# Significance of the Web as a Learning Resource in an Australian University Context

by

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# DECLARATION OF ORIGINALITY

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# STATEMENT OF ETHICAL CONDUCT

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

Si Fan
March 2011

# ABSTRACT

The Web and web-based technologies have become widely acceptable and feasible in the modern society. It has created a new paradigm in various areas, including the field of education. Web-based learning, as a strong manifestation of e-learning, has also become indispensible within the tertiary education context. Web-based learning is powerful in many aspects in both traditional curriculum as well as online courses. The Web provides teaching staff and students with a powerful source for interactive communication, placement of teaching materials, assessment and evaluation. As the main stakeholders in Web-based learning are students and teaching staff, it is important to understand their views and attitudes toward the Web as a learning resource.

This research involved the participation of 502 students and 100 teaching staff from seven faculties/disciplines at the University of Tasmania. The aim of this study was to investigate the significance of the Web as a learning resource in this university context. It examined the views of teaching staff and students toward the significance of the Web in teaching and learning practices, and identified the environment in which the Web was used to facilitate teaching and learning. This study used both quantitative and qualitative methods for data collection and analysis. It involved two stages of data collection. One questionnaire and two sets of interview questions were used respectively. The statistical data were analysed using the SPSS (Statistical Package for the Social Sciences) software version 18.0. The textual data collected from the interviews, were analysed using the NVivo qualitative data analysis software version 8. Constructivist grounded theory and thematic analysis were the basis of qualitative data analysis.

The results of this study indicated a strong recognition of the role of the Web as a learning resource at the University of Tasmania. The Web was recognised as performing an essential role in the processes of communication, information retrieval, collaborative learning and assessment. Also, the Web and web-based technologies were seen as an important supplementary tool for face-to-face

learning. However, there were differences between perceived expectations of web-based education by teaching staff and students, and the ways in which it was conducted and managed. By discussing the end-users' views and evaluations, recommendations are made on the further development and modification of the Web adoption. It suggests that taking student expectations and needs into consideration can help create a more supportive and meaningful web-based learning environment. Training for both staff and students is also desired to enhance their skills in using the Web as a learning resource and to provide standard web-based support in all courses.

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# Chapter 1: Introduction

## 1.1 Introduction

The specific study concerned in this thesis was conducted to investigate the significance of the Web as a learning resource in a particular university context, the University of Tasmania (UTAS). The initial inspiration of this study was gained from the researcher's own learning experience. Born in the early 80s, the researcher grew up with the computers and network systems at the time when these modern technologies were commercialised and introduced into the markets. When she started secondary school, the World Wide Web (the Web) and computers had grown exponentially and took a more important role in classrooms. Learning strategies and teaching methodologies shifted and the Web and computers became indispensible. This led to an interest in the way the Web could be used as a learning resource to assist students to learn online, and triggered the importance of integrating the Web into everyday teaching and learning practices.

After graduating in China with her first degree in English Literature, the researcher made a decision to move to Australia and take on a new challenge, a postgraduate teacher education degree. By then, web-based learning strategies have been formally introduced into her learning and teaching practice. The Web has become an essential tool for students who wish to survive in the modern world. At the University of Tasmania, it has also become an indispensible tool for delivering teaching contents and materials, educational management, and academic planning. Students and teaching staff communicate with each other via emails; discussions take place in online forums; assignments are to be obtained and submitted via online courseware systems; and journal articles can be searched and downloaded with a few clicks. These experiences have strengthened the researcher's idea of conducting research on how the Web is being used to shape university students' learning experience.

In the following years, the researcher formally embarked upon this journey by beginning her PhD (Doctor of Philosophy) study. After reviewing relevant literature on web-based learning, the researcher found that there were significant gaps that could be explored. That is, many researchers tend to focus on the ways in which the Web and web-based technologies are implemented in teaching and learning activities; however, not many have mentioned the views and preferences of end-users toward the adoption of these technologies (Chin, 2004; Klassen & Vogel, 2003; Oliver & Omari, 2001). A further investigation of the literature found that there could be gaps between perceived expectations of web-based teaching by students and teaching staff and the ways in which it is conducted and managed. These gave the researcher an inspiration and a motivation to design this research and explore the ideas which have the potential to fill these gaps.

As the introduction of the thesis, this chapter provides an overview of the study. It will present a discussion on the project aims and objectives together with the research questions. It will also introduce the research background of this investigation which involves the development of the Web and web-based resources both in the outside world and within the Australian universities. In particular, it will look into the web-based learning context at the University of Tasmania in which this study was carried out. The justification and significance of the study, as well as its theoretical considerations will be introduced as a part of the overview. A general picture of the research methodology, including data collection methods and tools for data analysis, will be given. Finally, the ethical considerations, limitations of the research and the structure of this thesis will be discussed.

## 1.2 Research background

Due to the rapid growth of information technology, computers and networks have become increasingly important in many areas of modern society. This can also be seen from the prominent use of these resources as a platform for teaching and learning (Pahl, 2008). The adoption of web-based technologies for educational purposes is no longer a new concept (Smith & Tansbottom, 2000).

Schools and universities have adopted these technologies to support their students in both traditional coursework as well as online learning. According to Anderson (2009), in the year 2008, the worldwide corporate web-based learning market was valued at $17.2 billion. Due to the rapid development of networks and technologies, in some situations, such as off-campus learning, traditional teaching methods can no longer meet students' increasing demands and requirements on learning materials and information delivery. Therefore, the Web has become an essential means to meet these needs. Various web-based resources have been invented and adopted to offer a complete system of information and communication services and to support students nowadays (De Moor, 2007a).

The Web is changing the ways in which information is transferred and in which knowledge is taught in Australian education institutions. Asynchronous communication has become a reality due to the advance in information and communication technology (Aggarwal & Legon, 2003, 2008). Therefore, irrespective of the hurdles of time and distance, the Web has made education available to all individuals from different backgrounds. Not only do students who cannot be physically present on-campus need web-based learning, students undertaking traditional classroom learning also demand a blended-learning approach which integrates web-based support into everyday learning activities (Straub, 2008). The Web and various web-based technologies can offer innovative and immersive learning environments that provide valuable and affordable features which cannot be provided by the traditional face-to-face learning mode (Herrington, Oliver, Herrington, & Sparrow, 2000).

Since the Web was introduced into schools and universities for educational purposes in the 90s, there has always been a constant increase in the number of education institutions adopting it. It is estimated that 96% of Australian public and private colleges and universities were offering online courses in the year 2000 (Carr, 2000), and the percentage has kept increasing in the 21st century. According to the records of the Australian Department of Education (2009) and the Department of Foreign Affairs and Trade (2009), in Australia there were 37 public universities and 2 autonomous and self-accrediting private universities. All of these 39 universities have embraced the Web as a learning recourse and have been using web-based technologies and courseware systems to support students' learning and provide online courses (As shown in Appendix 9).

Australian universities fully or partially rely on the Web to deliver materials and learning experiences. Educators and researchers label learning modes according to the proportions of course materials and learning experiences delivered via the Web. Aggarwal and Legon (2000) introduce three "Internetalising" models which can be used to categorise modes of web-based learning environment at Australian universities. These three models are shown in Figure 1.1 below:

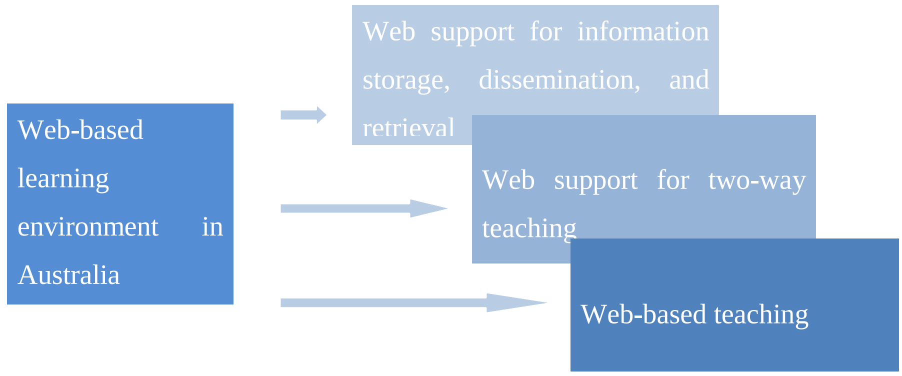


*Figure 1.1.* Web-based learning environment modes (Aggarwal & Legon, 2000)

Web-based learning is gaining rapid popularity at universities for various reasons. University students are a more suitable group for web-based learning as they are more mature than the students in schools and colleges. Most of them have had experiences of traditional lectures and face-to-face communication with the faculty, lecturers and peer students (Klassen & Vogel, 2003). Therefore, they are motivated enough to continue study without face-to-face interactions (Klassen & Vogel, 2003). In addition, the Web has presented lecturers at universities with a range of opportunities with which to support and enhance their curricula (Sauter, 2003). Hence, web-based education is diffusing across countries, educational levels, universities and disciplines (Aggarwal, 2003; Aggarwal & Legon, 2008). The question for Australian universities is no longer whether to adopt web-based learning, but how web-based technologies can be better adopted to assist students' learning.

