Evaluation of the Effectiveness of a Tertiary Course Delivered via the World Wide Web

The Case of the 86.761 Course – "Learning with Computers"

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A thesis presented in partial fulfilment of the requirements for the degree of Master in Education at Massey University.

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ABSTRACT

Delivering courses via the World Wide Web is a relatively new phenomenon. Evidence on how it can promote learning is still under investigation. The main objective of this thesis is to evaluate the effectiveness of a tertiary course, 86.761 "Learning with Computers", delivered via the web, and contribute to the formation of a body of knowledge on this subject.

The research is organised into three phases. Phase one involves the design of the web-based course and an interview with the Paper Co-ordinator which documents his perceptions of teaching via the web, the objectives, pedagogical strategies and web tools used to deliver the course content, and the design of the user interface. Phase two of the research describes the implementation of the web-based course. In the third phase, a questionnaire is used to gather data on the students' perceptions of the various aspects of the web-based course. It also involves another interview with the Paper Co-ordinator, which describes his perceptions of teaching via the web, after the implementation of the web-based course.

Analysis of data shows that there had been a positive evolution in the Paper Co-ordinator's perceptions of teaching via the web. Regarding the students' perceptions of learning via the web, results suggest that it was a positive and valuable experience, meaning a step in the right direction, yet with plenty of room for improvement. As for the objectives of the web-based course, some were clearly better achieved than others. The pedagogical strategies used to deliver the course content were accomplished with different levels of effectiveness. The results also reveal that the web tools used in the web-based course achieved various degrees of success. Finally, with respect to the user interface, findings show that the web-based course was simple,

easy to use and friendly. The aspects of consistency, access and navigation were considered acceptable, yet with plenty of room for improvement. However, the aspects of online help, advice and customisation were considered inadequate. In summary, this thesis was moderately successful in achieving its main objective. More research is needed on how to effectively use the web for teaching and learning.

Acknowledgements

This research was committed to evaluating the effectiveness of a tertiary course delivered via the World Wide Web. This evaluation would not have been possible without the co-operation and participation of the post-graduate students involved. The research was dependant upon their participation and I wish to express my appreciation for their time and for the rich information provided. In particular, I would like to thank the Paper Co-ordinator for his time and the invaluable information provided through the various interviews.

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Glossary

ARPRANet	A packet switched network developed in the 1960s.
Asynchronous Communication	A term that indicates that communication can take place without both parties being logged on at the same time.
Browser	A software used to read hypertext information and navigate trough various web sites (e.g., Netscape Communicator, MS Internet Explorer).
Chat mode	Form of communication in which messages are exchanged in real time rather than stored for later reading.
Discussion Forum	Online discussion group in which users contribute comments to be read by all other users.
Electronic mail (Email)	Electronic transmission of messages sent across a network to an individual or a group.
File Transfer Protocol (FTP)	Standards allowing the transfer of files to and from a host computer.
Gopher	An early form of computerised information distribution system. Gopher is a menu based system protocol, which allows a computer to maintain a database of information, which can be searched by other computers through the Gopher protocol.

"Lurker"	A person who mainly reads or listens to a mailing list document or Usenet newsgroup, without actively participating.
Modem	Computer peripheral device allowing information to be exchanged over a telephone line between computers.
Multimedia	Communication format integrating several media (text, audio, visual and animations), most commonly implemented with a computer.
Network	A communication system linking two or more computers.
Platform	Refer to a specific computer or operating system (e.g. a Macintosh is a platform). Platform independent means that a piece of software should work on a computer no matter what its operating system or make.
Synchronous Communications	Data communication in which transmissions are sent at a fixed time rate (e.g. two or more individuals communicating online at the same time to one another).
Telnet	A basic function provided by the TCP/IP protocol on the Internet is Telnet. This allows an individual to interact with another computer is she or he were directly connected to the remote computer.
Transmission Control Protocol/Internet Protocol (TCP/IP)	Standards that allow different computers to transfer data over the Internet.
Upload	Transfer electronic data from a local to a remote computer.
User Interface	Methods by which the user interacts with the contents of a computer application.

WebCT (World Wide Web Course Tools)	An authoring software package used to design and deliver content via the web.
Wide Area Information Service (WAIS)	A form of database available on the Internet.
World Wide Web (WWW or web)	Information available in hypermedia through the Internet.

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CHAPTER 1

Introduction

Twenty five years ago Bill Gates and Paul Allen, two famous computer gurus, were standing at a Harvard Square news-stand reading the January issue of the "Popular Electronics" magazine. On the magazine's cover was a photograph of a very small computer: the "Altair 8800". It was being sold for $397 as a kit. When it was assembled, it had no keyboard or display. When Bill and Paul read about this first truly personal computer (PC), they did not know exactly how it would be used, but they were certain that it would change people's lives and the world of computing for ever. They were right! The personal computer revolution happened and it has affected (and is still affecting) millions of lives. It has led us all to places and situations we had barely dreamed of. The creation and evolution of the personal computer has created today a $150 billion high-tech industry. The personal computer opened a road of innovation for the creation of sophisticated business applications, on-line systems, Internet connections, electronic mail, multimedia titles, authoring tools, games and education systems. Above all, it became the foundation for the next revolution.

Twenty-five years have passed and a more recent phenomenon has started. It is one of the most spectacular technological phenomena of the 1990s: the development and acceptance of the Internet as a means to communicate, to search for information, to shop electronically, to teach and learn, and do all sorts of other functions that affect everyone's lives. The Internet (or the net

as people call it) is a hot issue. It is the topic of endless newspaper and magazine articles, television programmes, conferences, and rampant speculation. Indeed, we are all leaping into the future and Bill Gates has made many pronouncements about the importance of the Internet for the future of computing and digital information exchange.

"We are all beginning another great journey. We aren't sure where this one will lead us either, but again I am certain this revolution will touch even more lives and take us all farther. The major changes coming will be in the way people communicate with each other. The benefits and problems arising from this upcoming communications revolution will be much greater than those brought about by the PC revolution" (Gates, 1995, p. XI).

1.1 Background to the Study

Internet is the new "buzzword" in education, though it has been around for quite some time. When did the "Internet mania" start and what are its main implications? The beginning of the Internet can be traced back to the 1960s (Brown, 1995) when the US Department of Defense developed the earliest version of a large international network (a predecessor of the Internet). The recent widespread use and fast growing popularity of this new media is providing new opportunities for delivering distance education courses, a result of the combination of the Internet with the existing powerful means of communication. The development of the World Wide Web, commonly known as the "web", and the subsequent creation of graphical browsers boost the popularity of the Internet. The Internet, then, has shifted from being a communication network of text-only to a powerful multimedia communication system with applications that, according to Shotsberger (1996), have the potential to revolutionise teaching and training. There is no doubt that the web has made the Internet much easier to use, opening up its use to a much broader group of users with limited computer experience. As long as one has web browser software, an account with an ISP (Internet Service Provider) and a computer with certain minimum requirements, one can use the web effectively. It is not surprising then that the web is

now recognised as holding potential for a whole breadth of activities, in particular, for education (Kapur & Stillman, 1997).

Since 1991, when the web became the mainstream of Internet communication, extraordinary growth has taken place, and it continues to grow at an unprecedented pace. The "web" is not only on the lips of every educator and businessperson, but also it is fast becoming common knowledge in virtually every way of life. Today, the web connects over 180 countries and many people as well as organisations rushing to build homepages as a means to present, advertise, sell and deliver new products. The number of instruction-related web sites are growing all the time. In fact, over the last few years, there has been a massive rush to place courses on the web. These efforts represent a broad range of intentions, from the archiving of classroom artifacts to offering supplemental instruction, to even providing an opportunity for individuals to complete a course remotely. An extensive list of web courses offered world-wide has been compiled by the University of Texas at Austin's World Lecture Hall[1]. This site illustrates the variety and quantity of web courses delivered around the world. Topics range from Accounting to Zoology. A short summary of each course and details of content are also available. At the time of writing this thesis several hundred courses were registered there. The World Lecture Hall registry mentioned here is undoubtedly only a tip of the iceberg in terms of web usage, because not all faculties would bother to register their courses there.

The general view is that the web is a reality. It is here to stay. The appeal and advantages of this media are immense when compared with traditional delivery methods. The web is unique in its ability, not only to carry a variety of media (e.g., audio, video, animation and chat) but also to do so from virtually anywhere at an affordable cost. Many pundits consider the web "as the way to go" for the future. Many even predict that it will not only revolutionise instruction (Reeves & Reeves, 1997), but also will supersede other more conventional methods of teaching.

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[1] The address for this web site is: http://www.utexas.edu/world/instructiona/index.html

Others, more cautious, favour a more balanced coexistence between traditional methods and web-based courses.

Perhaps the greatest challenge of the web is to create learning activities that can take advantage of the characteristics of the medium rather than simply duplicating activities that typify conventional classrooms. The mere transferring of teaching and learning formats from conventional classrooms to the web falls far short of the potential yield of this new medium. Designing and delivering instruction on the web requires thoughtful analysis and investigation on how best to use the web's potential (Khan, 1997). Barry Diller (cited in Alexander, 1995) once wrote a message to publishers of electronic magazines that applies to all educational developers. He stated:

"Taking magazine articles and slapping them online, word by word, that's repackaging...Redefine, don't repackage. Redefining the mission of your ventures is slow, brain-bending work...A new medium can empower and liberate you - if you let it" (Barry Diller, 1995, cited in Alexander, 1995, p. 3).

The quantity of educational material being published on the web is growing every year (Barnard, 1997). However, the quality of these materials varies considerably ranging from richly varied graphics and content pages to simple copies of text equivalents. The process of delivering courses through the web is considered to be in an infant phase (Newmarch, 1997). There is much to learn about mastering this medium for effective teaching and learning. The question as it stands today, is not "if" but "when" and "how" to effectively use this new powerful media. Evidence on how it can promote learning is still under investigation. In order to make it a credible means of education, there is a perceived need to address the issues of consistency and high quality content delivery.

Because delivering courses via the web is a relatively new phenomenon (Welton & Welsh, 1997; Siegel & Kirkley, 1997) more research is needed to determine the effectiveness of this technology in the delivery of instruction. The purpose of this thesis is to evaluate the

effectiveness of a tertiary course delivered via the web and, therefore, contribute to a better understanding on how to use the web for effective teaching and learning.

1.2 Definition of terms

There is frequent misuse and confusion in the literature about the terms "Internet" and "World Wide Web". At this stage, it seems appropriate to dispel some of the confusion surrounding these two terms before proceeding to the following chapters. The Internet, often referred to as the "net", is an unorganised collection of networks that includes local area networks, dedicated computer lines, telephone lines, and satellite links. Any one computer has to be physically connected to another computer, usually via a modem, using telephone lines to transmit and receive information. The World Wide Web, often referred to as the "web", is one of several services on the Internet. The web is one of the most exciting parts of the Internet because of its multimedia and hypertext capabilities.

A course delivered via the web is often referred to in the literature as "web-based instruction", "Internet-based course" or "web-based course". For consistency, the term "web-based course" is used throughout this thesis. A web-based course is a term that needs clarification. It basically means that the web is used as a mechanism to deliver the instruction. However, it should be noted that, as McCormack and Jones (1998) stress, a web-based course might use Internet applications such as email and file transfer protocol (FTP).

Finally, it is important to note that, although the author of this thesis has made every effort to consistently use the term web-based course throughout the thesis, other terms such as "web-based delivery option" and "WebCT" have the same meaning and have been used interchangeably in quotations and blocks of text based on outside sources.

1.3 Organisation of the Thesis

No building could be erected and maintained without a proper structure in place. The same principle applies to this thesis. Like many other theses, written as part of a Master of Sciences degree, this one adopts a fairly classical structure. The idea was to restrict the number and title of the chapters to a short number of meaningful topics.

Chapter one is called "Introduction" and, as the name suggests, is a basic introduction to the topic. Chapter two is called "Literature Review". It includes an overview of the technologies used in distance education as well as reviewing research done on the effectiveness of web-based courses. It also presents the thesis' problem, the aim of the research, the research questions and the scope of the thesis. Chapter three is entitled "Methodology" and presents the methods and principles used in the research design and data collection used throughout the thesis. It mainly outlines the methodological approach that guided this research.

The research work underlying this thesis is divided into three phases: Phase one refers to the design of the web-based course and an interview before implementation. Phase two refers to the implementation of the web-based course, and phase three refers to the evaluation of the web-based course. Therefore, chapters four, five and six reflect these three phases of the research. Chapter seven is entitled "Discussion of the Results", and, as the title suggests, is dedicated to analysis and discussion the research findings. Finally, chapter eight is called "Conclusions and Recommendations". It concludes with a summary of the main findings and includes a list of recommendations for further research in the same topic.

CHAPTER 2

Literature Review

Distance education incorporates many different technologies for delivering course content. These range from printing to other more complex technology-based media. This chapter starts by debating and defining the term "distance education." Having established a definition, one moves forward to briefly discuss the evolution of the media for delivering distance education content. It also includes a review of the most recent modes of delivery: the Internet and the World Wide Web. Given the relevance to this thesis, this chapter also reviews research done on evaluating web-based courses for higher education (University). The main areas covered by these researches are (a) students' perceptions of learning via the web, (b) teachers' perceptions of teaching via the web, (c) web technologies, and (d) user interface. Finally, it presents this thesis' problem, the aim of this research, the questions pursued in this thesis, as well as its scope and significance.

2.1 What is Distance Education?

There are a number of issues when attempting to define distance education. The first problem relates to the lack of unanimity when using the terminology in the field. Keegan (1980) proposes the adoption of "distance education" as a generic word that covers the major terms used by distance education institutions in the English-speaking world, and provides equivalent terms for the major European languages. Since the early 1970s, such designation has been

gradually adopted in the United Kingdom, North America, Australia, New Zealand and other parts of the English-speaking world, as well as internationally (Holmberg, 1989; Verduin & Clark, 1991).

Despite the gradual acceptance of this terminology, there are inherent problems as to its exact meaning and scope. The problem lies in finding a middle ground between an ideal definition and the existing reality. Kaye (1988) notes that because of the enormous diversity of systems, projects and institutions that teach at a distance make it very difficult to provide a definition other than one in terms of contrast to conventional face-to-face, classroom-based instruction. While almost every definition refers to the separation of teacher and student, many also reflect other illuminating perspectives. Holmberg's (1977) definition, for example, includes two elements that are considered essential: (1) the separation of teacher and student and (2) the planning of an educational organisation. However, in Holmberg's (1977) definition there is no direct mentioning of the need for mediated communication. Conversely, Moore's (1973) definition directly addresses the issue of mediated communication. Moore's definition highlights three characteristics: (1) the separation of teacher and student; (2) the use of technical media; and (3) the possibility of two-way communication.

Keegan attempted to offer a first comprehensive definition of distance education in 1980 and subsequently revised it in 1986 and 1990. Keegan's definition is based on the analysis of existing definitions proposed by Holmberg (1977), Peters (1973, cited in Keegan, 1990, p.37) and Moore (1973). Keegan's (1990) latest definition identifies the following key characteristics: (a) quasi-permanent separation of teacher and student; (b) influence of an educational organisation; (c) use of technical media to unite teacher and student to the content of the course; (d) provision of two-way communication; (e) quasi-permanent absence of the learning group.

Keegan moves away from an emphasis on the use of print material in the 1980 definition to acknowledge, in 1986 and 1990, that computers and a wide array of other technologies may also serve to engage teachers and students and convey content. However, the quasi-permanent

absence of learning groups in his latest definition risks excluding other important methods of delivery, such as teleconferencing. Moreover, there are many distance education institutions, such as the University of Wisconsin-Extension's Educational Telephone Network, that use distance group studying and learning (Verduin & Clark, 1991). This proves that Keegan's definition is far from comprehensive.

Garrison and Shale (1987) propose a more realistic and comprehensive definition. Their objective was to avoid the exclusion of new emerging forms of distance education such as teleconferencing and the Internet. The basic tenets of their definition are: (a) distance education implies that the majority of educational communication between teacher and student occurs non-contiguously; (b) distance education must involve two-way communication between teacher and student; (c) distance education uses technologies to mediate the necessary two-way communication.

For the purpose of this thesis, the Garrison and Shale (1987) definition of distance education will be used. The open and comprehensive framework of Garrison and Shale avoids the duality criteria of whether an educational activity should or should not be considered as distance education. Since the boundaries of distance education are often unclear and imprecise, therefore some vagueness must be expected if the intention is not to exclude activities that might reasonably fall under the scope of distance education.

2.2 Use of Media in Distance Education

An important aspect of distance education is the media used as a means of delivering content. According to the literature, one of the first distance education experiences took place in England during the nineteenth century. Isaac Pitman began teaching shorthand by correspondence in Bath, England, in 1840. Students transcribed passages of the Bible into shorthand and returned these to Pitman by using the "Penny Post" service (Rumble, 1986; Verduin & Clark, 1991). The passages were then corrected and returned to the students. In the

1880s William Briggs began to offer instruction by mail (Perraton, 1982). About the same time, Hans Hermond offered postal service to a number of his students who had moved away from town (Rumble, 1986). These early attempts at distance education relied heavily on an efficient postal service. Since then, advances in communication technologies have provided alternative delivery options for distance education. Increased interaction between teacher and student, and a desire to access wider and better information, have been driving forces underlying the use of new technologies to support the goal of learning at a distance. A wide range of media is now available. Contemporary distance education encompasses not only one-way communication technologies, but also interactive media such as the telephone, the video and the computer which permit student communication with teacher (Wiesner, 1983).

However, Brown and Brown (1994) argue that new technologies for delivery and interaction have not, instantly, replaced other serviceable existing modes. The old and the new must coexist to form an ideal mix for providing the best possible solution for every case of distance education. Tonta (1995) suggests that the older, more familiar technologies, such as print and audio, still have much to offer in terms of learning and cost-effectiveness. The author goes on to argue that newer technologies are not automatically superior and will still need to prove themselves. Holmberg (1995), on the other hand, believes that modern technologies have led to great improvements in distance education. Search for information in electronic databases, the widespread use of the Internet and the emerging possibilities of applying hypertext technologies are, no doubt, promising elements in the presentation of the subject matter. Electronic mail can eliminate the harmful procrastination characteristic of student-teacher interaction in writing. Electronic forums and chats have the potential to increase two-way communication and add value to traditional delivery modes. Video, sound and multimedia greatly improve the comprehension of many subjects, making learning an enjoyable experience. These are a few examples of the potential of the new technologies available.

Regarding the selection of the appropriate media, it is important to remember that each medium has advantages and disadvantages. Kaye (1988) stresses that some media are more

suited to specific learning objectives than others. Dewal (1988) recommends that it would be unwise to use media only because they are available. The chief criterion should not be the availability or access to media but their instructional potential and their teaching effectiveness. Kirkwood (1994) suggests that an alternative approach is to consider the desired learning outcome and then use this analysis to help in the selection of the appropriate media.

A schematic representation of the choice of media for carrying content in distance education courses is represented in Figure 2.1.

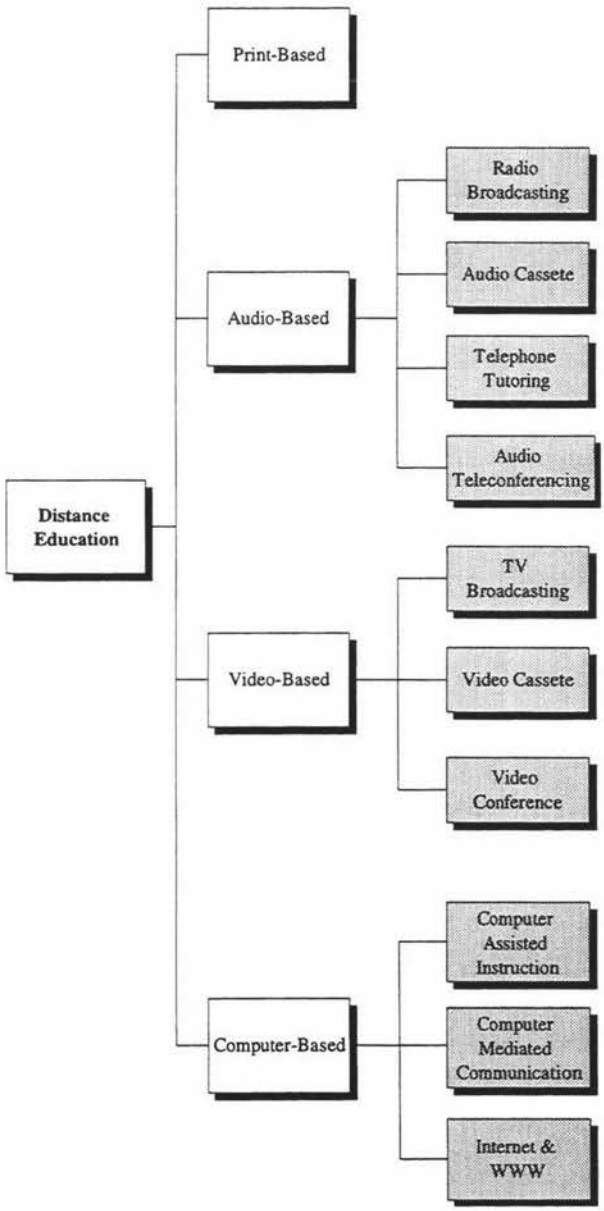

Figure 2.1 — The main media used in distance education

Source: Adapted from Keegan (1980)

The topic of this thesis focuses on the evaluation of the effectiveness of using the Internet and the World Wide Web for delivering educational content. Therefore, only these two modes of delivery will be reviewed hereafter. For those eager to deepen their knowledge on the other modes of delivery, a summary with brief descriptions is included in Appendix A of this thesis.

2.3 The Internet

This section presents an overview of the Internet. The Internet is a common name to designate a collection of interconnected computer networks all sharing the same TCP/IP protocol (Transmission Control Protocol/Internet Protocol). It comprises about 20,000 separate computer networks (federal, national, regional, campus). It was born twenty five years ago as ARPANet (Advanced Research Projects Association Network) (Tonta, 1995). The aim was modest. The ARPANet was an experimental network designed to support military research. Today, the Internet is an international network used for research, commerce, education and entertainment. According to Minoli (1996), the number of universities and research laboratories using the Internet has increased from 200 in 1988 to more than 10,000 in 1993. The number of host computers grew from 1 million in 1992 to 2 million in 1994 and 5 million in 1995. The numbers are still growing.

The first services offered by the Internet were electronic mail, file transfer protocol and Telnet. Electronic mail was for exchanging electronic text messages. File transfer protocol (FTP) was a method of accessing a remote computer to electronically move files across. Finally, Telnet, was a method to log in into other Internet computers and have access to certain public service information, such as libraries, catalogues and other types of databases.

The Internet can also be used as an important means to store and disseminate information. The most common methods available for this purpose are:

1. **Mailing lists** — Allow users to send electronic mail to a group of people by using a single electronic address. This convenient method of announcing or disseminating information is particularly convenient to announce timely material, arrange meetings and for group discussions among the list;

2. **List servers** — This is an enhanced form of mailing lists. Mainly refer to programs that manage mailing lists. Users have to subscribe to certain mailing lists and the server provides a number of features, like automated list management and document distribution, ideally for easy management and dissemination of information;

3. **Usenet newsgroups** — Is an electronic bulletin board on a specific topic. By using "newsreader" programs, people can read messages ("articles") that have been posted by other users, and can participate in discussions by posting their own articles. This is what people called "bulletin boards" or discussion groups. Usenet is the world's largest bulletin board service (Tonta, 1995);

4. **The Internet Gopher** — This is a document search and retrieval system. It provides a convenient way for beginners to get to know the Internet. Since Gopher servers are menu-based, there is no memorisation of cryptic commands. When the user finds something he or she likes, he or she can read or access it through the Gopher without having to worry about domain names, IP addresses, changing programmes, etc. The great advantages of Gopher are the ease of linking users transparently to information services everywhere on the Internet and the ease of navigating effortlessly through the use of a simple menu. Gopher information servers are most appropriate as places to publish information that does not change frequently;

5. **Wide Area Information Server (WAIS)** — This is a distributed text searching system ideal to find information in large indexed electronic databases. This tool is great for searching and finding articles based on what they contain. The WAIS allows users to search through Internet archives looking for articles containing groups of words. Like

Gopher, WAIS allows users to access resources on the network regardless of where they are. In Gopher, users do so by looking through a sequence of menus until they find the information required. WAIS does the same thing, but it actually does the search. The user input the information key words and the WAIS will try to find the material requested.

There is no doubt that the Internet has changed the way people communicate, share resources, deliver and access information as well as educate. No communication media has ever grown as quickly (The Economist, 1995). However, the Internet is still an evolving technology. Trentin (1996) recommends that, in order to avoid repeating some of the mistakes that accompanied the introduction of other technologies into education, one must first of all consider the Internet for what it really is. This means the existence of a powerful resource for accessing distributed information and a means to develop interactivity and interpersonal communication. The author further stresses that the success of using the Internet in education strictly depends upon the selection of the most suitable approach in order to produce "added value" for the course.

2.4 The World Wide Web

The World Wide Web (also known as "WWW" or simply the "web") is one of the latest advances in information exchange using the Internet. The web brings text, images, audio and video almost seamlessly onto the desktop making them all accessible by the simple click of a mouse.

Incompatibilities of platforms and tools in the use of the Internet frustrated users during communication and data retrieval, limiting their actions to a fixed linear or hierarchical path. To overcome these obstacles, Tim Berners-Lee, a physicist at *Conseil Européen pour la Recherche Núcléaire* (CERN) proposed a hypertext project in 1989. This web of information nodes hyperlinked together, rather than in a hierarchical tree or an ordered list, became available as the "World Wide Web" in December 1990 (Starr, 1997). It was put up on the Internet at large in the

summer of 1991 (Crossman, 1996). However, it did not take off until Marc Andressen, then an undergraduate at the University of Illinois, and others wrote a program called "Mosaic". In February 1993, Mosaic became the first graphical WWW browser with the capacity to display images, screen video clips and play audio files (Starr, 1997). Furthermore, all the original uses of the Internet such as FTP, email, Telnet, Usenet news and Gopher continue to thrive into the context of the web and have now converged into a singular information tool.

One feature that makes the web an attractive medium for delivery of instruction is the cross platform distribution. It means that the designer of computer based instruction no longer has to worry about producing separate versions of programs for Macintosh, DOS, Windows and UNIX. In addition, hypertext on the web provides the simplest form of user interaction, enabling user control of information. Crossman (1996) notes that the web, as an instructional technology, is unique in its ability not only to carry a variety of media, but also to do so from virtually anywhere. The author further stresses that the web has the potential to become the most comprehensive communication system ever developed.

There is no doubt that the web provides an exciting new opportunity for distance education. As the capabilities of the web have become more widely known, understood and applied students and universities have been quick to utilise its potential. The British Open University, for example, is now beginning to exploit the web (Hobbs & Taylor, 1996). Owston (1997) suggests that there is promising indication that the web is a viable means to access education material. The author, however, argues that the key to successfully promote improved learning via the web appears to lie in, how effectively, the medium is exploited in the teaching and learning situation. Alexander (1995) adds that the greatest potential for using the Web lies in the fact that it provides a chance to learn from the lessons of the previous faded technologies, and an opportunity to develop new learning experiences for students, which have not been possible before.

2.5 Review of Research

Internet courses for distance education constitute a vast, yet new area of research. Due to the popularity of this media, many articles, emphasising the use of the web for education purposes, started to be published recently. However, to suit the purpose of this thesis, the only research reviewed here is that concerning evaluation of web-based courses for tertiary education (University).

Delivering courses via the web is a relatively new phenomenon (Welton & Welsh, 1997; Siegel & Kirkley, 1997). Little research evidence exists to support claims for the effectiveness of web-based courses (Reeves & Reeves, 1997). Windschitl (1998) stresses that it will take some time for studies in this area to be published and be made available. In this section, reviews of ten different research articles have been included. These vary widely in terms of their nature, scope and complexity, ranging from a PhD thesis to simpler research articles published on the web. Despite a wide variation in terms of the sample covered (from 7 to 250 students in different courses) there is a common denominator: the evaluation of different aspects of web-based courses offered for tertiary education. The various reviews of research cover, with different degrees of emphasis, the following four main themes: (1) students' perceptions of learning via the web; (2) teachers' perceptions of teaching via the web; (3) web technologies used to deliver course content; and (4) user Interface.

2.5.1 Students' Perceptions of Learning via the Web

This section presents the review of research concerning the students' perceptions of learning via the web. Fong's (1997) research, for example, indicated that students found learning via the web helpful and they liked the flexibility of accessing the online content at any time and from their homes. Students also found the online material more interesting than attending lectures. Students did not like some features of the web-based material, such as difficulties in logging on to the university server, eyes getting sore while reading the material on a computer screen for

long periods of time, and the fact of not having Internet access from home. However, the research by Fong used a purely quantitative approach to elicit students' perceptions of using the material on the web. This was a weakness in terms of the comprehensiveness and richness of the analysis. Although the author provided valid insights, it would be desirable and quite helpful to complement Fong's approach with some qualitative statements based on the feedback from the participants. The combination of the two techniques would have allowed a more meaningful expression of the findings. Similar research by Bhuripanyo (1997) revealed that students agreed that the web could be used as a new delivery method of the content. However, students perceived that the course content should be delivered in the form of a traditional classroom instead of a web-based instruction. They mentioned that the web-based course had not met their expectations.

Saunders et al. (1997), on the other hand, used a number of qualitative techniques for the collection of data to describe the students' perceptions of learning via the web. Results indicated that the amount of time spent in locating web links, accessing and exploring the web page environment and fulfilling the course requirement was a constant concern for most of the students. Saunders et al. also found that the amount of effort placed on the web page by the students went hand-in hand with the corresponding course requirements. It was also found that a number of students had to invest their financial resources buying computer equipment and Internet access to save time and effort. Despite the above concerns, Saunders et al. revealed that students found the web page a worthwhile supplement to the paper-based course. Although Saunders et al. provided a detailed analysis of the students' perceptions of learning via the web, the nature and type of enquiries were very much geared towards discovering the cognitive and effective management strategies used by the students during the course. This means that the enquiries were limited in scope, not ascertaining, for example, the overall effectiveness of the web-based course. By focusing on specific management aspects, the research by Saunders et al. was rich in detail, yet poor in comprehensiveness since there were aspects of the students' perceptions that were clearly overlooked.

Research conducted by Welton and Welsh (1997) was more geared towards the evaluation of the effectiveness of a one-week module taught via the web. Results in this case revealed that half of the students agreed that their online experience stimulated their interest in the subject. Roughly, 53.3% indicated that the online activities assisted in understanding the materials. It was also found that the vast majority (86.7%) agreed that the amount of work had appropriately fulfilled the students' expectations. Regarding time spent on the online material, 40% did not spend more than expected while 40% spent more. Welton and Welsh found that, as a general impression, the students' perceptions of learning via the web were positive. Results suggested that this was a useful experience. Despite the positive outcomes of Welton and Welsh's evaluation, one important aspect that should be taken into consideration was the small size of the sample. Even the authors advised caution when attempting to generalise the findings to other populations.

Research conducted by Montgomerie and Harapnuik (1997) was another evaluation of the effectiveness of a web-based course. However, in this case, a much larger sample was covered. Results revealed that students either hated or loved the course. The great majority of students felt that the volume of web-based course work was greater than most other courses. Most students indicated that they were not comfortable with the online format and missed the face-to-face instruction. Those who enjoyed the course indicated that the flexibility of working on the course at their own pace and from their homes was appreciated. This finding was consistent with Fong's (1997) research where students liked the flexibility of accessing the web course from their homes. Montgomerie and Harapnuik (1997) also revealed that one third of the students stated they would have liked a fixed schedule and specific assignment dates. However, an important limitation of Montgomerie and Harapnuik's evaluation concerns the course title and content. Since the course was itself about the use of the Internet for learning purposes, one cannot ignore the possibility that students enrolled in the course already had a predisposition to favour the usage of such new media and technologies. It would be interesting to compare the

evaluation results of this course with another one, designed according to the same principles and philosophy, yet concerning a topic not related to the Internet or Information Technologies.

Yong (1998) also evaluated a web-based course, which dealt with information technologies. It was found that students showed willingness to increase the level of interest and involvement in the subject as a result of their participation in the web course, a finding consistent with those of Welton and Welsh (1997). Yong (1998) also revealed that most of the students had no opinion regarding whether the web course had improved their learning abilities. Yong showed that students were satisfied with the learning flexibility of using the web-based course, a finding consistent with those of Fong (1997) and Montgomerie and Harapnuik (1997). Yong (1998) also found a mixed response as to whether the web-based course had improved the overall quality of the face-to-face instruction. It was also found that there was a strong disagreement for the replacement of the traditional face-to-face instruction with the web-based course. Results by Yong provided valuable data on students' perceptions of learning via the web. However, the course evaluated by Yong only ran for a three-week period, not giving enough time for overall impressions to mature. The author suggested that in order to have more valid results, the course should run for at least a semester.

Interestingly, research conducted by Gibson (1997) revealed that students found the web-based course to be a more effective learning experience when compared with their usual way of studying. They gave high value to the chance of getting to know each other, the feeling of belonging to the same learning community and being able to share various common interests with the others. Students also indicated that they liked the personal, direct contact with the teachers. Although Gibson adopted a mixed approach for gathering information on students' perceptions, like Yong (1998), the students were quite familiar with computers and information technology in general. Therefore students' perceptions of learning via the web were probably biased in favour of using newer technologies to replace the more traditional learning environments. The validity of Gibson's findings was hampered by this fact.

Finally, excellent research by Naidu (1997) is notable for its in-depth analysis of students' perceptions of learning via the web and for evaluating a course outside the information technology field. The overall results suggested that students were quite happy with the web-based course. It was also found that this mode of delivery best met their learning needs and expectations. Students stressed that the time, pace and flexibility of the course allowed them to combine work and study. Despite the rich data provided by Naidu's findings, it is difficult to generalise to other populations due to the size of the sample (only 8 students). A larger sample would have yielded more useful results.

In summary, all the reviews, despite their respective strengths and weaknesses, indicated that students generally liked the experience of learning via the web. Having said that, in some cases students indicated that the web-based course contributed to increasing their knowledge of the topic, while in other cases it did not. There was also no consensus as to whether web-based courses should replace traditional classroom teaching. The research highlighted various positive and negative points of learning via the web.

2.5.2 Teachers' Perceptions of Teaching via the Web

In sharp contrast with the abundance of students' views, there is a shortage of research on the teachers' perceptions of teaching via the web. This important aspect is very often neglected. From all the research reviewed here, only one covers this topical issue. Naidu (1997) conducted a comprehensive evaluation where teachers were invited to express their views, after the completion of the web-based course. Results revealed that teachers liked the experience of being involved in the web-based course. They concurred that the web course offered them a learning opportunity, which they benefited from. Teachers mentioned some benefits of having the course on the web such as being able to introduce changes in the content without too much difficulty. However, teachers also warned that there were still enormous challenges unresolved in the proper design of instructional content for delivery via the web. The research by Naidu provided a valid insight on the teachers' views of teaching via the web. Despite the usefulness of the

results, these could have been still more meaningful had the author investigated the teachers' views on the strategies and objectives used to deliver the web-based course.

2.5.3 Web Technologies

This section presents research regarding the effectiveness of various web tools. Fong (1997), for example, evaluated the effectiveness of delivering study material on the web. One feature that the vast majority of the students (94%) liked was the online testing component. Students found it helpful in identifying problems in the course. They admired the way the on-line tests were designed, with lots of hints in guiding them to correct answers. Another feature included in the online study material was a set of hyperlinks to other sites. Students found them very helpful. Fong's research provided valuable information in terms of how to present study material online. However, in terms of usability for further research, a major limitation of Fong's research was the restrictive number of web tools used in the course: only the study material was used. Most courses via the web, today, offer a combination of various technological tools (e.g. forums, email, electronic chat) in order to best fulfil the potential of this mode of teaching. Therefore, the restricted scope of this research contributes very little to proving the effectiveness of delivering courses via the web.

A course evaluated by Lehman and Lehman (1996) also used very few technological tools: a simple web-based textbook. The results showed that the majority of the students (67%) preferred a paper textbook to a web-based one, given identical contents. Students (70%) indicated that if the web text had been more up-to-date, they would have preferred to use it instead. Findings also revealed that students recognised that the web-based text was not as portable and convenient as the printed text. Again, Lehman and Lehman's research had a major drawback: the narrow scope of inquiry. The authors mainly intended to clarify whether a web-based course as a replica of an existing paper-based one, was acceptable to the students. Indirectly, they tried to establish how a web-based course could add value as a supplement to a paper-based one.

Unlike the research of Fong (1997) and Lehman and Lehman (1996), the course evaluated by Saunders et al. (1997) used a variety of web tools, such as discussion forum and class web sites. Saunders et al. showed that the discussion forum intimidated some students. By the end of the course, the results revealed that only a handful of students had expressed their ideas in the discussion forum. However, despite low participation in the forum, the relationships that developed as a result, decisively contributed to the interpersonal networking among the class participants. Saunders et al. also found that the students (70%) liked the web links provided on the web page. By the end of the course 90% of the students reported using web links other than those on the web page. An important aspect of this research was the fact that classroom teaching was offered in parallel with the web-based course. It is difficult to argue, however, whether the results obtained by Saunders et al. would have been different had the course been offered only via the web. Without the opportunity of regular face-to-face meetings, students may make greater use of the discussion forum and the results might have been affected accordingly.

The course evaluated by Welton and Welsh (1997), in turn, was entirely delivered via the web for a one-week period. Interestingly, in this case, the authors found that students did not hesitate to contribute to conversation in the discussion forum. The vast majority (86.7%) of the students reported they were willing to participate in the discussions, a finding that contradicts those of Saunders et al. (1997) who indicated that only a few students used the forums. Regarding the usefulness of other web tools such as the chat and audio, Welton and Welsh (1997) revealed that more than half of the students (53.4%) found the chat sessions easy to use and helpful tool to understand the subject. Students did not attribute high value to the audio tool as an enhancement to instruction, with 80% indicating they would have understood the coursework without audio assistance. To better ascertain the validity of Welton and Welsh's results, however, a longer and highly attended course would have been necessary. In such a short period of time (one week), students' perceptions can be affected by the novelty of the first

contact with technologies. A longer-term and more mature impression would have been quite useful.

Another web-based course was evaluated by Powers and Mitchell (1997). In this case, the course was taught for a longer period (five weeks). The results revealed strong interaction and discussion among class members. From the 800 plus messages posted to the class listserv and sent over email, half were directly related to some prescribed assignments. The remainder of the messages were discussions based mostly on responses to questions initiated by other students. Results by Powers and Mitchell also revealed that the class Internet Relay Chat (IRC) played an important role in some important synchronous class discussion activities. The main objective was to provide the students with a means of asking questions and receiving immediate feedback. Regarding the use of email, Powers and Mitchell revealed that students, on many occasions, received email tips and suggestions from their colleagues. In this particular case, the results showed that a true "community of learners" emerged from the use of the email, listserv and chat technologies, where learners were committed to providing encouragement and support to each other throughout the course, as well as sharing information and generating class discussions.

Results by Powers and Mitchell also revealed that a feature of the class web page that proved to be quite popular among students was the "page of the day". These were a series of hyperlinks suggested by the instructor to motivate and capture the attention of the student. Another important feature was the "electronic schedule". Findings showed that students liked it since they could keep track of assignment due dates, becoming aware of class announcements, last minutes changes, etc. Although Powers and Mitchell's research provided valuable insights on student's perceptions of using some web technologies, the small size of the sample (only seven students) constituted serious limitation regarding the universality of the findings. Another limitation of this research had to do with the course title that deals specifically with information technologies. Due to students' familiarity with and interest in computers, they were naturally pre-disposed to doing well in the web-based course, meaning that their responses would reflect this fact.

Another important piece of information came up as the result of findings by Gibson (1997). He conducted research on the effectiveness of offering an Information Technology course via the web. In this case a larger sample (20) was covered. Regarding the usability of the forums, Gibson found that it was one of the most highly acclaimed tools in the web site. Students, who actually made use of the forums, found them useful. Gibson also revealed that students were divided regarding the use of printed material and web-based material. Half of the students would still prefer to have the paper version available. Also, half of the students found the electronic version sufficient for the future. The research by Gibson, however, was not comprehensive in scope since it only focused on a single module out of ten. This means that the students probably did not have time enough to "feel" the course properly and rushed into hasty conclusions. Another important limitation of this research had to do with the topic in focus: the author chose to evaluate a topic about the web itself. This limited the effectiveness of the evaluation.

Yong (1998) also evaluated the functioning of the discussion forum. He found that none of the students felt that they had actively participated in the discussion forums. Most of the students did not want to join the class discussion, a finding consistent with those of Saunders et al. (1997). Since Yong's (1998) research relied exclusively on closed-ended types of questions, the results failed to provide answers as to "why" students did not participate in the discussion forums. The findings would have been more meaningful had Yong used a mixed approach (quantitative plus qualitative). Naidu's (1997) research, on the other hand, provided a more detailed account of why students did not participate in the discussion forum. It was found that most of the students were reluctant to express their thoughts in the forum. However, they valued being able to read others' comments. Results also showed that students found the web links very useful in their understanding of the course content. Nevertheless, it is difficult to place Naidu's findings in a more valuable context since the author failed to provide information on students' level of exposure or familiarity with computers and information technology.

In summary, research on the effectiveness of the various web tools suggests mixed results. Some tools were clearly more successful than others. Participants liked features and tools, such as hyperlinks, online tests, discussion forums, email, listserv and chat facilities. However, research also indicates that student participation and use of such tools varied considerably. Sometimes they were eager to contribute and participate and sometimes they were not.

2.5.4 User Interface

This section investigates the effectiveness of user interface aspects in web-based courses. Findings by Yong (1998) revealed that most students (75%) concurred that the web site was friendly to use. He also found that most of the students (80%) did not have problems in accessing the web site. Yong's research on the user interface aspects was limited in the sense that he did not cover important factors, such as customisation, help, and so on. Similar research by Fong (1997) also found the web-based study material easy to use and navigate.

Welton and Welsh (1997) made a more thorough investigation. Findings revealed that over half of the students (53.4%) experienced being "lost" in the web site. Navigating the web site had better reviews. Findings showed that students were neutral regarding whether the design of the web pages enhanced their reading ease and understanding of the material. The great majority (86.6%) found the writing style adequate. The majority (73.3%) was neutral regarding whether the graphics and pictures enhanced their understanding of the materials. Participants provided mixed reactions on whether the graphics loaded too slowly. Regarding the design of the web page, participants indicated that the buttons and links were easy to find. Since the web-based course evaluated by Welton and Welsh ran for a period of one week, students probably did not have time to "feel" the interface.

Further research by Naidu (1997) found that most of the students had no problems with navigating the study material on the web. When focussed on specific features of the access structure such as the "study chart" and "graphics organisers" Naidu found that most of the

students indicated that the study chart was helpful in pacing their study. Students also pointed out that the use of graphics organisers was very helpful in navigating through the unit content and helping with reading on the computer screen. Since Naidu failed to provide information on students' familiarity with computers, it is difficult to conclude whether the user interface of the web-based course was easy of use or the students had sufficient computer knowledge to cope with it.

The research by Gibson (1997), as opposed to Naidu (1997), provided background information on the participants' computing skills. Results by Gibson suggested that students highly praised the graphical user interface. The simplicity and friendliness of the various graphical metaphors were the secret of success. Students found it easy and straightforward to access all functional areas of the course. However, caution is needed when analysing the findings of Gibson. Due to the students' familiarity with computers, they were naturally pre-disposed to doing well in the web-based course, meaning that their responses would reflect this fact.

In contrast to Gibson's (1997) research, Bhuripanyo (1997) conducted an evaluation totally outside the common information technology theme. Findings, in this case, revealed that most of the students agreed that the web-based course presented an attractive homepage and design. There was also agreement among students that the web-based course contained legible and attractive text. However, findings showed that only 36% of the students agreed that the course was arranged in an understandable and logical way. The same number agreed that the course had an effective navigation menu. Most of the students agreed that the course made effective use of graphic and colours. The research by Bhuripanyo provided a comprehensive analysis of the user interface. The author used closed-ended questions to evaluate the effectiveness of the user interface. However, the results would have been more meaningful had open-ended questions been used to complement his quantitative findings.

In summary, research suggests that the effectiveness of the user interface aspects is important, although the students' evaluation of these varies from course to course. In most of the cases, students indicated that the web-based courses were easy to use and navigate. On other occasions they praised the simplicity, friendliness, and intuitiveness of the interface. To avoid biased impressions, more research is needed to establish whether the very favourable opinions come from those participants with a strong computer background.

2.6 Statement of the Problem

The literature review conducted in this chapter revealed a number of important gaps and deficiencies. Most of the research studied here, although presenting interesting findings, does not appear to offer proper explanations as to why students do not always participate, or to why this or that result has occurred. The emphasis appears to be more on getting and presenting results rather than contrasting them with other research, analysing them in perspective or making an effort to make them more useful and meaningful. Most of the research seems to be more concerned with the labelling, rather than the meaning of the results. There is a need to better understand how teachers and students feel about this new mode of delivery. This means that research should be richer in explanations regarding their arguments and discussions (Windschitl, 1998).

All but one of the investigations reviewed here evaluated only one side of the problem: the students' views. The role of teachers and their perceptions was invariably overlooked. In the case of this topic, there is a need for a more comprehensive type of research, one that takes into account not only the students' perceptions of learning, but also the teachers' perceptions of teaching via the web. Moreover, all the cases reviewed here included a very limited number of web tools. The analysis of cases with more web tools would be of great value for educators. Finally, research on the evaluation of courses delivered via the web should always include a section on the benefits of the various elements of the user interface. A good user interface

design is crucial for the success of web-based courses and should not be overlooked by research (Henke, 1997).

One important issue clearly neglected in the literature reviewed was the evaluation of the pedagogical strategies and web-based course objectives underlining each case. It is very important for educators and course designers to select the most appropriate strategies in order to fulfil the respective course objectives. The course objectives should be exposed and the associated pedagogical strategies should be discussed in great detail in order to allow better deploying of the resources and a better design of the web-based courses. There is a need to fill this important gap in the research. Another weakness exposed by the literature review is the unfocussed type of the many evaluations done. All the research reviewed here performed evaluations of courses delivered via the web, yet very few measured the effectiveness of the various aspects of delivering. Due to its importance, however, there is a need to be more focused on the effectiveness aspects, rather than performing simple evaluations of courses delivered via the web.

It becomes clear, therefore, that there is a need to properly address the points highlighted above. Due to the great importance of the Internet for education and since little research has been conducted on the effectiveness of this new mode of delivery, there is a need to create awareness and understanding on how to best use the web for effective teaching and learning (Welton & Welsh, 1997; Windschitl, 1998). Moreover, the weaknesses demonstrated in the literature review suggest that evaluation is paramount, yet should be focused on the effectiveness aspects, should tackle the pedagogical strategies and course objectives, as well as being more comprehensive and offer a better understanding of teaching and learning via the web. This thesis will focus on the evaluation of a tertiary education course delivered via the web, and, at the same time, address the deficiencies found in the literature review. It expects, as a consequence, to make a valid contribution towards the fulfilment of the needs and deficiencies stressed in this chapter.

2.7 Research Objective

Taking into account the need to evaluate the effectiveness of web-based courses, this thesis has a main and sole objective, which is:

Evaluate the effectiveness of a tertiary education course delivered via the web.

2.8 Scope of the Thesis

For planning and strategic reasons, a decision was made at an early stage, regarding the scope and type of the thesis to produce. Generally speaking, two main options were available. Either to engage in a generic and comprehensive analysis of the various types of courses offered via the web (macro strategy), or instead to focus on a single case study and extract as much information as possible from this experience in order to properly evaluate its effectiveness (micro strategy). The decision was made to follow the latter strategy.

As a consequence of this choice, some important limitations were considered. These were mostly of a practical nature, because of the obvious constraints and limitations of time and level of inquiry for this type of research project. This thesis was, therefore, limited in scope in the following main areas:

1. **Level of inquiry** — This thesis was restricted to tertiary education courses;

2. **Number of courses and teachers** — This thesis focused on one single tertiary education course offered via the web, covering the perceptions of the respective students and the teacher.

2.9 Research Questions

In order to adequately fulfil the objective of the thesis, five topical research questions are pursued hereafter:

1. What are the teacher's perceptions of teaching via the web?

2. What are the students' perceptions of learning via the web?

3. What objectives and pedagogical strategies are used in the delivery of the web-based course?

4. What types of technologies are used as a media for the delivery of course content via the web?

5. How is the user interface designed to assist students to effectively use the web in their learning?

Answers to the above questions will, hopefully, contribute to a better understanding of the effectiveness of offering courses via the web.

2.10 Significance of the Study

The findings of this research will have the potential to help teachers, educators, web course designers and institutions to better understand how to effectively use the web to enhance distance teaching and learning. The significance and prospective benefits of this thesis are expected to contribute towards developments in three interrelated areas, as follows:

1. **Better understanding of the functioning of courses delivered via the web** — By in depth analysis, from a pedagogical perspective, of the various aspects that comprehend a course of this nature;

2. **Better design of courses to be delivered via the web** — By discussing the pedagogical objectives, strategies, technological tools and user interface in order to effectively assist students in their learning;

3. **Enhancing the quality of distance learning** — By discussing the effectiveness of the various aspects of learning and teaching via the web.

2.11 Summary

For the sake of clarity, this chapter started by introducing the meaning and scope of the "distance education" term. As a second step, a brief discussion of the technologies used in distance education was also included. This review highlighted the advantages and disadvantages of using certain technologies for distance education purposes. The review suggests that some courses and subject areas are better suited to some types of distance education technologies than others. It further recommends that one must take into consideration their instructional potential and their teaching effectiveness when choosing the most adequate means of delivering.

Regarding the web as a means for delivering courses to distance higher education courses (University), and despite its importance and popularity, very little research has been done so far on the effectiveness of this mode of delivery. The main reason for this is the very recent emergence of this mode of delivery. However, a literature review has been conducted on published research on the effectiveness of offering courses via the web to higher education students. Ten studies have been selected for reviewing purposes. The type, quality and scope of these studies varied widely. In terms of nature, they ranged from a PhD thesis to short simple articles published on the web and in specialised journals. In terms of geography and content, most of the research available focused on Information Technology courses offered via the web in the USA. The number of students involved in each study is usually small and the preferred techniques for evaluation are of a quantitative nature. In every review except one, the students' perceptions are well taken care of, while the teachers' perceptions are usually neglected. Some of the studies focus on cases of conjoint delivering (traditional classroom plus web) while others refer to courses exclusively offered via the web.

