a protocol for designing learning environments that use such technologies according to "best practice".

Your participation will greatly help me in conducting my research. Please rest assured that your participation will remain anonymous as I will use code names when writing the findings in my thesis.

I hope you will agree to participate. However, please note you are under no obligation or pressure and you are free to withdraw from the research at anytime.

If you have any inquiries regarding the conduct of the research please contact the Secretary of the University of Wollongong Human Research Ethics Committee on .

If you wish to take part in this research study and consent for the data to be used in the manner I have described above, please sign below.

Yours sincerely

Shirley Agostinho

...../...../.....



APPENDIX C

CASE TWO: STUDENT CONSENT FORM

University of Wollongong
Human Research Ethics Committee
CONSENT FORM

Research Title

Interactivity and Network Learning:
Instructional strategies used in educational World Wide Web sites.

Researcher's Name

Shirley Agostinho

This research project is being conducted as part of a Ph.D supervised by Associate Professor John Hedberg and Associate Professor Barry Harper in the department of Education at the University of Wollongong.

I will be an observer within the EDGA 957 (Implementation and Evaluation of Technology-Based Learning) class. I will be observing the interactions that take place within the class when a range of technology-based learning media such as asynchronous and synchronous computer-mediated communications and WWW interactions will be used.

The data I collect will be used to assist me in exploring the types of interactions possible when using the Internet as a learning tool.

Your participation will greatly help me in conducting my research. Please rest assured that your participation will remain anonymous as I will use code names when writing the findings in my thesis.

I hope you will agree to participate. However, please note you are under no obligation or pressure and you are free to withdraw from the research at anytime.

If you have any inquiries regarding the conduct of the research please contact the Secretary of the University of Wollongong Human Research Ethics Committee on

If you wish to take part in this research study and consent for the data to be used in the manner I have described above, please sign below.

Yours sincerely

Shirley Agostinho

Name, signature and date:

.....

...../...../.....



APPENDIX D

CASE ONE: STUDENT EMAIL QUESTIONNAIRE

Two questionnaires were designed. The first questionnaire was sent to the Sydney students via email in Week 10 of the subject. Permission to send the questionnaire was sought from each student. The second questionnaire was sent to both the Sydney and the Wollongong students via email in Week 11. Every email message was tailored to the individual student.

SAMPLE OF FIRST QUESTIONNAIRE—SENT TO SYDNEY STUDENTS IN WEEK 10

FIRST EMAIL TO REQUEST PERMISSION TO SEND QUESTIONNAIRE

Hi [Student Name]! Hope your day is going OK. If it's alright with you, I'd like to send you an email later in the week asking you a few questions regarding how often you access our class' home page, if you have a computer at home, etc. If you don't want to answer these questions, please just let me know and I won't send you the email. It's just that this info would help me in my research study. Many thanks and I'll see you tomorrow night.

SAMPLE QUESTIONNAIRE

Hi [Student name]. Hope everything is OK with you.

I would like to ask you some questions if you don't mind - those questions I wanted to send to you weeks ago! Please note that these are just informal questions and they are not structured in any particular order as opposed to a formal questionnaire. I just want to know a little more about how you access the Internet, if you have time to access the Internet, etc. I'd really appreciate your input. [Student name], these questions are just for my research - they have nothing to do with your assessment. I look forward to receiving your response. Many thanks

1. Do you have a computer at home and if so what kind/model is it? If you do have a computer, do you use it to access the Internet? If so, what speed is your connection ie: 14.4K or 28.8K?
2. Did you have an email account prior to starting this course? If so, do you use email at work or just for personal use?
3. What Internet service provider do you use?
4. [Student name], I've noticed that you don't access your email very often - why? How often would you say you do access it? Ie: once a week, etc.
5. How often do you access our class' home page? Eg., once a week, never, etc.
6. How often do you access the class' work-spaces in the BSCW site? (I've noticed that you haven't yet registered on our BSCW site - is that correct? If I'm correct - is there a reason?)
7. How are you finding the workload in this course? (Open-ended - I'm interested in any comments you may have.)
8. [Student name], if you had the option to participate in this class from home (via a computer and internet connection) would you prefer that than attending class "physically"?
9. Cast your mind back to week 4 remember the Successmaker exercise? Fill me in - how did you and [Student name] get together to discuss it?
10. Lastly, what age bracket you fall into? (Optional!)

21 - 30, 31 - 35, 36 - 40, 41 - 45, 46 - 50, 51+
Thank you so much for your time.

SAMPLE OF SECOND QUESTIONNAIRE—SENT TO BOTH SYDNEY AND WOLLONGONG STUDENTS IN WEEK 11

SAMPLE QUESTIONNAIRE SENT TO SYDNEY STUDENTS

Hi [Student name]. I hope you don't mind but for my research I would like to know a little more about why you are doing this form of study, etc. I'd really appreciate if you could email back your response. Also, I would like to organise a face-to-face interview with you at the end of session to discuss with you how you think this subject went, etc. but at this stage I 'm not sure how to “physically” get to see you. If you have any suggestions let me know. Many thanks in advance for your assistance.

1. [Student name], are you doing a Masters in Education or the Doctorate of Education (Ed.D)? I understand you are doing it part-time - correct?
2. Why are you doing this form of study? Is it for self-interest, work-related reasons, etc?
3. How many subjects have you done so far? Could you please name them and tell me when you did them please.
4. Are you doing any other subjects this session? If so, which ones? And if so, how are you finding the workload for the other subject(s) in comparison to 957?
5. [Student name], did you know any of the people in our class before starting this subject? If so, who?
6. One last question! - Do you have any comments on how this week's class went, especially since [Instructor name] wasn't there?

Thanks once again for your time.

SAMPLE QUESTIONNAIRE SENT TO WOLLONGONG STUDENTS

Hi [Student name]. How's it all going?

I hope you don't mind but for my research I would like to know a little more about why you are doing this form of study, etc. I'd really appreciate if you could email back your response. Many thanks in advance for your time.

1. [Student name] - you are doing the Doctorate of Education (Ed.D) part-time - correct?
2. Why are you doing this form of study? Is it for self-interest, work related reasons, etc?
3. I believe that this is your first year at it and so far you did 2 subjects in 1st session and now are doing EDGA957 and EDGA954 this session - right? Apart from EDGA950 what was the other subject you did last session?
4. How are you finding the workload for EDGA954 in comparison to 957?
5. [Student name], who are the people in our class that you knew prior to starting this subject?
6. [Student name] - a demographic question please: What age bracket do you fall into: (optional)
a. 30 - 35 b. 36 - 40 c. 40 - 45 d. 46 - 50 e. 50+
7. OK, one last question! - Do you have any comments on how this week's class went, especially since [Instructor name] wasn't there?



APPENDIX E

CASE ONE: END-OF-SUBJECT QUESTIONNAIRE

(Space format of questionnaire has been reduced)

EDGA957: IMPLEMENTATION AND EVALUATION OF TECHNOLOGY BASED LEARNING, SPRING SESSION, 1996

Name (optional): _____

Attended class most frequently (*Please tick*) in Sydney ☐ in Wollongong ☐

-
1. Please make any comments about this course in terms of:
 - a. Its relevance to you
 - b. What you thought was the best topic
 - c. Other topics that you felt might have been included

 2. Do you have any comments about the assessment of this course?
(the amount of work required, type of assessment task, was it clear what was required from you?, etc.)

 3. Please make any comments about the teaching and learning processes used in this course.

 4. Do you think anything additional could have been done to support the teaching and learning processes when the instructor was “physically” not present in your class?

 5. Did the process of commencing the two classes at different times (the Wollongong class starting at 4.30pm and the Sydney class starting at 5.30pm) impact on you and did it have any effect on the learning processes of this course?

 6. Please comment on your experience with the use of the technology in this course in terms of:
 - a. Installing the appropriate networking software on your computer at home
 - b. Using the various technologies in the classroom
 - c. Accessing the chat spaces and discussion forums from home
 - d. Creating a Web page as part of your class presentation
 - e. Using the EDGA957 Web site

7. Comment on your experiences in collaborating with class members via the technology. Did you use personal meetings to supplement or did you only use the technology?

8. Do you have any suggestions about how this course could be improved?

9. Overall, how would you rate this course, in comparison to other courses you have taken within the Graduate School of Education at The University of Wollongong.

Please circle:

worse than others 1 2 3 4 5 6 7 much better than others

Any other comments could be written on the reverse side of this sheet.

Thank you very much for your time and contribution. I look forward to receiving your response.

[Instructor Name]



APPENDIX F

CASE ONE: POST-SUBJECT STUDENT INTERVIEW

INITIAL DESIGN OF INTERVIEW

1. BEGINNING OF INTERVIEW

Thank you very much for agreeing to see me. I would like to tape this conversation if it is OK with you as I don't want to be frantically writing down notes. This tape is only for my research and I will ensure that your input today will remain confidential and no one will listen to the tape apart from me.

2. EXPERIENCE WITH TECHNOLOGY

- What has been your prior experience in using the Internet, creating Web pages, using email, using live chat, etc.
- What experience do you have with using: email, the Internet, computers in general? Do you use a computer at work?
- How did you get organised ie: hardware, software for this course? Ie: anyone help you set up the network software like the ISP?
- What do you think about the Internet in general?

3. THE SUBJECT OVERALL

- What did you think about the whole course, from a content perspective and a structure perspective, that is, the Instructor in Sydney one week and in Wollongong the other week and the use of the technologies?
- What did you think about the instructor being present on alternate weeks?
- What did you think about one class starting at 4.30pm and the other at 5.30pm?
- Do you think the objectives about the assessment were clear?
- [If interviewing a Sydney student] When the instructor was not present did you have enough direction to proceed with work?
- [If interviewing a Sydney student] How did you get on with others in the Sydney group?
- What do you think of the instructor's involvement in the course?
- Do you think you learned much from this course? If Yes: do you think the use of the technology helped you to learn? If No, why not?
- What recommendations to improve this course would you suggest?
- What did you like most about the course?
- What did you like least about this course?
- When students were presenting their seminars, did you make a point of reading/accessing their Web page prior to coming to class. If not, why not?
- Did you read your email before coming to class?
- During the seminars, honestly, did you ever feel that you were lost - didn't know what was going on and what you were supposed to do?
- Do you think this course was approached in a Constructivist way?
- In terms of how we used the technologies, do you have any suggestions for improvement?

4. STUDENT SEMINAR PRESENTATION

- How did you work with your partner on your seminar topic?
- How did you collaborate in developing your Web page and what Web editing software application, eg., PageMill, did you use?

- What did you think about your seminar presentation? Did you anticipate what would happen?
- How did you come up with your instructional strategy to engage the class for the evening?
- Now that you have more experience in using computer mediated communication tools, do you think you could collaborate effectively with a partner online?

5. FINAL QUESTION

- Do you think that the use of this technology can enhance learning?

6. END OF INTERVIEW

Conclude interview by thanking interviewee.



APPENDIX G

CASE TWO: END-OF-SUBJECT WEB-BASED QUESTIONNAIRE

Course Evaluation Questionnaire

Which class did you attend?

Course Content and Assessment

1. Please make any comments about the content of this course in terms of:

- a. Its relevance to you.
- b. Whether it met your expectations.
- c. Other topics or issues you felt might have been included.

2. Please make any comments about the assessment for this course in terms of:

- a. Amount of work required, type of assessment tasks, the order in which the tasks were completed, etc.
- b. Whether you felt the first three assessment tasks assisted you in preparation for the Successmaker project.

Course Structure and Delivery

3. What did you think about the idea of the non-required meeting weeks whereby asynchronous discussion of the course readings was encouraged? Did you find it an effective alternative to enhance your understanding of the content? It is a good concept? Any suggestions to improve its implementation?
4. Please make any comments about the use and availability of the class Web site in terms of:
 - a. Its usefulness for you.
 - b. Its accessibility to you.

- c. How often you accessed the Web site.
 - d. Its structure and layout and if there were other "things" you felt should have been included.
 - e. Bringing the two groups together as one community.
5. Please comment on your experience in using the technology in this course, (i.e., accessing this Web site outside class time, using the chat and discussion tools, etc.)
6. Did you use the internet technology to collaborate with your team members for the Successmaker Project? If not, how did you collaborate? If so, what tools did you use and were they effective?

General Comments

7. What did you like most about this course?
8. What did you like least about this course?
9. Do you have any suggestions about how this course could be improved?
10. Overall, how would you rank this course in comparison to other courses you have taken within the Graduate School of Education at The University of Wollongong.
Please click in the appropriate box:

Worse than others 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ Much better

If you wish to make any other comments, please add them here.

Submit **Reset**

Thank you very much for your time and contribution.

[Instructor name]

Created: 30 October 1997

Direct comments and questions to:

[Associate Professor \[Instructor name\]](#)

[Copyright and Disclaimer](#)



APPENDIX H

CASE TWO: END-OF-SUBJECT QUESTIONNAIRE

(Space format of questionnaire has been reduced)

LETTER THAT ACCOMPANIED QUESTIONNAIRE

Wednesday, 10 December 1997

Dear [Student name]

[The following paragraph was included if student responded to email requesting if they would participate in filling in a questionnaire]

Thank you for agreeing to fill in the attached questionnaire regarding the course *EDGA957 - Implementation and Evaluation of Technology-Based Learning* you completed this session. Your feedback will greatly help my research that examines how the Internet (namely the World Wide Web) can be implemented in postgraduate education.

[The following paragraph was included if student did not respond to email requesting if they would participate in filling in a questionnaire]

I sent you an email on Monday, 1 December asking if you would be willing to fill in a questionnaire for me regarding the course *EDGA957 - Implementation and Evaluation of Technology-Based Learning* you completed this session. I didn't receive a response so I thought to send you this letter to ask you if you could please fill in the attached questionnaire. Your feedback will greatly help my research that examines how the Internet (namely the World Wide Web) can be implemented in postgraduate education.

I thought a written questionnaire would be a suitable approach as it gives you an opportunity to express your views freely allowing you to maintain anonymity if you so wish. I estimate that it may require approximately 20 minutes of your time to complete.

For your convenience I have enclosed a self-addressed stamped envelope.

I would like to thank you in advance for taking the time to read this and complete my questionnaire. If I can be of any assistance to you in the course of your studies or if you are interested in reading any part of my thesis (whenever I get it finished!!!) please do not hesitate to contact me.

I wish you and your family a very happy festive season and I look forward to receiving your response.

Regards

Shirley Agostinho

QUESTIONNAIRE

EDGA957: Implementation and Evaluation of Technology-Based Learning, Spring Session 1997

1. From where did you mostly access the EDGA957 Web site?
Please tick
☐ Home ☐ Work ☐ University Multimedia Lab ☐ Sydney Centre Lab
☐ Other (please specify) _____

2. Did you access the EDGA957 Web site from home?
☐ Yes
Please state:
i. Your computer model/brand and modem connection speed.
ii. Your Internet Service Provider (ISP) and why you chose that particular ISP.
iii. If you had Internet access from home prior to commencing this course.
☐ No. Please state why.
(Eg., I do not have a computer at home. I do not have a modem. Etc.)

3. Did you experience any difficulties accessing the class Web site?
☐ Yes Please comment.
☐ No

4. Describe your level of experience with using the Internet prior to commencing this course, in terms of the following:
a. Searching the Web for particular topics of interest.
b. Creating Web pages and what tools you are familiar with.
c. Using Email.
d. Using synchronous discussion tools.
(Eg., Internet chat facilities, Live Chat facilities such as the one used in this course, etc.)
e. Using asynchronous discussion tools.
(Eg., Listserver facilities, Discussion Forum facilities such as those used in this course, etc.)

5. Did the course cover content areas you were expecting?
(Eg., Would you have liked to spend more time on a particular content area? Do you think there could have been other topics included? Did you understand the readings? Etc.)