The specific discourse where this research took place is the University of Tasmania in Australia, one of the oldest universities in the country. In the past five years, the numbers of both academic teaching staff and students at the university increased steadily. In 2006, the university employed 2009 teaching staff and provided higher education for 17,407 students which included 1,370 off-shore students who were studying online (University of Tasmania, 2007). In 2009, the numbers of academic teaching staff and students increased to 2,548 and 24,455, including 2,182 online students. At the time of submission of this thesis, the 2010 statistics of teaching staff was not yet available (University of Tasmania, 2010c). However, it can be summarised that there were 26,401 student enrolments throughout 2010, which included 2,843 off-shore students (University of Tasmania, 2010d). The statistics derived from the university quality assurance reports are illustrated in Figure 1.2:

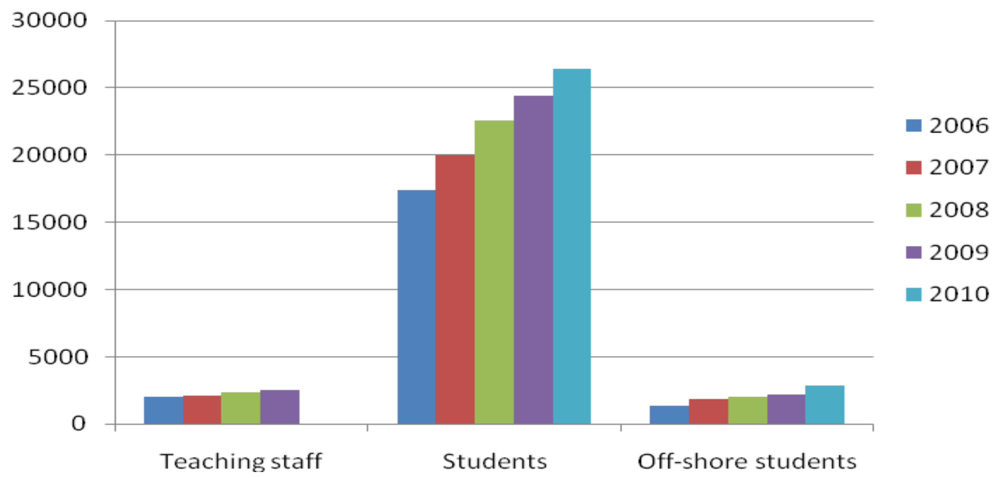


*Figure 1.2.* Statistical reports of teaching staff and students from 2006 to 2010

The participants of this study are self-selected from those students and teaching staff who were studying or teaching at the time of data collection. They are from seven faculties/disciplines spanning all three campuses of the university. The university has eight faculties/institutions as follows (University of Tasmania, 2009b):

- Faculty of Arts
- Faculty of Business
- Faculty of Education

- Faculty of Health Science
- Faculty of Law
- Faculty of Science, Engineering & Technology
- Australian Maritime College (AMC)
- Menzies Research Institute

This study asked the views and evaluation of the participants from seven of these faculties/institutions on the Web adoption in their own academic areas. The Menzies Research Institute was not chosen due to its focuses on research projects instead of general teaching activities. There were only a small number of students conducting research activities at this institution (Menzies Research Institute, 2009). Hence, the academic context of Menzies was not considered as a typical university context which should involve a considerable number of coursework students as well as research students. Apart from the Menzies Research Institute, the other seven faculties and institutions were included in this research project.

The university values the blended learning style and the incorporation of the Web into teaching and learning to support its students. It is addressed in the policy that the university commits to ongoing continual improvement and strategic planning for web-based learning to "leverage the existing systems, people, intellectual capital and skills" and thereby "to improve the quality of (its) offering to students and to extend the reach of the university" (Fountain, Kregor, & Williams, 2010, p. 1). All the students and staff at the university are each provided with an account name and a password that allows them access to the computer facilities and networks within the campuses. MyLO is the central platform used for providing systematic support in teaching and learning activities for the students and staff at this university (University of Tasmania, 2009a). Some other supplementing web-based tools and software are also used to support the MyLO system. To examine the significance of the Web, the researcher of this study investigated the evaluative views from both end-user groups.

## 1.3 Project aim and research objectives

The goal of this study was to investigate how the Web, as a learning resource, affected students' learning in one particular Australian university context. It examined views of students and teaching staff of the subject university toward the significance of the Web in teaching and learning activities, and identified the ways in which the Web was used by them to facilitate learning. A questionnaire and semi-structured interviews enabled the researcher to find differences between the views of students and staff on the Web adoption. By investigating their satisfaction toward and expectation of the web-based learning environment in their own faculties by these participants, this research examined how the web-based learning environment within this university could be enhanced. By discussing the views and evaluations of these end-users, recommendations were made for a more supportive and meaningful web-based learning environment. To obtain a detailed picture, the research aim was divided into five research objectives, which are explained below. To achieve each of these research objectives, specific research questions were proposed. It was believed that by seeking answers for these questions, the objectives would also be achieved.

Research objective 1: To examine the views of students and teaching staff on the significance of the Web in learning and teaching. The following research questions were raised:

- How do students and teaching staff describe the significance of the Web in learning and teaching?
- What are the views of students and staff toward the Web as a learning resource?
- How does the Web as a learning resource change students' learning styles?
- What is the influence of the Web on students' learning performance?
- What are the factors that influence the effectiveness of web-based learning?

Research objective 2: To identify the ways in which the Web is used by students and teaching staff to facilitate learning. The following questions were raised:

- In what way is the Web used by students to facilitate their learning?
- In what way is the Web used by teaching staff to facilitate student learning?

Research objective 3: To compare the views of students and teaching staff on the adoption of the Web in learning and teaching. The following questions were raised:

- What are the differences in views between students and staff toward the significance of the Web in learning and teaching?
- What are the differences in views between students and staff toward Web adoption in supporting learning activities?

Research objective 4: To evaluate the web-based learning environments in different academic areas in the subject university. The following questions were raised:

- How do students and staff evaluate the web-based learning environments in their own academic areas at the university?
- What are the views of students and staff on the usefulness of the My Learning Online (MyLO) system at the University of Tasmania?
- How do students and staff evaluate the adoption of MyLO in their courses?

Research objective 5: To provide some recommendations for enhancing web-based learning in the subject university. The following questions were raised:

- What are the challenges and obstacles in web-based teaching and learning practice?
- In what way web-based learning environment can be enhanced?
- What are the expectations of students and staff on the web-based learning environment in their faculties?
- What support strategies are expected by the students and teaching staff in relation to Web adoption for learning activities?

## 1.4 Justification and significance

The main justification of this study lies in the increasing number of Australian schools and universities adopting the Web and web-based applications to support student learning. Ubiquitous computing and life-long education is making web-based learning (e-learning) more feasible and acceptable (De Moor, 2007a). Nowadays, successful web-based learning endeavours can be seen around the globe, as well as within Australia (Peters, Tau, & Mensah, 2005). The Web, as an essential means of support, is contributing to the development of remote teaching and providing a wealth of possibilities in the field of education (Anne Adams & Blandford, 2003). Most Australian education institutions adopt the Web to fully or partially support their staff and students. Instead of teachers being the only resource in classrooms, the Web and web-based technologies are being adopted to conduct both on-campus and off-campus learning, as well as to contribute to the notion of virtual universities (T. Le & Le, 1997). Web-based applications have become indispensible, since they provide teaching staff and learners with a much easier access to resources, as well as a more convenient way to teach and learn. Using the University of Tasmania as a representative sample for the Australian tertiary education institutions, this study provides an examination of how these networks and highly developed technologies have changed the existing styles of teaching and learning in the whole Australian tertiary education context.

Within the Australian university context, there is a constant need to investigate students' views, beliefs and their preferences in teaching strategies and styles in web-based education. Similar to other innovations, the transfer from traditional face-to-face mode to web-based learning is a venture, within which not all organisations are able to survive (Mellahi & Wilkinson, 2004). Tertiary education, as a growing industry, is driven by "worldwide competition between education establishments and by a rising number of consumers who demand an increased amount of flexibility" (Bernardes & O'Donoghue, 2003, p. 21). Thus, education institutions have an urgent need to understand students' views and preferences, and accordingly to design and adopt teaching activities and web-based technologies to better suit these needs. Previous research has highlighted the implementation of the Web and web-based applications from an instrumental perspective (e.g. Anastasiades, 2007; Blair, 2007; Klassen & Vogel, 2003). However, to better cater for learners' demands, it is important to make clear the views of the students and teaching staff toward the Web as a learning resource, as well as the differences between views of these two perspectives. There is, to date, little specific study investigating these gaps. Therefore, there is an opportunity for this study to contribute to the field.

This study provides insights into the significant influences of the Web in teaching and learning practice, as well as the ways in which it is adopted by university staff and students to facilitate learning. It analyses the different understandings of teaching staff and students on Web adoption. It also provides suggestions by analysing direct feedback from current end-users at the university. These recommendations will focus on how the Web can be adopted to better suit student needs. Moreover, this research contributes to the evaluation of the effectiveness of the web-based learning environments in different academic areas. Evaluations are given from various perspectives, including usability, accessibility, suitability for the teaching context, and learner-friendliness of web-based resources. The potential educational benefits identified, educational usage outlined and recommendations made are transferable to other education institutions which intend to provide future students with supportive, effective and meaningful web-based learning environments.

## 1.5 Theoretical considerations

This thesis was underpinned by a social-cultural and educational approach to research which recognises the significance of the Web in university students' learning. A main consideration of this study was that educators in higher education sectors should be familiar with the ways in which students adopt resources in learning activities, and then to adjust their teaching methodology accordingly to meet students' needs. It was believed that a clear recognition of student preferences and expectations could assist education institutions and lecturers in understanding students' needs, thereby achieving a better learning outcome (Oliver & Omari, 2001; Trigwell, Prosser, & Waterhouse, 1999). An investigation of students and teaching staff's views on the Web as a learning resource has the potential to give such recognition to the University of Tasmania as well as other higher education institutions, so that adjustments can be made in the future to develop a more adaptive methodology for web-based education.

This research was supported by theories of both higher education and web-based education. The student group discussed in the study were mature university students who were either studying on-campus through face-to-face lectures or off-campus through web-based tools. In either case, the students were different from younger learner groups as they were able to manage and discipline their own learning tasks and pace (Klassen & Vogel, 2003). Therefore, learning was more independent in universities than in schools and other education contexts. Instead of studying theories of higher education and web-based education separately, this research examined the ways in which web-based learning have enhanced university students' skills in individualised learning, adaptive learning and independent learning. It intended to find out the specific learning approaches used and the educational theories which have emerged in this particular university context, the University of Tasmania.

This thesis was theoretically located in a mixed method approach to research which involved both quantitative and qualitative collection methods. It was interested in the multiple meanings and interpretations of university teaching staff and students' experience in teaching and learning at this university (Charmaz, 2006). This research used the theories of quantitative research, qualitative research and constructivist grounded theory in order to gain a better understanding of the discursive practices that position the university staff and students in their education experience. It was expected that the quantitative research theories would assist the researcher to draw a detailed picture of Web adoption in the subject university. The qualitative theories and constructivist grounded theory, on the other hand, would help in finding the convincing theories that underpin these adoptions.

## 1.6 Research methodology

The methodological principles underpinning this research were located within a mixed method research paradigm. It utilised both quantitative and qualitative methods to gather and analyse data. The study involved the participation of 502 students and 100 academic teaching staff in seven faculties/disciplines at the university. Data collection methods were in the form of questionnaire and semi-structured interviews, which were conducted in relation to the participants' teaching and learning experiences with the Web and web-based technologies. The data collection was organised into two stages: a quantitative stage and a qualitative stage. The quantitative study (phase one) was conducted firstly, by distributing a 43-item questionnaire to students and staff of each faculty/discipline. Data gathered from this stage were analysed using a statistical data analysis software: SPSS (Statistical Package for the Social Sciences) version 18.0. Afterwards, at the qualitative research stage (phase two), semi-structured interviews were organised with participants from each stakeholder group by students and staff. Their detailed views were analysed using a moisture of thematic analysis, a constructivist grounded theory approach and a three-step coding approach (Sarantakos, 2005). The qualitative data analysis was performed using NVivo software version 8.