From all these differences, it comes as no surprise that the studies reviewed here showed mixed results regarding the effectiveness of offering web-based courses. In most cases, students accepted the use of the web as a mode for content delivery, although sometimes they were keen to point out that web-based courses should be used in conjunction with more traditional modes

of delivery. Generally speaking, in most cases the use of certain technologies, such as discussion forums and chat modes created a learning community where students supported each other. Other studies, however, have shown that students did not use such technologies.

As well as highlighting the relevance of the research findings, a review of the literature suggested the existence of some important gaps and weaknesses. The most relevant were the lack of proper explanations, the lack of comprehensiveness in the approach, no focus on pedagogical strategies and course objectives, and unfocussed types of evaluation. In order to address the above deficiencies this thesis proposes to evaluate the effectiveness of a tertiary education course delivered via the web, as the sole objective. Taking into consideration the nature and scope of a thesis' project, this research will adopt a micro strategy and focus only on the evaluation of one single case study regarding a tertiary education course delivered via the web. To fulfil the initial objective and address the deficiencies highlighted in the literature review, this thesis will investigate the answers to five topical questions. These will cover the aspects of teaching via the web, learning via the web, course objectives and pedagogical strategies, types of technologies used for teaching via the web, and user interface issues. This thesis is expected to contribute to a better understanding of the functioning of web-based courses, better design of these courses, and ultimately to enhance the quality of distance education.

CHAPTER 3

Methodology

This chapter describes the methodology underlying this thesis and also explains the three phases of the research. In terms of organisation, this chapter starts with a description of the methodological approach adopted. A clear description of the research design, sample selection and the profile of the participants follow this initial stage. This chapter also discusses the procedures and techniques used for gathering and analysing data within each phase of the research. Finally, the ethical considerations of the research are outlined.

3.1 Methodological Approach

The concept of culture is very much central to the methodological approach adopted in this thesis. However, the main difficulty with this concept is that it means too many different things for too many different cases. It is beyond the scope of this thesis to discuss them all. The refined habits and courtesies of the upper classes, for example, are considered by some as belonging to a certain culture. However, the most widely found use of the term "culture" is in anthropology where it became synonymous with a certain definition. This definition treats culture as nearly everything that has been learned or produced by a group of people. Within this framework, most activities and behaviour that might occur on the field during a football game, for example, would be considered examples of culture. Culture would also include rules for the game and the physical objects such as the football and team uniforms. Nevertheless, despite the fact that often

anthropologists disagree on a definition of culture, as Bogdan and Biklen (1992) suggest, they all count on it for a theoretical framework for their work.

The concept of culture espoused in this thesis is an interpretative one in search of meaning. Following this perspective "*...culture is not a power, something to which social events, behaviours, institutions or processes can be causally attributed, it is a content, something within which they can be intelligibly - that is – thickly described*" (Geertz, 1973, p. 14). In this sense, there is interaction between culture and the meaning people attribute to events.

Geertz (1973) borrowed the notion of "thick description" from the philosopher Robert Ryle. Geertz used Ryle's example of an individual blinking one eye, and examines the different levels on which such an act can be analysed. Blinking can be represented as twitching, winking, pretending to wink or rehearsing winking. How and at what level one examines these behaviours constitute the difference between thin and thick description. When culture is examined from this perspective, one is faced with a series of interpretations of life, and the interpreting involved consists in trying to share in the meanings that the cultural participants take for granted and then depicting the new understanding to the readers.

The framework adopted in this thesis is also one of searching for meaning from the teacher's and students' perceptions while preparing, implementing and evaluating the web-based course. In line with this concept, the thesis does not intend to establish any universal laws of behaviour while assessing the effectiveness of delivering the course via the web. Instead it follows an interpretative approach searching for meaning and not an experimental one searching for laws. What this thesis is concerned with is getting explanations rather than constructing structures of social expressions.

3.2 Research Design

This thesis adopted an ethnographic evaluation method to meet the objective set up at the beginning. Web-based courses are new and complex learning environments. Variables such as

the ease of use or richness of the environment are not always obvious and are difficult to grasp by using traditional quantitative methods. Windschitl (1998) highlights the fact that novel learning environments require researchers to describe at various levels what is happening to the participants. Therefore, a descriptive approach was favoured as a more logical choice.

The ethnographic research method emerged from the field of anthropology, which provided evaluators with a new paradigm and new methods of data gathering and analysis. Anthropologists have also come up with a cultural interpretation of behaviours and events in educational research (Fetterman, 1986). Ethnography mainly involves descriptive data collection as the basis for interpretation. It represents a dynamic picture of the way of life, meaning the culture, of an interacting group. Ethnography uses multiple data collection strategies, therefore a good point is that it provides the flexibility needed to analyse a variety of situations within a group.

There is a set of values or principles that, according to Fetterman (1984, 1989), guide the ethnographic research. These principles are as follows:

1. The researcher assumes a holistic approach to problems for gaining a comprehensive and complete picture of the group under study. The researcher seeks to understand the problem from as many angles as possible;

2. The insider's perception of reality is situational meaning geared towards understanding and accurately describing situations and behaviours. An emic perspective leads to the recognition and acceptance of multiple realities. Studying multiple perspectives of reality is essential to understand why people think and act differently;

3. The researcher must place the acquired data in its specific context or environment in order to have a more accurate representation.

The application of the above principles to an ethnographic research does not take place in a vacuum. The basic guidance in the ethnographic research method is usually defined by the

boundaries of the study. Spradley (1980) suggests that the first thing ethnographers must consider is the scope of the study. Generally speaking, one can distinguish two main types of ethnographic studies according to the limits of their boundaries: micro and macro studies (Fetterman, 1989). "Micro studies" offer a detailed treatment or analysis of a small social unit. The focus is narrowed on to a particular problem or aspect and the sample is usually small. "Macro studies", in turn, emphasise the interaction of various elements as a whole. It deliberately simplifies the individual elements or units of analysis in order to retain a manageable analysis of the complete interaction of the whole system.

This thesis, because of its focus on a particular small case, followed a "micro-ethnographic approach." However, as Spradley (1980) stresses, the techniques of data collection and analysis are identical to those used in doing a project of much larger scope. In addition, micro studies require as much time to conduct as macro studies. Basically, this thesis is an in-depth study of a single situation (web-based course), trying to discover detailed relationships out of a small sample. This was in accordance with the research objective and the strategy outlined for the scope of this thesis. Therefore, the techniques of data gathering and analysis were in accordance with a micro-ethnographic framework. In addition, the design of this research was guided by the principles mentioned above.

3.3 Research Population

Massey University, originally located in Palmerston North, New Zealand, was established in 1964 as a result of a merger between the Massey Agricultural College and the Palmerston North University College. Massey University soon became one of the largest providers of tertiary education in New Zealand. The first fully extramural degree, the Bachelor in Education Course (BEd), was set up in 1970. From that time onwards, the number and variety of extramural courses offered increased dramatically. Today, Massey University offers over 650 papers to nearly 18,000 students extramurally every year (Annual Report, 1997).

In the past few years Massey University has been encouraging academic staff to develop web-based services for their students. At the end of 1997, the University decided to purchase a site license of WebCT (World Wide Web Course Tool) in order to allow staff members to design and offer web-based courses (Prebble, 1998). At the moment, this is the only authoring package that academic staff members at Massey University are entitled to use for developing Web-based courses.

WebCT is an authoring software package that has been developed by the University of British Columbia in Canada and was first introduced at the Fifth International World Wide Web conference in Paris, France in 1996. The main purpose of the software is to provide teachers and learning institutions with a set of powerful technologies for delivering courses via the web without requiring any programming skills from users and developers. Since its introduction, it has evolved on several fronts, with an updated user interface, support for emergent technologies (JAVA scripts, ActiveX controls) and a number of new educational administrative tools. WebCT is entirely World Wide Web-based (Goldberg, 1997) and is platform independent. Access to WebCT courses can be done through any web browser software, such as Netscape Navigator™ or Microsoft Internet Explorer™. The course designer has to provide the content. Interactivity, structure and educational tools are provided by WebCT. WebCT requires minimal expertise on the part of the designer of the educational material and on the part of the student, though familiarity with computers and the World Wide Web (WWW) in particular, is highly recommended.

In the case of this thesis, the choice of the population was based on the following factors:

1. **Adequacy** — Since Massey University is the main provider of tertiary distance education in New Zealand, therefore the environment was considered adequate to implement the proposed research;

2. **Convenience** —The researcher is a student from Massey University College of Education. Therefore the choice of Massey was a logical first choice as a matter of convenience;

3. **Usefulness** — Finally, since there was very little research on the topic of web-based tertiary courses in New Zealand, the choice of the Massey population purports to make a contribution in this direction.

3.4 Research Sample

The sample selected for this thesis was a single case within the target population. The sample comprised 21 post-graduate students enrolled in the Massey University course 86.761, "Learning with Computers" during the 1998 academic year. From these, 20 out of the 21 students enrolled agreed to participate in this research. It important to note that three students withdrew from the course later on, and therefore the total number of students was actually 17. The course was delivered simultaneously by two different methods of delivery: mail-posted paper-based materials (including a face-to-face meeting in April 1998) and via the web. The reasons for the selection of this sample were:

1. **Size** — The size of the sample was considered ideally suited to this type of in-depth study. The sample size was also considered sufficient and necessary to answer effectively all the research questions. It had the potential to provide adequate data to represent all activities of the web course;

2. **Convenience** — Since the researcher and the student sample were all studying at College of Education, the convenience and overall feasibility of the project was enhanced by easy access to the Computer Server at Massey where all the information generated during this web course was stored;

3. **Appropriateness** — The course 86.761 was part of the post-graduation program in education at Massey University. Because of its educational background, it was considered well suited to implement this research.

3.4.1 Selection Procedure

As part of the course 86.761 for 1998, an on-campus course activity took place in April 1998. During the event students were formally invited to participate in this research. The researcher introduced herself to the students and provided them with an Information Sheet (see Appendix B) where the objective of the research was explained. The information sheet included the following themes: (a) the nature and purpose of the research; (b) research questions; (c) participants' involvement in the research; and (d) the issue of confidentiality. Students were then asked to sign a Consent Form (see Appendix C) granting permission to be part of the sample for this research. They were also asked to fill in a Student Profile Form (see Appendix D) with personal details and background. The background information requested from the students covered four main themes: (a) Internet access; (b) previous experience with some Internet technologies; (c) previous enrolment in other Internet courses; and (c) job position.

3.4.2 Characterisation of the Sample Profile

The sample for this research comprised 20 participants: 12 female and 8 male. All participants were students enrolled in the paper "Learning with Computers" at Massey University during the 1998 academic year. All of them were living in New Zealand and were geographically spread around the country. The age distribution of the sample is highlighted in Figure 3.1. The distribution of the sample age group indicates an average age falling within the 41-45 group.

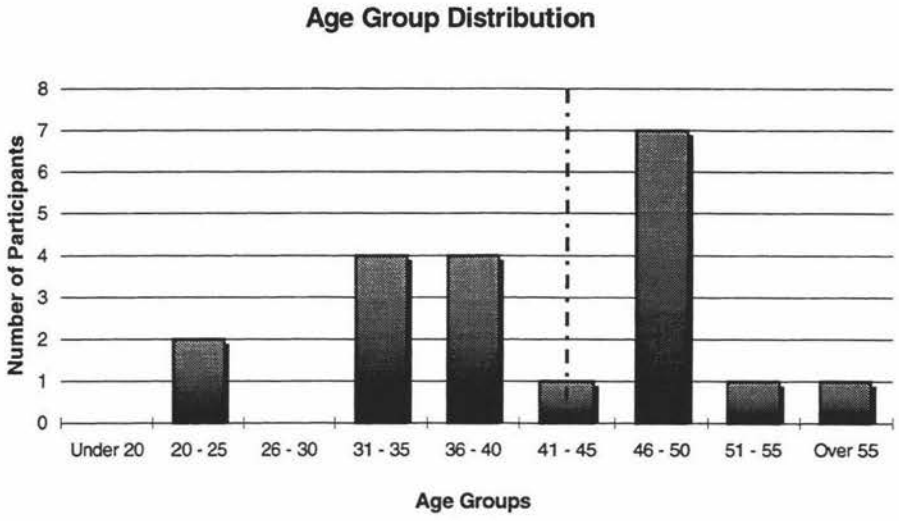

Figure 3.1 — Age distribution for the participants in the sample

Regarding the professional occupation of the participants involved, data collected indicated that 45% were involved in various teaching activities while the remaining 55% were full time students, school administrators and other professionals (see Figure 3.2).

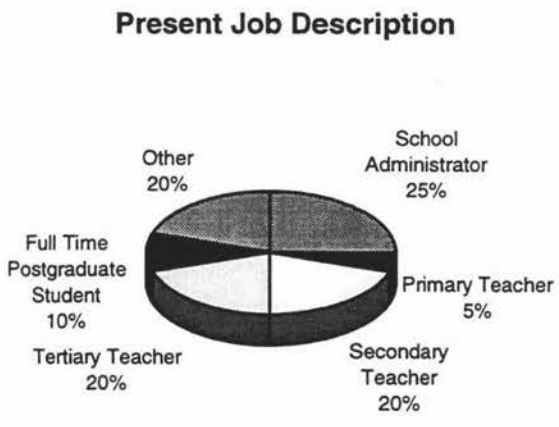

Figure 3.2 — Professional occupation of participants

Most of the participants (90%) had access to the Internet, as illustrated in Figure 3.3. From these, some could only access the Internet from their offices (35%), while others had access from home (25%) and the remaining had the convenience of accessing the Internet from both home and office (30%).

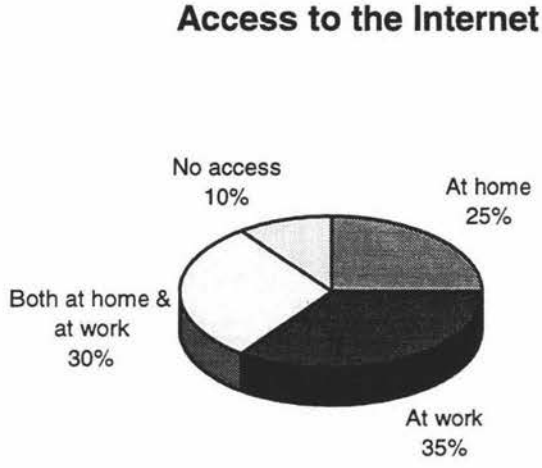

Figure 3.3 — Internet access

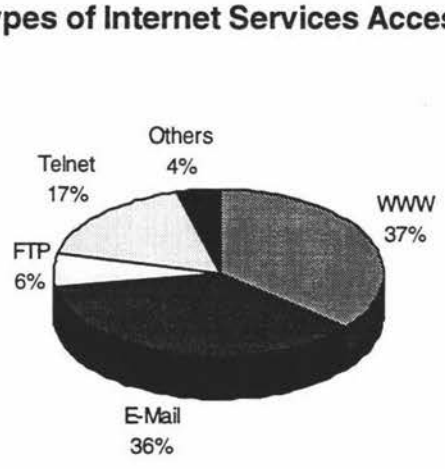

Figure 3.4 — Distribution of Internet services usage

For those with access to the Internet, not all used or subscribed to the many available Internet service options. As illustrated in Figure 3.4, most of the participants subscribed or used regularly the World Wide Web (37%) and email (36%). A minority used Telnet (17%), FTP (6%) and other services.

An important aspect of the participants' profile was to evaluate their level of competency regarding the usage of the various Internet technologies. Data indicated that most of them were reasonably familiar with the use of email, web surfing and Internet searching activities. Similarly, data suggested that the participants were not very familiar with the use of electronic chat and forum activities. An overall picture of the participants' competency level with the various Internet technologies is highlighted in Figure 3.5.

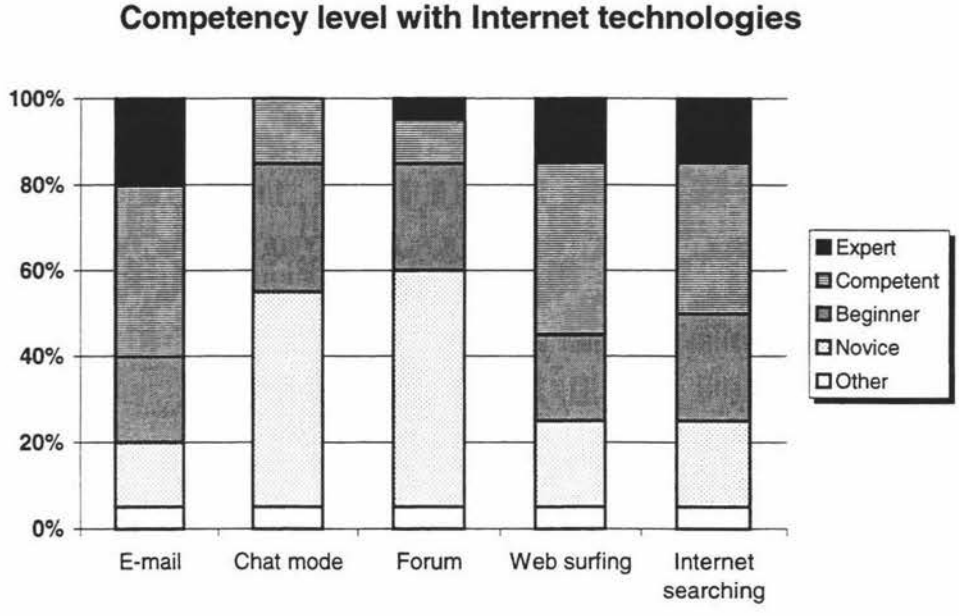

Figure 3.5 — Familiarisation with some key Internet technologies

Regarding any previous experience with Internet courses, only 15% of the participants acknowledged such. This means that the great majority of the participants (85%) were using this opportunity to participate in a web-based course, as a complement to the traditional paper-based mode, for the first time.

3.5 Data Collection

This research involved a variety of techniques for data collection. Exclusive reliance on one method, as Burns (1994) stresses, may give an incomplete or distorted picture of the particular slice of reality of the investigation. Triangulation is at the heart of ethnographic validity

(Fetterman, 1989), testing one source of information against another to search for alternative explanations. In this research, by using among other techniques, observation in conjunction with interviews and a questionnaire, triangulation was achieved. This allowed verification to be built into the data gathering process.

3.5.1 Phase One - Design of the Web-based Course and Interview

The initial phase of research had two different objectives. The first objective was to design and test the web-based course. The second objective was to gather information on the Paper Co-ordinator's perceptions, beliefs and plans of teaching via the web before delivering the course via the web.

3.5.1.1 Design of the Web-based course

This section describes the design of the web-based course. In the last week of February 1998, the Paper Co-ordinator and the researcher met for the first time to discuss the design and implementation of the web-based course. The Paper Co-ordinator put forward a plan, which constituted the starting point for the design of the course. The following list provides the main content of the plan:

1. Set up electronic forums for the various key course issues;
2. Set up an electronic calendar with the main University dates and relevant dates from the Administrative Book;
3. Organise some self-assessment tests based on the course topics;
4. Include material from Study Guide and Administrative Book;
5. Provide electronic links to other sites;
6. Set up the student homepage tool;

7. Set up the chat tool;

8. Insert a blue background ribbon on course content pages and course homepage;

9. Organise the course homepage layout.

The next step was to become familiarised with the WebCT software and its features. This was done by reading the WebCT user manual. This was considered an important step to better understand the software.

Throughout the design phase, the WebCT user manual, only available online, was extensively used. Assistance from the electronic manual was proved to be unsatisfactory. It does not provide complete step-by-step instructions on how to do the major tasks and sometimes it does not explain important matters that should be considered. Contact with the WebCT support service in Canada was necessary on various occasions to assist with matters that were not described in the user manual. Online help was also frequently used. In addition, the Paper Co-ordinator and the researcher held weekly meetings to review progress and discuss additional revisions. Email was also used as a means for providing feedback. All the changes or problems that emerged during the design phase were fully discussed between the researcher and the Paper Co-ordinator.

Before proceeding any further, a word of caution is needed. Technologies are in a state of constant improvement and change. As Grabe and Grabe (1996) highlight, software, hardware and ideas for how to apply technology are constantly changing. It is necessary, therefore, to state at this stage that all technology features used in this course refer to WebCT version one. In addition, the online manual and technical support either from online help or direct contact with the support service in Canada reflect this version of the software.

3.5.1.1.1 The Course Homepage

Any course developed by using WebCT is organised around the set-up of a starting homepage. This homepage is the entry point for the course. Therefore, the first stage of the design focused on the starting homepage, hereafter referred as "course homepage". A number of icons were selected for each topic based on the recommendations, objectives and strategies of the Paper Co-ordinator. In the design process various sketches were tried out on a notebook, as recommended by Boling and Frick (1997) in order to clarify how the layout would be presented online.

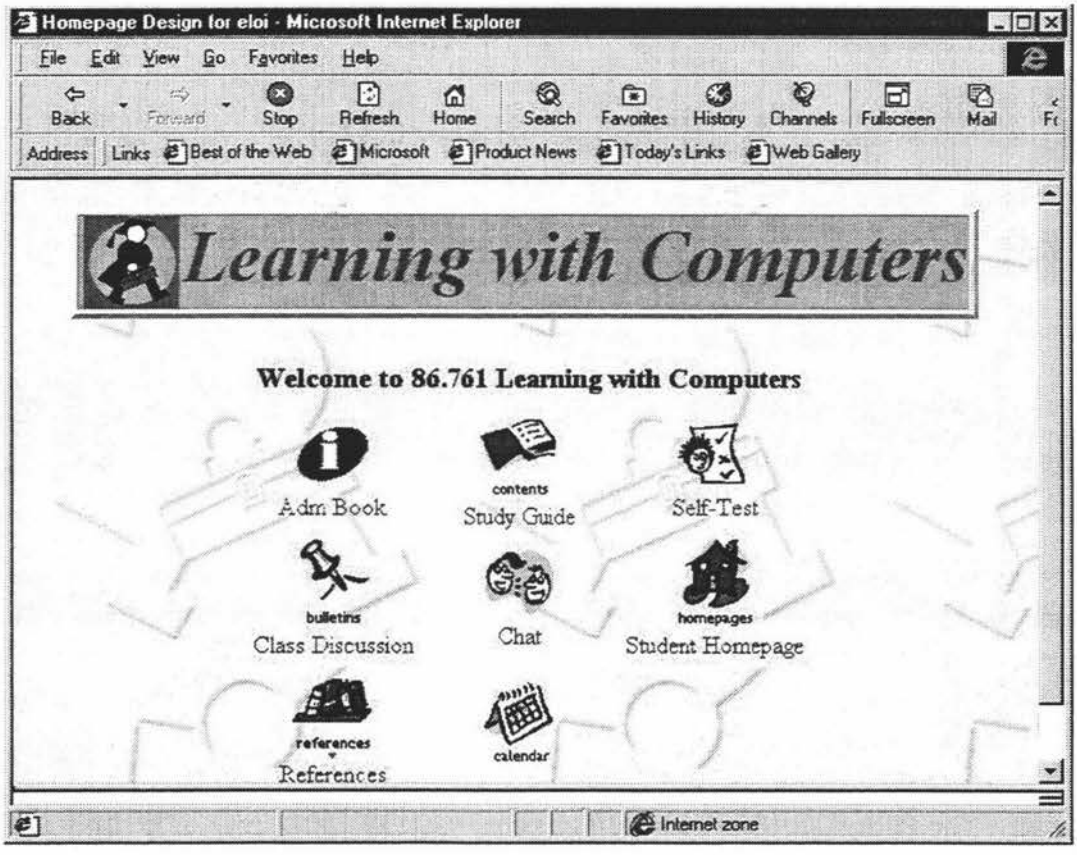

Figure 3.6 — Initial layout of the course homepage

A draft of the homepage was already available online. The initial icons were changed and a few others were added. However, the initial banner, the picture in the footer and the counter

were kept in the first stage. The initial layout of the eight icons on the course homepage was displayed in three columns and three rows (see Figure 3.6).

The next stage consisted of adding a background colour to the course homepage and making a template for the loading of course content. Although the WebCT provided a set of ready-made templates for the background, a customised blue background ribbon from an external source was chosen instead. It took some time to understand that this ribbon had to be uploaded to the server before trying to add to the pages.

3.5.1.1.2 The Course Content

The course content had to be exported to a Hypertext Mark-up Language (HTML) format since this is the WWW standard. WebCT does not supply an HTML editor (Goldberg & Salari, 1997). Microsoft Word for Windows™ software was used to save the course content into HTML format. After completing this process, the content pages were uploaded to the server. The table of contents of the Study Guide was organised in a linear structure. A combination of linear and hierarchical structures was selected for the Administrative Book in order to reduce the cluster in its table of contents.

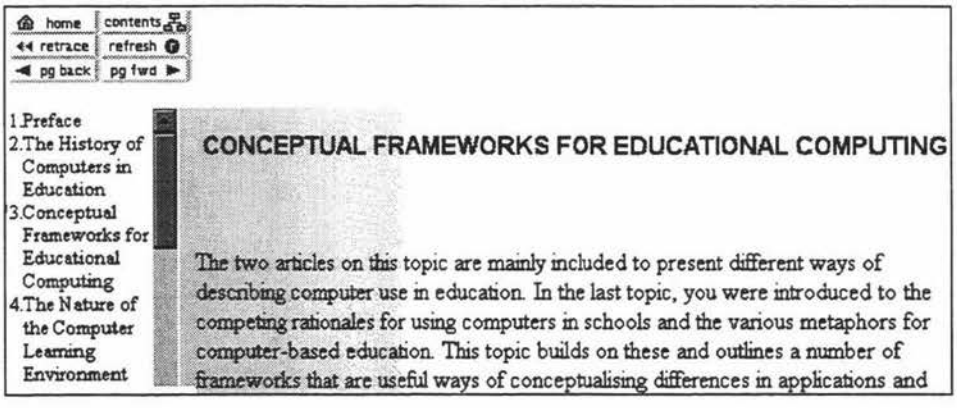

Figure 3.7 — List of topics

By default, WebCT inserts a button bar with the navigation icons at the top of each page of content. To ease the navigation, it was decided to customise the display even further. A decision was made to include a list of the topics on the left-hand side for the content of both the Study

Guide and Administrative Book, as an attempt to speed access to course material (see Figure 3.7). In this way, the user could jump from topic to topic without having to return to the content page. The various graphics and charts included in the paper-based version of the course content were removed from the electronic version.

3.5.1.1.3 Changes

There was a problem with the initial reference and the self-test icons. These were found to be built-in functions of the WebCT, which could not be called from the course homepage after all. Therefore these icons had to be removed. Since these options can only be called when navigating through content topics, it was decided to position them on the "supplementary readings" page of the Administrative Book. The email and quiz tools were added to the homepage instead.

3.5.1.1.4 The Quiz Tool

The next phase involved organising the quiz tool. According to the Paper Co-ordinator, three quizzes would take place. The first quiz comprised nine multiple-choice questions and one open-ended question. The time availability of the quiz and the number of attempts were specified. The scores options along with the Paper Co-ordinator's customised message were set-up. When testing the quiz tool a major problem was identified. The software could not cope with open-ended types of questions. This limitation led to a revision of the first quiz. As a final compromise, ten multiple-choice questions were selected (see sample in Figure 3.8). The remaining quizzes were not set-up at this time. They will be released at a later stage.

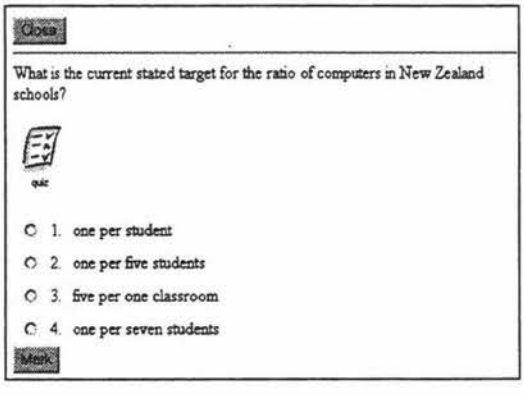

Figure 3.8 — A multiple-choice quiz sample

3.5.1.1.5 Electronic Forums and Electronic Calendar

One electronic forum was created for each topic specified by the Paper Co-ordinator (see sample in Figure 3.9). Personal welcome messages from the Paper Co-ordinator including the purpose of each forum were also included. A special private forum for discussing this research project was also set up as part of the design of the forums.

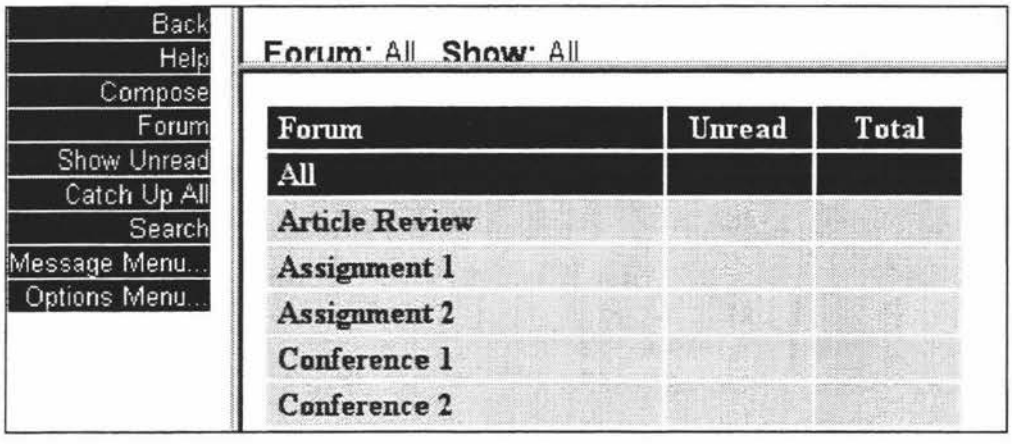

Figure 3.9 — A list of electronic forums

Regarding the electronic calendar tool, the relevant information from the Administrative Book and other key dates from Massey University were added. A public access option that allows the students to add their own entries to the calendar, was also set-up.

3.5.1.1.6 The Final Stage

In order to complete the range of tools on the course homepage, a student presentation tool was added. However, it was later decided to remove it and replace it with an electronic link tool.

The final stage of the design consisted of fine-tuning the graphics and icons. A major customisation work was done in the banner displayed on the course homepage. Rather than choosing from one of the ready-made banners provided by the WebCT, an entirely new project was developed using a specialised graphics package. The banner was later uploaded to the server and embedded in the course homepage. The same banner was added to the chat tool as well as the blue ribbon background colour. The banner was not added to the other tools since

the WebCT does not allow this degree of customisation. As part of the graphics fine-tuning tasks, customised labels were also added to the various icons presented in the course homepage. This was considered part of the strategy of making the interface as intuitive as possible. The final version of the course homepage is presented in Figure 3.10.

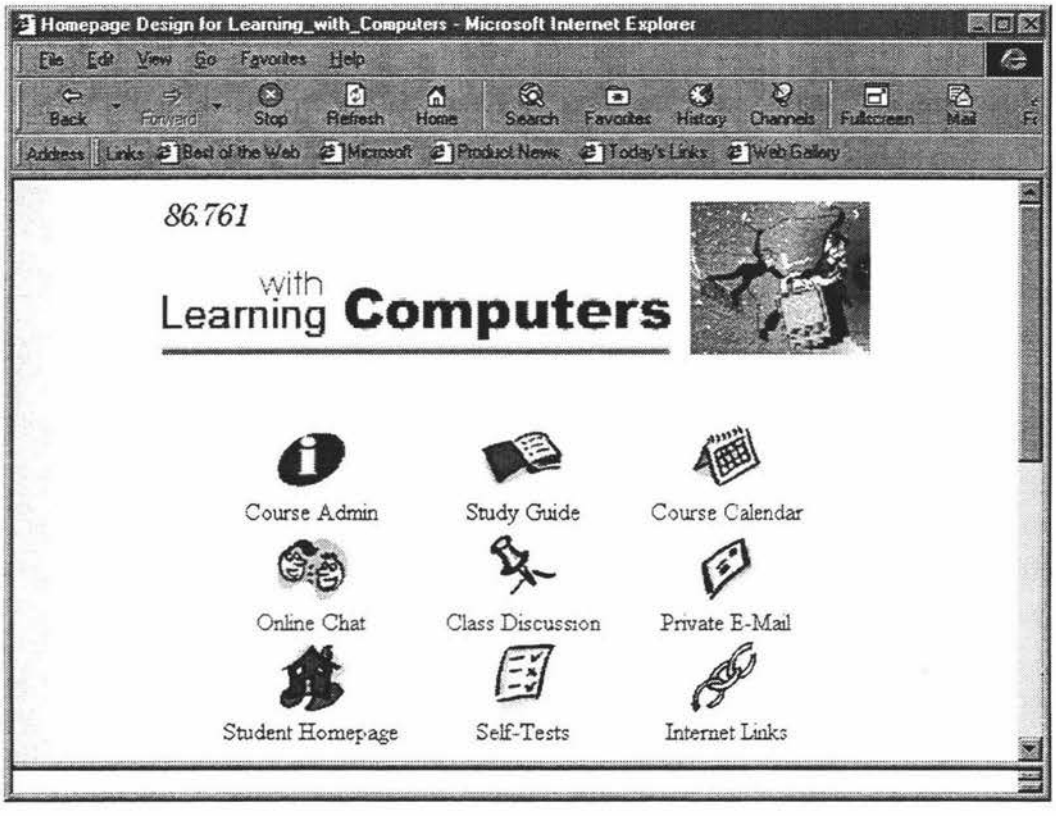

Figure 3.10 — Final version of the course homepage

3.5.1.2 Pilot Test

After completion of the design of the web-based course, three post-graduate students and one teacher were invited to test it. Neither the students nor the teacher were involved in the course 86.761. The students and the teacher were asked to access and use the web-based course for a period of three days and were asked to use all the educational tools available in the program. In the end, they were asked to fill in a Pilot Test Form (see Appendix E) stating the problems encountered and making suggestions for further improvements. The objective of this pilot was to test the product in all options and capabilities before it was made available to the students. In

this way, problems could be fixed, educational tools fine-tuned, and strategies revised before the final release of the product. The pilot testing was in line with Boling and Frick (1997) who recommended this initiative for the same reasons.

3.5.1.3 Feedback from the Pilot Test

A pilot test was organised in order to get some feedback on the initial settings and functionality of the course. Generally speaking, feedback from the respondents was quite positive. Acknowledging some valuable suggestions, various small corrections were made. These can be briefly summarised as:

1. The list of topics in the Administrative Book was changed into a linear structure. In this way the students could see the whole content without the need of an intermediary step;

2. The list of topics of the Study Guide was reset since it was not showing;

3. The font size and spaces in the Study Guide and Administrative Book were changed to improve the ease of reading;

4. Some options of the electronic calendar were also changed. It was noticed that entries in the calendar were not showing. This was due to a mistake in option selection. It was then set-up properly to allow students to have access to the entries;

5. It was also decided to insert some extra icons to the navigation toolbar of the pages of content in order to allow students to access the course features (e.g. chat, quiz). The final version of the navigation toolbar is represented in Figure 3.11.

Figure 3.11 — Navigation toolbar with additional icons

3.5.1.4 Interview

After completing the design of the web-based course, and before the beginning of the course, an open-ended semi-structured interview (Guba & Lincoln ,1981) was conducted with the Paper Co-ordinator. This was done in April 1998 after the Paper Co-ordinator signed a Consent Form granting permission for the interview to take place (see Appendix F). A set of questions was developed beforehand (see Appendix G). The questions were prepared in order to ultimately answer the four questions set up at the beginning of this thesis. They were set up in line with literature related to web-based courses and design (see for example, Forsyth, 1996). As mentioned above, this interview was conducted in order to obtain information on the objectives and pedagogical strategies to be used on the web-based course, perceptions of teaching via the web, options of web technologies to include, as well as the design of the user interface. The Paper Co-ordinator read the questions before the interview started. The interview was then audio taped with permission of the participant and later transcribed into text.

Another interview took place in May 1998. Since the first interview lacked depth on a few important points, the objective of this interview was merely to complement the data from the first interview. A new set of open-ended semi-structured questions (see Appendix, H) were prepared with reference to literature related to user interface (see for example, Mandel, 1997). The Paper Co-ordinator was asked to sign another Consent Form granting permission for the interview to take place and be audio taped. The main themes covered in this interview were (a) ease of use; (b); navigation features; (c) technology options; (c) changes in the design; and (d) information included on the electronic calendar.

Interviews were considered important supplements to observation because they can provide information that is not accessible through observation. Patton (1990) notes that people are interviewed to find out from them things one cannot directly observe. One cannot observe feelings, thoughts and intentions. Therefore the purpose of interviewing is to ask questions about these things. For this reason, this method of data gathering was considered of great

importance to gather information on the Paper Co-ordinator's perceptions and plans for the web-based course. It was decided that an open-ended semi-structured interview would be ideal. This would allow more flexibility and keep focus on the content of the crucial issues of this research. In addition, this type of interview would allow a more valid response (Burns, 1994) from the informant's perception of reality.

3.5.2 Phase two – Implementation

The second phase of the research focused on the implementation of the web-based course. The objective, here, was to collect all the relevant data from the students and the Paper Co-ordinator in order to describe the functioning of the course. This section describes the various techniques used in the data collection process during the second phase of this research. It consisted of (a) non-participant observation; (b) fieldwork journal; (c) teacher's diary; and (d) private forum set up on WebCT.

3.5.2.1 Non-participant Observation

By means of non-participant observation, data was collected bi-monthly, starting in May 1998 until November 1998. The frequency of data collection was considered reasonable for the quantity and variety of information generated. Some WebCT[2] tools were used in order to access and construct a small database with the main activities that took place in the web-based course. The WebCT tools used for this purpose were the "Page Tracking", "Student Tracking", and "Student Profile" information. Basically, the use of the WebCT tools for data collection generates static snapshots of the course activities, considered very useful to track students' participation and progress in the course. The collection and analysis of two course snapshots per month gave a good compromise between data generated (feasibility of research) and the dynamics of course behaviour (quality of data).

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[2] As mentioned before, WebCT was the authoring software used to design the course.

WebCT automatically generates and stores several types of information. People with special access to this data can then monitor students' participation and progress in the course. The built-in tools facilitate tracking the progress of each student through the course material, as well as overall determination of the level of use of each course component. The "Student Tracking" tool (see Appendix I) was used to collect information on students' access to the course homepage. In order to obtain more detailed information for each student in the course, the "Student Profile" tool (see Appendix J) was also used. This included information on the number of articles read and posted, access to external references, use of the Study Guide and Course Administration (course notes). The "Student Profile" tool also provided access to the number and type of pages visited by each student. Finally, the "Page Tracking" tool (see Appendix K) was used to obtain information on the time spent on each page (total and average) of the course material (Study Guide and Administrative Book). Moreover, information on activities that took place on the various forums between students, students and Paper Co-ordinator, and between students, guests and Paper Co-ordinator, was also collected. Finally, WebCT also kept record of the activities in the four chat rooms (see Appendix L). This was used to keep tracking of the activities that took place during the course in these four chat rooms. However, WebCT did not keep a record of the other chat rooms and therefore it was not possible to monitor the activities in these chat rooms.

The researcher adopted a non-participant role in order to record the activities without interfering with students. Justification for the decision was to avoid partiality, misjudgement and inappropriate involvement in the course activities. Based on the research objective, it was decided that the most appropriate approach was to act as a "complete observer" (Bogdan & Biklen, 1992). In accordance with this approach, the researcher did not participate in the activities on the web-based course. Instead, the researcher looked at the scene as though through a one-way mirror in order to observe the activities in the web-based course without influencing student's participation in the course, particularly in the forum, email and chat modes.

Finally, on completion of the observations in November 10th a letter of appreciation was sent to the Paper Co-ordinator (see Appendix M).

3.5.2.2 Fieldwork Journal

In addition to the information gathered through the WebCT tools, a fieldwork journal was implemented. This was very much in line with Spradley (1980), who recommended the use of a similar add-on. Justification for the implementation of a fieldwork journal was the perceived need to have a tool for keeping informal impressions and unorganised useful thoughts on the course. In this journal, a chronological record of observations was kept. Records were taken every fortnight and personal impressions, problems, and work developed during the course was logged in. A sample of a blank page of the fieldwork journal is included in Appendix N.

3.5.2.3 Teacher's Diary

A teacher's diary was designed to obtain course information from the Paper Co-ordinator. Since the Paper Co-ordinator's overall position on the course design and implementation played a very important role in this research, the use of this device was considered of utmost importance. The diary was presented to the Paper Co-ordinator during the on-campus course activities. The diary contained the following themes: (a) things that could be improved or changed about the web-based course; (b) teaching strategies used during the course; (c) thoughts and comments; and (d) time spent with students as part of the WebCT activities. The Paper Co-ordinator was asked to complete the diary on a weekly basis from April 1998 to the first week of November 1998.

Unfortunately and due to unspecified reasons, the Paper Co-ordinator did not fill in the teacher's diary, as requested at the beginning of the course.

3.5.2.4 Private Forum set up on WebCT

A private forum was set up on the WebCT for the purpose of this research. Access to this forum was exclusively conditioned to the students and the researcher. Students were asked to post messages regarding any problems they were having with the web-based course, and place any relevant comments. The creation of this forum was thought of as a valuable source of information to gain important insights on the effectiveness of the course tools.

3.5.3 Phase three – Evaluation

The last part of the research concerned the evaluation of the web-based course. The objective was to assess the effectiveness of the web-based course listening to the Paper Co-ordinator and the students. This section describes the two techniques used in the data collection process during the evaluation phase and after the course was completed: (a) student questionnaire; and (b) interview with the Paper Co-ordinator.

3.5.3.1 Student Questionnaire

The questionnaire was designed to gather information from the students regarding: (a) their perceptions of learning via the web; (b) objectives and pedagogical strategies; (c) use of web technologies; and (d) comments to the user interface. The questions were set up in line with the basic set of questions pursued in this thesis, with results of phase one and with the literature related to web-based courses (see for example, Khan & Vega, 1997; Mandel, 1997; Fitzelle, Jr. & Trochim, 1996; Goldberg, 1996; Zhu, 1997; Hoffman & Lyon, 1997). The questionnaire had a mixed format. It included, not only a series of statements using a five point Likert scale: strongly agree (1), agree (2), neutral (3), disagree (4), and strongly disagree (5), but also ticking boxes and open-ended types of questions (see Appendix O). The questionnaire was planned and formatted in accordance with the guidelines suggested by Burns (1994) and Wiersma (1995). A cover letter (see Appendix P) was included with the questionnaire in order to explain to the respondents the purpose and value of their responses. It also reminded participants that their

responses were confidential and anonymous. In addition, stamped-envelopes were provided for returning the completed questionnaire in order to increase the rate of respondents.

The questionnaire was pilot tested with a small group of students who were not involved in the course 86.761. The students provided valuable feedback and some questions were revised in order to increase clarification and avoid misunderstanding. Copies of the questionnaire along with the respective covering letters were sent over to them on 10th of November 1998. A period of thirteen days was planned for the filling in and returning of the questionnaires. By 23rd November 1998, a total number of ten questionnaires had been received. In order to increase the response rate, follow up letters (see Appendix Q) were mailed out to participants. The second timeline asked participants to complete the questionnaires and return them by November the 30th 1998. Two additional questionnaires arrived after this second round. Therefore, 12 out of 17 questionnaires sent were received (three students withdrew from the course). This means that the percentage of respondents was 71% of the total number of students who completed the course. Finally, a letter of appreciation was sent to the participants (see Appendix R).

The main reason for using a questionnaire as a means to collect information from the students was the benefits of this method in the given circumstances of reaching a sample spread all over the country. Questionnaires and interviews are regarded as the most important methods to complement observation. Therefore, the questionnaire would complement the data collected during the second phase of this thesis and provide important information that it was not possible to gather through the WebCT software. Due to its limitations, WebCT software did not provide information on quizzes, student homepage, email, and access to Internet Links. Valuable constructive comments were expected as a means to crosscheck the effectiveness of the non-participant observations. In addition, the questionnaire was considered important to gather information on participants' perceptions of learning via the web, opinion on the use of the web technologies, opinions about the strategies and objectives used to deliver content, as well as the user interface.

3.5.3.2 Interview

After the completion of the web-based course, another open-ended semi-structured interview (Guba & Lincoln, 1981) was conducted with the Paper Co-ordinator. This was done in November 1998 after the completion of the course and after the Paper Co-ordinator signed a Consent Form granting permission for the interview to take place and be tape-recorded. A set of questions was developed beforehand (see Appendix S). The purpose of this interview was to evaluate the success of, and record the evolution of the Paper Co-ordinator's perceptions regarding the web-based course after completion. The points covered in this interview were basically the same covered in the first and second interviews. The questions were prepared in order to ultimately cover the basic set of questions set up at the beginning of this thesis. They were set up in line with the results of phase one and phase two as well as related literature to web-based courses (see for example, Forsyth, 1996).

3.6 Data Analysis

This section and associated sub-sections explain how the information collected was later treated, analysed and recorded until it was turned into meaningful data. Some simple analysis took place while dealing with the student profile forms, the interviews with the Paper Co-ordinator, the information gathered from the WebCT, the journal and the student questionnaire. The analytical procedures adopted for each case are described in the following sub-sections.

3.6.1 Student Profile

As a first step, the information provided by the students in the student profile forms was entered onto a spreadsheet in order to construct a database consisting of 16 different fields, according to the order and number of questions in the student profile form. The spreadsheet became, therefore, the "student profile database" and constituted the basis for performing simple basic analysis on the students' profiles (see Appendix T). After organising all the fields by rows and columns on the spreadsheet, the second step was to engage in some meaningful analysis.

The first type of analysis was to determine for each group of variables, basic mathematical expressions such as totals, percentages and averages. Finally, and most important of all, five charts were produced to display graphically the most relevant information extracted from the student profile forms. The charts selected for display were: (a) age group distribution of the participants; (b) description of the professional occupation of the participants; (c) participants' capability of accessing the Internet; (d) description of the types of Internet services accessed by the participants; and (e) assessment of the competency level of the participants regarding Internet technologies.

3.6.2 Interviews

The three interviews held with the Paper Co-ordinator were fully transcribed, coded, and analysed. The interviews covered four main themes: (a) teacher's perceptions of teaching via the web; (b) objectives and pedagogical strategies; (c) web technologies; and (d) user interface. The coding process (Burns, 1994; Bogdan & Biklen, 1992) began by reading the transcripts and marking with letters A, B, C, and D any comments or phrases that appeared to be related to the main themes. A word processor was used to organise the selected extracts under the respective themes. The coded extracts from the interviews were later analysed in terms of the research questions, interpreted, and presented in the results.

3.6.3 Information gathered from the WebCT

The information collected from the WebCT was both quantitative and qualitative. The two types of information were treated differently. Starting with the quantitative data generated by the WebCT, it was decided to create six complementary databases that constituted the basis for further analysis. The databases were created on six spreadsheets. Due to the vast quantities of information automatically generated by the WebCT and, above all, the way the WebCT presented the information, careful planning was necessary in order to perform simple analyses and produce meaningful charts. The six spreadsheet samples included in Appendix U are:

1. **Accumulated Student Tracking Information** — Since the WebCT could only provide information on an accumulated format, this spreadsheet included, therefore, the accumulated values of the most significant part of the raw quantitative information, as extracted from the WebCT. This spreadsheet became a database covering 42 different variables, which had their origin in the "student tracking", and "student profile" WebCT tools. The 42 variables recorded twice a month for each participant were grouped into three sub-groups: access information, number of hits and history of the pages visited;

2. **Accumulated Page Tracking Information** — For functional reasons and due to the large number of variables at stake, it was decided to split quantitative information and create another spreadsheet. The new spreadsheet was named "Accumulated Page Tracking Information" and covered exclusively the information originating on the "page tracking" WebCT tool. The spreadsheet also became a database of accumulated raw data taken straight from the WebCT. In this case it covered three main variables for each of the 31 pages of material posted on the web: number of hits until the collection date, total time spent until the collection date and average time spent until the collection date;

3. **Discrete Student Tracking Information** — To make data analysis possible, all the accumulated data from the "Accumulated student tracking information" was transformed into discrete data, as an intermediary step. By doing so, a new database on "Discrete student tracking information" was constructed, making it possible to quantify the magnitude of events between measurements. In terms of variables, this database exactly replicated the number and order of the variables laid down in the "Accumulated student tracking information" database.

4. **Discrete Page Tracking Information —** As in the previous case, a new "Discrete page tracking information" database was needed in order to analytically transform the accumulated raw data provided by the WebCT into more meaningful discrete data

between collection dates. This database also replicated the number and order of the variables included in the "Accumulated page tracking information" database.

5. **Consolidation of the Discrete Student Tracking Information** — Rather than using data from single individual data measurements, what was deemed interesting was the grouping and consolidation of the discrete figures into totals and subtotals for each student, group and sub-group. This means, a new database based on the variables of the "Discrete student tracking information" database was created. The new database was named "Consolidation of the student tracking information" and presented the variables in a consolidated format (totals and sub-totals).

6. **Miscellaneous WebCT Information** — Finally, another spreadsheet was created to store scattered quantitative information with respect to the functioning of three important web tools: the total number of messages exchanged in the electronic chats, the total number of messages exchanged in the discussion forums and the total number of accesses to the Internet Links. Because of functional reasons the information was included on a different database. In this case, the information included was not automatically generated by the WebCT, as was the case with the two accumulated databases referred to before. The information was counted manually and later recorded after printing all the chat messages. Due to the low number of messages exchanged in the chat, it was decided to present data on a monthly basis, instead of bi-monthly. The total number of exchanged messages in the discussion forums and the total number of accesses to the Internet links was also counted manually. Due to their consolidated format and the small number of variables included in this database, it was decided to calculate and include the discrete and consolidated values on the same spreadsheet.

As a summary, charts based on all the discrete and compounded information recorded in the six databases were produced to illustrate the evolution of the most relevant variables in the functioning of the web-based course.

As for the qualitative data, the most relevant messages from the discussion forums, including the private forum, were selected and used in chapter 5 of this thesis to complement the quantitative data of the discussion forums. Some messages were also used to complement the researcher's observation of the implementation of the web-based course.

3.6.4 Fieldwork Journal

All the relevant information that was recorded in the journal during the running of the web-based course was highlighted in different colours according to the research questions. Basically, the information in the journal was used in the discussion of the results.

