

School of Information Systems

**The Perceptions of Lecturers and On-campus Students of Online
Teaching and Learning in Higher Education**

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Abstract

In recent times, there has been a strong push for higher education institutions to offer more online courses to cater for students who otherwise would be denied university education. While this may benefit the many distance education students, the take-up rate of totally online education by current on-campus students remains uncertain. At the same time, many lecturers have started to design and develop online teaching material for their courses; many do so without the support of their employer – the university that they work in.

The purpose of this study is two-fold. Firstly, to gain an insight into how on-campus students perceive online learning and to examine their readiness and willingness to make the shift from conventional classroom learning to online learning with no face-to-face contact. Secondly, to gain an insight into how lecturers approach online teaching; so as to better understand the problems they face when switching to a teaching mode that is quite different from the classroom teaching they are familiar with.

The outcomes of this study will provide us with a better understanding of how lecturers and on-campus students perceive online teaching and learning. Understanding students' level of readiness to take part in online learning and their willingness to switch from the conventional classroom to cyberspace will assist universities in making decisions on the future direction of online courses. This is particularly important to those universities that intend to replace conventional classroom teaching with online courses. A better understanding of the problems faced by students and lecturers in online teaching and learning will also enable university administrators to ensure adequate resources are being allocated and the right level of support is provided. Lecturers' experiences in designing and developing online courses also assist in forming guidelines, policies and procedures for others to follow.

An exploratory study was carried out on five groups of students and their lecturers to investigate their perceptions of online teaching and learning. Each group of students was

enrolled in a specific subject unit when the study was carried out. All of the students were studying on-campus pursuing bachelor or postgraduate qualifications in various disciplines across the university. Students from each group were asked to complete a questionnaire during one of their lecture sessions. Their lecturers were interviewed individually. Both quantitative and qualitative analyses were applied on the collected data.

Results of the study found that the majority of the students had sufficient knowledge at using the Internet and were very positive about online teaching and learning. While they would have liked to see more online teaching and learning used in their courses, they would not want it to replace classroom teaching and learning. The lecturers felt that online teaching – the development of online course material and the constant monitoring of students progress, was a time consuming but rewarding task. They would like to see their efforts in taking up such challenges recognised and rewarded by their institution and more resources be provided to assist them in further development in the area.

In conclusion, the outcomes of this study show that if given the choice, not all on-campus students would like to enrol in online courses. The majority of them would still prefer classroom learning supplemented by online learning. Universities should invest in online teaching and learning with more resources allocated to assisting lecturers in online teaching. However, universities contemplating using online courses to replace traditional classroom teaching may find themselves losing their existing on-campus students.

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Chapter 1: Introduction

1.1 Introduction

Many believe that due to developments in Internet technologies, online, or virtual, education is here to stay. This is particularly so in higher education due to the change in student demographic in recent years. Today, many university students are mature students with full time paid work and family commitments as well as trying to obtain education at the same time. These students will prefer, may even demand, flexibility in the way they receive education (Ryan, et al, 2000, p 12). They will cherish the convenience of accessing course material via the Internet so that they can do so anywhere and at any convenient time. They may like the opportunity to communicate with their instructors and their fellow students without the need of face-to face meetings. Institutions of higher education could consider the Internet as a mean of alleviating the pressure of building bigger campuses to accommodate an increasing student population hungry to achieve better qualifications.

In theory, online education has everything to offer and nothing to lose. However, in practice, does it really work? Can online education achieve the same outcomes or even better as some have claimed, as conventional classroom teaching and learning practices that have been in place for so many years? Can students learn better online? Can they learn online at all? Can university lecturers make the transition from classroom teaching to instructors in cyberspace?

In order for online education to succeed, it has to be pedagogically sound. Which means it must satisfy the two key stakeholders – learner and teacher of any learning environment. This study aims to examine the perceptions of university students and lecturers in online learning and teaching. The outcomes of this study will provide us with a deeper understanding of the problems and opportunities associated with online education as perceived by both students and academics, and will assist in formulating the appropriate solution.

1.2 Background

The Internet and World Wide Web have been widely used in education delivery in Australia since the late 1990s (Tapsall & Ryan, 1999). One of the main driving forces in the early days was cost reduction. The Internet could deliver education to a vast number of students across the globe without any distance barrier or the need to travel from one location to another. Another attraction was the promise of flexibility where students could choose to learn at their own time, own pace and own location. With the Internet technologies becoming more widely available and more affordable, undeniably the technologies have provided significant benefits and opportunities where they were not previously available. However, while many are claiming success in the endeavours, there is yet concrete proof that the technologies have indeed improved learning and enhanced teaching.

The emergence of online education has a significant impact on the strategic direction of many universities (Harasim, 2000). In Australia, the continuous decrease in government funding to higher education, has forced universities to rely on self-funding for survival. One obvious means to achieve that is to increase enrolment without increasing the associated costs. With the cost reduction promise of online courses, many universities may be tempted to offer some of their courses completely in online mode to replace conventional classroom teaching in a bid to attract more students and cut down overhead. While many distance-ed students have welcomed the use of the Internet in replacing the conventional print-based distance learning for the many apparent advantages such as speed and convenience the Internet could offer, it is still unclear how current on-campus students perceive online learning or if they are ready to make such a transition.

Given that online teaching and learning is fairly new, many teachers and students are still unfamiliar with such an environment. However, as educational institutions, particularly universities, rush into online course delivery, one assumption was made:

academics know how to teach online and students know how to learn online (Palloff & Pratt, 1999). With the many issues surrounding online teaching and learning, this was clearly a large assumption that needs to be verified. Various studies in the past looked at the perceptions of online teaching and learning from students and academics, however, the outcomes have been inconclusive hence suggesting more such studies are needed. Thus, one purpose of this study was to examine the many issues surrounding online teaching and learning from both students' and lecturers' perspectives.

There has been a debate over online versus conventional learning and students' preference over the two learning environments. This debate is particularly relevant when the subject concerns students who are currently studying on campus. Some studies have suggested that online courses are no longer just for distance students; they are equally in demand by on-campus students (Harasim, 2000). The outcome of this debate is significant when considering the demand of online education and the deployment of resources in online courses. Hence, the second purpose of this study is to attempt to contribute to the debate concerning the question of whether currently on-campus students are ready and willing to make the shift from traditional classroom teaching and learning to a totally online learning environment? Students' demographic factors such as age, studying full-time or part-time, language background, etc, may play a significant role in their preference of learning environment.

1.3 Definition of Terms

Over the past decade, many terms have been ‘invented’ to refer to the use of technologies, particularly the Internet and World Wide Web, in teaching and learning.

Below are some of them:

- Online teaching/learning/instruction
- Web-based teaching/learning/instruction
- Internet-based teaching/learning/instruction
- Resource-based teaching/learning/instruction
- Online education
- Virtual education
- E-learning
- Asynchronous learning network (ALN)

In the literature, these terms are often used interchangeably where they all refer to educational activities that make use of information and communication technologies (Farrell, 2001). “Distance education” or “distance learning” are two terms that are also often used to describe the same learning environment. In contrast, other authors use these terms to refer to students who are learning at a physical distance without the use of the Internet so these terms are somewhat confusing.

In this study, the term “online teaching and learning” is chosen and used in a very broad sense where the following meaning applies:

“An approach to teaching and learning that utilize Internet technologies to communicate and collaborate in an educational context. This includes technology that supplements traditional classroom training with web-based components and learning environments where the educational process is experienced online”

(Blackboard, 2004)

The term “online teaching and learning” is chosen over “online education” because the focus of this study is on teaching and learning whereas “education” has a much broader implication.

Although the term “online teaching and learning” is chosen, much of the literature that was consulted for this study referred to those terminologies listed above.

1.4 Research Objective

This study aims to gain insight into online teaching and learning in the Australian higher education sector through the investigation of perceptions and experience of students and lecturers.

In recent years, many studies have claimed that an increasing number of university students are electing to study online rather than attending classes on campus. This study examines current on-campus university students’ attitudes towards online teaching and learning, and examines their readiness and willingness to migrate from the traditional classroom to a technology based online learning environment. This study also aims to examine the relationship, if any, between students’ demographics and their perception of online teaching and learning.

When universities commenced online teaching a decade ago, it was assumed that academic staff could make the transition from classroom teaching to online teaching or mix the two modes of teaching without any apparent concerns. This study sought insight of lecturers’ experience in online teaching with a focus on the problems and difficulties encountered and the different strategies used to overcome those problems and difficulties. It also aims to elicit important issues related to online teaching and learning from lecturers and students.

1.5 Research Questions

With the research objectives outlined above, the following research questions were designed to guide the study:

Research Question 1: How did students perceive online teaching and learning in higher education?

Research Question 2: Did students' demographic background have any impact on the students' perceptions of online teaching and learning?

Research Question 3: How did lecturers perceive online teaching and learning in higher education?

Research Question 4: Was there a match in expectation in expectation between students and lecturers? What were the common issues or concerns, from both parties, on online teaching and learning?

1.5.1 Hypotheses for Research Question #2

Research question 2 was established to test some of the claims from the literature that a student's background characteristics may have an impact on the student's perception of online teaching and learning. As such, the following hypotheses were derived:

Research Hypothesis #1: Students studying part time would prefer online teaching to classroom teaching

Research Hypothesis #2: Older students being more independent learners would prefer online learning to classroom learning

Research Hypothesis #3: Postgraduate students being more self-directed learners would prefer online learning to classroom learning

Research Hypothesis #4: Students who were more experienced with online learning would prefer online learning to those who were less experienced

Research Hypothesis #5: Students whose first language was not English would prefer to use email than face-to-face or other verbal methods to communicate with their lecturers

1.5.2 Exclusions

The study has intentionally excluded the university's perspective to focus on the pedagogical aspects of online teaching and learning within the university. While the university, the lecturers and the students form the three main stakeholders in higher education, the university has a more complex role in comparison to students and academia. Not only does the university have a responsibility in engaging appropriate academics to provide a high standard of education to students but it also has the responsibility of ensuring the inflow of funding to maintain the university's survival. As the Internet and WWW gain popularity, the Internet may be seen as a lower cost education delivery method in comparison to the conventional classroom delivery. Given that many universities are struggling to survive with the constant reductions in government funding, one may see the Internet as the answer to the many problems confronting many universities. However, in order for this to work, it has to work pedagogically, i.e. achieving objectives for teaching and learning. Do students feel that they learn better through the Internet and WWW? Do lecturers feel that they teach better using the Internet? A study of perceptions of lecturers and students on the use of Internet and WWW in teaching and learning would allow us to gain insights into the matter. Unless we can verify that this new delivery mode works for both teachers and students in educational sense, it could not and will not be successful.

1.6 Significance of this Study

As Oliver (2001) pointed out "the best opportunities with online learning come from successful bottom-up approaches undertaken and owned by the most important stakeholders, teachers and their students". It is therefore significant and indeed important to study the perceptions of students and lecturers of online teaching and learning.

The study of students' and lecturers' perceptions on online teaching and learning allows us to discover:

- Acceptance: if students and lecturers have accepted the concept of online teaching and learning.
- Readiness to participate: if students are ready and willing to participate in such environments and if lecturers are ready and willing to teach in such an environment.
- Expectations: what do staff and students expect from such a learning environment?

The findings of this study will assist university management to identify:

- The required resources to establish and sustain such a learning environment. This includes required funding, expertise and time.
- The acceptable methods to use for designing and developing online learning. To have a better understanding of what works and what does not.
- The anticipated outcomes. To be better prepared for the anticipated problems and ways to overcome those problems.

Research will subsequently assist us to revise our educational goals in online teaching and learning; devise and improve the design and development strategies and monitor the process of online teaching and learning.

The finding of this study will assist university administrators in planning for their online programs and also to ensure both teachers and students receive the support they need.

Lastly, the outcome of this study will assist us in identifying areas for future research.

1.7 Scope of this Study

This study seeks the opinions of students who were at the time, enrolled as ‘on-campus’ students in an Australian university. These students were not engaged in distance learning at the time of the study. The lecturers participating in this study were employed by the university to carry out normal academic duties, thus teaching was one of their main roles. These lecturers may have been involved in distance learning in the past or intended to do so in the future, but they were not asked to speak on that particular role.

This research does not look into the impact of the Internet and WWW on distance education. Distance education means students have received their education through correspondence in the past and now possibly through the Internet or through a combination of different delivery media. Whether they are using the Internet or not, “distance education” students do not attend face-to-face classes by definition. The use of the Internet and the World Wide Web in distance education is not included in this study for two reasons: firstly distance education students do not have the choice between attending classes on campus or not. It would probably be true to say that these students have no other choice than to accept other forms of education delivery. These might well include online delivery but will not include face-to-face classes. The researcher believes that such factors would have significantly changed the students’ perceptions of the matter. Secondly, distance education is a complex topic; there have been many studies conducted and there will probably be yet many more to come, looking at different aspects of distance education. Hence, the researcher believes that students who are pursuing distance education should not be included in this study. Similarly, lecturers who are engaged in distance education are probably specialized in a non-classroom type of education delivery and would probably be better equipped with using the Internet and WWW in this regard. It is therefore inappropriate to include them in the same study as lecturers who are hired primarily to engage in classroom teaching.

As stated in section 1.5.2, this research does not look at the topic from the university’s perspective. The university bears a more complicated role which includes funding, research, community services, etc in addition to teaching and learning. The primarily

goal of this study is to explore the perceptions of people whose roles are either as teacher or as learners in a higher education environment.

The ‘teachers’ in this study are those who are employed by the university to undertake the tasks of teaching and research. They are expected to teach in conventional classroom setting and to use whatever media/technology deemed to be fit to achieved teaching and learning objectives. They are not hired solely as ‘course content developers’.

Students participating in this study are those who choose to attend classes on campus rather than via correspondence.

1.8 Structure of this Thesis

Following this Introduction, the relevant literature is reviewed in Chapter Two. The research method of survey consisting of questionnaire and interview is described in Chapter 3. Research findings are detailed in Chapter 4. Discussion, recommendations and conclusions are completed in Chapter 5.

Chapter 2: Literature Review

2.1 Introduction

The Internet has been around since the 1970s, and originated from the U.S. Defense Department network called ARPAnet and various other radio and satellite networks (Krol, 1994, p13). The World Wide Web (WWW, or the Web), an information service to the Internet that came to the world's attention in the 1990s, is relatively new compared to the Internet. The WWW is based on a technology called hypertext, mostly developed by CERN, the European Particle Physics Laboratory (Krol, 1994, p287).

In the last few years, the Internet and its WWW capability have made a huge impact on many lives across different parts of the world due to its application in businesses, education, government services and many other areas. For many of us, the Internet/WWW changed the way we live. It is therefore not unreasonable to assume that most readers would know what the Internet and the WWW are about. However, for completeness of this thesis, this Chapter will briefly introduce the Internet and the World Wide Web, and also to outline the developments in the area of using the Internet/WWW in higher education. Important issues that are related to online teaching and learning will also be discussed in this chapter from both students' and lecturers' perspectives.

2.2 The Internet and World Wide Web (WWW)

The Internet and Transmission Control Protocols, TCP/IP, that allow hundreds of thousands of networks to interconnect and the computers on them to inter-work, were initially developed in 1973 by American computer scientist Vinton Cerf as part of a project sponsored by the United States Department of Defense Advanced Research Projects Agency (ARPA) and directed by American engineer Robert Kahn. (The Great Idea Finder, 2002; Berners-Lee, 2002). The World Wide Web was developed in 1989 by English computer scientist Timothy Berners-Lee to enable information to be shared among internationally dispersed teams of researchers at the European Laboratory for

Particle Physics (formerly known by the acronym CERN) near Geneva, Switzerland (The Great Idea Finder, 2002; Berners-Lee, 2002).

Fundamentally, the Internet is a network of computer networks from around the world. It is comprised of thousands of smaller regional networks connecting millions of users in more than 90 nations around the globe (Jonassen, Peck, & Wilson, 1999, p20; Haughey & Anderson, 1998, p12). Each of these regional networks is composed of still smaller networks that serve institutions, business, and individuals who connect their computers to the regional networks via modems and telephone lines (Jonassen, Peck, & Wilson, 1999, p20; Haughey & Anderson, 1998, p12). Each computer connected to the Internet has a name or address that can be uniquely identified. Each piece of information that is made available to the public has a Universal Resource Locator (URL) that acts as an address for search and retrieval. Part of the URL is the address of the server where that piece of information is stored. When a client sends a URL to request for a specific piece of information, the server will make a copy of the information available and send to the client computer. Software such as the browser will then display the information on the client computer.

The Internet brought along facilities such as electronic mail (email), news (such as bulletin board and newsgroup), files transfer protocol (FTP) and telnet. Through the Internet, sending electronic mail to another user anywhere in the world has become an effortless task; it is fast (instantly receivable) and cheap (no postage and connection will bear the cost of a local telephone call if connecting through the telephone line). Broadcasting messages to a group of users can be easily achieved through the use of bulletin board or newsgroup where any group member can choose to reply or add more information to the original message. A message threading mechanism is usually available to enable users to keep track of the discussion of a topic. Internet users can use the FTP feature to download files from other 'sites'. This is particularly useful for downloading many sharewares and "freeware" products available on the Internet. Telnet features allow users to connect to remote computers, which enables the accessing of software or data files remotely.

The World Wide Web (WWW), on the other hand, is a set of software and standards that allow users that are connected to the Internet to distribute and obtain information stored on the Internet (Haughey & Anderson, 1998). The WWW adds important features to the Internet but relies on the Internet for data transportation and error checking.

The WWW that supports hypertext linking and full multimedia digital delivery of data enables a vast amount of information available for whoever that is connected to the Internet. To access these information files, users need the use of software called the “browser”. The two most popular browser software are Netscape Navigator and Microsoft Internet Explorer. Current versions of browser software also support other Internet facilities such as email, news (such as bulletin board and newsgroup), files transfer protocol (FTP) and telnet. Hence the WWW is really what the users are using when they are connected to the Internet (Haughey & Anderson, 1998).

2.3 The Use of the Internet and WWW in Higher Education

Education is probably one of the most important ventures – the real “killer” application of the Internet (Witherspoon & Johnstone, 2001). Vast amounts of development have taken place in the past few years in the area of using the Internet and the World Wide Web in higher education. This movement could be said to have been caused by two main factors: the growth and popularity of the Internet and the World Wide Web, and the key changes in the world of education (Ryan et al, 2000, p7).

The growth of the Internet over the last few years has been phenomenal and well beyond what the other technologies had ever achieved, as reflected by Huber (1997):

“The Internet’s pace of adoption eclipses all other technologies before it. Radio was in existence 38 years before 50 million people tuned in; TV took 13 years to reach that point. Once the Net was opened up to the general public, the Internet crossed that line in four years”.

According to figures supplied by Pastore (2002), there were between 450 to 530 million, depending on the source of data, Internet users across the globe in year 2002 with more than 90% of the active users coming from over 20 nations. These figures are continuing to grow with an estimation of more than 700 to 900 million Internet users worldwide by the year 2004 (Pastore, 2002).

In recent years, some major changes have taken place in higher education, these include:

- the increasing emphasis on lifelong learning,
- the need to equip students with new skills to find employment,
- the growing learners population, and
- the changing demography of university students.

(Ryan, et al, 2000)

We are now living in an information society with a majority of the work force embracing the use of information technology. As a result advancement in technologies has created new demands for the work force. Consequently the work environment requires more technologically skilled and better-educated employees (Kilmurray, 2003). Tough competition in the job market means that even a university degree does not guarantee someone with a well-paid job (Judy & D'Amico, 1997 as cited in Kilmurray, 2003). All this, coupled with changing technologies where skills and knowledge need to be constantly updated, has consequently led to increasing demand of further education and training. The concept of lifelong learning has been broadly defined as including all aspects of learning experiences throughout life, whether formal, informal or non-formal (Candy et al, 1994).

Today, we have more mature-age students seeking to pursue university education. Conaway (2002) in her paper stated that in the U.S., only about one-third of college students fit the description of 18 to 21-year-olds attending college full time. Forty-one percent of students (and 69 percent of part-time) are aged 25 or older. In Australia, according to a survey conducted by the Australian Bureau of Statistics, the education

participation rate of mature-age students has grown steadily from 3.9% to 4.6% for men and from 5.5% to 6.8% for women between 1989 to 1999. The number of students between the age of 35 and 64 accounts for 18% of all students in 1999, compared to 15% in 1989. (Australian Social Trends, 2000).

The majority of mature-age students, with their work or family related commitments, often find attending classes on campus everyday a difficult requirement to fulfil (Hope, 2001). The concept of flexible delivery, as defined by George and Luke (1995) as “an approach to providing educational opportunities that are focused on the varying learning needs and circumstances of students”, has since replaced conventional distance learning as it covers more than just physical distance. Indeed, with flexible education delivery in place, the boundaries of on-campus and distance education have become blurred and the emphasis is now on "flexible learning" (Nguyen, Tan & Kezunovic, 1996; Beller & Or, 1998). Even students who live close to campus can now choose not to attend classes. Instead, through the use of technology, they can receive their education in alternate mode.

Technologies have a long history in aiding the delivery of education. Television and radio are two good examples of delivering lectures to distance education students for the past many years. Recent advances in information technology and its success in commerce and industry have led many educators to believe that technology is the answer to many problems faced by universities. Particularly with the increasing scarcity of resources in higher education, universities were urged to look into the strategic use of technology in order to ensure the survival of higher education (Daniel, 1998). In assessing the future of higher education institutions, Massy and Zemsky forewarn: “It is likely that traditional institutions will either have to adapt to the new uses of technologies, as many are, or risk losing ground” (Massy & Zemsky, 1995).

As the Internet and WWW have gained popularity and accessibility amongst the world population, some educators even believed that the Internet and WWW had revolutionised education, as De Long (1997) states:

“At a fundamental level, the Web challenges the authority of the professor in the classroom by democratising information. It shifts the focus from production and delivery to customer and content – from professor and lecture to student and information. The most skilful instructor is therefore the one who can best teach discernment among myriad competing sources of information. The culture of higher education is likely to be profoundly changed as a result”

(De Long, 1997, p1)

The wide spread availability of the Internet appears able to fulfil the role of providing access to lifelong learning opportunities to more potential students than would otherwise be able to access to education because of physical constraints. Research claims that the Internet facilitates collaboration, interactivity and project-based learning and provides an authentic environment for learning (Kennedy, 1998; Kearsley & Shneiderman, 1999; Deacon et al, 2000). However, one perceived disadvantage of using the web in education is that the number of links and the vast amount of information available overwhelms many students, hence confusing and discouraging them (Damoense, 2003). Pedagogically, the effectiveness of online courses in relation to individual student’s learning need, perception and student-outcome, however, remains questionable (Phipps et al, 1998;Phipps & Merisotis, 1999).

Today, almost every university in Australia has a website and offers at least some of their courses online. Many courses are also offered in multiple modes where students have a choice of how they want to take the course. Even with courses that are offered in the conventional classroom mode, web supplementary material has become a common feature and indeed, many students now demand such a feature as the norm in all the courses they are undertaking (Conaway, 2002).

Education has been one of the most important exports to Asia for Australia since the last decade. To remain competitive, many Australian universities are offering online courses

or multiple modes of education delivery to attract overseas students with different education needs. McCann, et al (1998) in their DETYA occasional paper pointed out that flexible delivery in higher education enables Australian universities to continually compete in increasingly competitive overseas markets.

2.4 The Promises of Online Teaching and Learning

The literature claims that there are many educational advantages with online education; these will be discussed in the following pages.

Online education removes the constraints of time and place with instruction available when the learners want it and at an unlimited number of locations (Wallhaus, 2000). From the learners' prospective, online education offers students the opportunities of pursuing a range and variety of study options that would not otherwise have been possible (Porter, 1997).

Learning online means students can choose to learn at their own pace and at their own speed. This is hard to achieve in the conventional lecture situation where usually all students need to accept the speed and pace at which the instructor presents the material, and there is very little chance for students to re-hear the lecture. However, in an online learning environment, students can access, read, hear or view the web-based material repeatedly if necessary (Porter, 1997; McGee, 2000).

Students can learn in a convenient location when engaged in online education as long as they have access to a PC and the Internet. Students can also chose to study at a location that is comfortable to them – at home, office, library or an Internet café (McGee, 2000). With increasing numbers of students not being able to attend classes on campus due to work, family or personal reasons, convenience is probably the main reason why many students choose to do online courses (Porter, 1997; McGee, 2000).

Some students work better in the morning and some prefer to work late nights. Some students can only work at certain times during the day because of employment or other commitments. With online material being accessible 24 hours a day, 7 days a week, no students will find themselves being disadvantaged (Jeffline, 2002).

With the overwhelming amount of information available on the Internet on just about any subject, students can learn about topics that are not covered in their course or programme offered in their area (Porter, 1997; McGee, 2000). Online education also opens a wider range of choices where students may choose to be associated concurrently with multiple education providers and modes of instruction according to their needs (Wallhaus, 2000). It also provides the opportunity for students to participate in programmes of universities that offer high prestige programmes without having to relocate (Porter, 1997).

Online material can be presented in a variety of forms including text, audio, and visual such as graphics and video. When designing online learning material instructors can choose to present the same material in multiple formats to accommodate students with different learning styles or preferences (McGee, 2000). Students engaged in online courses also have the opportunity to use a range of different technologies (Porter, 1997) such as email, chat, online bulletin board, ftp and to download and use the required software programs for specific purposes such as to view a video clip.

Online learning provides greater opportunity for students to become self-directed in their studies (Porter, 1997; McGee, 2000). When navigating web-based learning material, students have full control over the sequence of pages they wish to access and to make decisions on what information is deemed to be important and what can be skimmed. In other words, they can tailor their learning to their interests and apply the information that suits their situation (McGee, 2000).

McGee (2000) argues that contrary to the popular belief that online learners are being isolated, online learning actually brings greater amount of interaction amongst learners.

The reasons behind this could be that online learning does not have the constraint of 'fixed' class time like conventional classes so students and instructor have more time to interact (McGee, 2000). The online learning environment also removes physical cues such as language, ethnicity, gender and other physical abilities and disabilities. These do not need to be revealed unless the students choose to. Without these physical barriers, many students may feel more inclined to participate in online discussion (McGee, 2000). If the discussion forum allows anonymous contribution, students will feel more empowered and are more daring and confrontational regarding expression of ideas (Kubala, 1998). Online discussion forums also provide the opportunity for each student to view other students' postings and learn through the exposure to different perspectives (Jeffline, 2002). This supports constructivist learning theory. This allows students to build individual meaning through awareness of the variations in interpretation and construction of meaning among a range of people (Alexander, 1995).

In addition to pedagogical benefits, online education can also reduce administrative costs for the institution associated with printed material (Jeffline, 2002). Instead of providing course handouts, online learning students can read material on the screen or download course material and print items as needed. This in turn will save institutional time and cost in printing, collating and distributing these materials. Also, when the instructor updates or makes corrections to any material, an email can be sent or a broadcasting message to inform all students about the changes. This can cut down a lot of paper wastage.

This transformation from institutional-centred context for the delivery of instruction to a more learner-centred emphasis brings greater competition and specialization amongst educational providers but at the same time a greater need for co-operation and resource sharing (Wallhaus, 2000).

2.5 The Problems of Online Teaching and Learning

Despite the many promises and claimed benefits, online education also comes with problems. These problems include the quality of instruction, hidden costs, the technology itself and the attitudes of instructors, students and administrators (Valentine, 2002).

To achieve successful adoption and sustained use of online learning in universities, Oliver (2001) suggests that there are four major issues which universities need to look into: developing cost-effectiveness approaches; achieving and maintaining quality in online learning; ensuring access and equity in the delivery of online programs; and developing strategies to sustain online program delivery.

Quality is one of the biggest concerns of online course delivery in higher education; many countries use accreditation systems to impose minimum standards on online courses (Hope, 2001). Recently *The Chronicle of Higher Education* reported that the last four unaccredited distance-learning institutions in Louisiana were being forced to leave the state in a move to maintain the state's standard of quality in higher education (Foster, 2002).

Technology has made online education possible but technology itself poses many problems. Problems associated with technology include accessibility, technical limitations and support. While computers and the Internet have become very common in recent years, the question of equity and accessibility to technology remains a major concern (Illinois Online Network, 2001). This is particularly significant in developing countries, rural and lower socio-economic areas where students do not have the opportunity of receiving education online because they cannot afford the technology (Illinois Online Network, 2001). With new technology emerging everyday, enthusiastic instructors may be eager to try new things, particularly to incorporate multimedia components in their web-based course material. While this has educational benefits to student learning, many students would not have the financial ability to continuously update their computer equipment with the latest software and hardware. User friendly

and reliable technology is critical to the success of any online program, however, even with the technological advancement we have achieved today, there are times when the technology fails us. In such instances, the students would have no access to the learning environment or any resources at all (Illinois Online Network, 2001). To participate in online learning and teaching, students and instructors must be computer and Internet literate. As technology is progressing rapidly, educational institutions that are offering online course need to provide adequate technical support to their students and teaching staff to assist them to stay updated with the technology.

While online learning claims to reduce travelling cost, it has, on the other hand, increased other costs involved. These are termed as 'hidden costs' because they are not directly associated with the course the student enrolled in such as tuition fees; rather, they describe the costs for taking the course online. Printing costs is an example of these hidden costs. In a conventional course, the lecturer usually provides the students with all the course handouts, however, once the course is online and materials are posted on the Internet, students will need to download or print this information. Internet connection is another example of these hidden costs. The demand for Internet access has risen significantly over the past few years resulting in more and more courses going online. In the course of this transition institutions have gradually passed on the cost to students so they need to obtain their Internet connection via private Internet providers and to pay for all the costs related to Internet connection and access (Oliver, 2001).