### 1.6.1 The quantitative stage

The first stage of this research used a quantitative approach which was based on numerical data. The researcher intended to achieve two goals at this stage: to collect scores that measure distinct attributes of students and staff on the Web, and to compare groups of variables in relation to views and attitudes of these two perspectives (Creswell, 2005). A deductive approach allowed the researcher to make hypotheses according to some already known theories discussed in relevant literature (B. Johnson & Christensen, 2004). These hypotheses were then tested with the participants during the quantitative data collection process in a form of a questionnaire. At the end of this stage, theories were generated from patterns found in the participants' responses and compared with the hypotheses.

The data collection tool used at this stage was a questionnaire which investigates the attitudes, views and behaviours of university students and teaching staff in relation to their Web adoption. The questionnaire was designed adopting Likert's (1932) "Likert Scale" format which is widely used by quantitative researchers for attitudinal measurements. As investigating the participants' views was the main aim of this study, a questionnaire like this was considered as the most suitable data collection instrument. The questions and statements in the questionnaire were designed according to hypotheses generated from relevant literature. The participants were asked to indicate on a five abbreviation scale to express the strength of their feelings for each question/statement. Their responses to the questionnaire were analysed using SPSS. Median values were pursued to calculate their degree of agreement on the questions/statements. The Kruskal-Wallis test was applied to seek factors that may affect the responses when their ideas were divided on certain question items. Lastly, the Spearman's Rank Order Correlation (rho) was used to determine the differences in the views of students and teaching staff toward the items.

### 1.6.2 The qualitative stage

The second stage adopted a qualitative approach to research as it developed and constructed meanings from the data collection in the natural university setting (Liamputtong & Ezzy, 2005). Different from the quantitative research method, qualitative research is more naturalistic, pragmatic, interpretive, emergent and evolving (Marshall & Rossman, 2006). Its characteristics helped the researcher construct meanings in the participants' interpretations of their experiences in web-based education. In the light of the first stage, this stage provided more insights of the rationale that are underlying Web adoption at this university. It applied an inductive approach which started with specific observations and then moved to a tentative generalisation (B. Johnson & Christensen, 2004). The researcher sought patterns that are grounded in the participants' input to form new theories and to generate new hypotheses.

The data collection tool used at this stage was semi-structured interviews which were guided by two sets of open-ended questions. Interviews were purposely chosen as they "yield direct quotations from people about their experience, opinions, feelings and knowledge" (Patton, 2002, p. 4). Two sets of ten questions were designed, one for the teaching staff group and one for the student group. These questions were developed according to the responses and input of the participants obtained at the first stage. In contrast to the questionnaire, these interview questions allowed the participants more freedom to express their ideas and discuss their views and attitudes toward the Web as a learning resource. The researcher, also being the interviewer, followed up the questions and elaborated further on the participants' input.

A constructivist grounded theory approach and thematic analysis were used to interrogate and interpret the interview transcripts. This data analysis process was organised into three steps: open coding, axial coding and selective coding. Through an inductive process, the constructivist grounded theory approach identified the key patterns, codes and categories grounded in the data. It used a logical and flexible set of strategies (Strauss & Corbin, 1990). This thematic analysis facilitated the construction of the dominant discourse presented in the responses to the interview questions. The researcher then sought to find patterns and developed theories in relation to their views toward the Web as a learning resource in the data analysis process.

## 1.7 Ethical considerations

An ethical awareness helped the researcher in building this full ethical approved study. Ethics was the basic principles and guidelines which helped the researcher to uphold things that she valued (B. Johnson & Christensen, 2004). Diener and Crandall (1987) consider the three areas of ethical concern for social research are: a) the relationship between society and science; b) professional issues; and c) the treatment of research participants. These three issues were kept in mind by the researcher throughout the data collection, analysis, as well as interpretation of results. The research was given full ethical approval by the ethics committee of the University of Tasmania. Ethical clearance (H10792) was obtained on the 18$^{th}$ August 2009 from the university to undertake the research (as shown in

Appendix 1.1). Ethical conduct involves a consideration of how data are collected and how analysed data are presented, rather than just simply following ethical guidelines (Ezzy, 2002). The collection interpretation and reporting of data were designed and practiced in relation to the professional standards and ethical conduct (Sarantakos, 2005).

This study brought no harm to the participants. All the participants recruited were university students and staff who should be considered as mentally and physically healthy independent adults. They were able to independently make decisions about whether to participate and give responses according to their own beliefs. There were no sensitive personal or cultural issues included in the research questions. Participants would thus not be offended by any of the instruments used for the data collection. Information about the research was provided. They could withdraw their participation at anytime without any effect on their teaching or studying. No data were collected or used without the participants' consent. Therefore, they could decide to withdraw without fear of repercussions.

The data report and storage were also organised with full ethical consideration. The participants' responses to the questionnaire were non-identifiable data, and no specific individual could be identified by anyone including the researcher. Therefore, the participants involved in the questionnaire stage were anonymous. Also, all information was treated in a confidential manner. On the other hand, the participant responses to the interview questions were re-identifiable data. However, their confidentiality was well protected. The interview transcripts erased all references to any particular named participant, so the information was known to the researcher only. The researcher was using the photocopier in the Faculty of Education; thereby no other people had access to the confidential information. Names of schools, teaching staff and students were erased from these initial data and were replaced by pseudonyms. Confidentiality was protected with no discussion of the participants with other people. The participants were recorded as Student A, B, or Lecturer A, B, etc. No individual's name was used in any publication arising out of the research.

Both data collected electronically and using paper instruments were stored securely. Data collected online using Survey Monkey were stored temporarily on secure servers in the US. All responses were downloaded to password-protected network storage areas at the University of Tasmania and then deleted from the US servers one week after the close of the project. The paper data were stored in a locked filing cabinet in the chief investigator's office. The data analysis and subsequent writing of the thesis were stored password protected servers. All data will be destroyed after a period of five years by placing them in sealed bags which are then removed and shredded by a contractor employed specifically to remove confidential waste from the university.

## 1.8 Limitations of the research

Due to the time constraints and some other issues, the researcher was restricted by a number of limiting factors. The data were gathered at one university site. The majority of the participants were located at the Launceston Campus of the university due to the convenience of access. Thus, the research cannot be generalised as a feedback from a comprehensive list of universities across Australia, although it would have been ideal to include information and evaluation from a broader spectrum of campuses and universities. Also, the number of participants from some faculties/disciplines was relatively small because of the location constraints. For instance, the researcher did not have many opportunities to access to the students and teaching staff within the Law Faculty due to its location in Hobart. However, this issue was solved by rearranging the questionnaire responses into four groups for the data analysis, according to the interrelationships between the academic areas.

Due to the limited adoption of MyLO in some courses, participants in these courses were not able to give evaluation on MyLO. Questions were designed in both the questionnaire and semi-structured interviews to investigate the views of students and teaching staff toward the effectiveness of MyLO in their own courses. Participants who were not involved in using the courseware could not give any evaluations or suggestions on its usefulness or improvement. Therefore, this limitation led to the sidedness of the results from this aspect. However, this problem was partially solved by grouping all related questions into one group, and thereby the participants could choose to skip them. This solution also allowed the researcher to summarise the frequency of MyLO adoption in different academic areas. For instance, if more participants in one faculty skipped this section, less usage of MyLO in this faculty would be defined.

Moreover, it would have been helpful if the researcher had distinguished the participants according to their cultural and language backgrounds. Although the cultural influence was not the focus of the study, the increasing cultural diversity within Australian universities suggests the value of involving such aspect into the study. A presentation of the research findings at a conference had triggered some researchers' interests in looking at the difference in the Web adoption of learners from various language and cultural backgrounds. The involvement of a small number of participants from non-English speaking countries had also shown the influence of language barriers on Web adoptions. Therefore, this can form a new research topic in future studies.

## 1.9 Structure of the thesis

This thesis is a report of the entire research project. It has eight chapters in total. Apart from this introductory chapter, the other seven chapters are Literature Review, Methodology, Development of Research Instruments, Quantitative Data Analysis, Qualitative Data Analysis, Discussion and Recommendation, and Conclusion. These chapters present the detailed contents of the study, as well as the methodological principles that underpinned this research. The contents of these seven chapters are outlined below. The whole process follows the research procedures that are suggested by Flick (2006a):

> The researcher's starting point is the theoretical knowledge taken from the literature or earlier empirical findings. From this, hypotheses are derived which are operationlised and tested against empirical conditions…The aim is that the representativeness of the data and findings can be guaranteed…A further aim is the breaking down of complex relations into distinct variables, which allows the researcher to isolate and test their effects. (p. 41)

*Chapter 2: Literature Review*

This chapter reviews a range of project related literature which provides the theoretical foundation within the research area. It looks at the background knowledge of web-based learning, including definitions of different relevant terms and the evolution of computer assisted learning (CAL), educational software and the Web adoption for educational purposes. The chapter discusses the educational philosophy which underpins web-based education in the Australian university context, such as constructivist theories, cognitive theories, individualised learning and adaptive learning theories and collaborativism. It looks at how the Web is used by university staff and students to support learning activities. The ways in which the Web is used for various learning purposes are introduced. This chapter also discusses the web-based learning environment in Australian universities. In particular, the web-based learning environment and the courseware system adopted at the University of Tasmania are introduced. Lastly, this chapter gives an outline of the principles used by other educators in web-based learning evaluation, as well as the issues and challenges appearing in the implementation of web-based technologies. The theories included are considered in the development of the research instruments, as well as in the discussion of the findings that have emerged from the data analysis.

*Chapter 3: Methodology*

This chapter introduces the methodological principles used in this research. The study utilised a mixed method research methodology which involved both quantitative and qualitative research methods to gather and analyse data. The objectives of this study are reaffirmed before the importance of the research problems is discussed. The researcher then moves towards the methodological principles that underline this study, including the quantitative research principle, the qualitative research principle and the thematic analysis and constructivist grounded theory. The data collection processes are also examined. A pilot study was conducted to ensure the validity of the study and the research instruments. Moreover, the data analysis approaches and tools are introduced, and followed by a discussion of the validity, reliability and credibility. Lastly, this chapter looks at triangulations which were also seen as important in this study.

*Chapter 4: Development of Research Instruments*

This chapter gives a detailed picture of the development processes of the research instruments. The data collection instruments designed are a questionnaire and two sets of interview questions. The questions, statements and structures in both instruments were designed in a way that could best assist in achieving the research aims and objectives. The chapter gives a detailed illustration on the initial development step and the adjustments to the final version. A pilot study, a validity test and a factor analysis were organised using the SPSS software to test these instruments. The process, results and adjustments made are also discussed.