6. What did you think about the instructor's involvement in this course?

7. What did you think about the discussions that took place in class during the required meeting times?

8. What did you think about the concept of the non-required meeting weeks?

9. During the non-required meeting weeks, it was intended we could argue/discuss the allocated readings using the asynchronous and synchronous discussion

tools provided in the class Web site. Unfortunately, not much online discussion occurred.

- a. Why do you think that happened?
 - b. What do you think of this strategy to discuss your ideas and understanding of the course literature?
-

10. We attempted to bring both classes together (Wollongong and Sydney) to form one community by using the class Web site. For example, conducting online discussions, posting a collaborative group summary of an evaluation model, posting class discussion summaries, providing weekly notices, allowing you to have your say, etc.

- a. Do you think we were successful in forming one community? If so, why was it successful? If not, what strategies you would suggest to enhance the bonding of this one community?
 - b. Do you think such collaboration between the two classes was necessary in the first place?
-

11. Please comment on your experience with using the class Web site in terms of the following:

- a. How did you navigate through the Web site? (I.e., What did you usually look at first? Etc.)
- b. How often did you access the Web site?
☐ Daily ☐ More than once per week ☐ Weekly ☐ Monthly
☐ Never ☐ Can't remember ☐ Other (please specify) _____
- c. Did you experience any difficulties in using the Web site?
☐ Yes How did you solve these difficulties?

☐ No

- d. The class Web site was modified in the early weeks of session. The main menu was restructured to include a *Notices* and *Tool Tips and Your Say* section. What did you think of the changes made?
- e. Did you find the following aspects of the class Web site beneficial? Please support your answer with a comment.
- i. Notices ☐ Yes ☐ No Comment:
 - ii. Discussion Summaries ☐ Yes ☐ No Comment:
 - iii. Tool Tips and Your Say ☐ Yes ☐ No Comment:
 - iv. References ☐ Yes ☐ No Comment:
 - v. Resources ☐ Yes ☐ No Comment:
- f. Do you have any suggestions about how this Web site could be improved for this course?
-

12. Do you think the sequence in which the assessment work was required was appropriate?

☐ Yes. Please state why. ☐ No. Please state why.

13. Do you think collaborative activities such as the online discussions should be included as assessable tasks?

☐ Yes. Please state why. ☐ No. Please state why.

14. The first class exercise involved collaborating with your allocated group to generate a Summary of an evaluation theory which was posted on the Web site.
- a. What were the benefits of the exercise in terms of collaboration?
 - b. What were the disadvantages of the exercise in terms of collaboration?
 - c. Do you feel that the collaborative exercise was a success? If so, why? If not, why?
 - d. Do you feel that being acquainted with your team members prior to commencing collaborative activities helps in facilitating the team process? If so, how would you suggest acquaintances be made? If not, why?
 - e. Did the Web technology provided in the course adequately support the collaborative task?
 - f. Did you find this exercise a useful strategy to assist you in writing your essay about Evaluation Theories?
(Eg., Did you use the information provided in the other summaries?)
-

15. Describe your experience in developing a Web Study Guide in terms of the following:

- a. What did you think was the purpose in developing a Web Study Guide? (Eg., To learn about your topic? To learn about the features that make a Web Study guide an effective learning tool? Etc.)
 - b. What tool did you use to develop your Web Study Guide and why?
 - c. By constructing a Web Study Guide, do you feel that you learned about your topic? If so, why? If not, why not?
-

16. Describe your experience in evaluating each other's Web Study Guide in terms of the following:

- a. What did you think was the purpose of evaluating each other's Web Study Guide? (Eg., To learn about the content? To evaluate how effective each Web Study Guide was as a learning tool? Etc.)

- b. What did you think about the assessment criteria used to evaluate each other's Web Study Guide?
- c. If you were to use the Web Study Guides to learn about the various topics, do you think this is an effective learning strategy in comparison to each student presenting a topic in a class presentation/seminar?
- ☐ Yes. Please state why. ☐ No. Please state why.
-

17. Describe your experience in collaborating with group members to produce the Successmaker Evaluation Proposal and Presentation in terms of the following.
- a. How did you collaborate?
(Did you meet online or face-to-face? How did you split up the task among group members? Etc.)
- b. Was it a successful collaborative experience?
(Do you feel all group members contributed equally? Did you learn by working with others? Etc.)
- c. Do you think this project was a beneficial experience to learn about the implementation and evaluation of a technology-based learning product?
- ☐ Yes. Please state why. ☐ No. Please state why.
-

18. During this course you experienced a form of technology-based learning. Do you think this gave you a greater appreciation of the issues regarding implementation and evaluation of technology-based learning?
- ☐ Yes. Please state why. ☐ No. Please state why.
-

19. Upon completing this course, do you feel confident and competent to implement projects and evaluate teaching and learning materials produced using a variety of technology-based learning environments?
- ☐ Yes. Please state why. ☐ No. Please state why.
-

20. Do you have any suggestions about how this course could be improved?

21. Yes, you're almost finished!!! The following questions will provide me with general information about you as a student.
- a. What stage have you reached towards completion of your studies?
- b. Why are you doing this form of study?
(Eg., Self-interest, work related reasons, etc.)
- c. Are you employed in full-time work?
- ☐ Yes ☐ No
- d. Tick the age bracket into which you fall.
- ☐ 25 and Under ☐ 26 to 30 ☐ 31 to 35 ☐ 36 to 40 ☐ 41 to 45
- ☐ 46+
-

If you have any other comments, please write them on the back of this questionnaire.

Thank you very much for completing this questionnaire. I look forward to receiving your response! I wish you and your family a wonderful Christmas and a very happy New Year.

Sincere regards

Shirley Agostinho
December 1997

■
APPENDIX I

INSTRUCTOR INTERVIEW NO. 1

Tuesday, 20 January 1998 3pm to 4pm

INTRODUCTION

I am interviewing you because I am interested in your opinions on how the course was run last year and it is interesting because you wore three “hats”: 1. You were the instructor, but also. 2. An expert in educational technology, and 3. A co-researcher in Web-based delivery and instruction.

These questions are to gain insight from you and they are not meant to judge or evaluate you as an instructor in any way. Many of these questions I have asked students in a questionnaire so I can compare the answers.

QUESTIONS ASKED

The following questions were asked in an informal fashion during the interview, that is, they were not read as verbatim.

1. What is your theoretical orientation in terms of teaching and learning?
2. Apart from EDGA957 in 1996 and 1997 have you had prior experience in teaching a class using technologies such as the Web, or email or video conferencing?
3. Why did you want to implement Web-based technology in such a course? What was your motive? (Some pointers: Was it a convenience factor to bring 2 classes together, or an experimental factor to see what instructional strategies we could work with or was it to situate learners because it was a technology based learning course?)
4. You made some assumptions implementing this technology. Could you state them. (Some pointers: You assumed students had access to the Internet and had some in using a Web browser and creating a simple Web page.)
5. Can you please explain your ideas of the framework for this subject, in terms of assessable work, and how the assessable work was sequenced.
6. What did you think about the discussions that took place in class during the required meeting weeks if both the Wollongong and the Sydney class?
7. What were you anticipating would happen during the non-required meeting weeks? (Ie: on the Monday night and during the fortnight.) What were your ideas?
8. What did you think your role was during those non-required meeting weeks?
9. You are widely read on the literature about asynchronous communication as a medium for discussion. Having been exposed to your experience last session, what are your thoughts of the strategy used to discuss ideas, for students to try and enhance their understanding of the literature?
10. We tried to bring the 2 groups (Sydney and Wollongong) together to form a community. Do you think we were successful?
- 11a. From where did you mostly access the subject Web site? That is, from your office or from home?
- 11b. Did you experience any difficulties in accessing the subject Web site?
- 11c. How often did you access the Web site during each week of the subject?
- 11d. When accessing the subject Web site, what was the purpose? (Ie., adding resources, checking resources, etc.)
- 11e. Did you experience any difficulties in using the site?
12. As an instructor, how did you feel about a PhD student changing the subject Web site of her own accord, such as adding things to the “Notices section: etc. For example, did you find my changes useful or were you annoyed?



APPENDIX J

INSTRUCTOR INTERVIEW NO. 2

**Interview with Instructor of EDGA957
Implementation and Evaluation of Technology-Based Learning
Tuesday, 16 March 1999 11am**

INTRODUCTION

I felt this interview was necessary for the following reasons:

- I would like to discuss your perspective of EDGA957 as the instructor. In doing so, I want to focus on contextual issues.
- I would like to confirm previous comments made by you.
- I would like to ask you questions that I haven't previously raised with you.

Draw a diagram that "contextualises" the interview

1. EDGA957 (PRE-TECHNOLOGY AND ORIGINS OF SUBJECT)

- From the subject outlines you have sent to me via email I understand that EDGA957 was first offered in 1995. Correct?
- Who decided that this particular content area or subject was required as part of the Graduate School of Education package of courses?
- Why was this subject devised?
What were the influences in the external environment that led you to think there was a need for this subject?
Were the influences related to the current situation of the instructional technology field? If so, what was happening in the field of Instructional Technology at that time that prompted you to devise this subject? What themes were emerging? (Probe by suggesting some key words such as: "change", "literature", "technology", "practice".)
Were the influences related to other educational institutions designing postgraduate programs that you need to compete with? If so, why is there an increase in these types of educational programs?
- Why was this subject offered both in Sydney and Wollongong? From where did the idea of offering subjects at a Sydney location originate?

2. EDGA957 - 1995

(Use 1995 Subject Outline as a reference)

- What were your ideas for this subject? That is, what did you hope students would be able to do upon the completion of this subject?

Let's look at the model you implemented in 1995. I would like to ask you these questions so that I can better understand the teaching/learning strategies you adopted prior to the introduction of technology in this subject.

- How did you decide on what content material to include in this subject? Is "content" a changing factor in this subject?
- How did this subject run? I.e: there were 2 classes and they met each week independently on separate evenings for 14 weeks? You attended all the class sessions?
- How did you devise the assessment tasks?
- From where did the student seminar task originate?

- What was your idea behind the student development of a portfolio of resources?
- Could you explain your idea for the evaluation project?
- How did you think these assessment tasks would relate to the aims of the subject? I.e, what is the relationship between the tasks you have set and the aims of the subject? For example, what were you hoping students would learn or achieve via the seminar presentation, portfolio of resources and evaluation project?
- Why did you decide to deliver the content by instructor-led workshops for the first 5 weeks and then student-delivered seminars for the remaining weeks? From where did this idea originate?
- From these questions, I'm trying to form a picture of how you see "effective learning" takes place. What's your view about how effective learning can take place for students in a postgraduate environment? In my interview with you on 20 January 1998 I asked you if you could state your theoretical orientation in relation to education in terms of teaching and learning. You responded as follows: (read out the transcript from Interview on 20 January 1998). Could you articulate these ideas using EDGA957 as a specific example please? That is, how did you apply your theoretical construct of "learning" in this subject? What were your teaching strategies?

3. EDGA957 - 1996

(Use 1996 Subject Outline as a reference)

Introduction of technology

The nature of the course delivery changed in 1996 and that's when I became involved. The delivery strategy was noted in the 1996 subject outline by the addition of the paragraph titled "Instructional Strategy".

- What were the external factors leading to this delivery change? In other words, why was the technology introduced? What were your motives to introduce the technology? (Probe - Was it to allow students to learn about technology through the use of it or primarily driven to test different ways of using it?)

In answering this question may I reflect on how you have answered this question in the past.

When I was preparing for my PhD proposal presentation you first mentioned my involvement in EDGA957 in a meeting held with you, myself and Barry on 7 June 1996. When I asked you why you were experimenting with the technology you outlined the following 2 reasons:

- You couldn't be in the one place at the one time.
- The central educational development unit wanted a pilot study to be carried out.

- Why did you allocate the same day for the Sydney and Wollongong EDGA957 class?
- Why did the educational development unit want a pilot study in the first place? What was pushing them to look at this technology?
- Why did they ask you to be involved? And why did you agree to be involved? (Was one reason because you wanted to learn from it as you stated in my interview on 20 January 1998 (read it out) that you had no prior teaching experience with videoconferencing and the web. Correct?)
- Your reasons for introducing the technology when asked on 20 January 1998 were broader in context and you raised the following themes: 1. "Survival" 2. "different to previous instructional media" 3. "allows change in time and

space” 4. “economic issues”, 5. “policy changes”. (Read out transcript).
Do you still agree that these themes were influential?

If so:

- Why is there an interest to deliver courses outside campus? Where is this interest coming from or being pushed from?
- Why are you interested in “expanding and breaking the nexus of time and space”? (Probe - to find out whether these flexible mode ideas are pedagogically driven or economically and politically (survival) driven.)
- Are there any other influences?

Course specifics - Background

The content covered appears to be the same as that in the 1995 course offering. The assessment tasks were the same except for the last assignment students could actually use the subject as an example of a technology-based learning implementation. The structure of the content delivery was also the same. The thing that was different in 1996 was that both the Sydney and Wollongong class were held on the same evening.

- What were you hoping the technology could allow you to do? What model were you hoping to achieve? (Probe for point-to-point: class-to-class/predominantly synchronous or Point-to-multipoint: class-to-class + individual-to-class + individual-to-individual: synchronous and asynchronous.)
- How did you mark the assessable work: (there was no criteria discussed or made explicit to the students).
 - i. How did you mark the student seminars? Was it solely based on the written paper the student submitted?
 - ii. How did you mark the portfolio or resources?
 - iii. How did you mark the final evaluation assignment?
- (Show student marks) How do you feel students went in 1996? Do you think the learning outcomes were achieved?
- Did the technology help or hinder the learning process? (Probe for an explanation)
- How did it help or hinder you as an instructor?

4. EDGA957 - 1997

(Use 1997 Subject Outline as a reference)

Background

In a meeting on 22 April 1997 I mentioned my research study and you stated that there has been a “quantum leap in the tools” available (read out transcript). In that meeting you stated that you were not going to hold the EDGA957 classes on the same evening and that you wanted to put the small online collaborative task (Successmaker) as the main assessable project.

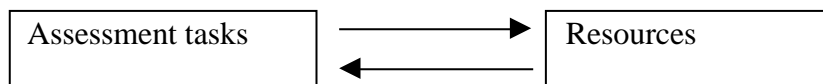
We then met on 14 July 1997 to discuss how we were going to restructure EDGA957. I had some ideas (which I had thought about when going to AUSWEB'97) which were:

- Assessment should include some group work if you want to encourage collaboration.
- Rather than students addressing separate topics, interaction with content should be more integrative - like the way they will experience it in the real world, therefore have a group project in which they have to think of a range of issues.

- We should encourage asynchronous discussions even from home so they don't have to necessarily attend a physical class.

However, you already had some similar ideas. In that meeting, the assessment tasks and structure changed dramatically. The main idea you had was to integrate the assessment pieces into the course - make them stepping stones - or use a problem based approach to drive the content.

- How did you come up with this idea? Why did you decide to make Successmaker the final group project?
- Where did you get idea of a Web Study Guide from?
- From where did the idea of reviewing Web Study Guides originate?
- Where did you get the idea for the theoretical evaluation paper? And small online collaborative task from?
- Where did you get the idea of non-required meeting weeks from? Did that influence you to structure the classes on separate evenings so that you could then meet with each class each fortnight?
- And namely where did you get the following idea from?



- In terms of assessment I helped with the Successmaker projects and I also evaluated the WSG for my personal experience.
- (Show the marks.) In our meeting (also with Barry) on 30 March 1998 you said that you felt that the learning outcomes were better achieved in Case 2 than in Case 1. Why do you think this? What did you think about the quality of the work in 1997?
- Did the technology support the achievement of the learning outcomes? If so, how?
- Did the technology hinder the achievement of the learning outcomes? If so, how?
- Can you explain the difference in marks over the 2 implementations?