The promise of cost saving or revenue generating for online courses may not be fulfilled for some institutions. Wilner and Lee (2002) reported that Arizona Learning Systems was created in 1996 with US\$3.8 million as legislative funding, but could not come up with a plan to increase enrolment so decided to quit before losing even more money. In early 2002, the United States Open University announced it would close its door in the middle of the same year (Arnone, 2002). After an investment of US\$20 million, the University found its enrolment was not growing fast enough to keep debt from accruing too quickly. Many of those institutions that were specifically set up to run online courses and intended to make big money ended up suffering big losses (Wilner & Lee, 2002).

Many online programs in the past were initiated as special projects and few ended up as mainstream activities (e.g. Alexander & McKenzie, 1998; Collis & Oliver, 1999). Oliver (2001) argues that one of the underpinning factors influencing the successful adoption of online teaching and learning in higher education is the establishment and maintenance of processes that create settings which are sustainable and provide a means for ongoing and self-supporting activity. He further argues that in order for online teaching and learning to become mainstream activities in a university setting, it needs to be accepted by teachers and students and it needs to be easily achieved and maintained (Oliver, 2001).

The use of the Internet and WWW in the corporate world for training purposes has reported many short-comings. One of the main criticisms being the technologies failed to deliver what was promised. Commercial e-learning software often lacks integration and interoperability among components and with other software within the organization. Product limitations and inadequate support services were also some of the other complaints (Goodridge, 2002). On a similar note, Baker (2002) also labels such activities as being costly, failing to deliver results and argues that live training classes are far more productive and cost effective as far as IT training for professionals is concerned.

2.6 Pedagogy of Online Teaching and Learning

There have long been debates on which is the most appropriate approach in teaching and learning. Historically teachers have been using the “directed instruction” approach where students are perceived as the receiver, processor and memorizer of information and teacher as the manager and supervisor in learning (Flynn, 2002). The underlying philosophy of ‘direct instruction’ is objectivism, which asserts that knowledge and truth exist outside the mind of the individual and are therefore objective (Tam, 1999). Direct instruction is based primarily on learning theories proposed by behaviourist and information processing theorists (Gonzalas, 2002). The learning objective in this approach is the acquisition of facts, skills, concepts and strategies where “learners are told about the world and are expected to replicate its content and structure in their thinking” (Jonassen, 1991). The major drawback of this approach is that students are not

engaged in the learning process hence it does not provide problem solving, higher-order thinking skills and could also lead to boredom (Flynn, 2002; Gonzales, 2002).

In recent years, an entirely different approach called the 'constructivist' has gained increasing popularity amongst educators (Mayer, 1996). Constructivists believe that knowledge is constructed, not transmitted and knowledge construction results from activity, so knowledge is embedded in activity (Jonassen et al, 1999). Constructivists view learning as the result of mental construction; people learn best when they actively construct their own understanding (Wilson & Lowry, 2001). As opposed to simple information transmission from teacher to student, constructivism emphasizes the learner's role in constructing meaning, i.e. they do more than just process information, they build an understanding through interacting with their environment. Students learn by fitting new information together with what they already know. (Duffy & Cunningham, 1996).

When using technology in education, Jonassen et al (1999) argues that technology cannot teach students; rather, learners should use technologies to teach themselves and others. In the past, technologies were used to teach the same ways as teachers had always taught making them substitute teachers, however, a great deal of research comparing online learning technologies and teachers shows both to be as effective as one another (Jonassen et al, 1999). Instead of learning from technologies as we did in the past where technologies were used as delivery vehicles such as in computer-assisted instruction Jonassen et al (1999) suggests that we should learn with technologies where they are used as engagers and facilitators of thinking and knowledge construction.

As constructivist learning theory is gaining increasing recognition in higher education, so the popularity of using the Internet and WWW has increased in education delivery. Oliver (2000) suggests that technology-based approaches to learning provide many opportunities for constructivist learning; it provides and supports a resource-based, student-centred learning environment thus enabling learning to be related to context and practice. Wilson and Lowry (2001) argue that people use the web all the time for self-directed purposes, and through searching information on the Web, one is constantly

constructing meaning (Wilson & Lowry 2001). Given that the Web, as a whole, is unedited, un-refereed and always changing; it accommodates information from many different sources, often of different perspective; users have to learn quickly to judge the quality of conflicting sources (Wilson & Lowry 2001). To achieve this, one needs to draw on one's pertinent background knowledge and information literacy skills for interpreting and evaluating information (Wilson & Lowry 2001). In supporting a learner-centred environment, when users search information on the Web, they follow the links from the websites and due to the hypertext environment; users have more control over their learning experience than in a lecture or when reading a book (Wilson & Lowry 2001).

When designing online learning material to support constructivist learning, Oliver (2000) suggests more focus should be placed on the learning activities ahead of content; and by using the course objectives, consideration of the forms of learner activity and engagement that are needed could be driven to achieve the planned outcomes.

Internet tools such as email and chat promote communication amongst Internet users but at the same time, compared to face-to-face communication, there is significant information loss in virtual communication. While acknowledging the serious limitation of virtual communication, the absence of time and place constraints: e.g. you can read and reply to email at anytime, anywhere; represents some advantages in virtual communication over conventional communication (Wilson & Lowry, 2001). Some online learning projects, for example those cited in Wilson and Lowry (2001), have been established to bring people together through collaborative work, discussion and common interest. These projects, include sites such as the Learning design case studies (<http://curry.edschool.virginia.edu/go/ITcases/>) where learners were engaged in collaborative problem solving and written responses were required from student teams (Wilson & Lowry, 2001). Another example is ITForum, A listserv for instructional-technology professionals (<http://it.coe.uga.edu/itforum/index.html>) with the aim to provide a forum for people from around the world to discuss theories, research, new paradigms, and practices in the field of Instructional Technology (Wilson & Lowry, 2001).

One special feature of the Internet is its information-rich environment where one can find information of any kind. In the context of learning and teaching, Duchastel (1996) argued that while the Internet is information-rich, it is, however, process-poor. In terms of learning effectiveness, this information richness could be a valuable tool for those who seek information, but it would be of little use to those who do not know what to seek (Duchastel, 1996). Vargo (1997) questioned, “do these technologies really provide a pedagogically sound foundation on which to build more effective (as well as efficient) educational programmes?” In citing various learning theories, Vargo (1997) further pointed out that “effective learning is not just about the efficient transfer of certain quantities of knowledge, but it is also about developing skills and attitudes for life-long learning, it is about experiencing the joy of learning, it is about both factual knowledge and developing good judgement”. In light of that, is there proof that online education can fulfil the objectives of effective learning?

Can online teaching and learning replace traditional classroom teaching and learning? Many would argue that universities such as Open University and many others have already done that. However, does that imply that we as educators should discontinue classroom teaching and offer only online courses? Taynton (2000) argued that “the effectiveness of online learning increased when online technologies are used in conjunction with, rather than as a replacement for, proven learning strategies such as tutorial and study groups, facilitated workshops, face-to-face consultation, and provision of print-based reading materials.”

2.7 Important Issues Related to Online Teaching and Learning

This section looks at the important issues related to online teaching and learning. These issues involve multiple aspects, ranging from teaching/ learning theories to computer interface design. These issues will be discussed from both students’ and teachers’ perspectives.

These issues are:

- Objectives and motivation: to examine the objectives and motivation of the different stakeholders: university administrator, students and lecturers in an online teaching and learning environment.
- The roles of learner and teacher: the roles of teachers and learners alter significantly in an online teaching and learning environment (Oliver, 1999).
- Access and usage: students' access and usage of online learning material significantly affect their success or otherwise in the online learning environment.
- Communication: one of the most important aspects of any learning environment, communication in online learning environment presents different opportunities and challenges to teachers and learners.
- Design and delivery: there are many issues surrounding the design and delivery of online learning content, they include aspects of human computer interface (HCI), the technologies and the need for guidelines.
- Support and Assistance: to look at the kind of support and assistance needed by both teachers and learners in online teaching and learning environment.
- Students' demography: to examine the impact students' demographical factors have on online teaching and learning.

Each of the above issues will be discussed in greater detail in the remaining Chapter.

2.7.1 Objectives and Motivation

The objectives and motivation of online education need to be examined from multiple perspectives – as Romm and Ragowsky (2001) stated:

Creating an environment that is motivating to students is one of the major objectives of any educational technology. However, for such a technology to be sustained over time, it has to be intrinsically motivating to those who manage it (instructors) and those who resource it (institutions).

From the institution's perspective, cost saving was the main motivation for going online during the early days. As Bourne (1998) proclaimed: "we think (online teaching and learning) can reduce cost, free more faculty time, and enable us to do more with less". It was envisaged that using the Internet in teaching and learning could reach the mass without the cost of buildings; classrooms and live teachers. This "cost-saving" element in online teaching and learning was dismissed by some as "myth" -- considering the amount of investment in technology infrastructures needed by institutions and time from teachers in order to achieve quality (Felix, 2003). There are, however, success stories and the University of Phoenix Online (UOP Online) is one such example that experienced high student' uptake rate and revenue generation. UOP Online recently announced its enrolment increased by 70% from 29,000 students in 2001 to reach 49,400 students with estimated revenue of US\$500 million in 2003 (Kilmurray, 2003).

Students, on the other hand, were attracted to the flexibility of time and space that a fully online learning course could offer (Felix, 2003), particularly for those who are otherwise not able to enrol in a course due to geographical location or work and/or family commitments. However, unlike face-to-face classroom, online students may not have an instructor on hand to recognise lack of motivation or to immediately prompt a student to participate. In most cases, online students need to rely on intrinsic motivation based upon interest on the course content and the desire to achieve credit (Varvel, 2001).

Because of the convenience offered by online learning, some researchers suggested that many on-campus students were also keen to take up online courses thus blurring the boundary between on-campus and distance education status amongst students. (Nguyen, Tan & Kezunovic, 1996) This simplistic view in learning and how students learn has, however, overlooked many other contributing factors that affect students' learning.

What motivated academic staff to participate in online teaching? Schifter (2000) found the top five factors were 1) their personal motivation to use technology, 2) the opportunity to develop new ideas; 3) the opportunity to improve teaching; 4) the opportunity to diversify program offerings and 5) greater flexibility for students. Schifter in her study also surveyed administrators on what they thought were the motivating factors for academics to participate in online teaching. Apart from the first factor, the other results were quite different from those nominated by the academics. There were 1) their personal motivation to use technology; 2) monetary support for participant (e.g. stipend, overload); 3) intellectual challenge; 4) credit towards promotion and tenure and 5) time release (Schifter, 2000). The literature has reported that quite often academics were being offered monetary incentives to be involved in online teaching (e.g. as reported in McDonald & Reushle, 2002). This difference in perception should be noted if the right motivators for academics are to be implemented.

Those academic staff who took up the challenge of putting teaching materials online in the early days and who did so because of their personal motivation in using technology in teaching fit in as “early adopters” in Roger’s technology adoption framework (Rogers, 1995).

2.7.2 The Role of Online Learner

On-campus students tend to elect to take an online course due to factors of convenience. However, this may not be sufficient to sustain learners when they are not adequately prepared to participate in online courses (Dringus, 2000). In reality, not only do online students need to be equipped with computer and Internet skills, they also face challenges

such as isolation, dehumanisation or facelessness, and the social construction of identity (La Ganza, 2001), which are not usually present in the traditional classroom learning environment.

Often students enter an online course carrying the same expectations as they would with an 'on-campus' course that is taught in a classroom environment, i.e. that the teaching staff will 'teach' and they will 'learn' from the material provided (Palloff & Pratt, 1999). The truth is, the roles students need to take on in an online learning environment are much different from those in the traditional classroom-learning environment. Palloff and Pratt (1999) suggest that what distinguishes online learning from traditional classroom learning is that students need to take responsibility for their learning. Specifically they identify three different roles that an online student needs to take on: knowledge generation, collaboration and process management (Palloff & Pratt, 1999).

We cannot assume students know how to take on these roles automatically, they need to be told what is expected of them when they enrol in an online course or even to be taught on how to take on these roles (Palloff & Pratt, 1999).

Students need to be equipped with the necessary computer skills in order to participate effectively in an online learning environment (Taynton, 2000). At the very basic level, students need to know how to use a web browser such as Microsoft Internet Explorer or Netscape; to be able to navigate between web pages, understand the basic concept of hyperlinks; the use of at least one search engine, email, and file download utilities. We may assume that given the popularity of the computers and the Internet, students are expected to be computer/Internet literate by the time they start university. However, a recent study (Lim & Lee, 2000) on first year university students' IT skills shows that this assumption may not be valid. For example, out of the 71 students surveyed, 26% of them did not know how to use Web addresses (URL); 30% of them did not know how to download a file from the Internet; while 85% of the students know how to use email, 45% of them did not know how to use email attachments (Lim & Lee, 2000). When studying students' satisfaction of an online course, Mason and Weller (2000) discovered

that one of the key issues raised by many students was the time it took to become competent with the PC, the Web and/or computer conferencing. Taynton (2000) suggested that the steep learning curve for those students who are unfamiliar with computer technology could result in real feelings of anxiety and stress when engaged in online learning. One of the contributing factors could be computer phobia which Todman (2000) estimates that as much as 50% of undergraduate students suffered from.

While many children these days have greater exposure to computers and the Internet at very young age (Pastore, 1998) and therefore have fewer problems with technology skills by the time they attend university, mature-age students, on the other hand, may not be able to use technology to their best advantage (McLoughlin, 2000). Older students tend to suffer greater degree of anxiety when using computers for researching or for searching course related or assignment related information over the Internet (Waterman, 2000 as cited in Taynton, 2000). International students coming from developing countries where computer and Internet technology is not so widespread may also be faced with skills problems related to the use of ICT technology and would need to be trained (Madon, 2000).

Laurillard (1993) suggests that computer-based learning has a major role in promoting self-directed learning and increased student autonomy. However, the shift to student self-direction and autonomy implies that students need to take greater responsibility towards their own learning; many students may need assistance in achieving this skill (McLoughlin & Luca, 2001).

2.7.3 The Role of Online Teacher

The literature (e.g. Oliver, 1999; Radloff, 2001; Hope, 2001) on online teaching and learning suggests that there is a change of role for teachers in the online learning environment. This change usually involves both pedagogy and teaching practices (Oliver, 2001). The role of the online teacher has long been recognised as a complex and

demanding one with responsibilities spreading across multiple areas such as pedagogical, social, managerial and technical (Berge, 1995, Bonk et al. 2000).

Traditionally teachers were hired as the experts of knowledge, their primary role was to pass the knowledge to their students by means of telling them what they know and how they interpret the world according to books they read and other resources they studied (Jonassen et al, 1999, p219). But with the introduction of technologies in teaching, a teacher is transformed from being mainly a content expert, to a combination of content expert, learning process design expert and process implementation manager (Massy, 1997). Many have described online teachers as knowledge facilitators (e.g. Hope, 2001; Cashion & Palmieri, 2002) and managers of learning (Abi-Radd, 1997). In an online teaching environment, less emphasis is placed on lecturing and greater emphasis on facilitating the educational process, particularly drawing on the capabilities of technology to increase students' learning productivity (Wallhaus, 2000). However, Saye's (1997) investigation into technological innovation in one secondary school found that while many teachers would use technology, not all were likely to use it in ways that empower students to be active learners.

With increasing amounts of information on all topics being published and accessed on the Internet, people no longer 'own' knowledge. The truth is, if you know something, it is likely that others know the same. Therefore, in online teaching environments, one does not 'teach' in the same way as one does in the classroom. Rather, what is called for is a process of guiding and assisting whenever students are in need. The key issue is how an educator could help students to gain that knowledge and to make meaning of that knowledge. As Oliver (1999) pointed out, the role of the online teacher is "no longer the sage on the stage" but more of a guide or a coach who provides the students with access to a variety of independent learning experiences.

In a constructivist learning environment, in order for learners to construct their own knowledge, teachers must relinquish some of their authority – in both a management sense and intellectually so that teachers' roles now shift from dispensing knowledge to

helping learners to construct more viable conceptions of the world (Jonassen et al, 1999, p220). And greater emphasis is now placed on teachers being the learning designer planning for engaging learning activities, teaching for learning outcomes with assessment strategies in more authentic settings and often as an integral part of the learning process (Oliver, 1999).

Palloff and Pratt (1999) suggest four key areas to ensure the success of online courses. They are: the use of technology; the establishment of guidelines; promotion of participation; promotion of collaboration and promotion of reflection. Teachers need to be trained to use the technologies, even with the most powerful tools that are available teachers will not use them effectively if they do not understand how to use them (Abi-Radd, 1997). Many academics may not have the required skills and knowledge to design and develop online course material. They will require training and support from their university in order to take up the challenge in online teaching. As Palloff and Pratt (2001) pointed out, it is important to provide training to faculty in order to help them get started and also to provide support to their ongoing work in online teaching.

However, the use of technology is only one of the requirements for online teaching. Teachers are also expected to change the ways in which they organise and deliver teaching material (Palloff & Pratt, 1999). Shotsberger (1997) argues that online teachers also need the skills to blend communication technologies to foster a sense of community. Alexander (1995) argues that when applying information technology in teaching and learning, there is no reason to expect the quality of learning to improve if we simply transfer a learning experience from one medium to another. Instead of just focusing on the features of the technology, Alexander (1995) argued that

“educational developers [should make use of the] knowledge of learning together with an understanding of the features of the WWW, to design learning experiences which promote a deep approach to learning so that 'what' students learn is a deep understanding of the subject content, the

ability to analyse and synthesise data and information, and the development of creative thinking and good communication skills”.

The literature has emphasised the critical role of the e-moderator (Mason, 1991; Salmon, 2000; Harasim et al., 1995) in organising online conferences and Anderson and Kanuka (1997) believe a moderator is essential in creating a stimulating and supportive online learning environment. Barnes (2000) believes that an e-moderator in an online learning environment should assist participants to communicate their thinking as they work with new ideas or take an active role in a debate.

2.7.4 Access and usage

Online education raises the question of equity. Some claim that moving education to the Internet makes education more accessible, particularly for those who have physical disabilities or are living in rural areas and for many third world regions (Harasim, 2000). However, others may disagree. Houweling (1999) argues that not all learners have access to computer equipment and Internet connection, which are essential for online education. In Australia, when discussing educational equity, two particular groups spring to mind: those from low socio-economic backgrounds and those from rural and isolated areas (Western, 1998). Online education may enable greater access to education for those in rural and isolated areas, it may not, on the other hand, address the needs of students from socio-economically disadvantaged background (Blair, 1999; Houweling, 1999). Hence, students who have access to computing facilities available on-campus will have an advantage over those who must pay for an Internet Service Provider to gain access to the Internet (Palmer, 2002). Students who have computer and Internet access from home may also find themselves competing for time with family members; moreover, older modems means that the time to download learning material may make the whole process infeasible (Boyd, Fox & Hermann, 2000). Some students may be given permission by their employers to use computer facilities at their workplace to access the Internet, while this may not always be a satisfactory arrangement (Boyd, Fox & Hermann, 2000), for many students, this could be the only feasible option

(McInnerney, et al, 2003). Students who have access to computers and the Internet may still be faced with other de-motivating factors such as a sense of isolation from a learning community, which contributes to the low completion rate in online courses (Hope, 2001).

Users of online education are expected to be computer literate. This could mean that people with no access to computers or who do not have a high degree of familiarity with computers may be disadvantaged (West, 1998). There is also a general expectation that young students who are fresh from high school have a medium to high level of computer literacy whereas mature-age students are generally less familiar with computers. However, a recent study (Lim & Lee, 2000) that surveyed all first year chemistry students attending Geelong campus of Deakin University has found that students, quite independent of their age, did not have the computing skills expected of them by their lecturers. It is important that educational institutions recognise that students' computer literacy plays a significant role in their success or otherwise in online learning, and that they are willing to allocate appropriate resources to alleviate the problem as quickly as possible (McInnerney, et al, 2003).

One of the strengths of the Internet is its users' ability to readily have access to a high volume of information. However, at the same time, Internet users could also suffer from information overload, being sidetracked by following one link after another thus resulting in low productivity (Mackay, 1989). When assessing students' usage of the Internet, one needs to be mindful that connection time may not be directly interpreted as learning time as much of this time could be lost on screening through information or even wasted on irrelevant content. Another related problem is the quality of the information posted on the Internet. Without policies on standards and the absence of a governing body, the Internet's users are left to make their own judgements on the quality of information they come across. Due to the lack of expertise in the subject area, many students may find themselves not in the position to make such judgements accurately.

Online students may not access the required website frequently enough or spend enough time accessing the material. One major problem in an online learning environment is motivation and discipline as Mason and Weller (2000) reported: “it doesn’t require fixed time for study, but consequently other demands on one’s time easily take precedence”. Students who took an online class were reported as not doing as well as those took the same course in a traditional classroom; with only half of the online students using all material available and most spending zero to three hours a week studying (Wilner & Lee, 2002). Many online students also complained that online courses carry a much heavier workload with large amount of reading, especially reading from the monitor (Mason & Weller, 2000). Many online students feel that they are not sufficiently self-motivated or self-disciplined; they need to come to classroom so that they are being ‘forced’ to prepare for the lesson. Because there is no face-to-face contact in online learning environment, many students may find themselves so lagging behind that they are not able to continue with the course.

2.7.5 Communication

Communication is an essential component of any learning environment. In a face-to-face teaching-learning environment, interactions are achieved when the teacher and learners are in the same physical location at the same time. In an online learning environment, learners and instructors rely on Internet technologies to communicate with each other. Essentially, there are two kinds of interaction in an online learning environment, one being the interaction between the individual and the content, the other being the interactions between learner and instructor or learner with other learners (Collins, 1996). The first kind of interaction will be discussed further in next section “Design and Delivery”.

Communication in online learning environments can be classified into two categories: synchronous and asynchronous communication (McIsaac & Gunawardena, 1996). Synchronous communication is achieved when both the sender and receiver of messages are online at the same time but at different places; and asynchronous communication is when delivery of the message precedes the receipt of message by students (Graves,

1997). Synchronous tools such as online chat and web conferencing, enable real-time communication and collaboration in a "same time-different place" mode (Kaplan & Ashley, 2003). Asynchronous tools such as email and discussion boards, on the other hand, enable communication and collaboration over a period of time through a "different time-different place" mode (Kaplan & Ashley, 2003).

Today, online courseware such as Blackboard and WebCT, support both synchronous and asynchronous communication over the Internet to integrate all classroom related functions into one seamless and easy-to-use package. This enables online learners not only to participate in discussions online but also to do group projects without face-to-face meetings (Conaway, 2002).

While it was recognised that the key advantage of the use of the Internet in learning is its ability to facilitate communication and collaboration (Harasim, 1993; Harasim & Hiltz et al, 1995; Collis, 1996), the reliance on online technologies in this regard, however, could also pose a few problems. Firstly, there are often steep learning curves with new online tools for learners and instructors. In addition, learners must work out technical problems associated with their personal computers, particularly problems associated with hardware and software compatibility with network protocols (Dringus, 2000). The use of asynchronous communication also raised several issues such as the management and facilitation of the discussion, when to intervene, how to build a learning community for diverse groups of learners and how to manage the proliferation of text generated with large classes (McDonald & Reushle, 2002)

Feedback given to students from instructors forms an important part of communication in an online learning environment. Dringus (2000) suggests that three types of feedback: immediate feedback such as comments on assignment work; automated feedback such as scheduled system maintenance or policies; and personal feedback such as praise or critique on individual progress; could enable learners to remain focused on learning and communicating in online learning environment.

Academics who are used to classroom teaching may lack the necessary skills to facilitate effective online communication; Lewis (2000) suggests the “W.R.I.T.E.” approach – which is (W)arm, (R)esponsive, (I)nquisitive, (T)entative, and (E)mpathetic, provides an important guideline in this regard. McInnerney, et al (2003) added another important aspect: (R)espect to good communication.

Many students may not be convinced that online communication could be as effective as face-to-face communication. One major problem being the absence of body language and the absence of ‘tone’, which could lead to messages being misunderstood or wrongly interpreted. As Dringus (2000) suggests, online learners must become comfortable with interpersonal distances and become accustomed to having meaningful interactions with people through a computer screen thus removing face-to-face contact. Other known problem with online communication include the so-called “information overload” symptom where students are overwhelmed by the number of messages posted by their fellow students on discussion boards hence it becomes too time consuming to read them all and too difficult to “to sort the wheat from the chaff” (Kear, 2003).

Supporters of online communication, however, claimed that there are many benefits. Harasim (2000) claims that online interactions such as those via discussion boards, displayed fewer of the extremes typical of face-to-face activity such as excessive or dominating input by a few and little or no participation by everyone else in the class. Asynchronous communication, where students can have access whenever they choose for discussion and reflection allows everyone to have a voice, overcoming challenges and traditional discrimination factors such as ageism, sexism and racism (Harasim, 2000). One advantage asynchronous communication has over conventional face-to-face group discussion is that individuals could read messages and then respond in their own time, taking as long as they need to think out their responses (Romiszowski & Corso, 1990; Romiszowski & DeHaas, 1989). Some students find that with email they have more time to compose their questions before emailing them to their lecturer. This could be particularly useful for those who has difficulties with the language used. Similarly, when students received an email reply from their lecturer, they would have more time to

read through the message and could read it repeatedly if they wish. This is something they could not do with verbal communication in classroom situation. Online communication tools such as discussion boards allow students to share their learning experiences and enable them to seek help from their peers. However, it has been observed that students are more inclined to read messages than posting their own ideas.

The psychology of learners communicating in cyberspace is worth taking note of. It is well known that people may do or say things in cyberspace that they won't normally do or say in face-to-face interaction - for example, a normally shy student, may speak up during online discussion. This is known as the online disinhibition effect (Suler, 2002).

2.7.6 Design and Delivery

Traditionally, the design and development of learning material has been guided by the principles of instructional systems design, where the aim of the material is to provide a means to transfer knowledge from the minds of the expert (teachers) into the minds of the learners (Oliver, 2000). As constructivist learning theory is gaining more recognition in providing solutions to the many problems and inefficiencies with conventional forms of teaching, the use of technology has also provided many opportunities to enable such a student-centred and constructivist-learning environment (Oliver, 2000; Wilson & Lowry, 2001).

As the content developer, not only does the academic have to ensure the content of the course is appropriate but he must also ensure that the material is presented in such a way that the learning objectives are being achieved. To do that, firstly academics must have the skills in using the software for web-based content development such as TopClass, WebCT or BlackBoard. Secondly, they must have knowledge of design and awareness of human-computer interaction considerations so that they will know the appropriate use of multimedia such as colour, graphic, text, audio, video, animation and other special effects to achieve the desirable outcomes. However, one must not place unrealistic expectation on the purpose of using multimedia in education delivery. Laurillard (1994) asserted that "discovery learning is over-ambitious – even at postgraduate level students

need a lot of guidance. It is a misuse of multimedia to expect it to deliver learning by this means". In order to ensure the content of course material is comparable and up to date, one must also be skilled in researching on the Internet and make students aware of relevant sites and keep track of the emergence of new sites.

Interactivity is a key consideration when designing online course material (Mesher, 1999). The effect of interaction is also well supported by education theory, as Barker (1994) put it "interactivity is a necessary and fundamental mechanism for knowledge acquisition". With the aid of technology, Lander (1999) argued that "the effects of interactions between the learner and the tasks at a cognitive level can, in many cases, be richer and more effective in online than face-to-face situation". How could interactivity be achieved in online teaching? In defining an interactive online learning environment, McLoughlin and Oliver (1995) emphasized learner control and engagement in order to reach understanding and knowledge.

Without face-to-face contact, one should be mindful about accessibility, particularly accessibility to learners with disabilities when designing online course material. Very often, multimedia content is being utilised in online course material to provide a more vibrant learning experience for the learners. However, multimedia can only achieve its purpose if students are able to access the information. Varvel (2000) explains that several problems could result in multimedia not being accessible. Firstly, technical problems such as older versions of web browsers or the lack of hardware such as speakers could prevent students from accessing multimedia material. Students with disabilities may also face problems in accessing multimedia content; students with deafness, for example, would have problem with audio or video content if captions were not provided. Similarly, students with colour blindness may not see images as they were intended. Blind students would need to rely on audio access when using the Internet.

Students' reaction to the design of online learning material could influence students' performance in online learning environments. Computer users would not show enthusiasm in using badly designed computer systems and the same human-computer

interaction issues applying to interfaces designed for online learning. The use of colour, graphic and linkage between web pages are all part of the whole design consideration. In addition, students are used to the classroom learning environment and they would make similar assumptions and have certain expectations when engaging in online learning.

2.7.7 Quality of Online Courses

Quality has always been an important issue as far as formal education is concerned. In recent times quality measurement and assessment have arisen in debate as formal education evolves to take a different form and shape from its centuries old origins. As Pond (2002) pointed out, early academic education was devoted almost exclusively to transmitting content or “knowledge”, therefore, the criteria for “quality” were limited to firstly the assessment of whether or not the instructor was a content expert and secondly if the students could demonstrate, through some type of examination, a mastery of the information provided to them by the teacher. Moreover, early formal education was an extremely exclusive activity, reserved for a very small and elite portion of the population, and this, the educational institution believed, maintained the quality of the learning process.

Today, education takes on different purposes, uses different methods and has become more “democratised” and is thus available to a much broader population (Pond, 2002). The use of technology such as the Internet for online course delivery has provided much greater education accessibility and flexibility to many learners; it has, however, also created new challenges for quality assurance and accreditation. As Pond (2002) pointed out, “the traditional mainstays of quality assurance such as physical attendance, ‘contact hours’, proctored testing, formal academic credentials for instructors/trainers, library holdings, and other factors are often impractical or simply irrational in today’s educational reality.”