3.6.5 Student Questionnaire

The storage, treatment and analysis of the information collected from the student questionnaires took place in three distinct phases. The construction of a database for the storage of all the information provided by the students, constituted the first phase. The second phase was the analysis — one spreadsheet was prepared to accommodate all the quantitative data. Apart from grouping, the calculations done were basic totals, averages and percentages for each of the 69 quantitative variables covered in the questionnaire. The spreadsheet with the quantitative information and the analysis was included in Appendix V of this thesis. Finally, the last phase referred to the construction of some charts illustrating the behaviour of the more representative quantitative variables.

The qualitative data in the questionnaire was grouped and coded according to four research questions pursued in this thesis. The question regarding the teacher's perceptions of teaching via the web was not covered in this case.

3.7 Ethical Considerations

This research was guided by Dobbert's (1982) ethical guidelines and by the Code of Ethical Conduct produced by Massey University (1990). First and foremost, the research has an

obligation to respect the rights, needs, values and desires of participants. Ethnographers and other qualitative fieldworkers have a special obligation because their research style invades the lives of participants and sensitive information is frequently revealed. In order to protect the participants' rights, the following safeguards were employed in this research:

3.7.1 Informed Consent

Participants were informed about the purpose of this research and they were asked to sign a written consent form in order to allow them to take part.

3.7.2 Confidentiality

The information was handled in such a way as to protect the confidentiality and anonymity of the participants. The results were grouped and compounded in order to prevent the identification of any particular participant. The tapes will be destroyed after completion of the study.

3.7.3 Anonymity

In order to protect the anonymity of participants, this research did not use the participants' names. The names of the participants were removed from the dialogues, which were used as quotations, taken from the discussion forums and chat rooms. The participants' names were also removed from the information taken from WebCT software, which were used as appendices.

3.7.4 Report of Findings

After the completion of the research, a summary of the findings will be made available to those participants interested, who requested it when answering the questionnaire.

3.8 Summary

This chapter outlined the methodological aspects that guided the research. Based on the concept of culture, the approach adopted in this thesis was a "thick description" of events, in order to look for explanations while evaluating the effectiveness of the web-based course, rather than seek to establish universal laws of behaviour. Regarding the design of the research, this thesis adopted a micro-ethnographic evaluation method to meet the objective initially set. This seemed to be the most appropriate method to deal with the nature of the problem, the constraints and the type of questions used.

The research population chosen for this thesis was all the Massey University programs for reasons of adequacy, convenience and usefulness. In this case, the research sample comprised a group of 21 post-graduate students enrolled in the Massey University course 86.761 – "Learning with Computers" during the 1998 academic year. This choice was based on reasons of convenience, size and appropriateness. The selection procedure took place in April 1998 during an on-campus event at Massey University. Detailed profiles of each participant were obtained by means of filling in a proper form. Analysis of these forms clearly established the average age group of the sample, job description of the participants, those who had access to the Internet, and the experience they had with some key Internet technologies.

This chapter also presented the various procedures for data collection and analysis used in each phase of the research. The research was split into three different but complementary parts: phase one dealing with design issues and an interview, phase two dealing with the implementation of the web-based course and phase three dealing with the evaluation aspects. Different methods and techniques were used for each phase. Finally, the ethical considerations of the research were outlined.

CHAPTER 4

Results - Phase One

This chapter provides the results of the first phase of the research. It discusses the content of one interview with the Paper Co-ordinator regarding his perceptions, course objectives, strategies, technologies and user interface. The findings of the interview are divided into six sections, which address fundamental research questions. The first section outlines the Paper Co-ordinator's expectations and perceptions of the web-based course. The second section describes the course objectives. The third section examines the strategies selected by the Paper Co-ordinator for the web-based course. The fourth section presents information on the technological tools. The fifth section provides information on the user interface. The last section presents additional relevant information on the construction and implementation of the web-based course.

4.1 Setting up the Case

An interview with the Paper Co-ordinator was implemented for the purpose of collecting the most relevant qualitative information about the design and implementation of the web-based course "Learning with Computers" This material is an essential part of this thesis. Basically it highlights the Paper Co-ordinator's expectations, strategies and views on the various aspects of the course before it was actually offered. This was considered topical for the correct understanding of the course design philosophy and its limitations.

4.1.1 Paper Co-ordinator's Initial Expectations

From the outset, expectations about the success of offering the web-based course were far from high. According to the interview given by the Paper Co-ordinator:

"I am sceptical. I have a healthy degree of scepticism...that's probably why I'm quite happy to be involved in this pilot experiment..."

The interview suggests that the reasons for such scepticism stemmed mainly from two different causes. These can be briefly summarised as:

a) **Paper Co-ordinator's personal beliefs** — The Paper Co-ordinator's personal preferences and own views on the role of the Internet as a media to teach students:

"...[I have doubts] from claims that suggest this is the way of future...based on my own experience, I... prefer to have the paper based products..."

b) **Some expected difficulties** — Anticipation of students' reactions to and difficulties with a new medium of delivery and a new way of learning, as mentioned in the interview:

"Technical difficulties...there is the [issue of] speed of download time...that [makes me] wonder whether the students would...persevere...[Another issue] if they're relying upon a commercial provider...that could be a disincentive for using WebCT..."

Despite the initial sceptical attitude, the interviewee explains that not all is doom and gloom. There are some benefits arising from the fact that the course is delivered via the web. The main point, however, is that the online dimension should be seen as an extension and not as a replacement of the traditional paper-based medium. According to the Paper Co-ordinator there are five major benefits derived from delivering the course via the web:

1. **Portability** — Rather than carrying the course material around, it becomes easier to access such material from whatever place has a computer and an Internet connection;

2. **An opportunity to create a learning community** — Due to the appealing interface and electronic benefits of using the web, this is an ideal opportunity to share ideas and build a so-called "learning community";

3. **Likely to increase class participation** — Many students are keen to experiment with new technologies. Others have probably been using computers in various capacities for some time. For those familiar with the technology this could therefore be the means to increase class discussion and participation through the various tools available;

4. **An opportunity to get in touch with the outside world more easily** — One catch phrase in computer technology is the objective of having "the world at your fingertips." This objective came one step closer to achievement with the widespread adoption of the Internet. This means that someone with a computer connected to the World Wide Web can have easy access to many libraries, scholars, scientists and other important sources of information;

5. **An opportunity to present more up-to-date material** — There is a clear advantage here when comparing the web mode of delivery against the traditional paper-based mode. Due to obvious administration reasons, material for printing and distribution has to be prepared and presented far in advance. This means that paper-based material can never reflect the latest events or thinking. Conversely, electronic material delivered via the web can include references to very updated material or the latest events in the field.

4.1.2 Course Objectives

The main objective of this course was for students to learn and develop a personal attitude towards learning with computers. Such a broad objective should be accomplished independently of the mode of delivery, either paper-based or via the web. As for the web component of the course and based on the interview, three main objectives were also identified:

1. **Social dimension** — The creation of a learning community capable of sharing and extending knowledge on the topic;

2. **Added value** — To complement the paper-based material and add value to the course through the use of various new technologies. This objective can also be seen as another means to justify the high fees paid by students - getting better value for money;

3. **Enhanced quality** — By providing means to more easily access high quality content in the area.

4.1.3 Course Strategies

In order to succeed and comply with the objectives initially set a few pedagogical strategies were used for the design and implementation of this web-based course. Such strategies were clearly highlighted in various parts of the interview. They can be briefly summarised as:

1. **Running a tutorial** —To minimise potential difficulties, the Paper Co-ordinator plans to run a tutorial on the functioning of the web-based course;

2. **Encouragement for the use of some key technologies** — By selecting and implementing some key technologies, (electronic forums, electronic mail, chat) in order to foster communication among students and contribute to the formation of a social dimension (learning community);

3. **Apprenticeship philosophy** — The creation of a small community of scholars through the development of an apprenticeship model of learning in which the Paper Co-ordinator would act as "the master" and students as "apprentices";

4. **KISS** — By following as much as possible the principle of "Keep It Simple and Stupid" (KISS), as explained in the interview:

"The less you have to explain how you're going to use the preferences...the better"

Further evidence for the application of the KISS principle can be found in the reasons described by the Paper Co-ordinator as to why he declined to select other more appealing technologies offered by WebCT:

"If you use audio or video...it's considerably more problematic technically to get it to work...I wouldn't like to have introduced those tools and therefore given the students a bad experience..."

5. **An extension of the paper-based material** — By clearly emphasising that the web-based course should be seen as a mere complement of the paper-based material and not as a replacement of it.

"That's the real advantage of supplementing the traditional material with new methods...that it provides alternatives and more flexible approaches to learning..."

6. **Selective differentiation** — Differentiate between the paper-based and the web-based courses only when necessary and implement new things parsimoniously when value is added as a result of that;

7. **Structured participation** — Engage the students and lead them into action through the accomplishment of tasks within certain specific deadlines. Structured participation can work as an incentive and can hopefully lead to the build up of the learning community. A good example of the structured participation strategy is highlighted in the following statement:

"...in one of the course assignments, it's called actually Scholarly Contribution...the students are required to take one of the course readings and write a review of that reading and then they have to post that online..."

8. **High quality content delivery** — Emphasise the high content and quality of the course in order to maintain the University's reputation on delivering long distance courses. In support of the high quality content the Paper Co-ordinator added:

"... this is just another way that I have added something to the course that further enhances its quality. That they got a list or links to all these International Associations and Conferences..."

9. **Minimal interference** — Adopt a "hands off" approach and let the course run by itself with minimal interference from the Paper Co-ordinator and a strict limit on the amount of time dedicated to feedback and discussion.

"...I'm not going to spend any longer than two hours a week doing this...As far as I am concerned, that's all we do with the internal students..."

4.1.4 Technological Tools

Within the range of possibilities offered by the WebCT software, a group of nine tools was selected as the most adequate for this course. Reasons for that stemmed from both, pedagogical beliefs and technical constraints. This means that the Paper Co-ordinator's own views, expectations, objectives and strategies, as well as limitations imposed by time constraints, access to special hardware etc., played an important role in the decision making. The rationale for the use and implementation of each technological tool can be briefly summarised as follows:

1. **Forums** — The decision to include electronic forums for discussion was very important. Forums were at the very heart of the course strategy and were considered the most important technological tool offered. A great deal of time was dedicated to the implementation of the forums. The Paper Co-ordinator described how the forums were structured:

"...I'm running a forum for each theme...[which will] involve someone...[from] the International Society for Technology in Education...someone...[from] the Australian Educational Computing Association...[someone from] Europe...in addition...I got forums set up just for general questions..."

However, cautious expectations were built around the use of this technology, as mentioned in the interview:

"So the forums hopefully with the guests contributing well, that will be a catalyst for the students to actually want to start asking questions...But I'm still a little hesitant to say that it will work naturally."

2. **Electronic Mail** — This technology has been around for some time. Most likely, students dealing with computers or with access to a computer connected to the Internet have been using this tool for quite some time. The decision to include electronic mail can be seen as providing the effective means of asynchronous communication between all those enrolled within the course (Paper Co-ordinator included). Since WebCT has a built-in email facility, this can be very useful in particular for those who do not yet have a private email account. Students are expected to use informal speech language with the intention of discussing problems, communicating, bouncing ideas and contributing to the formation of the "learning community";

3. **Electronic Links** — This was considered a useful tool to supplement the existing course material. Some electronic links were established to relevant and credible institutions in order to provide students with easy access;

4. **Electronic Calendar** — This was selected because there was no paper-based calendar in the course. The intrinsic value of this technology was the usefulness of having a quick means to check the latest calendar information. This was considered more as a utility

rather than a proper tool to add value to the course content. However, the great value of this tool would be to fully customise it to the course requirements;

5. **Chat** — This tool was given a very low priority due to the Paper Co-ordinator's experience in the past with this technology. Despite offering a chat capability, the Paper Co-ordinator does not intend to participate in chat discussions or use this technology. However, by acknowledging some benefits in the existence of a way to provide synchronous communication between a group of students, it was decided to offer this tool after all. It can be a valuable collaboration tool in some circumstances;

6. **Quizzes** — This tool was selected mainly because of the implicit added value. Due to its electronic nature it can perform certain tasks, such as immediate feedback to students, not possible through the traditional paper-based method of delivery. This appealing feature made it a worthwhile tool. Moreover, by using electronic means one can overcome the strict limits imposed by the University regarding the length of printed material;

7. **Personal Homepages** — Students are encouraged to use this tool as a way of introducing themselves to colleagues and ultimately foster the social dimension objective of the course. It is thought of as an interesting way to break social barriers and build trust among the students involved. Moreover, due to the variety and abundance of information available via the web, students are encouraged to link with their existing homepages. They can also browse the World Wide Web searching for new and interesting information placing electronic links in their personal homepages. Since there is no course content involved, this tool will not be part of any assessment. This means that students will probably allocate a lower priority to the implementation of this feature;

8. **Administration and Course Material** — The paper based course material, that is the Administrative Book and Study Guide, were replicated electronically more as a matter of convenience for the students than a priority in terms of innovation and added value.

However, the existence of both versions can be seen to be part of the objective of offering students better value for money. The Paper Co-ordinator decided to remove the graphics from the electronic version of the study material because of slowness of access, as mentioned in the interview:

"...if we included it [the graphics] and it was...very slow opening up...students just wouldn't bother...we wouldn't truly find out whether the paper-based text material was useful..."

4.1.5 The User Interface

The user interface was an important element taken into consideration for the success of the course. The interview with the Paper Co-ordinator suggests the existence of various factors and limitations. The implementation of the user interface was a compromise between the technical limitations imposed by the WebCT software on the one hand and an important range of factors on the other. The various factors were implemented with various degrees of success but they can be briefly summarised as:

1. **Ease of use** — There was a genuine concern to make the use of the various pages and tools available on the web as intuitive as possible. This was done through the choice of meaningful icons, the labelling of these icons and by adopting a simple and logical layout;

2. **Consistency** — Another important concern was to standardise and make use of various tools as consistent as possible in terms of menus, commands and conventions. This effort was severely hampered by the WebCT present limitations, as described in the interview:

"...there are some things about the interface that aren't very web like...those who have produced WebCT need to work on...the inconsistencies between the backs and forwards..."

The Paper Co-ordinator also categorically acknowledges that there is no consistency between the use of various tool applications due, in part, to the limitations of the software.

3. **Access and Navigation** — This was another important issue. Concerns were raised about how easy it would be for students to access the course material by going through the general Massey University list of courses. Some time and effort was also dedicated to ease the navigation within the various course web pages, as explained in the interview:

"...the icons that were selected...they all flow from one into another. They set a logic to the way I have put those together."

In the specific case of the forums, the Paper Co-ordinator says:

"...the navigation features in terms of the forums are appalling...They're only adequate once it's been explained to you."

4. **Help and advice** — This was probably the weakest point of the interface. The WebCT software, in the present version, does not provide users with any help files, user manuals, tips, or any kind of advice on how to proceed in certain situations. This makes it highly important to have a tutorial (face-to-face session) with all participants firstly, in order to introduce the product and practise with all the tools available and therefore minimise future requests for assistance. An important recommendation for improvement is the writing of a user's manual;

5. **Features** — The available number of features offered through the WebCT, such as degree of customisation, navigation, ease of use, consistency, maturity of the product and range of technological tools, were considered adequate for a first trial. Plenty of room for improvement was diagnosed, nevertheless the available set of features anticipated a certain degree of confidence in the course implementation;

6. **Customisation** — This particular aspect of the interface was considered quite important. Since one of the objectives of the course was the social dimension, the capability of

adding a personal touch here and there was considered very important. It gave an identity to the product as a whole.

"...the light blue...on the background...it's not too intrusive...[the homepage layout composed by] three rows and three [columns], it looks quite balanced...it's a representation of my own personality..."

4.2 Miscellaneous

To better understand some important aspects of the implementation of this web-based course, it is crucial to spend some time grasping the Massey way of doing things. This means taking into account pressures, policies, working philosophies, the environment and consequent staff attitudes. Without such basic knowledge, it is hard to find explanations for certain paradoxes in this research. One of the interesting paradoxes so far is the explanation for the fact that despite acknowledging the existence of a high degree of scepticism from the outset, why then bother to offer a web-based course in the first place?

Information collected from the interview with the Paper Co-ordinator suggests that motivation and attitude towards the course were strongly influenced by the following factors:

1. **Pressure to innovate** — There is an undeniable element of pressure from Massey to innovate and present new things, partly due to the system in place and partly due, in this case, to the nature of the topic to be taught in the paper;

2. **The University's reputation** — Massey University has a long-standing tradition in tertiary distance education. Because of this name and strong reputation there is also an implicit pressure to continue with the Massey tradition of being at the forefront of distance education programs;

3. **Personal benefits** — The course should be seen as an experiment. Whatever results come out of it, they can always be used as a lesson for the future, material for

presentations, conferences, journals or other professional publications, or even constitute case study material for the paper in focus. In this way, the web-based course can be seen always as a rewarding experience for the Paper Co-ordinator;

4. **Competition** — Within Massey there is a certain element of competition between the various Faculties. Many staff members are eager to introduce new technologies, to pursue new ideas and become leaders in their own fields of expertise;

5. **The Massey University system** — The current Massey University system rewards not only teaching innovation, but also strongly rewards research in terms of written publications, articles, conferences' participation.

4.3 Summary

Data collected in the first phase of this research focused on the Paper Co-ordinator's views on offering the course on the web. Despite the initial scepticism, he clearly envisaged some benefits by offering the course via the web. Reasons for presenting the course via the web underline the existence of three main objectives: enabling a social dimension, adding value and improvement of quality. The Paper Co-ordinator highlighted nine course strategies to fulfil the objectives: encouragement for the use of new technologies, apprenticeship philosophy, implementation of the KISS principle, a complement to the paper-based material, selective differentiation, structured participation, high quality content delivery, implementation of a tutorial, and hands-off approach.

A number of web technologies were selected for this course. According to the Paper Co-ordinator's interview, these were: the use of electronic forums, electronic mail, electronic links, electronic calendar, chat, quizzes, personal homepages, administration and course material. The forum was considered the most important strategic tool. Regarding the user interface and according to the Paper Co-ordinator, the final output was constrained by the technical limitations of the software. The final output took into consideration six main factors with

various degrees of success: ease of use, consistency, access and navigation, help and advice, and features and customisation. Finally, some miscellaneous issues were also raised. Five key factors were highlighted as key elements in better understanding the attitude and motivation of the Paper Co-ordinator when planning to introduce new programs and activities within the Massey University system.

CHAPTER 5

Results - Phase Two

As a logical sequence to the previous chapter, the results of the second phase of the research are presented herein. The findings are divided into two sections. The first section describes observations taken during the on-campus course regarding the introduction of the web-based course to the students. The second section has two important components. Firstly, quantitative data regarding the students' access and usage of the various web tools provided is put forward. Secondly, qualitative data is also provided to best describe the activities in the discussion forums. Qualitative data is based on extracts from the dialogues occurred in the various discussion forums.

5.1 Introducing the Web-based course

This section presents data collected by the researcher during observation of the introduction to the web-based course given to the students.

The web-based course was introduced to the students on April the 21st during the on-campus course. Before the introduction some preliminary work was done. All the students were given passwords and logging identification. During the introduction, which took place at the computer laboratory of the College of Education, the Paper Co-ordinator explained the content and purpose of the various tools used in the web-based course. The Paper Co-ordinator also made

clear to the students that the electronic quizzes in the web-based course were included only for self-reflection and would not be related to the exam. The Paper Co-ordinator spent more time explaining the forums and the way they were structured. He announced that guests would take part in the discussion for each theme of the course.

After being introduced to the web-based course, a handout was disseminated to the students. Briefly, it explained the purpose of offering this web-based course as well as the way to access it. Students were then invited to log on to the course homepage. In order to avoid misunderstandings and delays in accessing the course homepage, the student passwords and user name information were typed on a piece of paper and handed over to each student. However, despite such a precaution, some of the students had problems in accessing the course homepage. This happened mainly because there were some confusion on how to get to the right list of courses through the Massey common gateway course list.

A trial forum named "on-campus forum" was set up for use during the on-campus course in order to allow the students to try out the software as well as get used to it. The introductory message posted by the Paper Co-ordinator was as follows:

"...I'd like you to compose and send a test message to the On-Campus Forum. Just try the software out and see what you can make of it."

The students promptly used the on-campus forum. However, the first trial never comes right first time. Some students did not know how to post messages to the correct forum. The following extract is a typical example:

"Sorry we sent the previous message to the wrong place."

Other individuals struggled to grasp this new technology. One student wrote:

"I'm finding this technology quite a challenge! I hope to understand a little more by the time I'm finished here."

However, some technical problems occurred. Students complained about computer crashes.

"After crashing the computer we thought we'd give..."

Despite some problems, positive comments regarding these new web technologies were posted in the forum.

"Certainly enjoying this session to learn something new as I have not experienced a similar application yet."

Concerns were raised on how to best use these new web technologies.

"I am impressed with the amount of work that has gone into the development of this site but I know my limitations - not in terms of being a computer user but in terms of having real time to participate in this forum. I am interested to hear how others manage their time to allow quality participation in these potentially valuable forums."

Students were also asked to access the chat facility. The students accessed the various chat rooms, yet without engaging in any dialogues. However, the chat mode worked well and apart from one student who could not manage to exit from one of the chat rooms, students seemed to have no difficulties in dealing with the included chat facility.

Finally, students were introduced to the Internet link tool. The Paper Co-ordinator briefly explained the content of the links to external sources available within this tool. Students were shown how to access the Massey Library through this tool. Many tried to access the Massey Library, as a result of which, many computer crashes occurred. Despite this setback, students liked the idea of accessing the Massey Library within this web-based course.

By the end of the session, which lasted one hour and forty-five minutes, the Paper Co-ordinator seemed reasonably satisfied with the progress made by the students in using the on-

campus forum as well as their understanding of the software. He posted the following closing statement:

"You seem to have grasped the basic ideas behind, and tools within, WebCT quite quickly...Hang in there if you think you need more practice. I'm confident that with some more hands on experience you'll become experts. Keep exploring the software over the next few days and let's see if we can use it to "add value" to your learning."

5.2 The Use of the Web-based Course

This section describes the results of students' accesses to the various tools of the web-based course. As explained in the methodology, the findings presented in this chapter are a mix of quantitative and qualitative data. This section deals exclusively with the quantitative data gathered during an eight-month period of running the course via the web. For ease of reading and interpretation, findings were consolidated and displayed here in graphical formats.

5.2.1 Access to the Course Homepage

Starting with the number of accesses to the course homepage, Figure 5.1 shows an uneven distribution. There were clearly peaks and lows. Five main peaks of access were observed, at the beginning of May, in mid-June, mid-August, mid-September and in mid-November. These suggest the existence of certain bursts of activity in the web-based course. Conversely, three periods of weak access were also identified, in mid-May, at the beginning of July and mid-October.

The pattern highlighting the students' access to the web-based course should not be taken in isolation, therefore a comparative study describing all the accesses of the students, the Paper Co-ordinator and the guests in the discussion forums, was implemented. Such comparisons are illustrated in Figure 5.2. Figure 5.2 shows an important issue in the striking similarity of patterns between the accesses of the Paper Co-ordinator to the web-based course and those of

the students. The similarity suggests the existence of a cause-effect relation between this pair of variables. Another important point is the very weak number of accesses made by the guests in comparison with that of the students and the Paper Co-ordinator. All the three variables display uneven patterns of distribution suggesting the existence of bursts of activity in conjunction with low activity periods.

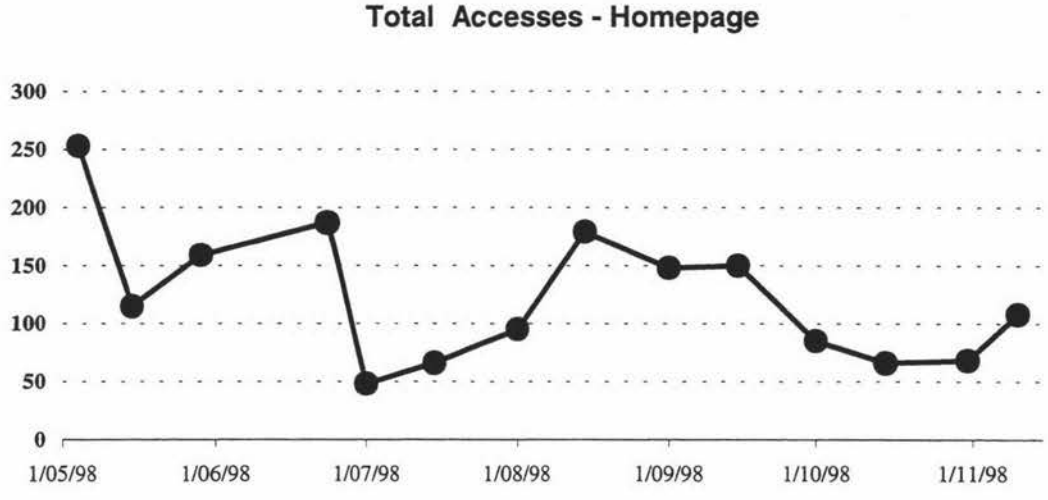

Figure 5.1 — Evolution of student access to the web-based course

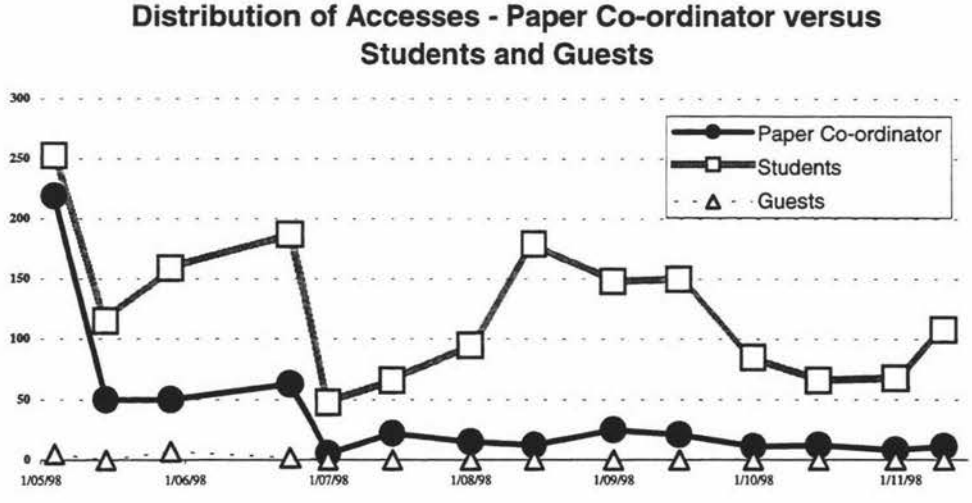

Figure 5.2 — All participants' access to the course homepage

5.2.2 Access to the Study Guide and Administrative Book

Access to the study material published on the web (Administrative Book and Study Guide) revealed the existence of moderate interest from the students. As in Figure 5.1, students' access to course material can best be characterised by an uneven distribution, as highlighted in Figure 5.3. The total number of student accesses suggest, in this case, the existence of five peak periods, namely at the beginning of May, in mid-June, mid-July, mid-September and at the beginning of November, followed by four periods of weak access, in mid-May, at the beginning of July, in mid-August and October. The maximum number of times that students accessed the study material was 34, recorded in May at the beginning of the course. Conversely, the lowest activity level on this particular issue was recorded at the beginning of July: one single page visited by all the students. This clearly indicates that, for some reason, the students spent more time exploring the published material during certain periods of the year.

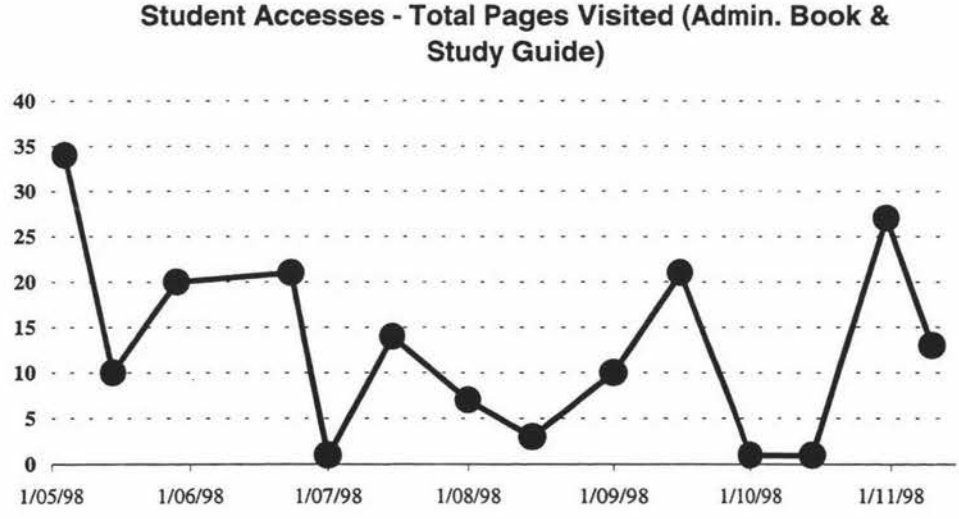

Figure 5.3 —Student accesses to the electronic study material

Further to the previous findings, and in order to have a more complete picture of the use of the electronic versions of the Study Guide and Administrative Book, Figure 5.4 was compiled. This figure highlights the evolution of total accesses and total time spent looking at all the web-based study material. The main difference between Figures 5.4 and 5.3 is that the first takes into

consideration accesses from all participants in the web-based course (Paper Co-ordinator, researcher, guests and students) while the second refers exclusively to the number of student accesses to the same material. Looking at Figures 5.4 and 5.3, two important conclusions can immediately be drawn. Firstly, the total number of accesses and the respective pattern of distribution do not differ too much in both cases. A comparison therefore suggests that the roles of the Paper Co-ordinator, researcher and guest did not interfere too much in the evolution of this specific variable. Secondly, the distribution of the total time spent looking into the on-line study material suggests an evolution similar to that of the total number of accesses. Generally speaking, both patterns show peaks and dips at about the same time, though different in terms of magnitude.

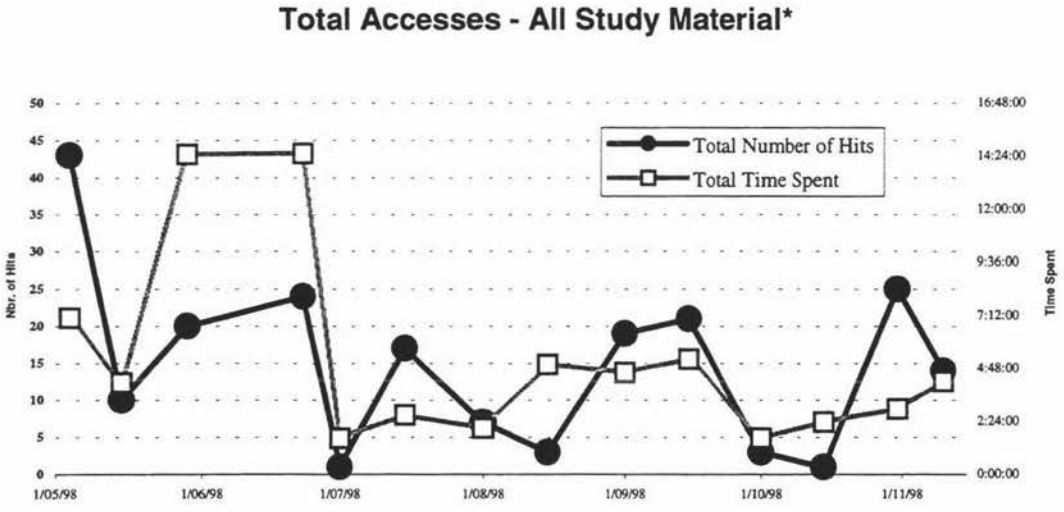

Figure 5.4 —Total accesses and time spent looking into the electronic study material[3]

[3] All study material means the various pages (31) of the electronic versions of the Study Guide and Administrative Book.

5.2.3 Access to Course References

Another variable recorded by the WebCT software was the number of accesses to the "References" feature included in the button-bar during the design process. By pressing the "References" button, students would have been granted access to a list of relevant books, periodicals and electronic links. The evolution of this variable is displayed in Figure 5.5. Only one access was recorded in the middle of August.

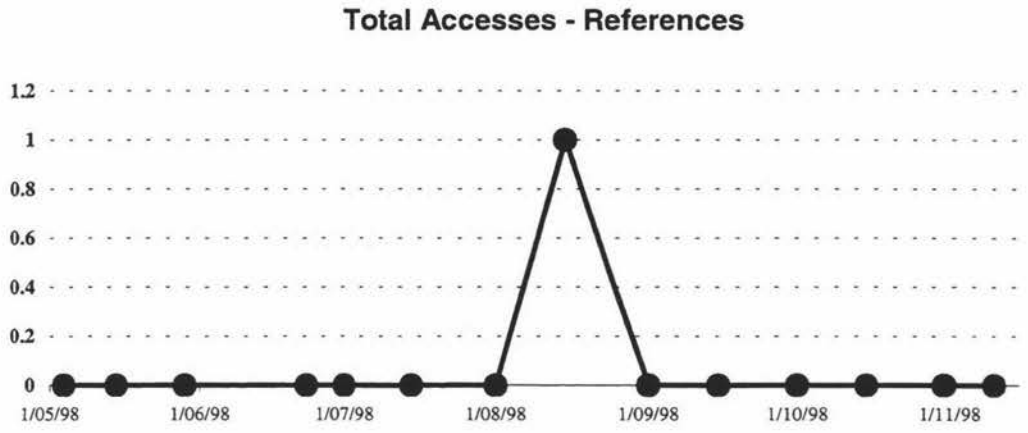

Figure 5.5 — Evolution of student accesses to the "Reference" feature

5.2.4 Quantitative Findings from the Forum Activities

The outcomes of using the electronic forums are shown by studying (a) the total number of messages exchanged, (b) accesses for the purpose of reading messages, (c) accesses for the purpose of posting messages, and (d) accesses for the purpose of following up messages. These variables provide an indication of the usage of this web tool.

The evolution of the total number of messages exchanged by all participants (students, guests, researcher and Paper Co-ordinator) in the various electronic forums is displayed in Figure 5.6. This pattern suggests an uneven distribution with peaks of activity recorded at the beginnings of May and June, in mid-August, mid-September and the beginning of November. Weak periods were recorded in mid-May, at the beginning of July, August and October, and in

mid-November. The maximum number of messages exchanged was 46, recorded at the beginning of May, and the minimum was zero at the beginning of October. This provides an indication of the wide variation of usage of this web tool throughout the course.

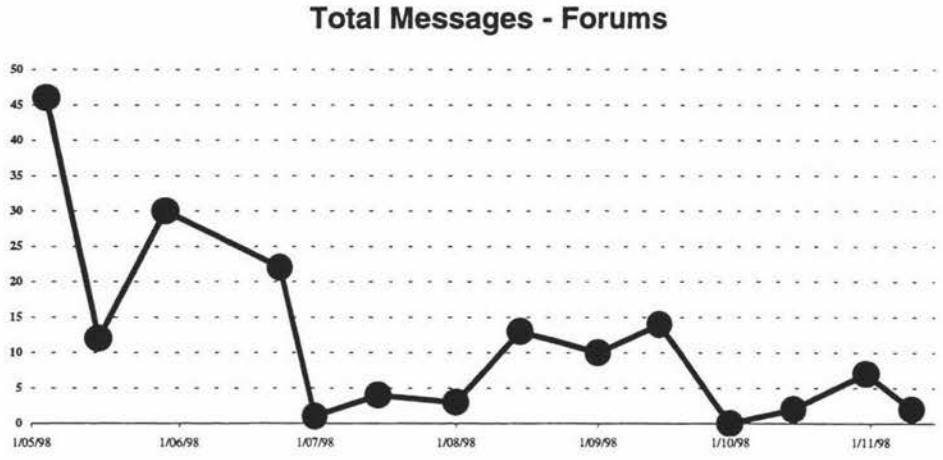

Figure 5. 6 —Total number of messages exchanged in the discussion forums

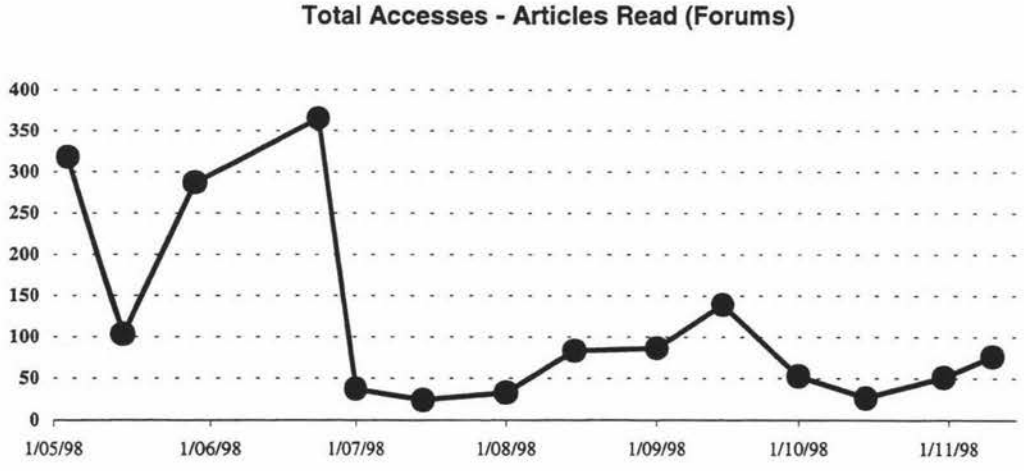

Figure 5.7 —Student accesses to the articles read in the forums

The evolution of the total number of student accesses to the articles read in the discussion forums is represented in Figure 5.7. The peak accesses by students were recorded at the beginning of May, mid-June, mid-September and mid-November. The periods of lower activity, in respect of the number of student accesses to the articles read, were logged in mid-May, mid-

July and mid-October. The striking similarities between the patterns displayed in Figures 5.1 and 5.7 suggest a possible cause effect relationship between the accesses to the homepage and the accesses to the articles read. The maximum number of student accesses for the purpose of reading articles posted in the forums was 365, recorded in mid-June. Conversely, the minimum number of student accesses logged for the same purpose was 24, recorded in mid-July.

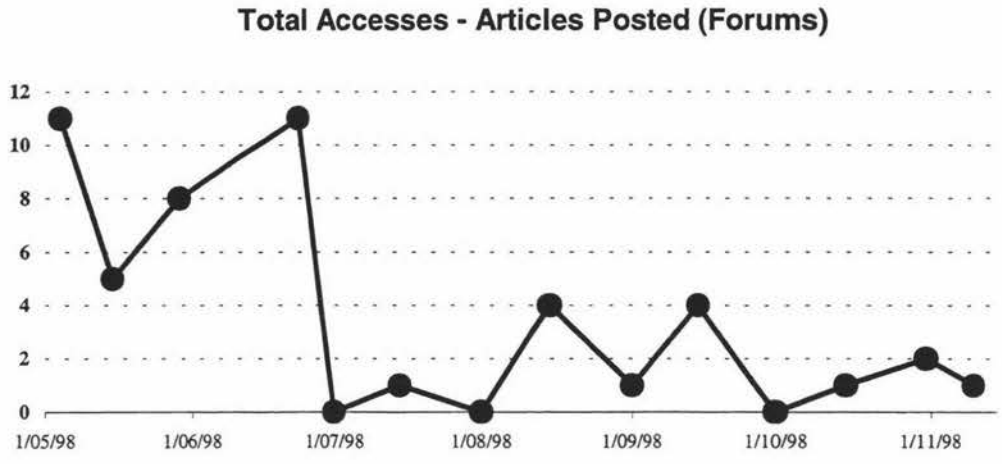

Figure 5.8 —Student accesses to the articles posted in the discussion forums

Regarding the student accesses to the articles posted, Figure 5.8 shows the evolution of this variable. A close look at this Figure also suggests an uneven distribution, with five peak periods at the beginning of May, in mid-June, mid-August, mid-September and at the beginning of November, and three periods of low access at the beginnings of July, August and October. The maximum number of accesses for the purpose of posting articles for the discussion forums was 11, recorded at the beginning of May and mid-June. Conversely, the minimum number of student accesses for the same purpose was zero, recorded at the beginnings of July, August and October. An important finding therefore is the wide variation of student behaviour regarding access for the purpose of posting messages. By comparing the evolution of student accesses to messages read against messages posted, two important findings can be stressed. One finding concerns the absolute figures in these two charts. While accesses for the purpose of reading

messages reach values of 300 hits, accesses for the purpose of posting messages rarely reach 10 hits. This large gap suggests a passive type of student, more keen on reading rather than posting new messages in the discussion forums.

The final focus will be on the student accesses for the purpose of following up messages in the discussion forums. Figure 5.9 shows the evolution of this variable throughout the duration of the course. The pattern of distribution shows the typically uneven behaviour with four peak periods at the beginnings of May and June, August-September and at the beginning of November and flat periods in mid-May, July, at the beginning of August, October and in mid-November. Such an evolution appears in tune with that of the student accesses for the purpose of posting articles. Not surprisingly, this suggests a conjoint activity of reading and exchanging messages and doing follow ups at certain points in time. The maximum number of student accesses for the purpose of follow ups in the discussion forums was 13, recorded at the beginning of May, while the minimum number was zero, observed in the weak periods mentioned above.

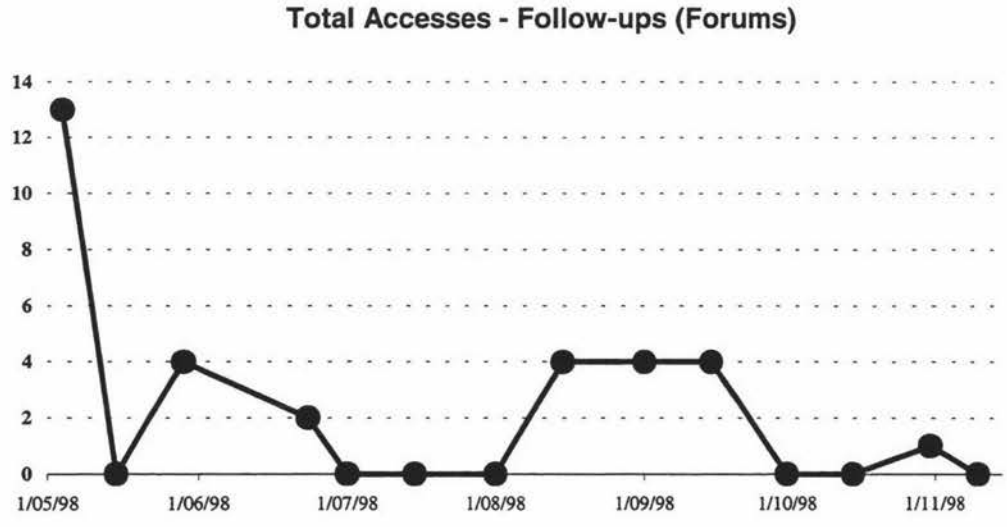

Figure 5.9 —Student accesses for the purpose of following up messages in the forums

5.2.5 Chat Activity

To study the student usage of the electronic chat, three different variables were chosen: the number of connections into the chat mode by different students, the number of attempted initiations of dialogue and the actual number of threaded dialogues among two or more students. The evolution of these three variables throughout the course is represented in Figure 5.10.

Analysis of the number of accesses to the chat facility by different students suggests that, initially, moderate efforts were made to initiate and maintain some kind of dialogue. The peak number of accesses was seven, recorded at the beginning of May. After that, the number of accesses for this purpose dried up. Figure 5.10 suggests that a few students tried to initiate dialogues, in particular during the period from June to November. For some reason, however, these attempts never materialised in a long threaded dialogue. The number of actual dialogue in the chat mode was consistently zero throughout the whole period of the course.

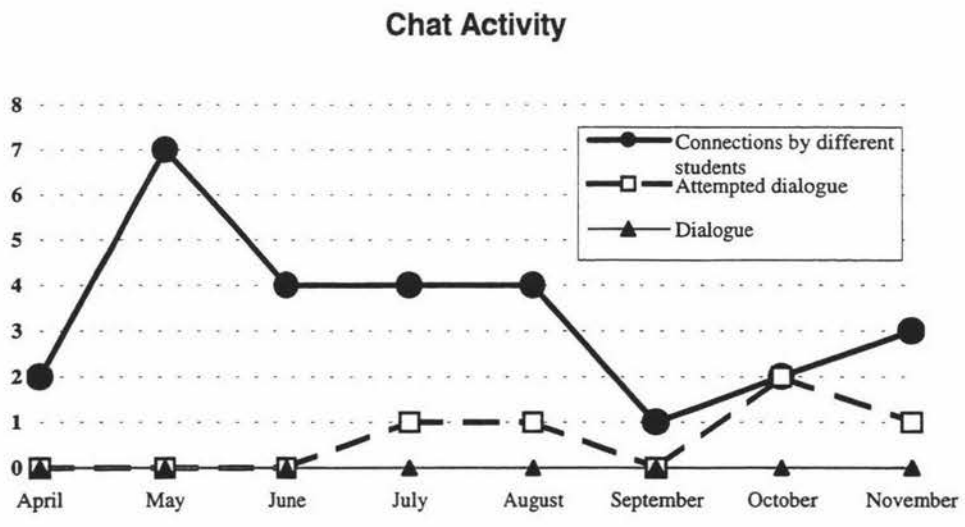

Figure 5.10 — Evolution of the chat activity throughout the course

5.2.6 Access to the Internet Links

The evolution of total accesses to the various Internet links disseminated in the web-based course is described in Figure 5.11. Interestingly, the distribution of this variable is different from the previous ones. For some reason, and after an auspicious start at the beginning of May, accesses from all involved in the course became less and less frequent with the exception of mid-June where accesses actually rose. Regarding this particular variable, the distribution suggests the existence of two peaks of activity: one at the beginning of May and the other in mid-June. The maximum number of accesses for the purpose of Internet links was 60, achieved at the beginning of May. Conversely, the minimum number was zero, recorded at the beginning of November. Generally speaking, this activity declined steadily until the end of the course.

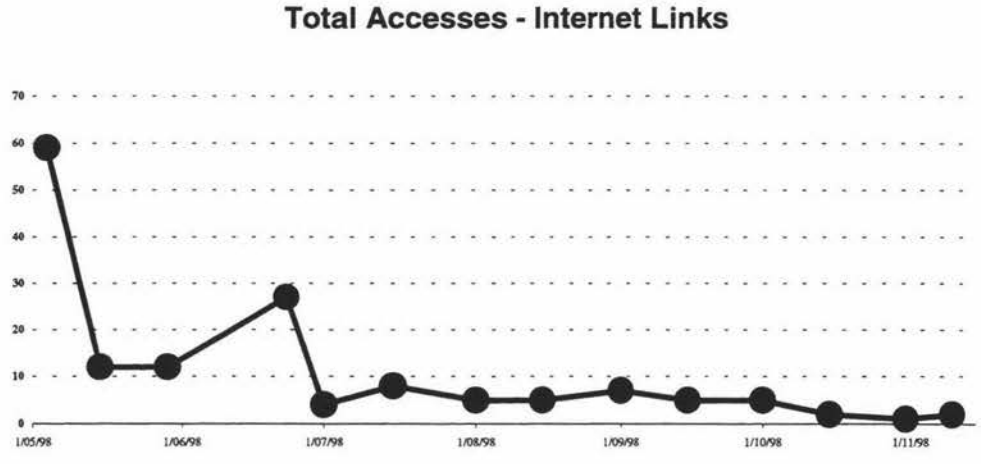

Figure 5.11 — Evolution of the total number of accesses to the Internet links

5.2.7 Student Typical Profiles

Two action profiles were selected based on the degree of activity demonstrated during the discussion forums. One is the so-called "active student profile". This portrays the curious and inquisitive student who not only frequently accessed the forums looking for new messages, but also took the initiative of starting discussions and posting new messages. The second, is the so-called "lurker student profile". This shows the typical case of a shy yet curious individual who

engaged, above all, in a passive participation strategy. This profile is best characterised by those individuals who accessed the homepage regularly to see if there was something new, yet neither posted many messages nor took new initiatives. According to the data collected, these two types of behaviour were observed during the course. Figures 5.12 and 5.13 graphically illustrate these two types of behaviour based on the student performance on the discussion forums.

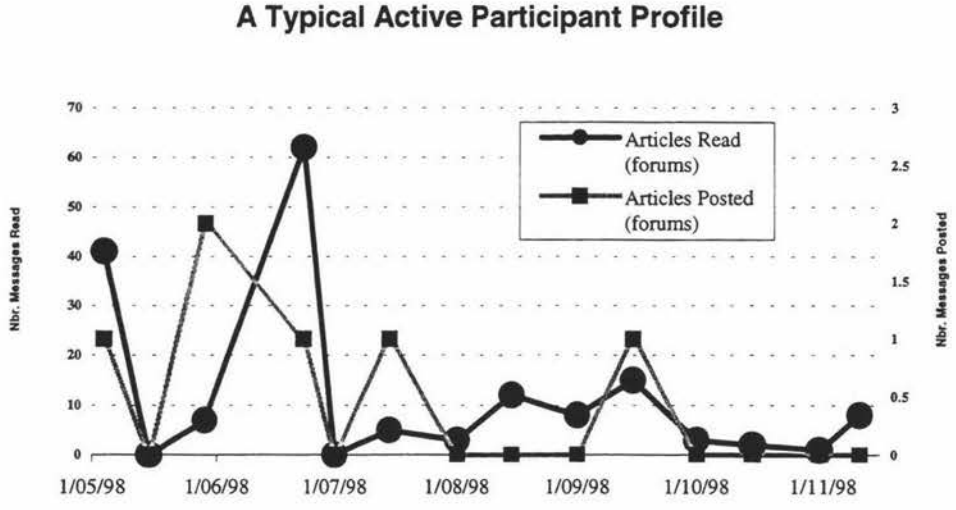

Figure 5.12 —Example of a typical "active participant" student

Analysis of the typical "active participant profile" (Fig. 5.12) suggests irregular behaviour with ups and downs, very much in line with the evolution of the total student accesses to the course homepage shown in Figure 5.1. Interestingly, periods of high numbers of messages posted are followed almost immediately by periods of intense numbers of messages read. This "active" student posted six messages throughout the course, at the beginnings of May and June, and in mid June, mid-July and mid-September. In this case, the maximum number of messages read were recorded in mid-June (62) followed by other peaks of reading messages in mid-July, mid-August, mid-September and mid-November.

In sharp contrast with this case is the typical "lurker profile" illustrated in Figure 5.13. The case highlighted there shows that the individual only posted two messages throughout the whole

course. However, that did not discourage this student from accessing the course on a regular basis for reading new messages. The "lurker's" top reading periods took place in mid-June (31 messages), mid-August (13 messages), mid-September (10 messages) and at the beginning of November (5). These cases are good examples of two distinct types of student behaviour.