5. EDGA957 - REFLECTION

(Refer back to contextual diagram)

- What impact has the introduction of technology had for you as an instructor? What has changed for you? How has/is your role changing? What has made you change? What has been the push for change?
- At the beginning of this interview I asked you: What did you hope students would be able to do upon the completion of this subject? and you replied: (state in my own words what he said)
With the introduction of technology can students do this as well? Has it opened up possibilities that couldn't be done before?
- To whom do you think the introduction of technology has had the most influence? The teacher/instructor or the student?
- The last question can be used as a final discussion piece to end the interview and try and develop some graphical model for the EDMEDIA'99 paper.
How has the technology influenced:
 - The design of the subject?
 - How the student and teacher interact?
 - How students interact with content?
 - Nature of the tasks they perform?

■

APPENDIX K

CASE ONE: MEMBER CHECK

COVER LETTER AND CONSENT FORM

Monday 13 December 1999

Dear [Student Name]

Thank you for agreeing to review my case study about the graduate subject, EDGA957, that you were involved with in 1996. This case study is one of two cases from my doctoral thesis. The case examined how network technologies were used in a university graduate subject and the focus dealt with the interactions that occurred amongst the students and between the students and instructor during the subject.

I would very much appreciate if you could review this case study report in terms of the following questions.

- Does it represent an accurate reconstruction of what occurred in EDGA957 in 1996? (I appreciate that considerable time has lapsed.)
- Is there important information that has been omitted that you feel should be included?
- Do you support the researcher's interpretation of this case? That is, the themes that are presented and the discussion of those themes.

In order for you to conduct this member checking review, please find attached the following:

1. A copy of the completed case study. (By "completed" I mean that all the necessary data, description and interpretation is provided. The chapter requires a proofread and the appendixes have not been included.)
Please make any comments anywhere on this hard copy.
2. A list of the students that participated in the subject with their pseudo names used in the case report.
3. A consent form that I would like you to sign. It requests that you maintain the confidentiality of the students' identities. Also attached to this form is a request if I can use your feedback as verbatim.

I will negotiate a time with you to collect and discuss your review. Thank you very much for your time and effort in assisting me. Kinds regards, Shirley Agostinho

MEMBER CHECKING CONSENT FORM

Doctoral Thesis Title: The evolution of a Web-based Graduate subject: The pedagogical change from fixed to flexible delivery
Researcher: Shirley Agostinho

Review of Case One

I, [Student name], agree to review the case study report about the graduate subject, EDGA957, that I was involved with as an educational consultant and as an enrolled student in 1996. My review will consider the following three questions.

1. Does the case study report represent an accurate reconstruction of what occurred in EDGA957 in 1996?
2. Do you feel that there is important information that has been omitted that should be included?
3. Do you support the researcher's interpretation of this case?

I will provide feedback on the hard copy of the case study provided to me by the researcher. I will also maintain confidentiality of the students' identities.

Signed: _____ Date: _____

I agree to allow my feedback to be quoted word for word if deemed necessary by the researcher.

Signed: _____ Date: _____

■

APPENDIX L

CASE TWO: MEMBER CHECK

COVER LETTER AND CONSENT FORM

Monday 3 April 2000

Dear [Student name]

Thank you for agreeing to review my case study about the graduate subject, EDGA957, that you were involved with in 1997. This case study is the second of two cases from my doctoral thesis. My study examined the interactions that were established amongst students and the instructor when network technologies were used in a postgraduate subject.

I would very much appreciate if you could review this case study report in terms of the following questions.

- Does it represent an accurate reconstruction of what occurred in EDGA957 in 1997? (I appreciate that considerable time has lapsed.)
- Is there important information that has been omitted that you feel should be included?
- Do you support the researcher's interpretation of this case? That is, the themes that are presented and the discussion of those themes.

In order for you to conduct this member checking review, please find attached the following:

1. A copy of the case study. (All the data, description and interpretation is provided, however, this case study report requires a proofread, the discussion sections still need work, and the appendixes have not been included.)
Please write any comments anywhere on this hard copy.
2. A list of the students that participated in the subject with their pseudo names used in the case report.
3. A consent form that I would like you to sign. It requests that you maintain the confidentiality of the students' identities. Also attached to this form is a request if I can use your feedback as verbatim.

Thank you so much for your time and effort in assisting me. I look forward to reading your comments. Kinds regards, Shirley Agostinho

PS - Could you please email me at shirley_agostinho@uow.edu.au to let me know that you have received this.

MEMBER CHECKING CONSENT FORM

Purpose of study: The purpose of this study is to examine the teaching and learning process when network based technologies were introduced in a postgraduate subject in order to inform the evolution of pedagogical strategies. The study focused on the interactions established among students and between students and the instructor when using these technologies.

Researcher: Shirley Agostinho

Review of Case Two

I, [Student name], agree to review the case study report about the graduate subject, EDGA957, I completed in 1997. My review will consider the following three questions.

1. Does the case study report represent an accurate reconstruction of what occurred in EDGA957 in 1997?
2. Do you feel that there is important information that has been omitted that should be included?
3. Do you support the researcher's interpretation of this case?

I will provide feedback on the hard copy of the case study provided to me by the researcher. I will also maintain confidentiality of the students' identities.

Signed: _____ Date: _____

I agree to allow my feedback to be quoted word for word if deemed necessary by the researcher.

Signed: _____ Date: _____



APPENDIX M

SUBJECT OUTLINE: EDGA957 1995

EDGA 957 IMPLEMENTATION AND EVALUATION OF TECHNOLOGY–BASED LEARNING 1995

SUBJECT OUTLINE

This subject is designed to investigate the links between educational theory, teaching and Learning practices with information technologies. It will seek to define the basic issues facing the practitioner when they are trying to manage technology-based learning projects. It seeks to answer such questions as: Is the project effective? Is there a problem with the design or the way it is implemented?

AIMS

The subject *Implementation and Evaluation of Technology–Based Learning* is designed to:

- prepare you to implement projects and evaluate teaching and learning materials produced using a variety of technology-based learning environments.
- review the impact of change theory on implementation of technology–based learning systems.
- review current literature on the evaluation of technology-based learning.

INSTRUCTOR

[Instructor name and contact details]

TIME

Spring Session, Mondays, 4.30-7.30 (Wollongong, IMLL),
Tuesdays, 5.30-8.00 (Sydney Centre)

ASSESSMENT

1. A seminar review of an agreed topic to facilitate learning and discussion on the topic. This review is to be delivered to a class session and then the “printed component” submitted on disk which would include words and illustrations. In the form of a publishable paper. (30% 2500 words max) — due October 31st or three weeks after the seminar presentation whichever is the earlier.
2. Develop a portfolio of resources and examples of implementation and evaluation resources. Write a reflective piece on why you included the items you selected (40% of final grade). (Due: October 31st)
3. Choose an educational software package. Evaluate the package using three different evaluation approaches, write each up separately and then discuss the application, merits & disadvantages of each approach.

or

Review the implementation of a technology-based learning project. Noting the planned and unplanned critical incidents and note the importance of each in achieving a final outcome.

In either case a one page statement of your ideas and intentions should be submitted in the fourth week of session (30% 2500 words max) (Due: October 31st, 1995)

CONTENT

In a broad introduction many issues need to be addressed. The first five weeks will include an instructor led discussions and workshops.

- | | |
|--|--|
| 17/7 | Week 1. Overview of the course —
What are the key concepts associated with implementation and evaluation and how do they fit within the development of technology-based learning systems. |
| 24/7 | Week 2. Planning a project—key issues for change and innovation. Issues for managing projects. Developing Checklists for Key Points and QA. |
| 31/7 | Week 3 Evaluation theory and approaches. Comparing Reeves with Alexander & Hedberg, what lessons can be learned? |
| 7/8 | Week 4. Why information technologies fail? Review of Article by Gayeski |
| 14/8 | Week 5. Can we learn from Technology-based learning systems? Review of Kulik, & Kulik, and Clark Articles |
| Weeks 6 to 12 — Workshop topics to be chosen by each group and presented in a three-hour workshop. | |
| 21/8 | Week 6 Evaluation Theory and technology based learning. |
| 28/8 | Week 7 User and usability testing — how it should be undertaken? |
| 4/9 | Week 8 Rapid Prototyping. Is it a necessary aspect of project development?
Evaluation of interfaces? Can Donald Norman be right? |
| 11/9 | Week 9 Creating teams, how important are the people to the implementation? |
| 18/9 | Week 10 Implementation from a teacher's perspective, what changes? |
| No classes on Weeks beginning 25/9, 2/10, 9/10 | |
| 16/10 | Week 11 From first pressing to market, what should novice developers be aware of in the emerging software distribution systems? |
| 23/10 | Week 12 Intellectual Property and Interactive Learning—What constitutes fair use? |
| 30/10 | Week 13 The last week will take a different format. General discussion and sharing of portfolios and evaluation projects. |

REFERENCES

[List has been omitted]

Journals of Relevance

[List has been omitted]



APPENDIX N

COMPUTER LABORATORY FACILITIES

WOLLONGONG SITE (ON-CAMPUS SITE)

Students attended class in the Interactive Multimedia Lab. The lab was equipped with approximately 13 Macintosh computers (mostly PowerMacs) and a printer, a scanner and video digitising equipment. Internet access was available from all computers and Netscape Navigator™ was the default browser installed on all machines.



The Interactive Multimedia Laboratory: Left side of the room as one enters the lab.



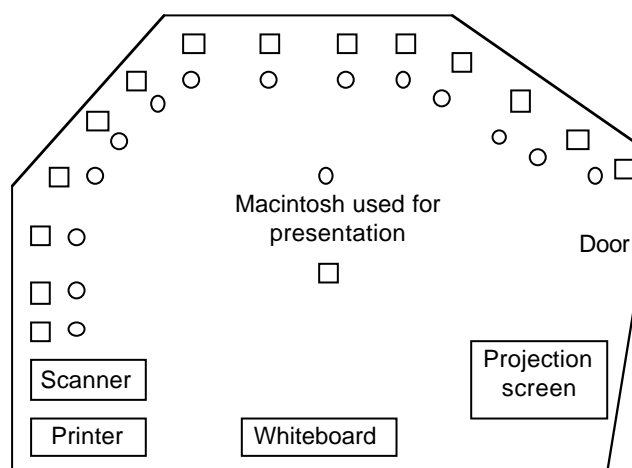
The Interactive Multimedia Laboratory: Right side of the room as one enters the lab.

SYDNEY SITE (OFF-CAMPUS SITE)

The lab facility in the off-campus site was equipped with 15 Macintosh computers (PowerMacs 6100 series). All the computers were connected to the Internet. (There was a 128K bandwidth connection between the off-campus site and the University of Wollongong.)

One Macintosh computer was positioned in the middle of the room and was used for presentations. A scanner and a printer were also available.

A diagram of the room layout is provided below.



- Macintosh computer
- Chair

APPENDIX O

CASE ONE: VIDEOCONFERENCING FACILITIES

Videoconferencing utilises telecommunication technology to enable people who are geographically separated to see and collaborate with each other in full motion video.

VIDEOCONFERENCING FACILITY—ON-CAMPUS SITE

A PictureTel System 4000 videoconferencing system was used in the Wollongong site. The seating arrangements and layout of the videoconferencing room on campus are illustrated in the following photographs.



Zooming and panning facilities (accessible from the videoconferencing control panel) were used to view all students in a videoconferencing session.

The videoconferencing system did not have the capability to automatically move and focus the camera on the person talking—it was not a voice-activated system.

At the beginning of each session in the Wollongong site, three camera view presets were usually set:

1. A camera view of all the participants in the Sydney site.
2. A close-up camera view of three of the six students in the Sydney site.
3. A close-up camera view of the other three students in the Sydney site (and the instructor if present).

The following facilities were provided for each video conferencing session.

1. *Document camera.* Using this piece of equipment, paper-based text or diagrams could be viewed by the participants. It was not a very effective form of information transmission as the text was often not legible.
2. *VHS video recorder.* This was used to record the videoconferencing sessions.
3. *Interface of Macintosh or IBM VGA video input.* Displaying information from a computer onto the videoconferencing monitor proved a very effective form of media. Visual presentations produced using Microsoft PowerPoint were used in most videoconferencing sessions.
4. *Dual monitors.* The availability of two monitors enabled one monitor to be used to display the PowerPoint presentation and the other monitor was used to display the participants from the remote end. The Picture-In-Picture facility displayed the local video image that was sent to the Far End. A small rectangle appeared in the lower right hand corner of the monitor and displayed the participants from the local site. This facility was set up for most of the sessions. Thus, participants from the local site could view the PowerPoint presentation on one monitor, the participants from the remote site on the other monitor and they could also see a small image of themselves.
5. *Air conditioning.* Due to the lighting requirements during the videoconferencing sessions, air-conditioning to cool the room was available. It was, however, automatically switched off at 6pm.

VIDEOCONFERENCING FACILITY—OFF-CAMPUS SITE

The videoconferencing facility available at the Sydney site was a PictureTel System 4000.

Similar facilities as per the Wollongong site were provided. However, the seating arrangement differed from the on-campus site. The tables in the Sydney site were arranged in a “V” shape.

CONNECTION BETWEEN THE TWO SITES

A 128Kbps link via ISDN connected the two videoconferencing sites.



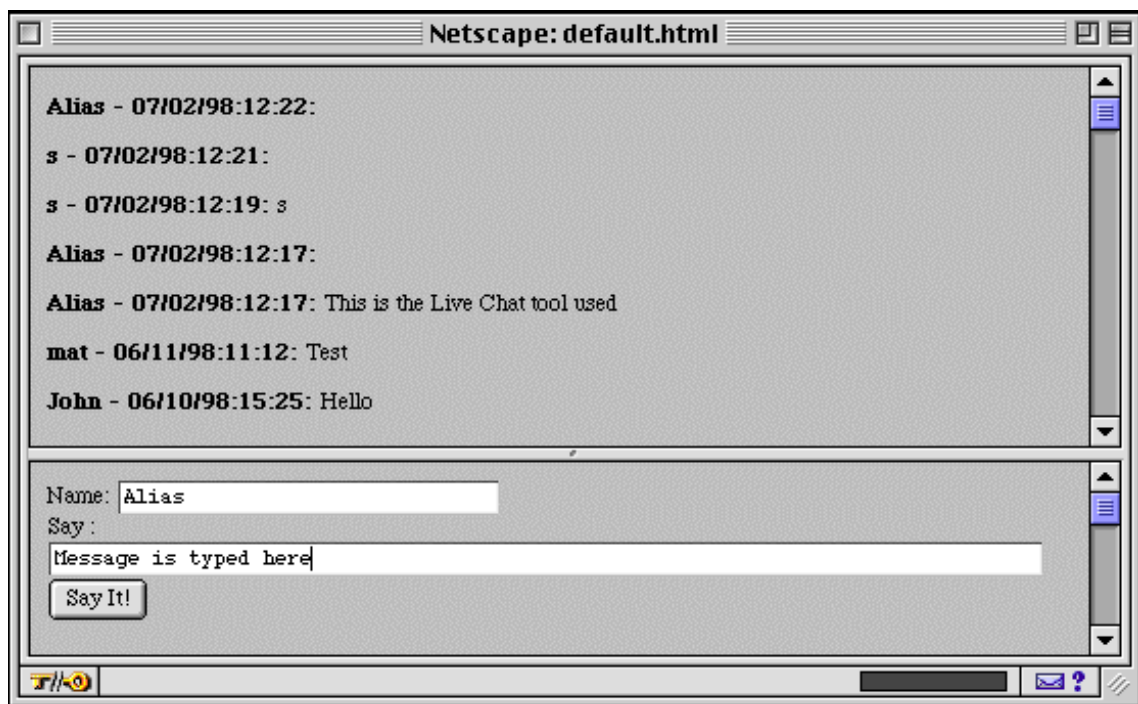
APPENDIX P

COMPUTER-MEDIATED COMMUNICATION TOOLS

LIVE CHAT

Live Chat was a text-based CMC tool designed for synchronous use. It was available as plug-in software to the Web Server software WebStar.