*Chapter 5: Quantitative Data Analysis*

Chapter 5 of the thesis provides an overview of the first data analysis stage: the quantitative research stage. This chapter introduces the tools and techniques used at this stage, in particular the grouping of the numerical data into sub-themes: instrumentality of the Web in different academic areas; the Web as a social enhancement tool; the Web and learners; the Web as a teaching and learning resource; and effectiveness of the MyLO system in different academic areas. The techniques involve investigation of the median values, analysis of Kruskal-Wallis tests and the Spearman's Rank Order Correlation (rho). An overview of the participant sample is provided, in particular their occupation, gender, academic faculty/discipline, length of studying/teaching, and level of knowledge about information technology (IT). The data analysis is then provided, according to the sub-themes mentioned above.

*Chapter 6: Qualitative Data Analysis*

This chapter introduces some of the theoretical aspects behind the qualitative analysis, in particular the constructivist grounded theory approach utilised. The chapter looks at how qualitative analysis may provide insights into the perspectives behind the quantitative findings, or emerging insights that have not yet been covered by the research. The results of the open-ended questionnaire section and interview questions are discussed. By working through the textual data line by line, the researcher generated codes that are in relation to the views of university students and teaching staff of the significance of the Web in learning activities. Through the three step coding approach, the following eight dominant categories in relation to web-based learning emerged:

- Instrumentality of the Web;
- Evaluation of web-based learning environments;
- Significance of the Web;
- Usability of MyLO;
- Experiences with the Web;
- Influences on Web adoption;
- Participants' expectations;
- Adjustments made.

*Chapter 7: Discussion and Recommendation*

Following the data analysis chapters, a discussion of the findings is presented, divided into five sections in the order of the research objectives. This chapter is an examination of whether the research objectives have been met and the extent to which the research questions have been answered. The main findings from the quantitative and qualitative analysis are presented and brought together to provide a range of perspectives on the web-based learning environment within this particular university context. Based on the evaluations and reviews of the university students and teaching staff, recommendations are made for the future adoption of web-based technologies and the further development of web-based learning environment within this university.

*Chapter 8: Conclusion*

This chapter looks at the importance of conducting this research, and provides an overview of the research journey at its conclusion. It also revisits the research aims, in particular the investigation of the views of students and staff on the significance of the Web as a learning resource. Findings presented within the discussion chapter are revisited and summarised. Finally, the researcher's thoughts on the findings are presented, including how the research objectives were addressed, a discussion of the overall findings, any emerging issues found, any weakness of the research, and how the researcher looks at the future of this study, leading to suggestions for further research.

## 1.10 Conclusion

As the first chapter of the thesis, this chapter has provided a general introduction on the research project and the structure of the thesis. It firstly explained the motivation of selecting this research topic, and provided the research background, which includes the overall adoption of the Web and web-based technologies within the Australian university context and the particular university context in which this research took place. The research aim and objectives were introduced and followed by the justification and significance of this study. This chapter then discussed the theoretical consideration of this research which is an educational approach supported by web-based learning theories, higher education theories and constructivist grounded theory. Based on these theories, the research methodology used in the data collection and analysis was introduced. Lastly, this chapter has included the ethical considerations, limitations of the research, and the structure of the thesis.

The following chapter will examine the theories and discussions in relation to web-based learning presented in other literature. The role of the Web in educational activities will be discussed, and followed by learning theories and pedagogical assumptions that are in relation to web-based education. Instrumentality of the Web in the Australian university context will be examined. Principles and strategies adopted by other evaluators to investigate the effectiveness of web-based tools, including courseware systems, will be reviewed. Lastly, it will give an introduction on the issues and challenges of web-based learning. The chapter will provide a background of the research matter and lay a foundation of theories for the design of the questions and statements within the research instruments.

# Chapter 2: Literature Review

## 2.1 Introduction

The previous chapter provided an overview of the study which was to investigate the significance of the Web as a learning resource at the University of Tasmania. It gave a brief introduction on the web-based learning environment and the position of the Web in the Australian university context. In this chapter, theories and concepts in relation to computer assisted learning (CAL) and web-based learning will be reviewed to provide a theoretical foundation to the research. Web-based learning has become a popular topic in all educational levels across Australia. A search on the Eric (Educational Resource Information Centre) Database in June 2010 for citations containing the term "web-based learning" has returned 3,870 references. Many of these citations are related to the use of the Web in tertiary education institutions and the evaluation of web-based learning environments. Also, multiple books on the subject of web-based learning were published in 2009, 2010 and 2011 (e.g. Lee & McLoughlin, 2011; Pan, Cheok, & Muller, 2010). A review of relevant literature enabled the researcher to create links to the developing body of background knowledge (Neuman, 1997).

In this chapter, a conceptual model (Figure 2.1) is designed based on Wilson's (1996) three categories of learning environment to show the position of the Web and web-based technologies in teaching and learning. In addition, theories in relation to web-based learning, including the constructivist theory, cognitive theory, individualised and adaptive learning theory, collaborativism, as well as objectivism and behaviourism, will be discussed in-depth. Following this, the purposes of Web adoption, such as communication, information retrieval, collaboration and assessment, will be introduced. A framework will be designed to illustrate the web-based tools used in Australian tertiary education institutions. To evaluate the web-based learning environment, principles and models used by other evaluators in assessing web-based learning systems will also be considered. Lastly, issues and challenges in web-based learning will be discussed.

## 2.2 Key concepts and their relationships

When discussing definitions in relation to computer assisted learning (CAL) and web-based learning, there are often too many concepts, some of which overlap. The same concept sometimes is given various names and definitions. For clarity, discussion will be given based on a model designed from Wilson's (1996) three major categories of learning environments: computer microworld, classroom-based learning environment, and virtual learning environment:

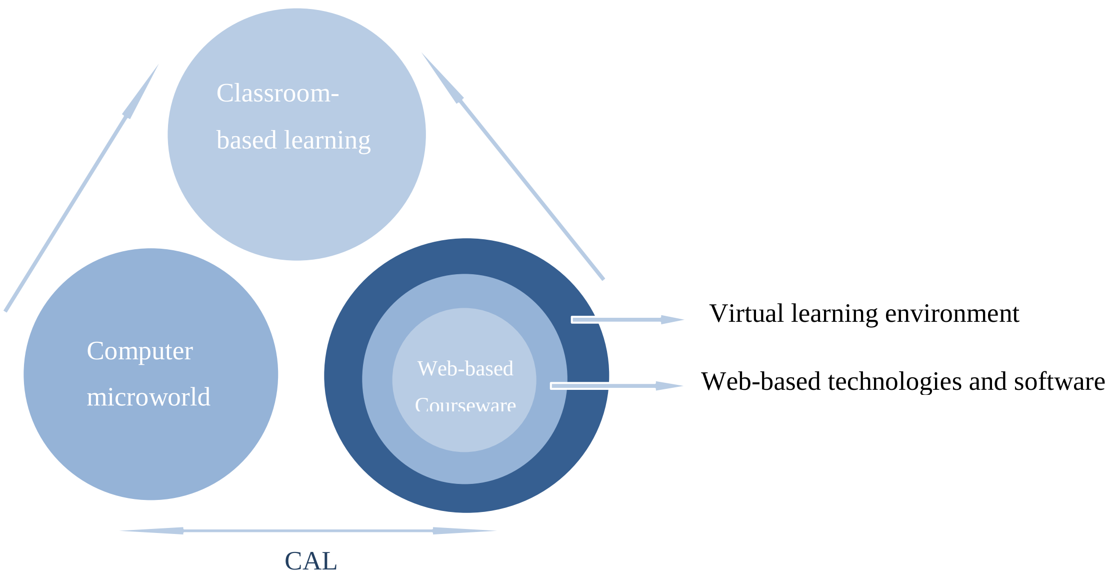


*Figure 2.1*. Three categories of learning environments

Classroom-based learning is commonly seen as the most widely used traditional educational setup among the three learning modes. In a classroom-based learning environment, students periodically meet face-to-face with their instructors and other fellow students, using traditional teaching materials, such as books and CDs (Parikh, 2003). Face-to-face learning interactions are still seen as the most popular mode among all learning methods. However, due to the rapid development of technology and network, this "onefold" teaching style can no longer meet students' learning demands, this limitation thereby led to the increasing popularity of computer assisted learning (CAL) in a worldwide context. As it can be seen from Figure 2.1 above, students who are involved in classroom-based learning nowadays are supported by both of the other learning modes: computer microworld and virtual learning.

Computer assisted learning (CAL) is also referred to as computer-mediated learning (CML) or e-learning (Talbot, 2003; Zhang, Zhao, Zhou, & Nunamaker, 2004). It represents to the combination of the two lower circles in Figure 2.1: the computer microworld and the virtual learning environment. The computer microworld refers to a self-contained computer based learning environment. In this context students learn at their own paces using a computerised learning system, such as computer-based training and intelligent tutoring systems (Parikh, 2003). Compared to the computer microworld, a virtual learning environment provides students with more freedom because it allows students, dispersed over a large geographic area, to learn through a communication medium (Parikh, 2003). Hence, it is also broadly called tele-teaching environment (Karoulis & Pombortsis, 2003) or distance learning (Shanker & Hu, 2008). CAL brings enormous benefits to learners and education institutions, such as easier access to quality education, affordable education, convenience and flexibility for learners and reduced environmental impact. The computer microworld and the virtual learning environment are the two major components of CAL, and both serve to support the traditional classroom-based learning approach.

Web-based learning (WBL), which is also defined as online education or Internet-based learning, is a major subcomponent of CAL, and appears frequently in recent literature. The Web is commonly understood as the World Wide Web or the Internet. It refers to the combination of internet, which indicates to an interconnection of networks, and intranet, which indicates to a private computer network that uses Internet Protocol technology. WBL has numerous names such as web-based instruction (Khan, 1998), Internet-based training and advanced distributed learning (TechTrends, 2000). Generally, these names refer to a mode of education delivery that "exploits the communication and information facilities of the Internet for the delivery of learning experiences to students" (Pilgrim & Creek, 1997, p. 1). WBL involves the Web and web-based technologies delivering distance education and instructions. Instead of handing out in-class materials face-to-face, instructors can post lecture notes, course information, class schedule and assignment tasks on the course website to assist students' learning (Parikh, 2003). Parikh (2003) believes that the Web can provide valuable contribution to all three learning environments, as it expands access to education for all learners, and provides opportunities of communication for both teachers and students. Hence, it involves both students on-campus and virtual students who are studying entirely online. Raisinghani (2003) believes that WBL has become a new culture in this era of globalisation due to its unique feature that enables students to continue their education without facing the hurdles of distance.