In light of the changes in education, there is a need for new paradigms in accreditation and quality assurance of academic education. Specific frameworks used for measuring and improving online education quality such as the Five Pillars for Quality Online

Education was proposed by the Alfred Sloan Foundation's Sloan Consortium (Sloan-C) in the mid-90's (Lorenzo & Moore, 2002). The framework assesses quality in online education from five different perspectives: learning effectiveness, student satisfaction, faculty satisfaction, cost effectiveness, and access (Lorenzo & Moore, 2002). Some higher education institutions have set up policies to ensure quality is achieved in online teaching and learning activities. The RMIT University in Melbourne, Australia is one such example. RMIT's policy for quality assurance of online courses requires online courses to show evidence of educational design and planning, evidence of peer review and evidence of formal evaluation (McNaught, 2002).

Student satisfaction is an important measure of quality. The literature has various suggestions on how student satisfaction could be achieved. Humbert (as quoted in Lorenzo and Moore, 2002) stressed that students, like customers, are satisfied when they received responsive, timely, and personalised services and support, along with high-quality learning outcomes. This "consumer-based" means of judging quality is very much in agreement with Pond's (2002) view that the emphasis should be on student experience rather than institutional experience and that students play an important role in determining quality in education. Pond (2002) also suggests that an "outcome based" model could be used in assessing quality in education where one should "focus on what outcomes we desire from educational experiences, not the means by which they are delivered" (Pond, 2002).

Several factors have been identified to have impact on student satisfaction in online education. Academic and administrative support services (including admissions, registration, career advice, tutoring, academic advising, library, etc.) are two key factors. Frequent contact between students and faculty, a lot of reciprocity and co-operation, a lot of student-to-student interaction, active learning techniques, and communication of high expectations – all these contribute to student satisfaction with the course they enrolled in (Lorenzo & Moore, 2002). It was also suggested that the best indication of student satisfaction in online courses could be found in graduation and retention rates (Vignare as quoted in Lorenzo and Moore, 2002).

Given that faculty are the ones who do the actual teaching, it is no wonder that faculty satisfaction has a significant impact on education quality. Thompson (as quoted in Lorenzo & Moore, 2002) reports “faculty members appreciate the additional flexibility offered by online learning environments both for themselves and for their students”. Faculty also find the experience of learning and using educational technologies increases their teaching effectiveness (Lorenzo & Moore, 2002). Indeed, as Schifter (2000) discovered, faculty are most likely to participate in online teaching and learning “due to interest in using computers in teaching, interest in exploring new opportunities for programs and students and interest in the intellectual challenge, rather than monetary or personal rewards”. The inhibiting factors, on the other hand, were identified as “issues essential for a program to be successful, i.e. institutional support for faculty, technical infrastructure and course development needs” (Schifter, 2000).

For many students, accreditation is one way to assured quality when choosing online programs (Hope, 2001). However, after graduation, getting online degrees recognised by potential employers poses another challenge for many online students. According to a study by Vault (Vault.com, 2000), 61% of employers being surveyed believe that online degrees are not as credible as their offline counterparts. Conaway (2002) agreed: “it was hard for an employer to differentiate a lesser-known online university from a diploma mill churning out phoney degrees for a moderate fee and no effort on the student’s part”. However, the same study also pointed out 77 percent of hiring managers say that an online degree received through an established university such as Duke or Stanford is more acceptable than a degree earned through an Internet only university. Despite concerns, it was reported that acceptance of online degree programs is on the rise: as more traditional and quality institutions begin to offer online programs, they will become more common and widely accepted (Back2College.com, 2004).

2.7.8 Support and Assistance

Support for student learning is identified in much of the literature as critical for effective teaching in any learning environment (Chalmers & Fuller, 1996; Posser & Trigwell, 1999). The need for flexible access to resources and learning support is even more imperative in a distributed learning environment (Chalmers & Fuller, 1996; Fowler & Branch, 2000).

(Lefoe, Gunn & Hedberg, 2001)

The lack of technology skills from many students could translate to greater need for support from the university. Students in an online course had cited that support (or lack of) of students and tutors was one of the factors that most affected students' satisfaction with their online course experience (Mason & Weller, 2000).

Davis (1999) in his study found that students rated trial and error, credit classes and peer support as the more effective methods in learning computer skills than faculty support, online help and printed documentation. While 'trial and error' and 'credit classes' required individual effort on the students' part, Internet communication facilities such as email and discussion groups or bulletin boards could facilitate peer support amongst students. The irony, however, was that students needed first to know how to use these facilities before benefiting from them.

In fact, students participate in open and distance learning, which incorporate online learning, need support for more than just the use of technology. Tait (2000) proposes a threefold functional model of student support that includes:

- Cognitive: covering the provision of appropriate learning resources,
- Affective: that is related to the emotions that support learning and success, and
- Systemic: helping students to manage rules and systems of the institution in ways that support persistence.

McLoughlin and Luca (2002) stress the importance of the social support in an online learning environment because “students need an environment that provides support for learning through social interaction, engagement and community building”. With that in mind, they argue “educators need a holistic perspective and a framework for supporting learners by creating environments that values the social, experiential, participatory and interpersonal”. Oliver (2000), on the other hand, argues that the most effective support in a web-based learning environment comes from peers. In a collaborative learning environment allow learners articulation of ideas and thinking could assist the development of learners’ understanding (Oliver, 2000).

Research indicates that support and assistance are needed for lecturers to employ the Internet as a teaching and learning tool (Cronje, 2001; Singh & Erwin, 2001; Valdez et al, 2000). Lecturers need to learn how to teach online, as Gold (2001) found out that even the very experienced classroom teachers felt that they want to take a course in online teaching. Sadly, many institutions do not recognise such needs and are not providing such courses (Gold, 2001).

To ensure success in online teaching and learning, students and teachers need support and assistance in technical aspects as well as pedagogical aspects. A good example of such support is that offered by Illinois Online Network (ION) (Varvel, Lindeman & Stovall, 2003). At ION, not only do they help faculty to develop and deliver courses in a complete online format but they also aim to produce online courses that incorporate best practices for engaging students in discussion and critical thinking (Varvel, Lindeman & Stovall, 2003). Results of evaluation surveys from participants of ION indicate that ION activities have had a positive impact on the satisfaction and confidence of faculty teaching online courses (Varvel, Lindeman & Stovall, 2003).

Some universities also ensure that students doing online courses are getting adequate support and assistance. Pace University is one such example. According to Sachs and Hale (2003), Pace University has focused on student satisfaction in their online courses since the inception of the program. Students are provided with technical assistance right

from the beginning as well as “online tutoring” facilities to deal with difficulties with certain subjects. Online students at Pace University are surveyed extensively and frequently from the beginning of their course to determine what assistance is needed. Results of the surveys are used as direct feedback to administrators and faculty who are involved in the program. As far as is reasonable, courses are continually modified and improved in response to students’ feedback (Sachs & Hale, 2003).

2.7.9 Impact of Students’ Demographical Factors

Many studies have attempted to create a “typical” profile of online students.

The literature has described online students as older, mature, self-initiators interested in outcomes (Hiltz, 1994); they usually seek further education voluntarily, are motivated, have higher expectations and are more self-disciplined (Palloff & Pratt, 1999).

Dutton and Dutton’s (2002) study also found that online students were older, they are less likely to be enrolled in full time study, they are more likely to have job or childcare responsibility and they are more experienced with computers. These characteristics were also evident in Diaz’s (2000) study, which found that online students were decidedly older (62% between 22-50 year old) than the traditional class (49.3%) and they were more academically experienced with over 36% having completed more than 60 college units compared to only 8.5% of the traditional class. In addition, the study also found the white ethnic groups were disproportionately represented in online classes (81.3%) compared to traditional classes (76.1%). His findings were in line with those by Thomson (1998). Diaz’s study also found that online students scored higher on the Independent Style scale and lower scores on the Collaborative and Dependent Style scales.

Koohang and Durante’s (2003) study on web-based learners’ perceptions, however, found that age and gender bore no significant difference on learners’ perception whereas learners’ level of experience with Internet did. Similarly, Hong, Ridzuan and Kuek

(2003) also found that race, gender and students' scholastic ability did not influence students' perception of using the Internet in learning; but students with better basic Internet skills had better attitude towards using the Internet to improve their studies.

Students' learning objectives played another significant role. Do they view 'flexibility' as more important than 'real' experience? Part time students would generally view flexibility as more important than 'real' experience. Cultural background also influences their sense of value in education. For example, it was said that students from many Asian countries where their societies were founded on Confucianism, would view education in a more traditional sense in which students should be learning from knowledgeable gurus (Hofstede, 1986). To these students, learning from computers and the Internet may appear to be of less value thus leading to disappointment.

2.8 Summary

This Chapter presented a review of the literature relevant to the core subject of this study. The Chapter began with defining the terms commonly used in the area of online teaching and learning and was followed by an examination of the current developments in the area as well as having its promises, problems, and pedagogy being identified and discussed. A number of important issues emerged from the literature including the roles of learner and teacher, design and delivery and access and usage. These issues set the foundation of investigation for the study where opinions of students and lecturers were sought. Past studies on online student demography proved to be inconclusive hence prompted a re-visit of the issue in this study.

The next Chapter will discuss the research method used in this study as well as the design of the research instruments.

Chapter 3: Research Method and Design

3.1 Introduction

The purpose of this chapter is to provide a detailed description of the research approach, data collection methods and the research design of this study.

The survey research approach was employed to conduct this study. Two different methods were used to collect both quantitative and qualitative data. A questionnaire was used to collect data from the student sample and in-depth interviews were conducted on lecturers. Mainly quantitative data were collected from students but the open-ended questions asked in the questionnaire also provide a small amount of qualitative data. Data collected from lecturers were of a qualitative nature.

The remainder of this chapter will discuss the following in detail:

- The survey approach
- The research methods
- The design of the study including the detailed design of research instruments
- Data sample
- Data collection
- Data analyses

3.2 The Survey Approach

After surveying the literature and reviewing the Galliers' (1991) taxonomy of research methods, it was deemed that the appropriate research approach for this study would be the use of the survey. Surveys are characterised by the way data are collected. In a survey, data of the same set of variables are collected from multiple cases so as to form a data matrix. Each column represents a particular variable and each row representing data of all variables from one case (de Vaus, 1991). Surveys are often used by researchers to

obtain answers from multiple respondents on the same set of questions (Neuman, 2000). In some cases the survey researcher can expose a group of people of a target group, in which the researcher intends to generalize, and to record their reactions (Krathwohl, 1993). The usual aims of survey study are to “measure many variables, test multiple hypotheses, and infer temporal order from questions about past behaviour, experiences, or characteristics” (Neuman, 2000). While experimental studies attempt to control variables to observe the outcomes, survey approaches do not. Instead, the survey approach studies the natural occurrence of the variables (de Vaus, 1991). Survey researchers are also interested in causes of phenomena and aim to draw causal inferences between variables. Krathwohl (1993) states that the survey researcher “is usually interested in [the] common responses to the questions, the variability in responses, and the interrelationships of certain responses, especially those involving demographic information or measures of social or psychological variables with positions on issues”. The common methods used for survey study can include questionnaire, both structured and in-depth interviews, observation and content analysis (de Vaus, 1991).

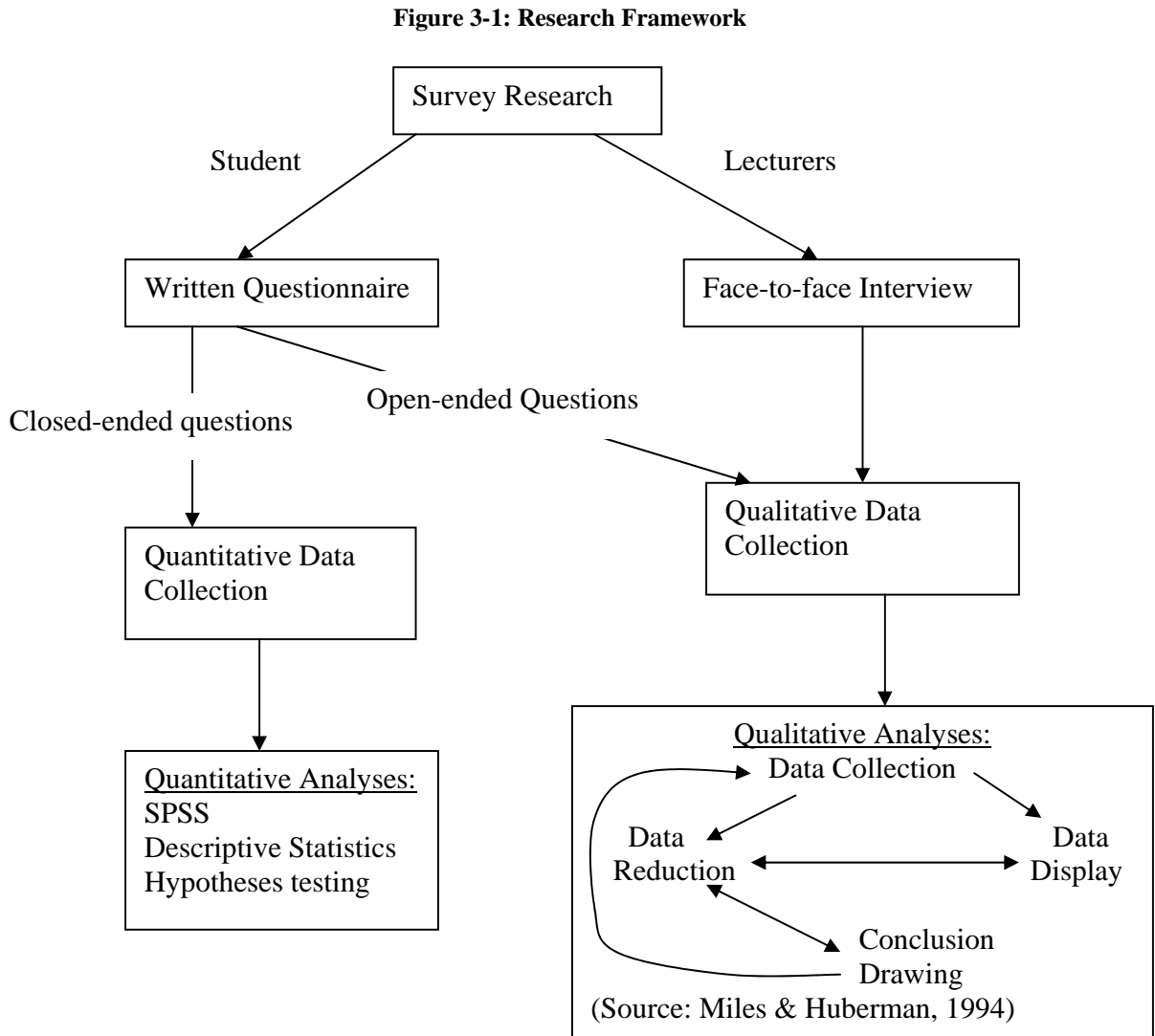
Babbie (1990) states that a survey may be used for descriptive, explanatory and exploratory purpose. The purpose of this study is considered to be mainly descriptive and partly exploratory; it was therefore appropriate to adopt the survey approach as the underpinning enquiry mechanism for the investigation. This study aims to: 1) gather opinions from a group of experienced students and lecturers on the topic of online teaching and learning; 2) test a set of variables that had been identified from the literature that may have significant impact on the students’ online learning experience and perceptions; and 3) seek insight into lecturers’ experience in online teaching. This study is descriptive because it aims to analyse and describe the online teaching and learning phenomenon through a group of students and lecturers. It also attempts to describe the relationship, if any, between students’ demographical factors and their perceptions. It is also exploratory because it aims to explore areas of concern on the topic through the study of teachers’ and students’ experience.

A range of data collection methods can be used in a survey study, they include questionnaire, structured interviews, in-depth interview, observation and content analysis (de Vaus, 1991). Questionnaire and in-depth interviews were the two selected data collection methods for this study. A questionnaire was used to gather students' opinions and the lecturers were interviewed. The questionnaire is the most common technique used in survey research (de Vaus, 1991). Questionnaires can be administered in either written form or through interviews. A written questionnaire was chosen to collect data from students for two reasons. Firstly, in this study, the researcher was interested in finding out students' opinions and attitudes towards certain aspects of online teaching and learning. The majority of the questions asked the students were of a close-ended nature. Students were asked to choose an answer from a given Likert-scale. This would be more difficult to undertake in an interview situation. Secondly, for the purpose of testing hypotheses, significant data sample size was needed (sample size and research design will be discussed later in this Chapter). Interviewing a large number of students would be too time consuming.

Data to be collected from lecturers, on the other hand, were intended to be more of the open-ended nature where lecturers were asked to describe their online teaching experience in detail. It was decided that face-to-face interview was best suited to collect this form of data. An influencing consideration in this choice was de Vaus (1991). He suggests that open-ended questions are best asked when people are able to give their answer verbally rather than in writing since many people experience greater difficulties putting ideas in writing.

A focal group interview was initially planned to collect data from a sub-group of students with open-ended questions. However, due to time constraints, and also the fact that there were only two open-ended questions and one asking for further comments; and that lengthy answers of these questions were not expected, these open-ended questions were included in the student questionnaire.

Figure 3-1 below shows the framework used to guide the research design for this study:



3.3 Triangulation

The use of a variety of data, investigators, theories, as well as methodologies in research is known as triangulation (Denzin, 1989). The logic of triangulation is based on:

No single method ever adequately solves the problem of rival causal factors. Because each method reveals different aspects of empirical reality, multiple methods of observations must be employed. This is termed triangulation. I

now offer as a final methodological rule the principle that multiple methods should be used in every investigation.

(Denzin as quoted in Patton, 2002).

Two types of triangulation were used in this study, data triangulation and methodological triangulation. Data triangulation refers to the use of a variety of data sources in a study (Denzin, 1989). In this study, data used for investigation were collected from students as well as from lecturers. Methodological triangulation, where more than one method was used, was also used in this study. Questionnaire and interview were the two different data collection methods used in this study. The use of triangulation has resulted in the researcher's ability to examine the perceptions and related issues of online teaching and learning from both the students' and lecturers' perspectives using both quantitative and qualitative data.

3.4 Research Design

As has already been stated, two survey instruments were used to collect data. The aim of this approach has been to gain a richer set of material with which to analyse the outcome. The design of both instruments is discussed below.

3.4.1 The design of the student questionnaire

The main objective of the questionnaire was to collect data from students regarding their perceptions and experiences of online teaching and learning. Data were collected so as to answer research question 1 and 2 but also to be used for evaluating research question 4 (see Section 1.5 Research Questions).

Study of the literature on online teaching and learning provided a background for designing the questionnaire. A number of important issues related to online teaching and learning were revealed in the literature study and this questionnaire was designed to investigate students' attitudes and opinions on these issues.

The format and content of this questionnaire was adapted from one that was used in Chang's (1996) study. Chang used a questionnaire to study students' perception of the effectiveness of computer-based learning technology in an information systems unit. Because both Chang's study and this study are investigating students' perceptions and experience of a particular learning environment, Chang's questionnaire was used as the starting point to design this questionnaire.

Many questions in this questionnaire were close-ended questions presented in a mixed format of questions and statements. While Chang (1996) uses a 7-point likert scale ranging from "Strongly Disagree" to "Strongly Agree" in her questionnaire; this study, however, uses a 5-point likert scale where students were asked to choose from "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". This five-point scale was used as suggested by literature in research design such as that in Neuman (2000, p262) and Babbie (1990, p127).

There were three open-ended questions in the questionnaire where students were asked to provide their own answers. It was necessary to leave these questions as open-ended for the following reasons: a) there could be many possible answers from the respondents; b) to permit the respondents to provide more details in their answers; c) unanticipated findings could be discovered (Neuman, 2000, p261).

The questionnaire was divided in seven sections each with a specific area of concern. A copy of the questionnaire can be found in Appendix I.

Section A of the questionnaire asked students their perceived usefulness of online teaching in their units. There were two questions in this section. In the first question, students were asked if they find online teaching to be useful in their unit and to give reason(s) to support their answer. The second question asked the students to provide suggestions as to how online teaching in their units could be improved. These were two of the three open-ended questions asked in this questionnaire.

Section B of the questionnaire aimed to capture the students' attitude towards the role of online teaching in higher education. Not only were students asked about the experience in online teaching and learning but also how they would see the use of the Internet and WWW in higher education in general. Students were also asked to compare online teaching and learning with the traditional classroom based teaching and learning. The perceived attitudes of their lecturers and peers on the topic were also solicited.

Section C was concerned with the students' usage pattern of online course material. Given that the underlying assumption of online education is the reliance on technology, the success or failure of online education is thus dependent on the willingness and competency from students' to make use of the technology. Hence, it was important to ask, "Do students use Internet tools such as email and bulletin boards to communicate with their lecturers/tutors and/or fellow students?". The purpose of this investigation was two fold. Firstly, the usage pattern could reveal the students' willingness and competency in using the technology and secondly, to determine the association, if any, between the students' usage patterns and their perceptions of online teaching and learning.

Section D was designed to seek students' opinions on the quality and design features of the online material and its efficiency in delivery. Interface design encompasses three distinct, but related constructs--usability, visualization, and functionality (Vertelney, Arent, & Lieberman, 1990). It is therefore reasonable to assume that interface features such as colour, screen layout, response time and ease of use, have a significant impact on users' perception of the technology used. Answers to questions from this section, together with lecturers' data would also be used to examine research question 4.

Section E was designed to find out if students had made use of the Internet facilities such as email and discussion groups to communicate with teaching staff or amongst themselves over subject matters. One of the important aspects of the use of Internet in education is its ability to bring people separated by space and time to access learning

resources from around the world (Ryan, et. al, 2000, p100). As Pask, Laurillard and others (as cited in Ryan, et. al, p25) have argued that learning takes place through conversation, this form of communication mediated by the computers offers great opportunities for interaction that is essential to the learning process (Ryan, et. al, 2000, p100). It was therefore important to find out if students were aware of the communication capability brought about by the Internet/WWW and whether they appreciate the benefits that come with it.

Section F dealt with students' experience and satisfaction over the online learning environment. In addition, students were asked to compare this experience with classroom learning experiences in terms of which study mode provided a better understanding of subject content and knowledge retention. Students' responses to these questions were deemed to be of utmost importance in determining if students were ready to replace the classroom with an online learning environment.

Section G was designed to provide a general demographic profile of students who had participated in this study. The forming of perception is a very complex process and could be affected by many factors including cultural background, past experiences and the environment. By noting the students' demographic information such as gender, age group, course discipline area, course level (undergraduate/postgraduate), study mode (part-time/full-time) and cultural background (Australian/International student); the co-relationship, if any, between any of these factors and the students' perceptions could be investigated. The last question in this section and the questionnaire asked students if they had any further comments about online teaching and learning. The purpose of this question was to offer students, after going through the entire questionnaire, an opportunity to express their opinion on what was lacking in the questionnaire and to bring that to the awareness of the researcher. This was the third open-ended question in this questionnaire.

One open-ended question was immediately followed by a close-ended question where students were asked if they found online teaching useful in their units. The open-ended

question then asked them to explain their reasons. The second open-ended question asked students to provide suggestions in which online teaching in their unit could be improved.

The questionnaire was reviewed by a colleague of the researcher, and a trial was performed with five volunteer students from a unit where the researcher was a tutor. Feedback from the colleague included the suggestion of placing the two open-ended questions about usefulness of online teaching and learning at the very beginning of the questionnaire where students are more likely to spend time in providing meaningful answers. And the last open-ended question to be placed at the end of the questionnaire so that students could write their comments after finished answering all the other questions. Feedbacks from the students after the trial also resulted in some of the questions being phrased differently to improve clarity.

3.4.2 The design of the lecturer interview

An interview plan was designed to collect data from lecturers on their perception and experience of online teaching of their units. A copy of the interview plan can be found in Appendix II.

Data were collected from lecturers using a semi-structured interview approach. This approach was adopted so that all interviewees would answer the same set of questions but also had the opportunities to offer their opinions on other aspects of the topic. One advantage of using this approach was the ability to compare and contrast the responses from all the interviewees and at the same time adding richness to the data through allowing flexibility.

The first question (see Appendix II Interview Plan) of the interview schedule consisted of some general questions about the unit such as enrolment number, students' background and hours of class contact. Questions in the interviews were guided by *Research Question 3: How do lecturers perceive the use of the Internet and WWW in higher education delivery?* This was refined into several sub-questions. Each sub-

question would then be used to design the actual interview questions. Each of these sub-questions is described below:

Sub-question 1: In what ways did each lecturer use the Internet in their teaching? Why?

The literature shows that the Internet/WWW is being used in more than one way in teaching (Finder & Raleigh, 1998; Ryan, et al, 2000, p23). For example, some might only use it for publishing course materials such as lecture notes, assignments, etc and others might have the entire unit online with no face-to-face contact at all. Lecturers were asked about how they used the Internet/WWW in their teaching and their reasons for doing so. The intention was to identify the popular usage of the Internet/WWW in education delivery and to determine the factors that contributed to the decision in selecting a particular usage.

Sub-question 2: What were the difficulties confronting each lecturer when using the Internet/WWW in teaching?

Although computer literacy is a common expectation amongst educators, not every lecturer would consider himself or herself as expert in applying the technologies in teaching. In particular this is the case with the very new Internet technology, which has become popular over the last five years. Many would agree that designing online teaching material for online delivery could be a very time consuming and tiresome task. The researcher's intention here was to pinpoint the exact problems that confronted lecturers when using the Internet in their teaching. The lecturers were also asked about the type and the extent of assistance made available for them during the development process. The rationale was that by identifying the difficulties faced by the lecturers, the management could evaluate the current situation and allocate resources and expertise to assist in the needed areas.

Sub-question 3: How did each lecturer perceive his or her students' acceptance or refusal in using the Internet/WWW in teaching?

In a conventional classroom-teaching situation, lecturers could easily obtain feedback from students and based on this feedback, the lecturer could act upon and make

improvements to the teaching. Online delivery often implies reduction in face-to-face contact between lecturer and students. As a result, a lecturer could have reduced feedback on how students were receiving the unit, the type of difficulties they might be encountering and also their acceptance or refusal of the mode of education delivery. Data obtained from lecturers would be cross-referenced with students' data when answering research question 4.

3.5 Data Sample

Before data collection, the sample from which the data were to be collected needed to be considered. Since the core of the topic was higher education, the background of the study was an Australian university. Curtin University of Technology was chosen as the participating university not only because the researcher is directly affiliated with that university but also because it shares many common characteristics with other government funded universities. Within the university, students and lecturers from a few units were asked to participate in the study. A course in Curtin University consists of many units, which the students need to complete before they graduate from the course. Each unit has a lecturer-in-charge who is responsible for the running of the unit. Students enrolled in the same unit will have to fulfil the same set of requirements of the unit. The selection criteria for units to be chosen for this study are discussed below.

When selecting the units for this study, attempts were made to incorporate units that were of a different nature in terms of subject area, students' backgrounds, class size and so on. This was done in order to enable comparative studies to be performed on data collected (from students and lecturer) from each unit. The rationale for the incorporation of diversities in the data sample is two fold: firstly as an attempt to reflect the variety in the population of units and secondly to allow more related issues on the topic to emerge so as to provide a better insight into the situation.

The following were the underlying assumptions for the data sample selection:

- Postgraduate students are more prepared for online learning than undergraduate students;
- Students who are studying a computing unit are more equipped to use the Web;
- Lecturers who teach units with larger enrolment numbers face more problems when teaching on the Web.

Two particular groups of students, first year students and those enrolled in complete distance learning, were excluded from the data sample. The reason for not including first year students was to ensure participants in this study had some experience in the university learning environment. First year students would probably have yet to acquire that experience. Distance learning students were excluded for two reasons: firstly, their situation differs from on-campus students because they could not compare the classroom-learning experience (for whatever reason). Secondly, the use of the Internet and the WWW in distance learning is a separate research topic of its own right and would not be appropriate to include in this study.

The online teaching experience of the lecturers was also one of the criteria in sample selection. In order to obtain a variety of views from the lecturers, opinions would be sought from those who were experienced in online teaching and also those who were new to this mode of delivery. Initial telephone calls to intended participants (lecturers) provided the opportunity to establish a brief profile of each lecturer's online teaching experience.

Based on the above assumptions and constraints, six units were selected initially consisting of:

- An undergraduate unit
- A postgraduate unit
- A computing unit
- A non-computing unit
- A large unit (with more than a hundred enrolments)
- A small unit (with less than twenty enrolments)

However, during the data collection process, the lecturer in-charge of one of the units decided to withdraw from the study (no reason was given), consequently data were collected from the remaining five units. However, the above criteria of the units still applied because some of the units incorporated two or more of the criteria.

All five units were taught in Curtin University of Technology. Of the five units, two of them were from the Business division, one from Humanities, One from Science (Computing) and one from Engineering. With respect to the two Business units, one was at undergraduate level, although there were some graduate students (13%) attending the class, and the other at postgraduate level with 100% of the students attending a postgraduate program. All units except one (Engineering) were run at the Bentley campus. The engineering unit was run at the Kalgoorlie campus.

3.6 Data collection

Data were collected from students and lecturers separately. The timing of data collection in this study was an important issue. The researcher realised that in order to obtain valid responses, the timing of the surveys needed some careful consideration. Both students and lecturers needed to be given sufficient time to explore and experience the online teaching and learning environment before they were in the position to comment. There were fourteen teaching weeks in one semester, so if data were collected too early in the semester, students and lecturers would not have had sufficient experience with online teaching and learning to provide valid data. This would particularly apply for those who did not have any prior experience in online teaching and learning. It was therefore decided that the data collection for this study should not take place till sometime towards the end of the semester when students and lecturers had spent most of the semester experiencing the online learning and teaching environment. However, to collect data towards the very end of the semester could mean a lower response rate, as a high absence rate from students was not uncommon towards the end of the semester when students become very busy with assessment work and start to miss lectures. Many students would also be reluctant to participate in activities that were not directly related

to their study given the close approach of the examination period. This was also one of the main reasons why the initial plan for the student focus group interview was cancelled.