INTERFACE



The screen layout consisted of two frames. The top frame displayed the messages. The most recent message was added to the top of the message stack. The user entered an identifiable name and message in the bottom frame. The message was displayed in the top frame when the user selected the “Say It” button. The maximum length of one message was approximately three lines.

When a user first accessed Live Chat, a message needed to be entered before the top frame displayed the messages. This caused some confusion for students.

FEATURES

Live Chat did not provide an archive capability. When used synchronously, approximately 50 messages were displayed at any one time and the oldest message was deleted. If not used synchronously, the screen was refreshed periodically, thus deleting all previous messages. Live Chat transcripts could be saved manually by selecting the top frame and saving the text as a text file.

Users could browse through the discourse by scrolling down the top frame. However, as each new message was posted, the top frame displayed the new message. This made it difficult for users to review previous messages whilst engaged in a synchronous online discussion.



APPENDIX Q

COMPUTER-MEDIATED COMMUNICATION TOOLS

DISCUSSION FORUM

The Discussion Forum tool enabled users to create discussion threads.

INTERFACE

A sample opening screen that displays all the discussion forums.

The discussion threads created in Case One.

The screen that was displayed when posting a message to a discussion thread.



APPENDIX R

COMPUTER-MEDIATED COMMUNICATION TOOLS

BSCW—BASIC SUPPORT FOR COOPERATIVE WORK

The *Basic Support for Cooperative Work* (BSCW) site [URL: <http://bscw.gmd.de/bscw/bscw.cgi>] enabled students to create “workspaces” where they could share files, messages and exchange URLs. This tool was chosen as it was a collaborative tool used in other flexible delivery programs, for example, Collis (1996a). Students initially accessed this tool directly from the German URL and this resulted in slow response times. The software was then down-loaded onto a server on campus. The students, however, found this tool cumbersome to use.

INTERFACE



APPENDIX S

SUBJECT OUTLINE: CASE ONE—EDGA957 1996

EDGA 957 IMPLEMENTATION AND EVALUATION OF TECHNOLOGY–BASED LEARNING 1996

SUBJECT OUTLINE

This subject is designed to investigate the links between educational theory, teaching and learning practices with information technologies. It will seek to define the basic issues facing the practitioner when they are trying to manage technology-based learning projects. It seeks to answer such questions as: Is the project effective? Is there a problem with the design or the way it is implemented? How might it be changed or modified.

AIMS

The subject *Implementation and Evaluation of Technology–Based Learning* is designed to:

- prepare you to implement projects and evaluate teaching and learning materials produced using a variety of technology-based learning environments.
- review the impact of change theory on implementation of technology–based learning systems.
- review current literature on the evaluation of technology-based learning.

INSTRUCTOR

[Instructor name and contact details]

TIME

Spring Session, Tuesdays, 5.30-8.30 (Sydney Centre and Wollongong alternate weeks)

ASSESSMENT

1. A seminar review of an agreed topic to facilitate learning and discussion on the topic. This review is to be delivered to a class session and then the “printed component” submitted on disk which would include words and illustrations. In the form of a publishable paper. (30% 2500 words max) — due October 29th or three weeks after the seminar presentation whichever is the earlier.

2. Develop a portfolio of resources and examples of implementation and evaluation resources. Write a reflective piece on why you included the items you selected (40% of final grade). (Due: October 29th)
3. Choose an educational software package. Evaluate the package using three different evaluation approaches, write each up separately and then discuss the application, merits & disadvantages of each approach.

or

Review the implementation of this subject as a technology-based learning project. Noting the planned and unplanned critical incidents and note the importance of each in achieving a final outcome.

In either case a one page statement of your ideas and intentions should be submitted in the fourth week of session (30% 2500 words max) (Due: October 31st, 1995)

INSTRUCTIONAL STRATEGY

This subject will take the form of an exploration of a number of methods of technology based learning. As part of the learning process there will be class sessions employing computer mediated communications, World Wide Web interactions and video conferencing undertaken through PictureTel and Quicktime conferencing. The process itself will be examined to determine the effectiveness of different technologies and the learning outcomes they generate. The instructor will alternate between Sydney and Wollongong and each group will be asked to lead discussion and create activities that establish links between the two sites. As the strategy is experimental, it may be necessary to undertake some additional work outside the normal class time.

CONTENT

In a broad introduction many issues need to be addressed. The first five weeks will include an instructor led discussions and workshops.

- | | |
|------|--|
| 16/7 | Week 1. Overview of the course —

What are the key concepts associated with implementation and evaluation and how do they fit within the development of technology-based learning systems. |
| 23/7 | Week 2. Planning a project—key issues for change and innovation. Issues for managing projects. Developing Checklists for Key Points and QA. |
| 30/7 | Week 3 Evaluation theory and approaches. Comparing Reeves with Alexander & Hedberg, what lessons can be learned? |
| 6/8 | Week 4. Why information technologies fail? Review of Article by Gayeski |

- 13/8 Week 5. Can we learn from Technology-based learning systems?
 Review of Kulik, & Kulik, and Clark Articles
- Weeks 6 to 12 — Workshop topics to be chosen by each group and presented in a workshop. The format of which should be discussed with the instructor first.
- 20/8 Week 6 Evaluation Theory and technology based learning.
- 27/8 Week 7 User and usability testing — how it should be undertaken?
- 3/9 Week 8 Rapid Prototyping. Is it a necessary aspect of project development?
- 10/9 Week 9 Evaluation of interfaces? Can Donald Norman be right?
- 17/9 Week 10 Creating teams, how important are the people to the implementation?
- No classes on Weeks beginning 24/9, 1/10
- 8/10 Week 11 Implementation from a teacher's perspective, what changes?
- 15/10 Week 12 From first pressing to market, what should novice developers be aware of in the emerging software distribution systems?
- 22/10 Week 13 Intellectual Property and Interactive Learning—What constitutes fair use?
- 29/10 Week 14 The last week will take a different format. General discussion and sharing of portfolios and evaluation projects.

REFERENCES

[List has been omitted]

Journals of Relevance

[List has been omitted]



APPENDIX T

CASE ONE: DESCRIPTION OF WEEKS 2, 4, 6, 9 AND 11

WEEK 2: THE START OF AN ONLINE ASYNCHRONOUS GROUP TASK

CONTEXT

Margaret's Internet searching and monitoring of listserver groups led her to find the *Basic Support for Cooperative Work Site* (BSCW) which resided on a Web server in Germany. The BSCW URL was accessible from the subject Web site. Before the students could use the BSCW site, they had to enter their email address and a password was issued to their email account. The password allowed entrance into the BSCW site. The instructor devised a task for students that involved the use of the BSCW site so that the students could experience the process of online collaboration. Students were to present an evaluation plan for a Computer Assisted Learning package called *Successmaker*. The instructor wanted two or three students from each site to form groups. Each group was to collaborate asynchronously for two weeks using the BSCW tool and deliver a group presentation in the videoconference in Week 4.

The instructor attended the Wollongong class one hour before the videoconference. The Successmaker project was discussed, four student groups were formed and Margaret explained how the BSCW tool worked. During the one-hour videoconference, the Successmaker project was discussed. The Sydney students were allocated to the four groups and Margaret explained the BSCW tool. After the videoconference the four groups were to begin the online group task. Online help was available from the BSCW site to assist students to become familiar with the tool.

HIGHLIGHTS

The interaction that occurred during the videoconference

Joan controlled the videoconference from the Wollongong site. Margaret showed Joan how to use the keypad a few minutes before the videoconference commenced and sat next to Joan during the videoconference to provide assistance. William, with assistance from Anthony and Simon, managed the Sydney site. A more relaxed atmosphere was apparent in this videoconference. For example, the following vignette illustrates the social interaction that took place in the first few minutes:

Simon asked about the volume and the instructor said that they should be able to set it from their end. Simon, William and Anthony were looking at the videoconferencing keypad. The instructor then commented to the Wollongong group: "Do you get the impression..." then Mary finished the sentence: "Kids playing with a new toy." Then Simon shouted out: "We found the button!" The Wollongong class giggled. The instructor then said: "Children, do you want to just check your lighting levels..."

The camera was focused on the instructor. Anthony said: "Don't move too much" and Simon added: "Stop moving in slow motion James." The instructor responded jokingly by saying: "Next time, maybe we should probably cut out the drinks prior to the 5.30 meeting time!" The class

laughed. Margaret then said: "...we should start." (Videoconference transcript, Week 2)

During the videoconference, several factors affected the flow of the interaction:

- Delays in the transmission of PowerPoint slides
- Participants were not familiar with the use of videoconferencing and novice drivers manipulated the videoconferencing controls from both sites
- Some students had not prepared for the class and were not familiar with the content being discussed
- The Wollongong students were more familiar with the task as it had been discussed prior to the videoconference

The following examples highlight these factors.

Example 1: David tried to comment after Charles.

David leaned forward and wanted to say something but the instructor responded to Charles' comment so David sat back to wait his turn. He tried another three times. On the third try he leaned forward and began to talk. The instructor spoke at the same time and then said: "sorry David." David leaned forward to approach the microphone when he spoke and looked towards the camera when making his comment. (Videoconference transcript, Week 2)

Example 2: A "them and us" kind of interaction occurred rather than students interacting as one class. This can be seen in the way the instructor addresses the questions in the following videoconference transcript excerpt:

The instructor spent 1.15 minutes explaining the PowerPoint slide. Sydney students wrote notes and the Wollongong students were not in view as the camera was focused only on the instructor. When James finished he paused for a few seconds and then said: "That's a question guys." William looked into the camera and replied: "yeah." Both the Wollongong students and the instructor laughed. Then Anthony made a more intelligible reply. The instructor looked into the camera and asked another question. It seemed like it was only directed to the Sydney site. There was a few seconds of silence then the instructor said that the Wollongong students could also respond to the question. (Videoconference transcript, Week 2)

Example 3: The Wollongong students had already discussed the Successmaker task.

38 minutes into the VC and Simon asked: "It may seem a little late in the piece, but this sounds like it might be a real thing. I've been under the impression that this might have been a simulation but now I must say that I'm confused...."

James replied: "I explained before we came online to the group here, it's a simulation but it's based on reality." (Videoconference transcript, Week 2)

The following student reflections summarise the interaction that occurred during the videoconference.

Video conferencing tonight was better. I think we're becoming more used to the experience although there are some in the group who prefer to be out of camera range and who have little to say. Mind you, they are by nature a little shy and reticent to join in discussion, so this may not be the Video Conference. There were hiccups getting the powerpoint slides to go through to Sydney....Our unfamiliarity with the Video Conferencing controls is

going to be a stumbling block. Were this method to be used for distance learning in [Mary's workplace] we would need to spend some time letting people "play" and get used to the technology before we started serious conferencing. (Mary, Reflective Journal, Week 2)

The class was more relaxed this week and members spoke out and contributed more to the discussion. Several problems surfaced and highlighted the unfamiliar discourse structure; for example: turn taking, people trying to talk at once causes a transmission problem, lack of clear neat language features including gestures and other non verbal clues that we take for granted in live face to face discussion. Information was easily lost if you became distracted and notes had to be taken to keep track of what was going on. (Anthony, Reflective Journal, Week 2)

The Sydney group was at the receiving end this week. The group was interacting more between themselves without the instructor as a focal point of discussion. The discussion prior to the Lecture was not focused on the subject topic. In other words there was little pre preparation for the event. Most participants seemed more relaxed than last week. Factors:

- The experience of being in front of a camera was not so novel.
- The instructor was with the remote group. Some students anxiety levels may have lowered.

The students (in Sydney) had control of the technology, ie camera movements and sound levels. This empowered the three students who collaborated in this process, but may have contributed little in the way of achieving the educational objectives beyond this manipulation. I noticed that the inability to have eye contact with the members of the remote group made the interaction less rewarding in the sense of lack of non-verbal feedback.

The time delay inherent in the incoming signal affects the flow of ideas by providing a distraction to the intuitive process of face to face communication. A speaker is often not visible as the camera may be trained on someone else. These factors add a certain level of disorientation, distraction and disjointed delivery. (Simon, Reflective Journal, Week 2)

There was confusion over the task

Some students seemed unclear of how to proceed with the Successmaker task. In her reflective journal Mary stated:

Oh boy! Now I am more confused than ever, Further discussion in the Video Conference about the assignments etc...I'm going to have to come into the Uni lab for things like that. This subject is going to be one big challenge. We are to form teams between Wollongong and Sydney to bid for a fictional evaluation contract based on the "Successmaker" paper in the hand out. All collaboration is to take place via electronic methods. This will be interesting. (Mary, Reflective Journal, Week 2)

Towards the end of the videoconference, David states his uncertainty about the structure of the task by asking: "Is this project going over the week? Are we actually going to be collaborating throughout the week rather than just tonight...?"

The start of online collaboration

The Sydney students were unable to begin collaborating with their Wollongong counterparts after the videoconference due to difficulty in accessing their email accounts. Anthony's review of the evening elaborates:

The first asynchronous session using the German site did not really work as the email passwords were not easy to get from our own private providers. This session would have worked much more smoothly if the groups had been formed a week earlier and the passwords sent to their respective members so that by the next week the work space could have been set up.

Some members of the group had limited IT skills and found the whole process rather daunting at first. A suggestion for the future would be to have an IRC channel running concurrently with the work space session to facilitate instructions and dialogue between the two halves of the group. (Anthony, Reflective Journal, Week 2)

In the Wollongong class, Joan, Margaret, Richard and Chi successfully created their respective BSCW workspaces. Little online interaction occurred in the BSCW site during the week. Mary's reflective journal highlights one reason for the lack online interaction during the week.

There is a "German Site" to set up Group Discussion pages and invite people to submit their thoughts and comments. The Sydney Group can't access it tonight. There are going to be problems with this facility as a number of people don't have modems and haven't access to the Web - including me. This will affect our ability to work in groups on the "bid" too To be able to communicate electronically we need to be able to have access to the electronics....It's very frustrating to know you have a deadline to meet on class work and can't see how it can be achieved because you don't have the necessary tools. (Mary, Reflective Journal, Week 2)

Several Sydney and Wollongong students met at a university function

At the end of Week 2 several Sydney and Wollongong students attended a Graduate School of Education function and were able to met face-to-face. During the function, Walter discussed his observations about the interaction that occurred during the two videoconferences with the researcher. He raised the following points:

- Students were politely taking turns to speak
- A protocol of use should have been established during the first videoconference (The protocol would have clarified how students could make comments and when the camera should be moved.)
- The lighting in both sites was poor
- The seating arrangements in the Sydney site was more suitable than in the Wollongong site (The seating layout in the Sydney site was shaped as a "V" which allowed students to see each other without the need for a lot of head movement. Unlike in the Wollongong site where the seating layout was shaped as a wide "U".)
- There is a lack of non-verbal cues in videoconferencing

WEEK 4: THE SUCCESSMAKER GROUP PRESENTATIONS

CONTEXT

Each of the four student groups presented their Successmaker evaluation proposals in the videoconference. The instructor met with the Wollongong class one hour before the videoconference and discussed a different topic with the class. Margaret had discovered another synchronous chat tool called *Yak!*. (Appendix U provides a snapshot of the interface.) This tool was trialed by both sites after the videoconference.