Advances in microcomputers and networks have made virtual learning environments feasible. Virtual learning environment are defined as "open systems that allow participant interaction through synchronous or asynchronous electronic communication" (Piccoli, Ahmad, & Ives, 2001, p. 409). It is an online learning environment which can be divided into synchronous or asynchronous, depending on whether students and instructors communicate in real time. In other words, if they communicate at the same time using web-based technologies like chat rooms or teleconferencing, this learning style is defined as synchronous learning. In contrast, the learning can be asynchronous if asynchronous forums, repositories, emails or other web-based technologies are used to communicate at different times (Jones & Vollmers, 2008). Schools and universities are increasingly implementing educational software and multimedia networks to create asynchronous courses for their learners. Virtual learning is a great opportunity, for education institutions like universities, to supplement high quality education and represent a novel teaching methodology (Mari, Genone, & Mari, 2008; Piccoli, et al., 2001). Irrespective of the many hurdles, asynchronous learning will continue to grow, and capture an increasing share of the higher education market (Aggarwal, Turoff, Legon, Hackbarth, & Fowler, 2008).

Lastly, the term web-based learning system is widely used by educators who are involved in designing and implementing web-based learning at universities. Web-based learning systems are also named courseware systems (Flanagan & Egert, 2000; T. Le & Le, 1997). It refers to a specific type of educational software which offers a complete system of information and communication services, and supports course needs in tertiary education contexts (De Moor, 2007a). Web-based learning systems vary in the objectives of learning activities served and assisted, for example, a class, a seminar, a subject, or a course. In large education institutions like universities, these systems are serving to support teaching across all courses, as well as creating independent asynchronous courses which allow students to study or gain degrees off-campus. Examples include MyLO at the University of Tasmania, the MyUTS at the University of Technology, Sydney, and the Learning Management System (LMS) at the University of Melbourne. Students are accommodated by these online platforms that provide them with opportunities to learn collaboratively and interactively.

## 2.3. Development of CAL and web-based learning

### 2.3.1 Development history of CAL and web-based technologies

Computer assisted learning (CAL) refers to any learning activities that involve using and supplementing computer technologies. The initial application of CAL started quite late. Despite the high costs, computers were initially introduced to schools in England in the mid-70s (Squires & McDougall, 1994). In the following 20 years, microcomputers or personal computers became commonplace within a worldwide. Blease (1986) reports that the number of microcomputers was increasing at “an alarming rate” during this period. By the mid-90s, computer-based packages and software could be seen in many classrooms, being used in a wide range of learning activities for different age groups, subject areas and classroom settings (Squires & McDougall, 1994; Wilss, 1997). Despite the rapid diffusion of CAL has already become incredibly rapid in the mid-90s, the popularity of web-based learning afterwards and the growth of courseware development nowadays is beyond the imagination of people at that time.

The origin of the Web reaches back to the 1960s when military agencies in the United States were funded for research projects to build robust, fault-tolerant and distributed computer networks (Grey, 2001). Although the Web was not established for any educational purposes at the very beginning, teachers and education institutions soon realised its educational values and introduced it into classrooms. In 1970s, computers and communication technologies started to be used to contribute to learning activities (McCormack & Jones, 1998). Open and distance learning programs started to be established (Hope, Prasad, & Barker, 2005). The following 30 years have witnessed a revolution in teaching and training throughout the globe (Lockwood, 2001). Web-based technologies were estimated to have an annual growth of 100 percent during the 1990s (Roldan, 2003). In 1998, the UK government's National Grid for Learning (NGfL) started to systematically link schools in the country to the Internet, provide resource to teachers, as well as train teachers to become ICT-literate (Grey, 2001). Pilgrim and Creek (1997) claim that the introduction of web-based education into schools has made the late 90s a significant "make-or-break" time for many higher tertiary education institutions. Recently, the Web has become an important avenue of the learning community (Chang, Lim, & Zhong, 2008). Many universities, schools and for-profit education institutions now offer online classes or courses, or use the Web in a variety of ways to support students' learning.

Development of educational software started a few years after microcomputers had been introduced to education institutions. Although some software programs that suit the specific teaching aims were used in classrooms, not many software programs were written specifically for schools or universities in the early years (Squires & McDougall, 1994). Due to easier access to computers and information technologies, demands of educators and students were also increasing; therefore, more software programs have been designed for specific purposes to meet their educational needs. By the mid-80s, more than 10,000 educational software packages had been published (Taylor, 1985). These packages acted as representatives of the early stage of courseware design and served to assist in classroom teaching and students' self-learning. The rapid growth of personal desktops and portable computers continued at an accelerated pace from the mid-90s to present (V. A. Green & Sigafoos, 2007). The discussion has changed from the possibility of involving educational software in teaching to the selection of more adaptable courseware packages. Many schools and universities have at least one courseware system to facilitate traditional lectures and tutorials and to create virtual learning environments. To better illustrate the timeline of the development of CAL and courseware, periods and stages of the development are shown in Table 2.1 on the following page:

Table 2.1. *Concluding remarks*

| Period | Development of CAL and web-based technologies |
|---|---|
| Early 70s to the mid-70s | • Computers were initially introduced to schools.<br>• Open and distance learning programs started to be established. |
| Mid-70s to the mid-80s | • More software programs were designed for specific educational purposes.<br>• More than 10,000 educational software packages were published. |
| Mid-80s to the mid-90s | • Computer-based packages and software became common place.<br>• Personal computers and networks were becoming popular. |
| Mid-90s to recent | • Personal and portable computers and network became more widely available.<br>• Complete commercial courseware packages were designed for tertiary education institutions.<br>• Web-based technologies grew by 100 percent during the 90s.<br>• Schools were systematically linked to the Internet; teachers were trained to be ICT-literate.<br>• The Web had become an important avenue of the learning community recently. |

### 2.3.2 The inexorable trend

Attempts have been made by researchers to investigate reasons why the development of CAL and web-based technologies is so rapid and whether their broader use is an inexorable trend. It can be seen from the development of CAL and web-based learning that the implementation of the Web in schools and universities has become an overwhelming trend. Why do these education intuitions choose to adopt the Web in teaching and learning? What benefits does the Web bring to educators and institutions? Why is the Web so unique that it brings conveniences which cannot be gained in other ways? These are the questions that many researchers and educators desire to seek answers. Four main powerful reasons summarised within literatures are introduced here.

Firstly, CAL and web-based technologies help create a virtual learning environment which enables students to learn synchronously and asynchronously (Aggarwal, et al., 2008). Building a web-based learning environment is like building a classroom without walls (Grey, 2001). CAL provides learners with not only enhanced learning outcomes, but also flexibility as they are not bound by location and time (Pilgrim & Creek, 1997). The Web has opened up a new window for both on-campus students and those for whom full-time university attendance is not a practicable option (Grasso & Leng, 2003). Instead of physically attending classes, learners can communicate with instructors and other fellow students at anytime and anywhere via emails or discussion forums. They can also have access to assignments and take quizzes posted by teaching staff. This flexibility cannot be provided by the traditional teaching methods either in the past, or in the future. Hence, it becomes one of the predominant reasons why the use of CAL and web-based learning are becoming an inexorable trend.

Low cost is another reason why education institutions attempt to adopt CAL and web-based technologies. Compared to face-to-face communication and the traditional telephone-based technology, the current multimedia and hypermedia communication tools obviously cost less (Perraton & Naidu, 2005). Although interpersonal relationships are considered as more effective, their lack of reproducibility makes it expensive from two perspectives: new editions require the replication of teachers' costs, and the space and time bonds demand students' here-and-now presence (Mari, et al., 2008). CAL and web-based learning provide students and teachers with recyclable and reusable resources and possibilities to teach and learn without spending any time or money on transportation. Moreover, it is also demonstrating its cost effectiveness for the institutions through increasing class size, faculty-student ratios (Aggarwal, et al., 2008; Rayburn & Ramaprasad, 2000), as well as reduced costs in building and maintaining campuses and buildings (Matthews, 2003).

Adoptions of CAL and web-based learning extend access to a broader range of users and opportunities. In a world that is one of increasing complexity, rapid change, and constant innovation (Esnault, 2008), a lifelong learning strategy that allows all people to join and to participate is needed. Due to the different backgrounds and increasing demands of learners, the traditional teaching methods cannot meet all the learning needs of students who learn in different ways, at different ages, and in different contexts (Esnault, 2008). University students nowadays are more likely to be engaged in learning processes which involve a variety of academic support, and respond to a mix of traditional and alternative learning methods (Ritchie & Jones, 1997). Thus, the exploiting of web-based learning and technologies can compensate for the deficiency of teaching methods, and extend access to students with special demands which cannot be supported by traditional learning experiences.

Enhanced learning outcomes, the most important goal that all education institutions aim to achieve, can also be provided by CAL and web-based learning. This view is seen as critical because researchers and evaluators have conflicting views on it. Some writers (Herrington, et al., 2000; Mari, et al., 2008) suggest that the focus of CAL is more on the reach of numbers of users, rather than on the richness of quality of education. Nevertheless, others demonstrate that well designed web-based learning systems have the potential to enhance learning outcomes (Chang, et al., 2008), or at least, are as effective as traditional face-to-face education (Aggarwal, et al., 2008). Web-based learning promotes enhanced learning outcomes by allowing instructors freedom to be creative and offering a new level of communication among learners (Matthews, 2003). Therefore, CAL and web-based technologies have a potential to facilitate better teaching and learning and accomplish better learner understanding (Mills, Marchessou, Nonyongo, & Tau, 2005).

Other researchers have diverse views toward the development of CAL and web-based learning. For instance, Rice (1997) argues that CAL and distance education help higher education institutions overcome the "triple challenge" of improving outcomes, extending access for a broader range of students and controlling costs, as well as allows new pedagogical opportunities and great flexibility. El-Seoud, Al-Khasawneh, and Awajan (2007) claim that using one of the web-based education delivery systems could be helpful to ameliorate the effect of rising cost and the lack of facilities or teaching staff, as well as provide institutions with possibilities for implementing asynchronous education delivery. Some other researchers (Bradburn & Zimbler, 2002; Raisinghani, 2003), who show strong confidence in CAL and web-based learning, believe that the potential for the distance education market is much more than the potential for resident instruction. It is expected that more education institutions will join the distance education market, expand the programs that are already existing or even define web-based learning as their core missions in the future (Aggarwal, et al., 2008; A. R. Johnson, 2009). Flanagan and Egert (2000, p. 1) summarise the reasons why web-based distance learning is proliferating:

- since the technology is available, the need is evident;
- online education is an important financial source for universities; and
- access to education is enhanced and opportunities are expanded.