3.6.1 Collection of students' data

Students' data were collected over two weeks between 5th and 16th October in 1998. For each group of students, the questionnaire was administered and collected during their lecture time. Prior arrangement was made with each lecturer of the five units for the actual survey date. Each lecturer was given the choice of having copies of the questionnaire mailed to them to be administered during lecture time or to have the researcher administer the questionnaire at one of their lectures. At one unit the researcher conducted the questionnaire personally. For the other four units the lecturer-in-charge administered the questionnaire and returned the completed questionnaires to the researcher. The reason for having all questionnaires administered during class contact time was to ensure a high response rate. The students were given time to fill in the questionnaire and were not allowed to take the questionnaires away with them, thus all distributed questionnaires were collected.

The only problem encountered was, as expected, that because the questionnaires were administered towards the end of semester, not all students were attending lectures when the questionnaire was distributed. Two units in particular, had only half of the actual enrolled students present in that week; consequently, the response rate from those two classes was only 50%. Table 3-1 shows the student enrolments and the corresponding number of questionnaires received from each group.

Table 3-1: Student Enrolments and Number of Returned Questionnaires

	Student Enrolments	Number of Responses	% Returned
<i>Group1</i>	38	19*	50
<i>Group2</i>	39	27	72
<i>Group3</i>	143	122	85
<i>Group4</i>	52	26	50
<i>Group5</i>	29	20	69
<i>Total</i>	301	215	71

*Note: The responses in *Group1* contained a high number of missing data. The majority of students only answered questions in one section (Section A), consequently the actual responses to most questions were only 5 to 7, which was a 13% to 18% response rate.

As indicated in Table 3-1, the response rate was 50% or above for all five groups. There were 301 students enrolled in those five units, however, at the time of data collection, only 215 students or 71% of them were in classes to participate in the survey.

3.6.2 Dealing with small data sample

As indicated in the above section, while the overall student sample size is within an acceptable range, four of the five student groups could be considered as a small sample size with each group having less than thirty responses. One group, in particular, had only five to seven valid responses to most questions. This is considered problematic when applying quantitative analyses as it is not acceptable, from a statistical perspective, to draw conclusion from such a small sample size. It would have been seen as the normal practice to abandon these small data samples and re-select other group with larger student number. However, three reasons prevented the researcher from following that path. Firstly, as stated in section 3.4, these groups of students were selected according to certain criteria and to re-select other groups would mean a time-consuming process and would not have been feasible given the time constraint. Secondly, the reason for the very low response rate in that particular group was worthy of reporting and to discard that group would have meant to forgo the opportunity to report one of the truths in online teaching and learning. Thirdly, quantitative analyses on individual group was mainly to

yield descriptive statistic results; hypothesis testing would be performed on the entire data sample and given the entire data sample size was over two hundred students, it should be large enough to allow conclusions to be drawn.

3.6.3 Collection of lecturers' data

Lecturers of the five selected units were contacted in early August 1998 to arrange for interviews. The actual data collection took place over three weeks between 28th August and 16th September of 1998. Individual appointments were made with each lecturer and the five lecturers were interviewed separately. In each interview, the interview was conducted in either the lecturer's office or the researcher's office where only the researcher and one of the lecturers were present in the room. There was no set time limit for the interview; however, some lecturers had indicated their own time constraints at the beginning of the interview. An interview plan was used in each interview to ensure all lecturers were asked the same set of questions, however, each lecturer was free to express his opinions on any aspects of the topic and it was up to the individual lecturer to decide how much he wanted to expand on each question. A tape recorder was used at each occasion to record the entire interview process. Table 3-2 below shows the duration of each of the five interviews:

Table 3-2: Duration of each of the five interviews

	Interview Duration (in minutes)
<i>Lecturer1</i>	45
<i>Lecturer2</i>	55
<i>Lecturer3</i>	65
<i>Lecturer4</i>	30
<i>Lecturer5</i>	110

3.7 Data Analysis Methods

This section outlines how data were being analysed in this study.

“In general, data analysis means a search for patterns in data – recurrent behaviours, objects, or a body of knowledge. Once a pattern is identified, it is interpreted in terms of a social theory or the setting in which it occurred. “

(Neuman, 2000, p426)

As students’ data and lecturers’ data were collected using different methods, their analyses were therefore, as expected, different.

Both quantitative and qualitative data were collected from students. Quantitative data collected using closed ended questions on the questionnaire were analysed using two main types of quantitative methodologies: descriptive analysis applying frequency distribution on all variables, and the measure of association between some variables.

The following table outlines steps to be taken in analysing students’ data:

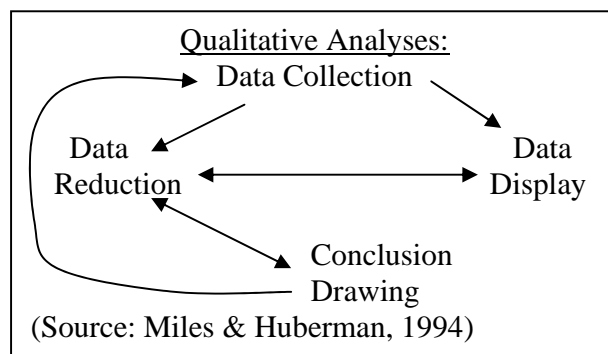
Table 3-3: Steps in student data analysis

Step 1	Each question on the questionnaire was coded as a variable and entered into a spreadsheet using the SPSS program. Responses were entered as numeric data. Some demographical variables were transformed from multi-categorical data to dichotomous data for the Chi-Square and PRE tests; e.g. there will be 26 different responses to ‘country of origin’, which subsequently converted to 2 categories: ‘Australia’ or ‘Others’.
Step 2	Perform frequency distribution analysis on each variable.
Step 3	Perform cross-tabulation analysis, using the Chi-Square method to determine possible association between variables at 5% or 1% levels of significance.

Step 4	Apply PRE (Proportionate Reduction of Error, a basic model used to measure association between two variables) analysis using Lambda on those variables identified in Step 3 above.
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Qualitative data collected from open-ended questions in the student questionnaire and from interviewing lecturers were analysed with a qualitative approach where data were categorised and interpreted, following a process as outlined in Miles and Huberman (1994) that contains three linked sub-processes: data reduction, data display, and conclusion drawing/verification. This process is depicted in Figure 3-2. Data reduction, as suggested by Miles and Huberman (1994) is the process of reducing the collected data using the chosen conceptual framework – the research question in this study, via data summaries, coding, finding themes, clustering or writing stories as ways of data selection and condensation. Data display, on the other hand, is defined as an organized, compressed assembly of information that permits conclusion drawing and/or action taking (Huberman & Miles, 1998). The outcome of this second process of qualitative data analysis should enable the researcher to see a reduced set of data as a basis for thinking about its meaning. The process of conclusion drawing and verification involves the researcher in interpretation: drawing meaning from displayed data (Huberman & Miles, 1998). A wide range of tactics could be used in this process, including the more commonly used techniques of comparison/contrast, noting of patterns and themes, clustering, and use of metaphors to confirmatory tactics such as triangulation, looking for negative cases, following up surprises, and checking results with respondents (Huberman & Miles, 1998).

Figure 3-2: Process of Qualitative data analyses



3.7.1 Analyses of student data

Student data obtained from questionnaires were entered into a spreadsheet format using the computer statistics software SPSS. Data from each group of students were entered into a separate spreadsheet. However, when performing statistical tests for associations between variables, data were combined into one single file for that purpose. A quantitative approach was applied when analysing students' data. Descriptive analysis such as frequency tests was performed on responses of every question to establish an overview of all the variables. Tests of association were also carried out to determine if association existed between some variables.

3.7.1.1 Levels of measurement

Responses to each question on the questionnaire were entered as numeric data. Responses from those questions that utilized the Likert-scale (from “strongly agree” to “strongly disagree”) were entered as ordinal data where “Strongly Agree” translated into numeric value “1”, “Agree” translated into numeric value “2” and so on. Responses on other questions that used other scales, e.g. sex with two possible answers; or age groups with five possible answers; were enter as nominal data with a numeric integer value for each answer.

3.7.1.2 Frequency distribution

Frequency distributions of responses of each question helped to summarise the data of the investigation. For example, if we want to know if students prefer online learning to classroom learning, the number of students in favour of this proposition provides us with a clear picture of the situation we are studying. However, with the majority of questions utilising the Likert scale, the frequency distribution for all of the five possible answers (strongly agree, agree, neutral, disagree, strongly disagree) may not be very useful in

summarising. Using the above example, if we want to know if students prefer online learning to classroom learning, we want to know the percentages of responses in favour, not in favour or neutral about the question being asked. The extent of how much in favour or not in favour would probably be of less importance. Therefore, to help to summarise and also to reduce complexity in the results, responses were collapsed into fewer categories by combining responses on “strongly agree” and “agree” to one category of “at least agree”; and responses on “strongly disagree” and “disagree” to another category of “at least disagree”. By doing that, many of the students’ responses would now be presented using the three categories (at least agree, neutral, at least disagree) instead of the five categories of the Likert scale.

3.7.1.3 Measure of association between variables

Two types of statistical tests were used to test the association between variables, the first, the Chi-Square test, was used to determine if an association existed. Once the association was established, the PRE (proportional reduction in error) statistic was used to measure the strength of the association (Lutz, 1983, p146).

As Chi-Square (X^2) is a very well known and commonly used method where its description can be found in almost every introductory statistics book, there is no need to detail the method here. However, it is important to point out that Chi-Square is most often used as a significance test to determine whether or not an association does exist between two variables (Lutz, 1983). Further, because Chi-Square can be performed on nominal variables, it can therefore be performed on higher-level variables such as those in ordinal, interval or ratio measurement (we cannot do the opposite) (de Vaus, 1991).

Proportionate reduction of error (PRE) is the statistic used to measure association between two variables (Blalock, 1979; Lutz, 1983; Babbie, 1990; Bernard, 2000; Neuman, 2000). As Neuman (2000) elaborated on PRE:

How much does knowledge of one variable reduce the errors that are made when guessing the value of the other variable? Independence means that knowledge of one variable does not reduce the chance of errors on the other variable...If there is a strong association or relationship, then few errors are made predicting a second variable on the basis of knowledge of the first...

The PRE statistic will be used to investigate the strength of association between students' demographic factors such as age, country of origin, level of study (undergraduate, postgraduate), mode of study (full time, part time) as dependent variables, and the experience (such as difficulty with navigation) and perception of online learning (such as positive feeling).

There are different statistics methods of PRE one can use to measure association between variables. When choosing from these methods, one key issue is the level of measurement of the variables to be analysed. Certain methods can only be used for interval/ratio type of variables but not on nominal or ordinal variables. As the student questionnaire was designed using the Likert scale, most of the responses were therefore of ordinal measurement (strongly disagree, disagree, neutral, agree and strongly agree). Questions related to students' demographic factors returned responses of either ordinal scale (e.g. age group) or nominal scale (e.g. country of origin). In dealing with mixed level of measurement, in this case nominal and ordinal, one approach was to use a 'weaker' statistic where a higher level of measurement would be treated as though it was at a lower level (de Vaus, 1985). In this case, ordinal variables would be treated as nominal. The PRE methods chosen for analysis in this study are the Lambda (L) and the Goodman and Kruskal's tau, also known as tau-y (Ty) for nominal variables (Blalock, 1979; Lutz, 1983; Babbie, 1990).

3.7.2 Analysis of lecturer data

Qualitative data were collected from interviewing lecturers. The process of data analysis of this qualitative data followed the three linked sub-processes: data reduction, data

display and conclusion drawing/verification (Miles & Huberman, 1984, 1994). According to Miles and Huberman (1984, 1994), data reduction involves activities such as data summaries, coding, finding themes, clustering and writing stories. Data display, is defined as an organised, compressed assembly of information, which enables a researcher to use as a basis for thinking of its meaning. Conclusion drawing and verification involves the researcher in interpretation and drawing meaning from displayed data.

Recorded data from lecturers' interview were transcribed and placed into text files. There were a total of 64 pages of text from the transcription. As each lecturer was asked the same set of questions, the first step of the analysis was to group all responses to the same question together. These responses were then categorised and compared. The intention was not so much to quantify the responses from different lecturers, rather, to examine the similarity and differences of their responses. Given that there were only five lecturers being interviewed, the frequency distribution of their responses was insignificant in any case, hence the type of quantitative analyses that were performed on students' data would not be useful in analysing lecturers' data. As lecturers' data were of qualitative nature, their responses were expected to provide rich and detailed insight to the investigation of this study. For example, one of the interview questions was about the problems lecturers encountered when using the Internet as part of their course delivery. The intention was not to find out how many lecturers had problems and how many didn't have problems, rather, through categorising the responses, it was possible to find out what were the problems and if they all had similar problems.

As the lecturers were given the opportunity to elaborate on their circumstances during the interview, the data collected also allowed the researcher to examine their responses within the different settings that were disclosed. For example, some problems that one lecturer talked about could be specific to the department he was working in and was not applicable to other lecturers who were working in different departments.

Apart from the set questions, lecturers were also given the opportunities to ‘add on’ their thoughts on other aspects of the topic. While this provided invaluable insight and extend the scope of the investigation, it also resulted in vast amount of data collected, over 80 pages of transcription in this case. Part of the analysis process was also to organise this vast amount of data so as to present them in a meaningful manner.

3.7.3 Matching Students’ and Lecturers’ Data

In order to satisfy Research Question 4, there was a need to compare and contrast perceptions between lecturers and students. Two approaches were adopted to achieve this.

This first approach was to directly compare responses between students and lecturers on a set of common questions asked. Some questions that were included in the student questionnaire were also asked at the lecturers’ interviews. These questions were:

“Are you satisfied with 1) the material on the Web 2) the outcome of using such a mode of delivery?”

“Do you feel that this mode of course delivery 1) enhanced teaching? 2) improved learning?”

“Would you consider your move to online teaching a success? Why or why not?”

“Do you feel that online teaching can 1) supplement 2) replace traditional classroom teaching?”

Although two different methods were used to collect data from students and lecturers, the comparison was still possible by applying qualitative analysis on responses from both sources.

The second approach was applying data triangulation where data from one source was compared and contrast with another source. Some interview questions were specifically targeted at lecturers' perceptions on students' perceptions, for example, questions like:

“What was the students' initial reaction towards this mode of delivery?”

“What were the main problems students encountered with this mode of delivery during the semester?”

“Are the students, in general, satisfied with 1) the material on the Web 2) this mode of course delivery?”

Data collected from lecturers' responses on these questions revealed their perceptions of students' online learning experience. These perceptions would then be compared with students' responses. However, as each of the above questions were spread across multiple questions in the students' questionnaire, there were no direct responses from the students per se. Instead, aggregate responses from related questions on the student questionnaire were used to compare with lecturers' responses. Responses from the open-ended question in Section A of the student questionnaire were also used to cross-check with lecturers' perceptions on students.

3.8 Quality (Reliability, Validity and Trustworthiness)

Tactics that were used to increase the quality of this research included:

- Use of an existing questionnaire that had been previously validated.
- Pilot testing of the questionnaire on students with adjustment based on feedback.
- Sampling a variety of units to improve the ability to measure variation in student perceptions.
- Use of analysis techniques that were appropriate to the level of measurement.

- Pilot testing of the interview protocol with adjustment based on feedback.
- The researcher conducting in-depth interviews in person.
- Recording and transcription of audio to text.
- Use of direct quotes.
- Analysis of transcripts into themes.
- Triangulation of data – sourced from students and lecturers.
- Triangulation of methods – questionnaire and interviews.

3.9 Summary

In summary, this chapter discusses the research approach, which is primarily the survey approach, employed in this study. A questionnaire was used to collect data from students. Both open-ended and close-ended questions were asked in the questionnaire. Lecturers were interviewed individually and the process was recorded using a cassette tape recorder. The design of the questionnaire and the interview plan were discussed in details. The data sample of the study was selected according a set of criteria, the result was five groups of students studying different units across the university and their lecturers who participated in the study.

The data analysis process was split into two: quantitative analyses and qualitative analyses. Quantitative data collected from closed-ended questions of the student questionnaire were analysed using the software SPSS to perform statistical analysis. Qualitative from open-ended questions of the questionnaire and collected from lecturers' interviews were followed by the analysis process containing the sub-processes of data reduction, data display and conclusion drawing (Miles & Huberman, 1994).

Two types of triangulation: data triangulation and methodological triangulation were used in this study to strengthen the outcomes of the study.

Chapter 4: Research Findings

4.1 Introduction

This chapter presents the findings of the study based on data collected from students and from lecturers. There were a total of 215 responses from students, details of student responses, including sub-total of each group can be found in Table 3-1 (page 71). Section 4.2 starts with an overview of the characteristics of the five groups of students using the students' demographic data. This section is then followed by Section 4.3 where students' perceptions of online teaching and learning are presented. Data collected from the students using the student questionnaire are presented from five different aspects, where each aspect was catered for in one section of the questionnaire: the role of online teaching and learning, access and usage pattern, design and delivery, communication via the Internet, and learning experience and user satisfaction. For each of these aspects, mainly descriptive analyses were applied to the collected data and findings for each group were compared and contrasted. Only summary data are presented, full details of all responses of each question in the student questionnaire can be found in Appendix III. Hypotheses testing were also conducted on data collected from students to examine the relationships, if any, between students' perceptions and their demographic background.

Section 4.4 presents the perceptions of lecturers on online teaching and learning. Using the interview data, this section presents the lecturers' perceived benefits, problems and expectations with respect to using the Internet in higher education.

Section 4.5 presents a summary of the findings of this study.

4.2 The Participant Groups

The section provides a brief description of each of the five groups of students and their lecturers participating in the study:

Group 1 (G1) and Lecturer 1 (L1)

G1 students were enrolled in a second year mathematics and statistics unit. This group of students was majoring in engineering and the unit was a 'service' unit for these students. There were two lecturers involved in the teaching of the unit, one on mathematics and the other on statistics. The lecturer who participated in this study was the mathematics lecturer (*L1*).

The main reason for *L1* to use the Internet in his teaching was to make his lecture material more accessible to students at a lower cost. He felt that to have the material printed and sold in the bookshop would cost the students too much. He also felt that by having the material available on the Web was much easier to make alternation to the material.

At the time of the study, *L1* had only just started to use the Internet in the teaching of the unit. Lecture slides were being scanned and placed on a Web site to enable students to have free access. Due to the lack of funding, *L1* had to take on the whole task by himself and found the exercise very time consuming. He was also faced with technical problems such as a very slow Internet connection and lack of proper software tools in dealing with html files.

L1 felt that what he had done was in its infancy and was probably not very useful for the students at that point. However, he considered it as a valuable experience and would continue to pursue the path of involving the Internet in his teaching and hoped that he would do a better job in future with the appropriate support from his department.

Group 2 (G2) and Lecturer 2 (L2)

G2 students were enrolled in a third year computer graphics unit. These students were majoring in computing studies, and this unit was one of their major units.

The lecturer of this unit, *L2*, had been involved in online teaching for the last five years and had constantly revised and improved his material on the Web. *L2* felt the Web was very useful for demonstrating computer graphics examples because students could see how things worked 'in front of their eyes'. Also, it had provided students with the opportunity to read through the lecture materials before going to class. Despite using the Internet in teaching, the lecturer did not reduce the frequency of class contact nor the number of contact hours.

Group 3 (G3) and Lecturer 3 (L3)

G3 students were enrolled in a unit on Internet technology. They were mainly Business students majoring in Electronic Commerce or taking the unit as an elective. There were a small number of postgraduate students in this group.

The lecturer of this unit, *L3*, had used the Web to replace some of the face-to-face classroom contact. Prior to the start of the semester, students were required to attend a five-day intensive course where they were taught how to use Web technologies such as the browser, email, and discussion group. After the intensive week, students only had contact with their tutor once every fortnight. During other times, all teaching and learning activities were conducted over the Internet. Due to the unit's content, students were not only learning via the Internet but also learning about the Internet and were required to produce their own Web pages as part of the assessment.

Group 4 (G4) and Lecturer 4 (L4)

G4 students were enrolled in a social science unit; they were either second or third year students majoring in social science.

The lecturer, *L4*, used the Web to encourage discussion amongst students outside the classroom. Students in this unit had a weaker computing background than the other

groups in this study. *L4* indicated that he had actively facilitated the discussion group over the Internet at the beginning of the semester and gradually took a back seat role once the students had created a discussion 'culture'. There was a 20% assessment mark allocated to the participation in the discussion. The use of the Internet had reduced the frequency of class contact between lecturer and students over the semester.

Group 5 (G5) and Lecturer 5 (L5)

G5 students were enrolled in a postgraduate business unit. This was the only group that had 100% postgraduate students.

The lecturer, *L5*, chose to use the Web in his teaching because most of the students were part-time and needed to have the flexibility offered by the Web. In addition, this unit was also offered overseas, and in this case, most communication between lecturer and students was achieved using the Internet. For students studying on campus, the use of the Internet had reduced the frequency of class contact between lecturer and students over the semester.

4.3 The perceptions of students

This section presents findings from data collected from students via responses from the questionnaire. Summary tables with percentages of responses of each group are used to illustrate findings regarding data collected from students. Data are presented based on each section of the questionnaire. Two types of statistical analyses were conducted on collected data: descriptive statistics and hypotheses testing. With descriptive analyses, findings from each group were compared and contrasted. Findings from group 1 were kept and presented along with findings from the other four groups despite its low response rate. The inclusion of group 1 was due to reasons discussed in section 3.6.2 and also to add richness to the findings as comparative analyses could be carried out between group 1 and other groups with much higher response rate.

The percentages presented in tables with descriptive data were calculated based on the actual number of responses to each question, excluding missing data. The actual number of responses to each question (n) was not indicated in tables where responses of multiple questions were presented. This is because the number of responses for each question varied among each group. In some tables where only responses from one question were presented, the total number of responses (n) from each group may not coincide with the total number of valid responses of that group as indicated in Section 3.6.1. This is due to missing data in responses for that particular question of that group. When discussing the number of responses, 'a majority' implies over 50% of the responses.

This section begins with descriptions of the characteristics of each of the five groups of students through their demographic data collected in Section G of the questionnaire. (A copy of the questionnaire can be found in Appendix I).

For gender distribution amongst each group, group *G4* and *G5* had a balance between both genders whereas the other three groups *G1*, *G2* and *G3* had more male than female students. Table 4-1 illustrates the gender distribution amongst each of the five groups.

Table 4-1: Students' gender distribution (in percentage) in the five groups

	<i>G1</i> (<i>n</i> =5)	<i>G2</i> (<i>n</i> =27)	<i>G3</i> (<i>n</i> =118)	<i>G4</i> (<i>n</i> =26)	<i>G5</i> (<i>n</i> =18)
Male	80	93	63	50	50
Female	20	7	37	50	50
Total	100	100	100	100	100

The majority of students from groups *G1*, *G2*, *G3* and *G4* were below 25 years old whereas the majority of students from group *G5* were older. Given that *G1*, *G2*, *G3* and *G4* were undergraduate groups and *G5* was a postgraduate unit, this finding was consistent. Table 4-2 shows the age distribution in each of the five groups.

Table 4-2: Age distribution (in percentage) in the five age groups

	<i>G1</i> (<i>n=5</i>)	<i>G2</i> (<i>n=27</i>)	<i>G3</i> (<i>n=120</i>)	<i>G4</i> (<i>n=26</i>)	<i>G5</i> (<i>n=19</i>)
36+	0	0	5	12	21
31 - 35 yrs	0	0	6	8	16
25 - 30 yrs	0	11	16	15	42
19 - 24 yrs	60	89	71	61	21
18 yrs & under	40	0	2	4	0
Total	100	100	100	100	100

Table 4-3 shows the study workload distribution in the five groups. Students with a study load of less than three units usually were part timers. Students in *G1*, who were majoring in engineering, usually had a study workload of eight or nine units per semester on average. As indicated in Table 4-3 all students in *G1* were full time students. The majority of students from *G2*, *G3* and *G4* were full time students, and *G5* consisting of all postgraduate students therefore had a high number of part-timers.

Table 4-3: Study workload distribution (in percentage) in the five groups

	<i>G1</i> (<i>n=5</i>)	<i>G2</i> (<i>n=27</i>)	<i>G3</i> (<i>n=120</i>)	<i>G4</i> (<i>n=26</i>)	<i>G5</i> (<i>n=19</i>)
5 or more units	80	63	13	8	0
4 units	20	26	61	69	42
3 units	0	4	12	15	11
2 or less unit	0	7	14	8	47
Total	100	100	100	100	100

Table 4-4 shows the students' level of study distribution in the five groups. Groups *G1*, *G2* and *G3* consisted of only undergraduate students whereas *G5* consisted of all

postgraduate students; *G3* is the only group that had a mixture of postgraduate and undergraduate students.

Table 4-4: Students' level of study distribution (in percentage) in the five groups

	<i>G1</i> (<i>n</i> =5)	<i>G2</i> (<i>n</i> =27)	<i>G3</i> (<i>n</i> =120)	<i>G4</i> (<i>n</i> =26)	<i>G5</i> (<i>n</i> =19)
Undergraduate	100	100	87	100	0
Postgraduate	0	0	13	0	100
Total	100	100	100	100	100

Table 4-5 shows the students' main country of origin distribution in the five groups. There were totally 27 countries of origin as stated by students. However, there were four major countries of origin: Australia, Singapore, Malaysia and Indonesia. When combining data from all five groups, as indicated in Table 4-6, there were 45 Australian, 37 students from Singapore, 36 from Malaysia, 19 from Indonesia and 37 from the other 23 countries. There were 28 missing data from the five groups of 202 students. Apart from *G1*, all other groups consisted of students from countries other than Australia.

Table 4-5: Students' country of origin distribution (in percentage) in the five groups

	<i>G1</i> (<i>n</i> =4)	<i>G2</i> (<i>n</i> =23)	<i>G3</i> (<i>n</i> =112)	<i>G4</i> (<i>n</i> =17)	<i>G5</i> (<i>n</i> =18)
Australia	100	43	18	35	28
Others	0	57	82	65	72
Total	100	100	100	100	100

Table 4-6: Students' country of origin distribution

Country	Number of Students	Percentage %
Australia	45	26
Singapore	37	21
Malaysia	36	21
Indonesia	19	11
Other Countries	37	21
Total valid responses	174	100
Missing data	(28)	

Table 4-7 shows the distribution of numbers of years spent in Australia. Although the question indicated that this was for those who were not born in Australia only, many Australian students have answered the question and selected the first option (10 or more years) as their answers. For those who didn't tick the box, their responses were assumed to be the first option.

Table 4-7: Students' years spent in Australia distribution (in percentage) in the five groups.

	<i>G1</i> (<i>n=5</i>)	<i>G2</i> (<i>n=28</i>)	<i>G3</i> (<i>n=122</i>)	<i>G4</i> (<i>n=26</i>)	<i>G5</i> (<i>n=20</i>)
>= 10 yrs	100	65	26	46	47
5 - 9 yrs	0	6	16	39	12
1 - 4 yrs	0	29	49	15	41
<= 1yr	0	0	9	0	0
Total	100	100	100	100	100

Table 4-8 shows the percentage of students in each group who suffered from colour blindness. As indicated, only a very small minority of students suffered from colour blindness.

Table 4-8: Percentage of students who suffered from colour blindness in the five groups

	<i>G1</i> (<i>n=5</i>)	<i>G2</i> (<i>n=28</i>)	<i>G3</i> (<i>n=122</i>)	<i>G4</i> (<i>n=26</i>)	<i>G5</i> (<i>n=20</i>)
Yes	0	8	2	0	10
No	100	92	98	100	90
Total	100	100	100	100	100

Table 4-9 shows the percentage of students who had attended other units that used the Internet for teaching and learning. All the students from *G2* had online learning experience from other unit(s); *G5* also had a significantly high number of students who had previous online learning experience as compare to those from *G1*, *G3* and *G4*.

Table 4-9: Percentage of students who had attended other units that used the Internet for teaching and learning

	<i>G1</i> (<i>n=5</i>)	<i>G2</i> (<i>n=28</i>)	<i>G3</i> (<i>n=122</i>)	<i>G4</i> (<i>n=26</i>)	<i>G5</i> (<i>n=20</i>)
Yes	20	100	12	11	45
No	80	0	88	89	55
Total	100	100	100	100	100

When comparing responses from the five groups of students, data from group *G1* were treated separately from the other four groups because of the small number of valid responses. Apart from the first question in Section A of the questionnaire where 14 students provided answers, only 5 to 7 of the 19 participants of that group had provided valid responses of all or some of the remaining questions in the questionnaire.

4.3.1 Usefulness of online learning

Section A of the questionnaire consisted of two questions, the first question was to find out from students if they found online teaching and learning useful in the unit and to give a reason for their response.

Table 4-10 shows the percentage of students in each group who responded “Yes” to the question: “Have you found Online teaching in this unit useful?”.