HIGHLIGHTS

The interaction that occurred during the videoconference

Margaret operated the Wollongong site and Walter operated the Sydney site. Each of the four groups took approximately ten minutes to present their proposal. During the presentations, little student interaction between the two sites occurred. Each presenter spoke and the rest of the class listened. The videoconference proceeded smoothly due to little camera movement and little class interaction. The delay in transmission of PowerPoint slides and the lack of non-verbal cues did affect the flow of presentation for some students. For example, the following excerpt from the fieldnotes demonstrates Martin's presentation.

Martin did most of the talking. The verbal presentation was out of sync with the graphical presentation as there was a delay when the PowerPoint slides were transmitted. Several times during the presentation Martin asked: "Can you hear me?" as he didn't receive any feedback from the Sydney site. (Fieldnotes, Week 4, p. 3)

Although most students politely listened to the group presentations, some students did not seem engaged in the videoconference. For example, during the presentation given by Richard and Robyn, the Sydney group selected the Mute function several times and chatted among themselves. When the last group presented, the body language from several students implied that they were not focused on the discussion. Consider the following excerpt taken from Week 4 Fieldnotes:

While David is talking, everyone in Wollongong is sitting and listening. The Sydney guys are out of view as the camera is on David. People are starting to look at their watches. Margaret lets out a yawn. Joan is looking flicking through her handout. Robyn is sitting with both arms crossed. Even the instructor looks bored. (Fieldnotes, Week 4)

Simon summed up his perception of the videoconference as follows:

The group seemed quite light-hearted tonight. I suspect that this was largely because we were feeling that the experience had been a bit of a 'joke'. I felt a sense of futility. (Simon, Reflective Journal, Week 4)

Margaret indicated later to the researcher that her group had had a very late night the previous evening preparing their presentation, thus she suggested that tiredness was a contributing factor to the apparent lack of student engagement.

The online synchronous session using Yak!

Students from both sites were to discuss an article online using Yak! Both sites were able to interact online only for a few minutes because the tool crashed. Both sites conducted face-to-face discussions for the remainder of class time.

Simon's reflection of the evening illustrates his frustration about using new CMC tools each week:

YAK-CHAT: Logging on proved difficult, 20 mins later, when I finally got through the server crashed, overloaded with 16 people on it simultaneously. I was frustrated, we were having a lot of new technology thrown at us at once and I was getting overloaded. (Simon, Reflective Journal, Week 4)

WEEK 6: THE ENTIRE EVENING DELIVERED ONLINE—CHI'S LIVE CHAT SESSION

CONTEXT

The topic Chi presented was Evaluation Theory and Technology-Based Learning. A discussion paper delivered as a Web page introduced the class to the topic. Chi outlined three questions in the Web page and wanted the class to address the questions in the Live Chat space. Her Web page was available on the subject Web site a few hours before class.

The instructor attended the Wollongong class and the hour from 4.30pm to 5.30pm was spent as a face-to-face session talking with the instructor and reading Chi's paper. Chi had printed copies of her Web page and distributed them to the students). At 5.30pm the Wollongong students waited for the Sydney class to make contact via the Live Chat space. David was the first to post a message in the Live Chat space at 5.46pm and said he was reading Chi's paper. The Wollongong students used the Live Chat space to discuss the questions among themselves while they waited for the Sydney students to arrive and read Chi's Web page. Martin and Joan worked together using one computer. Mei, Mary, Richard and Chi worked individually each sitting in front of a computer. Margaret and Robyn were absent.

Simon and David were ready to participate in the Live Chat discussion at 5.56pm. Walter, Charles and Anthony however, arrived late to class and were not ready to participate until approximately 6.20pm.

HIGHLIGHTS

The interaction that occurred in the Live Chat space:

The instructor facilitated the online discussion at the start by posting questions in the Live Chat space. He then allowed Chi to facilitate the discussion and she tried by posting the questions she had provided in her Web page in the Live Chat space.

The combination of students entering an online discussion already in progress; the lack of clear direction as to what question was being addressed; and the lack of time to absorb the material presented in Chi's paper, resulted in an online discussion that was not focused and confusing. The online discussion occurred for one hour. The topic of discussion that took place in the last fifteen minutes involved students asking other students about who was doing particular seminar topics in the upcoming weeks.

The following two excerpts from the Live Chat discourse illustrate what occurred in the online synchronous class discussion.

Excerpt T.1 is taken from the beginning of the online discussion. It highlights several issues. Firstly, an informal tone is apparent in the discussion. Secondly, Simon's late entrance into the online discussion leads to subsequent posting of flippant messages. Thirdly, it illustrates how Mei and Chi, who are from non-English speaking backgrounds, do not understand the colloquial language that is used.

James - 08/20/96:17:56:	So if you compare the approaches of Tyler and Scriven what is likely to be the different outcomes?
David - 08/20/96:17:56:	The objectives based approach ignores the fact that we cannot control all the variables in the learning situation . There will always be unintended outcomes and that is a desirable aspect of the learning process.
Simon - 08/20/96:17:57:	Hello everybody, I'm back. Finished the reading. Now what the hell are yo talking about.
Chi - 08/20/96:17:57:	All stakeholders make judgements about the worth of what is achieved.
Joan&Martin - 08/20/96:17:58:	But what is you're not interested in why or how?
Mary - 08/20/96:17:58:	As far as Ian is concerned, his objectives are to improve the bottom line - to give a better return to shareholders. Our objectives are quite different, so we provide evaluation reports to Ian that meet his needs and evaluate our objectives for ourselves.
David - 08/20/96:17:59:	If we have a learner centred approach I would think a naturalistic approach that enters into the learning situation and looks at the learner's perspectives and responses as well as other stakeholders would be important. David.
Simon - 08/20/96:17:59:	Evaluation is a wank. Who is Ian?
Chi - 08/20/96:18:00:	To compare the approaches of Tyler and Scriven, Tyler is concerned about achievement, Scriven is more concerned about what is important. Ma I right?
James - 08/20/96:18:00:	David, So should we adopt this approach, is there a time for the other approaches?
Richard - 08/20/96:18:01:	Ian must be a wank too?
Simon - 08/20/96:18:01:	White and two sugars thanks, Jim
Joan&Martin - 08/20/96:18:01:	What's 'wank' mean? Can you elaborate on your criticism?
James - 08/20/96:18:02:	Yes Chi, there is a belief that there is a value which can be ascertained outside the stated outcomes.
Simon - 08/20/96:18:02:	I say let the real world evaluate it. Put it on the factory floor and let the users maul it.
Chi - 08/20/96:18:03:	I can not find "wank" in my dictionary.

EXCERPT T.1 Synchronous Live Chat online discussion conducted in Week 6

In the Wollongong class, Mei verbally asked Joan and Martin what the colloquial word “wank” meant which resulted in Joan and Martin posting the “What’s ‘wank’ mean...” message. When Chi posted the message about not finding the word in her dictionary the Wollongong class roared with laughter.

Excerpt T.2 is taken from approximately half way through the online discussion. Many issues surface from this sample of online discourse. These issues are summarised as follows:

- The late arrival of Anthony, Charles and Walter makes it difficult for them to grasp what is being discussed.
- Although Chi tried to facilitate the online discussion by asking a question, Richard assumed Chi asked the question to help write her assessable theoretical paper.
- Joan started to “play” by posting a message as “James”.
- The first message in the excerpt posted by Richard was verbally answered by the instructor in class. The instructor read Richard’s message while standing next to Richard in class and replied verbally to his message. Most of the Wollongong students didn’t hear the instructor’s reply, not to mention the Sydney class. The instructor then approached the whiteboard and discussed the issue Richard raised with him. Mary turned her head from the computer and listened to what the instructor was saying. Joan and Martin also leaned over their chairs to listen to the instructor. This caused some of the

Wollongong students to stop contributing to the online discussion for approximately 5 to 10 minutes.

Richard - 08/20/96:18:20:	James - Within schools I think that's a foolish approach to take, as the students may not be getting the motivation to learn, which is a major part of what education should be about.
Simon - 08/20/96:18:21:	Mary, I am getting confused about the difference between evaluation and usability
Simon - 08/20/96:18:23:	mary I'am confused period
Mei - 08/20/96:18:24:	Can someone explain more about usability?
David - 08/20/96:18:25:	I think we should try some new questions. We seem to be in a rut. Recent literature emphasizes that there are no cut and dried answers re evaluation. How does it maintain its credibility?
Simon - 08/20/96:18:25:	Wait till next week Mei and you'll be an expert after me and Martin finish with you.
Anthony - 08/20/96:18:25:	I agree with David
Chi - 08/20/96:18:27:	I would like to know what areas of concern have been ignored by four evaluation approaches we discussed?
Mary - 08/20/96:18:27:	Not talking about usability - talking about evaluation - for example, if our training costs \$500 thousand, is my boss going to value the training outcomes enough to spend another \$500 thousand. I have to provide evidence that will convince him - the why d
Simon - 08/20/96:18:27:	David I do believe the end users should be the main focus of evaluation and leaveability to the Experts.
Simon - 08/20/96:18:27:	Say What!
Richard - 08/20/96:18:28:	Chi - is that for the benefit of your essay?
Simon - 08/20/96:18:28:	evaluating the evaluators
Mary - 08/20/96:18:28:	contd ... the why determines the HOW of the evaluation.
James - 08/20/96:18:28:	Simon you're wrong
David - 08/20/96:18:30:	They leave out the complexity of evaluation a la reeves and the difficulty of arriving at any final judgements.
Simon - 08/20/96:18:30:	James, Humans are fallible and have sub-conscious personal agendas
Anthony - 08/20/96:18:30:	There seems to be a circle of discussion at the UOW that is quite hard to fathom
Chi - 08/20/96:18:31:	Richard, that is for your understanding.
Joan&Martin - 08/20/96:18:31:	Simon, James didn't say you were wrong - Joan did because of a subconscious personal agenda

EXCERPT T.2 Synchronous Live Chat online discussion conducted in Week 6

The review of the evening by Anthony, Mary and Simon provides further description.

I arrived 30 minutes late and no pre information was given as to the venue of the class. As a result it was very difficult to pick up what was going on. The group was using chat and it was very difficult to pick up the thread of the conversation. (Anthony, Reflective Journal, Week 6)

Isn't it funny, we put up a web page, then we print it off to read it. This says something about our need to have hard copy when it comes to reading and digesting material. I know that I find that I can read a screen three times and have no comprehension of the material, it isn't until I have a black and white paper copy in my hand that I can follow the sense of it. (Mary, Reflective Journal, Week 6)

I found my self in the midst a conversation seemingly without beginning end or focus. I could not identify a particular question that some people seemed to be addressing. Quite by accident I fell into some light repartee with Martin and Joan and this was some quite comfort in an otherwise foreign land. I did feel like I was not able to talk the language. I feared risking my credibility by

saying something really out of context and looking stupid so I remained largely detached from the discussion. Learning and Information Exchange - Completely absent in terms of the topic. However it has made me think about improvements to the system, Such as Martin and I have discussed about our presentation next week. (Simon, Reflective Journal, Week 6)

WEEK 9: NOT ALL GOES ACCORDING TO PLAN FOR WALTER

CONTEXT

Mei and Walter produced separate Web pages for the seminar presentation. Mei posted several questions for students to consider in a BSCW workspace and sent an email message with these questions to students prior to the seminar. Only Chi posted a message in Mei's BSCW workspace.

The intention was that Walter would facilitate the evening's proceedings by using the Live Chat tool to broadcast instructions to the class. Walter had prepared a Web page from which he could copy and paste lines of text into the Live Chat space. His idea was to direct the class to several resources such as Web sites and a CD (which Mei managed from the Wollongong site and Walter managed from the Sydney site) and then facilitate an online synchronous discussion about these resources in the Live Chat space.

The Wollongong students met in the lab one hour before the Sydney class commenced and chatted among themselves. Students printed Mei's Web page and began to read it.

HIGHLIGHTS

What actually happened

Walter emailed his Web page to Margaret the afternoon of the seminar. Due to a university mail server crash Margaret did not receive his email. During class time Walter loaded his Web page in a BSCW workspace. More than one hour was consumed in the Wollongong site trying to access Walter's Web page. Margaret and Richard finally were able to open Walter's Web page but the images were missing. Shortly after, the network in the Sydney site crashed. Due to these technical difficulties, a face-to-face discussion in each site concluded the evening.

The following excerpts from the Live Chat discourse and commentary explains the interaction that occurred online (and off line!).

Excerpt T.3: Walter emailed his Web page to Margaret too late:

Margaret - 09/10/96:17:32:	Walter There is a problem with the mail server on campus and mail is nt being delivered
Margaret - 09/10/96:17:33:	I haven't received anything from you
Mary - 09/10/96:17:34:	Walter, when did you send the mail and what was in it?
Walter - 09/10/96:17:35:	About twenty minutes ago. It has an attachment which is my Web document for this presentation.
Mary - 09/10/96:17:36:	Margaret says, well Walter.....
James - 09/10/96:17:36:	Walter is trying to put it in the workspace

EXCERPT T.3 Synchronous Live Chat online discussion conducted in Week 9

In the Wollongong class, Margaret became annoyed when she read that Walter had only emailed his work to her twenty minutes ago. She replied verbally in class: "Well, Walter, teach you to be so slack!" The class started laughing and the students looked to Mary, who was acting as scribe, to see what she was going to type. Then Joan said to Margaret: "Twenty minutes ago and you're meant to get it

up and running on the Web? Oh, no, that's not on...I, at least got mine across about three o'clock on the day."

The Wollongong class spent the next fifteen minutes trying to access Walter's Web page from the BSCW site. They had little success as the following excerpt illustrates.

Excerpt T.4: The Wollongong class tried to access Walter's Web page without success:

Margaret - 09/10/96:17:50:	Walter It needs to be binhexed before you send it
Anthony - 09/10/96:17:50:	It's a self extracting archive Margaret
Anthony - 09/10/96:17:51:	Walter uploaded it as a document through the server
Margaret - 09/10/96:17:51:	We can't read it because it hasn't been compressed using binhex - sea doesn't work unless this happens first
Richard - 09/10/96:17:52:	Here's what we get when we click on the link on the server" µƒVwgvw†wwx‡-w—xx"‡—™——"©™"‘«©©"©"
Margaret - 09/10/96:17:52:	Why don't you just put it as text
Anthony - 09/10/96:17:53:	he sent it as a compactpro sea
Walter - 09/10/96:17:53:	
Mary - 09/10/96:17:53:	Poor Walter, you're lost for words!
Walter - 09/10/96:17:54:	I certainly am
Anthony - 09/10/96:17:55:	how about we use IRC and DCC it to you
Richard - 09/10/96:17:55:	What?
Mary - 09/10/96:17:55:	Say wot?????
Mei - 09/10/96:17:55:	What's that?
Chi - 09/10/96:17:56:	What does DDC mean?
Mei - 09/10/96:17:56:	IRC & DCC?
Anthony - 09/10/96:17:56:	open Internet Relay Chat ircle porgram thenlog onto uow server then open a dcc request via the menu , you can then send a file while we are fgetting my file up
Walter - 09/10/96:17:57:	
Margaret - 09/10/96:17:57:	Why
Mary - 09/10/96:17:57:	Good idea!!!! Let's go!
Mei - 09/10/96:17:57:	That's do something!
Richard - 09/10/96:17:57:	I liked her animation.
Mei - 09/10/96:17:58:	Thank you!!!!
Margaret - 09/10/96:17:58:	The Why was for the previous message. Walter Can you send yur doc to thew server agin but just as a text filr

EXCERPT T.4 Synchronous Live Chat online discussion conducted in Week 9

When the Wollongong class saw Walter's blank posting they roared with laughter. Mary tried to convey some of the emotion by posting the message: "Poor Walter, you're lost for words". Frustration surfaced in the Wollongong class. Margaret was annoyed that Walter had not sent his work to her earlier and the rest of the class was conscious that time was getting away. However, the frustration was expressed as laughter. For example, when Margaret posted her "Why" message, the class roared with laughter at the misinterpretation as in the Live Chat space it looked like she had responded to James's message.