## 2.4 Learning theories

Researchers have different perspectives on the role of the Web in university teaching and learning. Huerta, Ryan, and Igbaria (2003) argue that there are two dominant perspectives of web-based learning: the implementation of web-base technologies and the learning experience that can be obtained through web-based environments. The first perspective concentrates on the detailed implementation of the resources for specific purposes and sees any instance of the implementation as a project (Huerta, et al., 2003). The second perspective, however, focuses on the educational philosophy and pedagogical assumptions that underpin the instruction of web-based learning environments. These pedagogical assumptions must be understood by educators who intend to use these information technologies to enhance learning outcomes (Leidner & Jarvenpaa, 1995).

Learning theories that underpin web-based learning display a great deal of diversity. It is not surprising given that learning is a complex phenomenon which is influenced by a range of factors and undertaken by individuals with diverse preferences (Woolfolk & Margetts, 2007). A clear understanding of learning theories is essential in developing an effective web-based learning environment (Adrian, 2000). These learning theories provide sound guidelines for designing and implementing presentation models and student activities (Leflore, 2000). The various theories mentioned within literature include cognitive theory, constructivist theory, individualised and adaptive learning theory, collaborativism, objectivism and behaviourism. The following section is a discussion of these theories put forward by different researchers.

2.4.1 The cognitive theory

Cognitive theory is considered to be one of the most important learning theories that underpin web-based learning. Generally, cognitive theory stipulates that learners build mental schemas and frameworks to organise experiences and to help them understand the world (Huerta, et al., 2003; Leflore, 2000; Slavin, 2009). Tompson, Simonsen, and Hargrave (1996, p. 11) states that “cognitive theory concentrates on the conceptualisation of students’ learning process. It focuses on the exploration of the way information is received, organised, retained and used by the brain”.

Cognitive theory has a number of branches. One of them is the cognitive developmental view which was developed by Jean Piaget. Piaget made contributions within two specific orientations of this cognitive developmental psychology: constructivism and structuralism (Vialle, Lysaght, & Verenikina, 2005). The second branch of cognitive theory is the social cultural view which was established by the Russian theorist Lev Vygoysky (Vialle, et al., 2005). This theory focuses on the cultural, social and historical phenomenon in learners’ mental development. The third branch is the information processing theory which defines learning as the processing and transfer of new knowledge into long-term memory (Leidner & Jarvenpaa, 1995). Leidner and Jarvenpaa (1995) discuss that learning is a process of developing, testing, and refining knowledge until it is effective and reliable enough in problem-solving situations. All the above perspectives emphasise the process in which a learner uses his/her brain to organise experiences and make meaning of the real world. Therefore, any teaching strategy that helps strengthen this process will assist learning.

Cognitive theory has a strong relationship with web-based learning. It is believed by Gee (1990) that teaching and learning by distance is more likely to be influenced by cognitive theory than when they occur in a regular classroom setting. Effective teaching strategies, methods and tools have the potential to help learners organise meanings and experiences with richer constructions of knowledge and presentations of information. Students’ participation, enjoyment and commitment are more likely to increase when the learning environment and instructions match cognitive styles (Gee, 1990). In contrast, if students' cognitive styles are not considered and matched by the learning activities or instructions, lower satisfaction and a higher dropout rate would be encountered (Meredith, 1985 cited in Woolfolk & Margetts, 2007). Leflore (2000) gives some examples on the ways in which cognitive theory may contribute to the instruction of web-based learning systems, such as cognitive mapping or webbing, concept attainment activities, activation of prior knowledge, and use of motivational graphics, animation and sounds. He believes that web-based technologies can better support students in their mental schemas and framework building processes, as well as provide them with alternative learning methods, strategies and tools which help them achieve better understanding.

### 2.4.2 The constructivist theory

Constructivist learning theory is commonly seen as one of the branches within cognitive theory; however, it is highlighted and studied as a separate theory by many scholars. Learning is a collaborative constructive process within which problem solving is often used as a key strategy to reinforce users' capacity of reflection (Furtado, Furtado, Mattos, & Vanderdonckt, 2003; Schank, 1994). Constructivists assume that individuals construct their own reality of the objective world instead of reproducing the external reality (Leidner & Jarvenpaa, 1995). Learners' construction of meaning, social interactions in learning and problems solving in real-world contexts are the three characteristics of constructivist theories that can be applied to web-based learning (Leflore, 2000; Piccoli, et al., 2001). That is, learners construct meaning of knowledge by interacting with instructors and peers and using knowledge learned to solve everyday problems. According to Morphew (2000),

> The foregoing discussion on experiences used by constructivist instructions in the traditional classroom has numerous implications for distance learning education. With some creativity, much of the same experiences that stimulate thinking and facilitate the co-construction of meaning in traditional settings can be made available to the distance learner. (p. 12)

Constructivism views learning practice as an active constructive process in which learners create knowledge instead of passively acquiring it (Huerta, et al., 2003). Students' connection and involvement is the key factor in learning the materials

(Chickering & Ehrmann, 1987b; Hatcher, 2005). To allow students to construct meanings, they should be placed at the centre of a learning process. In this case, instructors play a role as facilitators, and all the learning activities should be designed in a way that encourages students to actively participate and interact. This point of view is supported by some other researchers (e.g., Martinez & Bunderson, 2008; Ng, 2000) who write that students should be seen as mentally active participants in the learning process instead of passive data recipients.

Web-based learning supports constructivist theories as it encourages interactions between instructors and learners and among learners themselves. Although some researchers (Mari, et al., 2008) believe that the face-to-face learning style can more likely promote interactions and more effective compared to web-based learning, some others (El-Seoud, et al., 2007) claim that web-based learning environments can be instrumental in enhancing student-centred learning. Web-based courseware systems like Blackboard, WebCT or Moodle can facilitate the change of learning paradigm from students as passive receptors of information to students as active learners (El-Seoud, et al., 2007). Zhang, Zhao, Zhou, and Nunamaker (2004) also state that web-based learning provides many opportunities for constructivist learning by supporting learners with student-centred and interactive learning, as well as rich resources.

There are a number of rationales that can be adopted to design, implement and assess learning activities and presentations. A teaching approach, which indicates a student-focused strategy that is aiming at students changing their own learning conceptions, is highly emphasised (Trigwell, Prosser, & Taylor, 1994; Trigwell, et al., 1999). It is argued that teachers should facilitate learning by encouraging and interacting with students. The roles of teachers include encouraging self-directed learning, making time for students to interact with each other to discuss the problems encountered, assessing to reveal conceptual change, provoking debate, using time to question students' ideas, and developing conversations with students (Trigwell, et al., 1999). These rationales can be used to achieve a better understanding of knowledge in web-based environments.

### 2.4.3 Individualised and adaptive learning theory

Individualised learning theory and the adaptive learning theory also relate closely to web-based learning. Both theories emphasise individual differences of learners. These two theories are closely related in their nature and therefore, they are discussed as one theory in this study. Individualised and adaptive learning theories are supported by cognitive theory which believes that an individual's prior knowledge is represented by a mental model in memory that operates as an important determinant of how effectively the learner will process new information (Leidner & Jarvenpaa, 1995). As every individual's mental model and prior experience are different, their effectiveness of processing knowledge and preference learning styles are also different. Therefore, there exists "considerable variation between different individuals in the way they learn", as well as between the ways one individual performs at different times (Sieber & Andrew, 2003, p. 219). This variation suggests the need of building an individualised and adaptive learning environment that can promote effective learning and foster independent and adaptive experiences.

Individualised and adaptive learning theory suggests that educators and institutions adopt a variety of teaching styles and strategies to cater for learners' individual needs. Tertiary education institutions nowadays are under pressure to accommodate learners from a variety of backgrounds and with different characteristics, needs and abilities. Teaching strategies and instructional methods that mostly match an individual's learning style will be most effective (Leidner & Jarvenpaa, 1995). No single teaching strategy or system can suit all students. Hence, a flexible and adaptive teaching style that can cater for all learners' requirements is in demand. To meet this demand, the existence and diffusion of web-based technologies can offer learners the capability and flexibility with a variety of information delivery systems and ways of presentations (Magoulas, Papanikolaou, & Grigoriadou, 2003).

There are three issues in an individualised and adaptive instruction. Firstly, identification of students' individual needs, learning preferences, and preferred learning styles should be taken as an important step in the design of instruction and its methodology (Magoulas, et al., 2003; Ng, 2000) It is beneficial for instructors in web-based learning to be aware of students' preference as information and knowledge can be packaged in so many contexts and styles with modern technologies (Martinez & Bunderson, 2008; Ng, 2000). With learners' preferences and expectations in mind, web-based education can be "hyper-personal", and produce better quality learning results by providing greater personalisation of learning experiences (Swan, 2003). Secondly, an effective web-based learning system should have specifically presented content, the ability to identify learners' unique learning styles, and assessment tools that can be used to monitor, support, and assess learners' individual progress (Martinez & Bunderson, 2008). Thirdly, a personalised and adaptive web-based learning environment or system should involve abundant resources, support collaboration and implement activities which engage learners of various levels from novices to experts (Sherry & Wilson, 1997).

### 2.4.4 Collaborativism

Collaborativism, which is also named cooperative learning, is believed to be one of the theories underpinning web-based education. Collaborativism is interrelated to the constructivist theory. However, instead of emphasising the interactions between an individual and objects, collaborativism assumes that learning emerges when interactions occur between an individual and other individuals (Leidner & Jarvenpaa, 1995; Slavin, 1990). It believes that students learn when they excise, verify, solidify, and improve their mental models by discussing and sharing information with others (Leidner & Jarvenpaa, 1995). Slavin (1990, 1996), who contributed a number of articles and books on cooperative learning, argues that collaborativism provides a radically different approach to web-based instructions of which the possibilities have been tapped only on a limited basis.

Collaborativism assists learning from four major perspectives, namely, motivational, social cohesion, developmental and cognitive elaboration (Slavin, 1996). The motivational perspective focuses on the reward or goal structures which encourage members in a group to help each other to exert maximum effort and to engage in behaviours that help the group to be rewarded (Slavin, 1996).

The social cohesion perspective is related to the motivational perspective. However, instead of seeing the motivation of group members helping each other as of personal interest, it supports that students assist other students in learning because they care about the group as a whole (Slavin, 1996). In addition, the developmental perspective indicates that the interactions provided by well developed tasks can increase learners' problem solving skills and critical thinking concepts (Furtado, et al., 2003; Vygotsky, 1978); while the cognitive elaboration perspective indicates that explaining learning materials to other students and peer tutoring can assist students in restructuring and elaborating information in memory (Slavin, 1996).