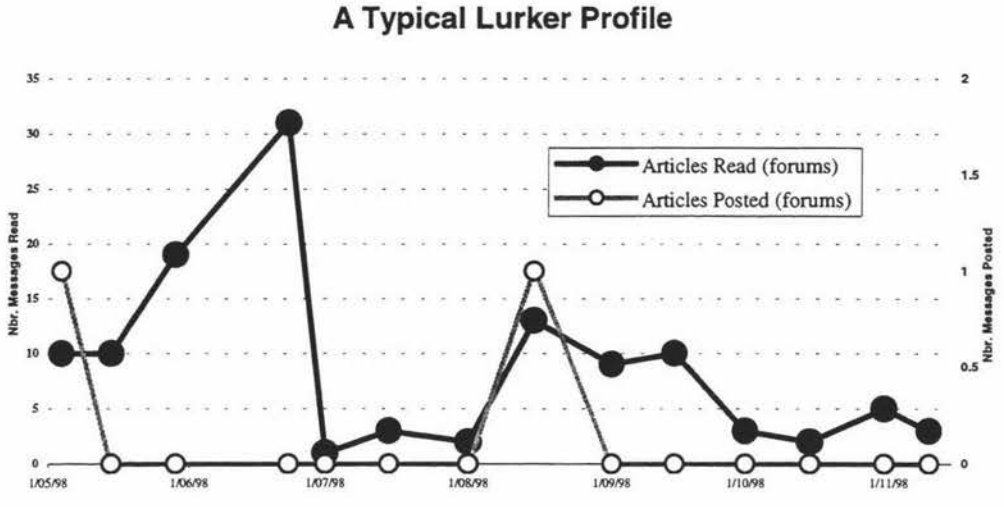

Figure 5.13 — Example of a typical "lurker" student

5.2.8 Student Homepages

Regarding the number of electronic pages completed by the students using the student homepage tool, thirteen out of twenty students built their web pages. Of the thirteen mentioned, only six students placed electronic links in their web pages.

5.2.9 Qualitative Findings from the Forum Activities

In this web-based course, the discussion forums played a very important role. An important part of the implementation of this web-based course was the collection, selection and analysis of those messages considered most relevant during the discussions. This section shows and comments on various sample messages, considered typically representative of the types of

dialogue established. The qualitative arguments developed here should be used in conjunction with the quantitative findings shown in Section 5.2.4.

The quantitative evolution of the forum activities described in Section 5.2.4 shows that few messages were exchanged among the participants. Moreover, the messages posted varied widely, in terms of length and content. Some could be considered as "warm up" kind of messages. These typically included a brief salutation or introduction to "break the ice" immediately followed by requests for further participation. Other messages are of a more serious type, dealing with "hot" issues in the course or even problems or suggestions for improvements.

At a time when no one was making contributions in the discussion forums, one student took the initiative of coming forward and posting a message to ask others about the silence. This is illustrated in one excerpt taken from one of the forums:

"I haven't seen any new messages in the course for a while. I'd like to hear what people are up to and how well they are getting on in regards to assignment 2...I know I've been snowed under and I suspect a lot of other people have too...Anyone out there?"

One student was quick to reply:

"I would have to say that I'm in complete overload, as I suspect others might be...However I am thinking about the next assignment..."

And then, two more students joined in the discussion:

"Yes-reading all this stuff about knowledge being socially-constructed and yet feeling quite isolated in many ways I was about to post a similar notice to try and construct a bit of knowledge socially around the second assignment!"

"It seems to have been eerily silent in the world of WebCT. I would be interested to receive any comments, critical, informative, argumentative whatever, on what I have put together for assignment 2 (draft version). So for any one interested here it is...."

The Paper Co-ordinator answered:

"Good question...I'm here but only just at the moment. Like others I'm snowed under at the moment. I'm sorry for the lack of contact recently but this is one of the realities of online teaching. I did say at the outset of using WebCT that this would be a learning experience for us all..."

A "hot" issue very much present in the various discussions was participation. In a different set of messages delivered in the Private Forum, one student was concerned that other colleagues would not make adequate use of this web-based course.

"I feel that as the use of it isn't compulsory...because everyone is so busy that they won't make use of it and the true potential of it won't be realised."

Another student mentioned the same subject later:

"If the students have notes in hard copy, what do they need the Web for? Have they requested this facility? We haven't requested the Web links either but being geographically apart it does make it easier to interact like this. Now a web-based tutorial discussion- that would be interesting."

And another added:

"...I love catching up with everyone. The article reviews are a great help."

Sometimes, things do not happen according to plan. This was the case in one of the activities in the discussion forums:

"Well we didn't generate much debate in our first conference but that's not unexpected given the busy on-campus course, etc...."

Based on the first experience, some lessons were learned regarding the organisation of the forums. As a result the Paper Co-ordinator came up with some intended suggestions for improvements:

"Ok, so it looks like the...conference was a fizzer! I was let down...and time just slipped past me before I could organise another event. Also, based on the first conferences I didn't see much point pursuing this option given the level of communication. This is part of the learning experience for me. Next year I'll build the conferences into the course assessment and also include other options such as a class debate and online role-play. Four guests is a bit of overkill compared to the other potentially more engaging possibilities."

Two students had problems in accessing the chat rooms. This was exemplified in the following conversation:

"...when I go to on-line chat, I am told to click on the room of my choice but there are no rooms to click on. Have they been disabled?"

"Have to agree with you...a decided lack of chat rooms detected from down here as well."

Another student could not use the email tool to compose messages. However, this problem was quickly solved and the student was able to use the email tool after all.

"I have now been able to compose a message!! I downloaded IE4.01 and have just tried this to find that it works."

5.3 Summary

This chapter presented the results of the second phase of the research. Data suggests that the students had some difficulties in understanding how to work with the software during the

introduction to the web-based course. Despite the difficulties and small problems, which occurred during the introduction session, the students had an opportunity to try out all the tools available in the web-based course.

Regarding the usage of the web-based course, results revealed an uneven distribution of accesses to the main web tools. Generally speaking and based on the number of hits recorded along the duration of the web-based course, participants started with a great deal of interest. After that, activity for the main web tools revealed peak periods followed by periods of very low activity. The patterns observed were more or less consistent for most of the main web tools. Based on the number of hits and accesses to certain web tools, it was obvious that some tools and features were more successful than others. Two contrasting examples of that, were the number of accesses recorded to read articles posted in the discussion forums (high) compared with the accesses to "references" feature included in the button bar (very low).

Finally, analysis of the discussion forums suggests that not many messages were exchanged among the participants. Analysis of these messages revealed they varied a lot in terms of their purpose, length and content. The most representative messages could be divided into two groups: one inviting further participation and another focused on the discussion of "hot" issues, including difficulties and suggestions for improvements. Analysis of the messages also clearly revealed a "passive" attitude on the part of the participants involved.

CHAPTER 6

Results – Phase Three

This chapter presents the results of phase three of the research. The objective, here, is to pinpoint the relevant data pertaining to both the teacher's perceptions of teaching via the web, and the students' perceptions of learning via the web, at the completion of the course. Following along the main lines of inquiry of this thesis, this chapter also focuses on the teacher's and students' views of the objectives and strategies used to deliver the content via the web, as well as the web technologies and the user interface adopted in the web-based course. On the teacher's side, the idea is to ascertain whether there have been any changes in the initial set of plans and ideas outlined at the beginning of the course. On the student's side, the idea is to collect all the relevant views in order to establish future comparisons and better evaluate the success of the web-based course.

The findings outlined in this chapter are organised into five sections. The first section outlines the teacher's perceptions of teaching via the web, after the completion of the course. The second section presents students' perceptions of learning via the web. The third section describes the teacher' and students' views on the objectives and strategies used to deliver the content via the web. The forth section presents the teacher' and students' views on the web technologies used. The fifth part describes the teacher's and students' views on the user interface. A mix of both, qualitative and quantitative data is presented here. Data on the

teacher's views was extracted from an interview with the Paper Co-ordinator, which took place after the completion of the web-based course. Data on the students' views was extracted from the questionnaire distributed to the students, also after the completion of the course.

6.1 Teaching via the Web – The Teacher's Point of View

This section presents data pertaining to the research question: *What are the teacher's perceptions of teaching via the web*? As explained in the methodology, data regarding the teacher's perceptions was collected by means of an interview with the Paper Co-ordinator after the implementation of the web-based course. The objective was to ascertain whether there was an evolution or change of opinion regarding the teacher's perceptions since the interview conducted with the Paper Co-ordinator before the implementation of the web-based course.

Generally speaking, after the completion of the course the Paper Co-ordinator showed a more optimistic stance towards various aspects of the web-based course:

"...my perceptions now? I think I've probably exceeded what initially I thought WebCT would do for the course or do for creating that community..."

The interview with the Paper Co-ordinator reveals his perceptions on four major issues. These can be summarised as follows:

1. **Evolution of the Paper Co-ordinator's original perceptions** — Stressing his role as a facilitator and, as a result, becoming more confident in the use of the new media. However, the Paper Co-ordinator is still not prepared to go too far too fast, as mentioned in the interview:

"...I'm now not as uncomfortable about future web-based developments in my teaching, but still...not to the point that I'm going to develop some of the more refined and sophisticated strategies that will get the students talking."

2. **Benefits of teaching via the web** — Pointing out some key benefits, such as flexibility in usage and quick access to the latest published material;

3. **Student participation** — Explaining the reasons why student participation in the web-based course was below the original expectations. According to the Paper Co-ordinator, the students did not participate because there was not any reward involved, apart from the article review task. Another reason mentioned in the interview was:

"...there's a whole culture associated with being an extramural student...what WebCT did...change the pattern of their study and some of those students...found that difficult...perhaps they weren't participating fully because they...weren't so familiar with what that meant of them..."

4. **Difficulties** — Commenting on some important technical difficulties which led to frustration and disappointment. The major problem encountered by the Paper Co-ordinator during the implementation process was accessing the web-based course during daytime (very slow). Another difficulty was the capability of writing HTML scripts as mentioned in the interview:

"...in order to create a homepage using WebCT...currently you actually do need to know something about HTML...maybe WebCT could build a better set of basic tools for creating homepages and I suppose that really just links...to the homepages that the students created...given what tools they had...at least half of them created a homepage..."

6.2 Learning via the Web – The Students' Point of View

To complement the previous section, students' views should also be taken into consideration. This section presents data pertaining to the research question: *What are the students' perceptions of learning via the web?* The data presented hereafter was extracted from answers

given in the student questionnaire distributed to those enrolled, after the completion of the course.

An important piece of information is the frequency of student accesses to the web-based course. Figure 6.1 displays this information, as stated by the students. Based on that, findings suggest that only 9% of the students accessed the web-based course on a daily basis, while 27% accessed it weekly, 27% accessed it twice a month, 18% every two months, and 18% suggested an even lower frequency.

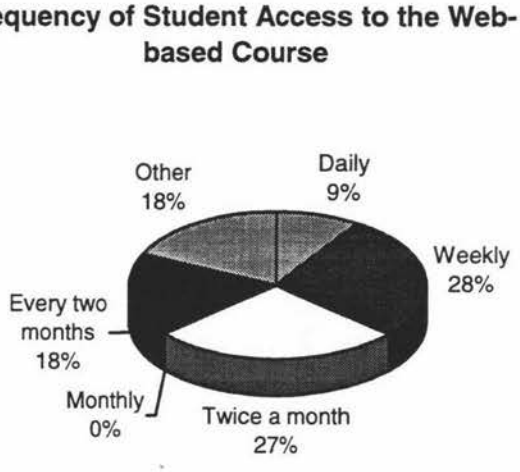

Figure 6.1 — Frequency of student access to the web-based course

Data on Table 6.1 suggests that a high percentage of the participants (91%) thought they had the necessary computer skills to participate in the web-based course. Interestingly, more than half (55%) agreed that the web-based course was a valuable learning experience, while 18% reported it was not and 27% remained neutral. Less than half (45%) of the participants indicated that the web-based course contributed to further their understanding of the topic, while 18% disagreed. On this particular issue, 36% were neutral. Regarding the cost of Internet access, 81% reported that it was not an issue for preventing further uses or access to the web-based course. Conversely, 18% said it was. The encouraging finding was that the great majority of

participants (91%) indicated they would like to participate in another web-based course, while 9% remained neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I already had the necessary computer skills to participate in this web-based delivery option.	0	0	9	27	64
This web-based delivery option was a valuable learning experience.	0	18	27	55	0
This web-based delivery option contributed to furthering my knowledge of the topic.	0	18	36	36	9
The cost of accessing this web-based delivery option through my Internet Service Provider was a disincentive for further using it.	36	45	0	0	18
I would like to participate in another web-based delivery option.	0	0	9	55	36

Table 6.1 — Students' perceptions of learning via the web

Comments made by the students provide for a more comprehensive evaluation of the web-based course. Generally speaking, students had mixed feelings about the usefulness of this web-based course. Some felt that it had a great potential to foster communication among class members, share ideas and break the isolation of extramural students. Conversely, a few did not find it useful. An important point, was the acknowledgement by the students that the web potential was clearly underused by the class. The following statement illustrates this view:

"I feel it has great potential but it was largely underused. Yesterday I noted that it had been accessed 850 times. I would estimate about 50% of these "hits" were folks just looking to see if there was anything new - my experience in the last few weeks!"

Some students even recognised that they did not take advantage of the technology. One student stated:

"I think the concept is excellent. I just feel it was unfortunate that I and possibly others found it difficult to find time to use it to its fullest extent."

Another student added:

"Neat and easy to use. I could have made more use of it, I am sure, especially in terms of contacting fellow course members – but as it was, I thought it was very well."

However, other students were more sceptical about the potential of the web-based course. One student stated:

"It was fine – no real problems. I felt, however, that it added little of real significance in comparison to the readings and my own research when doing the assignments."

When students were asked what aspects of the of web-based course they most liked, the following points were mentioned: (a) immediacy; (b) keep up-to-date about the course and others students; (c) feeling of belonging to a group; (d) opportunity to interact with others; (e) individual communication; (f) quick access to Massey Library; and (g) specific place just for the members of the course. Regarding what aspects of the web-based course students did not like, they mentioned the following: (a) lack of use and contribution by other students; (b) lack of direction from the Paper Co-ordinator; (c) lack of access to chat rooms; (d) difficult to read material and compose an answer in the same session; and (e) could not access the web-based course from home (only from work).

Commenting on the role of the Paper Co-ordinator, students clearly indicated that he should have participated more in the discussions (e.g. act as facilitator of discussion in the forums, organise and participate in regular chat sessions), focused discussions into time frames of one week or fortnight, and set up opportunities for people lacking confidence to contribute. Students also mentioned that the Paper Co-ordinator should have provided more structured activities and ensure that those students, who could not access the web site, would not be disadvantaged.

When asked whether the web-based course should become compulsory in the future, the students' opinions were split more or less in half: 45% agree and 55% did not. The main reasons mentioned by the students against this concept were: (a) it would disadvantage those who do not

have Internet access; and (b) it would preclude some students from enrolling because of the difficulty of personal access. Those students who agreed indicated some conditions attached such as: (a) on the condition that everyone has web access and it is virtually free; and (b) on the condition of not discriminating against other students.

Finally, the students suggested some important recommendations for future improvements for the web-based course. These were mainly: (a) compulsory contribution at regular intervals; (b) tie participation into assessment; (c) more facilitation from the Paper Co-ordinator; (d) more interactivity in the electronic Study Guide; (e) more direct use of forums and guests; (f) organisation of regular chat sessions; and (g) the usage of the web-based course should be encouraged in a more structured way.

6.3 Objectives and Pedagogical Strategies

This section presents data pertaining to the research question: *What objectives and pedagogical strategies are used in the delivery of the web-based course?* This section is divided into two parts. Part one presents data regarding the Paper Co-ordinator's opinions about the objectives and strategies used to deliver the content. These opinions were collected after the completion of the course. The second part presents data on students' opinions about the objectives and strategies, also collected after the completion of the course.

6.3.1 The Teacher's Views

6.3.1.1 Objectives

The initial interview with the Paper Co-ordinator reviewed in Chapter 4 of this thesis reveals the existence of three main objectives for delivering the web-based course. These were respectively: (1) the creation of a learning community; (2) adding value to the course; and (3) enhancing the quality of the course. In this section, the Paper Co-ordinator's evaluation of the success of the three mentioned objectives, after the completion of the course, are presented.

1. **The creation of a learning community** – According to the interviewee, a learning community was created within the web-based course. In the following statement the Paper Co-ordinator provides evidence to substantiate this claim:

"...I've got evidence of some students who did communicate to one another privately outside of the WebCT course package and those students...did indeed collaborate on the final course assignment...that joint assignment again, is one example of the way in which the community emerged..."

However, the learning community that was created within the web-based course was not the type of learning community that the Paper Co-ordinator originally envisaged in which students would write joint assignments, share ideas, have an integration. To create a "true" learning community, the Paper Co-ordinator would need to integrate the technology within the course. Another reason mentioned by the Paper Co-ordinator that prevented the creation of a "true" learning community was the small number of students enrolled in the course.

2. **The added value objective** – The Paper Co-ordinator was confident that the web component added value to the course, as described in the following statement:

"...in some ways I've added value and the students themselves have added value to the course...I've been able to give...more specific and refined feedback...pointing them in the direction of some new literature..."

According to the Paper Co-ordinator, the web tools that added value to the course were, the Internet links, email, and forums, and to some extent, the quizzes. The tools, which did not added value, were the study material, electronic calendar, and the student homepage.

3. **The enhanced quality objective** - The Paper Co-ordinator was positive that the web component enhanced the quality of the course. Although not directly mentioned by him, it is assumed that the quality of the course was enhanced whenever there were situations of added value. Added value and enhancement of quality are directly interrelated —

whenever there is one, there is the other. Following this line of thought, one can say that the case of the Internet links, quizzes and feedback provided by the Paper Co-ordinator were examples of enhancement of quality.

6.3.1.2 Pedagogical Strategies

As highlighted during the first interview with the Paper Co-ordinator, in Chapter 4 of this thesis, nine different strategies were initially outlined for this web-based course. These were: (1) implementation of a tutorial; (2) encouragement for the use of some key technologies; (3) apprenticeship philosophy; (4) KISS principle; (5) an extension of the paper-based material; (6) selective differentiation; (7) structured participation; (8) high quality content delivery; and (9) minimal interference. The effectiveness of such strategies are reviewed hereafter:

1. **Implementation of a tutorial** - Generally speaking, and despite the lack of computing skills demonstrated by the students, the implementation of the web-based course was, according to the interviewee, satisfactory. However, due to the lack of computing skills by the students, the Paper Co-ordinator plans to refine some details of this strategy for next year, as mentioned in the following statement:

"...I would be a little more directive in the way that I introduced it to them. In other words, instead of giving them...an instruction sheet to follow...they needed more direction than that..."

2. **Encouragement for the use of some key technologies** - The Paper Co-ordinator was agreeably surprised by the number of email messages he received from the students. However, he acknowledged the lack of interaction in the forums where students should have debated issues at a deeper level. He also mentioned that the chat facility was not used;

3. **Apprenticeship philosophy** – Commenting on the success of this strategy, the Paper Co-ordinator said:

"The idea of....act...within an apprenticeship...model...that was relatively consistent with what I would have stated...The fact that I had given them support on their assignments...that...[was] consistent with that orientation I had."

4. **The KISS principle** – This principle was used in the initial design and throughout the year by the Paper Co-ordinator. The KISS principle was considered important, yet without compromising the integrity of the course. An example of how this principle was used in practice is mentioned in the following statement:

"...the decision to stop continuing beyond my guests because those weren't working, the decision to only have two of the self tests as opposed to four were again part of keeping it simple..."

5. **An extension of the paper-based mode** – Since there was not enough evidence to make the course totally web based without compromising on the number of students enrolled, the Paper Co-ordinator, cautiously, will continue to use the web component as a supplement to the traditional mode of delivery.

6. **Selective differentiation –** Commenting on the success of this strategy, the Paper Co-ordinator stated:

"I'll refine slightly...I'll give serious consideration to removing the study material...that indicates...more strongly to the students that the web-based delivery...is not about duplicating the traditional material but adding value through the forums and other ways..."

7. **Structured participation** - The Paper Co-ordinator acknowledged the lack of contributions to the discussion forums. He recognised that there was no reason for the students to contribute, aside from the article reviews. As a result, lessons were learned for next year. He plans to encourage students' contributions by making it part of the course assessment. However, to increase students' participation, more time and effort are

needed from the Paper Co-ordinator. Regarding the success of the article review task, the Paper Co-ordinator said:

"...the students did indeed post their article reviews and it gave them incentive to use WebCT. And they were rewarded for that by gaining marks for having done the task."

8. **The high quality content strategy -** The Paper Co-ordinator was confident that the quality of the course was enhanced by the web component;

9. **Minimal interference –** Commenting on the success of this strategy, the Paper Co-ordinator said:

"...at the outset I...was going to be taking a fairly minimalist approach to this...what I did...was utilise the technology in ways that didn't add...extra burden...I must have spent quite a bit of time on it..."

6.3.2 The Students' Views

This part presents data on the students' opinions about the objectives and strategies used in the web-based course. The data used here was extracted from answers given in the student questionnaire. The results were compounded, analysed and displayed in Table 6.2.

One of the most important objectives of the web-based course was the formation of a learning community. Regarding this objective, and according to Table 6.2, the findings suggest that 36% of the participants agreed that the web-based course created a learning community where students shared ideas and supported each other. Curiously, another 36% disagreed and 27% were neutral. Another important objective was adding value to the course. According to Table 6.2, 73% of the students agreed that the range of features and activities in the web-based course added value to the course. Conversely, 9% disagreed and 18% were neutral. Finally, on the enhanced quality objective, more than half (54%) of the students agreed that by using the

web component it did enhance the quality of the course, while 27% disagreed and 18% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
This web-based delivery option greatly contributed to the formation of a learning community, encouraging students to support and share ideas with each other.	0	36	27	27	9
The features and activities provided through this web-based delivery option added value to the course.	0	9	18	64	9
The quality of the course was enhanced through using this web-based delivery option.	0	27	18	45	9
The on-campus tutorial regarding the web-based delivery option was adequate to enable me to master the various included tools (e.g. forum, chat, and Internet links).	9	9	9	45	27
Communication among students was fostered through the use of email, forums and chat modes available through this web-based delivery option.	0	0	55	45	0
This web-based delivery option created a small community of scholars where the Paper Co-ordinator acted as a "master" and students as "apprentices".	0	9	55	27	9
This web-based delivery option was simple and easy to use.	0	9	9	82	0
This web-based delivery option should be seen as a replacement of the paper-based mode.	27	27	27	18	0
This web-based delivery option can be valuable as a supplement to the paper-based mode.	0	0	9	64	27
The structured activities (e.g. article reviews, guests) stimulated participation in this web-based delivery option.	0	9	9	82	0
Structured activities should have been compulsory to ensure greater participation in this web-based delivery option.	9	27	27	18	18
More structured activities would have helped to increase my participation in this web-based delivery option.	9	0	0	64	27

Table 6.2 — Students' perceptions of the objectives and strategies

Regarding the strategies used in the delivery of the web-based course, Table 6.2 suggests that 72% of participants felt that the on-campus tutorial for the web-based course was adequate, while 18% did not and 9% were neutral. Evaluating the success of the encouragement for the use of some key technologies strategy, opinions were divided. More than half of the participants

(55%) were neutral regarding how communication among students was fostered through the use of email, forums and chat modes available in the web-based course, while 45% agreed. As for the success of the strategy of the "apprenticeship" philosophy, interestingly, more than half (55%) had no opinion whether the Paper Co-ordinator acted as a "master" and the students as "apprentices" within the web-based course. Conversely, 36% agreed and 9% disagreed. Regarding the KISS strategy, the majority of participants (82%) indicated they found the web-based course easy and simple to use, while 9% did not and 9% were neutral. Concerning the strategy of using the web-based course as an extension of the paper-based mode, more than half of participants (54%) did not agree with a potential replacement of the print based material by the web mode of delivery. Conversely, 18% agreed and 27% were neutral. Still commenting on the same strategy, the great majority of participants (91%) agreed that the web-based mode of delivery could be a valuable supplement to the print-based material, while 9% remained neutral.

Commenting on the success of the structured participation strategy, the majority of participants (82%) felt confident that structured activities stimulated their participation in the web-based course, while 9% disagreed and 9% were neutral. Assessing the compulsory nature of this strategy, 36% of participants did not agree that structured activities should have been compulsory in order to ensure greater participation, while 36% agreed and 27% were neutral. However, the great majority of students (91%) felt that more structured activities, yet not compulsory, would have helped to increase participation. Conversely, 9% strongly disagreed.

Qualitative data from the student questionnaire provided further information on the effectiveness of the web-based course objectives and strategies. When asked which activities had added value to the course, students indicated, on the top of the list, the article reviews posted by other class members in the forums. In second place came the discussion forums, email, guests, student homepage, quiz and comments from the Paper Co-ordinator.

A few students found the on-campus tutorial on the web-based course inadequate. Evidence of that is suggested by one of the students' comments:

"More time should have been given to this, specially to explain about constructing the homepage (e.g. complete before we left)."

And another student stated:

"I think we really needed more tuition on the detail of the web-based delivery option...perhaps more specific instruction could be given at the on-campus course as to how we should interact in the discussion forums (e.g. specific dates/times). We understood what was expected (re the article reviews) and, therefore, all took part. It would have been good to have more specific direction regarding other uses of the WebCT."

Students' comments support the view that more structured activities would have encouraged participation. One student mentioned:

"I think I would have made greater effort to find time somehow to participate more if the activities had been more structured."

Still on the same topic, another student suggested:

"Small "mini" assignments on a regular basis would get all people contributing and strengthen the potential for this medium to enhance student's learning."

One example of a structured activity that encouraged students' participation was the article review postings. As one student commented:

"...posting the article review on the web was a good idea...useful to all, and got us using the site."

One student, who was not in favour of making activities compulsory, stated:

"It is difficult to make it compulsory...in some way the activities have to be a natural part of one's activity. For me, using WebCT meant being at school, on my own...and with time to do things. My study is not often able to be neat and as convenient as that!"

6.4 Web Technologies

This section presents data pertaining to the research question: *What types of technologies are used as media for the delivery of course content via the web*? This section is divided into two parts. Part one describes the teacher's side of the problem and highlights his impressions on the usage of the web technologies after the completion of the course. Part two presents the students' side of the problem, mentioning their opinions on the use of the web technologies also after completion of the course. All data here was therefore collected and analysed *a posteriori*.

6.4.1 The Teacher's Views

As mentioned before, the arguments stated in this section refer to the Paper Co-ordinator's views on the functioning of the various web technologies, after the completion of the course.

6.4.1.1 Discussion Forums

As a general comment regarding the functioning of the discussion forums, the Paper Co-ordinator acknowledged student participation but with quite low contributions. In the following statement he mentioned one reason why the discussion forums did not work:

"...the online debates and guests didn't work...and it didn't work [because]...they weren't linked to the assessment..."

As a result of the poor interaction achieved in the discussion forums, the Paper Co-ordinator decided not to invite more guests, as initially planned. Learning from the present experience, some ideas were put forward for next year:

"...not only am I going to reward the students to some degree for their participation and contribution, but also...rather than having four guests...I'll probably have two guests...I have a really good idea for online debate where I'll allocate different roles to students and we'll debate a particular issue."

6.4.1.2 Email

The Paper Co-ordinator was surprised by the number of email messages he received from the students and wondered how many messages were exchanged among the students. According to the interviewee, some students did not understand how to use this tool properly, as described in the following statement:

"...they don't realise that their user name is the name that's all they need to use for sending email to other students...that isn't surprising because there is nowhere within the web-based delivery option that [explains]...how to send email to other students...."

To help solve problems, the Paper Co-ordinator plans to implement a section on "Frequently Asked Questions" for the future.

6.4.1.3 Chat

The Paper Co-ordinator commented on the usage of the chat facility by the students.

"...[the chat tool] was included to see whether they would use it or not...I didn't use it in the course...I have no knowledge whether the students attempted to use it on their own...."

A technical problem was identified with this tool.

"...several students...made comments at some point either directly on the email or within the forums that they...didn't have chat rooms...."

6.4.1.4 Quizzes

Evaluating the usefulness of the electronic quizzes, the Paper Co-ordinator indicated that they were considered a useful feature to supplement the course. However, fears were raised that the electronic quizzes might have confused the students, as mentioned in the following statement:

"...it may have sent the wrong message to the students, that in order to pass this course, this is what you need to do...I'd be looking for much deeper level of understanding and the self tests just don't give you the opportunity to explore those understandings."

Initially, there was an intention to offer four quizzes. However, the Paper Co-ordinator ended up offering only two.

"The reason there [weren't] four...it was actually because I didn't want the students to have to go off and learn that other material - they'd done enough."

6.4.1.5 Internet Links

Overall, the Internet links to other sites were considered a very useful feature in the web-based course, according to the Paper Co-ordinator. There was evidence to suggest that students used the Internet links:

"...through the assignment they've produced and to a lesser degree some of the communication that took place within the WebCT environment, there's evidence to show the students had been to some of those...conference sites...professional associations..."

6.4.1.6 Student Homepage

Regarding the success of the student homepage tool included in the web-based course, the Paper Co-ordinator was pleased with the number of homepages the students created, as mentioned in the interview:

"...they could make links with their own material and many of them...got homepages linked to at least...to their own email [address], so that's part of the community. They didn't go any further than that because I didn't ask them to in the course assessment."

However, implementation of the students' photos did not happen as planned, as explained by the Paper Co-ordinator:

"...one of the original intentions was to get them to put photographs there and so forth. One reason that didn't happen was time, second reason because of the technical requirements to make that happen..."

6.4.1.7 Administrative Book and Study Guide

As for the electronic versions of the Administrative Book and Study Guide, the interviewee said they were not useful at all.

"...I'm sceptical whether anyone used them...the students didn't really need that information..."

6.4.1.8 Electronic Calendar

The Paper Co-ordinator claimed that for administrative reasons the calendar was useful. However, about the extent of student use, the Paper Co-ordinator stated:

"I used it to indicate to the students that I was going away on several occasions during the year...I've no knowledge whether they've used, I'm sceptical about the extent to which those [announcements in the calendar] were used."

6.4.2 The Students' Views

As mentioned before, this section presents data regarding the students' opinions on the use of the web technologies after completion of the web-based course. The data used hereafter was extracted from the answers given by the students in the student questionnaire.

6.4.2.1 Discussion Forums

Starting with the students' participation in the discussion forums, Figure 6.2 suggests that the great majority of the students (91%) classified their participation as "passive", while only 9% classified their participation as "active".

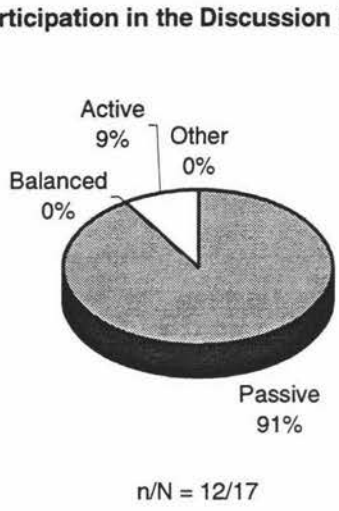

Figure 6.2 — Student participation in the discussion forums

Table 6.3 shows the compounded answers of the students regarding their opinions on the success of the discussion forums. Interestingly, some students (36%) did not find participating in the discussion forums time consuming, while 27% did and 36% were neutral. Approximately half (45%) mentioned they were reluctant to express their thoughts in the discussion forums, while 18% were not and 36% were neutral. More than half of students (63%) felt that the forums provided them with opportunities to interact with other members of the class, while 27% did not and 9% were neutral. On a different aspect, more than half of the students (73%) valued the guests' participation in the discussion forums, while 9% did not and 18% were neutral. However, and again more than half of the students (63%) disagreed that they interacted with other class members as result of the guests' participation in the forums, while 9% agreed and 27% were neutral.

Table 6.3 indicates that the majority of the students (82%) found the article reviews posted in the forums useful, while 9% disagree and 9% were neutral. Seventy-three percent of the students agreed that the Paper Co-ordinator encouraged students' participation in the forums, while 27% did not. On the aspect of the ease of use, more than half of the students (73%) agreed it was easy to follow conversation in the forums, while 9% disagreed and 18% were neutral. The majority of the students (82%) also agreed that it was easy to post messages in the forums,

while 18% disagreed. Finally, and regarding whether the forums added value to the course, 73% of the students felt they did while 9% disagreed and 18% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Participating in the discussion forums was time consuming.	0	36	36	9	18
I was reluctant to express my thoughts in the discussion forums.	0	18	36	45	0
The discussion forums provided me with opportunities to interact with other students (e.g. discuss issues, exchange ideas, etc).	0	27	9	45	18
I valued the guests' participation in the discussion forums.	0	9	18	55	18
I interacted more with other students in the discussion forums as a result of the guests' participation.	18	45	27	9	0
I found the article reviews posted by other students useful.	0	9	9	55	27
The Paper Co-ordinator encouraged students' participation in the discussion forums (e.g. questioning, posting material).	0	27	0	55	18
It was easy to follow conversation in the discussion forums.	0	9	18	64	9
It was easy to post messages in the discussion forums.	9	9	0	82	0
The discussion forums added value to the course.	0	9	18	73	0

Table 6.3 — Students' opinions of the discussion forums

Comments by the students highlighted their passive participation in the discussion forums, as one mentioned:

"I suppose I was selfish. I read others' contributions, but did not put any in myself. I felt I had little to offer – but appreciated others' input."

As for the reluctance to express thoughts in the discussion forums, one student stated:

" I enjoyed reading the material posted but didn't really feel confident to contribute. By the time I had read the material I often didn't have time to think up an acceptable contribution...people have to feel comfortable with their classmates before they will contribute."

As for the article reviews posted, one student commented:

"...articles review posting was brilliant and very useful."

Students stressed the major weaknesses found in the discussion forums, were: (a) the class did not fully participate in the discussion; (b) the discussion was limited to a group; (c) the discussion never got going on issues; (d) delaying feedback comment, not like face-to-face discussion; and (e) some contributions were too long. Conversely, the major strengths of the discussion forums, were: (a) provided opportunities to interact with a widely dispersed class and consolidate thinking; (b) offered a variety of views on topics; (c) brevity of comments; (d) opportunity to learn about the web-based course; and (e) time available to consider response.

Regarding the handling of the forums by the Paper Co-ordinator, some students were happy and others not so happy. Some students suggested he should have posted more direct questions based on readings, a more focussed discussion time, and weekly postings.

6.4.2.2 Email

The frequency of the students' usage of the email tool to communicate with other class members is presented in Table 6.4. Analysing frequency of use, 27% indicated that they never used the email to communicate with other class members, while other 27% used the mail one or two times to communicate, and 27% used it three or four times. Only 18% used the email more than six times to communicate with other students. Findings also indicate that 27% of the students never used the email tool to communicate with the Paper Co-ordinator, while 36% of the students used it one or two times for the same purpose. Still on the same issue, 18% of the students used the email three or four times to contact the Paper Co-ordinator and only 9% used it five or six times, while other 9% used the email more than six times to contact the Paper Co-ordinator.

Table 6.5 complements the information on Table 6.4. Findings suggest that more than half of students (63%) indicated that it was easy to post messages, while 9% indicated it was not and

27% were neutral. Also more than half of the students (54%) agreed that the email tool added value to the course, while 9% disagreed and 36% were neutral.

Question	Never (%)	1-2 times (%)	3-4 times (%)	5-6 times (%)	More than 6 times (%)
How often have you used the email tool to communicate with other students?	27	27	27	0	18
How often have you used the email tool to communicate with the Paper Co-ordinator?	27	36	18	9	9

Table 6.4 — Email usage

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
It was easy to post messages using the email tool.	9	0	27	45	18
The electronic mail tool added value to the course.	0	9	36	36	18

Table 6.5 — Students' opinions of the email tool

Some students found the email facility a good way to have personal communication and feedback. However, other students did not see any advantage in having an email facility within the web-based course. As one student mentioned:

"No real reason to use the tool when standard email is already available."

Still regarding the email tool, a few students showed difficulties in using it. One student commented:

"I am not sure how to receive or to send [email messages]. I don't know what the messages under "compose new message" mean, nor do I know how to send attachments."

6.4.2.3 Chat

Table 6.6 indicates the students' views on the functioning of the electronic chat tool provided. Findings suggest the majority of students (82%) did not interact with the Paper Co-ordinator through the chat mode, while 9% did and another 9% were neutral. Interestingly, 82%

of students did not use the chat tool to interact with other students, while 9% did and 9% were neutral. More than half of the students (63%) indicated that the chat tool did not add value to the course, while 9% said it did and 27% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I used to electronic chat to interact with the Paper Co-ordinator.	27	55	9	9	0
I used the electronic chat tool to interact with other students.	37	45	9	9	0
The electronic chat mode added value to the course.	18	45	27	0	9

Table 6.6 — Students' opinions of the chat mode

The main reasons for not using the chat mode mentioned by students were: (a) lack of chat rooms; (b) no one was connected at the same time; (c) lack of time; and (d) lack of confidence to participate synchronously. On this respect, one student commented:

"I didn't use this feature at all. This is [because of] my reluctance to work in a live situation – lack of self-confidence."

Since no one was connected at the same time, one student mentioned:

"No one else was online when I was. Perhaps organised times for electronic "drop-in" sessions would be more useful for chat with a specific topic to discuss."

And another student added:

"I think it [chat] has a wonderful potential but students need encouragement [to use the chat] (e.g. set times to use or agreed upon times)."

6.4.2.4 Internet Links

In regard to the use of the Internet links tool by the students, Figure 6.3 suggests that 18% of the students never accessed the Internet links, while 36% had made use of the Internet links

once or twice, and 9% used it five or six times. Finally, 36% indicated that they had made use of the Internet links more than six times. The majority of the students (72%) indicated that the Internet links added value to the course, while 27% were neutral.

Diagram of the Frequency of Student Usage of the Internet Links Tool

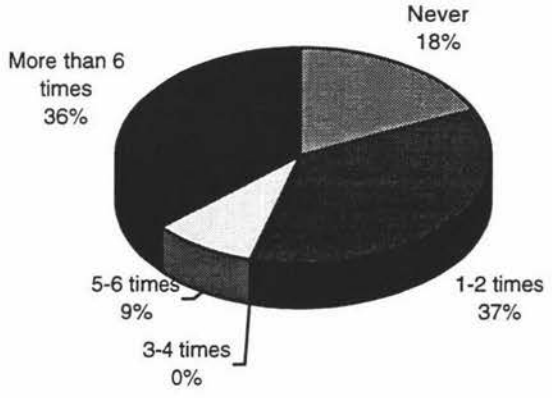

Figure 6.3 — Frequency of students' usage of the Internet Links tool

The main strength of the Internet links tool mentioned by students was the advantage of having an additional resource available online. As one student stated:

"Additional resource available online. This is one of the strengths of an online course that use can be made of Internet resources for readings and examples."

One student even "bookmarked" sites from the Internet links tool:

"...it's easier to go straight to the sites using bookmarks rather than logging into WebCT, finding the links, etc."

6.4.2.5 Quizzes

Regarding the number of electronic quizzes completed by the students, Figure 6.4 shows that 36% of the students completed one quiz, 18% completed two, while almost half of the students (45%) did not bother to complete any one of them.

Diagram of the Use of the Quiz Tool by the Students

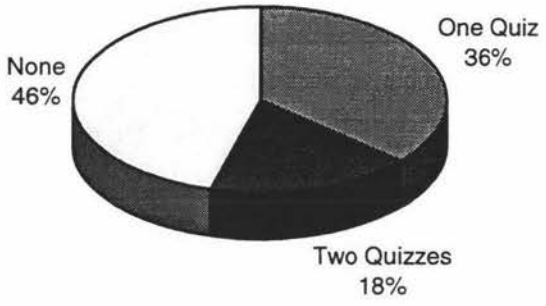

Figure 6.4 — Diagram of the use of the Quiz tool by the students

Still on the same subject, Table 6.7 highlights the students' views on the success of the quiz tool. More than half of the students (64%) were neutral regarding whether the quizzes were useful to help check their understanding of the topics, while 36% said they did. As for added value, less than half (45%) agreed that the quizzes added value to the course, while 9% disagreed and 45% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I found the electronic quizzes useful to help check my understanding of the topics.	0	0	64	27	9
The electronic quizzes added value to the course.	9	0	45	36	9

Table 6.7 — Students' opinions of the quizzes

Students who did not complete the quizzes mentioned the following reasons for this behaviour: (a) lack of time; (b) do not enjoy quizzes; (c) did not know who was going to have access to the results. One student commented:

"A late addition to the course. Not enough time!"

However, another student, who completed the two quizzes, stated:

"The electronic quizzes gave me the impetuous to research the readings and to think about ideas I may have missed."

6.4.2.6 Electronic Calendar

Regarding the number of times students made use of the electronic calendar tool, results showed that 18% of the students never used the electronic calendar, while the vast majority (73%) used it once or twice and only 9% used it three or four times. As for preferences between a paper-based calendar and a web-based one, Table 6.8 indicates that 45% of the students would prefer a paper-based calendar, while only 18% indicated a preference for a web-based one and 36% were neutral. On the issue of added value, almost half of the students (45%) agreed that the electronic calendar added value to the course, while 18% disagreed and 36% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I would prefer to have used a paper-based diary, rather than a web-based calendar.	0	18	36	36	9
The web-based calendar added value to the course.	9	9	36	45	0

Table 6.8 — Students' opinions of the electronic calendar tool

Students' comments supported the unpopularity of the electronic calendar. They basically mentioned that there was no reason to use a web-based calendar when a paper-based one was already available, as stated by one student:

"No point in using it when a paper-based one is available."

Another student added:

"Another diary/calendar to check is not useful. I prefer to have one master document."

6.4.2.7 Student Homepage

Regarding the number of homepages created by the students, findings suggest that the majority of the students (64%) created their own homepage within the web-based course, while 36% did not. Table 6.9 indicates that half of the students (50%) did not place links in their homepages, while 38% did and 13% were neutral. The majority agreed (63%) that the student homepage tool provided them with opportunities to get to know other class members, while 13% disagreed and 25% were neutral. As for the ease of use, half of the students (50%) indicated that it was not easy to construct a homepage with the tools provided, while 38% disagreed and 13% were neutral. Finally, regarding added value, the majority of the students (63%) indicated that the student homepage tool added value to the course, while only 13% said it did not and 25% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I placed web links in my homepage.	25	25	13	25	13
The student homepage tool provided me with opportunities to get to know other students (e.g. reading students' biography).	0	13	25	50	13
I found it easy to construct my own web homepage with the tools provided.	25	25	13	38	0
The student homepage tool added value to the course.	0	13	25	50	13

Table 6.9 — Students' opinions of the student homepage tool

Comments provided by the students suggest some difficulties in understanding on how to construct their own homepages with the given tools. Among other factors, students, for example, mentioned the lack of online help:

"As far as I was concerned I didn't know who could help me construct one [homepage]. I got frustrated trying."

Despite the difficulties, some students felt the homepages offered opportunities to learn something about other colleagues, as explained by one student:

"It helped to learn about other students and the useful information on many topics they were able to supply."

However, one student, who felt that the homepages did not provide opportunities to get to know other students, stated:

"Most people made an initial homepage at the on-campus course or shortly afterwards. Most were just greetings, no biographies, etc...were evident as such. So not really providing opportunities to get to know other students."

6.4.2.8 Administrative Book and Study Guide

Table 6.10 shows how frequently the students have used the electronic Administrative Book and Study Guide provided in the web-based course. Findings suggest that 37% of students never accessed the electronic Administrative Book, while only 27% accessed it one or two times and another 27% accessed three or four times. Only 9% of the students indicated that they have accessed the electronic Administrative Book more than six times. Regarding the use of the electronic Study Guide, findings suggest that 46% of students never accessed it, while 18% accessed it one or two times, and 9% accessed it three or four times. Also 9% of the students indicated they have accessed the electronic Study Guide five or six times, while 18% accessed it more than six times.

Table 6.11 indicates the students' preferences when comparing the web-based material with the paper-based one. Findings suggest that the majority of the students (72%) would prefer to have used a paper-based version of the study material, while only 9% would prefer to have used a web version one and 18% were neutral. However, if the web version of the Administrative Book and Study Guide were more up-to-date and had more hyperlinks, the vast majority (73%) indicated they would have made more use of these materials, while 18% indicated they would

not, and 9% were neutral. Interestingly, 36% of the students reported that the electronic Administrative Book and Study Guide added value to the course, while the same percentage (36%) disagreed and 27% were neutral.

Question	Never (%)	1-2 times (%)	3-4 times (%)	5-6 times (%)	More than 6 times (%)
How often have you used the web-based Administrative Book?	37	27	27	0	9
How often have you used the web-based Study Guide?	46	18	9	9	18

Table 6.10 — Frequency of use of the Administrative Book and Study Guide

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I would prefer to have used a paper version of the study material, rather than a web version.	0	9	18	45	27
If the web version of the Administrative Book and Study Guide were more up-to-date and had more hyperlinks, I would have made more use of these materials.	9	9	9	64	9
The web-based Study Guide and Administrative Book added value to the course.	9	27	27	36	0

Table 6.11 — Students' opinions of the Administrtive Book and Study Guide

Comments provided by the students support the fact that the students have a preference for the use of the print-based material. The main reasons mentioned by the students to support this finding were: (a) can carry the print-based material to various locations; (b) do not like reading on screen; (c) easier to get and find relevant piece of information when print-based; (d) online access costs money; and (e) the online material was text-based only. One student stated:

"The major weaknesses was that it was entirely text-based and as we had print version it was more convenient to use that."

6.5 The User Interface

This section presents data pertaining to the research question: *How is the user interface designed to assist students to effectively use the web in their learning?* As in the previous section, two different perceptions of this question are taken into account: that of the teacher and that of the students. This section reflects the views of both after the completion of the web-based course.

6.5.1 The Teacher's Views

The Paper Co-ordinator commented on the important issue of consistency:

"...there are...still those inconsistencies [in the forum] which were noted at the outset of our design of the web based delivery option...the menus...could be refined to be a little friendlier and the inconsistency of how you go back, and all that leads to a bit of confusion."

Another important point, which eases readability, was the size of the fonts used:

"...the font size of the messages [in the discussion forums] that students write...is extremely small...I noticed that in reading it...it wasn't easy to do so..."

Changes and possible future improvements in the user interface are planned for the future, as stated by the Paper Co-ordinator.

"...the top line could easily go. There is obviously an issue about the overall look of the interface that will come into it, because we put a lot of thought into that. I will still look for a balance and there may be some other tools that I might consider."

6.5.2 The Students' Views

As mentioned before, this section presents data on the students' views of the design and adequacy of the user interface in the web-based course. Comments and data were extracted and compounded from the answers given by the students in the student questionnaire.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
The screen layout (distribution, and visibility of the icons) was easy to use and understand.	0	0	9	64	27
The amount of text per page (in the web-based Study Guide and Administrative Book) displayed on my computer screen made the reading easy.	9	0	36	36	18
The font size used in the web-based Study Guide and Administrative Book was adequate for providing easy reading on my computer screen.	0	0	18	64	18
The meaning of the icons in the web-based delivery option was clear and intuitive to me.	0	9	18	36	36
The web-based delivery option was pleasant to use in terms of elegance, presentation and attractiveness.	0	0	9	73	18
I found the button bar in the discussion forums difficult to use (e.g. back, show all, etc.)	0	55	27	18	0
I found the button bar in the email tool difficult to use. (e.g. back, show all, etc.).	0	36	55	9	0

Table 6.12 — Ease of use of the user interface

Table 6.12 shows how students evaluated the ease of use of the user interface. Findings suggest that the great majority of the students (91%) found the screen layout easy to understand and use, while 9% were neutral. More than half (54%) indicated that the amount of text per page (in the electronic Administrative Book and Study Guide) displayed on their computer screens made the reading easy, while 9% disagreed and 36% were neutral. The vast majority of the students (82%) also indicated that the font size (of both, the electronic Administrative Book and Study Guide) was adequate for reading on their computer screens while 18% were neutral. Regarding the meaning, clearness and intuitiveness of the icons, the majority (72%) agreed that they were meaningful, clear and intuitive to use, while 9% disagreed and 18% were neutral. Also, the great majority (91%) found the web-based course pleasant to use in terms of elegance,

attractiveness and presentation, while 9% remained neutral. More than half (55%) of the students found the button bar in the forums not difficult to use, while 18% did and 27% were neutral. Finally, 36% of the students found the button bar in the email easy to use, while 9% did not and more than half (55%) were neutral.

Table 6.13 highlights the students' opinions on the consistency of the user interface. Starting with the background colour used in the web-based course, more than half (55%) of the students were neutral regarding whether it was soothing to the eyes, while 45% agreed it was. As for the lack of a consistent standard for the buttons used in the various web tools, 36% agreed that it was disconcerting at first and took them a while to become familiarised with them, while 27% disagreed and 36% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
The background colour ribbon (blue) used on the left-hand side in the web-based delivery option was soothing for the eyes.	0	0	55	45	0
The lack of a consistent standard for the buttons used in the various technological tools of this web-based delivery option was disconcerting at first. It took me a while to become familiar with them. (e.g. terminology, positioning on page, size and fonts of the buttons of the various tools, such as email, forum, chat, etc.)	0	27	36	36	0

Table 6.13 — Consistency of the user interface

Table 6.14 summarises the students' opinions on the access and navigation features of the user interface. Findings here suggest that all the students (100%) found it easy to navigate through the various sessions of the web-based course. While the majority (64%) indicated that loading time for the various parts of the web-based course was not slow, 36% disagreed. Also, more than half (54%) of the students found it easy to reach the main page of the course through the Massey University Homepage, while 27% did not and 18% were neutral.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
It was easy to navigate through sections of the course (e.g. I could find my way around and go to the places I wanted).	0	0	0	82	18
On my computer, the loading time for the various parts of the web course (e.g. forum, chat, email, etc.) was slow.	0	64	0	18	18
I found it easy to reach the main page of this web-based delivery option by accessing it through the Massey University Homepage (e.g. press "Teaching and Learning" then "Learning with Computers", etc.)	9	18	18	45	9

Table 6.14 — Access and navigation of the user interface

Table 6.15 shows the students' views on the customisation capabilities of the user interface. More than half (55%) of the students were neutral regarding whether the web-based course provided them with opportunities to configure the workspace to suit their individual learning style, while 36% indicated it did not provided them with the options, and only 9% agreed that it did. Interestingly, the vast majority of the students (64%) were neutral regarding whether the web-based course provided adequate online help to guide the less experienced student, while 27% indicated it did not, and only 9% indicated it did.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
The web-based delivery option provided me with options to configure the workspace to suit my individual learning style (e.g. customisation of icons, buttons, colours, etc).	0	36	55	9	0
This web-based delivery option provided adequate on-line support to guide the less experienced student (e.g. help within the WebCT software).	0	27	64	9	0

Table 6.15 — Customisation of the user interface

Comments gathered from the students revealed that some had difficulties in using the button bar in the discussion forums. Evidence of that is present in the following comment:

"I didn't really like the use of the frames, pushing the back button goes back through each message-takes a long time to get back to where you started. Buttons are quite small."