Walter then posted his Web page as a PageMill document in the BSCW workspace. While Margaret and Richard tried to access these documents, the rest of the Wollongong class engaged in a face-to-face discussion. Mary attempted to keep the Sydney class informed by posting messages in the Live Chat space.

At 6.30pm Margaret and Richard had opened Walter's Web page and shown the rest of the class how to access the pages. Walter finally began his presentation—but not for long. Because two of the three hours of class time in the Wollongong class has transpired, Walter's instructions (although appropriate if all had gone according

to plan) seemed pedantic and time wasting to the Wollongong students. Sample 3 provides a excerpt of messages Walter posted and Mary's response to them.

Excerpt T.5: A sample of messages posted by Walter and Mary at the start of Walter's seminar presentation:

walter (feeling small) - 09/10/96:18:25:	I am sort of running through a script here, so I will get it going. I am going to attempt to give this presentation using the chat space to direct you through a series of web sites and local documents.
Mary - 09/10/96:18:25:	Fire away.
walter (feeling small) - 09/10/96:18:26:	In addition I am going to ask Mei to operate a copy of the Donald Norman CD-ROM, "Defending Human Attributes in the Age of the Machine", from which I will be showing you at least one excerpt.
Mary - 09/10/96:18:26:	okay
walter - 09/10/96:18:27:	You can make comments during the presentation back into the chat space, however in order to keep the number of people inputting into the chat space to a minimum, I ask that you appoint one person to act as scribe.
walter - 09/10/96:18:27:	This way there will be only three people putting in information, a scribe in Sydney, a scribe in Wollongong, and me.
walter - 09/10/96:18:28:	If you haven't already done so, I would like the teacher's computer and overhead to be switched on, and to remain on the chat space at all times.
Mary - 09/10/96:18:28:	It is! Get going.
walter - 09/10/96:18:28:	Could you please nominate a scribe now.
Mary - 09/10/96:18:28:	Has been nominated all night!!!
walter - 09/10/96:18:29:	David has volunteered to be the scribe here .Before we start, any questions?
Mary - 09/10/96:18:29:	AAAARRRRGH!!!!
walter - 09/10/96:18:29:	Let's start with a test of the system. Could you please copy the following URL and paste it into Netscape's "GO TO:" field: http://wabbit.its.uow.edu.au:88/pub/english.cgi/f602/home.html
walter - 09/10/96:18:30:	What did you see?
Mary - 09/10/96:18:30:	The home page is up and running!!

EXCERPT T.5 Synchronous Live Chat online discussion conducted in Week 9

When Walter posted the message requesting the Wollongong class to nominate a scribe, the frustration by the Wollongong students was apparent. Joan said in class: "Oh, he's got to be joking, we've already done this." Martin approached the researcher and stated his observation that the technology doesn't allow the frustration to be conveyed online. The Wollongong students were empathic to Mei as she had been ready to present something to the class the entire evening yet Walter had taken up the evening. Margaret and Joan stated in class that the Wollongong class should go ahead with Mei's presentation. And this is what occurred because a few minutes later the network crashed! Sample 4 illustrates the online discourse that transpired.

Excerpt T.6: A network crash ends Walter's online seminar presentation.

walter - 09/10/96:18:32:	Good. Could you follow the link to the cartoons, and then come back to the chat space. I think we will leave the article for you to read later.
James - 09/10/96:18:33:	I have just copied the url and started a new Browser
Mary - 09/10/96:18:33:	CARtoons don't come up on some - image 1 and 2 are missing from file.
walter - 09/10/96:18:33:	oh shit

Mei - 09/10/96:18:34:	Oh dear...
Mary - 09/10/96:18:34:	We're getting very frustrated at this end too!
Researcher - 09/10/96:18:34:	Guys - may I say something quickly - we have 1 hour left down here - Mei has her web paper all organised and has an activity planned ie: showing us Norman CD so can we plan how to use the next hour?
David - 09/10/96:18:34:	Walter says his computer has just crashed.
Researcher - 09/10/96:18:35:	hahhhhhhhhhh
James - 09/10/96:18:35:	The network is a little hot! and three of our computers have just crashed
Mary - 09/10/96:18:35:	Ha ha ha ha ha ha ha ha!
Margaret- 09/10/96:18:35:	Surprise surprise
Richard - 09/10/96:18:35:	Ooooooh really?
Martin - 09/10/96:18:35:	Crashed?
James - 09/10/96:18:36:	Why don't we run two sessions one here and one there and we can summarise the two chats later
Mary - 09/10/96:18:36:	A lesson for us on the foibles of using technology for distance learning?
Mary - 09/10/96:18:36:	AGREED - Over and out!

EXCERPT T.6 Synchronous Live Chat online discussion conducted in Week 9

When David posted the message saying that the network at the Sydney site had crashed, the Wollongong class burst into laughter. The Wollongong students (and researcher) could not resist posting several messages in an attempt to convey the atmosphere in the Wollongong class.

Mei finally presented her seminar as a face-to-face presentation. Walter presented his seminar to the Sydney class.

Although, the weekly content topic may not have been presented as smoothly as in past weeks, many lessons were learnt that evening about the implementation and use of network based technology! Mary's reflection of the evening provides one example.

Mary's reflection of the evening sets the scene of what occurred:

Tonight was a good example of what happens when you rely on technology. Walter had sent material to Margaret for loading, via email, at the last minute. There had been problems with UOW email all day and it hadn't gone on. So we spent half the night fiddling with email and enclosures trying to get it up, unsuccessfully. The instructor was in Sydney so he didn't get the opportunity to hear Mei's input, or hear the workshop that she ran after we all gave up on Walter's presentation and went with what Mei had loaded. Not really fair to Mei, who had evidently put a lot of effort in. Not Walter's fault either, the technology failed him. But he and we learnt a valuable lesson. Get it in early because Murphy's Law is a real One!

Conclusion: Despite the warning from Margaret earlier in the subject about getting material to her in good time, it's always going to happen that someone is running late. When implementing subjects that rely on technology it's vital to have some sort of procedures defined as to what happens when things go wrong, to ensure that people understand the technology that they have to use, or to have some support person there as a backup. (Mary, Reflective Journal, Week 9)

WEEK 11: DAVID AND ROBYN OPT FOR A SYNCHRONOUS APPROACH

CONTEXT

A two-week semester break occurred between Weeks 10 and 11. The instructor encouraged David and Robyn to consider an asynchronous delivery approach for their seminar. For example, during Mary's seminar in Week 10, the instructor offered the following suggestion to David in the Live Chat space:

James - 09/17/96:19:18: OK I had hoped that the threaded discussion would take place over the week and that each question would be a new thread
James - 09/17/96:19:18: I was thinking that you might set up the discussion and let it rip for the 14 days before the next topic which will be Margaret on Maintenance Evaluation
(Live Chat, Week 10)

David and Robyn, however, opted for a synchronous approach. The topic presented dealt with implementation issues from a teacher perspective. They produced separate Web pages, which were structured as discussion papers. The evening was structured as a thirty-minute videoconference followed by an online synchronous task using the Discussion Forum tool. The task involved reading a case study and addressing several questions. The case study was to be discussed in three small groups. David created three discussion threads in the Discussion Forum and wanted each group to discuss the case study in one particular thread. Students were not allocated to groups. They were to create the groups themselves.

The Web pages were available from the subject Web site on the day of the seminar. (Robyn sent her Web page to Margaret several days before the seminar but due to work commitments, Margaret's programmer was only able to load it onto the Web site on the day of the seminar.) David spent the entire afternoon before class on the telephone with Margaret to work out how to email his Web page to her. David used an IBM PC and there were some incompatibilities with sending his files via email to Margaret.

David informed the students via email about the structure for the evening and explained how the online task was to be conducted. The email message was sent a few hours before the class. It read as follows:

We hope to have our WWW pages up later today. Robyn and I will do a thirty minute presentation on the videoconference re implementation. Then we will use the thread discussion forum to discuss a case study that is (hopefully) attached to my WWW page re the use of email and WWW in the Australian Studies course at [Name of University]. We thought the best thing would be to split into three discussion teams with 2 from Sydney & 2 from Wollongong in each. Once you have read the case study and decided which team you are in go into the discussion forum space and you will see a message for each of team 1,2 and 3 re Implementation-The Teacher's Perspective to get you started. Start contributing to that team's discussion.
David & Robyn.
(Email message from David, Week 11, Tuesday, 8 October 1996, 12:45 PM)

The instructor was not present this week. The Wollongong students met in the lab one hour before the videoconference. It was an informal class gathering. Robyn introduced her topic and a general class discussion occurred.

HIGHLIGHTS

The interaction that occurred during the videoconference

Margaret operated the videoconferencing equipment from the Wollongong site and Simon managed the Sydney site with assistance from Anthony who operated David's PowerPoint presentation. More than four weeks had past since the class had used videoconferencing and Simon and Anthony had forgotten how to transmit the PowerPoint slides. At the beginning of the videoconference, Anthony asked Margaret: "How do we get the snapshot from the computer to the screen?"

Robyn and David took turns to speak. There was little interaction among the students, however the videoconference proceeded relatively smoothly. As Simon later reflected, this may have been due to:

The group is more accepting of the limitations of the technology. We might find the fact that we can't see the person speaking (because the camera is trained elsewhere) annoying but we can at this stage recognise voices and absorb the meaning through the words alone. (Simon, Reflective Journal, Week 13)

The interaction that occurred in the online synchronous task

After the videoconference the students went to their respective labs and began to read the case study task David had assigned. Students were not allocated to a particular group and three discussion threads were created for the same task. What occurred was the following:

- The three student groups were not established.
- Students posted messages to more than one discussion thread.
- The Sydney students posted messages individually, whereas the Wollongong students worked in small groups.
- One discussion thread became the dominant interaction space.
- Different "personas" were used by students when posting messages.

The number of messages posted and the participants in each thread is outlined in Table T.1.

TABLE T.1 Case One, Week 11: David's online task—The number of messages posted in each thread and student participation in each thread		
<i>Thread</i>	<i>Number of messages posted</i>	<i>Student participation</i>
Team 1	6	David: 3 messages Chi and Mei (pair): 2 messages Anthony: 1 message
Team 2	7	David: 4 messages Margaret, Joan, Mary (group): 2 Richard (posted message using the researcher's name): 1

TABLE T.1 Case One, Week 11: David's online task—The number of messages posted in each thread and student participation in each thread			
Team 3	76	David:	16 messages
		Charles:	13 messages
		Richard, Martin (pair):	11 messages
		Anthony:	9 messages
		Walter:	5 messages
		Joan, Margaret, Mary (group):	4 messages
		Richard (posted messages using the instructor's name):	4 messages
		William:	4 messages
		Simon (posted messages as "ziggy"):	3 messages
		Margaret (her last message was posted as "The real Margaret" due to Richard's misuse of her name):	3 messages
		Martin, Joan, Richard (group):	1 message
		Sydney student (posted message as "Marguerita"):	1 message
		Robert (posted message using Margaret's name):	1 message
		Robert (posted message using Joan's name):	1 message

The level of student engagement on the task differentiated between the two sites. The Sydney students were more committed to the online task than the Wollongong students. David posted several messages to facilitate class discussion. The messages posted by the Sydney students were mostly task focused, unlike many messages posted by several Wollongong students. For example, in the *Team 2* discussion thread, Richard posted a message using the name of the researcher to flame the message posted by Margaret, Joan and Mary. The message read:

Thread: Team 2
 Researcher's name
 October 8, 1996 (19:05)

Joan, Mary & Margaret, We totally disagree with what you are saying -we think your opinion is totally uninformed.

In the *Team 3* discussion thread, Richard used the instructor's name when posting several messages. The Sydney students thought the instructor was online. Richard and Martin were in hysterics when serious messages addressed to the instructor were posted by the Sydney students. Sample messages include:

Discussion Thread: Team 3 (Message 54 of 76)
 James
 October 8, 1996 (19:26)
 Hi everyone, Ive just gained access: I think you need to look more globally - can we focus the discussion along this tread??

Discussion Thread: Team 3 (Message 58 of 76)
 David
 October 8, 1996 (19:29)
 James, The problem is getting academics to be aware of global trends towards flexible learning...

Discussion Thread: Team 3 (Message 61 of 76)
 James
 October 8, 1996 (19:26)
 When you think globally you need to focus less on industrial issues and more about your suntan.

Discussion Thread: Team 3 (Message 71 of 76)
 Ziggy (Simon)
 October 8, 1996 (19:43)

James, by globally do you mean, the way technology overall is perceived...

After the class, the researcher emailed several students to ask how they thought the evening progressed, especially without the presence of the instructor. Insightful feedback provided by several students is provided in Table T.2.

TABLE T.2 Case One: Student feedback about the class process in Week 11	
<i>Student</i>	<i>Feedback</i>
Richard	<p>I think it went reasonably well, once we got into the video conference. I was expecting Robyn to say a little more than she did in the first hour, but was glad she didn't when I realised she was just saying what she was going to say during the VC anyway.</p> <p>I think the chat would have been better in the chat space, as the Forum we used is more for asynchronus...discourse. The idea of breaking us up into pairs didn't work, because everyone in Sydney started to join group three (where Martin and I were). It was also difficult prior to that because their (them in Sydney) idea of a pair seemed to be two of them at two computers and they seemed to be talking to themselves in the chat space (which to me seems like a misuse of the technology). As a result Martin and I got left behind, and that's when we started to muck around and pretend we were James. I think it got them to think a bit harder when they thought we were James, but we didn't get much out of the experience. (Email to researcher, Week 11)</p>
Margaret	<p>I don't believe we were quite as committed to the discussion as we could have been. I find it frustrating that group activities don't seem to work i.e. online I wonder if we were all at home or at our desks would we stay on task more. When I was in [interstate] I found I was completely focussed on the activity. There is usually not a conclusion to the group discussion activities - no closure - I find that frustrating too. (Email to researcher, Week 11)</p>
Mary	<p>I thought the VC was good. The forum session was dodgy. Following seperate threads just didn't happen. We waited and waited for someone in Sydney to join our thread, and nothing happened. At that point we lost Margaret and Joan. (Margaret wanted to know how AskEric worked and then wanted to show Joan and I the live chat rooms, all while trying to keep up with what was happening on the Forum - very confused, and not very fair to Robyn.) Very hard to get back on track again. That's a problem with the forum. It really is something that needs to be used ahead of time, not as a live chat, it isn't immediate enough for live chat and organises itself differently.</p> <p>There was a distinct lack of discipline in Wollongong on Tuesday night, says I with a wry smile, we were all feeling the angst of returning to lectures with a heap of work over our heads I think, and while the cat's away....even in Sydney. Everyone is showing a little fraying round the edges. It wouldn't have happened if James had been in Wollongong, but it would probably still have happened if he had been in Sydney. (Email to researcher, Week 11)</p>
Martin	<p>Timing is everything. Just having the technology there and using it to death doesn't do it for me. Like classroom stuff, I think the facilitator should be vigilant. If discussions have run out gasoline then the exchange should move on or be closed down. Careful monitring is definately the order of the day. Also the jocularly and stuff just goes to highlight the need for social interactions. Everyone gets so serious sometimes. It's hard to concentrate for hours speaking about stuff without so much as a smile! (Email to researcher, Week 11)</p>
Walter	<p>I think it went well enough. James has a habit of taking over the proceedings, which (while a relief sometimes) tends to keep some people from showing what they can do. The videoconferencing part went well, though it did seem to us in Sydney that you lot in Wollongong were getting a bit skittish in the on line chat phase. We, on the other hand, were busy trying to evade Charles and his ranting, which is one reason why he got to send so much of his lunacy down the line. (Email to researcher, Week 11)</p>

David found the experience quite stressful but he learnt many lessons from his online implementation. Below is his reflection of the evening:

I think it went ok but you can always see how things could be improved. I found it all enormously stressful juggling the content of an essay I am still writing, learning to produce an HTML page, creating a Powerpoint presentation, transmitting files from [workplace] to Wollongong by email and ftp, liaising with a student in Wollongong [referring to Robyn] and

having very limited communication with the lecturer about it all-not to mention support staff [referring to Margaret] who were in [interstate] until Friday!...I do feel feedback and communication with James could be more extensive but then I don't seek him out as actively as perhaps others do.