Table 4-10: Percentage of students who perceived the usefulness of online teaching and learning in the unit

Section A Q1	Percentage of those who responded “Yes” in each group				
	<i>G1</i> (<i>n=14</i>)	<i>G2</i> (<i>n=27</i>)	<i>G3</i> (<i>n=122</i>)	<i>G4</i> (<i>n=26</i>)	<i>G5</i> (<i>n=20</i>)
Have you found online teaching in this unit useful?					
Yes	0	96	97	89	84

Apart from *G1*, the majority of the students (84% to 97%) from the other four groups felt that online teaching and learning had been useful in their units. Those students had mainly cited convenience, communication and pedagogy as their reasons. Here are some of the comments from students:

Table 4-11: Categorized qualitative responses from student questionnaires

Reason	Example:
Convenience	<p><i>“Information was always accessible”</i></p> <p><i>“Accessible anywhere, anytime without referring back to the tutor”</i></p> <p><i>“Allows students to learn at own pace”</i></p> <p><i>“Able to catch up on missed lecture”</i></p> <p><i>“Easy access to online references”</i></p> <p><i>“Flexible, I can use the Web during my free time”</i></p>

	<p><i>“Don’t need to bother the lecturer face-to-face”</i></p> <p><i>“I can always go back to read the information again when I still have problems”</i></p>
Communication	<p><i>“It has provided greater possibility for discussion and sharing ideas between students than that available through normal classes”</i></p> <p><i>“You can log onto the net and either chat with classmates or discover information about the topics being studied. You don’t have to wait until your tutorial”</i></p> <p><i>“The discussion group in our unit is very interesting, thought provoking, and helps to add ‘flavour’ to a very challenging (and at times dry) unit”</i></p> <p><i>“Being able to ‘talk’ to other students I wouldn’t normally be able to”</i></p> <p><i>“Breaks down barriers and allow people to talk freely”</i></p> <p><i>“It facilitates discussion in a forum that allows you to be semi-anonymous and not suffer from interruption”</i></p> <p><i>“It makes student discussion ‘equal’ (i.e. allows anyone to contribute)”</i></p>
Pedagogy	<p><i>“Reinforcement of material taught in class”</i></p> <p><i>“More interactive compare to traditional PPT slides”</i></p> <p><i>“Material presented on the Web is not available elsewhere”</i></p> <p><i>“Different medium for learning”</i></p> <p><i>“Better interface”</i></p>
Other reasons	<p><i>“I feel that commerce is tending towards greater use of electronic means of communication. The use of WWW features is important both commercially and personally”</i></p> <p><i>“Save paper, save trees”</i></p>

For those students who responded ‘No’ to the first part of question 1, difficulty in gaining access to the Internet appeared to be the main reason. Here are some of the comments from these students:

“No regular access to the Internet except at uni which is a fair distance from work and home” (quite a few responses like this)

“Don’t like reading from the screen”

“Because it’s too impersonal”

For group *GI*, all of the 14 students who gave answers to question one stated that they did not find online teaching in the unit useful. It appeared that they had had much difficulty in accessing the online material; the following are some of comments from these students:

"... printing it was a bit of a headache and waste of paper..."

"It is unnecessary when such information is easier to get hold of in a library!"

"Didn't know about it"

The second question in Section A of the questionnaire asked students how online teaching in the unit could be improved. Technical problems such as the server was slow or not always available were the main complaints. Not enough communication was another complaint, particularly from those who were in complete online learning mode. There were also suggestions for other aspects such as improving some of the Web features and pedagogy. Here are some of the responses that were given:

“The server is always down...” (quite a few complaints like this)

“The speed of the server is too slow. Slow loading of the Web page can be a real put-off” (once again, quite a few complaints like this)

“Faster download time, more bandwidth”

“Live Java chat for discussion”

“More discussions in discussion group”

“Need clearer instructions.”

“More class-based lessons, fewer online lessons; I don’t need to come to school to just to sit in front of a computer...”

“Some materials on the Web appear to be out dated”

“Interactive chat rooms with topics will be nice”

“Instructor should give more direct lead to discussion topic”

“Maybe having a tutor online at a specific time to ask question”

“Regular face-to-face ‘trouble shooting workshop’ would be great...it will help to reduce the anxiety for those who have not used the Web before”

“More interactive features, more graphics, more humour / creativity in Web pages”

“Some of the lecture notes are extremely large to scroll through”

“Not too wordy, improve readability”

Students who were in a total online learning mode expressed the views that that they would like to have class contact and to be able to work with classmates:

“More student-lecturer contact”

“Have a monthly class to attend”

“Group assignments to develop closer relationship with class members”

“More interaction between students and instructors”

There were also complaints that were not specific to online teaching and learning but more on general pedagogy; for example:

“Need more feedback from lecturer”

“Should provide clear instructions on assignment requirements”

“Should provide answers to tutorial questions”

“More interactions in tutorial”

4.3.2 The role of online teaching

Section B of the questionnaire sought opinions from students on the role of online teaching in a learning environment. Table 4-12 provides a summary of the percentage of students from each group who responded “strongly agree” or “agree” to each question in this section. The majority of the students (63% to 93%), including those from *G1*, agreed that they felt positive about their experience of online teaching and learning; this is consistent with several studies in the literature (Berge, 1999; Stringer and Thomson, 1998, Wegner, Holloway and Garton, 1999; Sandercock and Shaw, 1999; Spiceland and

Hawkins, 2002). Apart from *G1*, the majority of the students (69% to 85%) from the other four groups felt that their experience of online teaching and learning had been a successful one. The majority of students (58% to 81%) from all four groups (*G2* to *G5*) indicated that they would like to see online teaching in other units. While the majority of students from *G2*, *G3* and *G5* indicated that they would have chosen to use online material even if they were not required to do so, only 43% of *G4* agreed with that. While the majority of the students from *G3*, *G4* and *G5* considered using the Web in teaching as an innovative idea, students from *G2* did not feel quite strongly about it. This is most probably due to the fact that these students all had prior experience of online learning from other units; in addition, these students were majoring in computing hence were very accustomed to the application of technology.

Table 4-12: Summary of Students' responses on the perceptions of the role of online teaching and learning in higher education

Section B		Percentage of those who responded “strongly agree” or “agree” in each group				
Perceptions of the role of online teaching and learning		<i>G1</i> *	<i>G2</i> *	<i>G3</i> *	<i>G4</i> *	<i>G5</i> *
1.	I feel positive about online teaching and learning.	63	93	84	77	65
2.	My experience in online teaching and learning in this unit is a successful one.	13	85	82	69	75
3.	I would like to see online teaching used in other units in the University.	72	81	75	58	70
4.	I would have chosen to use the subject material on the web even if I were not required to do so.	14	70	68	43	75

5.	I was attracted to online teaching and learning because it is an innovative idea for facilitating student learning.	29	52	71	66	70
6.	Online teaching can substitute for the traditional classroom approach.	17	8	47	27	40
7.	Online teaching can be used to supplement the traditional lecture.	43	70	75	73	75
8.	The teaching staff seemed enthusiastic about online teaching as a mode of instructional delivery.	14	63	74	92	75
9.	I was encouraged by my lecturer to try online learning.	29	78	59	100	90
10.	I was supported by positive attitudes from my peers about online learning.	14	42	56	54	55

* Number of responses from each group varied from question to question, see Appendix III

It is quite clear that only the minority of the students, from all five groups, considered that online teaching could substitute classroom teaching. As can be seen from Table 4-13, it is quite interesting to note that the strongest disagreement came from *G2*, who were the computing major students. Within this group, 33% of the students strongly disagreed and another 33% of them disagreed that online teaching can substitute classroom teaching.

It is also quite interesting to note that a large number of students felt 'neutral' about the issue - 50% from *G1*, 26% from *G2* and 34% from *G3*. This implied that these students either could not make up their mind or did not have an opinion about the issue. With the exception of *G1*, the majority of the students (70% to 75%) from the other four groups, however, agreed that online teaching can be used to supplement classroom teaching (see Table 4-12 Item 7).

Table 4-13: Responses (in percentage) on online teaching can substitute classroom teaching (Q 6 of Section B)

	<i>G1</i> (<i>n</i> =6)	<i>G2</i> (<i>n</i> =27)	<i>G3</i> (<i>n</i> =120)	<i>G4</i> (<i>n</i> =26)	<i>G5</i> (<i>n</i> =20)
Strongly Agree	0	0	21	0	10
Agree	17	8	26	27	30
Neutral	50	26	34	11	15
Disagree	33	33	17	31	30
Strongly Disagree	0	33	2	31	15
Total	100	100	100	100	100

Apart from *G1*, the majority of the students from the other four groups agreed that the teaching staff was enthusiastic about online teaching and they were encouraged by their lecturers to try online learning. In terms of peer support, only about half of the respondents from groups *G2* to *G5* felt that they were supported by positive attitudes from their peers.

This result is somewhat in conflict with the other findings discussed above - given that students generally felt successful and positive about online learning, this should transmit into positive attitudes towards the matter. One interpretation could be that students felt 'isolated' in the online learning environment, where social interactions such as those in a classroom environment, do not exist. Generally, this could be somewhat compensated when "discussion group" such as bulletin boards are incorporated as part of the online learning environment. And this probably could also explain why *G2*, the only of four groups (besides *G1*) that did not utilize a discussion group, has the lowest (except *G1*) agreement on the issue.

4.3.3 Students' access and usage pattern

Section C of the questionnaire was concerned with the access and usage pattern of online subject material. Over 95% of the students in *G2*, *G4* and *G5* accessed the material at least three times or more as Table 4-14 demonstrates. *G3* had a slightly lower figure: 86% of its students accessed the material at least three times or more. The most common places where students viewed the materials were the laboratories at the university and at home with the most common duration of access being about an hour per session.

Table 4-14: Responses (in percentage) to the number of times online material accessed (Q1 of Section C)

Number of times access	<i>G1</i> (<i>n</i> =7)	<i>G2</i> (<i>n</i> =27)	<i>G3</i> (<i>n</i> =122)	<i>G4</i> (<i>n</i> =26)	<i>G5</i> (<i>n</i> =19)
Never	57	4	0	0	0
Once	0	0	6	0	0
Twice	29	0	8	4	5
>= Three Times	14	96	86	96	95
Total	100	100	100	100	100

As indicated in Table 4-15, students generally did not have a problem with the availability of computers except those from *G4* where only 38% of its students indicated that they had no difficulty in finding a computer available for them to use. The majority of students from all groups felt that they had sufficient knowledge to use Web technology; they were familiar with at least one search engine and there were few problems in navigating between Web pages.

However, not all students agreed that there was adequate technical assistance available when needed, nor did they feel that Internet connection was problem free. Excluding *G1*, students from *G5* seemed to have the least problems with Internet connection (See Table 4-15, 70% strongly agreed or agreed) while students from *G3* had the most Internet

connection problems (32% strongly agreed or agreed). The extremes of these two groups of responses are hard to explain since both groups were mainly using the computer laboratories in the same division within the university and should have received similar IT support.

Table 4-15: Summary of students' responses on access and usage pattern

Section C		Percentage of those who responded “strongly agree” and “agree” in each group				
		<i>G1*</i>	<i>G2*</i>	<i>G3*</i>	<i>G4*</i>	<i>G5*</i>
	Access and usage pattern of online material					
4.	I have no problem in finding a computer that allows me to go through the subject material on the web.	80	78	52	38	70
5.	I have sufficient knowledge to use the web technology.	100	100	78	81	70
6.	There is adequate technical assistance available when I need it.	60	27	46	27	25
7.	The response time when using the web was reasonable.	40	55	41	58	65
8.	There were very few problems with the internet connection.	80	55	32	43	70
9.	I have very few difficulties with the University's SES login system.	60	36	41	57	42
10.	I have very few difficulties when navigating between web pages.	80	89	59	66	74
11.	I am familiar with at least one search engine for searching information on the web.	80	97	91	68	75

* Number of responses from each group varied from question to question, see Appendix III

Question 9 of this section asked students about the University's SES (Student Electronic Services) login system, as indicated in Table 4-15 three out of the five groups were dissatisfied with the facility. However, the system has since been replaced.

4.3.4 Design and delivery of on-line course material

Section D of the questionnaire was concerned with the quality and design features of the online material and its efficiency in delivery. As indicated in Table 4-16, the majority of the students from all groups were satisfied with the design aspects of Web pages, these included the use of graphics, colour and attractiveness of the layout. With the exception of those from *G1*, the majority of the students were also happy to read material from the screen, although many students still had the material printed. The majority of students across all groups did not download and use a word processor to read the material.

Apart from *G1* and *G2*, the other three groups agreed that delivering the subject material via the Web makes learning more interesting. It is interesting to note that *G2* students did not feel this way. Only 33% strongly agreed or agreed and 52% of *G2* students felt 'neutral' about the issue. This is despite the fact that the lecturer of *G2* was the one with the most experienced in online teaching and the material used on the Web had been revised many more times than those used in the other four groups.

Once again, the explanation could be this group of computer science students were more used to online teaching and learning, and hence had a much higher expectation than their peers in other groups.

The majority of the students across all groups felt that the linkage to other resources had enhanced their learning experience. They also felt that the subject contents were appropriate to deliver on the Web, and that the presentation of the content was clear and coherent.

Table 4-16: Summary of responses on design and delivery of online material

Section D		Percentage of those who responded “strongly agree” or “agree” in each group				
Design and delivery of online material		<i>G1*</i>	<i>G2*</i>	<i>G3*</i>	<i>G4*</i>	<i>G5*</i>
1.	The physical layout of the material was attractive.	40	70	74	66	100
2.	The graphics used (if any) in the web pages were appropriate.	80	71	77	61	95
3.	The colour used in the web pages was appropriate.	80	72	81	61	100
4.	I find it easy to read the material from the screen.	40	69	72	80	60
5.	I often have the material printed and read them on paper.	60	48	48	39	75
6.	I often download the material and read them using a word processor or other software.	40	31	33	33	45
7.	Delivering the subject material via the web makes learning more interesting.	40	33	66	57	58
8.	I find the linkage to other resources (if any) enhances my learning experience.	60	81	76	58	74
9.	The subject content was appropriate to deliver on the web.	60	93	80	77	90
10.	There was a logical sequence of presentation of the subject content on the web.	60	89	78	89	84
11.	The presentation of the subject content was clear and coherent.	60	85	82	73	90

* Number of responses from each group varied from question to question, see Appendix III

4.3.5 Communication via the Internet

The aim of Section E of the questionnaire was to find out how communication both between teaching staff and students, and amongst students themselves, was achieved via the Internet. Students were asked about their usage of electronic mail (email) and discussion groups in communicating with their lecturers and peers. Table 4-17 provides a summary of students' responses in this section.

Table 4-17: Summary of responses on communication via the Internet

Section E		Percentage of those who responded “strongly agree” and “agree” in each group				
Communication via the Internet		<i>G1*</i>	<i>G2*</i>	<i>G3*</i>	<i>G4*</i>	<i>G5*</i>
1.	I usually contact my lecturer/tutor via email when I have a problem regarding the subject matter.	20	70	72	44	45
2.	I prefer my lecturer/tutor to answer my questions, or provide assistance to my problem, via email.	20	63	59	56	30
3.	I prefer to discuss problems on subject matters with my fellow students via email.	40	34	33	40	30
4.	A discussion group is a good way to discuss problems amongst students.	100	22	64	88	65
5.	I frequently check the messages posted on the discussion group.	50	0	38	80	60
6.	I frequently post questions I have encountered with the subject to the discussion group.	50	0	28	60	45

* Number of responses from each group varied from question to question, see Appendix III

As indicated in Table 4-17, only two groups, *G2* and *G3*, contained a majority of students who preferred to contact their lecturers via email when they had a problem with the subject matter. However, the number of students in these same two groups dropped slightly (*G2* 63% and *G3* 59%) when asked if they preferred their lecturers to answer their questions via email. The numbers also dropped for *G5*, where 45% of the students preferred to contact their lecturers via email when they had a problem with the subject matter, but only 30% of them preferred their lecturers to answer their questions via email. In contrast, *G3*, 44% of students preferred to contact their lecturers via email when they had a problem with the subject matter. However, the number rose to 56% when asked if they preferred their lecturers to answer their questions via email. When discussing problems related to the subject matter amongst the students themselves, not many students (30% to 40% across five groups) were keen to do so via email. This could be because usually students have their own circle of friends in the university who they discuss their problems with, and it would have been just as easy to do so on a face-to-face manner rather than via email.

In terms of discussion groups, as indicated in Table 4-17, apart from *G2*, all other groups felt that discussion groups was a good way to discuss problems amongst students (64% to 100%). Only 22% of *G2* felt the same about discussion group, this could be due to the fact that there was not a discussion group set up for them during the semester. However, the situation was quite different in *G1* where all those who responded had felt that a discussion group was a good way to discuss problems amongst students, even though there wasn't a discussion group being set up for them in that unit. It is also interesting to note that although the majority of the students felt that discussion groups were a useful way to discuss problems amongst students, it did not translate into a high usage rate amongst the groups with the exception of *G4*.

While 64% of *G3*'s students recognised the usefulness of discussion groups, only 38% indicated that they had frequently checked messages posted on discussion group; and only 28% indicated they had frequently posted messages to discussion group. *G5*'s result

was slightly better in the sense that although only 45% indicated they had frequently posted messages to discussion group, 60% had indicated that they had frequently checked messages posted on discussion group.

The most frequent use was *G4*, where 80% of its students indicated they had frequently checked messages posted on discussion group and 60% indicated they had frequently posted messages to discussion group. The main reason for this could be due to a 20% assessment tied to participation in the discussion group. This strategy also led to 88% of the respondents in *G4* into believing that the discussion group is a good way to discuss problems amongst students.

4.3.6 Learning experience and user satisfaction

Section F of the questionnaire sought students' opinions on how their online learning experience impacted their overall learning experience in the unit and how their online learning experience compared with their classroom learning experience. Table 4-18 provides a summary of responses from this section.

Table 4-18: Summary of responses on learning experience and user satisfaction

Section F		Percentage of those who responded “strongly agree” and “agree” in each group				
Learning experience and user satisfaction		<i>G1*</i>	<i>G2*</i>	<i>G3*</i>	<i>G4*</i>	<i>G5*</i>
1.	The linkage between web pages allows me to have more control over the reading sequence I want.	80	63	79	80	75
2.	The ability to control the rate and sequence of the presentation of subject material on the web enhanced my learning experience.	80	59	82	72	80

3.	The ability to review subject material on the web at specific junctures has facilitated my learning experience.	40	73	78	61	74
4.	I understood the subject content better via the web than I would have from a traditional classroom lecture.	60	22	52	23	50
5.	Learning via the web helped me retain more of the acquired knowledge than I would have from a traditional lecture.	60	44	51	46	47
6.	The knowledge gained via the subject material on the web was equitable with the amount of time I spent on it.	40	52	71	73	74
7.	I felt a sense of satisfaction and achievement after experiencing online learning.	40	41	67	73	63
8.	My online learning experience has motivated me to start seeking information on the web on other subjects.	60	70	70	58	42

* Number of responses from each group varied from question to question, see Appendix III

As indicated in Table 4-18, the majority of the students (63% to 80%) across all five groups had agreed that the linkage between Web pages allowed them to have more control over the reading sequence they needed. Similarly (59% to 80%), felt that being able to control the rate and sequence of the presentation of the subject material on the Web had enhanced their learning experience.

Apart from *G1*, the majority of the other four groups (61% to 78%) agreed that the ability to review subject material on the Web at specific junctures had facilitated their learning experience. However, given the majority agreed that 'the Web has enhanced learning' and 'the Web has facilitated learning', it was quite surprising to see that not many students (22% - 52%, excluding *G1*'s responses) were convinced that they had understood the subject content better via the Web than they would have from a traditional classroom lecture. Nor was there an overwhelming agreement (44% to 60%) when asked if the Web had helped them in retaining more of the acquired knowledge than they would have from a traditional lecture.

The majority of the students (71% to 74%) from group *G3*, *G4* and *G5* agreed that the knowledge gained via the subject material on the Web was equitable with the amount of time spent. A majority of the same three groups felt a sense of satisfaction and achievement after experiencing online learning; whereas only 40% of *G1* and 41% of *G2* felt the same. Apart from *G5*, the majority of the students (58% - 70%) from the other four groups agreed that their online learning experience had motivated them to start seeking information on the Web on other subjects. Only 42% of *G5* felt the same, this is quite inconsistent with the responses on other questions from this group thus far.

4.3.7 Summary of students' responses

Below is a summary of descriptive findings of students' responses to the survey:

Responses from four of the five groups were quite consistent with a few exceptional cases. The remaining group was significantly different from the other groups due to the fact that online teaching and learning was at its infancy stage.

The majority of the students from four of the five groups felt that online teaching and learning had been useful in their units.

The majority of the students from all five groups agreed that they felt positive and successful about their online learning experience of teaching and they would like to see online teaching in other units. However, they would like to see online teaching as a supplement rather than a replacement of classroom teaching and learning.

Students generally had no problem with the availability of computers and felt that they had sufficient knowledge to use the Internet/WWW. However, they did have problem with Internet connection and would like to see more technical assistance being made available when needed.

The majority of the students from all groups were satisfied with the design aspects (layout, use of colour and graphics) of Web pages and were quite happy to read course material from the screen.

Not all students liked to use email to communicate with their lecturers. Only two groups had a majority of students who preferred to contact their lecturers via email when they had a problem with the subject matter. Equally, when discussing problems related to the subject matter amongst the students themselves, not many students were keen to do so via email.

In terms of discussion groups, the majority of students from four of the five groups felt that discussion groups were a good way to discuss problems amongst students. However, this did not warrant a high usage rate. Only two groups had a majority of their students frequently checking messages posted to the discussion groups. The number of students dropped significantly when asked if they had frequently posted messages to discussion groups.

While the majority of students agreed that 'the Web has enhanced learning' and 'the Web has facilitated learning', it was quite surprising to see that not many students were convinced that they had understood the subject content better via the Web than they would have from a traditional classroom lecture. Nor was there an overwhelming

agreement when asked if the Web had helped them in retaining more of the acquired knowledge than they would have from a traditional lecture.

A majority of the same three groups felt a sense of satisfaction and achievement after experiencing online learning agreed that their online learning experience had motivated them to start seeking information on the Web for other subjects.

4.3.8 Test of associations between some of the students' demographic factors and students' perceptions and experience in online teaching and learning

In order to investigate research question 2, four research hypotheses were tested for associations between specific factors. These research hypotheses, as documented in Chapter 3, section 3.3.1, were:

Research Hypothesis #1:	Students studying part time would prefer online teaching to classroom teaching
Research Hypothesis #2:	Older students being more independent learners would therefore prefer online learning to classroom learning
Research Hypothesis #3:	Postgraduate students being more self-directed learners would therefore prefer online learning to classroom learning
Research Hypothesis #4:	Students who were more experienced with online learning would prefer online learning to those who were less experienced
Research Hypothesis #5:	Students whose first language was not English would prefer to use email than face-to-face or other verbal methods to communicate with their lecturers

Tests were conducted using all responses from all groups since the sample size of individual groups may not be large enough to draw conclusive results.

4.3.8.1 Testing of Hypothesis #1: Students studying part time would prefer online teaching to classroom teaching.

The following pair of null hypothesis and alternative hypothesis was used to test this hypothesis:

H_0 : Students' views on replacing classroom teaching with online teaching was not related to students' study mode (part time / full time).

H_1 : Students' views on replacing classroom teaching with online teaching was related to students' study mode (part time / full time).

The variables used for testing this hypothesis were "Student Study Mode" and "Online teaching can substitute classroom teaching". The independent variable "Student Study Mode" was a derived variable using data from Question 3 of Section G of the student questionnaire. In this question, students were asked how many units they had enrolled in during that semester. Using collected data, students were deemed to be "part time" if they were enrolled in less than three units; otherwise the student's study mode was considered to be full time. Values of the dependent variable were from Question 6 of Section B of the questionnaire, where students were asked if they believed online teaching can substitute classroom teaching. Data collected for this question were used directly for testing this hypothesis.

Table 4-19 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-19: Chi-Square Tests for testing Hypothesis #1

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.457	4	.168
Likelihood Ratio	6.311	4	.177
Linear-by-Linear Association	3.985	1	.046
N of Valid Cases	195		

As indicated in Table 4-19, the Chi-Square test's 2-sided significance level is much higher than 0.05. Therefore we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. As a result at this test it was concluded that H_o may be true and that students' view on replacing classroom teaching with online teaching may not be related to students' study mode (part time / full time).

As there was no significant evidence of a relationship, any measurement of its strength was inappropriate.

4.3.8.2 Testing of Hypothesis #2: Older students being more independent learners would therefore prefer online learning to classroom learning

The following pair of null hypothesis and alternative hypothesis was used to test this hypothesis:

H_o : Students' views on replacing classroom teaching with online teaching was not related to students' age.

H_1 : Students' views on replacing classroom teaching with online teaching was related to students' age.

The variables used for testing this hypothesis were “Student Age Group” and “Online teaching can substitute classroom teaching”. The dependent variable “Online teaching can substitute classroom teaching” for the statistics tests was the same as that in testing Hypothesis #1. The independent variable was “Student Age Group”, a derived variable using data collected for Question 2 of Section G of the student questionnaire. The students were given five choices of answers to the question, however, for the purpose of testing this hypothesis; only two values “Below 25” and “Over 25” were computed using the collected data.

Table 4-20 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-20: Chi-Square Tests for testing Hypothesis #2

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.352	4	.079
Likelihood Ratio	8.248	4	.083
Linear-by-Linear Association	1.461	1	.227
N of Valid Cases	195		

As indicated in Table 4-20, the Chi-Square’s 2-sided significance level is higher than 0.05, we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. We therefore concluded that H_o may be true and students’ views on replacing classroom teaching with online teaching may not be related to students’ age.

As there was no significant evidence of a relationship, any measurement of its strength was inappropriate.

4.3.8.3 Testing of Research Hypothesis #3: Postgraduate students being more self-directed learners would therefore prefer online learning to classroom learning

The following pair of null hypothesis and alternative hypothesis was used to test this hypothesis:

H₀: Students' views on replacing classroom teaching with online teaching was not related to students' level of study (postgraduate / undergraduate).

H₁: Students' views on replacing classroom teaching with online teaching was related to students' level of study (postgraduate / undergraduate).

The variables used for testing this hypothesis were "Student Study Level" and "Online teaching can substitute classroom teaching". The dependent variable "Online teaching can substitute classroom teaching" for the statistics tests was the same as that in testing Hypothesis #1 and #2. Values of the independent variable "Student Study Level" were responses from Question 4 of Section G of the questionnaire, where students were asked if they were "undergraduate" or "postgraduate" students.

Table 4-21 shows results of the Chi-Square statistics tests between the two variables.

Table 4-21: Chi-Square Tests for testing Hypothesis #3

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.037	4	.401
Likelihood Ratio	3.910	4	.418
Linear-by-Linear Association	1.866	1	.172
N of Valid Cases	195		

As indicated in Table 4-21, the Chi-Square's 2-sided significance level was higher than 0.05, we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. We therefore concluded that H_o may be true and that students' views on replacing classroom teaching with online teaching may not be related to students' level of study (postgraduate / undergraduate).

As there was no significant evidence of a relationship, any measurement of its strength was inappropriate.

4.3.8.4 Testing of Hypothesis #4: Students who were more experienced with online learning would prefer online learning to those who were less experienced

Three sets of paired null hypothesis and alternative hypothesis were used to test this research hypothesis:

Set 1:

H_o : Students' views on replacing classroom teaching with online teaching was not related to students' previous online learning experience.

H_1 : Students' views on replacing classroom teaching with online teaching was related to students' previous online learning experience.

The variables used for testing this pair of hypotheses were "Student previous online learning experience" and "Online teaching can substitute classroom teaching". The dependent variable used for testing was the same as that in testing of Hypothesis #1 and #2. Values of the independent variable were from Question 8 of Section G of the questionnaire, where students were asked if they had previous online experience from other units they had studied. Students were given the choice of "Yes" or "No" as answer

to the question. Data collected for this question were used directly for testing this hypothesis.

Table 4-22 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-22: Chi-Square Tests for testing Hypothesis #4 (Set 1)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.967	4	.007
Likelihood Ratio	14.963	4	.005
Linear-by-Linear Association	13.861	1	.000
N of Valid Cases	195		

As indicated in Table 4-22, Chi-Square's 2-sided significance level < 0.01 , which indicated a relationship between the two variables. To test the strength of the relationship in this case, PRE (proportional reduction in error) measures on the two variables were conducted. All PRE measures are normed with a standardized scale where 0 means no association and 1 means there is perfect association (Lutz, 1983, p. 159). Lambda and Goodman and Kruskal's Tau-y are two commonly used PRE measure of association for nominal variables (Lutz, 1983, pp. 160-166). Table 4-23 shows the results of PRE measures for the strength of relationship between the two variables.

Table 4-23: PRE tests results for testing Hypothesis #4 (Set 1)

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Lambda	Symmetric	.010	.029	.354	.724
	B6 - Substitute Dependent	.014	.040	.354	.724
	G8 - Prior Exp Dependent	.000	.000	.	.
Goodman and Kruskal Tau-y	B6 - Substitute Dependent	.015	.008		.020
	G8 - Prior Exp Dependent	.072	.034		.008

As indicated in Table 4-23, although the relationship was statistically significant, its strength as measured by both Lambda and Goodman and Kruskal tau values were so low to be of negligible practical importance. We therefore concluded while there was a relationship between students' view on replacing classroom teaching with online teaching and students' previous online learning experience, the importance of this relationship was negligible.

Set 2:

H_o : Students' positive feeling about online teaching and learning was not related to students' previous online experience.

H_1 : Students' positive feeling about online teaching and learning was related to students' previous online experience.

The variables used for testing this pair of hypotheses were "Student previous online learning experience" and "Positive experience". The independent variable "Student previous online learning experience" used for testing was the same as that in testing of Set 1. Values of the dependent variable were from Question 1 of Section B of the questionnaire, where students were asked if they felt positive about their online teaching and learning experience. Data collected for this question were used directly for testing this hypothesis.

Table 4-24 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-24: Chi-Square Tests for testing Hypothesis #4 (Set 2)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.531	4	.639
Likelihood Ratio	3.603	4	.462
Linear-by-Linear Association	1.178	1	.278
No. of Valid Cases	195		

As indicated in Table 4-24, Chi-Square's 2-sided significance level was much higher than 0.05, we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. We therefore concluded that H_o may be true and

that students' positive feeling about online teaching and learning was not related to students' previous online experience.