Leidner and Jarvenpaa (1995) suggest, from an instructor's perspective, that there are three implications of collaborative learning model in web-based environments. They believe that instructors should facilitate the sharing of information and knowledge between learners, provide immediate feedback and allow students opportunities for peer review, as well as apply cooperative assessment strategies. This is evident in the implementation of online learning communities, online discussion forums, peer evaluations and various assessment strategies. These tasks and communication technologies can support inquiry, debate and creativity (Dempster, 2003), as well as provide an opportunity for both on-campus and off-campus students to learn collaboratively (J. S. Brown, Collins, & Duguid, 1989).

### 2.4.5 Objectivism and Behaviourism

Objectivism and behaviourism take into account a radically different view from the theories mentioned above. Objectivism holds a different opinion from constructivism. It believes that there is an objective reality and that the goal of learning is to understand this reality and then modify one's own behaviour accordingly (Jonassen, 1993). That is, knowledge is transferred from instructors to students. Objectivism believes that the instructor should work as the source of objective knowledge and an expert of the subject matters (Leidner & Jarvenpaa, 1995). It also believes that the instructor should be in control of the learning of materials and pace of learning (Leidner & Jarvenpaa, 1995). This point of view is agreed by McClelland (2001) who argues that constraints should be placed upon learners to reinforce their learning. Learning environments should be set up to constrain learners in the ways they learn, or free them to explore, instead of being set up to meet students' preferences as some constraints encourage and push students forward in a learning process (McClelland, 2001). Myhill, Le, and Le (1999), also point out that a "user-friendly" web-based learning system should not necessarily be seen as "learner-friendly". For instance, a computer game may be loved by its users, but may be designed without any educational value.

Behaviourism is another theory in relation to web-base learning mentioned by researchers (e.g., Huerta, et al., 2003; Wilson & Myers, 1999). It holds a different view from the constructivist and cognitive theories. Some behaviourists see learning as the acquisition and strengthening of responses (Wilson & Myers, 1999); while some others believe that learning is a relatively enduring change in behaviour that occurs as a result of experience (Konza, 2005). However, the behaviourism theory generally assumes that the outcome of learning is "a change in behaviour and emphasises the efforts of external events on the individual" (Woolfolk & Margetts, 2007, p. 220). Wilson and Myers (1999) argue that this theory should be seen as a serious theoretical stance in learning and instructional design, although it is often dismissed by some other researchers. Huerta et al. (2003, pp. 26-27) give some behaviourist principles for consideration in designing web-based learning environments as follows:

- Learning by doing (i.e., actively engaging students in tasks);
- Behavioural objectives (i.e., linking instructional goals with assessments);
- Task decomposition(i.e., breaking complex tasks into simpler ones);
- Motivation (i.e., applying reinforcement principles when successes occur);
- Response-sensitive feedback (i.e., informing learners about their errors);
- Transfer (i.e., asking learners to apply skills acquired in other settings).

As instructional design evolved out of sound educational philosophy, these learning theories should be carefully considered by education institutions and educators who intend to implement the Web in teaching and learning, as well as designers and evaluators of web-based environments (Wilson & Myers, 1999).

Involvement, choice and integration of one or more learning theories affect the ways in which one curriculum is written, activities are designed, and learning resources are adopted in this learning context. Apart from learning theories, educators' pedagogical assumptions should also be considered. These pedagogical assumptions underpin the design and the development of a learning environment and activities.

## 2.5 Pedagogical assumptions

Educators' pedagogical assumptions have a strong relationship with learning theories. An instructor's pedagogy acts as an important role in the design of a curriculum and its learning activities. All curricula and activities should be designed and implemented based on sound learning theories and comprehensive pedagogies since these factors can provide a more intelligent basis for curriculum design, selections of learning resources and creation of learning environments (Tyler, 1949).

### 2.5.1 Pedagogy and curriculum design

An educator's pedagogies operate as compasses in curriculum design. The term pedagogy refers to the methods and philosophy upheld by an educator or instructor. The term curriculum, however, indicates the subjects taught in education institutions (Marsh, 2009). Curriculum design appears in a variety of forms depending on the designers' pedagogical assumptions and the characteristics of the target learners. Within a sound pedagogy and curriculum design, the instructors should be "dedicated to the concept of distributed learning and versed in distributed learning pedagogy" (Meyer-Peyton, 2000, p. 83). In web-based learning courses, teachers' pedagogies play an equally important role as in face-to-face teaching. They can strongly assist instructors in the planning, assessing and other teaching processes (Marsh, 2009). Pedagogical decisions must be made in terms of the fundamental goals of the course to ensure that teachers and students are going on a right direction in purposeful learning activities and prevent them from getting lost (Schrum, 2000).

Web-based applications enable a more student-centred pedagogy and curricula in tertiary education. Bernardes and O'Donoghue (2003) argue that, with the help of technologies, teaching and learning delivery is able to be transformed in a way that has not happened for generations. This is not about the technologies themselves, but about the pedagogical value they create in the educational context. Within a web-based learning environment that is supported by a student-centred pedagogy, instructors perform as a “guide on the side” instead of a “star” or “sage” on the stage (Repman & Logan, 1996); learners’ characteristics, however, are taken into account as parameters of the design of any decision making and learning activity design (Nguyen & Kira, 2000).

### 2.5.2 Pedagogy and learning resources

Selecting suitable pedagogical tools to help achieve the expected learning outcomes requires as much effort as needed in the curriculum design. Apart from the careful design, the implementation of learning resources is also considered to be an important issue. Educators adopt tools and resources that are believed to be suitable in the learning activity and for the target learners. As a learning resource, the Web is used to support both traditional face-to-face learning as well as online learning. According to Chin (2004), students who enter universities would assume that their lectures will use web-based technologies because most of them would have experiences learning with the Web in previous classrooms. As higher education providers, universities are responsible to help subject departments to integrate online access and to create a learning environment where information resources within the school network and on the Internet are treated as an important part of education (Grey, 2001).

The selection and adoption of learning resources depend on the pedagogical assumptions of the educator. While many schools and universities nowadays tend to integrate the Web and web-based technologies into their curriculum design and teaching activities, some educators are adopting these technologies for wrong reasons (Chin, 2004). It is suggested that resources should not be used in a curriculum only because they exist or other institutions are using them. However, educators who decide to apply these web-based tools and materials should fully understand the pedagogical benefits that can be gained or achieved through them (Chin, 2004). Also, these resources should be used in a way that connects well with the learning activities designed and supports the learning environment set up for teaching. At the meantime, all learning resources should be assessed on their "learnability", which considers three core issues of "learning theory, instructional design, and curriculum choices" before they are put in use (Duchastel, 2003, p. 299).

### 2.5.3 Pedagogy and learning environments

An educator's pedagogical decisions have a strong influence on the learning environment that he/she would create. An instructor who supports constructivist theory and cognitive theory would hold a constructivist philosophy of teaching and learning (Slavin, 2009). Thus, this instructor would be more likely to create a student-centred learning environment and encourage collaborative learning activities, which can develop students' problem-solving skills and critical thinking skills, such as online group discussions and information sharing. In contrast, an instructor who agrees with the behavioural learning theories would be more likely to develop a teacher-centred learning climate which sets more constraints to reinforce and shape students' learning (Slavin, 2009). Moreover, instructors who support individualised learning and adaptive learning would call for an inclusive learning environment which can cater for learners from diverse backgrounds with different learning needs (Kershner, 2009). Therefore, they may choose to use collaborative activities which are considered to be "one of the most important educational interventions for successful inclusion" (Putnam, 2009, p. 81). Whichever learning environment is designed and created, it should have a positive influence on students' learning. Chin (2004) suggests some elements or quality criteria which can be used by educators to self-assess their learning environments. These elements, include engagement, expectation, social support, students' self-regulation and student direction, are believed to be crucial for an effective and supportive learning environment.

## 2.6 Instrumentality of the Web in educational activities

### 2.6.1 Communication

Achieving effective asynchronous and synchronous communication is seen as a high priority issue that should be considered by a designer of a web-based classroom (Hsu, Marques, Hamza, & Alhalabi, 1999; Rugelj, 2003). Learning cannot occur without communication between learners and instructors. Effective communications allow instructions, which facilitate learners' attainment of intended and specific learning goals, to be delivered (Khan, 1998). The Web provides learners with geographic independence and temporal independence within the communication process (McCormack & Jones, 1998). That is, for students who are not able to make physical presence to the campus, communication tools are needed to transfer teacher instructions which enable them to check their own performances, keep them on the right track and help them set goals for future learning. Regular student-faculty contacts in and out of class is also beneficial in promoting students' motivation and involvement (Chickering & Ehrmann, 1987a).

Similar to face-to-face communications, both asynchronous and synchronous communications involve interactions and exchange of ideas. From a lecturer's perspective, instructions can be sent to students without physically meeting them. This sort of messages is defined as a web-based instruction (WBI), which indicates to an innovative approach for using the Web as the medium to deliver instructions to a remote audience (Khan, 1998). From a student's perspective, they may contact teaching staff to ask for instructions in relation to learning tasks, or contact other students to discuss about learning contents. In either way, teaching staff and students need to make contribution to the communication, and respect the ideas others have contributed. From a faculty's perspective, they are responsible in providing email platforms and other communication tools for students and teaching staff to make these communications occur.

A variety of tools can be used to achieve communication in web-based learning. Emails are one of the representatives among all the asynchronous communication tools. The other tools could be bulletin boards, listservs, newsgroups and conferencing tools, etc. (El-Seoud, et al., 2007; Khan, 1998). Synchronous communication tools could be MSN and Face books. Hsu, Marques, Hamza, and Alhalabi (1999) believe that any technology, from conventional e-mail to sophisticated videoconferencing, can be used in a web-based classroom to achieve educational goals. These components individually or jointly contribute to one or more features to provide opportunities for teaching staff and students to communicate over learning contents and to conductive teaching and learning (Khan, 1998).

### 2.6.2 Information retrieval

The Web has become the most popular resource for information acquisition in modern education institutions. Its ease of use for collecting, sharing and distributing information makes it a ubiquitous and an ordinary tool for common people's everyday activities (Zaiane, 2001). Using electronic resources provides both lecturers and students instant access to a wide range of resources and a much easier option to organise and manage the large amount of references (Chin, 2004). Searching on the Web saves a great deal of time on acquiring the information needed. The amount of information that can be obtained from books and other resources cannot compare to that can be acquired from the Web within the same amount of time. Bradshaw (2005) gives the evidence that hundreds of pages of text can be sent in a few minutes' time over the networks today, and one 10,000-word article can be downloaded in about one second. Also, advantages of the Web are not only limited to high speed, but also include enabling learners from different places of the world to share information across countries, cultures and languages.