If I was doing it over again I would have had a face to face meeting with Robyn to sort out what we both presented on the night-that was hard by telephone. I would also have given more thought to the exercise. My problem was (a) Robyn couldn't really get a handle on what we had to do re an exercise...(b) I was not technically on top of the discussion tool options and their potential...I would probably pin everyone down re whether they were in team 1,2 or 3 because what happened was that teams 1 and 2 were almost defunct and most people joined the discussion in team 3.I also tossed around giving each team a different aspect of the topic. Now I think I would have just structured it more by listing the issues in order that the teams should discuss. (Email by David to researcher, Week 11, Wednesday October 9, 1996 11.30am)



APPENDIX U

COMPUTER-MEDIATED COMMUNICATION TOOLS

YAK!

Yak! was a “freeware” CGI synchronous discussion tool developed by John O’Fallon.

INTERFACE

In the boxes provided, the user entered his/her name or an alias followed by a message. The message was then displayed at the top of the Web page when the “Send/Update” button was selected. The messages displayed were delimited by a line.

FEATURES

Yak! provided an archive capability as every message was appended to the top of the Web page.



APPENDIX V

SUBJECT OUTLINE: CASE TWO—EDGA957 1997

EDGA 957 IMPLEMENTATION AND EVALUATION OF TECHNOLOGY-BASED LEARNING 1997

SUBJECT OUTLINE

This subject is designed to investigate the links between educational evaluation and implementation particularly where learning is being supported by information technologies. It will seek to define the basic issues facing the practitioner when they are trying to manage technology-based learning projects and to answer such questions as: Is the project effective? Is there a problem with the design or the way it is implemented? How might it be changed or modified.

AIMS

The subject *Implementation and Evaluation of Technology-Based Learning* is designed to:

- prepare you to implement projects and evaluate teaching and learning materials produced using a variety of technology-based learning environments.
- review the impact of change theory on implementation of technology-based learning systems.
- review current literature on the evaluation of technology-based learning.
- explore the role of computer mediated communications in learning.

INSTRUCTOR

[Instructor name and contact details]

TIME

Spring Session (alternate weeks), Mondays, 4.30-7.30 (Wollongong, IMLL),
Tuesdays, 5.30-8.00 (Sydney Centre)

ASSESSMENT

1. Prepare a paper based on class and on-line discussion which compares and contrasts a number of evaluation theories and how they can be employed in evaluation of technology-based learning
Due on August 11/12th, 1997 . (Worth 30% of final grade)
2. A Web-Study Guide on an agreed topic to facilitate learning and discussion on the topic. This guide is to be accessed by all members of the subject and will form a background learning exercise for the last group project of the subject. It should introduce the user to the key issues of the topic and how these issues relate to the implementation and evaluation of technology-based learning. It

should require between 2 and 4 hours of study for a user and it should be submitted in a form suitable for immediate placing on the Faculty's Web server.
Due on September 8/9th, 1997. (Worth 30% of final grade)

3. Evaluations of all Web Study Guides other than your own, submitted according to a set of criteria generated on Week 2 of session. **Due October 13/14th, 1997** (Worth 10% of final grade, which will be reduced proportionally by the % of evaluations you have not completed. ie if 10 are required, you complete 7 you will receive .7 of the rankings given by the others for your Web Study)
4. Submit a group project which is a proposal to evaluate a technology-based learning project and will involve a presentation to the whole class on November 3rd/4th and submission of a written proposal.
Due: November 3/4th, 1997 (Worth 30% of final grade).

Note: All the above deadlines are inflexible and should any unforeseen circumstance arise, students should negotiate any variations at least one week in advance. All assessment criteria will be negotiated well in advance of due dates according to the schedule below. Students should also consult the Faculty of Education Assessment Procedures 1997 for additional requirements.

INSTRUCTIONAL STRATEGY

This subject will require attended sessions and computer mediated communications as the instructional strategies. As part of the learning process there will be class sessions employing computer mediated communications, World Wide Web interactions and electronic mail and several topics will be discussed asynchronously over two week periods. The process itself will be examined to determine the effectiveness of different technologies and the learning outcomes they generate. The class meetings will occur in alternate weeks according to the schedule below. Both the Sydney and Wollongong groups will contribute to joint discussions and activities that establish links between the two sites.

CONTENT

In a broad introduction many issues need to be addressed.

21/22 July Week 1. Overview of the course —

Workshop on the tools for communication within the course. How the tools can be used. Planning for electronic communication. Introduction to first topic.

28/29 July Week 2.

What are the key concepts associated with implementation and evaluation and how do they fit within the development of technology-based learning systems. Evaluation theory and approaches. Comparing Reeves with Alexander & Hedberg, what lessons can be learned?

Developing Checklists for Evaluation of Web Study guides

Writing an evaluation report.

Decide on topics/questions/issues to discuss in computer conference

*4/5 Aug Week 3 On-line discussion about Evaluation models and theories.
Discussion will take place over the two week period.

Selection of study guide topic.

11/12 Aug Week 4. Review of CMC as a method of discussing issues.

Strategies for designing Web study guides.

Introduction to Gayeski Article — Decide on topics/questions/issues
to discuss in computer conference

Assignment 1 Due.

Suggested Topics for Web Study Guides chosen from:

1. Assessing distribution and publishing options: what should novice developers be aware of in the emerging software distribution systems?
2. Cost-benefit analysis and project implementation
3. Creating implementation teams, how important are the people to an implementation?
4. Evaluating initial project ideas — strategies and concerns
5. Formative evaluation of products— evaluating a product design
6. Implementation from a teacher's perspective, what differences are there from the designers perspective?
7. Intellectual Property and Interactive Learning—What constitutes fair use? How can it impact on implementation?
8. Maintenance evaluation the often forgotten side of routine data collection.
9. Organisational Development and Technology-based learning.
10. Planning a project—key issues for change and innovation. Issues for managing projects.
11. Rapid Prototyping how it can be used to evaluate project concepts?
12. Scheduling and making deadlines, implications for implementation
13. Strategies for evaluation of interfaces: Insights from Donald Norman.
14. Summative evaluations and the roles of different theoretical positions
15. TBL and change management
16. The expert review — connoisseurship as an evaluative review
17. Usability testing — how it should be undertaken?

*18/19 Aug Week 5 Online discussion about “Why information technologies fail? Review of Article by Gayeski “over the two week period. Optional workshop on developing Web study guides.

25/26 Aug Week 6 Review of Gayeski discussion. Can we learn from Technology-based learning systems? Review of Kulik, & Kulik, and Clark Articles, comparison with Reeves and Hedberg.

Set up online discussion for next two weeks.

*1/2 Sept Week 7 Online discussion of Functions of Evaluation over the two week period.

8/9 Sept Week 8 Change management and implementation. Confirmation of final project groups.

Set up online discussion for next two weeks.

Assignment 2 Due

*15/16 Sept Week 9 Use of Web Study guides on-line over the two week period.

22/23 Sept Week 10 Introducing Successmaker and the writing of evaluation reports. Discussion of project planning and implementation strategies.
RECESS 2 weeks

13/14 Oct Week 11 Presenting an evaluation proposal. **Assignment 3 Due**

*20/21 Oct Week 12 Online discussions of Group collaboration

*27/28 Oct Week 13 Online discussions of Group collaboration

3/4 Nov Week 14 Presentation of evaluation proposal. **Assignment 4 Due**

* Indicates a non-required meeting week. However, participation is required in online discussions.

REFERENCES

[List has been omitted]

Journals of Relevance

[List has been omitted]



APPENDIX W

COMPUTER-MEDIATED COMMUNICATION TOOLS

DISCUS

DISCUS Version 2.01 was a “freeware” asynchronous conferencing program developed by Kevin Paulisse and William Polik at Hope College. It ran on a Unix Web server.

INTERFACE

FEATURES

DISCUS featured the combination of threaded topics and continuous message display. It enabled text to be displayed in different font sizes and colours. Graphics could also be inserted into a message. Administrative functions were also available such as editing and deleting messages, and moderators could be assigned to each computer conference.

■ APPENDIX X

CASE TWO: SUMMARY OF ASYNCHRONOUS DISCUSSIONS THREADS AND EMAIL LISTSERVER MESSAGES

DISCUSSION THREADS CREATED IN DISCUSSION FORUM

The Discussion Forum tool was used in the first three weeks of the subject. Thirteen discussion threads were created in total. They are summarised in the following table.

TABLE W.1 Discussion threads created in the Discussion Forum during Case Two (Thirteen threads created in total)						
<i>Thread order</i>	<i>Thread title</i>	<i>Week created</i>	<i>Created by:</i>	<i>Purpose</i>	<i>No. of messages</i>	<i>Time frame of postings</i>
1	How was your day?	1	Paul *	The Wollongong students posted messages to become familiar with the tool.	4	Week 1
2	Silly Things	1	Paula	The Wollongong students posted messages to become familiar with the tool.	6	Week 1 to Week 3
3	Trying to create a new topic	1	Paula	Paula practised creating a new discussion thread.	1	Week 1
4	Concepts of Implementation	1	Instructor	The instructor created this thread for the Sydney students to practise using the tool whilst addressing content.	17	Week 1
5	Week 2 Tyler's Model	2	Instructor	A small student group asynchronously discussed a question provided by the instructor. Outcome of task was to produce a summary.	21	Week 2 to Week 3
6	Week 2 Scriven's Goal Free approach	2	Instructor	A small student group asynchronously discussed a question provided by the instructor. Outcome of task was to produce a summary.	10	Week 2 to Week 3
7	Week 2 Stufflebeam and decision-making	2	Instructor	A small student group asynchronously discussed a question provided by the instructor. Outcome of task was to produce a summary.	23	Week 2 to Week 3
8	Week 2 Other models	2	Instructor	A small student group asynchronously discussed a question provided by the instructor. Outcome of task was to produce a summary.	12	Week 2 to Week 3

9	Live Discussions	3	Ian **	To ask students to organise synchronous times to interact in the Live Chat space.	2	Week 3
10	Untitled	3	Student group	One of the small student groups notified the class that their summary was posted in the subject Web site.	1	Week 3
11	Frequently asked questions (FAQs)	3	Instructor	Technical problems, hints or tips could be posted to this thread.	2	Week 3
12	Scriven/evaluation	3	Daniel	Daniel posted his summary in this thread.	1	Week 3
13	Discussion Forum Closed!	14	Researcher	The class was notified that the Discussion Forum was no longer in use for the subject.	1	Week 14

* Paul withdrew from the subject in Week 5

** Ian withdrew from the subject in Week 4

DISCUSSION THREADS CREATED IN DISCUS

DISCUS was introduced to the students in Week 4. It became the tool that was used instead of the Discussion Forum tool. From the end of Week 3, the asynchronous tool DISCUS was used instead of the Discussion Forum. It was used until Week 12 and eight discussion threads were created. The following table provides a summary of each discussion thread.

TABLE W.2 Discussion threads created in DISCUS during Case Two (Eight threads created in total)						
<i>Thread order</i>	<i>Thread title</i>	<i>Week created</i>	<i>Created by:</i>	<i>Purpose</i>	<i>No. of messages</i>	<i>Time frame of postings</i>
1	Using this Computer Conference tool	3	Instructor	Students posted "test" messages to become familiar with the tool.	28	Week 3 to Week 5
2	Why information technologies fail? Article by Gayeski	4	Instructor	The instructor posted three questions that students were to address after reading the assigned article.	34	Week 4 to Week 7
3	Discussion of FoodCo	6	Thomas	The instructor suggested to the Sydney class that they discuss an article online.	9	Week 6 to Week 7
4	Week 7- Thoughts on the Kulik and Tennyson Articles	7	Instructor	The instructor posted two questions that students were to address after reading the assigned article.	3	Week 7 to Week 8
5	Change within organisations: 5 cases for discussion by Jonathon	9	Jonathon	A discussion thread that accompanied Jonathon's Web Study Guide.	1	Week 9

6	Web Study Guides - Feedback, questions, etc	9	Researcher	A feedback forum for students to discuss the Web Study Guides.	6	Week 8 to Semester break
7	Successmaker Project - issues, concerns, discussion...	9	Researcher	A discussion space for students to raise any issues about the group project.	5	Week 9 to Week 12
8	DISCUS FORUM FINISHED FOR EDGA957 1997!	14	Researcher	The class was notified that DISCUS was no longer in use for the subject.	1	Week 14

EMAIL LISTSERVER MESSAGES

An email listserver dedicated to the subject was available to the class from Week 6. Students were notified about it in the subject Web site and were asked to subscribe to it.

Twelve messages were posted to this listserver. Ten messages were posted by the researcher and two email messages were posted by the students. The table below provides a breakdown of each message.

TABLE W.3 Email messages sent to the subject email listserver during Case Two (Twelve messages posted in total)			
<i>Message order</i>	<i>Week Sent</i>	<i>Sent by:</i>	<i>Email message details</i>
1	7	Researcher	Informed students of feedback researcher sent to the DISCUS developer.
2	7	Researcher	Provided some information about Successmaker (the final group project) that the researcher found in newsgroups.
3	7	Researcher	Informed students of Library workshops run by the University.
4	9	Researcher	Replied to a student's question regarding the Web Study Guide evaluation task.
5	9	Researcher	Informed students of Library workshops run by the University.
6	Semester break	Researcher	Informed students why they may have experienced problems accessing the subject Web site. Informed students that the Notices section of the Web site was updated.
7	Semester break	Grant	Notified the class about incorrect URLs in his Web Study Guide and provided the correct http addresses.
8	11	Hugh	Notified the class about the salient points in his Web Study Guide.
9	11	Hugh	Notified the class about incorrect URLs in his Web Study Guide and provided the correct http addresses.
10	12	Researcher	Informed students that the researcher posted a summary of the discussion that took place by the Sydney class about Successmaker in Week 11.
11	13	Researcher	Asked students about dinner arrangements for the last week of class.
12	13	Researcher	Informed students that the Notices section of the subject Web site was updated.

■ APPENDIX Y

CASE TWO: DESCRIPTION OF SUBJECT EPISODES 1, 5 AND 6

EPISODE 1: "PLAY TIME"

THE FIRST ON-CAMPUS CLASS—AN EXAMPLE OF "UNSTRUCTURED PLAY"

The instructor, James, was not present in the first class held on campus due to a commitment to attend a conference. The researcher thus presented the first on-campus class. The instructor, however, attended the off-campus class, which was held the following evening.

The researcher conducted the first on-campus class as an informal session. A subject outline and reading material (as per Case One) were distributed to students. The researcher explained her role in the subject and student introductions were made. The subject delivery was explained and students were informed that Internet access was required for the subject. The assessment tasks were discussed and the face-to-face meeting structure was explained. The subject Web site was demonstrated and it was explained to the students that the Web site was developed to meet their needs, thus they were encouraged to provide feedback about the site's usefulness during the subject.

The remainder of the evening was structured as a practise and "play" session. The researcher asked the students to navigate the subject Web site and enter information about themselves in the Student Profiles section of the Web site. The Live Chat and Discussion Forum tools were briefly demonstrated and students were encouraged to experiment with these tools and begin searching for online material for the first assignment. Each student was seated in front of a computer and the researcher walked around the room to talk with the students and answer any questions.