As there was no significant evidence of a relationship, any measurement of its strength was inappropriate.

Set 3:

H₀: Students' feeling successful about online teaching and learning was not related to students' previous online experience.

H₁: Students' feeling successful about online teaching and learning was related to students' previous online experience.

The variables used for testing this pair of hypotheses were "Student previous online learning experience" and "Successful experience". The independent variable "Student previous online learning experience" used for testing was the same as that in testing of Set 1 and 2. Values of the dependent variable were from Question 2 of Section B of the questionnaire, where students were asked if they felt that their online teaching and learning experience was a successful one. Data collected for this question were used directly for testing this hypothesis.

Table 4-25 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-25: Chi-Square Tests for testing Hypothesis #4 (Set 3)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.498	4	.645
Likelihood Ratio	3.562	4	.469
Linear-by-Linear Association	1.365	1	.243

As indicated in Table 4-25, Chi-Square's 2-sided significance level was much higher than 0.05, we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. We therefore concluded that H_o may be true and that students' feeling successful about online teaching and learning may not be related to students' previous online experience.

As there was no significant evidence of a relationship, any measurement of its strength was inappropriate.

4.3.8.5 Testing of Hypothesis #5: Students whose first language was not English would prefer to use email to communicate with their lecturers

Two sets of paired null hypothesis and alternative hypothesis were used to test this research hypothesis:

Set 1:

H_o : Students' preference in using email to ask their lecturers questions was not related to students' first language.

H_1 : Students' preference in using email to ask their lecturers questions was related to students' first language.

The variables used for testing this pair of hypotheses were "Contact lecturer/tutor via email regarding subject matter" and "1st language". Values of the dependent variable "Contact lecturer/tutor via email regarding subject matter" were from students' responses of Question 1 of Section E of the student questionnaire. Values of the independent variable "1st language" were derived from Question 5 and 6 of Section G of

the questionnaire. Question 6 of Section G asked students to state their country of origin. Those who stated that they were from “Australia”, “England”, “Northern Ireland”, “New Zealand” and “Scotland” were assumed to have English as their first language. The rest of the students were assumed to have a language other than English as their first language. Those who did not state their country of origin but stated that they had been in Australia for 10 years or more were also assumed to have English as first language.

Table 4-26 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-26: Chi-Square Tests for testing Hypothesis #5 (Set 1)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.778	4	.216
Likelihood Ratio	5.460	4	.243
Linear-by-Linear Association	3.817	1	.051
N of Valid Cases	179		

As indicated in Table 4-26, Chi-Square’s 2-sided significance level was much higher than 0.05, we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. We therefore concluded that H_o may be true and that students’ preference in using email to ask their lecturers questions may not be related to students’ first language.

As there was no significant evidence of a relationship, any measurement of its strength was inappropriate.

Set 2:

H_o : Students’ preference in receiving emails with answers to their questions from their lecturers was not related to students’ first language.

H_1 : Students' preference in receiving emails with answers to their questions from their lecturers was related to students' first language.

The variables used for testing this pair of hypotheses were "Prefer lecturer/tutor to answer questions via email" and "1st language". Values of the dependent variable "Prefer lecturer/tutor to answer questions via email" were from students' responses of Question 2 of Section E of the student questionnaire. Independent variable "1st language" was the same as that used in Set 1 testing.

Table 4-27 shows the results of the Chi-Square statistics tests between the two variables.

Table 4-27: Chi-Square Tests for testing Hypothesis #5 (Set 2)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.838	4	.428
Likelihood Ratio	3.667	4	.453
Linear-by-Linear Association	.062	1	.804
N of Valid Cases	179		

As indicated in Table 4-27, Chi-Square's 2-sided significance level was much higher than 0.05, we could not conclude (beyond reasonable doubt) that there really was a relationship between the two variables. We therefore concluded that H_0 may be true and that students' preference in receiving emails with answers to their questions from their lecturers may not be related to students' first language.

As there is no significant evidence of a relationship, any measurement of its strength was inappropriate.

4.3.9 Summary of hypothesis testing

Association tests were conducted to investigate the relationships, if any, between students' demographic background and their perceptions of online teaching and learning. As indicated from the literature, students' study mode (part time / full time), age, level of study (postgraduate / undergraduate), previous online learning experience and their first language (English / Non-English) may have some influences over their perception of online teaching and learning.

However, association test results of the five research hypotheses revealed that there were no significant associations between the above-mentioned students' demographical factors and their perceptions of online teaching and learning. This finding was in contrast to the literature and will be further discussed in Chapter 5: Discussions and recommendations.

4.4 The perceptions of the lecturers

This section presents findings of lecturers' data through qualitative data collected from interviewing the five lecturers who participated in the study. The purpose of the interviews was to gather rich data from lecturers on their experience in online teaching.

This section begins with a summary of the characteristics of the five lecturers; the sub-sections that follow present lecturers' qualitative data on various aspects of their online teaching experience where the researcher identified a number of themes. A copy of the interview scheme is attached in Appendix II.

Table 4-28: Summary table of lecturers' characteristics

Lecturer	Group	Sex	Number of students	Online teaching experience
L1	<i>G1</i>	Male	38	Less than 6 months, it was his first semester doing online teaching
L2	<i>G2</i>	Male	39	More than 4 years
L3	<i>G3</i>	Male	143	More than 2 years
L4	<i>G4</i>	Male	52	About 4 years
L5	<i>G5</i>	Male	29	More than 6 months, it was his second semester doing online teaching

As indicated in Table 4-28, all lecturer participants were male, their online teaching experience varied from beginner to over four years of experience. For Lecturer L1, it was his first attempt in using the Web for teaching purposes. Lecturers L2 and L4 were the most experienced followed by L3 who had over two years of online teaching experience. Lecturer L5 started using the Internet in his teaching the previous semester.

4.4.1 Hours of class contact

Three out of five lecturers interviewed had reduced class contact hours because of the use of the Internet/Web in their teaching. Lecturer L3, gave his students the options of: 1) completely on-line; 2) one intensive week, and then work on their own afterwards; 3) weekly contact. Lecturer L4 reduced his class contact to fortnightly instead of weekly after using the Web in his teaching. Lecturer, L5, had reduced class contact to monthly instead of weekly after using the Web in teaching. The remaining two lecturers, Lecturers L1 and L2 maintained weekly class contact that was the same as before using the Web.

4.4.2 Reasons for using the Web in teaching

The five lecturers were asked to state their main reasons for using the Web in their teaching. Their answers could be categorized into the following five themes:

- Flexibility
- Effective communication
- As an additional resource
- An enriched learning environment
- ‘Technology push’

Flexibility

All five lecturers hinted, at some stage of their interviews that the Web offers a more flexible and convenient learning environment for students, especially for those part time students who cannot come onto campus regularly. Lecturer L4 extended this benefit as he put it: “to improve the flexibility of a unit, e.g. for independent learners who do not think it's important to come to classes”

Lecturer L5 used the Internet to deliver his course to students studying in two other countries and hence minimise his overseas teaching trips. Lecturer L2 felt that given the choice, a majority of the students would prefer to come to class; but for those who did not have the choice (due to job, family or other commitment) such as those enrolled in distance education, the Internet provides an alternative to class room education. He also felt that the Internet provides a more suitable learning environment to the independent learners who do not think it is important to come to classes.

Effective communication

Lecturer L4 felt that the Internet could be used as a means of effective communication - an efficient way to disseminate information to all students. It was felt that the use of the Internet would enrich the experience for everybody by creating a community where they would all share – as he stated:

"...my learning approach is based on getting students to teach one another...the Internet enable me to do that in a way that wasn't limited to those very few opportunities face-to-face".

Lecturer L2 felt that some students find email very useful in asking lecturers questions, especially those students who would not normally ask questions in class. As he commented:

"... sometimes students from other cultural background, or even from a speaking English perspective, they were very worried about sounding foolish when they asked a question even in tutorial or a lecture, or even coming to see the lecturer. If they then had time to write the question down, think about what they wanted and then send it off, they would then get a response back which again they could look at their own leisure."

As an additional resource

Lecturer L1 expressed that the original idea of putting teaching materials on the Internet was because printed material was getting too expensive for students to purchase.

An enriched learning environment

Lecturer L2 felt that the availability of a vast amount of information and the richness of information on the Web provided an enriched learning environment for the students. As he remarked:

"...we did that because I could see immediately the advantages of having a lot more information available to students, the ability to have, just as a trivial thing, coloured diagrams rather than straight black and white diagrams in course notes, specially important in Computer Graphics but in other areas as well."

Technology push

Lecturer L4 said he was excited by the possibilities of doing different things with the technology, this was echoed by Lecturer L2 as he commented:

“... at the end of 1992 it became apparent to me that the use of electronic media was reaching a level where we could benefit by using it for the delivery of course material...”

L2 also commented that with using the Web he was able to incorporate interactivity into his course material:

“Currently we have these interactive applets so that the students can do things at their own pace and investigate things. From the very start we have had programs which can execute and then be displayed on their screen so they can see an example program running...”

Lecturer L3, whose unit was about Web technologies, said using the Web to deliver his unit would set a good example for students to see how the technology is being applied. He also added that online teaching is being considered as the strategic direction of his teaching department in which all units would eventually go on-line.

4.4.3 How the Internet/WWW was used in teaching

The ways the Internet/WWW was used in teaching varied substantially amongst the five units studied. At one end, it was used only to publish lecture notes by means of scanned images; at the other end, it was used to provide an online learning environment with multimedia, CMC (computer mediated communication), and interactive learning material to students from different parts of Australia and the world. In three of the units, the lecturers had provided students with some kind of ‘virtual library’ where links to useful sites can be found. Apart from the WWW, four of the five units had also incorporated at least one of the other Internet features such as email (electronic mail),

online chat, and bulletin board to promote CMC. Online quizzes, whether as part of the unit assessment or for student self-testing purpose, were used by three of the five lecturers.

Lecturer L3 assessed his students' assignments online with results and comments emailed back to individual students. In addition to course delivery, he also used the Internet to handle all course management functions, e.g. a list of students' email addresses to enable students to communicate amongst themselves was generated and broadcast online.

Lecturer L2 had provided students with what he termed as 'interactive learning material'. One of the examples he gave was that in addition to the text-based explanation of a certain concept, he would also include an applet in the relevant page, and when students clicked on the applet, they would actually see the execution of a sample program to demonstrate the concept.

Only two of the five lecturers, L2 and L3 felt that they had sufficient computing skills when they first decided to get started in online teaching. Two of the remaining three, L4 and L5, although not having the skills themselves, were given technical support from their departments to progress with their projects. Only one lecturer, L1, commented that there was no help available and it was a long and difficult process to even just have his lecture notes scanned and put on the Web.

4.4.4 The development process

Three of the lecturers: L3, L4 and L5, had chosen WebCT (see www.WebCT.com) as the development tool. WebCT was the software endorsed by the university for the use of online course development. The other two lecturers, L1 and L2, used other tools for their developments.

In terms of development time, none of the lecturers could give a specific time frame; all of them indicated that the development of their online material was completed gradually over a period of time. All agreed that it was much more time consuming to develop online teaching material than material for conventional face-to-face teaching.

When asked about the perceived differences between online teaching material development and conventional teaching material development, the replies varied significantly. Lecturer L1 and L2 felt that HTML (hyper text mark-up language) was the only difference. Lecturer L2 also added that when the source of material turned into HTML, the navigation of material also changed from linear to non-linear. He also saw the advantage of the HTML form as “being much richer and fuller, with graphics, multi-media, etc, and at a lower cost as compared to the paper form”. He further added that he would now prepare all his teaching materials on the assumption that they would be used for online since he felt that it was much easier to convert from HTML to paper than the other way round.

Lecturer L5, on the other hand, felt that the whole philosophy was different between these two types of course materials development, he felt that one had more opportunity to incorporate interactivity in the online mode. Lecturer L3 felt that it was much harder to develop online teaching materials because everything had to be ready before the course started.

Lecturer L4 felt that there should be no difference between the development of these two types of teaching material, as he explained: “...that there really isn’t a difference, because you should do those planning things anyway...” However, he then added “...but we know most people don’t..., they worked on routine...” He then proposed that since the content of the material would be very similar for these two modes of delivery, one should focus more on how to communicate effectively (in the online mode) with the students.

4.4.5 The perceived difficulties from the lecturers' perspective

Time constraints, pedagogical concerns and technical problems were the main difficulties faced by these five lecturers during their online material development processes.

Time constraints were a problem for two of the lecturers, one of them, lecturer L3, who was not accustomed to the English speaking environment, felt that having to develop all the online teaching material in English within a short time frame was a slight problem. To ensure material would be as interactive as possible was also an important concern for this particular lecturer.

Technical problems were Lecturer L5's main concern as he felt that the server was a bit slow during the development process and it went down too frequently.

Two other lecturers, L2 and L4 expressed that their main concern were the students' responses, as L4 exclaimed:

“Well, the principal difficulty... I didn't know what I was doing. You know, in a global sense, I didn't know how students would respond!”

Lecturer L2 was more concerned about how students would benefit from the material being delivered over the Internet, as he explained:

“Finding out the links, where else on the Web can you get more information that is good information, now what can you get in terms of interactivity that may help students... those types of things, that's where the time needs to be spent. ...Each week I literally spend one hour enriching that course and looking at ways in which I can make the online material better and better and better for students. And that's the main thing you've got to say 'How good is it for students.' Don't make it look nice, how do students benefit? Don't put really, really glitzy stuff on there, how good is it for students? No good

making it look really nice if it's not beneficial for students. And that's a difficult thing. It comes back to again, knowing about teaching and learning, not just 'I can make it look nice' but 'How can I help students to learn. How can I teach these concepts or whatever'

4.4.6 Lecturers' perceptions of students' reactions

The lecturers felt that students, in general, had responded positively and with interest as two of them commented:

"I think that they were...definitely interested and um, also happy to be exposed to new technology. Willing to learn and, I would say satisfied with the new service that we offer..." and

"...generally, pretty positive... given that they were looking to do the unit, obviously it's a new unit, something different, and the whole lot seemed to fit together..."

However, they also pointed out that there was resistance from some of the students, as lecturer L2 commented:

"...the students you would classify as bright and energetic, they really loved it because it opened up a very rich environment for them to explore things. The students that didn't like it, they tended to be, although there's no formal correlation, they tended to be students who were academically poor as well, really they just weren't interested in anything..."

Lecturer L3 agreed:

"...it kind of divides students very much, you get students who absolutely hate it and others who really like it. Some students get very enthusiastic

about this ... its [a] good experiment, very modern and all that. And then you get students who say, 'I don't like reading on screens, I don't like this mode of delivery at all'. So, it really is you know, very much, radicalises the students and you find that they go off in different directions". It was also felt that students did tend to accept it eventually, as they commented " ... maybe about ten percent, fifteen percent, so three or four find it a bit hard to cope, but they get used to it...a lot of those uncertainties which were there for the first two weeks, disappeared in the third week when I got most of them into the lab and showed them what it is we were doing..."

4.4.7 Students' feedback

Apart from one group *GI*, the other lecturers had collected formal and/or informal feedback from their students on on-line delivery. The only lecturer who did not collect feedback from students, had, however, certain perceptions on how students viewed and received the on-line delivery mode and also the quality of online material. Below are extracts of comments made by the lecturers on students' perception of online teaching and learning, either based on student feedback data they collected or just on their own perception of students.

The main difficulties faced by students

The main problems, as raised by four of the five lecturers, were technical problems related to access and response time. The complaints included:

“...the most difficult thing of course, is the getting access to a computer through the SES system”;

“...the biggest problem posed to students and me were the lab facilities....They didn't get access to e-mail. E-mail systems didn't work, Web systems didn't work. Not even the computers work because they took them several minutes to log in”;

“...Some of them said they couldn't log on.... Remote access was slow... we always have this ten percent who are lagging behind...”;

“...there were students complaining about the printing during the semester. The main reason being the materials were in graphic format (scanned images) and each image takes time to print.”

Lecturer L2 who had been involved in on-line teaching for a much longer period than the others, had found that over the years as technology changed, the type of problems confronting the students had also changed significantly. The example he gave was that four years ago, many students would complain that they didn't know what a 'hot link' was, or did not know how to use a browser. But in the more recent days the problem would more likely to be not having the right “pug-in” software to download certain material. His awareness of students' current problems led him to focus on how to help students to get the information and appreciate it.

Students' satisfaction

Apart from the group *GI* where students' feedback was not collected, the other four lecturers felt that the students were generally satisfied with both the mode of delivery and the online material. Their comments included

“Yes, I have very good feedback,... I think that we should be OK”

“Yes, I've done a number of surveys... the results are uniformly positive I have to say, ...that many students agree with the quality rather than disagree.”

Lecturer L3 did a more detailed analysis and commented:

“In terms of the mode of delivery - I would say there are about let’s say, five to ten percent who are enthusiastic about the course, or are very happy. Um, about twenty to thirty percent who would be happy with the course, about fifty percent, fifty percent to sixty percent who um, think it is OK and [they] can work with that, and there would be about ten to fifteen percent who absolutely hate it. In term of the material, generally most students are happy.”

Lecturer L4 felt that the students' satisfaction was not so much about the technology, but rather the teaching and the learning environment. As he said:

“... it’s not about the technology, it’s about their sense of me as a teacher, as someone who creates good learning environments.”

He also pointed out that his students had indicated their preference for a combination of face-to-face and on-line teaching over pure on-line teaching.

4.4.8 Lecturers’ satisfaction

All five lecturers agreed that there was room for improvement in the online teaching materials they developed. Amongst them, only one lecturer expressed that he was completely dissatisfied with the outcome of his online teaching experience. Two of the other four had explicitly stated that they were satisfied with the outcomes. The remaining two, although expressing that they were not satisfied, did so more for reasons related to their personal expectation rather than the outcome of their experiences. As one of them, L4, stated:

“No, because I’m never satisfied...I’ve wanted always to be better and better usually implies making changes based on the previous teaching experience, and, when you make the change, you then find something else is wrong”.

The other lecturer, L2, said something very similar:

“Oh, I don’t believe you can ever be satisfied. Um, some units I haven’t changed much at all. Some units what I do is, I go into them and say ‘This is a new thing which I found beneficial, we might trial something’ and so...”

4.4.9 Online delivery as a means to enhance teaching

All five lecturers gave positive answers when asked if they believed the use of the Internet had enhanced their teaching. The two commonly cited advantages of using the Internet in teaching were 1) the ability to point students to useful links for additional information on various topics; and 2) the availability of communication tools such as email, chat or discussion forum over the Internet. As Lecturer L4 pointed out: because hypertext is non-sequential in nature, students could choose and pick to visit the appropriate websites to obtain the information when needed. By using electronic forms of communication tools instead of face-to-face contact, lecturer L2 stressed that students could take time to think through the questions they wanted to ask before writing them down as email. When they received a reply from the lecturer, they would have a written answer that they could refer to later.

Lecturer L5 felt that he could get the message across more clearly online as it was in written form. Lecturer L2 felt that using the Web enabled him to do things that he could not do in a conventional classroom, examples he gave include interactivity and multimedia that he could build in to his online material. He also commented that with the Web, not only he could place examples there for students to read through, he could also incorporate interactivity’ into the example such as having an applet that would demonstrate the execution of a program and display the result in front of the students.

Lecturer L3 felt that the Web could supplement classroom teaching in the sense that he did not have to cover everything in the classroom; instead, he could place those materials on the Web for students to look up at their own time. In this sense, the Web

could remove some of the teaching load hence allow the lecturer to do a better job in the classroom under less pressure.

Lecturer L1 felt that because online material is available to anyone and should be available to anyone, it would put pressure on teaching staff to improve the quality of the materials to be placed on the Web, because they knew they would be scrutinised. He hoped that this would lead to better presentation, better explanation and more examples made available to the students. However, he also worried that lecturers might become over reliant on the Web, as he commented:

“... but I think it could lead to what I might call lazy teaching - it's on the net, I don't need to tell you, you know, that sort of thing may creep in...”.

Lecturer L4 felt that the Internet had added flexibility into the ways we do things:

“I think it enhances peoples' capacity to create and structure environments that are specific to their unit. You know, one of the things that we've got at the moment in this, in this institution is a lot of assumptions about the way things ought to be organised across the whole university. And that's necessary to scale the university to the point where you can have thousands of students here. I think teachers suffer from a sense that things were organised in a way that suits the institution. Like, lectures have to be at a certain time, they can't be forty minutes long; they've got to be an hour long and all that sort of stuff... you've got to run around and get stuff on closed reserve by a particular date. Those sorts of things that are inflexible in terms of teaching will tend to disappear. So it will enhance teaching from that point of view.”

He also felt that with the use of the Web, he could change the way students learn:

“Given that my fundamental goal is to create in students a sense of self awareness, or capacity to learn independently, the Internet allows me to do that in a way that face-to-face teaching, from experience did not... ”.

He also recognised that the technology had provided him with other benefits such as the option of using a combination of face-to-face and online discussion in delivering a unit.

4.4.10 Online delivery as a means to improve learning

There were mixed reactions towards the question. All felt that students could benefit from it in some ways but were concerned about any claims of proof. As lecturer L2 pointed out:

“Ooh that's very difficult to say.... my gut feeling is ‘Yes’, it is very difficult to even prove that scientifically... The reason being is that you can’t do a controlled experiment with students... However, the feedback that we do get tends to indicate that students are very, very appreciative of what’s online for various reasons... And I think that anything that helps students to assimilate knowledge, to make them more comfortable, I think that helps their learning. I don’t think anybody would disagree that the Web is fun and so fun things often encourage, ... an environment where learning is made easier as well. So I think there are a lot of things going for it and I don’t think there are many disadvantages. It’s a bit distracting so as long as they don’t just get a lot of noise from the Web, I think that it's beneficial and hence maybe learning is increased.”

Lecturer L3 felt that students' learning was improved because the Internet offers them “a supplementary source of information where they could learn a lot by themselves.” It is a powerful tool to communicate with teaching staff and fellow students. However, as pointed out by lecturer L1, maybe only the good students would benefit from it, as for the weak students, it might have a negative effect:

“Students might think that that’s all they need and they don’t need to go to lectures... if the students use it sensibly, it should be good but I’ve got a sneaky feeling that if you’ve got students that are sort of, on the run, you know, they haven’t done their assignments, they’re a bit late, they’re overloading, so they don’t go to classes...”

Lecturer L4 felt that the Internet could improve learning by way of enabling a better learning community where communication between learner and teacher or learner and learner was not restricted to just once a week classroom contact. The lecturer also felt that text-based asynchronous discussion using the Internet technology was better than face-to-face as it encouraged thoughtful dialog about complex philosophical issues in his unit. This was particularly helpful to students whose first language was not English.

Lecturer L5 felt that because using the Internet in learning allows students to feel as though they were playing, learning was more enjoyable. Moreover, the Internet enabled students to learn at their own pace, own time and at the students’ choice of location, and all these factors led to the increase of flexibility in learning and in maintaining the interest of the students.

4.4.11 The Perception of Success or Failure

The lecturers were asked if they considered their moves to online teaching were a success or a failure and to explain the reasons for their answers.

All but one lecturer felt that their experiences were a success. Lecturer L1 felt that it was only a qualified success. This was due to a lack of time and resources to support the whole project.

The other four lecturers who considered their moves successful had different views on what they meant by the term 'success'.

Lecturer L2 considered it to be successful in term of teaching and learning experience and for the benefit of his students and the people such as other academics teaching similar subjects who had an interest in his material. However, he felt that because of resistance from his department, the project was missing out on funding and kudos, consequently the department and the university did not benefit from the effort that he had put into the project, even though he considered himself as one of the very early adopters of online teaching in higher education. In this sense, the lecturer did not consider it as a success.

Lecturer L5 made his judgement based on the feedback from his students:

“Yes, so far, yes, definitely... I have good feedback from the first semester and from both on campus students and offshore students... so that’s a success, yes. Uh, under that form, that’s means that we kept this dual approach, face-to-face, and the Internet as a back up at this stage. However, I cannot guarantee what will happen if we rely solely on the Internet”.

Lecturer L3 considered it as successful because his aim was to find out if his unit could run 'online'. Therefore when his unit was actually totally delivered on the Web, he considered his project a success.

Lecturer L4 considered his experience a success purely because he felt good about it.

4.4.12 Online teaching to supplement or to replace classroom teaching

When asked if online teaching should be used to supplement or to replace classroom teaching, the immediate reaction of all five lecturers was that online teaching should not be used to replace classroom teaching. However, each of them was prepared to further explore the different aspects of the issue.

Lecturer L3 felt that to be able to study online without coming into campus is a possible option for busy postgraduate students because the alternative for these people is no education at all. As for undergraduates, he felt that it would be a good experience for students to go through one or two units in their entire course to see how the technology worked in this regard. However, he would not like to see students going through the entire undergraduate study without going to classes.

While lecturer L2 expressed that he would not like to see 'lecturerless' lectures, he did, however propose that online teaching can be used effectively in two ways: firstly as supplemental material and secondly to use it for short courses with the possibility of off-shore teaching. He felt that students would really benefit from having the teaching material made available on the Web for them to access. As for short courses and off-shore teaching, he said one of the common arguments against online teaching is that it would not be cost effective because it would take too much of the lecturer's time to reply to students' email queries. However, he argued that online teaching could be quite cost effective with careful management and tutors can be hired for the sole task of answering students' email queries, for example.

Lecturer L1 felt that for some subject material, it would not be possible to substitute classroom teaching with online teaching. As he said:

“... in the mathematics area it would have to supplement it. Because I think that mathematics, well certainly for me, mathematics is an area that needs explanation. Quite often um, students seem to want something explained, how did you go from steps, from line three to line four, you know, what did you do, why did you do that, what do I have to recall in order to do that. You know, do I have fractionalised an equation, or whatever. So they need that explanation. Now, unless you are going to put all of those explanations on the Web, which will then make your document so huge, and of course it would waste the time of those students who are capable of just going straight through... ”

He also argued that even if we could put all the explanations on the Web, the system would still lack the flexibility in comparison to a lecturer who could respond to the students' different needs in classroom teaching.

Lecturer L4 felt that we should recognise the strengths and weaknesses of online teaching and use it to complement classroom teaching. He explained:

“ I think the trick is to say, yes, it supplements and replaces by thinking through all the possible ways in which it can replace. For example, a lecture has about five different purposes. So you might say the Internet can replace purpose three and four in the lecture, the giving out of administrative information, and the opportunity to ask questions about the previous week's lecture. It can't replace the lecture itself, but it can replace those elements within it. So we get them out and we use the Internet for that. ... or you can replace every second week, or every third week, or you can have a lecture once a month, or you can have a party down at the tavern once a month. ... This technology, by radically transforming, either just because it's accidental and we can do it now, or because there's something inherent within the technology and it's application that says, yes, the world is now a different place. It means that we can re-think everything that we ever thought of about education, if we want to, and if the unit served the right sort. Yeah, sure, for a thousand-student unit, we can't do some of the things you can do with a five-student unit. And we already know that is the case. But I do think that there is a very great problem if you start to think in terms of, you need to, in a sense, start from scratch and say, I'm going to teach this now, I want to teach a unit on x. And then you open your drawer of possibilities and tools and inside there is the Internet. Rather than thinking, this is how I teach my unit? How can I take this bit out and put the Internet bit in? Maybe you need to start that way, but I do think that we're probably now at a stage where the technology is mature enough to simply say, 'I want to teach this, I want my students to learn this, let's see how I do it'.”

Lecturer L5 was more concerned about how students perceived an online unit in term of value for money:

“I don’t think so, I don’t think it will replace entirely and I guess we have to strike a balance here, because students you know, particularly at now, at the post grad level, pay a lot of money, so if they don’t feel that they get value for their money, if they don’t sit in a class and we don’t, you know, massage them with a few case studies and that sort of thing. Uh, so you have to get balance and have flexibility offered by the Internet and at the same time, I guess give some sort of minimal interaction which is useful.”

4.4.13 Advice on online teaching

Advice from the five lecturers was very broad, covering a range of issues including technical as well as pedagogical advices.

Some advice was on preparation, such as:

“...getting advice from more experienced staff before starting the project...”;

“... expect the unexpected, there will always be problems...”;

“set specific goal, ask yourself what do you want to use it for?...”;

“expect that it's more work than you initially anticipated...”;

“... start small,... think ahead,... have some long term thinking...”.

The general feeling was that online teaching was still something new to many and required time to be familiarized with the concepts. And as in any other cases when dealing with technology, one should always prepare to expect the unexpected.

Lecturer L4, who was an experienced online teaching lecturer, stressed the importance of using the Web as a communication tool. As he explained:

“...communication, forget about content, think, how do I get computer mediated communication...Either private email type stuff. Play around with lists. Maybe they work better for some units than others. Discussion based. Forget about synchronous chat for the moment. It’s a bit of a disaster but it could have some huge possibilities in a classroom situation, or maybe with half a dozen students, even though you can get together. So experiment with CMC. That, that’s got to be the first thing that you do...”

Lecturer L4 gave some of the most profound advice on the pedagogy of online teaching:

“there is more to online teaching than...it’s not how you use the Internet to teach, the question you need to ask yourself is: how do I teach? And from that question, then the answers will emerge. There is no answer about how to use the Internet to teach and learn better. But there is a process which involves thinking about teaching and learning and from that point, you can then work out how to use the Internet.”