Another student added:

"It took me a long time to work out how to use the button bar-indeed I...am not using them effectively."

And for the lack of consistency with the buttons, one student suggested:

"I really have no suggestion other than to create a more uniform toolbar system – one that it's intuitive – some of it is – some of it isn't."

Regarding difficulties in accessing the course homepage through Massey University site, one student commented:

"First time finding it [the course homepage] from the Massey site was complex and time consuming - after that it was bookmarked."

And another student stated:

"[I] Saved as a bookmark. But I did have problems a couple of times – it's not obvious!"

6.6 Summary

Data collected in the third phase of the research focussed on two different targets of the evaluation. Firstly, the Paper Co-ordinator's views on offering the course via the web, and secondly the students' views on learning via the web. All the perceptions were recorded after the completion of the course. Results suggest that at the end of the course the Paper Co-ordinator had a more positive attitude towards teaching via the web and even acknowledged some benefits. Concerning the objectives and strategies used to deliver the course via the web, the Paper Co-ordinator claimed moderate success, while suggesting the refinement of some strategies for the future. As for the technologies used to deliver the content via the web, there were mixed results, according to the Paper Co-ordinator. The Internet links and the email were some of the most successful tools, as claimed by the Paper Co-ordinator, while the electronic

Administrative Book and Study Guide and the electronic calendar were considered the least useful tools in the web-based course. The use of the discussion forums by the students was considered by the Paper Co-ordinator, to be well below the original expectations. He also commented on some deficiencies regarding the user interface, such as the inconsistency of buttons and font size.

Regarding the students' views on learning via the web, results suggest mixed feelings. Generally speaking, the vast majority of students concurred that there is a potential for delivering courses via the web. However, the students complained about the lack of participation by fellow-members of the class. They commented positively on most of the objectives and strategies. However, they clearly suggest that some strategies were more successful than others. An important point suggested by the students was the need for more structured activity in order to increase participation. The students also indicated that the article review posting was useful. They had mixed feelings regarding the success of the use of the web technologies. In their opinion, some were clearly more successful than others. What they considered the most successful tools were the Internet links, email and forums. The less successful tools considered by the students were the electronic Administrative Book and Study Guide as well as the electronic calendar and the chat. Interestingly, the students' acknowledged their participation in the forums as "passive", while recognising the value of the guests and article reviews. Finally, the student's evaluation of the user interface in the web-based course suggested the course was easy to use, intuitive and easy to navigate. Some of the students indicated difficulties in understanding the email and forum buttons as well as accessing the main page of the course through the Massey University web page. Others criticised the lack of consistency in some toolbars, the lack of customisation features and the lack of an adequate on-line support.

CHAPTER 7

Discussion of the Results

Explanations for the findings constitute an essential part of this thesis. The objective of this chapter is to discuss the various research findings, compare them with other results presented in the Literature Review and establish a more definitive view on the success and effectiveness of the web-based course. In terms of organisation and content, this chapter discusses the findings in line with the five topical questions pursued in this thesis. The first section discusses the teacher's perceptions of teaching via the web. The second section discusses the students' perceptions of learning via the web. The third section discusses the effectiveness of the objectives and pedagogical strategies used in the delivery of the web-based course. The fourth section discusses the effectiveness of the technological tools used in the web-based course. Finally, the fifth section discusses the effectiveness of the user interface adopted in the web-based course. These sections together will create an overall picture of the success and effectiveness of the web-based course.

7.1 The Teacher's Perceptions of Teaching via the Web

By analysing and comparing the Paper Co-ordinator's perceptions of teaching via the web before and after the web-based course took place, one can acknowledge an important evolution. The perceptions suggest the existence of an evolutionary virtuous circle, where the Paper Co-

ordinator's set of original beliefs and expectations are improved and refined, suggesting a new better cycle for the next "spin up". This concept is illustrated in Figure 7.1.

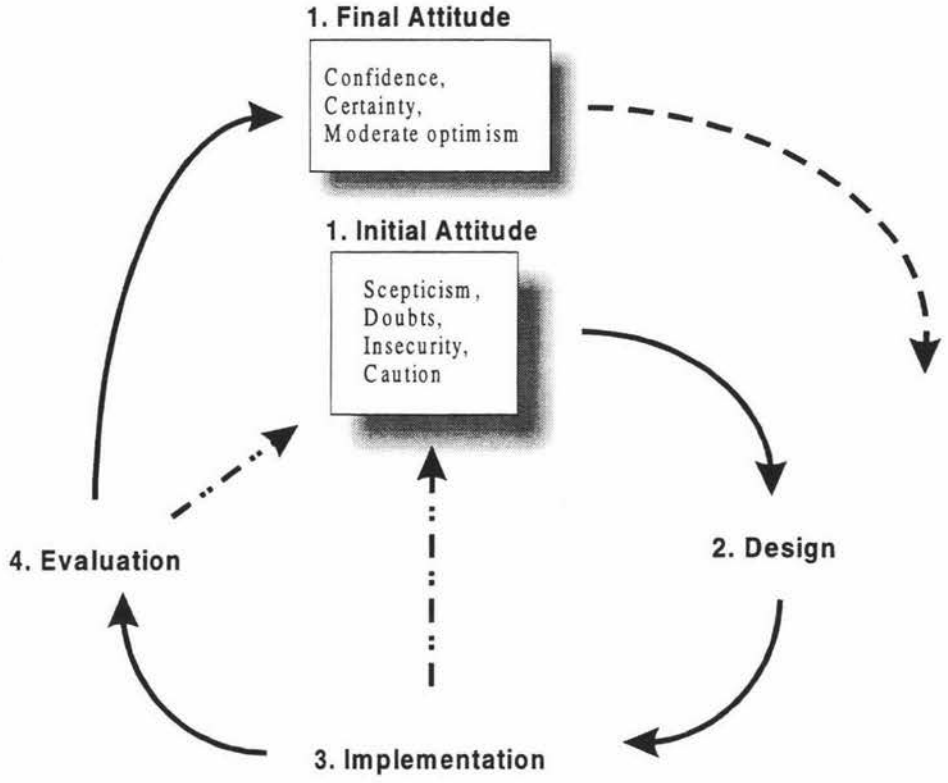

Figure 7.1 — The virtuous cycle of evolution

The cyclical concept shown in Figure 7.1 illustrates the evolution of the teacher's perceptions of teaching via the web. The process comprises four distinct phases that affect each other in a clockwise succession. The first phase is called attitude and portrays the posture of the teacher towards teaching a program via the web. The second phase is the course design showing how the teacher's beliefs and teaching philosophies can be integrated in the design of a web course. The third phase concerns the implementation, focussing on a range of practical measures to make things work. The final phase focuses on the evaluation to ascertain the success of the web-based course. The initial attitude affects the design of the course. The design influences the implementation and the implementation, in turn, influences the evaluation results. Finally, the outcomes of the evaluation with various student feedback collected during the implementation

and evaluation phases influence the teacher's attitude to the next course suggesting a perpetual cyclical process of evolution.

In the case of the web component of the "Learning with Computers" course, the Paper Co-ordinator's initial attitude was one of scepticism, doubts and reservations about the results of delivering the course via the web. Reasons for such a conservative position stemmed from the following aspects: (a) this was the first time the Paper Co-ordinator had offered a course via the web and the existence of a sense of insecurity and apprehension was to be expected; (b) despite all the hype, the Paper Co-ordinator did not believe the Internet would become the primary way of teaching in the future; (c) he anticipated an increase in his workload; (d) he expected difficulties and showed concern about how the students would react to this new mode of delivery.

Despite the above concerns, the course was designed, implemented and evaluated as described in chapters 3, 4, 5 and 6 of this thesis. During the implementation and evaluation phases of the web-based course, student feedback played an important role that helped to refine the strategies, and above all to condition the perceptions of teaching via the web for the next academic year. After completion of the course, the results revealed that the Paper Co-ordinator was demonstrating a more optimistic attitude regarding teaching via the web. Hence the evolutionary cyclical concept. The initial attitudes of scepticism, doubts and insecurity gave place to a more positive posture of confidence, certainty and even moderate optimism. Reasons for such an evolution may be attributed to a certain maturity acquired from the experience of teaching via the web during the eight-month course, which created a climate of more confidence and certainty for similar courses in the future. Other reasons relate to the encouraging preliminary results and student feedback. These led the Paper Co-ordinator to conclude that success had been achieved in the functioning of some parts of the web-based course.

Central to the positive evolution in attitude of the Paper Co-ordinator was his belief in the success of his philosophy of teaching (apprenticeship model) where his role as a facilitator was

of utmost importance. As shown in chapter 6, he clearly believed that his role as a facilitator and his teaching philosophy were right and contributed strongly to the success of the web-based course. It would be interesting to know whether the original beliefs would have been maintained and reinforced had he adopted a different teaching philosophy and a different active role in the process of teaching via the web. However, because this thesis only focused on a single case study there is no evidence to answer this question.

In pedagogical terms, the most significant outcome of the teacher's perceptions of teaching via the web, was the realisation of the existence of a "virtuous circle" (see Figure 7.1) as opposed to a "vicious circle." While the first continually evolves into new and better stages of development through refinement and change the second would have locked the system into a cycle where the teacher starts with a set of negative attitudes which the functioning of the course would tend to reinforce and perpetuate. Hopefully this was not the case with this web-based course.

Other research findings confirm some of the Paper Co-ordinator's perceptions of teaching via the web. The Paper Co-ordinator, for example, commented on the advantages of offering the course via the web. He stressed the advantage of easily accessing the course content from different locations. He was also able to provide information on the exam and course assignments that otherwise would not have been possible via the traditional mode of teaching. These findings are consistent with Naidu's (1997) research, where the teachers indicated the web was a valuable experience, which offered better support to the students. The optimistic attitude shown by the Paper Co-ordinator at the end of the web-based course was also consistent with Naidu's (1997) findings, revealing that, not only did teachers like the experience of being involved in projects of teaching via the web, but also had the perception that teaching via the web could add value to courses due to the greater interaction and communication among participants. Interestingly, some of the reservations, worries and doubts shown initially by the Paper Co-ordinator were equally confirmed in Naidu's (1997) research, where the teachers

mentioned the enormous challenges still unresolved and the time needed to find the correct design of instructional material for delivery via the web. Finally, the Paper Co-ordinator's perception of seeing teaching via the web as a valuable experience was also confirmed in Naidu's (1997) research, when the author mentioned that teachers concurred that teaching via the web offered them a learning opportunity they clearly benefited from.

Finally, a word of caution is necessary. Despite the various advantages and opportunities that obviously had an effect on the optimistic tone shown by the Paper Co-ordinator, at the end of the web-based course, a whole range of threats, difficulties and problems are still unresolved. If the constraints and difficulties are not properly addressed, there is a danger that they could work against the functioning of similar courses and adversely affect the perceptions of teaching via the web. Examples of possible threats mentioned by the Paper Co-ordinator were, firstly, the provision of adequate technical support to staff members and students during the design and implementation phases of the web-based course and, secondly, finding a balance between the amount of time devoted to the web-based course and other staff duties. The absence of the first and getting the second wrong could give rise to frustration and eventually impact negatively on the perceptions of teaching via the web. Other research findings raised the same concerns regarding the increasing teaching workload as a result of delivering via the web. Gibson's (1997) findings suggested that teaching via the web should become part of the normal teaching load and not have to be carried out as additional work. Interestingly, in his research, Gibson clearly mentioned the case of the sole teacher in charge of delivering a course via the web, who withdrew shortly after the trial was completed since the amount of work required was considered well beyond any payment offered.

7.2 The Students' Perceptions of Learning via the Web

What did the students think of the experience of participating in the web-based course? Can it be considered a positive experience in pedagogical terms? Before discussing the students'

opinions on the essential parts of the web-based course, it is important to describe which factors affect the formation of the students' perceptions.

Students' perceptions are affected by five major factors as highlighted in Figure 7.2. Eagerness and preparedness to participate in a web course are important factors that could very well condition students' opinions, even before a course has actually started. The web-based course design, structure, objectives, strategies, functioning, results and evaluation are other important factors bound to affect the students final opinions on the experience of participating in a web course. This thesis does not intend to establish how much each factor in isolation can contribute to the formation of the final perceptions but simply mentions which factors should be taken into consideration while seeking for explanations in the discussion of the students' perceptions.

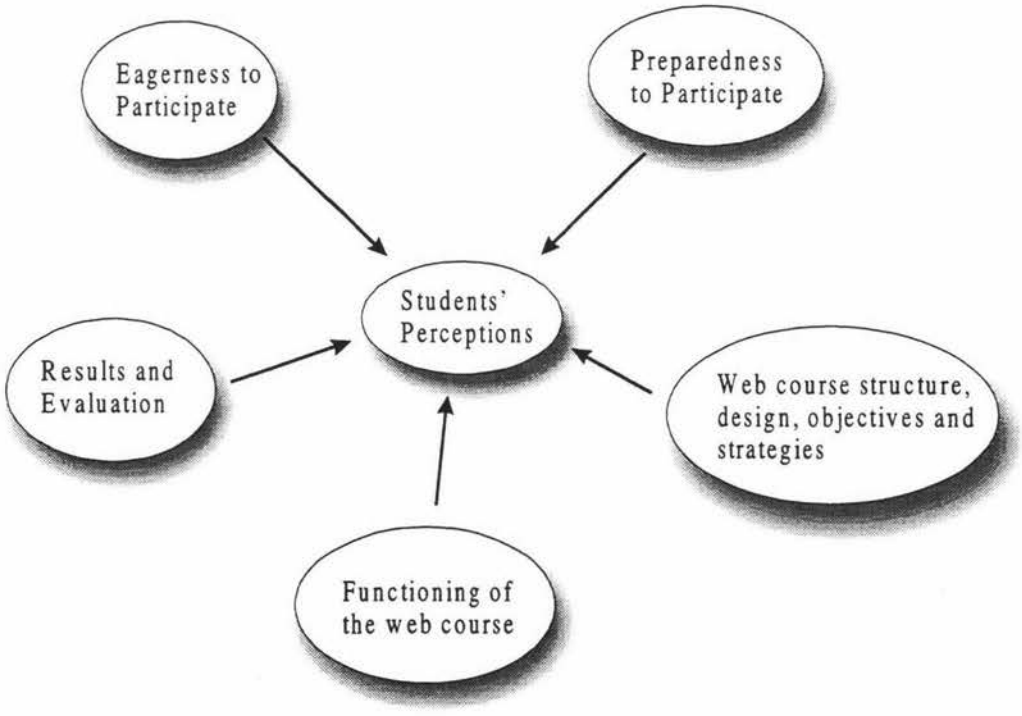

Figure 7.2 —Factors affecting the perceptions of learning via the web

In discussing the eagerness aspect of participation, it is important to remember that all the students enrolled were introduced to the web-based course during the on-campus activity. Despite being offered as an option (not compulsory) and a complement to the paper-based

material, all students were eager to participate in this new mode of distance learning. Commenting on the preparedness factor of participation, most of the students mentioned at the outset that they were participating in a web course for the first time (85%). They also mentioned having very limited computer skills and experience in dealing with Internet technologies, as described in chapter 3 of this thesis.

The students' impressions of various aspects of the web-based course design, functioning and evaluation have been described in chapter 6 of this thesis. To better discuss these impressions, it was decided to construct two key diagrams that summarise and portray the students' perceptions with regard to the major aspects of the web-based course. The first diagram represented in Figure 7.3 describes the students' perceptions in regard to the major actual achievements of the web-based course. The second diagram shown in Figure 7.4, in turn, focuses on the students' perceptions in regard to preferences, as well as potential uses and hypothetical outcomes of the web-based course should certain assumptions have proved to be true. The two diagrams complement each other and should be discussed in conjunction.

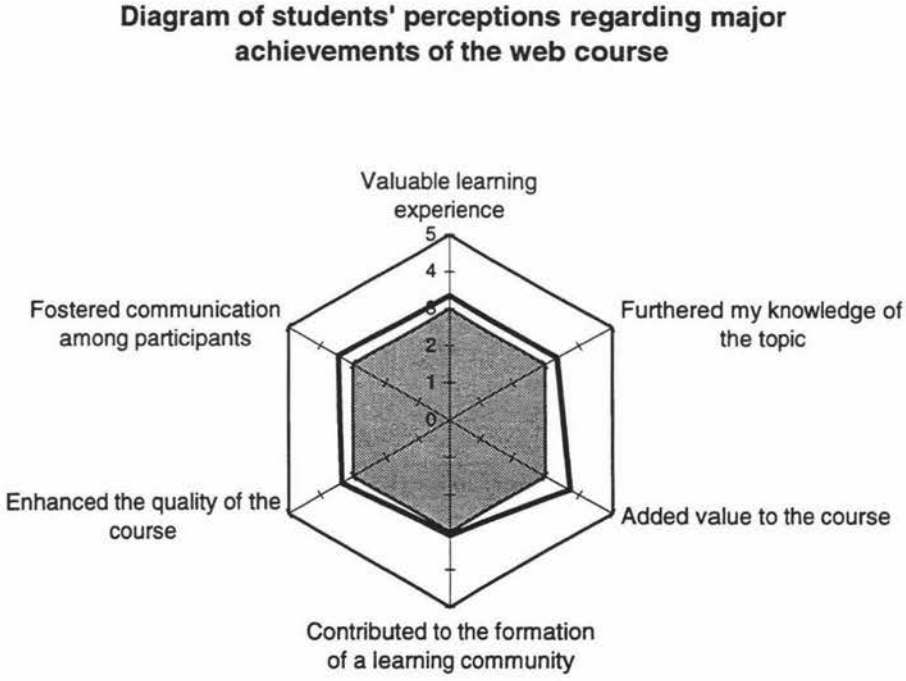

Figure 7.3 — Students' perceptions of major achievements of the web-based course

Diagram of the students' perceptions regarding various web course potential uses and outcomes

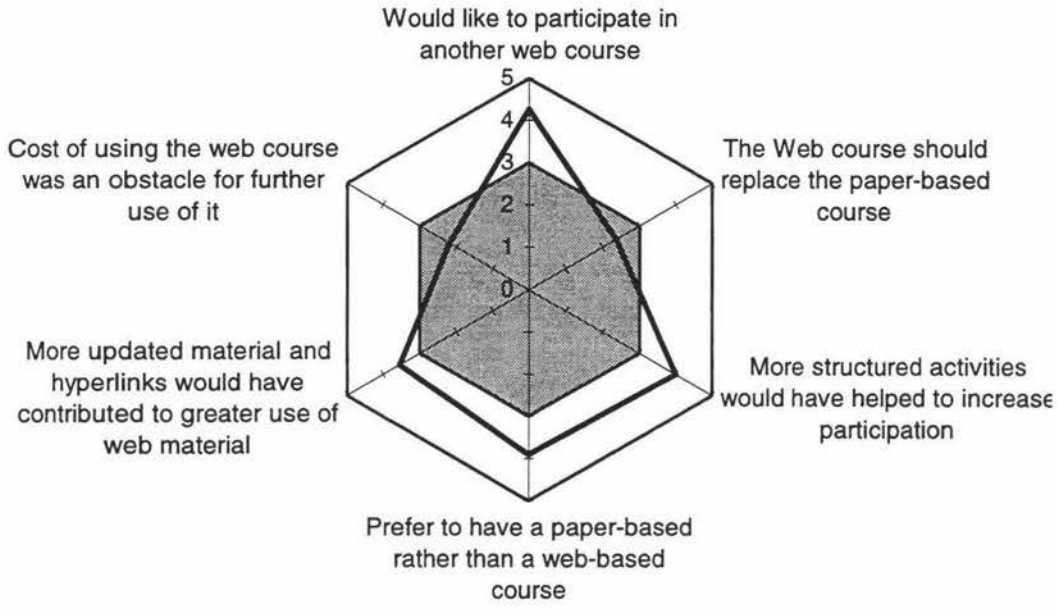

Figure 7.4 — Students' preferences and potential outcomes of the web course

Both diagrams have six dimensions and each dimension is ranked on a scale from 0 to 5 in accordance with the Likert scale used in the student questionnaire. The white areas of the diagrams represent the students' measure of agreement with regard to the various dimensions of the diagram. Conversely, the grey areas of the diagrams represent the students' measure of disagreement with regard to each of the six dimensions considered. The thick black line located in the middle of each diagram represents the mean of the students' perceptions with regard to each of the dimensions considered, as collected and analysed in the students' questionnaire.

Generally speaking, and looking at Figure 7.3, the students expressed moderately positive opinions on the six key achievements of the web-based course. Research findings suggest two possible explanations for such mild positions. Firstly, many students expressed neutrality with

regard to agreement with the many key issues (meaning they chose a value of 3). Secondly, and more importantly, in many cases students were split in their opinions, expressing mixed feelings about the usefulness of the web-based course.

In sharp contrast with this positive evaluation, is the strange fact that student participation in the web-based course (in particular the forums) was considered quite low. To complicate matters, a quick analysis of Figure 7.4 and some qualitative statements in chapter 6 suggest that the students not only enjoyed the web-based course and would like to participate again, but also they thought the web-based course had a great potential that was not adequately fulfilled. Moreover, they clearly acknowledged lack of participation and lack of dialogue among class-members.

Analysis of the diagrams in Figures 7.3 and 7.4, together with the findings highlighted in chapter 6 regarding the students' qualitative comments about various aspects of the web-based course, suggest the existence of four important paradoxes, as follows:

1. **Paradox 1** — Despite the high eagerness to participate in a web-based course shown during the on-campus course, the students' activity showed quite a low level of participation;

2. **Paradox 2** — Despite the weak preparedness status for participation demonstrated by the participants at the beginning of the course, they clearly indicated at the end of the course that they felt they had the necessary computer skills for using the web-based course, after all;

3. **Paradox 3** — Despite the low level of participation, students acknowledged that the web-based course was easy to use and navigate, it had a good and intuitive design, they had not had too many major technical difficulties and the Paper Co-ordinator was always at hand to help coach and encourage students to move forward;

4. **Paradox 4** — Despite the overall positive evaluation of the web-based course, students did not participate as expected.

A common denominator between paradoxes 1, 3 and 4 is the low level of participation verified. Explanations for the weak participation common to the three mentioned paradoxes are as follows:

1. **Teaching strategies** — As seen in Figure 7.4 and as mentioned in chapter 6, the students strongly indicated that more structured activities, more assessments and the inclusion of more updated material and more hyperlinks would have contributed to increase the student participation in the web-based course. These findings suggest that if different teaching strategies accommodating these particular aspects had been adopted, perhaps the student participation would have been greater;

2. **Learning habits** — As indicated in Figure 7.4 and mentioned by the Paper Co-ordinator the students undoubtedly preferred to use the paper-based course rather than the web-based one. A possible reason for this lies in the fact that Massey extramural students are still very much attached to the traditional paper-based mode of distance learning used successfully by Massey University for many years. This probably means that at this stage they feel more comfortable with the old method of planning, studying and performing assignments and only engage in a new method "whenever strictly necessary". These perceptions are report by other research findings. Montegomrie and Harapnuik (1997) indicated that students were not comfortable with the online format and missed the traditional mode of delivery. Bhuripanyo (1997) also found that students felt that the course content should be delivered in the traditional form instead of via the web;

3. **Time constraint** — Some students suggested that despite the concept of learning via the web being excellent they simply did not find time to make adequate use of the tools

available. Saunders et al. (1997) reported similar results. The authors found that time was also a constant constraint for most of the students;

4. **Role of the Paper Co-ordinator —** Results indicate that more direction and more participation by the Paper Co-ordinator could have made the students more focused and more engaged, perhaps contributing towards greater participation in the various activities of the web-based course;

5. **Shyness, selfishness and discomfort—** A high percentage of the respondents to the student questionnaire (45%) indicated they were reluctant to express their thoughts in the discussions. Shyness, and even selfishness and discomfort while participating could explain the passive attitude shown by a significant number of students. Other research findings also confirmed students' reluctance and insecurity in participating in the discussions (Naidu, 1997; Saunders et al., 1997).

6. **Other difficulties —** Results indicate that some students referred to various types of difficulties, which may have impacted negatively on their participation in the web-based course. Research by Gibson (1997), Saunders et al. (1997) and Fong (1997) reported similar results.

The discrepancy between the low preparedness status of the students at the beginning of the web-based course and their perception of having the necessary skills at the end of the same course can have two possible causes. Either the students felt they acquired the necessary skills during the tutorial given during the on-campus course plus the experience gained from on-job training, or they simply did not understand this question in the questionnaire.

Other research findings also confirm some of the positive perceptions demonstrated by the students in the web-based course evaluated by this thesis. Saunders et al. (1997) found that the general impression of the students on the course was that the web component was a worthwhile supplement to the traditional one. Findings by Welton and Welsh (1997) also confirmed that the

web course was a useful experience and the students' perceptions of learning via the web were positive. Gibson (1997) who mentioned that students found the web course an effective learning experience corroborates the same findings. Another important perception mentioned by the students was the feeling of belonging to a group and sharing the same space and ideas with other classmates. This finding was also confirmed by Gibson (1997) who discovered that students valued the feeling of belonging to the same learning community and being able to share various common interests.

7.3 Objectives and Pedagogical Strategies

Due to the length and nature of the explanations concerning the effectiveness of the web-based course objectives and pedagogical strategies, it was decided to subdivide this part into two sections: one devoted to the objectives and another dedicated to the pedagogical strategies pursued in the web-based course.

7.3.1 Course Objectives

From the outset, three main objectives were identified and associated with the web-based course, as described in chapter 4 of this thesis. These were respectively: (a) the creation of a learning community; (b) adding value to the course; and (c) enhancing the overall quality of the course. It is important to note that these were implicit objectives taken from the Paper Co-ordinator and were not revealed to the participants at any time.

Regarding the students' views on the success of the learning community objective, Figure 7.5 shows a mean value of 3.09. This suggests neutrality as a whole on the achievement of this objective. The Paper Co-ordinator, however, presented evidence that a learning community was created, although very different from the one he envisaged at the outset. In chapter 6 the Paper Co-ordinator mentioned possible reasons that prevented the formation of a "true" learning community, such as the lack of integration of the web technology within the course and the

small number of students enrolled. The first reason might affect the enrolments and disadvantage those students with no Internet access. The second reason (low number of students) is not consistent with the findings of Powers and Mitchell (1997) and of Gibson (1997). Powers and Mitchell had only seven students and a "true" learning community emerged. The same happened with Gibson with 20 participants.

The results show that a "true" learning community was not achieved since there was no evidence of close collaboration, participation, interaction and sharing of ideas within the web-based course. Since other research findings (Powers & Mitchell, 1997; Gibson, 1997; Welton & Welsh, 1997) suggest that learning communities have been achieved, it could well be the case that the students in this web-based course were not able to create a "true" learning community by themselves. The results here indicate that, perhaps a more active role from the Paper Co-ordinator could have helped to promote the formation of this learning community.

Diagram of the students' perceptions about the web course objectives

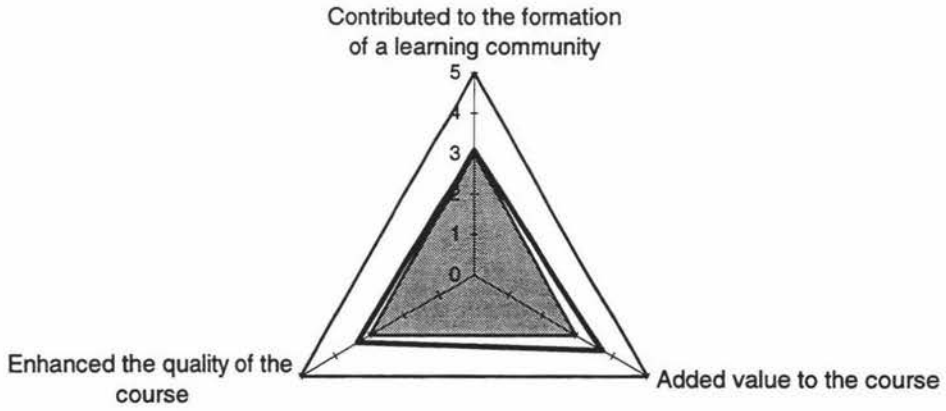

Figure 7.5 —Students' perceptions of the objectives of the web-based course

Figure 7.5 shows that most of the students agreed that the web component added value to the course. This view is shared by the Paper Co-ordinator. Naidu (1997) reported similar findings.

However, Lehman and Lehman's (1996) results indicated that students did not find there was much value in publishing paper material online. Regarding the value added by each specific web tool, Figure 7.6 suggests that the students valued some tools more than others. The majority of these views are in accordance with the ones expressed by the Paper Co-ordinator. The only discrepancies of opinion lay in the case of the usefulness of the student homepage tool, the electronic calendar and the study material online.

Diagram of the students' perceptions regarding value added by specific web tools

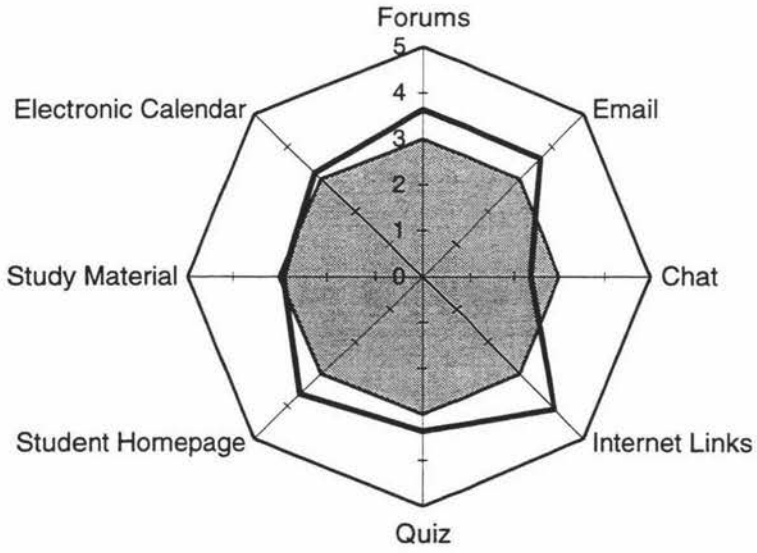

Figure 7.6 — Students' perceptions of the value added by each specific web tool

Why did the students indicate the web component added value to the course? Evidence suggests that by offering various web tools, and activities, the students were given the opportunity to engage in certain tasks that would not have been possible in the traditional mode of delivery. This explains the fulfilment of the added value objective of the course. Such fulfilment is also supported by Powers and Mitchell (1997) who suggested that students would not have had the same types of experience in a regular classroom situation.

Figure 7.5 also suggests that the students were moderately positive (mean value of 3.36) about the fact of the web-based course enhancing the overall quality of the course. This view was not a surprise since one perceives the existence of a strong link between added value and quality. Because the students indicated that the web-component had added value to the course, it is logical to expect a similar position on the enhanced quality objective. Having said that, it is interesting to notice that while 73% of the respondents agreed that the web component had added value to the course, only 54% agreed with the statement that the web-based course enhanced the overall quality of the course. A possible explanation is probably the meaning attributed by the students to each of these terms. Another possible explanation is that added value is more tangible and easy to observe than a subjective quality. Regardless of the meaning and the eventual explanations, the students definitively found that the web-based course contributed towards enhancing the quality of the course. Interestingly, research by Yong (1998) suggested mixed reactions regarding the achievement of quality by presenting the course on the web. Students were divided as to whether the web-based course improved the overall quality of the face-to-face instruction.

The students' views were consistent with those of the Paper Co-ordinator on the success of this particular objective. The enhanced quality objective was achieved, however, how well and why it was achieved is very difficult to comment on and quantify, as it depends on what is meant by the term "quality." As no definition of quality was given to the students, the perception that the web component did indeed enhance the quality of the course has to be subjective. More research is needed in order to ascertain how and why the quality of the course has been enhanced.

7.3.2 Pedagogical Strategies

In the first interview with the Paper Co-ordinator described in chapter 4 of this thesis, nine pedagogical strategies were depicted associated with the web-based course. All these were

considered as means to achieve the three final objectives of the web-based course. They were considered implicit pedagogical strategies and they were not revealed to the course participants at any time. How effective were those strategies?

7.3.2.1 Implementation of a Tutorial

In order to prepare the course participants for the web experience, the Paper Co-ordinator felt the need to offer a face-to-face tutorial session to all those eager to participate. This was considered a key strategy for the success of the web-based course. The Paper Co-ordinator's impressions combined with the students' views show that the outcome of the tutorial was positive. However, a few students commented on an inadequate amount of time and detail devoted to some of the tasks. There is clearly room for improvement in order to increase the effectiveness of this positive strategy. Other researches support the importance of this kind of tutorial. Powers and Mitchell (1997) suggest that face-to-face tutorials provide students with opportunities to learn about the technology and practice their technical skills. The authors also indicate that the instructor has the opportunity to develop personal contacts with students that are helpful later when online reassurance and advice is required.

7.3.2.2 Encouragement for the Use of Some Key Technologies

As mentioned earlier, one of the objectives of the web-based course was the formation of a learning community. A key strategy used to achieve this objective was providing and encouraging the use of key web technologies, such as the email, forums and chat. These web tools would work as vehicles to facilitate the students' communication, share ideas, discussion of problems and interaction with each other, leading towards the formation of a learning community.

Findings suggest these three technologies were used with varying degrees of success. In the section reserved for evaluating the success of the individual web tools, explanations will be offered as to why. At this stage the results shown in Figure 7.6 suggest that the students valued

the email and forum tools but very little value was attributed to the chat tool. However, a look at Figure 7.7 indicates that the students as a whole felt that communication among class members was fostered by the use of email, forums and chat. The issue of low participation does however cast a shadow on the overall effectiveness of these tools. These views were confirmed by the Paper Co-ordinator.

Diagram of the students' perceptions concerning key outcomes and preferences

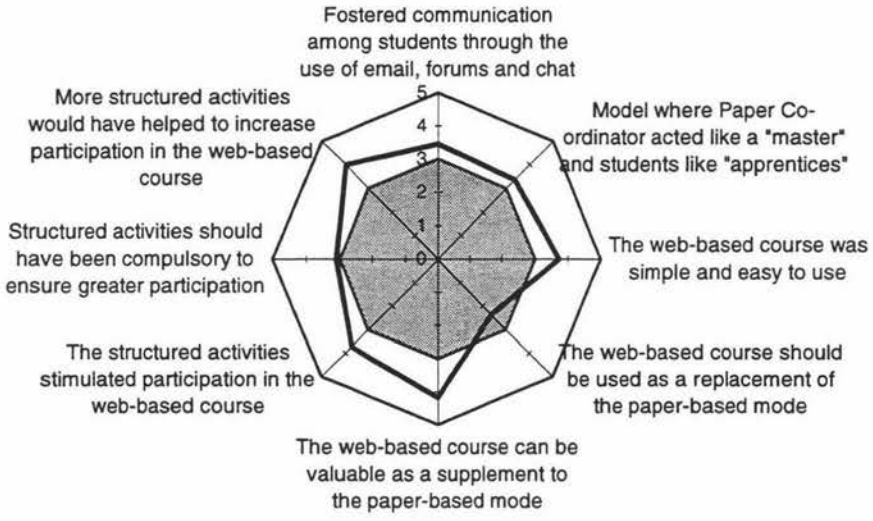

Figure 7.7 — Students' perceptions regarding key outcomes and preferences

Explanations for low student participation have been given already in this chapter. Commenting on the effectiveness of this strategy, the results suggest that, in the case of this group of students, there was a need for someone to lead the process and help to break down the barriers of communication. The students' comments such as "students need encouragement" and "weekly postings – not just whenever" indicated that the Paper Co-ordinator needed to take a more active role. These findings are consistent with those of Saunders et al. (1997) and Powers and Mitchell (1997). Saunders et al. showed that the involvement of a moderator is important to create and support online interactions. Powers and Mitchell revealed that some students

attempted to stimulate and develop conversation in the chat but did not succeed. The authors found that the instructor was a very important element of the chat facility.

7.3.2.3 Apprenticeship Model

From the outset, and as described in chapter 4 and 6 of this thesis, the Paper Co-ordinator always intended to use an apprenticeship type of model as the basis for his pedagogical role in the web-based course. Evidence to support the existence of the apprenticeship model in the teaching of the web-based course is mixed. The Paper Co-ordinator argued that this model existed and was consistent with his way of teaching. The existence of the model was not so obvious to the students. Taking the students' perceptions as a whole, however, one comes up with a mean value of 3.36 (see Fig. 7.7) suggesting a mild acknowledgement of the existence of such a model of teaching.

Whether the apprenticeship model existed or not, evaluating its effectiveness is difficult. It would have been necessary to imagine a scenario where a different model was applied to the same students, in the same circumstances and attending the same course to ascertain how the final results would have been affected by the use of a certain model to the detriment of the other. There is evidence that other teaching models have been used successfully in teaching via the web. Saunders et al. (1997) followed a constructivist theoretical framework and adopted a collaborative learning model as the basis for offering a course via the web. In this case, and in accordance with Saunders et al., knowledge construction occurred through intellectual and social interaction with peers and experts. The results were considered satisfactory. However, in terms of effectiveness, this thesis seeks for evidence of whether a certain model existed and has worked effectively. Since the findings only allowed for the evaluation of the existence of the model, more research is needed to adequately evaluate the effectiveness of the apprenticeship model.

7.3.2.4 KISS Principle

A key strategy in the design of the web-based course was the application of the KISS (Keep It Simple and Stupid) principle, as mentioned by the Paper Co-ordinator in chapters 4 and 6. Findings from the students' perceptions suggest evidence for the existence and moderate effectiveness of this strategy. Figure 7.7 indicates that the web-based course was simple and easy to use (mean value of 3.73). Written comments recorded from the students, such as "neat and easy to use" and "it was fine – no real problems" support the effectiveness of this strategy. Having said that, there were some difficulties due to the constraints of the WebCT software and the Massey University access system. The views of the Paper Co-ordinator also confirmed that the web-based course, although showing room for improvement, was simple and easy to use. However, despite acknowledging the importance of the KISS strategy, the Paper Co-ordinator also explained that he did not allow this principle to compromise the integrity of the course.

The KISS strategy has also been used successfully elsewhere. Findings by Naidu (1997) showed that students found one particular web-based course simple to use and easy to follow due to the inclusion of intuitive "graphic organisers" and "study charts" in the design. Gibson (1997) also indicated that success in the web course was mainly due to the simplicity and easiness of the graphical user interface. By using a graphical representation of a simple "virtual" campus, Gibson found that the simplicity, intuitiveness and friendliness of the various graphical metaphors were the secret of success.

7.3.2.5 Web as a Supplement of the Paper-based Mode

A key decision in the planning of the web-based course was to decide whether to offer the web component as a supplement or as a replacement for the traditional paper-based course. The Paper Co-ordinator, cautiously, and since this was the first time that a web component would be offered, decided to follow the strategy of offering the web component as a supplement of the paper-based course. With regard to this strategy, results indicate that the majority of the students

agreed that this was the correct decision (see Fig. 7.7). Saunders et al. (1997) reported similar findings. However, research by Gibson (1997) suggested mixed results in this respect. Half of the students found the web version as the necessary and sufficient mode of delivery for the future while the other half still prefer to have the paper version available. As for whether the web-based course should replace the traditional mode of delivery, Figure 7.7 shows the students' disagreement. Research findings by Yong (1998) and Bhuripanyo (1997) reported similar findings.

7.3.2.6 Selective Differentiation

An important strategy for the web-based course described in chapter 4 of this thesis was the principle of selective differentiation. Findings on the effectiveness of selective differentiation strategy suggest that it was not always followed. An example of this is the case of the electronic versions of the Administrative Book and Study Guide material. These were close replicas of the paper-based counterparts and as such it seems they were not adding value or any usefulness to the course. In chapter 6 of this thesis, the Paper Co-ordinator explained that he is now in a better position to tweak and refine the web content for next year. He indicates that he intends to keep those tools that added value to the course and eliminate the remainder. However, some intentions for next year can be seen as controversial, such as the Paper Co-ordinator's intention of removing the electronic versions of the Administrative Book and Study Guide. He says, "why bother now, refining the online material, given that the students wouldn't use it...so why bother". However, on this particular point and as represented in Figure 7.4, the students were quite positive that the inclusion of more updated material and more hyperlinks would have contributed to a greater use of the electronic course content. It seems that there is a chicken-and-egg situation here. Since the students did not reject the idea that the electronic Study Guide and Administrative Book added some value to the course, perhaps it would be a good idea to give it another go, at least for the second year, but with a revised content. Research by Lehman and Lehman (1996) indicated that by simply implementing plain text models based on a shallow

hierarchy of objects does not add any value to an existing printed version. The same authors recommend that web course designers should take advantage of the richness of the new medium rather than mechanically translating topics from an older format.

7.3.2.7 Structured Participation

An important strategy of the web-based course was the implementation of structured participation. The idea was to engage the students and lead them into action through the accomplishment of various activities. Analysis of the students' perceptions regarding the success of this strategy indicates a lack of structured activities. Findings suggest the existence of only one compulsory structured activity: posting an article review in the discussion forums. The students' comments in chapter 6 and Figure 7.7 left no doubt that more structured activities would have encouraged more participation in the web-based course. Research findings by Montgomerie and Harapnuik (1997) also suggest that students liked structured activities with fixed schedules and specific deadlines. Acknowledging disappointment with the lack of success of this strategy, the Paper Co-ordinator recognised that there was no reason for the students to participate, other than posting the compulsory article reviews. Even the guests did not help to encourage the students to participate, as expected. As a result, the Paper Co-ordinator decided to revise this strategy for the future in order to increase participation.

7.3.2.8 High Quality Content Delivery

In order to achieve the objective of enhanced quality, an important strategy was to select and use high quality content delivery. Commenting on the success of this strategy, the Paper Co-ordinator explained in chapter 6 how this was implemented. By selecting the more credible and more preponderant sites in the field, the Paper Co-ordinator revealed a concern for leading the students into quality research. Analysis of the students' perceptions on this particular issue confirmed the value, and implicitly, the quality of the Internet links. Another manifestation of this strategy would have been in the content of the electronic Administrative Book and Study

Guide. However, since these were no different from the paper-based counterparts, no assessment of quality was made. The scope of this thesis is the exclusive evaluation of the web component of the course.

7.3.2.9 Minimal interference

An important strategy outlined by the Paper Co-ordinator in chapter 4 was to pursue a path of minimal interference. From the outset, he indicated he would like to take a "hands off" approach and let the course run by itself. He initially stressed the intention of devoting no more than two hours a week for the running of the web-based course, since, he saw his role more as a facilitator rather than directing discussions. After the completion of the course, however, he admitted spending "five minutes there, half an hour here." Interestingly, and in sharp contrast with this perception, Naidu (1997) comes up with a different view regarding the amount of time teachers spent in a web-based course. Naidu indicated that teachers estimated spending as much as 20 to 30 hours a week organising the course content. Gibson (1997) suggested regular participation where teachers would moderate the forum, answer questions, organise extra activities, etc. Powers and Mitchell (1997) found that when the instructor took a "hands-off" approach and was not present during the asynchronous class discussions, the students were able to increase interaction and support each other. However, the same authors also discovered that for the same students the chat facility did not work without a strong intervention from the instructor. Powers and Mitchell appear to suggest that a "hands off" approach does not always work. It seems that it depends on the particular group of students and even on the tools they use.

Analysis of the students' comments confirmed that they perceived a lack of action from the Paper Co-ordinator and that had adverse effects on student participation. It appears there was a conflict between the strategy of minimal interference highlighted here, and the strategy of structured participation. Results suggest that in order to provide more structured activities and more guidance in order to increase participation, more time and effort would have been necessary on the part of the Paper Co-ordinator. Evaluation of the effectiveness of this strategy

is doubtful in terms of the respective outcome. Evidence suggests that the Paper Co-ordinator strongly favoured this strategy, while the students clearly wished otherwise. More research is needed in order to evaluate more carefully whether the outcome of this strategy would be positive or negative.

7.4 Web Technologies

How effective were the various web technologies used in the web-based course? This section discusses the research findings for all the web tools used in the course, suggesting explanations while evaluating their overall effectiveness.

7.4.1 Discussion Forums

Research findings on the use of this particular web tool revealed low student participation and uneven patterns of usage. To facilitate the search for explanations for the uneven patterns of usage, one should go back to Figures 5.6, 5.7, 5.8 and 5.9 in chapter 5 of this thesis. In Figure 5.7, the pattern suggests the existence of four peaks of activity. Explanation for the first peak recorded in May is found in the tutorial during the on-campus course. The second peak in the middle of June was probably linked to the compulsory posting of the article reviews. There was a revival attempt recorded in the middle of September. This happened after the students received a newsletter from the Paper Co-ordinator talking about the final exam. This event raised student curiosity about the final exam and encouraged others to start talking about it. Results suggest a last resurgence of activity in mid-November, when some messages were exchanged concerning the topic of the final exam. Figure 5.8 also reveals an uneven distribution of accesses with five major peaks of activity. The main difference between Figure 5.7 and 5.8 is the third burst of activity in Figure 5.8. There was an attempt by one particular student to revive the ailing forums. This seems to have worked, and a sustained number of messages were exchanged. In Figure 5.9, the evolution of student accesses for the purpose of following up

messages suggests the same bursts of activity on the same dates, meaning, therefore, similar underlying explanations.

Regarding the functioning of the discussion forums, the students declared themselves as "passive" participants (91%). The same view was acknowledged by the Paper Co-ordinator who classified the students' contributions as "poor" and "disappointing." Other research findings confirm passive participation in the discussion forums (Yong, 1998; Naidu, 1997; Saunders et al. 1997). However, research findings by Gibson, (1997) and Welton and Welsh, (1997) contradict this finding and suggest the existence of active student participation in the discussion forums.

Taking into account the students' views described in chapter 6 combined with their global evaluation of the discussion forums in Figure 7.8, it is possible to find some explanations as to why this particular group of students assumed a passive role in the discussion forums:

1. The students mentioned that they were reluctant to express their thoughts in the discussion forums (mean 3.27). This is a very significant finding that could explain an attitude of shyness and reluctance to participate in the student group as a whole. Other research findings confirm this reluctance to express thoughts in the discussion forums (Saunders et al. 1997; Naidu, 1997). Conversely, findings by Welton and Welsh (1997) suggest that students were not reluctant to express their thoughts;

2. The students as a whole admitted that participating in the forums was time consuming (mean 3.09), as can be seen in Figure 7.8. This view may be used as an additional explanation for their low participation;

3. The article review task was a positive contribution to the discussion forums (see Figure 7.8). Since they were compulsory and marked, the students indeed co-operated and posted their article reviews as intended. The addition of guests to the course in order to stimulate participation and increase interaction among classmates was not successful as

shown in Figure 7.8. Lack of structured activities and reward was probably another reason for this group of students not participating more in the forums;

4. Finally, discussing the role of the Paper Co-ordinator, the students praised his role as a factor contributing to encouragement and further participation. However, some students also indicated that the Paper Co-ordinator could have been more active, more focussed and more frequent in his interventions. This means that although his role was positive, it was not enough to please all participants.

In summary, although the students adopted a passive role in the forums, they still found them positive and valuable web tools which added value to the course. Possibly, more structured activities, rewards and a more active role from the Paper Co-ordinator would have contributed to more student participation.

Diagram of the Students' Perceptions Regarding the Success of the Discussion Forums

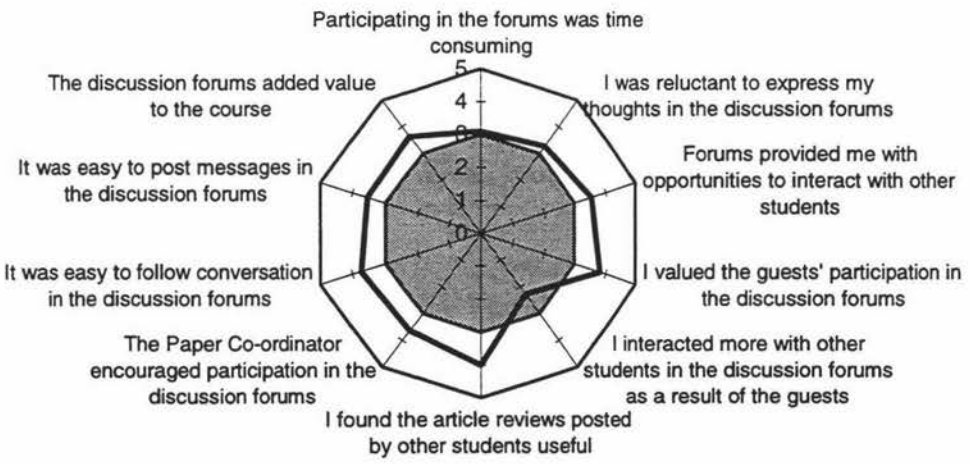

Figure 7.8 — Students' perceptions of the success of the discussion forums

7.4.2 Email

The email tool, as an integral part of the WebCT, seemed quite appealing from the outset. Evidence suggests that the students used this tool sparingly to contact each other, and only occasionally to contact the Paper Co-ordinator. Although the Paper Co-ordinator was quite optimistic about the success of the email tool, the evidence provided in chapter 6 does not appear to suggest a very optimistic use of the email facility. These findings contradicts those of Powers and Mitchell (1997) who found that students exchanged messages, offered tips and suggestions on many occasions.

Although the students agreed that this tool added value to the course, they did not use the email very often. The low frequency of usage may be attributed to the students' lack of perceived need. There are two possible interpretations. Either the students did not have any issues to discuss or they already had another email account outside WebCT, which they decided to use instead, as one student stated "why use it instead [of] conventional email." Another possible explanation is that a few students confirmed they had technical difficulties in using this tool. More research is needed to establish the exact reasons for the low use of the email tool.