Excerpt Y.1, taken from the Live Chat session conducted in class, illustrates how some of the students "played" with the tool. Several students, such as Daniel, Frank and Lorraine, did not post any messages in the Live Chat space or in the Discussion Forum during the first class.

Paul - 07/21/97:17:38:	It seems you don't see anything until you say something - No anonymous lurking
Paula - 07/21/97:17:39:	Hello Paul tell me a bit about yourself !
Paul - 07/21/97:17:39:	Hi Paula - I am really handsome and rich
Paula - 07/21/97:17:40:	This sounds promising!!! This is my first time Chattin' !
Paul - 07/21/97:17:41:	So - tell me about you.
Paula - 07/21/97:17:42:	Paul how do we get back to formal here. I just can't stop thinking about that movie - THE NET . Have you seen it?
Paul - 07/21/97:17:42:	Is that the one with Sandra Bullock (is that her name?)?
Paula - 07/21/97:17:43:	Yes! And she meets a baddy on the net by doing what we are doing now!! Scarry
sds - 07/21/97:17:44:	sds
Paul - 07/21/97:17:44:	Yes - I saw it - she had better software than us
Paul - 07/21/97:17:44:	Yes sds - what does sds mean
Paula - 07/21/97:17:45:	And better hardware!
Paul - 07/21/97:17:46:	Is anyone gunna use the forum thingy?
Paul - 07/21/97:17:46:	Y year eleven kids love this chat thing - they will sit there happily chatting to each other (in the same room) all day.
Paul - 07/21/97:17:47:	Paul I feel you are talking to yourself so I am going to join you.
Paula - 07/21/97:17:48:	What is the forum for again?
Paul - 07/21/97:17:49:	The forum is for longer discussion - not live chatting

Paula - 07/21/97:17:50:	Well I can see the point for our purposes in this subject. However real time talk is much more fun.
Paul - 07/21/97:17:50: Y	Yes - apparaently its a good way to learn to type fast
Paula - 07/21/97:17:50:	I think that I will exit now and go and have a look elsewhere. Adios'
Paul - 07/21/97:18:13:	What's happening
Jonathon- 07/21/97:18:19:	Dear Everybody, I am going to have a nervous breakdown!
Paul - 07/21/97:18:20:	Relax
Jonathon - 07/21/97:18:21:	Will somebody talk to me?
Paul - 07/21/97:18:22:	Hi there - this is just a little message to say hello
Paul - 07/21/97:18:23:	Lets make thiis a lively discussion
Paul - 07/21/97:18:24:	Come on you guys say sumthin
Jonathon - 07/21/97:18:25:	Nicola, Im glad you have accepted my invitation to an evening of wild abandon at Towradgi Bowling Club!
Nicola - 07/21/97:18:28:	Thankyou for the invitation Jonathon. I feel like letting my hair down and having fun.

EXCERPT Y.1 Synchronous Live Chat online discussion conducted in Week 1

Three discussion threads were created in the Discussion Forum during the evening and a total of six messages were posted. Table Y.1 outlines the posted messages. The table also illustrates the social and informal tone of the postings as students were playing with a new tool.

TABLE Y.1 Case Two: The three discussion threads created in the Discussion Forum during the first on-campus class (Six messages posted in total)				
<i>Thread</i>	<i>Thread Name</i>	<i>Created by:</i>	<i>No. of messages posted</i>	<i>Message</i>
1	How was your day?	Paul *	3	1. Hello everybody - did you have a nice day? Mine was just another day at the chalkface. Paul 2. Why isn't phonetically spelt phonetically?Paula 3. I had a pretty good day apart from being attacked by hoards of fans and admirers! Jonathon
2	Silly Things	Paula	2	1. I want to try this thing out! Paula 2. That's not very silly. One of the problems of the world today is that people are not good at being silly any more It really is a disappearing skill the old silliness so to avoid the danger of become unsilly this is about rhinoceroses and othe silly things. Paul
3	Trying to create a new topic	Paula	1	1. blah blah blah Paula

* Paul withdrew from the subject in Week 5

THE FIRST OFF-CAMPUS CLASS—AN EXAMPLE OF “STRUCTURED PLAY”

The instructor structured his first evening with the Sydney class by introducing the key concepts of implementation and evaluation of technology-based learning followed by a computer-mediated communication task using the Discussion Forum tool. The instructor created a discussion thread in the Discussion Forum titled: *Concepts of Implementation* and posted the following question for the Sydney students to discuss online during class.

When you think of Implementation, what does it mean or imply to you?
And a second question, what is Evaluation?
(James, Message 1)

Students posted individual messages and the online contributions were forthcoming for a period of approximately ten minutes. During that time, the students posted fourteen messages and the instructor posted one additional message to guide the

discussion. Although the online interaction was brief in duration, the exercise was taken seriously. The tone of the messages is illustrated in the Table Y.2.

TABLE Y.2 Case Two, Week 1: Discussion Forum—Sample messages from Thread: <i>Concepts of Implementation</i>
Implementation implies taking something and going through a process of identifying users,marketing,working with stakeholders and getting the something used. That process may require major cultural change and implementation is not always successful. (George, Message 2)
Implementation means putting an educational idea or theory into actual practice. Evaluation means assessing whether the practice works well. (Thomas, Message 3)
Implementation: presumably in the sense of technology based learning; pick the software, stick in a system accessible to students, then get them using it. Is that just a little too simplistic? Evaluation: picking the software; deciding whether the particular software under consideration has pedagogic merit in the specific circumstances under which its implementation is being considered. (better?) (Ian, Message 4)
Implementation would suggest successful completion of a project or a task, that would most likely include planning, analysis, evaluation and dare I say it 'implementation of a solution' Evaluation is a task performed during the life of a project. Evaluation should be an interactive process undertaken at various stages to test the validity/impact of conclusions, design or solution. (Ros, Message 7)
To me implementation means when you take drive/progress a project/plan through to completion. Hopefully prior to implementation you have had some sort of concept and planning. Implementation would include evaluation and assessment of some sort.... What is evaluation? This is all too hard. Well we've heard of summative and formative need I say more? (Patricia, Message 11)
Implementation (in a learning context) is the manner in which a learning system is delivered...it could include the range of technologies used and how they are used and administered in a learning environment. Evaluation considers the effectiveness of the learning program in terms of learning outcomes. (Angela, Message 12)

The last message posted in the discussion thread in class time exemplified how the online postings were content focused. It was posted by Thomas: "Does everyone in this course have a PH.D in education? I can't understand most of your answers".

During this online exercise, only one student, Ian, attempted to initiate online discussion. His message read as follows:

So, george what do you see to be the major factors influencing failure in implementing technology?
(Ian, Message 9)

George however, did not post a message in reply to Ian's question.

A GLIMPSE OF ONLINE INTERACTION AMONG STUDENTS OCCURRED OUTSIDE *class time*

Whilst the off-campus class was in progress, a student from the on-campus class, Jonathon, attempted to communicate with the students in the Sydney class by posting a message in the Live Chat space. This is illustrated in Excerpt Y.2. Jonathon, however, did not receive any reply. This was because the Sydney students in the off-campus class were using the Discussion Forum tool.

James - 07/22/97:18:57:	Hi shirley [researcher], we are about to go to the forum on implementation
Researcher - 07/22/97:18:58:	OK, I'll leave you all to it!
Ian - 07/22/97:18:58:	Alright then, see you later.
James - 07/22/97:18:58:	No why don't you look at the thread?
Researcher - 07/22/97:18:59:	Will do
James - 07/22/97:19:02:	has this dissappeared
James - 07/22/97:19:02:	

Ian - 07/22/97:19:04:	hello again
Jonathon - 07/22/97:19:20:	Hi! Shirley or James, My user id is [email address] if anybody else is still there, hi!
Jonathon- 07/22/97:19:21:	(By the way, I am in the Wollongong class)

EXCERPT Y.2 Synchronous Live Chat online discussion conducted in Week 1

At the end of the first week, Lorraine (from the Wollongong class) and Thomas (from the Sydney class) posted several messages in the Discussion Forum. Lorraine added two messages to the *Silly Things* thread; one message to the *How was your day?* Thread; and contributed to the *Concepts of Implementation* thread. Her messages, which are shown below, illustrate that she was experimenting with the tool but also trying to interact with the students—both the on-campus students and the off-campus students.

Thread: Silly Things (Message 3 of 6)

Lorraine

Hi - just looking and thought I'd follow Paul's lead and try this out!

Thread: Silly Things (Message 4 of 6)

Lorraine

I'm worried - Paul started to mention rhinoceros...but then didn't write any more - what silly things were you about to impart to us...

Thread: How was your day? (Message 4 of 4)

Lorraine

Anybody out there from Monday night's group? Check out the messages from Tuesday night! First lesson and they're already into deep and meaningful - scary!

Thread: Concepts of Implementation (Message 17 of 17)

Lorraine

I look on evaluation as being an ongoing issue rather than just conducted at the end of a program. Formative evaluation is usually conducted...while summative evaluation is conducted...

Thomas posted one message in the *Silly Things* thread. This message, shown below, illustrates his first attempt to interact with the students from the on-campus class.

Thread: Silly Things (Message 5 of 6)

Thomas

This is a great topic. Don't tell James but I think that this should be the title for the whole course. I can't spell rhinosterous but I think that it is preposterous that you chose this animal rather than saya poodle.

DISCUSSION

From this initial online interaction, two issues surface. Firstly, the description illustrates that online interaction driven by a task is of a different nature than online interaction with no task focus. Secondly, the postings by Lorraine and Thomas in the Discussion Forum and Jonathon's introduction in the Live Chat space demonstrate that several students were attempting to create an online community at this very early stage in the subject. Unfortunately, their initial contributions were not "rewarded", as they did not receive any feedback.

EPISODE 5: THE WEB SITE HOME PAGE IS RE-DESIGNED

REASONS FOR THE RE-DESIGN

In Week 6, the researcher implemented a modified Web site home page. The message bar that appeared on the home page was replaced with a “Notices” Section and a “Tool Tips and Your Say” section was added. Figure Y.1 illustrates the modified home page. The re-design was implemented for two reasons:

1. The subject Web site was evolving and the researcher felt that the existing message bar did not provide adequate space to explain the Web site changes to students. Examples of additions made to the Web site in the first six weeks of semester include:
 - A *Summary of Discussions* space was added to the Home Page in Week 2.
 - The Web pages produced by the students in Case One were added to the Web site as resources for students to produce their Web Study Guides.
 - Students photos were added to *Student Profiles*. The researcher thought that the photos of the students may assist in establishing more online rapport between the two classes.
 - DISCUS was added to the subject’s CMC tool set.Thus, the researcher thought that the students needed to be informed of the additions to the class Web site as well as be given instructions about class activities. Thus *Notices* was created, which provided students with all the latest updates about the subject and about the Web site. (An example is provided in Appendix Z.)
2. Because students were using a form of technology-based learning while learning about it, the researcher thought to allow students the opportunity to provide feedback about the subject and their use of technology in the subject. Students were able to post their feedback to the Web site via the *Tool Tips and Your Say* hyperlink.

FIGURE Y.1 Case Two: The revised Web site Home Page implemented in Week 6

DISCUSSION

During the second half of the session, several comments were posted to the *Tool Tips and Your Say* area about the changes made to the Web site. The chronology of the messages posted is provided in Excerpt Y.2. The feedback suggests that whilst the researcher thought the changes would assist students, several students thought the changes made to the Web site during the subject were confusing and there was too much information available.

1. Useful but rather overloaded:

I find the Web site for EDGA 957 is useful and challenging but I think a bit overloaded since lots of work to do particularly for designing a Web study guide. Or may be I am a little bit technofobic or out of dated student. Any comment ?

Anonymous

2. Thanks for the first comment!

Thank you for your feedback! It is important to receive such comments as this Web site is designed for your use and if it isn't meeting your needs is it important for us to know why and consider how we may improve it. May I ask - could you be more specific about this site being "overloaded"? I look forward your reply.

Researcher

3. Web site:

I agree with the comment regarding this web site. It is a little confusing when new categories are constantly added. It may be better to establish the range of options first, even if they are empty and then build them us as we go along.

Anonymous

4. Access to this Web site:

For the past two weekends I haven't been able to get into the site. Is there maintenance going on or something? It's been a bit frustrating as I haven't got much time during the week, and I need to look at the Web study guides on-line. As a result, so far I've only really had a good look at one! Just for the record...I've found this site quite clear and easy to navigate, although I agree it would be better to start with the various headings. I particularly like all the headings listed at a central point on the home page...if you get lost it's easy to go to this page and find your way back to where you want to go.

Angela

EXCERPT Y.2 Chronology of messages posted in the *Tool Tips and Your Say* section of the subject Web site

In the end-of -subject questionnaire, students were asked the following question:

The class Web site was modified in the early weeks of session. The main menu was restructured to include a Notices and Tool Tips and Your Say section. What did you think of the changes made?

(Question 11d, End-of-subject questionnaire)

Of the 15 out of 17 students who responded to the questionnaire, all but one thought the Web site changes were useful. One student, from the Wollongong class, thought the changes caused confusion. This student's feedback was: "I think there got to be a lot of locations and I got confused as to where things might be. Change confused me".

In the post-subject interview, the instructor suggested that new notice messages should be displayed on the home page and the old notice messages should be archived yet accessible from the Web site.

The findings concur with the cautionary point provided by Hill (1997) regarding regular updates to a Web site. "While it is easy to make changes to the environment, too much change can potentially be distracting for the learner. A Web page template should be established and adhered to in order to minimize learner dissonance" (p. 77).

EPISODE 6: WEB STUDY GUIDE PRODUCTION AND EVALUATION—NO TIME FOR ONLINE DISCUSSION!

DESCRIPTION

During the non-meeting period between Weeks 6 and 8, students worked on their Web Study Guides and were also to participate in another online asynchronous discussion devised by the instructor. The discussion focused on another assigned reading. The instructor created a DISCUS discussion thread: *Week 7-Thoughts on the Kulik and Tennyson Articles* and posted the following message:

The two articles...are...Kulik, Bangert & Williams, and...Tennyson who is summarising a number of different author's viewpoints about how media can be used for teaching. Basic questions that you might raise are:

What do these two articles say about learning from technologies and how does their analysis compare with Gayeski?

What would you say about the methodologies employed and which discussion would drive your decision-making as an implementor of technology in learning?

Only two contributions were made to this online discussion. Isabel posted one message; the researcher posted the other.

Between Weeks 9 and 11 the students were engaged in completing their third assignment (evaluating all the Web Study Guides). Realising that little online discussion had occurred, the researcher tried to encourage an online community presence by creating another discussion thread in DISCUS titled: *Web Study Guides - feedback, questions, etc.* The first message read as follows:

I thought to create this discussion topic so that if you wish to give feedback regarding the Web Study Guides, you can do it here! Also, you may wish to ask fellow students how they did something in their Web Study Guides, eg., where did you find that graphic?, or how did you do that? etc.

Only Angela and Thomas contributed to this discussion thread and the researcher responded. A total of six messages were posted; two from the students and four from the researcher.

DISCUSSION

The description illustrates that whilst the students were engaged in completing their assessable work, online discussion was given a lower priority. The student feedback outlined in Table 5.19 alludes to a lack of association between the asynchronous online class discussions and the assessment tasks. This suggests that the online discussion tasks were not perceived by the students as supporting their current tasks, that is, producing a WSG and evaluating the WSGs. It appears that the online discussions were perceived simply as “extra work” and were seen as peripheral to the assessment tasks. This is similar to the finding that surfaced in Case One.



APPENDIX Z

CASE TWO: "NOTICES" FROM SUBJECT WEB SITE EXAMPLE FROM WEEK 6

Updated: 26th August 1997
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