His view was echoed by another very experienced online teacher, lecturer L2, as he said:

“...what are your objectives in terms of learning? You’re providing a service to students, it’s no good saying ‘Isn’t it pretty!’ you’ve got to ask yourself: ‘If I’m going to do this, how are the students going to learn?’ If putting it on-line doesn’t help the students, don’t bother; you’re just wasting your

time. If putting it online helps the students in some way or there's some benefits for the school or for the students or for the lecturer, that's fine. ”

Still focused on students, L4's other advice was to *“realise that what you're doing is intercepting with a change that's taking place outside of the university, base what you do in an awareness of the social change that's involved.”*

Getting support and resource from the teaching school, division or both before starting the project was another piece of advice from two lecturers based on their own experiences. Lecturer L1 found his task extremely time consuming due to lack of resources, whereas Lecturer L2 found himself not getting the support and recognition from his teaching school after spending vast amounts of time and effort on his online teaching project.

4.4.14 Suggested improvement

The lecturers were asked what improvements they would make if they were to run their units online again. Lecturer L1, who had just started on the project, obviously felt that a great deal needed to be done to the current project that he considered in its 'infancy'. The more experienced developers suggested improvements that were mainly about adding more advanced features to their online material. Lecturer L5 would have liked to put in video clips and multimedia into his website but felt that he was constrained by the limitation of the available technology.

Lecturer L3 would like to see more interactivity at the same time more 'control', that is a mechanism where he could monitor and motivate his students to learn online. As he explained:

“... I mean to make them do certain things... top control whether they do it or not. And, well, the control part is not important but makes them feel that

they are controlled...if you think it doesn't matter if you do it or not, you end up not doing it.”

Lecturer L2 suggested 'Intelligent Web pages' to be used in his online teaching material, to which he explained:

“... what I mean by that is instead of students having a Web page, where they read, next Web page, read it, next Web page etc what happens now is that the Web pages that are presented to them are dynamic and they may start reading a Web page, they may then do a very short quiz and the results of that quiz, along with previous results about that student, have said 'The next Web page you should see is this one'. It maybe the next sequential one but it may, in fact, be 'Look you haven't learned enough about this, let's give you more information or slightly different information' but it may be that 'you actually go a couple of pages ahead because you're obviously picking up this information very, very quickly, have a good understanding of it, we don't want to bore you with trivia' and so these intelligent Web pages really are generated dynamically based upon the student's ability. And that then becomes very, very useful for a student because not only is it active on their part but it's active directed learning...”

Lecturer L4, however, did not suggest a technical improvement; instead, he proposed a more holistic approach towards online teaching and learning:

“...as the academic you take responsibility for making something work. Not by applying a sort of single solution but by giving the students responsibility for making it work the way you want it to. Now, I want there to be a community of learning. I don't like to force the students to do that. I don't set up some mechanism that will do that. I try to educate the students how they should respond to it. And some of them do and some of them don't, but it's their responsibility, not mine”.

4.4.15 Summary of Lecturers' responses

The five lecturers had a varied amount of online teaching experience and their skills in developing online teaching material also varied significantly.

The main reasons for these lecturers to take up online teaching included:

- Flexibility
- Effective communication
- As additional resource
- An enriched learning environment
- 'Technology push'

The reason for taking up online teaching, the experience of the lecturer and the resource and support available to the lecturer appeared to be the main reasons of how the Internet/WWW was being used in teaching. This usage varied significantly across the five groups, ranging from one end of just publishing lecture notes to the other end where multimedia, CMC, virtual library and electronic communication tools were used to provide an online learning environment.

Time constraints, technical problems and pedagogical concerns were perceived as the main difficulties faced by these lecturers. Three of these lecturers were given assistance and support by their teaching department whereas the other two had to be self-reliant.

Four of these five lecturers had collected feedback from their students and were aware of the problems and difficulties faced by their students in an online learning environment. All four felt that their students were generally satisfied with the online teaching materials developed and the online learning environment that was being set-up. The same four also said that they were satisfied with their online teaching experience.

All five lecturers felt that the use of the Internet/WWW had enhanced their teaching. The two commonly cited advantages of online teaching were 1) the ability to provide links to various websites for a variety of information where the students could refer to;

and 2) the availability of communication tools such as email, chat and bulletin board to promote better communication between lecturer and students and amongst students.

While all five lecturers felt that the use of the Internet/WWW could improve student learning, they had different opinions on how the students would benefit from it. Some of the perceived benefits include the Internet/WWW had made learning fun hence encouraged more learning; communication was made easier via tools such as email, chat and bulletin board where students were not restricted to once a week class contact; and the flexibility the Internet/WWW had introduced into learning where students could engaged in learning activity at their own time, pace and place. It was also suggested that these benefits would be difficult to be measured or proved.

Despite the hard work, all but one lecturer felt that their online teaching experience was a success. However, none of them would like to see online teaching replace conventional classroom teaching completely. The common view was one should recognise the benefits brought by online teaching and exploit its strength using it to supplement classroom teaching.

The advice these lecturers gave to anyone who wish to undertake online teaching include: 1) As online teaching and learning was still new to many, one should become familiarized with the concepts before starting. One should 'plan ahead', 'start small' and 'seek advice from an experienced developer'. 2) One should think about the pedagogical issues before starting, one of the objectives of using online teaching should be about helping students to learn better and to ensure students benefit from it. 3) One should obtain the support and resource from their teaching school before starting, this was vital to the success of the project.

Chapter 5: Discussion and Recommendations

5.1 Introduction

The purpose of this chapter is to provide a synthesis of the research outcomes related to the research questions that were used to guide the study. The aim of the study, as mentioned earlier in Chapter 1 (p. 3), was to gain an insight into online teaching and learning in higher education from both the students and lecturers perspectives. This insight will benefit universities in making strategic decisions about online learning environments and will also help to facilitate further research in the study area. As the nature of the study was exploratory rather than theory testing, it was therefore appropriate for the researcher to make inferences based on the research findings. Recommendations based on these inferences are made in order to provide guidelines for those who are interested in engaging in online teaching and learning in higher education. Conclusions of the study are presented at the end of the chapter with brief recommendations on future research studies.

5.2 Inferences and recommendations

Four research questions were designed to guide this study. This section discusses each of these research questions individually and inferences are drawn from the findings of the study and recommendations are made.

5.2.1 Research Question 1: How do on-campus students perceive online teaching and learning in higher education?

The results show that students are generally keen to participate in online learning. The majority of student participants of this study indicated that their online learning experience was positive and successful and that they would like to see more units incorporate the Internet as part of the learning environment. They would continue to use the Internet as part of their learning resources even if they were not required to do so.

They also felt that the online material made learning more interesting and having material available on the Web allowed them to have greater control over their learning pace.

Inference #1: The use of the Internet and World Wide Web in teaching and learning is acceptable by students in higher education. They believe they can benefit from such a learning environment and would use it even if they were not required to do so.

Recommendation #1: Higher education institutions should continue to make use of the Internet and WWW in their education delivery. They should not abandon the idea. In fact, as students demand more units to have a 'Web presence', universities should prepare themselves to meet students' demand.

Students in this study indicated that they had sufficient knowledge to use the Web technology with only a minority having difficulties in getting access to computers and Internet connection. Students were also comfortable in communicating with their lecturers and peer via electronic mail; and endorsed the use of discussion groups on the Internet as part of the learning environment. All this implies that students in higher education are ready for online learning. This finding is important and significant as a study conducted on TAFE students' online learning readiness revealed that the timing for online learning in TAFE was premature (Warner, Christie & Choy, 1998).

Inference #2: Students in higher education believe that they have sufficient skills in using the Internet technology and they do not appear to have serious problems with computer access or Internet connection.

Recommendation #2: As the majority of students in higher education have sufficient exposure to the use of PC and Internet facilities, training in basic computer usage and Internet skills can be kept to minimum.

However, it is important to note that despite the satisfaction and sense of achievement with online learning, students in this study did not want to see online teaching as a complete substitute for classroom teaching. Neither did they believe that they would understand the subject matter better via the Web than they would have from a traditional lecture. They also disputed that the online material would help them to retain more of the acquired knowledge than they would have from a traditional lecture.

These responses indicate that students are still very much in favour of the classroom learning environment and would only like to see online teaching and learning as a supplement to classroom learning environment. Therefore institutions that are contemplating introducing complete online education need to be aware that they might find themselves turning students away rather than attracting more of them. The concept of the virtual university as depicted by Harasim et al (1995) as a provider of totally online courses through the use of computer networking is clearly not desired by the majority of students in higher education. This is particularly true in cases where for-profit companies were formed to deliver courses to college students; many of these companies have failed to sustain enrolments and had gone out of business by the year 2002 (Wilner & Lee, 2002).

Inference #3: Despite their acceptance of online teaching and learning, students in higher education are still very much in favour of classroom teaching. Students do not believe that they learn better through the Internet and WWW than in the classroom environment.

Recommendation #3: Online resources should be used to supplement rather than to replace classroom teaching. More research should be conducted to look into the strength and weaknesses of Internet technologies and how best they can be used to supplement traditional classroom teaching and learning.

As indicated by the majority of students in the study, they would like to see online resources such as course materials (e.g. lecture notes, tutorial exercises, assignment

specification) being implemented in more units in the university. This implies that soon students will expect some form of online component being incorporated into all units they are studying. It is therefore important for institutions to consider adopting some kind of framework and guidelines in the design, implementation and evaluation of such learning environments. Not only will this provide a consistent look-and-feel website interface for the students, but also help to keep the websites' maintenance and revision a more manageable task.

Inference #4: As an additional resource, students will soon expect some form of online component being incorporated into all units they are studying.

Recommendation #4: Institutions should adopt standards and frameworks to guide the development of any online teaching material so as to provide students with a consistent look-and-feel website interface across units and also enable easier maintenance.

Students with a more technical background, for example the group of computer literate students who participated in this study, undoubtedly will have much higher expectations of the technology. Given that the younger generation has more exposure to information technology at a younger age, many students will have greater computing experience before their arrival at higher education institutions. If the online environment created by the institution does not meet up to their level of expectation, they risk the possibility of leaving the students quite disinterested in, or unmotivated by, this mode of education delivery.

Inference #5: Students are becoming increasingly informed with current technology and hence have a higher expectation on what the technology can deliver.

Recommendation #5: Institutions should constantly update the technology used and seek feedback and suggestions from student users for improvements.

5.2.2 Research Question 2: Do students' demographic backgrounds have any impact on the students' perceptions of online teaching and learning?

Findings in this study showed that students' demographical factors such as age, first language, mode of study (part-time or full-time), level of study (undergraduate or postgraduate) and previous online learning experience do not appear to have any significant impact on students' perception and experience in online learning. Five research hypotheses were set up in order to answer this research question; however, none of the five hypotheses were supported by the study outcomes.

These findings, however, were not consistent with the literature. For example, Diaz's (2000) study found that the white ethnic group was disproportionately represented in online classes (81.3%) compared to traditional classes (76.1%); online students were decidedly older (62% between 22-50 year-old) than the traditional class (49.3%) and they were more academically experienced with over 36% having completed more than 60 college units compared to only 8.5% of the traditional class. His findings were consistent with those by Thomson (1998). Dutton and Dutton (2002) also found in their study that online classes had a larger number of older students, students who were not studying full-time or enrolled in a regular undergraduate degree program.

While it may be true that students in online classes exhibit certain characteristics, results of this study could not find any indication of relationship between on-campus students' preference for online learning with their age-groups, study mode (part-time or full-time) and level of study (undergraduate or postgraduate). One obvious contrast between this study and those mentioned above would be the difference in data sample representation. While online students were the subject of investigation in Diaz's (2000) and Dutton and Dutton's (2002) studies, all students who participated in this study were those who had chosen to attend classes on campus. The result from this study, while not contradicting Dutton and Dutton's study, could imply that students, regardless of age, study mode and

level of study, if given a choice, would still prefer classroom learning over online learning.

Once again, the study could not find any significant difference in email usage between local and Asian students. In fact there was no significant difference in perceptions and experience of all aspects of online learning between Australian and Asian students. This finding implies that when adopting policies on online teaching and learning, Australian and Asian students can be treated as one entity with no special consideration needed for either group.

Postgraduate students are thought to be more skilled in self-directed learning than undergraduates and would therefore do better in an online learning environment. Again, this was not supported by this research's findings. Given that the majority of participants believed they did well in their online learning experience, there was no significant difference between responses from these two groups. One possibility could be that the number of postgraduate students who participated in this study was significantly lower than the number of undergraduate students hence the effect, if any, was not felt.

Inference #6: Students' demographic background such as age, sex, country of origin, mode of study (part-time or full-time) and level of study (undergraduate or postgraduate) do not appear to have any significant impact on students' perception and experience on online learning.

Recommendation #6: The findings of this study suggested that when designing and implementing online resources, students' demographic background does not appear to be a major concern. However, as the findings of this research contradict some previous studies on the impact of students' demographic background has on perceptions; further studies on this aspect are recommended.

5.2.3 Research Question 3: How do lecturers perceive online teaching and learning in higher education?

Lecturers who participated in this study used the Internet in their teaching because they believed the students could benefit from it in some ways. These benefits, which ranged from cost saving on printed material to creating a learning community, were very much the lecturers' initiatives and many were experimental. Although these lecturers instinctively felt that they had done a good job on online teaching, they did not have a proven instrument to evaluate their 'product' and to measure the effects it had on students' learning.

The ways the Internet/WWW was used in teaching varied substantially amongst the five units studied. The different usage of the Internet/WWW in teaching had clearly demonstrated that the concept of online teaching and learning meant different things to different people. The way that the Internet/WWW was used in teaching was largely dependent on three main reasons: why it was used in the first place; the experience of the lecturer and the resource and support available to the lecturer.

The lecturers were also self-taught, self-motivated teachers who developed and implemented their online material themselves. Some did that with help from the university in the form of time relief or technical assistance; others were very much on their own and received no form of assistance from their department or division what so ever. They all agreed that it was a time consuming and very much learn-as-you-go process, particularly for those who didn't have prior knowledge or skills on Web technologies. These findings were consistent with the literature (e.g. Neumann, 1998). As online teaching is a new endeavour, the lack of general accepted guidelines means that every lecturer was doing it in the way they see fit. The problem with this is that students would need to deal with different interfaces, designs and expectations of the units they are studying. This could result in additional workload to students. In addition, maintenance of these websites, if to be carried out by a third party, could become a very demanding job as the peculiarities of each site would need to be understood.

Inference #7: Lecturers who are willing to incorporate the Internet technology as part of their teaching; have often taken on the task through their own initiative with little or no help from the university they are working in. While they believe the students will benefit from such practice, they also feel that not only is it a demanding and time-consuming job, it also won't get them the reward and promotion compared to some other activities such as research publications.

Recommendation #7: Universities should provide support to staff who are involved in online teaching. The types of support might include training, technical support and time allowance for the huge volume of electronic messages they have to read and reply. Some form of recognition and reward scheme should be put in place as an incentive to encourage and reward those who are involved if universities value such development.

Like the students, these lecturers believe that the Internet could supplement classroom teaching; they would not like to see it replacing face-to-face education delivery. In this regard, these lecturers raised a number of pedagogical concerns with regards to online teaching and learning:

1. Online learning provides a 'flat' learning environment where every learner receives the same treatment. However, in reality, not everyone learns in the same manner. Some might take a longer time or require more assistance than the others. In a classroom situation, a good teacher can always observe individual student response, maybe through facial expression or body language, and thus make a decision to provide more explanation or more examples. This would be difficult to achieve over the Web, although often a FAQ (frequent asked question) section can be set up so that students can browse through a list of questions and answers in order to find answers to their own questions, the effect is most probably not the same.

2. To run a complete online course over the Internet is almost certain to pose an identity authentication problem with students. It would be difficult for the institution to be sure that the person who had completed all the assessment is actually the student who had enrolled in the course. Without face-to-face contact, academics will never really get to know their students except via exchanges over emails or discussion groups.
3. To have all teaching materials on the Web for students to browse or download might create a false sense of security to some students who mistakenly believe that reading those material will enable them to gain knowledge.
4. Online courses of the same subject content will soon lose its individual characteristics, particularly with those that use the same textbook where publishers these days usually provide online material with the adopted textbook. Without the face-to-face learning component, what will be the difference between say, one programming course and the other? So in effect, higher education institutions may lose their competitiveness in providing quality individual courses.
5. There is also a fear that online education delivery is being promoted because of its perceived cost-saving factor rather than its learning benefits.

Inference #8: Lecturers do not want to see online teaching replace classroom teaching as there are many pedagogical concerns related to online teaching and learning that have not been researched thoroughly.

Recommendation #8: More research studies on the pedagogical effects of online teaching and learning are needed to gain more insight and to find ways on how to best use the technology for more effective teaching and learning.

Lecturers in this study were also concerned about how online education delivery may change the role of academics and the nature of the job. The reduction or total

replacement of face-to-face interaction with students means teaching now takes on a different role, a role that is more of a content developer, and/or online learning facilitator where the main duties include monitoring discussion groups and replying to emails from students. This change will obviously have a significant impact on job satisfaction and also one's decision on a chosen career path.

Inference #9: Lecturers are concerned that online teaching will change the nature of their job role. This could lead to less job satisfaction and an unintended career path.

Recommendation #9: Universities should work together with academics to define their job role and provide assistance for academics to switch from their conventional role to one that is more relevant to the current education setting.

5.2.4 Research Question 4: Is there a match in perceptions between students and their lecturers? What are the common issues or concerns, from both parties, on online teaching and learning?

Using data collected from the five lecturers and their students in this study, lecturers' and students' perceptions on online teaching and learning were 'matched' in each of the following areas:

Online course material

Both students and lecturers in this study appeared to be satisfied with the online course materials used in their respective courses. The majority of the students in this study were satisfied with the online course material presented to them with the exception of one group of students where access to the course material was the major obstacle. Students were satisfied with all design aspects of the online course material including the layout, and appropriate use of colour and graphics. With the exception of a small minority who complained about their dislike of reading from the screen, the majority of students appeared to have no problem in that regard. This implied that the length of text on each

section of the material was kept to an acceptable level as students did not see the need to have the material downloaded and printed. Many students also commented that they appreciated the hyperlinks included in the course material where they could follow those links to read up on topics that interested them. This feature was obviously noted by the lecturers as the ability to point students to useful links do one of the commonly cited advantages of online teaching by all five lecturers.

Inference #10: Online teaching and learning is well received by both lecturers and students in higher education and they shared very similar expectations from online teaching and learning.

Recommendation #10: Given that online teaching and learning is well received by both lecturers and students, this implies more research should be carried out to further explore this kind of learning environment.

Online experience

The majority of students and their lecturers in this study felt that their overall online learning and teaching experiences were positive and successful. However, their reasons were quite different. The lecturers felt that the use of the Internet/WWW had enhanced their teaching in the sense that course material could be presented using different media and HTML allowed students to have more control over the sequence of how they wanted to go through the material. They felt that the features of the Internet/WWW could create a 'richer' learning environment for their students as compared to classroom learning.

The students, on the other hand, saw the Internet/WWW as a convenient means of obtaining course material, particular in the event of missing a class. They did not feel that they could achieve better understanding via online learning than they would in traditional lectures. Even given the fact that students could go through online material as many times as they like and at their own pace, students did not believe online learning could achieved better knowledge retention compared to traditional classroom learning.

Lecturers and students, however, both agreed that online teaching and learning should be used to supplement and not to replace classroom teaching and learning.

Inference #11: Students were seeing the Internet/WWW as a convenient means to obtain course material rather than an enriched learning environment where they could benefit from the many features that may assist them to learn better.

Recommendation #11: Students need to be taught how to engage in online learning in order to achieve the maximum benefits.

Online communication

Effective communication was cited by at least two of the lecturers in this study as the main reason for going online. Advantages such as being able to carefully write down and revise the question(s) before emailing to the lecturer and being able to receive answers in written form, were cited by lecturers as the main reasons why students would benefit from online communication.

However, online communication was not being appreciated by the majority of the students in this study. The take up rate was particularly low when communicating online amongst students themselves for the discussion of subject related matter. This is somewhat contradictory to the belief that “[the] use of electronic mail between students and teachers is becoming widely accepted; students state instructors are more accessible by e-mail...students are much more participatory and display investigative characteristics” Chorp (1995). However, as Zagorsky (1997) pointed out that “many educators are implicitly assuming that all students will use these new electronic resources once they are available. However, research to date has not explicitly tested this assumption.” Moreover, students could be put off by electronic messaging systems because of the information overload characteristic of the medium (Finholt & Sproull, 1990; Sproull & Kiesler, 1991).

Inference #12: Students are reluctant to make full use of online communication tools such as email, chat and discussion group as part of their learning activities, yet research has shown that much learning takes place during conversation between learner and instructor and also amongst learners themselves.

Recommendation #12: Students need to be encouraged to make more use of online communication tools and see that as part of the learning activities. Lecturers should be more aware of the obstacles that are holding students back from communicating online.

5.3 Conclusion

This study aims to gain insight into online teaching and learning in the Australian higher education sector through the investigation of perceptions and experience of students and lecturers. A better understanding of the two key stakeholders; students and lecturers will better equip any educational practitioners who wish to be involved in online teaching and learning in higher education. It is envisaged that key findings of this study will add new knowledge to the field of study where educational researchers could draw upon this new knowledge before embarking in further research in this area.

This study found that online teaching and learning is well received by both lecturers and students in higher education sector and both parties shared very similar expectations from an online teaching and learning environment.

Students who participated in this study were positive about their online learning experience and believed that they could benefit from the use of the Internet and WWW in higher education. However, students were seeing the Internet/WWW as a convenient means to obtain course material rather than an enriched learning environment where they could benefit from the many features that may assist them to learn better.

While students believed that they have sufficient skills in using the Internet technology, the majority of those students who participated in the study felt that more technical assistance should be made available when needed. This implies that higher educational institutes that are keen to take up online teaching and learning should first ensure sufficient support is in place.

Outcomes of this study show that students do use email to communicate with their lecturers on subject matters; however, they are less likely to use it to communicate with their peers. This implies that students value the social aspect of university life and do not wish to use email to replace face-to-face social contacts with other students. It is therefore important for higher education institutes to provide ways to ensure online students do not feel isolated in their learning environment.

This study found that students' demographic backgrounds do not appear to have any impact on their perception or experience in online learning. This finding is somewhat contradictory to the literature and will therefore need further investigation.

This study found that online teaching and learning is acceptable to both students and lecturers in higher education. However, while embracing and accepting the benefits from the technology, neither students nor lecturers would like to see online teaching replace conventional classroom teaching. This implies that students and lecturers are not mentally ready to make the shift from traditional classroom teaching and learning to a total online mode. They will require further evidence to convince them of the effectiveness of such environment before they make their commitment.

This study also found that students would like to see online teaching and learning being made available to other units in the university. As students are demanding wider use of the Internet and WWW in teaching, universities should find ways to encourage and reward lecturers who are willing to take up such a challenge. Students are becoming increasingly informed with current technology hence have a higher expectation of what the technology can deliver, it is therefore vital for universities to provide continuing

support and assistance to lecturers in setting up and maintaining the quality of such learning environments.

From the lecturers' perspective, this study found that lecturers who were involved in online teaching often did so through their own initiative with little or no help from their university. While they believed students would benefit from this practice, they acknowledged that not only is it a demanding and time-consuming job, it also does not give them access to rewards and promotions, unlike the more traditional activities such as research publications.

Lecturers in this study did not want to see online teaching replace classroom teaching as there are many pedagogical concerns related to online teaching and learning that have not been researched thoroughly. They are also concerned that online teaching will change the nature of their role, which could lead to declining job satisfaction and an unintended career path.

In all, this study can conclude that on-campus university students and faculty are ready and willing to engage in online teaching and learning. However, they are not willing to give up classroom teaching. All this implies that higher education institutes need to make a larger commitment if they are serious about online teaching and learning. This commitment includes better support for faculties in converting their courses into an online mode and encouraging further research in this area. Faculty promotion systems also need to be reviewed to recognise effort and contributions made in this area.

5.4 Limitations

The study collected data from five groups of students and their lecturers. While the total students' sample data size exceeds two hundred, it is relatively small compared with the thousands of students enrolled in any normal Australian university at any one time. This is obviously a major limitation of the study and a much larger data sample size is recommended for any research study of similar nature.

The researcher deliberately omitted distance-learning students from the study as the intention of the study is to focus on the perceptions of students that are in the position to attend classes on campus. This is not saying that the perception of distance-learning students are not important, rather, because the circumstances of these two groups of students are significantly different, the researcher felt that they should be dealt with separately. However, it would certainly be interesting to compare the perceptions and learning experience between the two groups and this may be the basis of some further research..

To collect qualitative data, students should be interviewed after the questionnaire was administered. However, to achieve a reasonable representation, it would have been necessary to interview a group of at least twenty students. This in turn would have generated a large volume of data to be analysed. In view of the time constraints and the difficulty in dealing with large volume of qualitative data, it was decided that student interviews were not feasible for this study.

Data from this study were collected towards the end of 1998 and the researcher recognises that much has happened in the research area since then. Students and lecturers have also become more accustomed to the concepts of online teaching and learning; many of the pedagogical concerns would probably have been discussed and addressed. It would be interesting to re-run the same instruments used in this study with current students to find out what changes have occurred since this study was conducted.

5.5 Future studies

While this study produced some very interesting results in examining the perceptions of students and lecturers on the use of the Internet in higher education, there are two main shortcomings as mentioned in the last section. The first, the need for a larger sample size in data collection, which also broadens to the need of multiple-institutions participation. This is particularly crucial given that some findings were in conflict with findings of the

literature in the area of the impact of students' demographic background on perception and experience on online education. Secondly, with the rapid development in Internet technology and the many innovative uses of technology in education since this study was conducted, it will be interesting and beneficial to the area of research to re-examine the same issues by collecting new data and comparing the findings.

It will also be very beneficial in terms of adding new knowledge to explore other research methodologies when conducting investigation similar to this one. For example, as mentioned in the previous section, one of the limitations of this study is not having collected sufficient qualitative data from students; therefore a similar study using the interview method would certainly add new insight to the investigation.

As this study revealed, many students did not believe that they could learn better online. It is therefore important to have more studies looking into the effectiveness of online teaching and learning with the aim to change the mindset of using the Internet for convenience only. Studies with empirical data in this regard may help to convince students that web-based material is more than just supplementary to classroom learning and that they could indeed learn better online with the many features offered by the Internet technology.

As with the use of the many features offered by the Internet technology, more studies are needed to further investigate how these features could benefit teaching and learning and how best they can be used to achieve educational objectives as set by higher education institutes.

Finally, findings of this study have raised other questions in the field of online teaching and learning that may warrant further research. One of them is the objective of higher education institutions. For some time now researchers have been saying that there is a need for a 'paradigm shift' from traditional classroom teaching and learning to a total online mode, however, is such a 'need' prompted by educational objective or is it motivated by other factors such as convenience or cost-cutting? What do higher

education institutes want to develop in their students? We also need to examine the expected graduates' quality of those who participated in online learning in comparison with those who studied in a conventional manner. Areas that need investigation include their readiness for employment, their skills and knowledge in the use of technology and their capability in 'lifelong learning' upon graduation.

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Appendix I: Student Questionnaire

Online Teaching Student Evaluation Questionnaire

The aim of this questionnaire is to obtain an understanding of how student users perceive and receive online teaching in the unit they study. Please answer all questions as accurately as possible.

All participants in this study can be assured of anonymity and confidentiality throughout the study. All demographic data will be summarized in aggregate form.

Results from the study will be made available to lecturers in charge to help improve online teaching for student benefit.

Online teaching:

Online teaching refers to the use of the World Wide Web (WWW) / Internet to deliver any part of a university subject. This encompasses distribution of unit outlines, lecture notes and assignments through to complete on-line delivery where the WWW/Internet is the dominant medium for facilitating student learning.

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SECTION A: STUDENT COMMENTS ON ONLINE TEACHING

This section is intended for student recipients of online teaching to express their views and comments about online teaching and learning.

1. Have you found online teaching in this unit useful? YES / NO

WHY / WHY NOT?

2. How could online teaching in this unit be improved?

SECTION B: PERCEPTION OF ROLE OF ONLINE TEACHING

This section aims to capture the perception of the student users regarding the use of online teaching in the unit and in tertiary education in general.

Please circle the appropriate number.

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1. I feel positive about online teaching and learning.	1	2	3	4	5
2. My experience in online teaching and learning in this unit is a successful one.	1	2	3	4	5
3. I would like to see online teaching used in other units in the University.	1	2	3	4	5
4. I would have chosen to use the subject material on the web even if I were not required to do so.	1	2	3	4	5
5. I was attracted to online teaching and learning because it is an innovative idea for facilitating student learning.	1	2	3	4	5
6. Online teaching can substitute for the traditional classroom approach.	1	2	3	4	5
7. Online teaching can be used to supplement the traditional lecture.	1	2	3	4	5
8. The teaching staff seemed enthusiastic about online teaching as a mode of instructional delivery.	1	2	3	4	5
9. I was encouraged by my lecturer to try online learning.	1	2	3	4	5
10. I was supported by positive attitudes from my peers about online learning.	1	2	3	4	5

SECTION C: ACCESS AND USAGE PATTERN

This section is concerned with the usage pattern of student users of online subject material. Please circle the appropriate answer for questions 1-3.

1. How often have you accessed the unit material on the web?
 - a. never
 - b. once
 - c. twice
 - d. three times or more

If never, please state reason: _____

2. Where do you usually access the subject material on the web?
 - a. university computer laboratory
 - b. home
 - c. work
 - d. friend's

3. How much time do you spend going through the subject material on the web each time?
 - a. half an hour
 - b. an hour
 - c. two hours
 - d. three or more hours

Please circle the appropriate number

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
4. I have no problem in finding a computer that allows me to go through the subject material on the web.	1	2	3	4	5
5. I have sufficient knowledge to use the web technology.	1	2	3	4	5
6. There is adequate technical assistance available when I need it.	1	2	3	4	5
7. The response time when using the web was reasonable.	1	2	3	4	5

8.	There were very few problems with the internet connection.	1	2	3	4	5
9.	I have very few difficulties with the University SES login system.	1	2	3	4	5
10.	I have very few difficulties when navigating between web pages.	1	2	3	4	5
11.	I am familiar with at least one search engine for searching information on the web.	1	2	3	4	5

SECTION D: DESIGN AND DELIVERY

This section is concerned with the quality and design features of the online subject material and its efficiency in delivery.