7.4.3 Chat

Evidence included in chapters 5 and 6 of this thesis confirms that the chat activity was low as shown in Figure 5.9. The number of connections into the chat mode suggests a peak of activity at the beginning of May, probably because of the tutorial session where the students had the opportunity to experiment with this tool. After that, the number of student connections into the chat tool dropped to four, probably suggesting some frustration with the lack of dialogues. Later on this number dropped even further. The chart also reveals that, although some students tried to initiate chats in the period between June and November these attempts went nowhere. The actual number of threaded chats was consistently zero, from the beginning to the end of the course. Figure 7.9 suggests that the chat can be considered to be the worst performer of all the

web tools included in the course. These findings contradict those of Welton and Welsh (1997) and Powers and Mitchell (1997) who showed that students engaged in chat sessions and found them useful.

Diagram of the Students' Perceptions of the Use of the Web Chat Tool

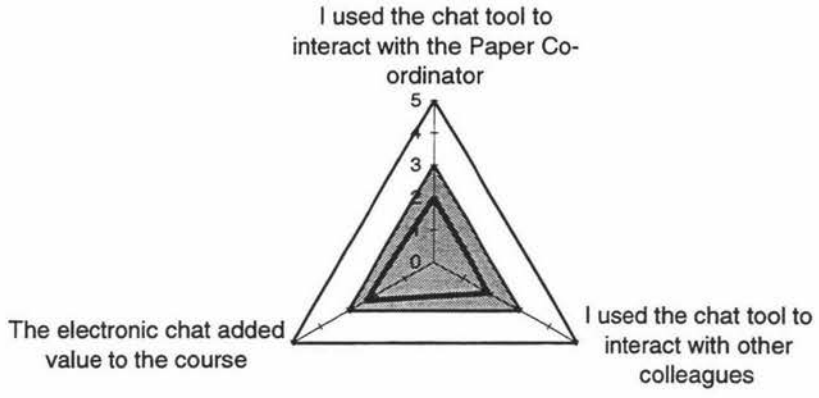

Figure 7.9 — Students' perceptions regarding the success of the chat tool

Why did the chat not work? There are various possible explanations for this outcome. One reason could be the absence of any incentive from the Paper Co-ordinator, who mentioned that he intended to neither participate nor to structure the chats. Research by Powers and Mitchell (1997) confirmed that instructors played a very important role in the success of chat sessions. The authors also revealed that the chat sessions had been previously set up to work for periods of one hour on various different occasions and worked well. Other possible reasons for the low use of the chat facility were the lack of synchronisation or structure between classmates, and the reluctance (meaning shyness and self-confidence) of some to engage in this mode of communication. Written comments from some students support these explanations. There were also some technical difficulties (lack of chat rooms) and some students simply felt no need to use it.

7.4.4 Internet Links

The chart included in Figure 5.11 illustrates the total number of accesses recorded for this particular tool throughout the course. According to this Figure, accesses to the Internet links had a peak of activity at the beginning of May due to the tutorial session. After that, the number of times the students accessed this tool decreased considerably. However, there was a burst of activity recorded in the middle of June. A possible explanation was that the interest in exploring Internet links had grown with the preparation of the article reviews. However, a word of caution is necessary while interpreting the chart in Figure 5.11. A few students mentioned they "bookmarked" the sites after using the Internet links tool. By doing this they found a way to bypass the tool while still accessing some major sites. This means the results of the chart including in Figure 5.11 can be misleading and should be interpreted with caution.

Regarding the success of the Internet links, the students supported the view that this was a very positive and valuable addition to the course geared towards guiding them to the most relevant information available on the Internet. This finding confirms the Paper Co-ordinator's perceptions that this tool was a very useful addition to the course. Other research findings indicate that when included in web courses the links become a popular feature appreciated by the students (Fong, 1997; Powers et al., 1997; Naidu 1997). However, and despite the usefulness confirmed by the two sources, evidence suggests a limited use of this tool, probably due to the absence of other structured activities where some kind of reward was implicit. The students were more likely to have used the tool if there was a perceived need or reward (in this case the article reviews) involved.

7.4.5 Quizzes

The quiz tool included in the web-based course provided students with access to two electronic quizzes created by the Paper Co-ordinator. Evidence suggests that the students' desire to complete the quizzes was far from great. The written comments from the students provided

interesting explanations as to why they did not complete the quizzes. These range from lack of time and "do not like quizzes" to reservations on privacy issues ("did not know who was going to have access to the results"). It might be possible that this particular group of students, despite acknowledging that the quizzes were quite useful and actually added value to the course, did not make an effort to use this facility because there was no incentive, reward or marking at stake. Fong's (1997) research revealed a more positive experience with a similar tool. He found that the vast majority of students indicated that the online testing was helpful in identifying the problems of the course.

7.4.6 Electronic Calendar

Another tool offered via the web was the electronic calendar. This was a built-in feature of the WebCT software and was considered from the outset more like an utility rather than a proper pedagogical tool. Evidence suggests that this tool added value to the course. Nevertheless, the students (73%) seldom used it. This finding is consistent with the Paper Co-ordinator's scepticism on whether students would use the tool. Reasons such as convenience and preference for not having used this tool more often can be found in some of the students' comments. These findings contradict those of Powers and Mitchell (1997) who mentioned the popularity of the "electronic schedule" web feature. Their findings showed that students liked it since they could keep track of due dates for assignments, become aware of course announcements, last minutes changes, reminders, etc.

It is possible that the students perceived the electronic calendar to be "just another tool" and used the calendar tool only once or twice, probably for the sake of curiosity. It is possible that without a clear purpose or a strong incentive, they just moved on without making efforts to use it more often. Research by Powers and Mitchell (1997) showed that the announcements in the electronic schedule were followed by a lecture. The authors indicated that students were motivated to use the tool.

7.4.7 Student Homepage

The student homepage tool included in the web-based course was more like a social utility than a true pedagogical instrument. The objective was to provide the students with their own "little corner" where they could place their own photographs, links, small biographical notes, etc. The majority of the students (64%) used this tool and completed their own homepages. However, some students clearly indicated difficulties in the construction of their homepages and there was an agreement that constructing homepages was difficult as shown in Figure 7.10. This could be a valid reason for 36 % of the students not having completed their homepages. Findings suggest that most of the students simply wrote greetings with their email addresses and trivial information avoiding disclosing biographical notes or any type of personal information. Because of this, it appears that this web tool was not really providing opportunities to get to know each other. However, most of the students clearly indicated that this tool provided them with opportunities to get to know each other and, most important of all, the tool was a worthwhile addition to the course (both with mean values of 3.63 as seen in Figure 7.10). Perhaps this group of students found the information they wrote, sufficient to introduce themselves to the group.

7.4.8 Electronic Administrative Book and Study Guide

For the sake of convenience, the Paper Co-ordinator decided to offer electronic versions of the paper-based editions of the Administrative Book and Study Guide via the web. The electronic versions were replicas of the equivalent paper-based ones with the exception that of most of the graphics, figures and charts were removed from the electronic versions for practical reasons. This allowed for a quicker download of the text and information.

In chapter 5 of this thesis, Figures 5.3 and 5.4 provide an overview of the participants' use of this electronic material. Discussing the more comprehensive chart in Figure 5.4, one can note five peak periods of activity. The first peak of activity was probably due to the tutorial session.

The second peak occurred during the entire month of June and, most likely, was due to preparation of the first assignment and posting of the article reviews. After that, the participants' interest in the electronic material dried up quickly. However, a third burst of activity took place in the middle of July, for which there is no apparent explanation. Evidence suggests that more than half of the total hits recorded for all the participants in this period were due to one particular student. There is no obvious reason as to why this particular student went searching for the electronic material in that particular period. Explanations for the peak of activity recorded in the middle of September are probably associated with the occurrence of the second assignment, which took place around that time. Finally, the last peak recorded at beginning of November appears to be linked with the preparation for the final exam. Still in Figure 5.4, the time spent by all the participants in reading the course material online appears to suggest a pattern quite similar to the one relating to the number of hits. This suggests that, most probably, the average time spent in reading course material online did not change significantly throughout the whole course.

Findings suggest a very low usage of the online study material. A possible explanation for its low usage was that the electronic version was an exact replica of the equivalent paper-based version provided. Figure 7.11 indicates that had the electronic versions been different (with more links and more updated material) this group of students would have used it more often. This means that the students saw a potential for the course content to be published on the web. Research by Lehman and Lehman (1996) confirm these findings. The authors showed that the majority of the students still preferred a paper textbook to a web-based one, given identical contents. However, should the web version been more up-to-date the great majority of the students (70%) would have preferred a web-based text. It seems that value is only added when the content is modified in order to increase interactivity and follow the general guidelines of material published on the web. However, research by Gibson (1997) suggests mixed results regarding the students' attitudes towards online content. The author found that half of the

students still preferred to have a paper-based edition and another half mentioned they would not mind working with an electronic-only version in the future.

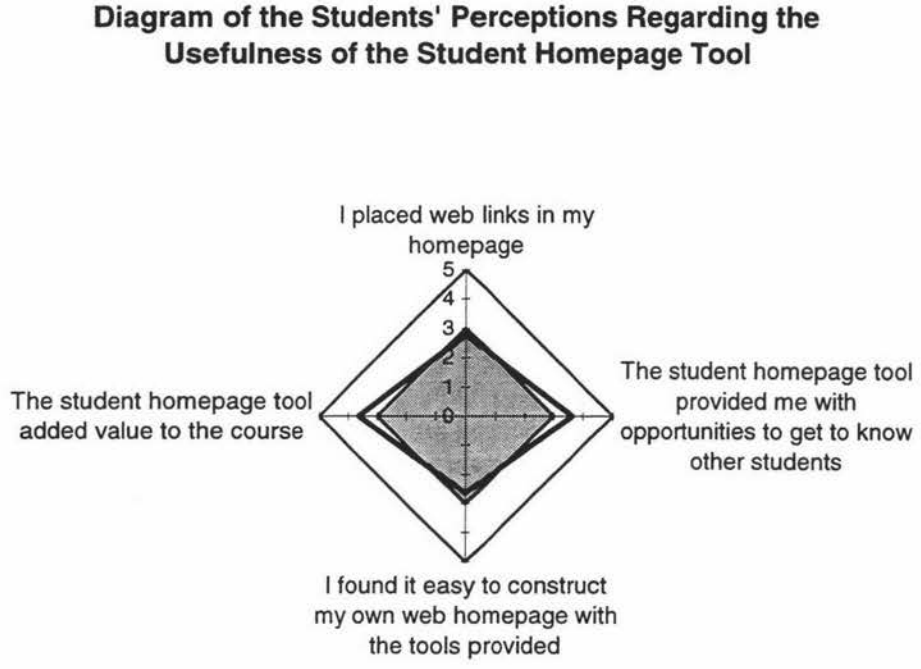

Figure 7.10 — Students' perceptions of the usefulness of the student homepage

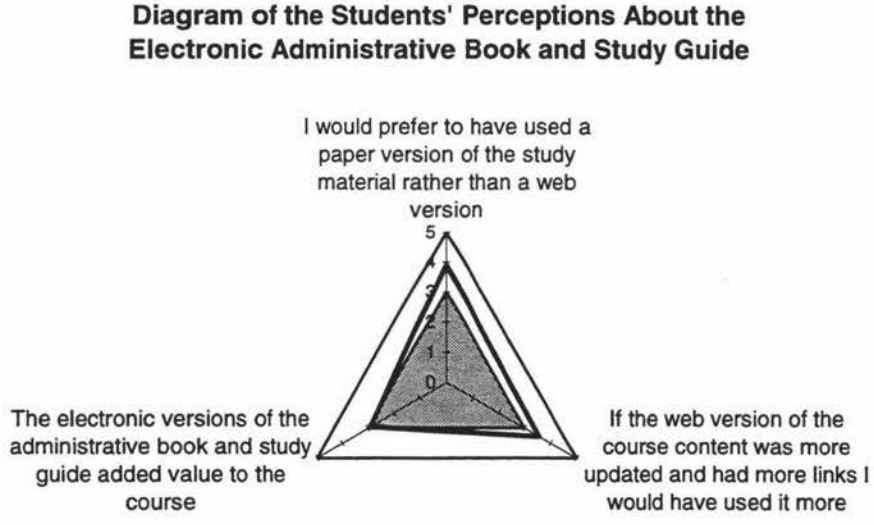

Figure 7.11 — Students' perceptions of the electronic study material

7.5 The User Interface

From the outset, a great deal of time and effort was dedicated to the design of the user interface. Within the obvious limitations of the WebCT software, attention was given to detail in order to provide the students with a quality product on the web. The following sections discuss the effectiveness of five aspects of the user interface for the overall success of the course.

7.5.1 Ease of Use and Consistency

This study provides evidence to suggest that the web-based course was simple, easy and intuitive to use. This is self-evident when looking at the variables illustrated in Figure 7.12. Other researches also confirm student satisfaction with the user interface in various cases. Gibson (1997) found that the web site was simple, easy to use and friendly. Welton and Welsh (1997) also mentioned that the students found the design of the web-based course easy and intuitive. Bhuripanyo (1997) confirmed similar positive perceptions from the students.

Diagram of the Students' Perceptions Regarding the Ease of Use and Consistency of the User Interface

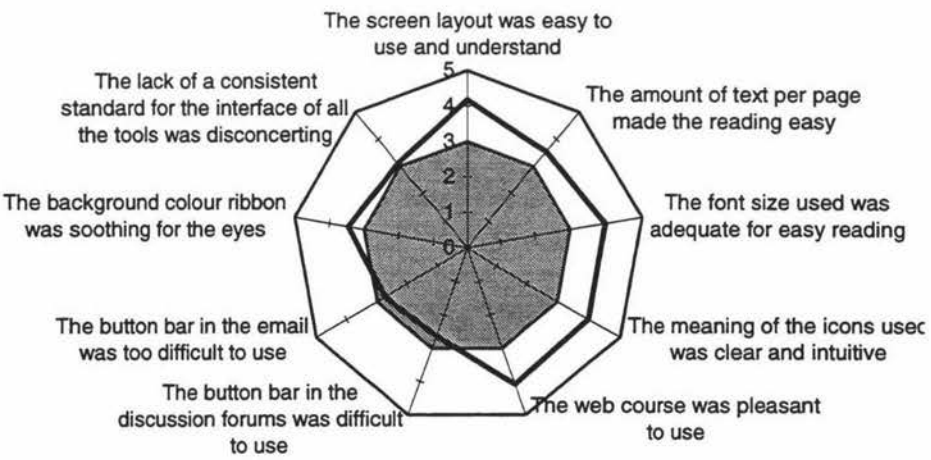

Figure 7.12 — Students' perceptions of the ease of use and consistency

Regarding the consistency of the user interface, despite praising some aspects, such as the colour of the background ribbon, the students argued that there was lack of consistency in the user interface of the various web tools. The Paper Co-ordinator also acknowledged some inconsistencies with the user interface. The aspect of consistency of the various web tools is very much dependant on the WebCT capabilities. At the moment, not all aspects of the program are fully customisable. Unless new software is used, or a new updated version of the WebCT software comes along, it would be difficult to make great progress on this particular aspect.

7.5.2 Access, Navigation, Help, Advice and Customisation

The students' views regarding the access, navigation, help, advice and customisation of the user interface are summarised in Figure 7.13. This figure indicates that the students did not have problems in navigating the web-based course (mean value of 4.18). Both Naidu (1997) and Welton and Welsh (1997) reported similar findings. However, findings by Bhuripanyo (1997) revealed mixed results regarding the effectiveness of the navigation menu of the web site. Regarding access, results show that a number of students (36%) raised some concerns about the time necessary to load all the information into their computers. Some (27%) also mentioned difficulties in accessing the web course through the Massey University general gateway. These two aspects of accessibility should be addressed and improved in the future.

Although the help and advice aspects were recognised by both the Paper Co-ordinator and the students to be insufficient and weak, many students overlooked these important aspects because their skills had been polished during the tutorial session. There is room for improvement here in the form of providing proper online help and an adequate user's manual. Regarding the customisation of the user interface, Figure 7.13 shows that this aspect was unfavourably treated by the students. There is room for improvement in this respect, yet evidence suggests that the lack of customisation can be directly attributed, once again, to the

capabilities of the WebCT software. New versions with more features will, hopefully, address this deficiency.

Diagram of the Students' Perceptions Regarding the Access, Navigation, Help, Advice and Customisation Features of the User Interface

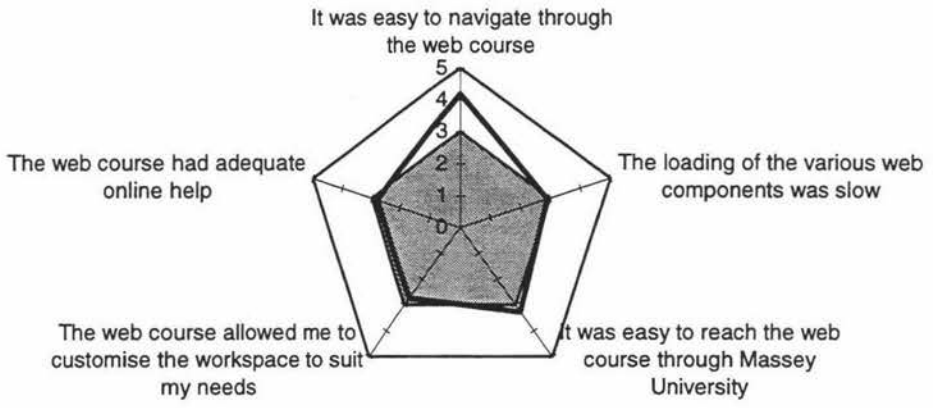

Figure 7.13 — Students' perceptions of the access, navigation and customisation

7.6 Summary

This chapter discussed the various research findings disseminated throughout the thesis. The teacher's perceptions were contrasted with the students' views and the literature reviewed in chapter 2 in order to establish a comprehensive opinion on the overall success and effectiveness of the web-based course.

Discussion of the teacher's perceptions of teaching via the web suggest the existence of a positive and virtuous cycle of evolution where the initial attitude of scepticism, doubts and insecurity gave place to a moderate optimism, as well as more certainty and confidence for delivering the course via the web. In this particular web-based course, the students' perceptions of learning via the web suggest that, overall, it was a positive and valuable experience. Regarding the three objectives of the web-based course, some were clearly more successfully

and effectively achieved than others. Discussing the objective of the formation of a learning community, evidence suggests that a "true" learning community was not achieved. Regarding the added value objective, evidence suggests that, as a whole, the web component indeed added value to the course. Discussing the objective of enhancing the quality of the course by offering a web-based component, evidence suggests that this objective was also achieved, although more research is needed to more accurately establish how and why this objective was achieved.

Discussion of the nine pedagogical strategies pursued by the Paper Co-ordinator suggests interesting results. The initiative of promoting a tutorial was considered a positive and an important strategy with repercussions on the overall effectiveness of the web-based course. The encouragement for the formation of a learning community by means of providing some key tools, such as the forums, email and chat, despite being positive, proved to be not very effective. Evidence to support this view is based on the low level of student interaction verified in the use of these three tools. With regard to the success of implementing an "apprenticeship model", evidence suggests that such a model indeed existed and was moderately effective despite controversial views from the students. Evidence also suggests that the KISS principle was used in the design by the Paper Co-ordinator and acknowledged by the students. This principle was positive and effective. Results have shown that the Paper Co-ordinator decided to offer the web component as a supplement to the paper-based mode. This strategy was well supported by the students who were not prepared to see the paper-based delivery mode replaced by a web-based course. The strategy of selective differentiation between the paper-based course and web-based course proved to be positive and effective to a certain extent. With regard to the strategy of structured participation, findings suggest it was poorly implemented despite its high potential value. As for the strategy of high quality content delivery, evidence suggests that this strategy was positive, effective and visible, particularly in the selection of the hyperlinks included in the web-based course. Finally, and with regard to the minimal interference strategy, evidence

supports its existence throughout the course. However, one can question the effectiveness of this strategy since it apparently did not contribute to produce positive results.

The various tools used in the web-based course suggest different levels of success and effectiveness. Despite the general low level of contribution by the students, the most valued tools were the Internet links, forums, email, and student homepage. Lagging behind in terms of value and effectiveness were the online study material, the quiz and the electronic calendar tools. Evidence suggests that should new strategies have been used in conjunction with these tools, perhaps the results would have been different. The last effective and least valued tool was the chat. Despite the various degrees of success for each tool, the students and the Paper Co-ordinator suggested multiple reasons to explain the general low level of use demonstrated by the participants.

Discussion of the user interface used in the web-based course suggests it was largely successful, effective and welcomed by the students. The participants praised the ease of use, simplicity and intuitiveness of the web interface. The aspects of access and navigation were also examined. Evidence suggests that the web-based course was easy to navigate although sometimes confusing due to inconsistencies in the user interface. Access to the web-based course via the Massey University general gateway was considered complex and prone to errors. Access and navigation both showed room for improvement. Findings suggest that the electronic advice and online help aspects included in the design of the web-based course were not adequate. This was a deficiency linked to the present capabilities of the WebCT software. There were suggestions for the inclusion of good online help and the provision of a user's manual. Finally, the important issue of customisation was also discussed. Evidence suggests that the level of customisation provided in the web-based course was unsatisfactory.

CHAPTER 8

Conclusions and Recommendations

This chapter marks the end of the thesis. The objective, here, is to present a whole range of concluding remarks, such as a summary of the main findings and conclusions, to expose the weaknesses and strengths of this research, the implications of the thesis for education and research, as well as suggest recommendations for future research.

This chapter is therefore organised into five sections. The first section presents the main conclusions of the thesis. The second section describes its strengths and weaknesses. The third section stresses its main implications for education. The fourth section highlights implications for research. Finally, the last section suggests a series of recommendations for the future.

8.1 Conclusions of the Thesis

The main objective of this thesis was to *evaluate the effectiveness of a tertiary education course delivered via the web*. The proposal was to achieve this by means of an in-depth analysis of the web component of the course 86.761 "Learning with Computers" offered by Massey University. A comprehensive set of variables was used to allow the evaluation of the effectiveness of teaching and learning via the web in this study. As a result, it was then

possible to describe the participants' perceptions of the various aspects of the web-based course in some detail.

A summary of the main findings of this thesis can be found in Table 8.1.

Issue	Effectiveness	Outcome	Comments
Teacher's perceptions of teaching via the web	Medium	Positive	Existence of a "virtuous circle". Moderate optimism at the end of the course. Many threats still impending upon the future success of this mode of teaching.
Students' perceptions of learning via the web	Medium	Positive	Students liked to participate, they indicated the web fostered communication among colleagues and contributed to further their knowledge. Very keen to participate again in a similar event.
Learning community objective	Low	Positive	No "true" learning community was formed. Perhaps a more active role from the Paper Co-ordinator could have helped.
Added value objective	Medium	Positive	Wide consensus on the fulfilment of this objective.
Enhanced quality objective	Medium	Positive	More research is needed to ascertain why and how was this objective achieved.
Implementation of a tutorial	Medium	Positive	Moderately successful, yet with room for improvement.
Use of key technologies	Low	Positive	Low usage of the key web technologies. Perhaps a more active role from the Paper Co-ordinator could have helped.
Apprenticeship model	Medium	Positive	More research is needed to establish more accurately the effectiveness of this strategy
KISS principle	Medium	Positive	Moderately successful, yet with room for improvement.
Web course as a supplement to the paper-based mode	High	Positive	Appears to have been the correct decision.
Selective differentiation	Medium	Positive	Not always followed. Contradictory views. It needs some revisions/improvements for the future.
Structured participation	Low	Positive	Only one structured activity. More structured activities would have increased the participation in the web course. In principle, these should not be made compulsory.
High quality content delivery	Medium	Positive	Students liked the selection of the Internet links and sites
Minimal interference strategy	Low	Doubtful	More research is needed to prove the effectiveness of this strategy. The Paper Co-ordinator liked it, yet it appears that the students did not.

Discussion forums	Medium	Positive	Valuable tools. Low overall participation and contribution. The students did not like to express their thoughts in the discussions. Students liked the article review postings. The role of the guest was ineffective. The role of the Paper Co-ordinator was positive and effective but not good enough according to some participants. There is room for improvement for the future.
Email	Medium	Positive	Low usage. Contradictory views about the success of this tool. There is room for improvement for the future.
Chat	Very Low	Negative	Disappointing usage. No incentive to use this tool. Negative evaluation expressed by both, the Paper Co-ordinator and students. Other research, however, suggests otherwise. Based on the outcomes and other research, there is a need to reassess the offering of this tool for the future.
Internet links	High	Positive	Despite the limited usage they were considered a very useful addition to the course.
Student Homepage	Medium	Positive	Limited usage. This was considered a useful utility added to the course. Many difficulties expressed by the students while using this tool should be dealt with during the tutorial.
Electronic calendar	Low	Positive	Despite the low usage, this was considered a useful addition to the course. No incentive to increase the usage of this tool.
Online Study Material (electronic Administrative Book and Study Guide)	Low	Positive	Duplication. Clear preference for paper-based material. Despite the low usage, the students mentioned that more hyperlinks and more updated material would have contributed to a greater use of the online study material. There is room for improvement for the future or simply reassess the offering of this tool.
Electronic Quizzes	Low	Positive	Despite the low usage, this was considered a useful addition to the course. No incentive to increase the usage of this tool.
Ease of use of the user interface	High	Positive	Wide consensus regarding the ease of use, simplicity and intuitiveness of the user interface. There is still room for improvement.
Consistency of the user interface	Medium	Positive	Satisfactory, yet with plenty of room for improvement.
Access and navigation of the user interface	Medium	Positive	Satisfactory, yet with plenty of room for improvement.
Online help and advice included in the user interface	Low	Positive	Unsatisfactory. Plenty of room for improvement.
Customisation of the user interface	Low	Positive	Unsatisfactory. Plenty of room for improvement.

Table 8.1 — Summary of the main findings

Taking into account the summary presented in Table 8.1 plus all the discussion and explanations disseminated throughout the thesis, one can draw the following main conclusions:

1. Findings suggest an important and positive evolution in the Paper Co-ordinator's perceptions of teaching via the web. Central to the positive attitude of the Paper Co-ordinator were the encouraging results obtained from the web-based course and his belief in the success of his teaching philosophy as well as his role as a facilitator. These perceptions together with the experience acquired by running the web course led to a positive attitude. This was considered an important outcome with important pedagogical consequences. However, some important unresolved issues could jeopardise future attitudes towards teaching via the web. Research confirms that the challenges of having to face extra workload and some technical difficulties could overshadow the future success of this mode of teaching;

2. As for the students, and based on the various research findings, this thesis concludes that learning via the web was a positive and moderately effective experience. Analysis of the students' perceptions showed that, they liked to participate in the web-based course, they learned from the experience, and they were eager to participate in future similar initiatives. However, the students also suggested plenty of room for improvement in various aspects. In pedagogical terms, and with regard to learning via the web, this thesis concludes that the web-based course was a step in the right direction, yet still had some way to go in order to adequately fulfil its potential;

3. Regarding the effectiveness of the three objectives of the web-based course, this thesis concludes that a "true" learning community was not achieved within the web-based course. Despite the low effectiveness of this objective, this thesis argues that it is an important and positive aim in pedagogical terms, and deserves more time and effort in the future. This thesis also concludes that, in general, the web component added value

and enhanced the overall quality of the course. However, more research is needed to better evaluate the quality aspects of the course;

4. Findings suggest that the nine pedagogical strategies adopted for the web-based course were accomplished with different levels of effectiveness. This thesis concludes that the most effective strategy was the decision to offer the web-based course as a supplement to the paper-based material. Only moderate effectiveness was achieved by offering a tutorial, following the apprenticeship model of teaching, using the KISS principle, selective differentiation, and high quality content delivery. Results suggest that encouragement for the use of some key technologies, structured participation, and the minimal interference approach had low effectiveness. This can be attributed to the low level of student participation and contribution to the course. Also more structured activities, more extras and a more active role from the Paper Co-ordinator could have led to different outcomes. Doubts persist about the effectiveness of the apprenticeship model and the Paper Co-ordinator's minimal interference approach. More research is needed in order to clarify the effectiveness of these two strategies;

5. Findings also suggest that the nine web tools used in the web-based course achieved various degrees of success. All but the chat tool were considered positive by the Paper Co-ordinator and by the students. Despite the low overall usage of the web tools, generally speaking, they were regarded as useful and adding value to the course. This thesis concludes that the most effective tool was the Internet links. Moderate effectiveness was achieved by using the discussion forums, email, and student homepage tools. Low effectiveness was achieved by the use of the electronic calendar, quiz and online study material (Administrative Book and Study Guide). Very low effectiveness was achieved by the chat tool. Basically, the low effectiveness was due to low student participation and use of the web tools. Reasons for this were the lack of incentives or reward for further usage, lack of more structured activities, some

technical difficulties, and the lack of more positive action by the Paper Co-ordinator. Plenty of room for improvement was diagnosed;

6. Finally, the evaluation of the five aspects of the user interface suggests positive results with mixed effectiveness levels. This thesis concludes that high effectiveness was obtained with regard to the ease of use, simplicity and friendliness of the user interface. The aspects of consistency, access and navigation were considered moderately effective with suggestions of some room for improvement. The aspects of online help, advice and customisation were considered inadequate. The participants suggested plenty of room for improvement here. However, progress in these last three aspects is closely linked to the capabilities of the WebCT software.

In summary, one can conclude that this thesis was moderately successful in achieving its initial objective, since it was able to reasonably evaluate a case on the topic of teaching and learning via the web, and produce a set of encouraging results as well as some useful contributions to education and research.

8.2 Strengths and Weaknesses of the Thesis

Like any other work, this thesis has strengths and weaknesses. Some were considered more relevant than others. As well as the obvious limitations of time, content and style due to the nature of this thesis, the work produced created its own strengths and limitations. These will be described in this section.

8.2.1 Strengths

One of the most interesting features of this thesis was the comprehensiveness of the analysis. This thesis covered not only the teacher's side of the argument, but also the students' views. Moreover, it analysed not only the web course objectives and pedagogical strategies, but also the web tools offered and the user interface aspects. The coverage of such a wide range of issues made the arguments interesting and rich. One of the intentions of this thesis

was to search for explanations regarding the effectiveness of teaching and learning via the web. The vast collection of perceptions recorded in the various interviews with the Paper Co-ordinator together with observations and students' views, suggest some interesting explanations of the attitudes and behaviour of the teacher and participants. Finally, this thesis used quantitative and qualitative data to better support the arguments. During the data collection, more than 100 different quantitative variables have been measured and numerous qualitative variables and comments were recorded. Fifteen different databases were created to hold the various data and analyses. The scope and breadth of the data makes this thesis a useful source of information for further research on the same topic.

8.2.2 Weaknesses

The small size and characteristics of the sample used in this study, compromises the ability to generalise the results. Experimenting with larger and different types of samples would have allowed more solid conclusions. The scope of the thesis also reflects important limitations on the ability to generalise the research findings. Therefore, caution has to be taken when attempting to compare results or establish more general conclusions.

A review of the literature on the subject area of this thesis revealed the existence of very little research published on this particular topic, with obvious implications. The reason for the lack of research is the novelty of the topic: it is a very recent educational phenomenon and 80% of other applicable research findings were produced in 1997. Another weakness concerns the accuracy obtained in the evaluation. Despite the evaluation objective of this thesis being moderately successful, there were occasions where it was difficult to establish whether a certain item was moderately or highly effective. Since this thesis relied heavily on qualitative data, without a well established measurement criteria, it was sometimes difficult to evaluate. It was felt that a well defined measurement criteria should have been used.

One of the objectives associated with the web-based course was to enhance the quality of the course. Although respondents gave their opinion on whether this objective had been

achieved, this thesis failed to give the participants a previous definition of quality. Due to the subjective nature of the term, quality can mean different things to different people. By not defining the term "quality" in advance, the information collected lost its credibility. This issue was clearly overlooked in the thesis. Due to its importance, however, more research would have been necessary in order to establish whether and how the web-based course had indeed enhanced the overall quality of the course. Another weakness of this thesis was the failure to clearly establish the effectiveness of the apprenticeship model. Due to the complexity of the subject, perhaps an entire thesis could have been devoted to this interesting topic. More research is needed in order to clarify the effectiveness of this teaching philosophy. Evaluation of the minimal interference strategy was another weakness of this thesis. Due to some contrasting views between the Paper Co-ordinator and the students, it was difficult to come to a conclusion of whether this strategy had produced a positive or a negative outcome. More research is needed in order to clarify the issue.

Finally, the student questionnaire used in this thesis was far from ideal. It ended up as a compromise solution with various constraints. Because it was the only opportunity to capture the students' perceptions, its initial design was over-ambitious. The initial format, which was too long and comprehensive had to be substantially revised. At the end, it was felt that some issues were slightly overlooked. Rather than posting one single questionnaire at the end of the course, a more appropriate solution would probably have been the creation of two online questionnaires. However, since the web-based course was being offered for the first time with limited WebCT software capabilities, there was no opportunity to implement this solution.

8.3 Implications for Education

As a result of writing this thesis, extensive pedagogical material has been made available to scholars and educators alike. All the material collected in this thesis has made a contribution to those interested in better and more effective methods of delivering courses via the web. The plethora of data, contrasting arguments and discussion makes the content of this

thesis ideal for those who wish to use it as a basis for further classroom teaching or discussion on the topic of delivering courses via the web.

The nine pedagogical strategies highlighted in this thesis and the respective discussion of their effectiveness can be used as an important basis for educators to refine future pedagogical strategies, prepare new ones or simply reflect upon other effective ways of delivering via the web. The three web course objectives identified in this study together with the discussion of their effectiveness, can also be considered as valuable pedagogical targets for those interested in planning, studying, organising or designing new courses to be delivered via the web. Furthermore, this thesis explored in detail the effectiveness of many web tools ranging from discussion forums to the electronic calendar. The analysis of the effectiveness of these tools can be considered of great importance for educators and researchers. Finally, this thesis discussed important user interface factors, such as ease of use, simplicity, and consistency. The findings associated with the discussion of these factors can be quite useful in particular for those interested in the effective design and implementation of user interfaces for web-based courses.

8.4 Implications for Research

Despite its weaknesses, the content of this thesis can be considered a useful source of information for researchers, scholars and the scientific community at large. An important contribution to researchers is the in-depth analysis, comprehensiveness, richness of argument and range of explanations described. Before innovating there is a need to better understand an existing phenomenon and this thesis is a step in this direction. A second important reason for the appeal of this thesis to researchers is its focus on the effectiveness rather than a mere assessment of facts. Researchers and course designers are always eager to learn from others' experiences and be assured of the effectiveness of certain strategies and tools before including them as part of their courses. Finally, and due to the lack of other research published on the

topic of this thesis, it is a useful addition to the limited body of existing knowledge in the area.

8.5 Recommendations for Future Research

This thesis opened the door a little further towards an understanding of the effectiveness of delivering courses via the web. However, more research is needed on how to use the web for effective teaching and learning. Despite the encouraging results, one has to acknowledge the many weaknesses and limitations of the work produced. For those eager to carry on from where this thesis has stopped, a series of recommendations for future research are outlined here.

In the course of the research there was always a perception that the outcomes might have been different if a different sample had been used. It would be interesting to know how cultural factors, habits and the sample size could affect the outcome of the results. There was also the perception that Massey University extramural students were "addicted" to certain habits and study routines that could somehow affect their attitudes towards a new mode of learning. The ideal situation for such an experiment to occur would be when an institution offers exactly the same course for two consecutive years and then compares the results. There is plenty of scope for interesting research in this field.

This thesis focused on a single case study, therefore, there was no opportunity to find out how different pedagogical strategies, course objectives and teaching concepts would affect the effectiveness of the learning and teaching processes. A very interesting topic for future research would be to study the offering of the same course via the web on various occasions, yet using completely different pedagogical strategies, teaching philosophies and course objectives on each occasion. This could also study the effect of replacing the teacher in a certain web course.

The web-based course in this thesis was characterised by offering a certain number of web tools, in conjunction with two guests in the discussion forum and the article review posting activity. It would be very interesting to know how other web tools, other structured activities and other premium additions would have affected, not only the student contributions, but also the effectiveness of the learning process. Possible ways to find out the effects of other web tools and activities is through comparative studies. Findings in this area could have a strong impact on designing better and more effective web courses.

Many of the students' criticisms regarding the user interface were attributed to the limited capabilities of the WebCT software. It would be interesting to study the impact of using another authoring software package on the overall student participation in the course. Another important aspect concerns the effect of metaphors. Gibson (1997), for example, offered a web course with a graphical metaphor that simulated a university campus. The students considered this highly successful and popular.

The important issues of effectiveness and quality mentioned in the weakness section need more research. The creation of a better measurement scale for the term effectiveness is important. However, in attempting to do so, methodologies and approaches would probably have to be used. The issue of quality, also investigated in this thesis, was considered to be overlooked. More research should be done on evaluating quality and what participants perceive as factors contributing to quality. Research in this field would contribute to establish a better and higher standard of evaluation for future research.

Another important recommendation for the future is the creation of some kind of international standard of quality. This should be seen as the yardstick against which all courses offered via the web should be measured. The recommendation here is that an international independent body should be created to look after the quality of courses offered via the web. This body should create a standard and should also perform regular audits to ensure that standards are maintained. All participants should be informed of the standards

before enrolling or participating. Against this idea, it can be argued that the web and education topics are too dynamic to be forced to any agreed strict standard. However, the existence of a standard, even if not ideal can far outstrip the disadvantages of having no standard at all and letting courses proliferate wildly due to market forces with doubtful concerns for quality education and the consumers.

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APPENDIX A

Use of Media in Distance Education

Use of Media in Distance Education

1.1 Print-based Technology

Printed material was the first medium used for delivering distance education. Since its first introduction, print has always been the dominant medium in distance education and will continue to be the most used form of delivery in the foreseeable future (Verduin & Clark, 1991; Keegan, 1983; Kaye, 1988). However, today it is becoming increasingly rare for an institution to rely solely upon print-based material. According to a survey on distance education organisations (Holmberg, 1986), 95% of the respondents referred to their use of printed course materials along with other media. The reason for supplementing the printed material lies not only in the availability of other media but also the necessity to overcome the problem of lack of interaction between teacher and student.

Printed material is relatively cheap to deliver. It is portable and easy to skim and search. However, printed material act as a one-way communication medium, designed to transmit subject content. It offers little opportunity for the student to interact with a tutor or third party because it is a delayed form of communication. Rekkedal (1983) notes that even if the postal services are fast, the handling of assignments, corrections, marking and feedback is bound to take some time. Since feedback is slow, there is often a feeling of isolation that reduces the ability to arouse motivation on the part of the student. The availability of other media can help to bridge the gap between teachers and students as well as stimulate students to keep working (Ostman et al., 1988).

1.2 Audio-visual Technologies

Bates (1984) suggested that the introduction of audio-visual media into distance education was advantageous. The result was a widening of the scope for alternative approaches in terms of delivery. The variety of the media available was an important factor in increasing student motivation and deepening understanding. Bates went on to say that the use of audio-visual media could help increase the quality of learning and reduce drop out. A number of audio-visual media usually used to deliver distance education are reviewed below.

1.2.1 Broadcast Radio and Television

The use of radio and television broadcasting for delivering distance education did not take until recently compared with the use of the old printed material. Broadcast communication technologies, first utilising the radio and then television, improved the speed and effectiveness with which instruction could be delivered. Bates (1988) defended the idea that broadcasting would continue to be one of the few methods of distribution guaranteed to be available to students. He further added that broadcasting would remain the cheapest way to deliver audio-visual material to a very large number of students.

Radio is a popular medium used for adult education in many countries and is still a fast growing phenomenon (Verduin & Clark, 1991) in some developing countries. Radio is an important adult education medium in countries with low literacy rates. However, one of the limitations of radio broadcasting is its non-interactive nature, although Alaska and Australia use two-way interactive radio for distance education (Wolcott, 1994). A further limitation is that the radio listener must listen at a fixed time to programs that they cannot pace. However, the widespread availability of cassette players and audiocassettes allow students to tape programs for later listening. Dewal (1988) maintains that in-depth study of a topic cannot be expected from radio or even from television broadcasts. Program broadcasting via both media can often be of a general awareness nature. At the British Open University for example, which is one of

the most frequent users of radio (Garrison, 1989), the impact of audiocassettes has been dramatic. Radio transmissions in 1983 dropped to less than thirteen hours a week and over 500,000 cassettes were mailed to students (Bates, 1984). Bates (1982) foresaw audiocassettes integrated with printed materials as a major area for development in distance education. Indeed, many institutions, in addition to offering print materials, mail audio cassettes to supplement their educational programs (Porter, 1997). However, Laurillard (1993) argues that print and audio material in their canonical form, offer little for themselves. They cannot be discursive, in the sense of being able to comment on the student's apprehension of the topic. Laurillard further adds that media, which inherently provide for only one-way communication, will always be lacking the capability to support the validation of knowledge.

Broadcast television by the 1960s was being touted as the technological solution for most educational problems. Bates (1988) even suggested that television had a valuable and unique role to play in distance education. However, instructional television has fallen far short of its earlier expectations (Ahern & Repman, 1994). Television production, according to Daniel and Stroud (1981), is expensive and few projects have been successfully adapted to TV programmes, which are both appropriate to the course and consistently professional in quality. In the United States, for example, most use of television broadcasting for distance education was based on the concept of using it as the main medium of instruction. The result was that most instruction took the form of a lecturer sitting in a studio delivering a talk to a static camera. Such inadequate use of television soon led the academic world in the United States and elsewhere to regard television education as a total failure (Walton, 1992).

The biggest weakness of current broadcast television as a medium for distance education, although it combines audio and visual media, has to do with its one-way form of communication. It tends to be a very passive and non reflective medium (Laurillard, 1993), partly because it is not controlled by the student. It cannot be reviewed, is uninterrupted and is presented at the same pace to the students. However, the future digital television broadcasting is supposed to change this. Such future interactive television will try to provide teacher and

student interaction in tele-learning situations. However, the extent to which viewers can respond will be limited (Tiffin & Rajasingham, 1995).

The pattern regarding audiocassettes and radio repeats itself with videocassettes and television. Videocassette and cassette players have added a new dimension to the development, distribution and use of educational television programming. However, the only advantage of videocassettes over television relies on the self-pacing providing a greater learner control. Students can stop, repeat and reflect on what they have seen before moving on to the next part of the programme. This medium, however, does not provide intrinsic feedback on what the student is doing. This is a clear disadvantage. In most courses, according to Bates (1983), videocassettes are used simply to back up transmissions rather than as the main means of distribution.

1.2.2 Two-way Communication Technologies

Two-way communication has been subject to a number of research studies (Holmberg, 1989; Keegan, 1986, 1990; Rekkedal, 1983). Holmberg (1993) notes that there can be no doubt that it serves important educational and generally supportive objectives. This mode of communication is or should be based on a kind of empathy. It is important that the tutor realises what the student's situation looks like and what his or her difficulties are. An outline of the most important modes of two-way communication follows.

1.2.2.1 Telephone Tutoring

Telephone tutoring, a direct link to the generation of distance education based on two-way communication, can complete the communication gap in a regular and immediate manner. Oral telephone tutoring interaction as part of distance education has been practised for decades and has been found useful (Holmberg, 1996). Scales (1984) notes that telephone tutoring can make students feel less isolated and assist them in overcoming some of the difficulties associated with

learning in isolation. Robinson (1984) highlights that this interactive form of contact can help reduce the sense of isolation.

1.2.2.2 Audio Conferencing

The telephone is an important technology that students and teachers use for interaction. The use of telephone by groups involving scattered individuals or people gathered at a particular location has also greatly expanded the interactive possibilities of telephone learning (Verduin & Clark, 1991). Audio conferencing, which is the oldest and the least expensive (OECD, 1996) real time conversation technology, connects individuals by voice with the telephone. All the participants can hear each other and talk with each other even though they may be far apart. This communication technology has been used increasingly (Murphy, 1988) for education and for training individuals at a distance. The University of Wisconsin-Extension (US), for example, has the world's largest and most sophisticated (Murphy, 1988) telephone-based delivery system. The British Open University also makes some use of telephone conferencing for students in isolated areas of Scotland and Wales (Kaye, 1994).

Although audio conferencing brings people together to discuss and interact Laurillard (1993) maintains that this medium is essentially a solution to a logistical problem, rather than a pedagogical problem. She argues that normally it is used to overcome the problem of communication with students who are geographically widespread. In contrast, Thompson (1996) believes that audio teleconferencing has a unique role in allowing students at virtually any location to join with teachers and peers in spoken discussion and that interaction has the potential to contribute to the growth of understanding. However, the extent to which that potential is realised depends not only on the individuals who participate and their willingness to engage in intellectual discussion, but also on the medium itself, and on how that medium is used. An effective audio conferencing is dependent upon informed intellectual discussion where students and teachers are well prepared, as well as integration with a range of visual resources and audio equipment (Robertson, 1986). It should be noted that the success of any

teleconferencing experience hinges upon the quality of the audio component. Without good quality audio, audio conferencing loses its main strengths, which is the opportunity for the immediate exchange of information among the participants.

1.2.2.3 Audiographic Conferencing

The communication of audio conferencing can be enhanced by an audiographic system. Audiographic conferencing combines technologies for voice communication with those allowing image or data transmission. While voice remains the primary communication in this medium, audiographic technologies also have the capability to transmit pictorial or electronic data using regular telephone lines to simultaneously supplement and enhance the audio message. Examples of various audiographic peripherals are facsimile machine (fax), electronic blackboard, still video technology, and the personal computer (Wolcott, 1994).

Audiographic conferencing, according to Laurillard (1993), is more effective at allowing teachers and especially students to express their point of view through both language and diagrams. The addition of graphic elements overcomes the obvious limitations of pure audio conferencing. Kaye (1994) even suggests that the use of graphics assists the teaching process because the screen provides a focus of attention for the students.

The level, quality and flexibility of an audiographic session varies widely from one system to another, depending on the communication bandwidth available and the sophistication of the existing hardware, software and peripherals. Early systems, such as the electronic typewriter and early electronic blackboard, were fairly primitive, with low-resolution black and white images, slow transmission speeds and no graphic feedback from reception sites. Furthermore, at the University of Wisconsin the systems that had been used for some time were abandoned in 1987 because of such limitations (Kaye (1994). Audiographic conferencing has only recently re-emerged since the introduction of high-resolution PC-based systems equipped with high-speed transmission modems and twin telephone lines. At the UK Open University, for example, the

use of a proprietary audiographic system, which required two phone lines, was eventually abandoned for cost reasons and because of the reluctance of many students to use local centres for the tutorial sessions (Robinson, 1990).

1.2.2.4 Videoconferencing

The most sophisticated and expensive (Murphy, 1988) kind of conference is a videoconference. Charbonneau and Cunningham (1994) note that to justify the use of videoconferencing, the added pedagogical benefits must compensate for the higher set up and delivery costs. Videoconference systems may include:

1. **One-way video, two-way audio —** Students at a remote site, or sites, see and hear the teacher on several TV monitors around the room. Using a telephone, students can call the teacher and talk to other colleagues. The students can see the teacher on a television monitor, but the teacher cannot see the students;

2. **Two-way video, two-way audio** — In this mode, and despite being in remote sites, students and teachers can see, listen and talk to each other.

There will probably be a sharp increase in the use of videoconferencing (OECD, 1996) because of the new forms of technology that are emerging such as compressed video, which requires less bandwidth. Compression technology is used, not only to reduce bandwidth for transmission, but also to reduce memory cost for on-demand applications that are storage based (Minoli, 1996).

Although videoconferencing does offer an improvement over the audio conferencing difficulties of identifying who is talking, it also has some shortcomings. Some participants, for example, would be intimidated and nervous with the camera pointing at them. Incidentally, the general anonymity involved in audio conference sessions is often regarded as an encouragement for the interaction and involvement of students in the educational experience. Furthermore,

videoconference participants, as Tiffin and Rajasingham (1995) suggest, are not television talents. They tend to look at the image of the person they are talking to on a monitor, instead of looking at the camera. As a result, they appear to be looking off camera and do not have the eye contact, which gives conviction to what they are saying.

1.2.2.5 Desktop Videoconferencing

Desktop videoconferencing involves communication between individuals through their individual personal computers. Students and teachers can discuss information, ask or respond to questions, share documents and other materials in real time. The minimum requirements for a desktop videoconferencing session are personal computers fitted with a video camera, digital audio cards, adequate software and eventually modems for transmission of information. PC-based conferencing systems can also be created by connecting PCs to local area networks (LANs) which are extended to wide area networks (WANs). PCs can also be connected directly to WAN.

Desktop videoconferencing offers a number of benefits over audio conferencing. Participants do not have to meet at a pre arranged conferencing site to be able to see and hear a course. Another advantage is that students may share documents while they work on their computers or even send email to teachers. They only need access to their computer set-up (e.g. camera, conferencing software) which may be at home or in the office. However, although it allows participants to work together in real time, it does not create the same classroom feeling as audio conferencing does. Students and teachers still work alone at a personal computer in what could be seen as a disadvantageous situation.

Porter (1997) stresses that advances in current software and hardware have made desktop videoconferencing possible and increasingly more affordable and user-friendly. Moreover, the progress in the bandwidth transmission limitations and leading edge streaming technologies have strongly contributed to make videoconferencing a more convincing and enjoyable

experience. The quality of desktop videoconferencing depends on progress in these two important issues. Low-end technology may not give participants the quality they would expect.

1.3 Computer-based Technologies

If the 1970s saw television broadcasting being tried out as a component of many distance education systems, in the 1980s and 1990s it was the turn for the new computer-based technologies to make their contribution (Bates, 1988). Computers are rapidly becoming the preferred long distance education communication tool (Markwood, 1994). However, there seems to be some controversy over terminology to describe computer applications for distance education in the literature. The terms CAI (Computer Assisted Instruction), CAL (Computer Assisted Learning), CBL (Computer Based Learning) and CBI (Computer Based Instruction) are all used indistinctly to describe computer applications in distance education. Verduin and Clark (1991), for example, classify computer applications as CAI, CMI (Computer Managed Instruction) and Computer Conferencing, while Thompson et al. (1996) refer to CBL as the most general term to describe computer applications in education.

This thesis will review the use of computers in distance education under the terms CAI (as referred by Chacón ,1992; Luehrmann,1980; Verduin & Clark, 1991), CMI (as referred by Heinich et al. 1985, 1996) and Computer Mediate Communication (CMC), which is a broader term that includes computer conferencing, electronic mail and electronic database (Burge, 1994; Taylor, 1996; Levinson, 1990). CMC is often used when describing computer and communication systems (Rekkedal, 1992) designed for facilitating interpersonal communication.