Please circle the appropriate number

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1.	1	2	3	4	5
2.	1	2	3	4	5
3.	1	2	3	4	5
4.	1	2	3	4	5
5.	1	2	3	4	5
6.	1	2	3	4	5

7.	Delivering the subject material via the web makes learning more interesting.	1	2	3	4	5
8.	I find the linkage to other resources (if any) enhances my learning experience.	1	2	3	4	5
9.	The subject content was appropriate to deliver on the web.	1	2	3	4	5
10.	There was a logical sequence of presentation of the subject content on the web.	1	2	3	4	5
11.	The presentation of the subject content was clear and coherent.	1	2	3	4	5

SECTION E: COMMUNICATION VIA THE INTERNET

This section is to find out how communication between teaching staff and students, and amongst students, was achieved via the Internet.

Please circle the appropriate number.

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1. I usually contact my lecturer/tutor via email when I have a problem regarding the subject matter.	1	2	3	4	5
2. I prefer my lecturer/tutor to answer my questions, or provide assistance to my problem, via email.	1	2	3	4	5
3. I prefer to discuss problems on subject matters with my fellow students via email.	1	2	3	4	5

Only answer questions 4-6 if there was a discussion group being set up for your unit.

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
4. A discussion group is a good way to discuss problems amongst students.	1	2	3	4	5
5. I frequently check the messages posted on the discussion group.	1	2	3	4	5
6. I frequently post questions I have encountered with the subject to the discussion group.	1	2	3	4	5

SECTION F: LEARNING EXPERIENCE AND USER SATISFACTION

This section deals with learning experience and satisfaction of the student users.

Please circle the appropriate number.

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1. The linkage between web pages allows me to have more control over the reading sequence I want.	1	2	3	4	5
2. The ability to control the rate and sequence of the presentation of subject material on the web enhanced my learning experience.	1	2	3	4	5

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
3. The ability to review subject material on the web at specific junctures has facilitated my learning experience.	1	2	3	4	5
4. I understood the subject content better via the web than I would have from a traditional classroom lecture.	1	2	3	4	5
4. Learning via the web helped me retain more of the acquired knowledge than I would have from a traditional lecture.	1	2	3	4	5
5. The knowledge gained via the subject material on the web was equitable with the amount of time I spent on it.	1	2	3	4	5
6. I felt a sense of satisfaction and achievement after experiencing online learning.	1	2	3	4	5
7. My online learning experience has motivated me to start seeking information on the web on other subjects.	1	2	3	4	5

SECTION G: DEMOGRAPHIC PROFILE OF STUDENT USERS.

This section is intended to provide a general demographic profile of student-users that have experienced online teaching and learning. Please circle the appropriate answers or fill in the blanks.

1. Sex :
 - a. Male
 - b. Female

2. What was your age on your last birthday?

- a. 36 and above
- b. 31 - 35 years
- c. 25 - 30 years
- d. 19 - 24 years
- e. 18 years and under

3. How many units have you enrolled in this semester?

- a. 5 or more units
- b. 4 units
- c. 3 units
- d. 2 or less units

4. Are you are an undergraduate or postgraduate student?

- a. Undergraduate
- b. Postgraduate

5. How long have you been in Australia? (for those who were not born here)

- a. 10 years and more
- b. 5 - 9 years
- c. 1 - 4 years
- d. Less than 1 year

6. Country of origin: _____

7. Do you suffer from any form of colour blindness?

- a. Yes
- b. No

If Yes, what colours do you suffer from? _____

8. Have you studied any other units that were involved in online teaching prior to this?

- a. Yes
- b. No

If Yes, please specify unit name(s) : _____

Any other comments on online teaching?

If you would like to participate in a follow-up interview, please write your name with an email and/or telephone contact.

**END OF SURVEY
THANK YOU FOR YOUR COOPERATION**

Appendix II: Lecturer Interview Schedule

Questions for interviewing the unit controllers

1. Name of the unit, undergrad/postgrad, enrolment number, hours of class contact
2. Reasons for using the Internet/WWW in your unit
3. In what way(s) did you use the internet/WWW in your teaching? E.g. lecture notes, unit outline, assessment, email, discussion group, etc.
4. Do you feel that you have sufficient computing skill when you first decided to involve in online teaching?
5. What software was chosen, why? Have you look at other software?
6. How long did it take you to have the material developed on the web?
7. What are the main differences between material developed for the web and material developed for conventional classroom delivery?
8. What assistance did you get from the School? Division? To develop your material on the web?
9. What were the main difficulties during development?
10. What was the students' initial reaction towards this mode of delivery?
11. What were the main problems students encountered with this mode of delivery during the semester?
12. Have you obtained any formal/informal feedback from students on the mode of delivery? The quality of the material on the web?
13. Are the students, in general, satisfied with 1) the material on the web 2) this mode of course delivery?

14. Is this the first time you use this mode of delivery? If not, what improvement have you implemented since your first attempt?
15. Are you satisfied with 1) the material on the web 2) the outcome of using such mode of delivery?
16. Do you feel this mode of course delivery 1) enhance teaching? 2) Improved learning?
17. Would you consider your move to online teaching a success? Why or why not ?
18. Do you feel that online teaching can 1) supplement 2) replace the traditional classroom teaching?
19. What advice would you give to other lecturers who intend to pursue online teaching?
20. What improvement will you implement if you will run the unit in the same mode next time?

Appendix III: Descriptive Statistics: Students' Responses

Group 1 (G1)

A1	N	
	Valid	Missing
Usefulness	14	5

	N		Mean	Median	Std. Deviation
	Valid	Missing			
B1	8	11	2.2500	2.0000	.7071
B2	8	11	3.3750	3.0000	.9161
B3	7	12	2.0000	2.0000	.8165
B4	7	12	3.1429	3.0000	1.2150
B5	7	12	2.4286	3.0000	.9759
B6	6	13	3.1667	3.0000	.7528
B7	7	12	2.4286	3.0000	1.1339
B8	7	12	2.8571	3.0000	.3780
B9	7	12	2.8571	3.0000	.6901
B10	7	12	3.0000	3.0000	.5774

	N		Mean	Median	Std. Deviation
	Valid	Missing			
C1	7	12	2.0000	1.0000	1.2910
C2	6	13	1.0000		.0000
C3	5	14	1.6000	1.0000	.8944
C4	5	14	2.4000	2.0000	1.5166
C5	5	14	1.8000	2.0000	.4472
C6	5	14	2.6000	2.0000	1.3416
C7	5	14	2.6000	3.0000	1.1402
C8	5	14	2.2000	2.0000	.4472
C9	5	14	2.4000	2.0000	.5477
C10	5	14	2.0000	2.0000	.7071
C11	5	14	1.6000	1.0000	.8944

	N		Mean	Median	Std. Deviation
	Valid	Missing			
D1	5	14	2.6000	3.0000	.5477
D2	5	14	2.2000	2.0000	.4472
D3	5	14	2.2000	2.0000	.4472
D4	5	14	2.6000	3.0000	.5477
D5	5	14	2.8000	2.0000	1.3038
D6	5	14	3.4000	3.0000	1.5166
D7	5	14	1.8000	2.0000	.8367
D8	5	14	2.2000	2.0000	.8367
D9	5	14	2.2000	2.0000	.8367
D10	5	14	2.0000	2.0000	.7071
D11	5	14	2.4000	2.0000	.5477

	N		Mean	Median	Std. Deviation
	Valid	Missing			
E1	5	14	3.8000	4.0000	1.3038
E2	5	14	3.4000	3.0000	1.1402
E3	5	14	3.2000	3.0000	1.3038
E4	4	15	1.5000	1.5000	.5774
E5	4	15	3.0000	2.5000	1.4142
E6	4	15	2.2500	2.5000	.9574

	N		Mean	Median	Std. Deviation
	Valid	Missing			
F1	5	14	1.8000	2.0000	.8367
F2	5	14	1.8000	2.0000	.8367
F3	5	14	2.6000	3.0000	.5477
F4	5	14	2.8000	2.0000	1.3038
F5	5	14	2.4000	2.0000	.5477
F6	5	14	3.0000	3.0000	1.2247
F7	5	14	2.6000	3.0000	.5477
F8	5	14	2.4000	2.0000	.5477

	N		Mean	Median	Std. Deviation
	Valid	Missing			
G1	5	14	1.2000	1.0000	.4472
G2	5	14	4.4000	4.0000	.5477
G3	5	14	1.2000	1.0000	.4472
G4	5	14	1.0000		.0000
G5	4	15	1.0000		.0000
G6	4	15	1.0000		.0000
G7	5	14	2.0000		.0000
G8	5	14	1.8000	2.0000	.4472

Group 2 (G2)

	N	
	Valid	Missing
Usefulness	27	1

	N		Mean	Median	Std. Deviation
	Valid	Missing			
B1	27	1	1.8148	2.0000	.5573
B2	27	1	1.9259	2.0000	.7299
B3	27	1	1.7407	2.0000	.7642
B4	27	1	2.0370	2.0000	.8540
B5	27	1	2.5185	2.0000	1.0141
B6	27	1	3.9259	4.0000	.9578
B7	27	1	2.1111	2.0000	1.3107
B8	27	1	2.2593	2.0000	.8590
B9	27	1	1.8519	2.0000	.7698
B10	26	2	2.5385	3.0000	.8115

	N		Mean	Median	Std. Deviation
	Valid	Missing			
C1	27	1	3.8889	4.0000	.5774
C2	18	10	1.3889	1.0000	.5016
C3	26	2	1.9615	2.0000	.8709
C4	27	1	2.0000	2.0000	1.0742
C5	27	1	1.3704	1.0000	.4921
C6	26	2	2.7692	3.0000	.9923
C7	27	1	2.5926	2.0000	1.1184
C8	27	1	2.6667	2.0000	1.1435
C9	25	3	3.1600	3.0000	1.4629
C10	27	1	1.6667	2.0000	.6794
C11	27	1	1.5185	1.0000	.7000

	N		Mean	Median	Std. Deviation
	Valid	Missing			
D1	27	1	2.4074	2.0000	1.0473
D2	27	1	2.2222	2.0000	.9337
D3	25	3	2.2800	2.0000	.8907
D4	26	2	2.3077	2.0000	1.0495
D5	27	1	2.7407	3.0000	1.2276
D6	26	2	3.2692	4.0000	1.2508
D7	27	1	2.7778	3.0000	.8916
D8	27	1	2.0000	2.0000	.7338
D9	27	1	1.8148	2.0000	.5573
D10	27	1	1.7778	2.0000	.7511
D11	27	1	1.8889	2.0000	.6405

	N		Mean	Median	Std. Deviation
	Valid	Missing			
E1	27	1	2.1852	2.0000	1.0391
E2	27	1	2.3333	2.0000	1.0000
E3	27	1	3.0370	3.0000	1.2242
E4	9	19	3.1111	3.0000	.9280
E5	9	19	4.3333	5.0000	.8660
E6	9	19	4.3333	5.0000	.8660

	N		Mean	Median	Std. Deviation
	Valid	Missing			
F1	27	1	2.3333	2.0000	.7845
F2	27	1	2.4074	2.0000	.8439
F3	26	2	2.2308	2.0000	.7646
F4	27	1	3.1481	3.0000	.9885
F5	27	1	2.7407	3.0000	1.0595
F6	27	1	2.4074	2.0000	.7473
F7	27	1	2.7407	3.0000	.8130
F8	27	1	2.2222	2.0000	.6980

	N		Mean	Median	Std. Deviation
	Valid	Missing			
G1	27	1	1.0741	1.0000	.2669
G2	27	1	3.8889	4.0000	.3203
G3	27	1	1.5556	1.0000	.8916
G4	27	1	1.0000		.0000
G5	17	11	1.6471	1.0000	.9315
G6	23	5	4.8696	2.0000	6.6148
G7	26	2	1.9231	2.0000	.2717
G8	26	2	1.0000		.0000

Group 3 (G3)

	N	
	Valid	Missing
Usefulness	119	3

	N		Mean	Median	Std. Deviation
	Valid	Missing			
B1	120	2	1.8833	2.0000	.6759
B2	120	2	1.9583	2.0000	.7379
b3	120	2	2.0500	2.0000	.8874
B4	120	2	2.1583	2.0000	.7991
B5	120	2	2.0750	2.0000	.8317
B6	120	2	2.5333	3.0000	1.0606
B7	118	4	2.1017	2.0000	.9553
B8	119	3	2.0840	2.0000	.7766
B9	119	3	2.3866	2.0000	.9838
B10	119	3	2.3950	2.0000	.7835

	N		Mean	Median	Std. Deviation
	Valid	Missing			
C1	122	0	3.8033	4.0000	.5244
C2	110	12	1.6000	2.0000	.5779
C3	122	0	2.1066	2.0000	.9604
C4	122	0	2.6557	2.0000	1.2777
C5	122	0	2.0410	2.0000	.8272
C6	122	0	2.6393	3.0000	.8631
C7	122	0	2.8443	3.0000	.9623
C8	121	1	3.0579	3.0000	1.1202
C9	121	1	2.9174	3.0000	1.0846
C10	122	0	2.3852	2.0000	.9311
C11	122	0	1.5820	1.0000	.7023

	N		Mean	Median	Std. Deviation
	Valid	Missing			
D1	121	1	2.1570	2.0000	.6326
D2	121	1	2.1570	2.0000	.6193
D3	120	2	2.0833	2.0000	.6023
D4	121	1	2.2314	2.0000	.9377
D5	121	1	2.6860	3.0000	1.1905
D6	121	1	3.0083	3.0000	1.1797
D7	121	1	2.2231	2.0000	.8113
D8	121	1	2.0331	2.0000	.7180
D9	121	1	1.9504	2.0000	.7286
D10	121	1	2.0000	2.0000	.7303
D11	121	1	1.9835	2.0000	.7186

	N		Mean	Median	Std. Deviation
	Valid	Missing			
E1	121	1	2.1405	2.0000	.8879
E2	120	2	2.2583	2.0000	.8351
E3	120	2	2.7833	3.0000	.8810
E4	115	7	2.3304	2.0000	.8452
E5	115	7	2.8174	3.0000	.9786
E6	115	7	3.0435	3.0000	.9587

	N		Mean	Median	Std. Deviation
	Valid	Missing			
F1	120	2	2.0083	2.0000	.6673
F2	120	2	1.9417	2.0000	.6648
F3	120	2	2.0833	2.0000	.5882
F4	120	2	2.4500	2.0000	.8080
F5	119	3	2.4454	2.0000	.8801
F6	120	2	2.2250	2.0000	.7155
F7	120	2	2.1750	2.0000	.8165
F8	119	3	2.0924	2.0000	.8733

	N		Mean	Median	Std. Deviation
	Valid	Missing			
G1	118	4	1.3729	1.0000	.4856
G2	120	2	3.6000	4.0000	.8442
G3	120	2	2.2667	2.0000	.8671
G4	120	2	1.1333	1.0000	.3414
G5	105	17	2.4190	3.0000	.9784
G6	112	10	3.7054	3.0000	3.5225
G7	120	2	1.9833	2.0000	.1286
G8	120	2	1.8833	2.0000	.3224

Group 4 (G4)

	N	
	Valid	Missing
Usefulness	26	0

	N		Mean	Median	Std. Deviation
	Valid	Missing			
B1	26	0	2.0385	2.0000	1.1129
B2	26	0	2.3077	2.0000	1.0870
B3	26	0	2.4231	2.0000	1.3616
B4	26	0	2.9615	3.0000	1.2159
B5	26	0	2.1538	2.0000	1.1204
B6	26	0	3.6538	4.0000	1.1981
B7	26	0	2.1538	2.0000	1.2229
B8	26	0	1.6923	2.0000	.7359
B9	26	0	1.3462	1.0000	.4852
B10	26	0	2.6154	2.0000	1.0612

	N		Mean	Median	Std. Deviation
	Valid	Missing			
C1	26	0	3.9615	4.0000	.1961
C2	26	0	1.3846	1.0000	.6972
C3	26	0	2.1538	2.0000	.8806
C4	26	0	3.2692	4.0000	1.4848
C5	26	0	1.9231	2.0000	1.0554
C6	26	0	3.2692	3.0000	1.1852
C7	26	0	2.5769	2.0000	1.1017
C8	26	0	2.9615	3.0000	1.1826
C9	26	0	2.6538	2.0000	1.2310
C10	26	0	2.3462	2.0000	1.1981
C11	25	1	2.1200	2.0000	1.2689

	N		Mean	Median	Std. Deviation
	Valid	Missing			
D1	26	0	2.2692	2.0000	.7243
D2	26	0	2.3077	2.0000	.7359
D3	26	0	2.3077	2.0000	.7359
D4	26	0	2.1538	2.0000	.7317
D5	26	0	3.1923	3.0000	1.3272
D6	26	0	3.3846	3.0000	1.1341
D7	26	0	2.5385	2.0000	1.1395
D8	26	0	2.5000	2.0000	1.2083
D9	26	0	2.0769	2.0000	.7442
D10	26	0	2.1538	2.0000	.6748
D11	26	0	2.3462	2.0000	.7971

	N		Mean	Median	Std. Deviation
	Valid	Missing			
E1	25	1	2.6800	3.0000	.8524
E2	25	1	2.7200	2.0000	1.2754
E3	25	1	3.0800	3.0000	1.1150
E4	25	1	1.7600	2.0000	.8794
E5	25	1	2.0800	2.0000	1.1150
E6	25	1	2.6800	2.0000	1.2152

	N		Mean	Median	Std. Deviation
	Valid	Missing			
F1	25	1	2.1600	2.0000	.8981
F2	25	1	2.2800	2.0000	.9798
F3	26	0	2.3077	2.0000	.9703
F4	26	0	3.1538	3.0000	1.0466
F5	26	0	2.8077	3.0000	1.0961
F6	26	0	2.4231	2.0000	.9021
F7	26	0	2.2692	2.0000	.9616
F8	26	0	2.3846	2.0000	1.2026

	N		Mean	Median	Std. Deviation
	Valid	Missing			
G1	26	0	1.5000	1.5000	.5099
G2	26	0	3.3846	4.0000	1.0983
G3	26	0	2.2308	2.0000	.7104
G4	26	0	1.0000		.0000
G5	13	13	2.2308	3.0000	1.2352
G6	17	9	7.7059	5.0000	7.8959
G7	25	1	2.0000		.0000
G8	26	0	1.8846	2.0000	.3258

Group 5 (G5)

	N	
	Valid	Missing
Usefulness	19	1

	N		Mean	Median	Std. Deviation
	Valid	Missing			
B1	20	0	1.9500	2.0000	.7592
B2	20	0	2.1500	2.0000	.9881
B3	20	0	2.0500	2.0000	.9987
B4	20	0	2.2000	2.0000	1.1050
B5	20	0	2.2500	2.0000	.8507
B6	20	0	3.1000	3.0000	1.2937
B7	20	0	2.3000	2.0000	1.1743
B8	20	0	2.0500	2.0000	.6863
B9	20	0	1.8500	2.0000	.7452
B10	20	0	2.4500	2.0000	.8256

	N		Mean	Median	Std. Deviation
	Valid	Missing			
C1	19	1	3.9474	4.0000	.2294
C2	17	3	1.7647	2.0000	.6642
C3	17	3	1.7647	2.0000	.9034
C4	20	0	2.4000	2.0000	1.2312
C5	20	0	2.3000	2.0000	.8013
C6	20	0	3.1000	3.0000	.7881
C7	20	0	2.3500	2.0000	.8127
C8	20	0	2.4500	2.0000	.9445
C9	19	1	2.8947	3.0000	1.0485
C10	19	1	2.2632	2.0000	.9912
C11	20	0	2.1000	2.0000	1.0208

	N		Mean	Median	Std. Deviation
	Valid	Missing			
D1	20	0	1.9000	2.0000	.3078
D2	20	0	1.9000	2.0000	.4472
D3	20	0	1.8000	2.0000	.4104
D4	20	0	2.5500	2.0000	.8870
D5	20	0	2.2000	2.0000	1.3992
D6	20	0	2.9500	3.0000	1.1459
D7	19	1	2.6316	2.0000	1.2566
D8	19	1	2.1579	2.0000	.9582
D9	20	0	2.0500	2.0000	.6048
D10	19	1	2.0000	2.0000	.5774
D11	20	0	1.9500	2.0000	.5104

	N		Mean	Median	Std. Deviation
	Valid	Missing			
E1	20	0	2.9500	3.0000	1.0501
E2	20	0	3.0500	3.0000	.9987
E3	20	0	3.0500	3.0000	1.0501
E4	20	0	2.4000	2.0000	1.0463
E5	20	0	2.4000	2.0000	1.0954
E6	20	0	2.9000	3.0000	1.0712

	N		Mean	Median	Std. Deviation
	Valid	Missing			
F1	20	0	2.3000	2.0000	.7327
F2	20	0	2.2500	2.0000	.7164
F3	19	1	2.2105	2.0000	.8550
F4	18	2	3.2778	3.5000	1.0741
F5	19	1	2.6842	3.0000	1.0569
F6	19	1	2.2105	2.0000	1.0317
F7	19	1	2.3684	2.0000	1.0116
F8	19	1	2.5263	3.0000	.9048

	N		Mean	Median	Std. Deviation
	Valid	Missing			
G1	18	2	1.5000	1.5000	.5145
G2	19	1	2.6316	3.0000	1.0651
G3	19	1	3.0526	3.0000	.9703
G4	19	1	2.0000		.0000
G5	17	3	1.9412	2.0000	.9663
G6	18	2	8.6111	3.0000	10.1003
G7	20	0	1.9000	2.0000	.3078
G8	20	0	1.5500	2.0000	.5104

Appendix IV: Extract of Interview Transcripts

**Researcher: Could you maybe talk about the reasons for using the web in your teaching?*

*L2: Yes. In, at the end of 1992 it became apparent to me that the use of electronic media was reaching a level where it would, we would benefit by using it for the delivery of course material and, at that stage, I used an Honours student to have a look at ways in which we could use, um, what's called the xxx Compliant Email to send information out to students. Er, he started that project and about three quarters of the way through, so that was the end of 1993, we discovered the Worldwide Web, um it was starting to be used quite a lot, and so in that year, starting 1994, I had a different Honours student look to putting one of our courses onto the Worldwide Web. And we did that because I could see immediately the advantages of having a lot more information available to students, the ability to have, um, just as a trivial thing, coloured diagrams rather than straight black and white diagrams in course notes, specially important in Computer Graphics but in other areas as well. It also gave me the ability to have students looking at something on the screen and being able to get a copy of the programme, xxx, load it, execute it and see what was happening. That, the work that xxxx did as part of her Honours meant that now, for that particular unit, there's about 78000 sites throughout the world that are using those particular course notes and we've built on the initial work that she did so that now we have course notes and on-line notes which are different in content, very dramatically sometimes, but also different in arrangement because the course notes did a straight linear, this follows this, follows this whereas with on-line material you have to be aware of the fact that students can look at things in a non-linear manner. So, we have a nice mechanism for doing that and it produces what I think is fairly useful ways for students to learn, to get information, to be able to

learn at their own pace in their own way. Since then there have been other innovations on the Worldwide Web which, again, have added to our commitment to Worldwide Web teaching. For example, the use of Java based applets have meant that we could have example programmes running inside the browser to demonstrate various things. For example, in teaching Introductory Computer Science, we have various computer algorithms that we want to show students and they can actually step through these, little by little, to see what happens when certain pieces of code are executed. And that's quite good for their understanding. So, overall, this commitment to Worldwide Web seems as though it's very, very useful to the students. We've done a number of surveys, we always have on-line feed-back forms, um, which elicits, um 5 point scales of Strongly Agree, Strongly Disagree. Also just free text comments about things. Most of the time, 90% of the time, we get comments which say 'Really great' 'Terrific' 'This has helped me a lot'. We often get comments saying 'Here are some areas in the code you might like to change this' xxx another expert's opinion on something and that's been very beneficial as well because we can then include that in the course notes and make them better and better.

**Researcher: So all your course notes and everything you would put on, on the Web?*

*L3: Yep. Um if you're talking about the management side first, um the, what I have up there is all my unit outlines, all my assignment handouts, um, all I have up, on-line as well is, um, student groups. We have a project where there is students groups, xxx ahh, who is in which group is on-line so they can access that. They get a list of um, where they register, they register their email address with their name and their student ID. So I get a class list with name, student ID and email address, um, from them. The register is for the web and they also get access to that list so they can email any student in the class and get a class list. Um, part of their assignment is to do home pages on the web um, and again, that's managed through the web so they register their name, and their student ID and their URL. Um, through that they can actually, sort of a list of the personal home pages and

they also get a list of their student, of their project um, on-line and it's also accessible by them. So, and it's also, we get them to register to the list server on-line, so that management is done through that as well. Um, from the list of, from the class list that I get, plus the email addresses I get, I contact them, also through individually you know, I send them the marks, all the marks that I have um, are sent to them individually per email. I don't have a um, I don't have a list of marks outside my door anymore. I just send them the marks individually, individual. Um, also to give them feedback is done through that and all the events that have happened in class is done through the list. As far as the content is concerned, that's done on the Web CT. Um, in terms of functional, see what we do is we have xxx on-line, we have links on-line where we refer them to, um, as far as content is concerned, we have, we are using bulletin boards, so we have class discussions on-line, um we are using, um email group project where they communicate with each other with email and discuss a case study. Um, xxx where they have to hand in an email essentially, sending it in at the end, um, we have a student project where they have to um, use the web, by that, I mean, xxx where they have to build web pages. Um, and um I will be using tests, on-line tests.

**Researcher: So, when you first started, do you feel that you have sufficient computing skills to, to deal with the Internet?*

*L4: I believed I had enough computing skill because I'm confident that I can learn what I need to learn on the spot. However, in terms of actual, actual skills, no. I have had to teach myself large amounts of HTML both in terms of the technical, less in terms of the technical side, I just look my book up when I need to know that tag, I don't use once every six months. I needed to teach myself enough about what the internet, that the web particularly could do, and that meant learning about site design, HTML, how to use HTML to achieve certain looks and feels. Uh, recently I've started to use Javascript as well because of it's

functionality not because it looks good, although I do that too, just for interests sake, um, but because you can do some very useful string design fields for navigation. Plus you can do things like the automatic uh, sending of stuff um, in a way that's a little bit easier than just using straight HTML. So I actually had to learn, I've learnt enough now, that if someone said to me, "could you design me a website for just that purpose", I feel I could do that and that's been a real learning curve. But one I've been happy to do. Um, and we have to understand here that that was in part because throughout this time I've had uh, job insecurity and I was quite seriously considering a career change into ah, web design. And so all this is an opportunity for me to skill myself up. Um, plus I'm a highly motivated self learner, so it was very easy for me to feel confident. But interesting motivations, the principal motivation for me learning to do all this was because I got increasingly frustrated that I didn't have control. I could see a mistake in the website, something didn't work. I would email the person who originally was doing the HTML and say fix it, it wouldn't get fixed, it didn't get fixed. Uh, the graphics, the graphics got done. I didn't like something a little bit later on, or six months down the track I thought I'd better change that – I couldn't. Because all the graphics stuff was on someone else's desk and I didn't know how to use it. So, I mean as well as the website, I taught myself about graphics, uh, not, not at any profound level. I mean, I don't pretend to be a designer, or graphic designer, or graphic artist. I, I do things which are simple. And uh, I think the students appreciate that because as long as you are careful and clever, you can achieve some really useful effects very simply. Which make the thing seem like it's professional and real. Increasingly the benchmark for students use of internet education sites will be other websites that they visit routinely. You don't have to mimic them, you don't have to use the rules of professional site design which often include things like sucking people deeper in because of advertising attempts to get quick xxx on advertising and so on. But you do need to present something that is crisp and clear and colourful, and has a few bells and whistles so that students feel like they are dealing with something professional.

**Researcher: Do feel that, by using the web, the Internet, it improves, or enhances your teaching?*

*L5: Uh, I would say definitely yes because you can get the message across more clearly, ah, you can have you know, they take it also as a game. Uh, the quiz, so it's learning, you now learning, uh by playing sort of thing. And there is this sense of uh, you know, uh learning at your own pace also, at the time, at the location of your choice. And so that definitely increase the flexibility and the interest also of the students.

**Researcher: So do you see that web based teaching does substitute the traditional classroom teaching, or just a supplement?*

*L1: Well, I think that in the mathematics area it would have to supplement it. Because I think that um, mathematics, well certainly for me, mathematics is an area that needs explanation. Quite often um, students seem to want something explained, how did you go from step, from line three to line four, you know, what did you do, why did you do that, what do I have to recall in order to do that. You know, do I have fractionalised an equation, or whatever. Um, so they need that explanation. Now, unless you are going to put all of those explanations on there as well, on to the web, which will then make your document so huge, and of course it would waste the time of those students who are capable of just going straight through, so I think that um, there has to be some face to face. Now whether that has to be a lecture or, just hey look, they'll have tutorial time based on that is another thing. And it may be that, that that's perhaps the better way to go. I tend to be a person who's flexible and I'll say, well look, I'll start of with lectures and the material that's on there and, as we're going along, you as a group, tell me how you want it to go. I mean, I'm, I'm not there to say, well look, this is the way that you're going to do it, and if a, if a group of students

want to come in small groups, now that to me could be a bit of a problem in terms of time-tabling. But, if they want to be in smaller groups to discuss certain things, then we can set that up.

End of Extract