1.3.1 Computer Assisted Instruction

Many people associate the use of computers in education with the acronym CAI or Computer Assisted Instruction (Knapper, 1980). CAI can be interpreted as the concept of a computer delivering information to a student. Students interact with lessons programmed into computer software. Earlier programs for CAI had no images or sound because the mainframe computers in which they were developed during the decade of 1960s, were able to carry only text information. When the new sound, video, graphics and multimedia capabilities of microcomputers, personal computers and mainframes were available (Chacón, 1992), the whole industry of CAI reoriented towards them. However, despite the fact that software is improving rapidly, quality has been a problem. Maddux et al. (1997) suggest that, although many software developers realise today the importance of consulting experts in both education and computer science, some software is still developed without consideration of both technical and educational factors.

CAI is usually classified by the different types of programs being used. Heinich et al. (1985, 1996) list six modes of CAI: Drill and practice, tutorial, gaming, simulation, discovery and problem solving. Jones et al. (1993) add two more applications: Hypermedia and microworlds. These applications are discussed below.

"Drill and practice" is the most common and best known form of instructional program. Drill and practice programs provide a variety of questions with varied formats. The student is usually given several tries before the computer presents the correct answer. Such programs are passive in the sense that they do not attempt to teach. It is assumed that the teaching has already been carried out. Because of this, Jones et al. (1993) argue that, although drill and practice programs can be useful, they are limited in their scope and applicability. Furthermore, Lockard et al. (1990) suggest that many drill and practice programs are the work of individuals who can be good computer programmers but know little about sound learning principles. Therefore, numerous drill and practice programs are of minimal educational value.

Unlike drill and practice programs, which do not teach, "tutorial software programs" go a step further by attempting to teach new concepts, ideas and skills. Students are given opportunities to interact with such concepts. The program advises the student whether questions answered are right or wrong and gives further explanation of the topic. Tutorials provide a one-to-one teaching situation and give students an opportunity to proceed with the learning task at their own pace. However, although it is based on the promise of individual tuition, it has become clear that it does not address particular students' needs. As Jones et al., (1993) comment, the problem is that it is very hard, although not impossible, to program in ways that really identify particular student problems. To do this successfully, the authors suggest that a program would have to encapsulate some of the techniques used by teachers such as looking at a number of answers and trying to identify a pattern.

"Simulation programs", although not true teaching programs, allow realistic practice without the expense or risks otherwise involved. A simulation is designed so that actions a student takes within the simulated environment produce results similar to those that would occur in the real environment. The student acts, and the simulator reacts. Simulations can be used to learn about properties of physical or biological objects, for example. Laurillard (1993) considers simulation programs interactive since they give intrinsic feedback on students' actions. Furthermore, good program simulators, according to Lockard et al. (1990), are highly motivating to most students because they typically present questions and issues that are truly thought provoking and not easily answered. Maddux et al. (1997) suggest that simulations represent one of the most exciting potentials in education.

"Computer microworlds," according to Laurillard (1993), are often referred to as simulations. However, the key difference between the simulation and microworld is the way students interact with it. The microworld provides a mediating mechanism for acting in its world, namely a programming language. This provides a level of description of what is happening in that world. Microworlds made their biggest impact in education in the form of the programming language LOGO™.

"Hypermedia" refers to another programming approach, which allows users to link pieces of information together in a theoretically unlimited number of ways. Hypermedia combines methods of representation information such as video, graphics, animation and text. Thompson et al. (1996) note that the potential for the use of hypermedia in education and distance education (Jones et al., 1993) is great. Hypermedia systems not only allow huge collections of information and a variety of media to be stored on compact forms, but also offers students an opportunity to explore in their own way and learn with their own style.

"Problem solving software" involves the student's definition of a problem and then manipulating variables or otherwise searching for a solution using the computer for calculation and arrangement of data (Heinich et al., 1985). Garrison (1989) notes the educational value of this mode is the problem solving strategies that students acquire. Thompson et al. (1996) note that most problem solving software is similar to simulation software because students are placed in situations where they can manipulate variables and then receive feedback on the results of these manipulations. However, simulations are attempts to model real-life situations and objects, whereas "problem solving" programmes are a more general type of software that include less specific educational environments.

"Instructional games" present contents in a game format. Instructional games are usually directed at a specific goal and involve some measure of competition. Games rely upon creative imagination on the part of the participants. Heinich et al. (1985) stress that instructional games can be a highly motivating framework, particularly for repetitious drills. According to Grabe and Grabe (1996), certain instructional games, such as "The Oregon Trail," have been popular for many years and seem to embody characteristics teachers would find of value.

"Discovery programs" require students to use inductive approach to learning. Students are presented with problems, which they solve through trial and error or systematic approaches (Heinich et al., 1996). The aim of using discovery programs is to deepen the understanding that results from playing around with a puzzling problem.

1.3.2 Computer Managed Instruction

Computer managed instruction (CMI) is one area that, according to Kaufman (1986), promises to increase the efficiency and effectiveness of distance education. CMI uses the computer's branching, storage, and retrieval capabilities to organise instructions and track student records and progress. Verdiun and Clark (1991) stress that CMI is more important in distance education than in conventional education because in distance education the student may not have access to any of the formal or informal on-campus means by which students are notified of important information.

1.3.3 Computer Mediated Communication

Computer Mediated Communication (CMC) is the term used to designate all modes of communication made possible by use of computer networks. CMC refers to the use of such communications as electronic mail, electronic bulletin boards, computer conferencing and electronic databases (Cuskelly & Gregor, 1994; Burge, 1994). CMC, according to Mason and Kaye (1990), has already shown itself to be a valuable educational tool in small-scale distance education programs. However, Mason and Kaye (1990) warn that although CMC possesses certain advantages over other interactive media it does not necessarily mean that it should be considered as a complete substitute for other forms of delivery. The authors note that the challenge to educators is not replacing traditional forms of delivery by CMC but to integrate the latest into the wide range of resources available. This must be accomplished in such a way that distance education systems become more flexible, open, responsive, effective and decentralised in the light of the new potential that CMC offers them.

CMC has the potential to remove distance barriers (Cuskelly & Gregor, 1994) enabling students from distance locations to participate in group activities and have greater access to teachers and lectures. Garrison (1989) highlights that CMC offers a new alternative to facilitating two-way communication in distance education. It has the potential to overcome distance students' feelings of isolation by providing a means of sharing study problems and

suggestions about how to overcome such problems from both course teachers and fellow students (Jones et al., 1993).

Successful use of CMC depends upon a number of factors including the existence of a friendly user interface, a helpline for students, provision of services that meet real needs at reasonable cost and ensure that staff and students are appropriately trained to use the system (Moran, 1994).

1.3.3.1 Electronic Mail and Computer Conferencing

Electronic mail (commonly named as "email") is a technology that permits computer users to exchange messages with each other over a network of geographically dispersed computers. Electronic messages, in the form of simple text or text plus graphics and animations in a few more advanced applications, can be sent to one or more named recipients (Jones et al., 1993). Porter (1997) notes that email is becoming increasingly popular as a common part of education in general, and distance education in particular. Porter goes on to assert that email adds another dimension to the way educators and students interact. It also encourages learning to take place any time, any place.

Computer conferencing (CC) can be described as a more complex version of email that supports group discussions and many-to-many (Harasim, 1990) type of communication. With this technology, individual users have the capability to join "conferences" on specific topics of interest. Users can be members of more than one of such conferences, each conference containing all the messages sent to it by the various conference members. Kaye (1989) suggests that CC can be a powerful device for group communication and for co-operative learning. Burge (1994) adds that CC can be "an optional extra" to a distance education course reliant on normal paper mail between student and teacher.

While telephone tutoring, audio and video conferencing require that all participants interact at the same time or synchronously, CC allows interactions to be made at different times. Mason

(1988) suggests that this asynchronous communication mode is ideal for distance students and teachers who must conduct their studies around home and work. Student control, as Laurillard (1993) notes, is very high for this medium. Burge (1994) stresses that CC addresses geographical and psychological isolation and can be used to develop interaction among students and between a student and his/her teacher. However, Berge (1995) suggests that the strengths of CC are often not so compelling if CC is relied upon as the sole delivery method of instruction. The author further emphasises that only when CC is combined with other media, such as audio conferencing, can effective instructional system be designed.

The success of CC depends very much on the quality of its moderator. In some ways, the moderator's role is quite similar to that of a committee chair or a seminar leader. The role of moderators in CC involves special technical and educational responsibilities. Henri (1988) suggests that the moderator must develop special skills in order to be able to lead discussions and other activities available to students. Laurillard (1993) also stresses that skill in conducting a successful dialogue via conferencing is as important for the success of the interaction as it is in face-to-face situations.

1.3.3.2 Electronic Databases

The possibility of accessing large volumes of information stored in electronic databases, such as ERIC system, opens up new horizons for distance education (Henri, 1988). Such technologies enable distance education establishments to free themselves from the need to provide students with large volumes of printed documentation and hence from the constraints of the postal service. In the United States, for example, there is already an electronic university network which lists over eighty online databases in its electronic library to be used as a component of external studies courses (Kaye, 1988).

Having access to such databases, which are constantly being added to and updated, students are able to make information choices that correspond to their own personal interests.

Information can be copied or downloaded into the students' or teachers' own computers and stored for later use. More recently a new breed of databases has hit the market (Chacón, 1992). The key feature is that users have an opportunity to contribute to the database either by direct or indirect form. Generally, information is a service that is provided and users cannot add further data or modify the data disseminated (Henri, 1988). These databases serving groups with shared interests and allowing data input by users are termed "Interactive Information Banks."

APPENDIX B

Information Sheet

Information Sheet

Evaluation of the Effectiveness of a Tertiary Course Delivered via the World Wide Web

The Researcher

My name is Ieda Margarete Santos and I am a full time post-graduate student at Massey University. This research project is being undertaken as part of my MEd thesis at Massey. My thesis' supervisors are Dr. Tracy Riley and Dr. Ken Ryba, from the Department of Learning and Teaching.

The Nature and Purpose of the Study

The objective of my research project is to evaluate the effectiveness of a university course delivered via the World Wide Web. There is a perceived need to address the issues of consistency and high quality content delivery. At this stage, it is extremely important to measure the effectiveness of such courses. This research intends to contribute towards that goal.

The specific research questions are as follows:

1. What are the teachers' perceptions of teaching via the web?
2. What are the students' perceptions of learning via the web?
3. What objectives and pedagogical strategies are used in the delivery of the web-based course?
4. What types of technologies are used as a media for the delivery of course content via the web?
5. How is the user interface designed to assist students to effectively use the web in their learning?

Contact Numbers

Mrs. Ieda Margarete Santos (06) 356 6354

Dr. Tracy Riley: (06) Ext. 8625

Dr. Ken Ryba: (04) 356 9099

Participants' Involvement

All students undertaking the course 86. 761 - Learning with Computers, will be invited to participate in the study.

Participants in this study will be required to do the following:

1. Use the Private Forum set up in the Class Discussion in the course web page for feedback on problems or comments about the course;
2. Complete a questionnaire designed to collect a range of information on the web delivered course.

Access to the Research Results

A summary of the research findings will be available to participants should they request it. Participants will be asked to fill in a request slip for a summary report.

Confidentiality

Information provided as part of this project will be kept strictly confidential. No participants in this study will be named without their permission.

APPENDIX C

Student Consent Form

Consent Form

Evaluation of the Effectiveness of a Tertiary Course Delivered via the World Wide Web

I have read the Information Sheet and have had the details explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand I have the right to withdraw from the study at any time and decline to answer any particular questions.

I agree to provide information to the researcher on the understanding that my name will not be used without my permission. (The information will be only used for this research and publications arising from this project).

☐ I agree to participate in this study under the conditions set out in the Information Sheet.

☐ I do not agree to participate in this study.

Signed_____

Name_____

Date_____

APPENDIX D

Student Profile Form

Student Profile Form

This form is an important part of my research project. Please, spare some time filling in all the information requested. If any doubt arises, please do not hesitate to contact me.

1. Name_____

2. Mailing Address_____

3. E-mail Address_____

4. Age Group

☐ Under 20 ☐ 20-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-45

☐ 46-50 ☐ 51-55 ☐ Over 55

5. Do you have access to the Internet?

☐ Yes, at home ☐ Yes, at work ☐ Yes, both at home and at work ☐ No

6. If yes, what kind of Internet access service do you subscribe? (You may tick more than one box).

☐ WWW ☐ E-mail ☐ FTP ☐ Telnet ☐ Others

7. What is your experience with each of the following technologies?

Electronic Mail	☐ Novice	☐ Beginners	☐ Competent	☐ Expert
Chat Mode	☐ Novice	☐ Beginners	☐ Competent	☐ Expert
Forum (Group Discussion)	☐ Novice	☐ Beginners	☐ Competent	☐ Expert
Web Surfing	☐ Novice	☐ Beginners	☐ Competent	☐ Expert
Internet Searching	☐ Novice	☐ Beginners	☐ Competent	☐ Expert

APPENDIX E

Pilot Test Form

Pilot Test Feedback Sheet

Thank you very much for participating in this pilot test. Please, spare sometime using all the tools included in the 86.761 web delivered course and provide me with some feedback on this form.

1. Please, write down any general comments or anything you consider relevant about the design and performance of the 86.761 web delivered course. Feel free to use the back of this page if you run out of space.

2. Write your comments about the design, performance and usefulness of each of the following specific tools:

Admin. Book

Study Guide

Calendar

Chat

Class Discussion

Private E-mail

Student Homepage

Self-test

Links

3. Do you have any suggestions for improvement?

Thank you very much for your kind co-operation.

APPENDIX F

Interview Consent Form

Interview Consent Form

Evaluation of the Effectiveness of a Tertiary Course Delivered via the World Wide Web

I have read the Information sheet and have had details of the study explained to me. I therefore agree to participate in the interview and have the interview recorded.

I understand I have the right to withdraw from the study at any time and decline to answer any particular questions.

I agree to provide information to the research on the understanding that my name will not be used without my permission.

I also understand that I have the right to ask for the audio-tape to be turned off at any time during the interview.

I can ask further questions about the study at any time during my participation.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signed_____

Name_____

Date_____

APPENDIX G

Interview Questions Before Implementation

Interview before Implementation

1. What is your opinion about the benefits of teaching via the web?

2. Why are you presenting the course on line as well as proving printed study guide?

3. Students are provided the printed study guide. How differently is the content delivered on line?

   a) Which mode of delivery will best assist students learning?

4. Three features, which are used to deliver the course on line, are e-mail, Forum and Chat mode.

   a) What are the strengths and difficulties of each feature?

   b) What strategies have you planned to assist the administration of these features?

5. Why do you want the students to build their own homepage?

   a) What are you expecting the students to construct on their homepage?

   b) What features would you see important for students to use and implement on their homepage?

6. What is your reason for adding a quiz option?

   a) How are you going to organise the delivery of the quiz?

7. Do you believe the students will rely upon the printed calendar in the study guide or interact regularly with the online calendar?

8. What is the purpose of adding a link option on the homepage?

9. What are some of the strengths of presenting on line courses using WebCT?

   a) What are the disadvantages?

10. How important is the presentation and the design of the web page to assist students in interaction and learning?

11. What are some of the difficulties you would expect students to face?

a) What strategies as paper co-ordinator are in place to assist student queries in using the course online?

APPENDIX H

Interview Questions Before Implementation (Complement)

Interview (complement)

1. Do you consider the user interface of WebCT intuitive?

2. Do you consider the navigation features adequate?

3. Do you think that there is consistency between the use of applications?

4. Is there any help and tips included in the software to assist students on how to best use the software?

5. Are you happy with the range of features included in WebCT?

6. Why haven't you used in the course other technologies available within WebCT?

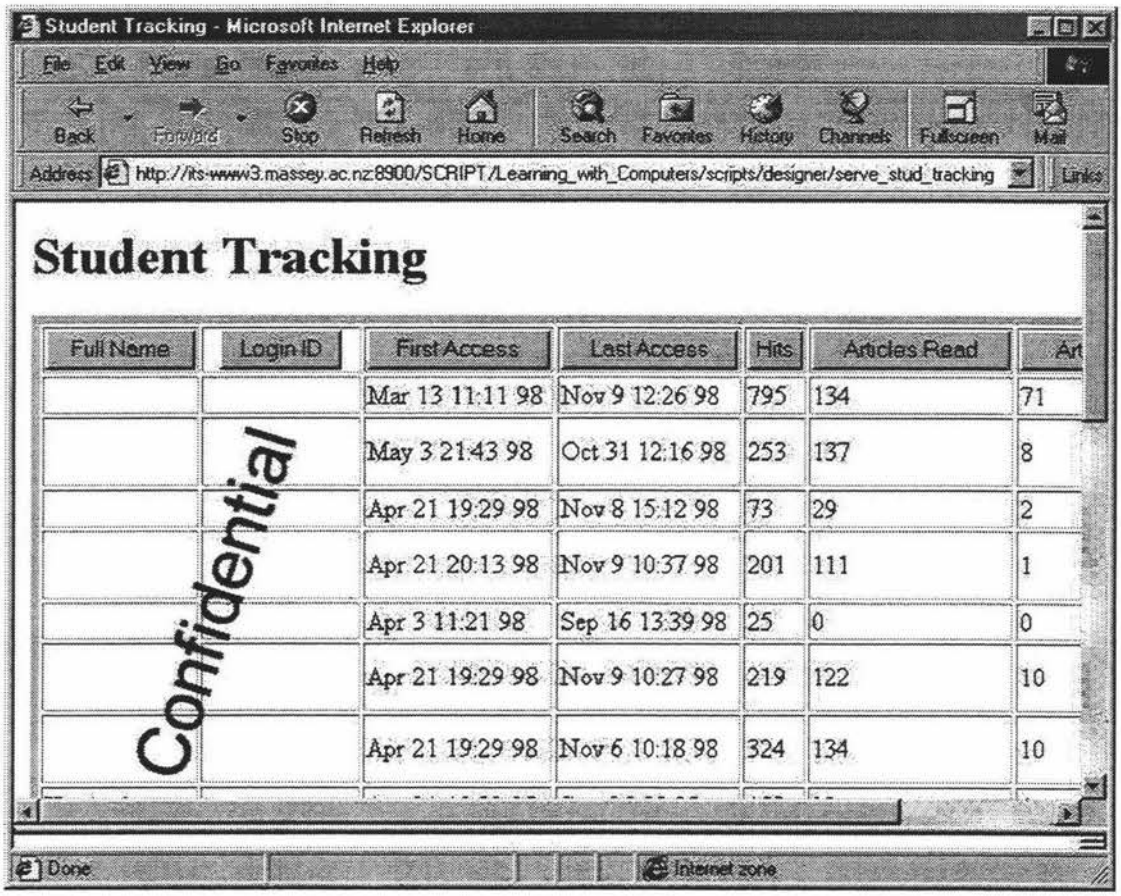
7. During the design phase, why did you drop the student presentation option?

8. Why did you remove the graphics from the content?

9. What information have you included in the calendar?

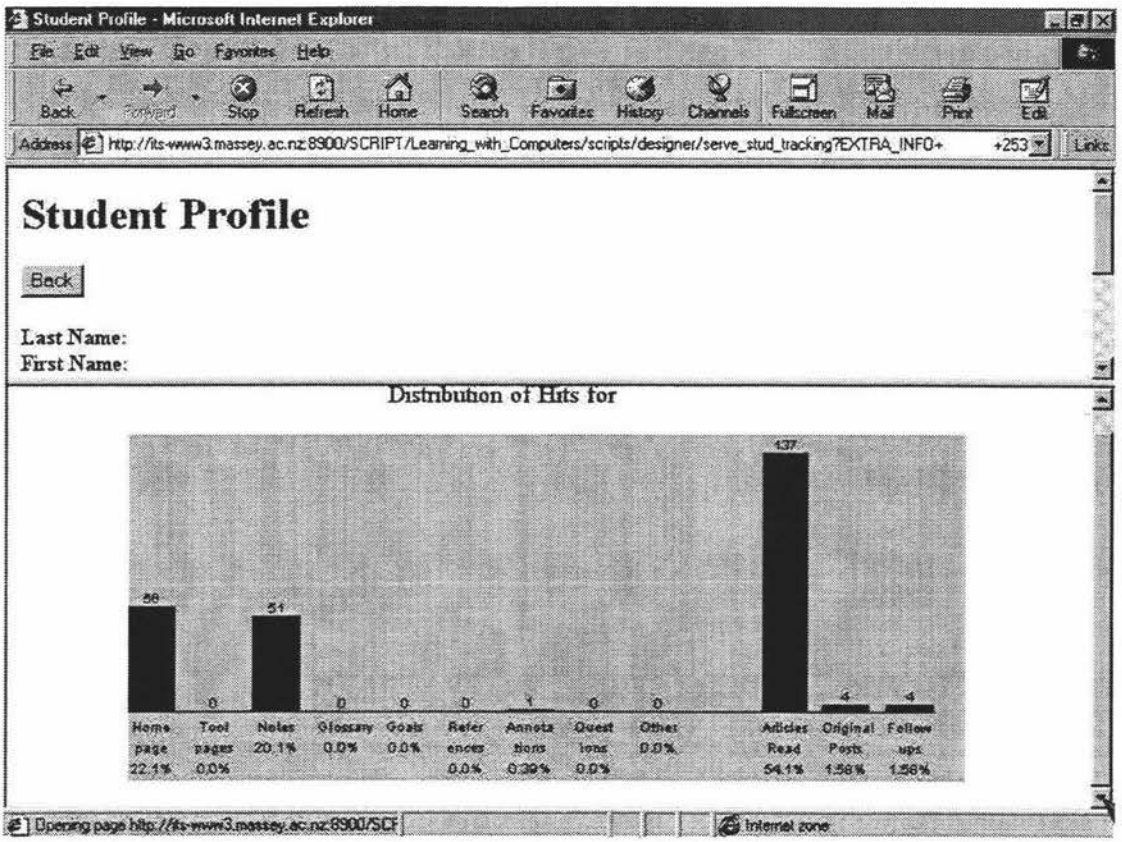
APPENDIX I

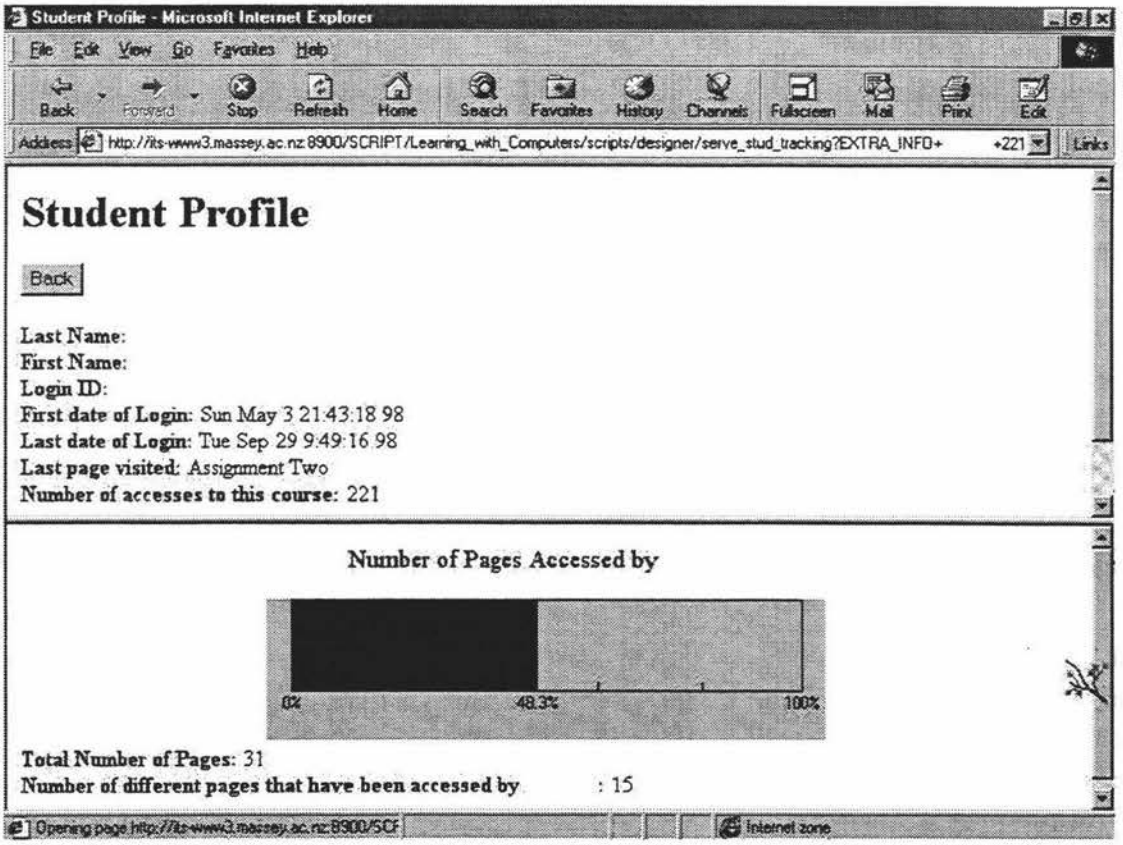
Example of the Student Tracking Tool

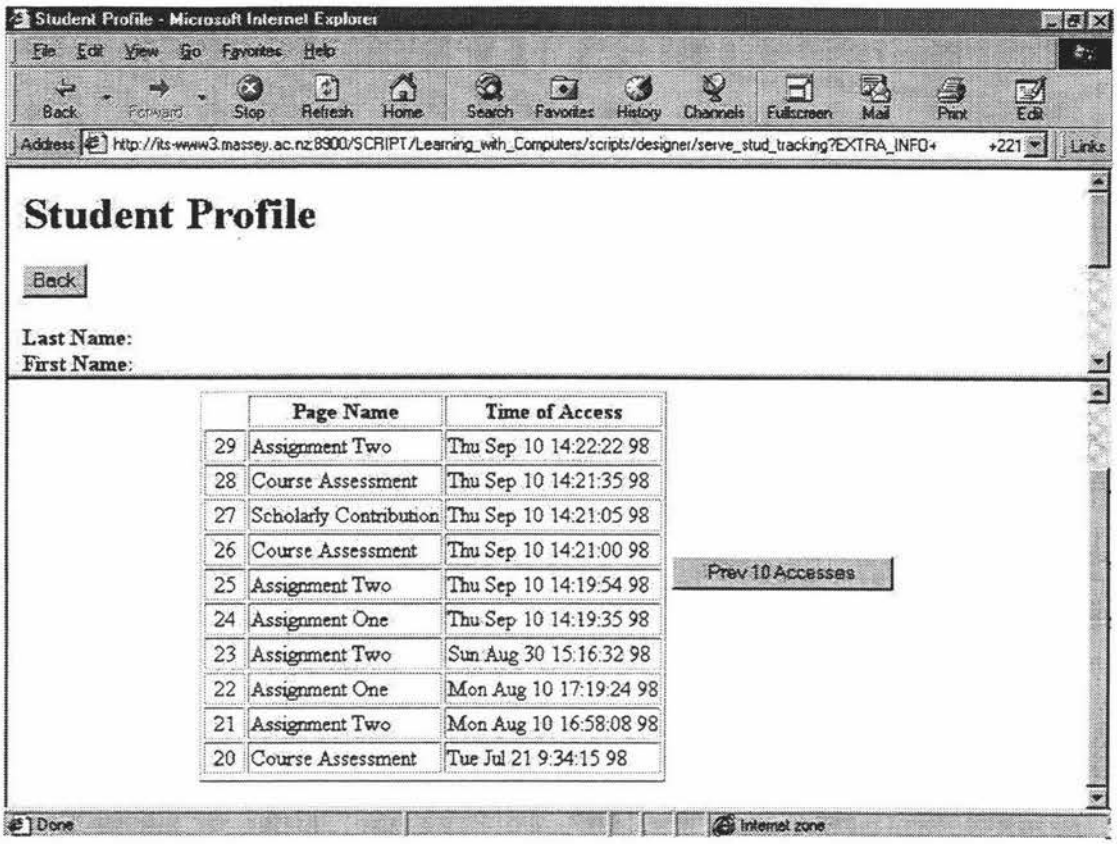

Student Tracking - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail
Address http://its-www3.massey.ac.nz:8900/SCRIPT/Learning_with_Computers/scripts/designer/serve_stud_tracking
Links
Student Tracking
Full Name
Login ID
First Access
Last Access
Hits
Articles Read
Art
Mar 13 11:11 98
Nov 9 12:26 98
795
134
71
May 3 21:43 98
Oct 31 12:16 98
253
137
8
Apr 21 19:29 98
Nov 8 15:12 98
73
29
2
Apr 21 20:13 98
Nov 9 10:37 98
201
111
1
Apr 3 11:21 98
Sep 16 13:39 98
25
0
0
Apr 21 19:29 98
Nov 9 10:27 98
219
122
10
Apr 21 19:29 98
Nov 6 10:18 98
324
134
10
Confidential
Done
Internet zone

APPENDIX J

Example of the Student Profile Tracking Tool

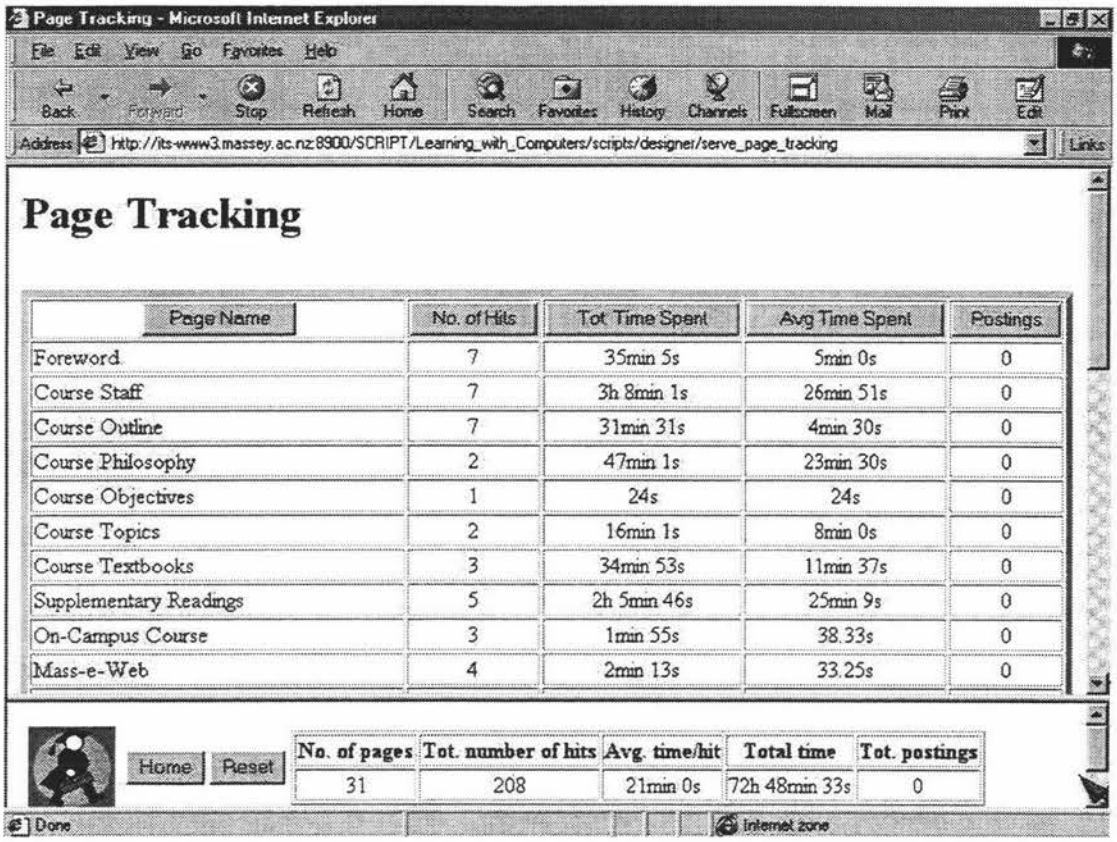

Student Profile - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://its-www3.massey.ac.nz:8900/SCRIPT/Learning_with_Computers/scripts/designer/serve_stud_tracking?EXTRA_INFO+ +253 Links
Student Profile
Back
Last Name:
First Name:
Distribution of Hits for
66
0
51
0
0
0
1
0
0
137
4
4
Home page 22.1%
Tool pages 0.0%
Notes 20.1%
Glossary 0.0%
Goals 0.0%
References 0.0%
Annotations 0.39%
Questions 0.0%
Other 0.0%
Articles Read 54.1%
Original Posts 1.58%
Follow ups 1.58%
Opening page http://its-www3.massey.ac.nz:8900/SCF
Internet zone


Student Profile - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://its-www3.massey.ac.nz:8900/SCRIPT/Learning_with_Computers/scripts/designer/serve_stud_tracking?EXTRA_INFO+ +221 Links
Student Profile
Back
Last Name:
First Name:
Login ID:
First date of Login: Sun May 3 21:43:18 98
Last date of Login: Tue Sep 29 9:49:16 98
Last page visited: Assignment Two
Number of accesses to this course: 221
Number of Pages Accessed by
0%
48.3%
100%
Total Number of Pages: 31
Number of different pages that have been accessed by : 15
Opening page http://its-www3.massey.ac.nz:8900/SCF
Internet zone


Student Profile - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://its-www3.massey.ac.nz:8900/SCRIPT/Learning_with_Computers/scripts/designer/serve_stud_tracking?EXTRA_INFO+
Links
Student Profile
Back
Last Name:
First Name:
Page Name
Time of Access
29 Assignment Two Thu Sep 10 14:22:22 98
28 Course Assessment Thu Sep 10 14:21:35 98
27 Scholarly Contribution Thu Sep 10 14:21:05 98
26 Course Assessment Thu Sep 10 14:21:00 98
25 Assignment Two Thu Sep 10 14:19:54 98
24 Assignment One Thu Sep 10 14:19:35 98
23 Assignment Two Sun Aug 30 15:16:32 98
22 Assignment One Mon Aug 10 17:19:24 98
21 Assignment Two Mon Aug 10 16:58:08 98
20 Course Assessment Tue Jul 21 9:34:15 98
Prev 10 Accesses
Done
Internet zone

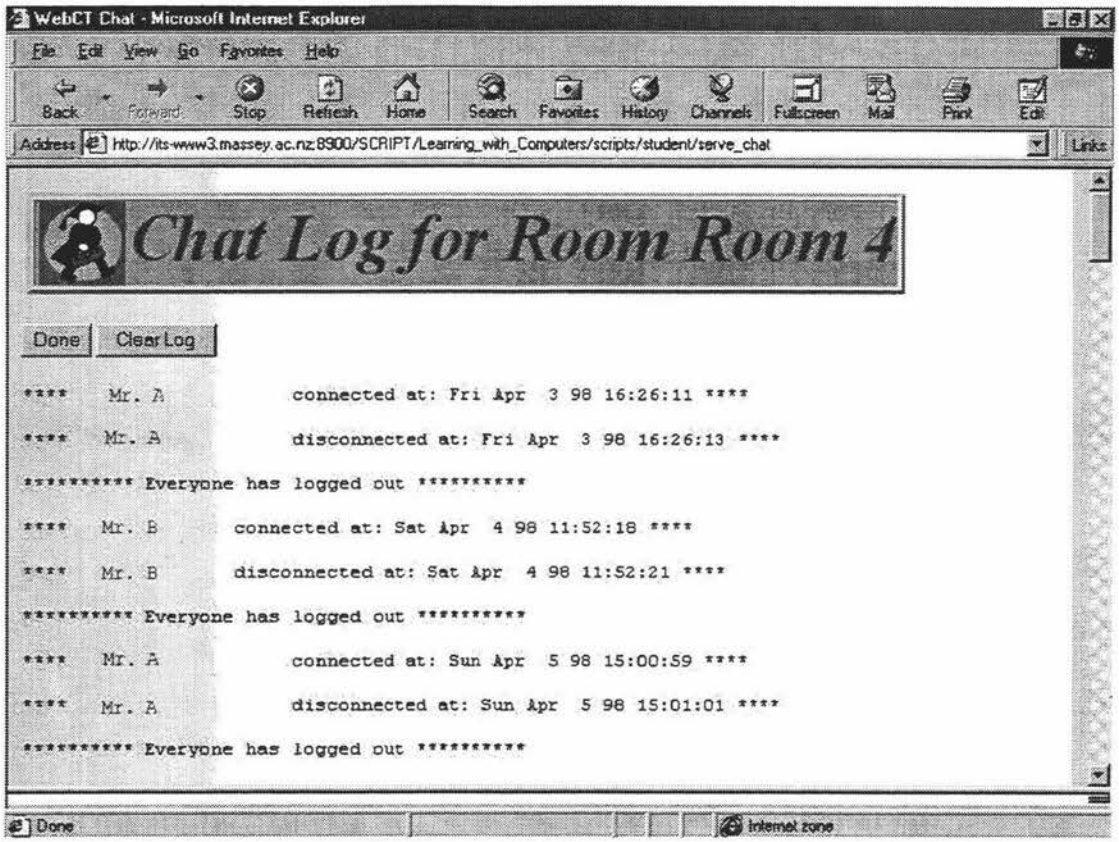
APPENDIX K

Example of the Page Tracking Tool


Page Tracking - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://its-www3.massey.ac.nz:8900/SCRIPT/Learning_with_Computers/scripts/designer/serve_page_tracking
Links
Page Tracking
Page Name
No. of Hits
Tot Time Spent
Avg Time Spent
Postings
Foreword 7 35min 5s 5min 0s 0
Course Staff 7 3h 8min 1s 26min 51s 0
Course Outline 7 31min 31s 4min 30s 0
Course Philosophy 2 47min 1s 23min 30s 0
Course Objectives 1 24s 24s 0
Course Topics 2 16min 1s 8min 0s 0
Course Textbooks 3 34min 53s 11min 37s 0
Supplementary Readings 5 2h 5min 46s 25min 9s 0
On-Campus Course 3 1min 55s 38.33s 0
Mass-e-Web 4 2min 13s 33.25s 0
Home
Reset
No. of pages
Tot. number of hits
Avg. time/hit
Total time
Tot. postings
31 208 21min 0s 72h 48min 33s 0
Done
Internet zone

APPENDIX L

Example of Chat


WebCT Chat - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://its-www3.massey.ac.nz:8900/SCRIPT/Learning_with_Computers/scripts/student/serve_chat
Links
Chat Log for Room Room 4
Done
Clear Log
**** Mr. A connected at: Fri Apr 3 98 16:26:11 ****
**** Mr. A disconnected at: Fri Apr 3 98 16:26:13 ****
********** Everyone has logged out **********
**** Mr. B connected at: Sat Apr 4 98 11:52:18 ****
**** Mr. B disconnected at: Sat Apr 4 98 11:52:21 ****
********** Everyone has logged out **********
**** Mr. A connected at: Sun Apr 5 98 15:00:59 ****
**** Mr. A disconnected at: Sun Apr 5 98 15:01:01 ****
********** Everyone has logged out **********
Done
Internet zone

APPENDIX M

Letter to the Paper Co-ordinator

Ieda Margarete Santos

12 Montgomery Terrace

Palmerston North

11 November, 1998

<Name>

<Address>

<City>

Dear <Name>

Ref. Data Collection

I am writing to express my appreciation for allowing me to access the 86.761 online material. I believe that I have collected valuable information, which would otherwise not have been possible without unrestricted access to the web course. I am also most grateful for the willingness you demonstrated in collaborating in this study.

I have completed the data collection for the second phase of my thesis. I therefore will be collecting no more information from WebCT.

I am looking forward to interviewing you this Friday in order to gather further information.

Yours sincerely,

Ieda M. Santos

(Post Graduate student at Massey University College of Education)

APPENDIX N

Journal

Journal

Date_____

1. Students' access to the course homepage

2. Number of accesses to the Internet Link tool

3. Number of homepages completed by the students, content and links

4. Activities in the discussion forums

5. Activities in the chat

6. Personal impressions

APPENDIX O

Student Questionnaire

CONFIDENTIAL

Evaluation of the effectiveness of a web-based delivering mode:

86.761

with Learning **Computers**

1998

Student Questionnaire

Massey University
COLLEGE OF EDUCATION

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Please return by 23 November 1998

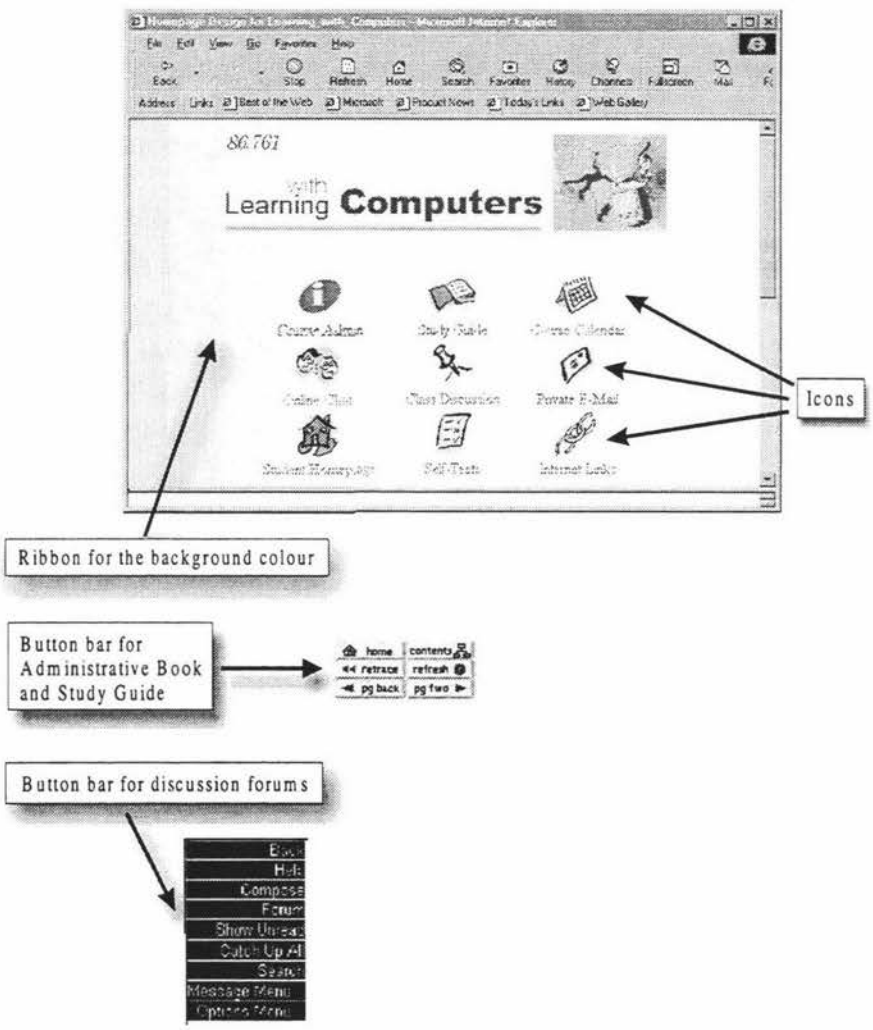
How to Complete the Questionnaire

Even if you have not accessed the 86.761- Learning with Computer web course, you will be able to evaluate the course by answering the first question in the questionnaire and other questions, based on your experience during the on-campus course.

The questionnaire is a mixture of open-ended and closed questions. When required, please indicate your opinion either by circling numbers on a five-point Likert scale, ticking boxes or adding your own comments in writing. Please, feel free to use the back of the last page to add extra comments if you think that the space provided is not adequate to express all your views.

To clarify some of the technical terms used in this questionnaire, a couple of drawings and labels are included below.

Screen layout



1. Participation

1.1. After attending the on-campus course *86 761 - Leaning with Computers*, have you since participated or used the respective web-based delivery option? Yes ☐ No ☐ (*Tick one*)

If no, mention your reasons:

1.2. On average, how frequently have you accessed this web-based delivery option? (*Tick one*)

☐ Daily ☐ Monthly

☐ Weekly ☐ Every two months

☐ Twice a month ☐ Other (specify) _____

2. General Impressions

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2.1. I already had the necessary computer skills to participate in this web-based delivery option.	1	2	3	4	5
2.2. This web-based delivery option was a valuable learning experience.	1	2	3	4	5
2.3. This web-based delivery option contributed to furthering my knowledge of the topic.	1	2	3	4	5

2.4. What is your general impression of this web-based delivery option?

3. Course objectives

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.1. This web-based delivery option greatly contributed to the formation of a *learning community*, encouraging students to support and share ideas with each other.	1	2	3	4	5
3.2. The features and activities provided through this web-based delivery option added value to the course.	1	2	3	4	5
3.3. The quality of the course was enhanced through using this web-based delivery option.	1	2	3	4	5

4. Pedagogical Strategies

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.1. Communication among students was fostered through the use of email, forums and chat modes available through this web-based delivery option.	1	2	3	4	5
4.2. This web-based delivery option created a small community of scholars where the paper co-ordinator acted as a "master" and students as "apprentices".	1	2	3	4	5
4.3. This web-based delivery option was simple and easy to use.	1	2	3	4	5
4.4. This web-based delivery option should be seen as a replacement of the paper-based mode.	1	2	3	4	5
4.5. This web-based delivery option can be valuable as a supplement to the paper-based mode.	1	2	3	4	5
4.6. The structured activities (e.g. article reviews, guests) stimulated participation in this web-based delivery option.	1	2	3	4	5
4.7. Structured activities should have been compulsory to ensure greater participation in this web-based delivery option.	1	2	3	4	5
4.8. More structured activities would have helped to increase my participation in this web-based delivery option.	1	2	3	4	5

If you "strongly agree" or "agree" with the previous statement add your comments.

4.9. Which web activities (e.g. article review, guests, quizzes, forums, student homepage, chat, email, etc.) contributed to add value to the course?

5. Web Technologies

5.1. Discussion Forums

5.1.1. How do you classify your participation in the discussion forums? (*Tick one*)

☐ Passive (mostly read messages)

☐ Balanced (mostly read and posted messages)

☐ Active (Read, posted and commented on others' messages)

☐ Other (specify)_____

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.1.2. Participating in the discussion forums was time consuming.	1	2	3	4	5
5.1.3. I was reluctant to express my thoughts in the discussion forums.	1	2	3	4	5
5.1.4. The discussion forums added value to the course.	1	2	3	4	5
5.1.5. The discussion forums provided me with opportunities to interact with other students (e.g. discuss issues, exchange ideas, etc).	1	2	3	4	5
5.1.6. I valued the guests' participation in the discussion forums.	1	2	3	4	5
5.1.7. I interacted more with other students in the discussion forums as a result of the guests' participation.	1	2	3	4	5
5.1.8. I found the article reviews posted by other students useful.	1	2	3	4	5
5.1.9. The paper co-ordinator encouraged students' participation in the discussion forums (e.g. questioning, posting material)	1	2	3	4	5
5.1.10. It was easy to follow conversation in the discussion forums.	1	2	3	4	5
5.1.11. It was easy to post messages in the discussion forums.	1	2	3	4	5

5.1.12. Which were the major strengths and weaknesses of using the discussion forums?

5.1.13. How would you like the paper co-ordinator to have handled the discussion forums? (e.g. more schedule participation, more time available on-line, etc.)

5.2. Electronic Chat

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.2.1. The electronic chat mode added value to the course.	1	2	3	4	5
5.2.2. I used to electronic chat to interact with the paper co-ordinator.	1	2	3	4	5
5.2.3. I used the electronic chat tool to interact with other students.	1	2	3	4	5

If you "strongly disagree" or "disagree" with the previous statement explain your reasons:

5.2.4. Which were the major strengths and weaknesses of using the electronic chat?

5.3. Electronic email within the web-based delivery option

5.3.1. How often have you used the email tool to communicate with other students? (*Tick one*)

☐ Never ☐ 5-6 times

☐ 1-2 times ☐ more than 6 times

☐ 3-4 times

5.3.2. How often have you used the email tool to communicate with the paper co-ordinator? (*Tick one*)

☐ Never ☐ 5-6 times

☐ 1-2 times ☐ more than 6 times

☐ 3-4 times

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.3.3. The electronic mail tool added value to the course.	1	2	3	4	5
5.3.4. It was <u>easy</u> to post messages using the email tool.	1	2	3	4	5

5.3.5. Which were the major strengths and weaknesses of using the email tool?

5.4. Electronic Quizzes

5.4.1. How many electronic quizzes have you completed? (*Tick one*)

☐ One

☐ Two

☐ None

If your answer is "None", mention your reasons for not completing the electronic quizzes:

(Please circle one number for each of the following statements)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
5.4.2. I found the electronic quizzes useful to help check my understanding of the topics.	1	2	3	4	5
5.4.3. The electronic quizzes added value to the course.	1	2	3	4	5

5.4.4. Which were the major strengths and weaknesses of the electronic quizzes?

5.5. Internet Links

5.5.1. How often have you made use of the various Internet links to external sources? (*Tick one*)

☐ Never ☐ 5-6 times

☐ 1-2 times ☐ more than 6 times

☐ 3-4 times

(Please circle one number for the following statement)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
5.5.2. The Internet links added value to the course.	1	2	3	4	5

5.5.3. Which were the major strengths and weaknesses of using the electronic links?

5.6. Electronic Calendar

5.6.1. How often have you made use of the web-based calendar tool? (*Tick one*)

- ☐ Never
- ☐ 1-2 times
- ☐ 3-4 times
- ☐ 5-6 times
- ☐ more than 6 times

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.6.2. The web-based calendar added value to the course.	1	2	3	4	5
5.6.3. I would prefer to have used a paper-based diary, rather than a web-based calendar.	1	2	3	4	5

5.6.4. Which were the major strengths and weaknesses of using the electronic web- based calendar tool?

5.7. Web version of the Administrative Book and Study Guide material

5.7.1. How often have you used the web-based Administrative Book and Study Guide? (*Tick one for each group*)

Administrative Book	**Study Guide**
☐ Never	☐ Never
☐ 1-2 times	☐ 1-2 times
☐ 3-4 times	☐ 3-4 times
☐ 5-6 times	☐ 5-6 times
☐ more than 6 times	☐ more than 6 times

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.7.2. I would prefer to have used a paper version of the study material, rather than a web version.	1	2	3	4	5
5.7.3. If the web version of the Administrative Book and Study Guide were more up-to-date and had more hyperlinks, I would have made more use of these materials.	1	2	3	4	5
5.7.4. The web-based Study Guide and Administrative Book added value to the course.	1	2	3	4	5

5.7.5. Which were the major strengths and weaknesses of using the web-based version of the Administrative Book and Study Guide?

5.8. Student Homepage

5.8.1. Did you create your own homepage within the web-based delivery option? Yes ☐ No ☐ (*Tick one*)

If no, mention your reasons:

(Please circle one number for each of the following statements)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
5.8.2. I placed web links in my homepage.	1	2	3	4	5
5.8.3. The student homepage tool provided me with opportunities to get to know other students (e.g. reading students' biography).	1	2	3	4	5
5.8.4. I found it easy to construct my own web homepage with the tools provided.	1	2	3	4	5
5.8.5. The student homepage tool added value to the course.	1	2	3	4	5

5.8.6. What were the major strengths and weaknesses of the student homepage tool?

6. User Interface

6.1. Ease of use

(Please circle one number for each of the following statements)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
6.1.1. The screen layout (distribution, and visibility of the icons) was easy to use and understand.	1	2	3	4	5
6.1.2. The amount of text per page (in the web-based Study Guide and Administrative Book) displayed on my computer screen made the reading easy.	1	2	3	4	5
6.1.3. The font size used in the web-based study guide and administrative book was adequate for providing easy reading on my computer screen.	1	2	3	4	5
6.1.4. The meaning of the icons in the web-based delivery option was clear and intuitive to me.	1	2	3	4	5

6.1.5. The web-based delivery option was pleasant to use in terms of elegance, presentation and attractiveness.	1	2	3	4	5
6.1.6. I found the button bar in the discussion forums difficult to use (e.g. back, show all, etc.)	1	2	3	4	5

State difficulties:

6.1.7. I found the button bar in the email tool difficult to use. (e.g. back, show all, etc.).	1	2	3	4	5

State difficulties:

6.2. Consistency

(Please circle one number for each of the following statements)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
6.2.1. The background colour ribbon (blue) used on the left-hand side in the web-based delivery option was soothing for the eyes.	1	2	3	4	5
6.2.2. The lack of a consistent standard for the buttons used in the various technological tools of this web-based delivery option was disconcerting at first. It took me a while to become familiar with them. (e.g. terminology, positioning on page, size and fonts of the buttons of the various tools, such as email, forum, chat, etc.)	1	2	3	4	5

6.3. Access and Navigation

(Please circle one number for each of the following statements)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
6.3.1. It was easy to navigate through sections of the course (e.g. I could find my way around and go to the places I wanted).	1	2	3	4	5
6.3.2. On my computer, the loading time for the various parts of the web course (e.g. forum, chat, email, etc.) was slow.	1	2	3	4	5
6.3.3. I found it easy to reach the main page of this web-based delivery option by accessing it through the Massey University Homepage. (e.g. press "Teaching and Learning" then "Learning with Computers", etc.)	1	2	3	4	5

6.4. Customisation

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.4.1. The web-based delivery option provided me with options to configure the workspace to suit my individual learning style. (e.g. customisation of icons, buttons, colours, etc).	1	2	3	4	5
6.4.2. This web-based delivery option provided adequate on-line support to guide the less experienced student (e.g. help within the WebCT software).	1	2	3	4	5

7. Miscellaneous

(Please circle one number for each of the following statements)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7.1. The cost of accessing this web-based delivery option through my Internet Service Provider was a <u>disincentive</u> for further using it.	1	2	3	4	5
7.2. I would like to participate again in another web-based delivery option.	1	2	3	4	5
7.3. The on-campus tutorial regarding the web-based delivery option was adequate to enable me to master the various included tools. (e.g. forum, chat, Internet links)	1	2	3	4	5

If you "strongly disagree" or "disagree" with the previous statement add your comments:

7.4. What do you wish the paper co-ordinator could have done in this web-based delivery option, <u>but did not</u>? (e.g. answer more questions, participate more in the discussion forums, etc.)

7.5. State what kind of problems you encountered while using this web-based delivery option (e.g.. password, computer crash, forums, chat, web browser, etc.).

7.6. What did you <u>like most</u> about this web-based delivery option?

7.7. What did you <u>most dislike</u> about this web-based delivery option?

8. Future Recommendations

8.1. In the future, should this web-based delivery option become compulsory?

8.2. What would you like to recommend for future improvements of this web-based delivery option?

Thank you for completing this questionnaire. Please, return the completed questionnaire by ***23rd November 1998*** to:

[redacted]

APPENDIX P

Questionnaire Cover Letter

<Name>
<Address>
<City>

8 November 1998

Dear <Name>,

Ref: Student Questionnaire

Back in April, we met during the on-campus course, as part of your participation in the Paper 86.761 – "*Learning with computers*". You may well recall that on that event I invited you to participate in a survey to evaluate the effectiveness of offering this particular Paper via the web. This would constitute an important part of my thesis leading me (hopefully) to a MEd. The time has then come to ask for your assistance.

Definition of term

For the purpose of this evaluation, the term "web-based delivery option" is used throughout the questionnaire to refer exclusively to the activities on the web (e.g. discussion forums, email, guests, etc.). No other parts of the course are covered in this questionnaire.

What are the aims of this questionnaire?

This questionnaire aims to collect information on your opinion about the various aspects of the 86.761 web-based delivery option. The information has the potential to help teachers, educators, web course designers and others to better understand how to effectively use the web to enhance distance teaching and learning.

Is it confidential?

Absolutely! I can guarantee that only I shall see the completed questionnaires. Your participation is **anonymous and confidential**. Your individual responses will be later grouped and consolidated with those from your colleagues.

What do I need to do?

My study relies on a very small sample. I would, therefore, very much appreciate your assistance in filling in this questionnaire. As you may well appreciate, the higher the response from students the more confident I shall feel about the overall results. This means the quality of my study depends very much on the accuracy and the completeness of the information you provide.

The questionnaire was designed to collect a whole range of information on your perceptions about the 86.761 web-based delivery option. The questionnaire should take 15 - 20 minutes to complete. Once completed, please place the questionnaire in the stamped envelope provided and post it to me by **23rd November 1998**.

Summary of findings

I really appreciate your time and help. In return, and in case you are interested, I would be pleased to provide you with a summary of the findings. For this purpose, fill in the "Research findings request form" and post it to me in the separate stamped-envelope provided.

If you have any questions concerning the questionnaire or the purpose of my study, please do not hesitate to contact me. I can be contacted either by phone at Palmerston North – [redacted] or by email – P.J.Pinto@massey.ac.nz.

Thank you for your time and interest. Your feedback is invaluable!

Yours sincerely,

Ieda M Santos
(Post-graduate student at Massey University College of Education)

APPENDIX Q

Follow-up Letter to Students

23 November 1998

<Name>

<Address>

<City>

Dear <Name>,

That's me again! Two weeks ago, you should have received in the mail a questionnaire seeking your opinion about the web-based delivery option of the Massey Paper 86. 761 – "Learning with Computers". The questionnaire is an important part of my MEd thesis, which I intend to submit until the end of the year.

If you have already completed and posted it back to me, please accept my sincere thanks and ignore the rest of this letter. If not, please, I am wondering whether you could be so kind to complete and return it to me by the **30th of November 1998.** As I explained to you before, the questionnaire has been sent to a very small sample. It is, therefore, extremely important that your opinion about the delivery of the 86.761 via the web is also included in this research if the results are to be accurate.

If by some chance you did not receive the questionnaire, or if it got misplaced, please do not hesitate to contact me either via my email: P.J.Pinto@masseyac.nz or by phone (6) 356-6354. It will be my pleasure to send you another copy.

Your contribution to the success of my research will be greatly appreciated. The findings of my research will be made available for those who expressed an interest in that.

Yours sincerely,

Ieda M Santos

(Post graduate Student at Massey University College of Education)

APPENDIX R

Letter of Appreciation to the Students

[redacted]

<Name>

<Address>

<City>

15 December 1998

Dear <Name>,

I am writing to thank you for the time and valuable information you provided by completing the questionnaire. I am very grateful for your participation.

I expect that it will take me a while to analyse and write up the results of the study. However, I will send you, as requested, a summary of the results when the study has been completed.

In the meantime I wish you all the best for Christmas and thank you for your co-operation.

Yours sincerely,

Ieda M. Santos

APPENDIX S

Interview Questions After Implementation

Interview after Implementation

Implementation

1. Back in April, how was the introduction of the web-based delivery option to the students?

Teacher's perceptions

2. After the web-based delivery option was completed, do you still maintain your initial perceptions and expectations coming up as a result of offering this course via the web?

Objectives and strategies

3. In your opinion, did the web-based delivery option create a learning community? (If not, explain why?) (if so, how?)

4. Do you think that this web-based delivery option added value to the course? (What were the stronger and the weaker components in terms of added value?)

5. Did this web-based delivery option enhance the quality of the course? (if so, in what ways?)

6. Do you think that all the initial course objectives for the inclusion of a web-based component were adequately fulfilled? (Added value, learning community, enhanced quality).

7. Based on the results of this web-based delivery option, what changes do you intend to make to the web-based course objectives for next year?

8. In your opinion, were all the initial strategies implemented and worked as planned?

9. Based on the experience of this web-based delivery option, what strategy changes do you intend to make for next year?

Web technologies

Forums

10. Which were the main problems/difficulties students had with using this technology?

11. How do you describe the students' participation in the discussion forums?

12. Did you invite the guests, as planned, to participate in the discussion forums?

13. Did the guests' participation adequately contribute to stimulate conversation among students in the discussion forums?

14. How useful was the use of this web technology?

Quiz

15. Which were the main problems/difficulties students had with using this technology?

16. Did you deliver the three quizzes as planned?

17. How useful was the use of this web technology?

Student homepages

18. Which were the main problems/difficulties students had with using this technology?

19. Were you satisfied with the homepages built by the students in the student homepage?

20. Have you placed the students' photos in the "students homepage"?

21. How useful was the use of this web technology?

Email

22. Which were the main problems/difficulties students had with using this technology?

23. Have students used the email tool to communicate with you?

24. How useful was the use of this web technology?

Chat

25. Which were the main problems/difficulties students had with using this technology?

26. Did you use the chat mode to communicate with students?

27. How useful was the use of this web technology?

Internet Links

28. Which were the main problems/difficulties students had with using this technology?

29. Did the number and quality of initially planned links were actually implemented? (If not, explain why?)

30. How useful was the use of this web technology?

Electronic Calendar

31. Which were the main problems/difficulties students had with using this technology?

32. Did the number and quality of initially planned events in the calendar were actually implemented? (If not, explain why?)

33. How useful was the use of this web technology?

Study Guide and Administrative Book

34. Which were the main problems/difficulties students had with using this technology?

35. How useful was the use of this web technology?

Miscellaneous

36. What other kind of difficulties did students encounter while using this web-based delivery option? (i.e. technical problems, computer skills, time, money, etc.)

37. What difficulties did you have in running this web-based delivery option?

38. In your opinion, what were the strengths and weaknesses of this web-based delivery option?

39. Do you think that the amount of time and effort you dedicated to this web course was considered satisfactory?

APPENDIX T

Student Profile Database

Student Profile Database

Name	Age Group	Access to Internet	Access to WWW	Access Email	Access FTP	Access Telnet	Access Others	E-Mail Experience	Chat Experience	Forum Experience	Surfing Experience	Searching Experience	Enrolled Internet Course	Technology used	Job Description
Student A	8	2	1	1	0	0	0	2	1	1	1	1	0	0	1
Student B	4	3	1	1	1	1	1	1	3	4	4	4	1	3	7
Student C	5	3	1	1	0	1	0	3	1	2	3	2	0	0	6
Student D	5	2	1	1	0	0	0	1	1	1	1	1	0	0	7
Student E	2	3	1	1	0	0	0	3	1	1	2	2	1	2	1
Student F	2	1	1	1	0	0	0	3	2	3	3	3	0	0	7
Student G	4	2	1	1	0	0	0	3	2	2	3	3	0	0	4
Student H	7	3	1	1	1	1	0	4	3	3	4	3	0	0	5
Student I	7	1	1	1	1	1	1	4	1	1	3	4	0	0	4
Student J	7	1	1	1	0	1	0	3	2	2	3	3	0	0	3
Student K	4	2	0	0	0	1	0	1	1	1	1	1	0	0	5
Student L	9	1	1	1	0	0	0	2	1	1	2	2	0	0	4
Student M	4	2	1	1	0	0	0	2	2	1	2	2	0	0	5
Student N	7	4	0	0	0	0	0	2	2	2	1	1	0	0	7
Student O	5	2	1	1	0	0	0	4	3	2	3	3	0	0	5
Student P	7	3	1	1	0	0	0	3	1	1	2	2	0	0	1
Student Q	7	2	1	1	0	1	0	3	1	1	3	3	1	3	1
Student R	6	4	0	0	0	0	0	0	0	0	0	0	0	0	1
Student S	7	3	1	1	0	1	0	3	1	1	3	3	0	0	4
Student T	5	1	1	1	0	0	0	4	2	1	4	4	0	0	6

Analysis

Total Students	Average Age Group	Percentage - Access to Internet	Percentage - Access to WWW	Percentage - Access to Email	Percentage - Access to FTP	Percentage - Access to Telnet	Percentage - Access to Others	Percentages of Email Experience	Percentages of Chat Experience	Percentages of Forum Experience	Percentages of Surfing Experience	Percentages of Searching Experience	Percentage of Students Previously Enroled in Internet Courses	Percentage of Students Familiar with Certain Web Technologies	Percentage of Students Allocated by Job Description
20	5.6	25%	85%	85%	15%	40%	10%	20%	0%	5%	15%	15%	15%	0%	25%
		35%						40%	15%	10%	40%	35%		5%	0%
		30%						20%	30%	25%	20%	25%		10%	5%
		10%						15%	50%	55%	20%	20%			20%
								5%	5%	5%	5%	5%			20%
															10%
															20%

APPENDIX U

Sample of Analysis of the WebCT Information

Accumulated Student Tracking Information

Name	Topics	Sub-topics	4/05/98	18/05/98	29/05/98	22/06/98	1/07/98	15/07/98	1/08/98	15/08/98	1/09/98	15/09/98	1/10/98	15/10/98	31/10/98	15/11/98
Student A	Access	First Time Access (Time)	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43
	Access	First Time Access (Date)	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98
	Access	Last Time Access (Time)	22:02	22:02	20:57	20:11	20:11	15:22	09:24	17:19	10:05	14:22	09:49	09:49	12:16	12:16
	Access	Last Time Access (Date)	3/05/98	3/05/98	20/05/98	22/06/98	22/06/98	14/07/98	21/07/98	10/08/98	31/08/98	10/09/98	29/09/98	29/09/98	31/10/98	31/10/98
	Distribution of Hits	Home Page	6	6	16	19	19	29	30	35	40	50	52	52	56	56
	Distribution of Hits	Notes (content)	1	1	11	11	11	19	20	22	23	29	29	29	51	51
	Distribution of Hits	References	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Distribution of Hits	Annotations	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	Distribution of Hits	Articles Read (forums)	7	7	14	57	57	65	65	78	97	125	132	132	137	137
	Distribution of Hits	Articles Posted (forums)	0	0	0	1	1	1	1	2	3	4	4	4	4	4
	Distribution of Hits	Follow ups (forums)	0	0	0	0	0	0	0	0	2	3	3	3	4	4
	Distribution of Hits Total		14	14	41	88	88	115	117	138	166	212	221	221	253	253
	History of Pages Visited	Foreword	0	0	1	1	1	3	3	3	3	3	3	3	4	4
	History of Pages Visited	Course Staff	0	0	1	1	1	1	1	1	1	1	1	1	2	2
	History of Pages Visited	Course Outline	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Course Philosophy	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Course Objectives	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Course Topics	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	History of Pages Visited	Course Textbooks	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Supplementary Readings	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	On-Campus Course	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Mass-e-Web	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Listserv Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Course Assessment	0	0	0	0	0	0	1	1	1	3	3	3	3	3
	History of Pages Visited	Assignment One	0	0	0	0	0	0	0	1	1	2	2	2	3	3
	History of Pages Visited	Assignment Two	0	0	0	0	0	0	0	1	2	4	4	4	5	5
	History of Pages Visited	Scholarly Contribution	0	0	1	1	1	2	2	2	2	3	3	3	4	4
	History of Pages Visited	Assignment Extension	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Evaluation of Assignments	0	0	1	1	1	1	1	1	1	1	1	1	2	2
	History of Pages Visited	Study Suggestions	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	History of Pages Visited	Written Assignments	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Referencing Assignments	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Sexist Language	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	History of Pages Visited	Plagiarism	0	0	1	1	1	1	1	1	1	1	1	1	2	2
	History of Pages Visited	Preface	1	1	3	3	3	4	4	4	4	4	4	4	5	5
	History of Pages Visited	The Hist. Of Comp. In Education	0	0	1	1	1	2	2	2	2	2	2	2	2	2
	History of Pages Visited	Conceptual Frameworks for Ed. Comp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	The Nature of Comp. Learning Env.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	The Teacher's Role in Edu. Comp.	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	History of Pages Visited	Learning Traditions and Ed. Techn.	0	0	0	0	0	1	1	1	1	1	1	1	2	2
	History of Pages Visited	Comp. And Behavioural Learning Theory	0	0	0	0	0	1	1	1	1	1	1	1	2	2
	History of Pages Visited	Comp. And Cognitive Learning Theory	0	0	0	0	0	1	1	1	1	1	1	1	2	2
	History of Pages Visited	Linking Theory to Practice	0	0	1	1	1	1	1	1	1	1	1	1	2	2
	History of Pages Visited Total		1	1	11	11	11	19	20	22	23	29	29	29	53	53
	Different Pages Accessed	Variety of Pages	1	1	9	9	9	12	13	15	15	15	15	15	25	25

Discrete Student Tracking Information

Name	Topics	Sub-topics	4/05/98	15/05/98	29/05/98	23/06/98	1/07/98	15/07/98	1/08/98	15/08/98	1/09/98	15/09/98	1/10/98	15/10/98	31/10/98	10/11/98
Student A	Access	First Time Access (Time)	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43	21:43
	Access	First Time Access (Date)	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98	3/05/98
	Access	Last Time Access (Time)	22:02	22:02	20:57	20:11	20:11	15:22	09:24	17:19	10:05	14:22	09:49	09:49	12:16	12:16
	Access	Last Time Access (Date)	3/05/98	3/05/98	20/05/98	22/06/98	22/06/98	14/07/98	21/07/98	10/08/98	31/08/98	10/09/98	29/09/98	29/09/98	31/10/98	31/10/98
	Distribution of Hits	Home Page	6	0	10	3	0	10	1	5	5	10	2	0	4	0
	Distribution of Hits	Notes (content)	1	0	10	0	0	8	1	2	1	6	0	0	22	0
	Distribution of Hits	References	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Distribution of Hits	Annotations	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Distribution of Hits	Articles Read (forums)	7	0	7	43	0	8	0	13	19	28	7	0	5	0
	Distribution of Hits	Articles Posted (forums)	0	0	0	1	0	0	0	1	1	1	0	0	0	0
	Distribution of Hits	Follow ups (forums)	0	0	0	0	0	0	0	0	2	1	0	0	1	0
	Distribution of Hits Total		14	0	27	47	0	27	2	21	28	46	9	0	32	0
	History of Pages Visited	Foreword	0	0	1	0	0	2	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Staff	0	0	1	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Outline	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Philosophy	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Objectives	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Topics	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	History of Pages Visited	Course Textbooks	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Supplementary Readings	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	On-Campus Course	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Mass-e-Web	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Listserv Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Course Assessment	0	0	0	0	0	0	1	0	0	2	0	0	0	0
	History of Pages Visited	Assignment One	0	0	0	0	0	0	0	1	0	1	0	0	1	0
	History of Pages Visited	Assignment Two	0	0	0	0	0	0	0	1	1	2	0	0	1	0
	History of Pages Visited	Scholarly Contribution	0	0	1	0	0	1	0	0	0	1	0	0	1	0
	History of Pages Visited	Assignment Extension	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Evaluation of Assignments	0	0	1	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Study Suggestions	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	History of Pages Visited	Written Assignments	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Referencing Assignments	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Sexist Language	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Plagiarism	0	0	1	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Preface	1	0	2	0	0	1	0	0	0	0	0	0	1	0
	History of Pages Visited	The Hist. Of Comp. In Education	0	0	1	0	0	1	0	0	0	0	0	0	0	0
	History of Pages Visited	Conceptual Frameworks for Ed. Comp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	The Nature of Comp. Learning Env.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	The Teacher's Role in Edu. Comp.	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Learning Traditions and Ed. Techn.	0	0	0	0	0	1	0	0	0	0	0	0	1	0
	History of Pages Visited	Comp. And Behavioural Learning Theory	0	0	0	0	0	1	0	0	0	0	0	0	1	0
	History of Pages Visited	Comp. And Cognitive Learning Theory	0	0	0	0	0	1	0	0	0	0	0	0	1	0
	History of Pages Visited	Linking Theory to Practice	0	0	1	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited Total		1	0	10	0	0	8	1	2	1	6	0	0	24	0
	Different Pages Accessed	Variety of Pages	1	0	8	0	0	3	1	2	0	0	0	0	10	2

Consolidation of the Discrete Student Tracking Information

Name	Topics	Sub-topics	4/05/98	15/05/98	29/05/98	23/06/98	1/07/98	15/07/98	1/08/98	12/08/98	1/09/98	15/09/98	1/10/98	15/10/98	31/10/98	10/11/98
All students	Access	First Time Access (Time)														
	Access	First Time Access (Date)														
	Access	Last Time Access (Time)														
	Access	Last Time Access (Date)														
	Distribution of Hits	Home Page	253	115	159	187	48	66	95	179	148	150	85	66	68	108
	Distribution of Hits	Notes (content)	34	10	20	21	1	14	7	3	10	21	1	1	25	13
	Distribution of Hits	References	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Distribution of Hits	Annotations	12	3	8	3	0	1	0	0	0	1	2	0	1	0
	Distribution of Hits	Articles Read (forums)	318	103	287	365	37	24	33	83	86	139	53	27	51	76
	Distribution of Hits	Articles Posted (forums)	11	5	8	11	0	1	0	4	1	4	0	1	2	1
	Distribution of Hits	Follow ups (forums)	13	0	4	2	0	0	0	4	4	4	0	0	1	0
	Distribution of Hits Total		**641**	**236**	**486**	**589**	**86**	**106**	**135**	**274**	**249**	**319**	**141**	**95**	**148**	**198**
	History of Pages Visited	Foreword	1	1	2	0	0	3	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Staff	2	0	1	0	0	1	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Outline	1	0	0	0	0	1	0	0	1	0	0	0	1	0
	History of Pages Visited	Course Philosophy	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	History of Pages Visited	Course Objectives	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Course Topics	0	0	0	1	0	0	0	0	0	0	0	0	2	0
	History of Pages Visited	Course Textbooks	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Supplementary Readings	1	0	1	0	0	0	0	1	0	0	0	0	1	0
	History of Pages Visited	On-Campus Course	2	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Mass-e-Web	1	0	1	1	0	0	0	0	1	0	0	0	0	0
	History of Pages Visited	Listserv Resources	0	1	0	1	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Course Assessment	0	0	0	2	0	0	1	0	0	2	0	1	0	2
	History of Pages Visited	Assignment One	3	0	2	4	0	0	0	1	0	2	0	0	1	0
	History of Pages Visited	Assignment Two	2	0	0	2	0	1	1	1	4	6	0	0	1	0
	History of Pages Visited	Scholarly Contribution	2	1	5	4	0	1	0	0	0	1	0	0	1	0
	History of Pages Visited	Assignment Extension	0	0	0	0	0	0	0	0	1	2	0	0	0	0
	History of Pages Visited	Evaluation of Assignments	0	0	1	1	0	0	0	0	0	1	0	0	2	0
	History of Pages Visited	Study Suggestions	1	1	0	0	0	1	0	0	0	2	0	0	2	0
	History of Pages Visited	Written Assignments	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Referencing Assignments	0	0	0	0	0	0	0	0	0	2	0	0	0	0
	History of Pages Visited	Sexist Language	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	History of Pages Visited	Plagiarism	0	0	1	0	0	0	0	0	0	0	0	0	1	0
	History of Pages Visited	Preface	2	0	2	0	0	1	1	0	0	0	0	0	1	1
	History of Pages Visited	The Hist. Of Comp. In Education	4	2	1	0	1	1	1	0	1	0	0	0	0	0
	History of Pages Visited	Conceptual Frameworks for Ed. Comp.	3	0	0	1	0	0	1	0	0	0	0	0	0	0
	History of Pages Visited	The Nature of Comp. Learning Env.	1	0	0	0	0	0	1	0	0	1	0	0	0	2
	History of Pages Visited	The Teacher's Role in Edu. Comp.	3	2	0	0	0	1	1	0	0	0	0	0	1	1
	History of Pages Visited	Learning Traditions and Ed. Techn.	1	1	0	0	0	1	0	0	0	0	0	0	1	1
	History of Pages Visited	Comp. And Behavioural Learning Theory	0	0	0	1	0	1	0	0	0	0	1	0	1	1
	History of Pages Visited	Comp. And Cognitive Learning Theory	1	0	0	0	0	1	0	0	1	0	0	0	2	2
	History of Pages Visited	Linking Theory to Practice	2	1	2	3	0	0	0	0	1	2	0	0	1	3
	History of Pages Visited Total		**34**	**10**	**20**	**21**	**1**	**14**	**7**	**3**	**10**	**21**	**1**	**1**	**27**	**13**
	Different Pages Accessed	Variety of Pages	30	8	16	18	1	9	5	2	5	9	1	1	13	8

Accumulated Page Tracking Information

Page Name	4/05/98			15/05/98			29/05/98			23/06/98			1/07/98		
	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent
Foreword	1	0:01:11	0:01:11	1	0:01:11	0:01:11	3	0:17:32	0:05:50	3	0:30:51	0:10:17	3	0:30:51	0:10:17
Course Staff	2	0:14:54	0:07:27	2	0:14:54	0:07:27	3	1:11:03	0:23:41	3	1:11:03	0:23:41	3	1:11:03	0:23:41
Course Outline	1	0:14:25	0:14:25	1	0:14:25	0:14:25	1	0:14:25	0:14:25	1	0:14:25	0:14:25	1	0:14:25	0:14:25
Course Philosophy	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00
Course Objectives	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00
Course Topics	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	1	0:00:00	0:00:00	1	0:15:33	0:15:33
Course Textbooks	1	0:00:26	0:00:26	1	0:00:26	0:00:26	1	0:00:26	0:00:26	2	0:33:40	0:16:50	2	0:33:40	0:16:50
Supplementary Readings	2	0:02:41	0:01:20	2	0:02:41	0:01:20	3	0:15:04	0:05:01	3	1:26:00	0:28:40	3	1:32:55	0:30:58
On-Campus Course	2	0:01:30	0:00:45	2	0:01:30	0:00:45	2	0:01:30	0:00:45	2	0:01:30	0:00:45	2	0:01:30	0:00:45
Mass-e-Web	1	0:00:35	0:00:35	1	0:00:35	0:00:35	2	0:01:10	0:00:35	3	0:01:49	0:00:36	3	0:01:49	0:00:36
Listserv Resources	0	0:00:00	0:00:00	1	0:00:52	0:00:52	1	0:00:52	0:00:52	2	0:01:20	0:00:40	2	0:01:20	0:00:40
Course Assessment	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	2	0:19:52	0:09:56	2	1:00:02	0:30:01
Assignment One	3	0:02:08	0:00:43	3	0:02:08	0:00:43	5	1:17:28	0:15:29	9	2:39:36	0:17:44	9	2:39:36	0:17:44
Assignment Two	2	0:01:11	0:00:36	2	0:04:56	0:02:28	2	1:46:17	0:53:08	4	2:08:11	0:32:02	4	2:08:11	0:32:02
Scholarly Contribution	2	0:16:36	0:08:18	3	0:17:10	0:05:43	8	3:40:05	0:27:30	12	6:12:00	0:31:00	12	6:28:37	0:32:23
Assignment Extension	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	1	0:00:32	0:00:32	1	0:00:32	0:00:32
Evaluation of Assignments	0	0:00:00	0:00:00	0	0:00:00	0:00:00	1	0:00:00	0:00:00	1	1:54:40	1:54:40	1	1:54:40	1:54:40
Study Suggestions	1	0:00:21	0:00:21	2	0:08:28	0:04:14	2	0:22:33	0:11:16	2	0:27:41	0:13:50	2	0:27:41	0:13:50
Written Assignments	1	0:05:04	0:05:04	1	0:05:04	0:05:04	1	0:05:04	0:05:04	1	0:54:01	0:54:01	1	0:57:17	0:57:17
Referencing Assignments	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00
Sexist Language	0	0:00:00	0:00:00	0	0:00:00	0:00:00	1	0:01:59	0:01:59	1	0:01:59	0:01:59	1	0:01:59	0:01:59
Plagiarism	0	0:00:00	0:00:00	0	0:00:00	0:00:00	1	0:04:10	0:04:10	1	0:04:10	0:04:10	1	0:04:10	0:04:10
Preface	4	0:23:05	0:05:46	4	0:32:57	0:08:14	6	0:40:55	0:06:49	6	1:30:27	0:15:04	6	1:33:36	0:15:36
The Hist. Of Comp. In Education	8	2:35:14	0:19:24	10	4:48:53	0:28:53	11	6:57:25	0:37:56	12	8:19:05	0:41:35	13	8:19:05	0:38:23
Conceptual Frameworks for Ed. Comp.	3	0:41:08	0:13:42	4	1:08:43	0:17:10	4	1:18:54	0:19:43	6	2:28:49	0:24:48	6	2:38:13	0:26:22
The Nature of Comp. Learning Env.	1	1:06:00	1:06:00	1	1:06:00	1:06:00	1	1:06:00	1:06:00	1	1:06:00	1:06:00	1	1:06:00	1:06:00
The Teacher's Role in Edu. Comp.	4	0:25:04	0:06:16	6	0:26:23	0:04:23	6	3:16:36	0:32:46	6	3:20:10	0:33:21	6	3:20:10	0:33:21
Learning Traditions and Ed. Techn.	1	0:00:32	0:00:32	2	0:02:05	0:01:02	2	0:02:05	0:01:02	2	0:02:05	0:01:02	2	0:02:05	0:01:02
Comp. And Behavioural Learning Theory	0	0:00:00	0:00:00	0	0:00:00	0:00:00	0	0:00:00	0:00:00	1	0:29:08	0:29:08	1	0:29:08	0:29:08
Comp. And Cognitive Learning Theory	1	0:00:28	0:00:28	1	0:00:28	0:00:28	1	0:00:28	0:00:28	1	0:00:28	0:00:28	1	0:00:28	0:00:28
Linking Theory to Practice	2	0:53:39	0:26:49	3	1:56:02	0:38:40	5	3:03:05	0:36:37	8	4:18:09	0:32:16	8	4:21:47	0:32:43
Total	**43**	**7:06:12**	**0:09:55**	**53**	**11:15:51**	**0:12:45**	**73**	**25:45:06**	**0:21:10**	**97**	**40:17:41**	**0:24:55**	**98**	**41:56:23**	**0:25:41**

Discrete Page Tracking Information

Page Name	4/05/98			15/05/98			29/05/98			23/06/98			1/07/98		
	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent	Nbr. Hits	Total Time Spent	Average Time Spent
Foreword	1	0:01:11	0:01:11	0	0:00:00	#DIV/0!	2	0:16:21	0:08:11	0	0:13:19	#DIV/0!	0	0:00:00	#DIV/0!
Course Staff	2	0:14:54	0:07:27	0	0:00:00	#DIV/0!	1	0:56:09	0:56:09	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Course Outline	1	0:14:25	0:14:25	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Course Philosophy	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Course Objectives	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Course Topics	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:00:00	0:00:00	0	0:15:33	#DIV/0!
Course Textbooks	1	0:00:26	0:00:26	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:33:14	0:33:14	0	0:00:00	#DIV/0!
Supplementary Readings	2	0:02:41	0:01:21	0	0:00:00	#DIV/0!	1	0:12:23	0:12:23	0	1:10:56	#DIV/0!	0	0:06:55	#DIV/0!
On-Campus Course	2	0:01:30	0:00:45	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Mass-e-Web	1	0:00:35	0:00:35	0	0:00:00	#DIV/0!	1	0:00:35	0:00:35	1	0:00:39	0:00:39	0	0:00:00	#DIV/0!
Listserv Resources	0	0:00:00	#DIV/0!	1	0:00:52	0:00:52	0	0:00:00	#DIV/0!	1	0:00:28	0:00:28	0	0:00:00	#DIV/0!
Course Assessment	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	2	0:19:52	0:09:56	0	0:40:10	#DIV/0!
Assignment One	3	0:02:08	0:00:43	0	0:00:00	#DIV/0!	2	1:15:20	0:37:40	4	1:22:08	0:20:32	0	0:00:00	#DIV/0!
Assignment Two	2	0:01:11	0:00:35	0	0:03:45	#DIV/0!	0	1:41:21	#DIV/0!	2	0:21:54	0:10:57	0	0:00:00	#DIV/0!
Scholarly Contribution	2	0:16:36	0:08:18	1	0:00:34	0:00:34	5	3:22:55	0:40:35	4	2:31:55	0:37:59	0	0:16:37	#DIV/0!
Assignment Extension	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:00:32	0:00:32	0	0:00:00	#DIV/0!
Evaluation of Assignments	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:00:00	0:00:00	0	1:54:40	#DIV/0!	0	0:00:00	#DIV/0!
Study Suggestions	1	0:00:21	0:00:21	1	0:08:07	0:08:07	0	0:14:05	#DIV/0!	0	0:05:08	#DIV/0!	0	0:00:00	#DIV/0!
Written Assignments	1	0:05:04	0:05:04	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:48:57	#DIV/0!	0	0:03:16	#DIV/0!
Referencing Assignments	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Sexist Language	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:01:59	0:01:59	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Plagiarism	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:04:10	0:04:10	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Preface	4	0:23:05	0:05:46	0	0:09:52	#DIV/0!	2	0:07:58	0:03:59	0	0:49:32	#DIV/0!	0	0:03:09	#DIV/0!
The Hist. Of Comp. In Education	8	2:35:14	0:19:24	2	2:13:39	1:06:50	1	2:08:32	2:08:32	1	1:21:40	1:21:40	1	0:00:00	0:00:00
Conceptual Frameworks for Ed. Comp.	3	0:41:08	0:13:43	1	0:27:35	0:27:35	0	0:10:11	#DIV/0!	2	1:09:55	0:34:58	0	0:09:24	#DIV/0!
The Nature of Comp. Learning Env.	1	1:06:00	1:06:00	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
The Teacher's Role in Edu. Comp.	4	0:25:04	0:06:16	2	0:01:19	0:00:40	0	2:50:13	#DIV/0!	0	0:03:34	#DIV/0!	0	0:00:00	#DIV/0!
Learning Traditions and Ed. Techn.	1	0:00:32	0:00:32	1	0:01:33	0:01:33	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Comp. And Behavioural Learning Theory	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	1	0:29:08	0:29:08	0	0:00:00	#DIV/0!
Comp. And Cognitive Learning Theory	1	0:00:28	0:00:28	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!	0	0:00:00	#DIV/0!
Linking Theory to Practice	2	0:53:39	0:26:50	1	1:02:23	1:02:23	2	1:07:03	0:33:31	3	1:15:04	0:25:01	0	0:03:38	#DIV/0!
Total	**43**	**7:06:12**	**0:09:55**	**10**	**4:09:39**	**0:24:58**	**20**	**14:29:15**	**0:43:28**	**24**	**14:32:35**	**0:36:21**	**1**	**1:38:42**	**1:38:42**

Miscellaneous WebCT Information

Chat/Total Message Forums/Total Hits Internet Links Data Collection

Topics	Sub-topics	April	May	June	July	August	September	October	November	TOTAL
Chat	Connections by different students	2	7	4	4	4	1	2	3	27
	Attempted dialogue	0	0	0	1	1	0	2	1	5
	Dialogue	0	0	0	0	0	0	0	0	0

		[illegible]	[illegible]	28/05/98	25/06/98	1/07/98	15/07/98	1/08/98	15/08/98	1/09/98	15/09/98	1/10/98	15/10/98	31/10/98	10/11/98
Forums	Total Messages - Forums/Accumulated	46	58	88	110	111	115	118	131	141	155	155	157	164	166
	Total Messages - Forums Discrete	46	12	30	22	1	4	3	13	10	14	0	2	7	2
	Other	1	0	4	1	0	0	0	0	0	0	0	0	0	0
	Res.	2	0	0	2	0	2	1	0	0	0	0	0	1	
	Total message students	24	5	12	13	0	1	0	8	5	8	0	1	3	1

		4/05/98	15/05/98	29/05/98	[illegible]/98	[illegible]/98	[illegible]/98	1/08/98	15/08/98	1/09/98	15/09/98	1/10/98	15/10/98	31/10/98	10/11/98
Internet Links	Total Hits - Internet Links/Accum.	59	71	83	110	114	122	127	132	139	144	149	151	152	154
	Total Hits - Internet Links Discrete	59	12	12	27	4	8	5	5	7	5	5	2	1	2

APPENDIX V

Analysis of the Student Questionnaire

Analysis of the Quantitative Data in the Student Questionnaire

Student	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	Participati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Student A	TRUE	Weekly	5	2	2	2	2	2	3	3	4	2	4	2	2	4	Passive	2	4	3	4	3	3	3	2	4	4	1
Student B																												
Student C	TRUE	Weekly	5	3	3	2	4	3	3	4	4	3	4	4	3	4	Passive	3	4	4	4	4	3	5	4	3	4	3
Student D	TRUE	Daily	5	3	3	3	4	4	3	3	4	2	4	3	4	4	Passive	3	3	2	2	2	2	4	4	3	4	2
Student E	TRUE	Month	4	4	4	3	4	4	4	3	4	4	4	4	4	4	Passive	2	4	4	2	4	3	2	4	4	4	3
Student F	FALSE																											
Student G	TRUE	Months	5	4	3	2	3	2	3	4	4	2	4	4	3	5	Passive	4	4	4	2	4	2	4	2	2	4	2
Student H																												
Student I																												
Student J	TRUE	Months	4	4	3	5	4	3	4	3	3	1	5	4	2	4	Passive	3	3	4	4	4	4	4	5	4	4	2
Student K	TRUE	Weekly	5	3	2	4	4	4	4	2	4	4	3	4	5	5	Active	2	2	4	4	4	2	5	4	4	4	2
Student L	TRUE	Month	5	2	4	4	3	2	4	5	2	1	4	4	1	1	Passive	5	2	3	4	5	1	4	5	4	1	3
Student M																												
Student N																												
Student S	TRUE	Month	4	4	4	4	4	4	4	3	4	3	5	4	3	4	Passive	3	4	4	3	4	2	4	4	4	4	2
Student T	TRUE	Other	3	4	5	3	5	5	3	4	4	1	5	4	5	5	Passive	5	3	4	5	5	2	5	2	5	2	5
Student U																												
Student V	TRUE	Other	5	4	4	2	4	4	3	3	4	3	4	4	2	4	Passive	2	3	4	5	3	1	4	4	4	4	1
Student X																												
Student Y																												
TOTAL COUNT:	**12**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**
AVERAGE:			**4.55**	**3.36**	**3.36**	**3.09**	**3.73**	**3.36**	**3.45**	**3.36**	**3.73**	**2.36**	**4.18**	**3.73**	**3.09**	**4.00**	**91%**	**3.09**	**3.27**	**3.64**	**3.55**	**3.82**	**2.27**	**4.00**	**3.64**	**3.73**	**3.55**	**2.36**

CRITERIA	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 1	TRUE	Daily	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Passive	1	1	1	1	1	1	1	1	1	1	1
	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 2	FALSE	Weekly	2	2	2	2	2	2	2	2	2	2	2	2	2	2	Balanced	2	2	2	2	2	2	2	2	2	2	2
	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 3		Twice a Mo	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Active	3	3	3	3	3	3	3	3	3	3	3
	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 4		Monthly	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Other	4	4	4	4	4	4	4	4	4	4	4
	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 5		Every Two Frequency	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Active	5	5	5	5	5	5	5	5	5	5	5
Case 6		Other																										

COUNT	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 1	11	1	0	0	0	0	0	0	0	0	0	3	0	0	1	1	10	0	0	0	0	0	2	0	0	0	1	2
Case 2	1	3	0	2	2	4	1	3	0	1	1	3	0	1	3	0	0	4	2	1	3	1	5	1	3	1	1	5
Case 3		3	1	3	4	3	2	2	6	6	1	3	1	1	3	0	1	4	4	2	1	2	3	1	0	2	0	3
Case 4		0	3	6	4	3	7	5	5	3	9	2	7	9	2	7	0	1	5	8	5	6	1	6	6	7	9	0
Case 5		2	7	0	1	1	1	1	0	1	0	0	3	0	2	3		2	0	0	2	2	0	3	2	1	0	1
Case 6		2																										

PERCENTAGES	Participation	Frequency	mputerSkl	rningExper	herKnowle	arnigComp	AddedVal	ObjQuality	Communicat	rCommuni	StrSimplicit	Replacemer	rSupplema	StrActivities	CompActivi	MoreActivi	rParticipati	ForTime	ForThought	rAddedVal	ForInteract	ForGuests	InteractGu	ForArticles	rCoordinat	Conversat	ForPostingt	AddedVal
Case 1	92%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	27%	0%	0%	9%	9%	91%	0%	0%	0%	0%	0%	18%	0%	0%	0%	9%	18%
Case 2	8%	27%	0%	18%	18%	36%	9%	27%	0%	9%	9%	27%	0%	9%	27%	0%	0%	36%	18%	9%	27%	9%	45%	9%	27%	9%	9%	45%
Case 3		27%	9%	27%	36%	27%	18%	18%	55%	55%	9%	27%	9%	9%	27%	0%	9%	36%	36%	18%	9%	18%	27%	9%	0%	18%	0%	27%
Case 4		0%	27%	55%	36%	27%	64%	45%	45%	27%	82%	18%	64%	82%	18%	64%	0%	9%	45%	73%	45%	55%	9%	55%	55%	64%	82%	0%
Case 5		18%	64%	0%	9%	9%	9%	9%	0%	9%	0%	0%	27%	0%	18%	27%		18%	0%	0%	18%	18%	0%	27%	18%	9%	0%	9%
Case 6		18%																										

Analysis of the Quantitative Data in the Student Questionnaire

Student	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Student A	1	1	1-2 times	3-4 times	4	5	One	4	4	5-6 times	4	1-2 times	4	3	Never	Never	4	4	2	FALSE					4	4	4	4
Student B																												
Student C	2	2	6 times	3-4 times	4	4	Two	3	4	Never	3	1-2 times	3	3	1-2 times	Never	4	4	3	TRUE	2	4	4	3	4	4	4	4
Student D	2	2	3-4 times	5-6 times	4	4	None	3	3	6 times	5	1-2 times	3	2	3-4 times	5-6 times	3	2	4	TRUE	2	3	2	4	4	4	4	5
Student E	2	2	1-2 times	Never	3	4	One	3	3	1-2 times	4	1-2 times	4	2	3-4 times	Never	5	3	4	FALSE					4	3	4	3
Student F																												
Student G	2	4	Never	Never	2	3	One	4	4	Never	3	Never	3	4	1-2 times	1-2 times	4	4	3	TRUE	5	2	4	2	4	3	3	4
Student H																												
Student I																												
Student J	3	3	Never	Never	3	3	None	3	3	1-2 times	4	1-2 times	4	4	Never	Never	4	4	3	TRUE	1	4	2	3	3	4	4	4
Student K	2	2	3-4 times	6 times	5	5	None	3	1	6 times	5	1-2 times	3	3	1-2 times	1-2 times	2	5	2	TRUE	4	4	1	5	5	1	4	5
Student L	2	2	6 times	1-2 times	3	1	None	3	3	6 times	5	Never	1	5	Never	Never	5	1	1	FALSE					4	3	3	3
Student M																												
Student N																												
Student S	1	1	1-2 times	1-2 times	4	4	None	3	4	1-2 times	4	3-4 times	4	3	3-4 times	3-4 times	3	4	4	TRUE	4	3	4	4	5	5	5	5
Student T	4	1	Never	1-2 times	5	3	Two	5	5	6 times	5	1-2 times	4	4	Never	6 times	5	4	4	FALSE	3	5	1	4	5	5	5	5
Student U																												
Student V	1	1	3-4 times	1-2 times	3	4	One	4	3	1-2 times	3	1-2 times	2	4	6 times	6 times	4	4	2	TRUE	1	4	3	4	4	3	4	2
Student X																												
Student Y																												
TOTAL COUNT:	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	8	8	8	8	11	11	11	11
AVERAGE:	2.00	1.91			3.64	3.64		3.45	3.36		4.09		3.18	3.36			3.91	3.55	2.91		2.75	3.63	2.63	3.63	4.18	3.55	4.00	4.00

CRITERIA	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 1	1	1	Never	Never	1	1	One	1	1	Never	1	Never	1	1	Never	Never	1	1	1	TRUE	1	1	1	1	1	1	1	1
	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 2	2	2	1-2 times	1-2 times	2	2	Two	2	2	1-2 times	2	1-2 times	2	2	1-2 times	1-2 times	2	2	2	FALSE	2	2	2	2	2	2	2	2
	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 3	3	3	3-4 times	3-4 times	3	3	None	3	3	3-4 times	3	3-4 times	3	3	3-4 times	3-4 times	3	3	3		3	3	3	3	3	3	3	3
	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 4	4	4	5-6 times	5-6 times	4	4		4	4	5-6 times	4	5-6 times	4	4	5-6 times	5-6 times	4	4	4		4	4	4	4	4	4	4	4
	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 5	5	5	more than	more than	5	5		5	5	more than	5	more than	5	5	more than	more than	5	5	5		5	5	5	5	5	5	5	5
Case 6																												

COUNT	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 1	3	4	3	3	0	1	4	0	1	2	0	2	1	0	4	5	0	1	1	7	2	0	2	0	0	1	0	0
Case 2	6	5	3	4	1	0	2	0	0	4	0	8	1	2	3	2	1	1	3	4	2	1	2	1	0	0	0	1
Case 3	1	1	3	2	4	3	5	7	5	0	3	1	4	4	3	1	2	1	3		1	2	1	2	1	4	2	2
Case 4	1	1	0	1	4	5		3	4	1	4	0	5	4	0	1	5	7	4		2	4	3	4	7	4	7	4
Case 5	0	0	2	1	2	2		1	1	4	4	0	0	1	1	2	3	1	0		1	1	0	1	3	2	2	4
Case 6																												

PERCENTAGES	htCoordinat	htStudent	hFreqStude	hFreqCoordin	hAddedVal	EmPost	QzNumber	QzUseful	zAddedVal	hkFrequenc	kAddedVal	alFrequenc	lAddedVal	alPreferen	Frequency	Frequency	gPreferenc	gUpdated	gAddedVal	hpCreation	hpPlacemen	hpOpportun	hpConstru	pAddedVal	EaseScreer	EaseText	EaseFont	Easelcons
Case 1	27%	36%	27%	27%	0%	9%	36%	0%	9%	18%	0%	18%	9%	0%	36%	45%	0%	9%	9%	64%	25%	0%	25%	0%	0%	9%	0%	0%
Case 2	55%	45%	27%	36%	9%	0%	18%	0%	0%	36%	0%	73%	9%	18%	27%	18%	9%	9%	27%	36%	25%	13%	25%	13%	0%	0%	0%	9%
Case 3	9%	9%	27%	18%	36%	27%	45%	64%	45%	0%	27%	9%	36%	36%	27%	9%	18%	9%	27%		13%	25%	13%	25%	9%	36%	18%	18%
Case 4	9%	9%	0%	9%	36%	45%		27%	36%	9%	36%	0%	45%	36%	0%	9%	45%	64%	36%		25%	50%	38%	50%	64%	36%	64%	36%
Case 5	0%	0%	18%	9%	18%	18%		9%	9%	36%	36%	0%	0%	9%	9%	18%	27%	9%	0%		13%	13%	0%	13%	27%	18%	18%	36%
Case 6																												

Analysis of the Quantitative Data in the Student Questionn

Student	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Student A	4	3	2	3	3	4	4	4	3	3	1	4	4
Student B													
Student C	4	2	2	4	2	4	2	3	3	3	2	4	4
Student D	4	2	2	3	2	5	2	4	3	3	2	4	3
Student E	4	2	3	3	3	4	2	2	2	3	2	5	4
Student F													
Student G	4	4	3	4	4	4	4	2	3	3	2	4	4
Student H													
Student I													
Student J	4	2	3	3	3	4	5	1	4	4	5	4	5
Student K	5	2	2	4	4	4	2	4	2	2	1	5	2
Student L	3	3	3	3	3	5	5	5	3	3	1	3	5
Student M													
Student N													
Student S	4	2	3	4	4	4	2	3	2	3	5	5	5
Student T	5	4	4	3	4	4	2	4	3	2	1	5	1
Student U													
Student V	4	3	3	4	2	4	2	4	2	2	2	4	4
Student X													
Student Y													
TOTAL COUNT:	11	11	11	11	11	11	11	11	11	11	11	11	11
AVERAGE:	4.09	2.64	2.73	3.45	3.09	4.18	2.91	3.27	2.73	2.82	2.18	4.27	3.73

CRITERIA	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 1	1	1	1	1	1	1	1	1	1	1	1	1	1
	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 2	2	2	2	2	2	2	2	2	2	2	2	2	2
	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 3	3	3	3	3	3	3	3	3	3	3	3	3	3
	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 4	4	4	4	4	4	4	4	4	4	4	4	4	4
	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 5	5	5	5	5	5	5	5	5	5	5	5	5	5
Case 6													

COUNT	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 1	0	0	0	0	0	0	0	1	0	0	4	0	1
Case 2	0	6	4	0	3	0	7	2	4	3	5	0	1
Case 3	1	3	6	6	4	0	0	2	6	7	0	1	1
Case 4	8	2	1	5	4	9	2	5	1	1	0	6	5
Case 5	2	0	0	0	0	2	2	1	0	0	2	4	3
Case 6													

PERCENTAGES	asePleasa	eButtonFor	seButtonEr	ConRibbor	ConLack	NavEasy	NavLoading	NavMain	ustConfigu	CustSuppor	MiscCost	ocParticipat	MiscTutoria
Case 1	0%	0%	0%	0%	0%	0%	0%	9%	0%	0%	36%	0%	9%
Case 2	0%	55%	36%	0%	27%	0%	64%	18%	36%	27%	45%	0%	9%
Case 3	9%	27%	55%	55%	36%	0%	0%	18%	55%	64%	0%	9%	9%
Case 4	73%	18%	9%	45%	36%	82%	18%	45%	9%	9%	0%	55%	45%
Case 5	18%	0%	0%	0%	0%	18%	18%	9%	0%	0%	18%	36%	27%
Case 6													