There are various information search engines in web-based education. General-purpose search engines, such as Google and Yahoo, are widely used by both educators and students to find information and resources to support teaching and learning. Electronic encyclopaedia websites, like Wikipedia, make it possible for learners from different language backgrounds to find any information by simply typing in the key words (Chin, 2004). Many universities allow students access to library catalogues, online databases and e-journals to read full-text books and journal articles that are prepaid, so that students do not need to pay extra money on these learning resources when studying on- and off-campus (As shown in Appendix 9). Lastly, students benefit from bulletin boards and email systems which inform them of the news and announcements from faculties and teaching staff and provide them with up-to-date information.

Apart from general information, universities and faculties provide students with learning materials that are related to their specific subject matters through the Web and web-based courseware systems. Universities in Australia adopt courseware systems like WebCT, Blackboard and Moodle to support students' learning (Zaiane, 2001). Students are provided with an account name and a password which allows them to log on to the system and find subject-specific information. The context of these online platforms can be assignments, lecture notes, support readings and even video recorded lectures. Courseware systems like this provide students with an opportunity to retrieve information and learning materials at the time of need.

### 2.6.3 Collaboration

The role of the Web as an enhancement for collaboration is widely recognised among researchers (e.g. Costantini & Toinard, 2001; Fortino & Nigro, 2003). It provides a great deal of flexibility and opportunities for collaborative learning. In many higher education settings, teaching staff and students have become familiar with online threaded discussion groups and forums (El-Seoud, et al., 2007). These collaborative tools are a new avenue where students can share ideas, post questions and present discoveries beyond time and place constraints of physical classrooms (Akers, 1997). In a traditional classroom, communications and discussions are sometimes restricted to large class sizes, scheduled class meeting times or instructors' office hours. However, the Web and web-based technologies assist learning through flexible interactions between learners and concepts, tasks and other people (Mayes, 2006). Online discussion board and forums allow students and instructors to interact and exchange ideas with peers at the time of thought (Akers, 1997; Fountain & Thomson, 2001).

Collaborative learning encourages students to work cooperatively as a team. Productive activities can only take place in a community which has the cooperation of all group members (Fortino & Nigro, 2003; Woolfolk & Margetts, 2007). It is generally agreed that learning outcomes are more likely to be enhanced when the learning process is designed to be a communal activity that encourages interactions among community members (Klassen & Vogel, 2003; McMillian & Chavis, 1986). When the work is done as a team effort instead of a solo race, a student can give feedback and responses on others' work, and benefit from the feedback of the tutor and peers in relation to the learning contents and styles (Chickering & Ehrmann, 1987a; Ng, 2000). Experience sharing and teamwork are highly recommended by Akers (1997) and Ng (2000) who mention that encouraging students to share is very important for a successful forum.

Another dominant contribution that collaborative learning may bring to learners is through critical thinking skills. In an online discussion forum students adjust their understanding of the world by exploring, questioning, analysing, evaluating, interpretation, predicting, explaining, and reflecting on their own experiences (Akers, 1997). Students' understandings are more likely to be developed when they are engaged in those activities which involve a critical thinking process (Cooper, Tyser, & Sandheinrich, 2007). Jones and Vollmers (2008) discover that a cohesive group culture, which promotes team collaboration, a shared vision and the desire to attain a goal, is a critical success factor in a virtual class.

Online forums and conferencing tools add another option to classroom discussions. Online forums are analogous to whiteboards but with the ability to develop media-rich interactive resource to support interactive and collaborative teaching and learning (Anastasiades, 2007; Blake, Scanlon, & Holliman, 2007; Chin, 2004). The distance in online discussion, to some extent, takes away the concerns of being watched by other people. Jones and Vollmers (2008) believe that virtual forums allow instructors and learners to express themselves without the pressure of personal differences. Some students who are shy in classrooms can be quite communicative and may contribute great ideas in web-based discussion activities. Akers (1997) argues that students feel more relaxed in an asynchronous participation because they are allowed time to reflect and carefully construct their points-of-view before expressing.

A number of studies have been conducted to investigate students' responses to online discussions (Akkoyunlu & Yilamz Soylu, 2006; Fountain & Thomson, 2001). In Fountain and Thomson's (2001) research, online forums using either asynchronous discussion or synchronous chat functions provide an excellent means in which students learning from one another, while asynchronous discussion forum appears as the most successful element of the web-support approach. A study conducted by Akkoyunlu and Yilamz Soylu (2006) examined students' views on blended learning environment as well as their achievement level and frequency of participation in the forum. The results indicate that the higher students' achievement level and frequency of their participation are, the more positive views they would hold about blended learning environment (Akkoyunlu & Yilamz Soylu, 2006). Ng (2000) mentions that instructors' attentions and input are a influential factor in online group discussions.

### 2.6.4 Assessment

Teaching staff involved in a web-based course need to implement online assessment methods to assess students' learning progress. Students' learning performances are commonly evaluated by regular formal examinations, casual tests and quizzes. Although web-based learning has become a reality with the advance of web-based technologies and networks, the traditional in-class assessments still remain a major method when it comes to examinations (Shen, Cheng, Bieber, & Hiltz, 2004). Therefore, methods to assess the teaching and learning performance in web-based education are in high demand (Reid, 1997). Implementing diverse assignment types, including readings, case studies, analysis of databases and websites, can help encourage students to explore subject materials in a more complex manner (Cooper, et al., 2007). Klassen and Vogel (2003) introduce three alternative online assessment approaches: Computer Adapted Testing (CAT), Open Resource Exams, and Portfolio Assessment. These three approaches concentrate respectively on the individuals' ability, problem solving skills and the learners' development phases (Klassen & Vogel, 2003).

Online assessments save time and provide conveniences to both teaching staff and students. Grading and assessing paper assignments can be time consuming for teaching staff due to large class sizes; web-based assignments and assessment, however, can minimise this time (Cooper, et al., 2007). The time required for grading online tests depends on the nature of the assessment. Some of them, such as an online quiz composed only of multiple-choice questions can be automatically graded and sent back to the student (Hsu, et al., 1999). Instead of taking the assessments on-campus, students can choose to take the tests at any location, where there is an access to networks. Cooper et al. (2007) also suggest that online quizzes can be used as an adjunct of ongoing assessment as this approach allows students to get direct formative feedback of their progress, and reduces the amount of last-minute "cramming" before examinations.

### 2.6.5 Supplementary to learning

Apart from the four purposes listed above, the Web has also contributed to some other aspects of teaching and learning, such as reflective learning, assignment submission, feedback, and work management. When being used for these purposes, the Web does not control learning activities, but acts as a supplementary instrumentality that enriches and enhances students' self-study, self-evaluation, as well as work management.

To build a successful web-based learning environment, students need to be assisted both in and after classes. The reflective learning process is important in both traditional classrooms as well as web-based learning practice as it reinforces students' understanding of the knowledge acquired. Recorded lectures and reflective journals are two dominant methods of reflective learning. Live lectures can be captured and recorded on a tape or as a video using software like Lectopia. This kind of software provides greater access to lecture materials for revision and concept review to all learners in web-based courses and traditional modes (Echo, 2008). In addition, reflective journals are encouraged by university teaching staff.

Keeping regular reflective journals on students' own learning practice is required by some lecturers as a part of the formal assessment. By writing journals, students can monitor their own learning progress, and review knowledge and information acquired. Teaching staff can also assess students' learning by reading their reflective journals. Many university wide courseware systems facilitate the sharing of learning experiences, perceptions and evaluations of activities through journal writing or uploading platforms.

Assignment submission is a function of web-based learning systems, but does not belong to any purposes of Web adoption mentioned above. This function is simple and widely used by teaching staff. Many web-based courseware systems have assignment drop boxes, where students can submit assignments electronically, and functions to help teaching staff manage issues in relation to academic integrity. For instance, one well known solution is Turnitin, a text matching system which provides functions like originality checking, grade marking and peer reviewing for university staff and students (iParadigms, 2009). It gives reports on the degree of text matching of students' work and published literatures, and aids staff and students themselves in examining whether plagiarism has occurred.

Feedback is an important component in web-based learning instructions as teaching and learning practice cannot be appraised and enhanced without them. On the one hand, students need feedback on their existing knowledge and competence (Chickering & Ehrmann, 1987a). Form this evaluation students can examine what they have already learned, what else are to be learned next, and what stage they are at in a learning process. On the other hand, teaching staff and faculties are in desperate need to get objective feedback from learners in order to better follow the learning process and evaluate the effectiveness of online learning systems and course structures (Micceri, Pritchard, & Barrett, 2006; Zaiane, 2001). Tools that give automatic feedback on either learning or teaching performances or on software structures do not exist yet; therefore, efforts are to be made by all learners, educators and instructors in gaining feedback in their specific education contexts.

Work management is a factor that indirectly influences teaching and learning performance. Many courseware systems have work management functions such as calendar tools and reminders that inform students and staff about important dates and events, such as conferences and university wide activities (Blair, 2007). The work management feature also includes functions to assist staff and students in managing their work loads and monitor their own progress. El-Seoud et al. (2007) even adopt an online course management system to help make available the course syllabus, class assignment rubrics and weekly class agenda. This function does not directly enhance learning outcomes but makes contribution to an effective web-based learning environment.

Generally, a large number of literatures have been dedicated to finding out views of staff or students on the influences of the Web and web-based technologies. However, not many have examined the differences in views between these two perspectives. In traditional as well as web-based courses, there is a gap between what is taught and what is learned (El-Seoud, et al., 2007), between what is intended and what is achieved (Oliver & Omari, 2001), and between perceptions of students and those of teaching staff as they think and practise from their own perspectives (Trigwell, et al., 1999). Teaching staff and students have different views and perceptions toward adoption of the Web and web-based technologies, which influence their decision making in teaching and learning practices. Learning outcomes will be enhanced when the teaching methods suit learners' needs. In contrast, the enhancement will not be significant if the gap is not considered and filled (Oliver & Omari, 2001). There are not many studies investigating these gaps, therefore, there is an opportunity for this study to contribute to the field.

## 2.7 The Web adoption in university contexts

Web adoption and web-based technologies usage appear in different ways, depending on the purposes of adoptions. The initial intention of using the Web in education is to create a virtual learning environment or to support traditional classroom teaching. It is believed by some researchers that educators' mission is to make it possible for learners to dialogue about the knowledge they want to learn and to discuss about visuals and texts that might aid them in understanding (Hsu, et al., 1999). In either case of the adoptions, the Web and web-based technologies are to be used by educators for this mission. This section intends to provide an overview of the various approaches and tools used in web-based teaching and learning.

A framework (Table 2.2) is developed based on the literature reviewed. The eight learning purposes of Web adoption summarised are communication, information acquisition, collaborative learning, online assessment, feedback, assignment submission, reflective learning and work management. In this section, the learning purposes together with the web-based tools used for achieving these purposes are demonstrated and summarised in a framework. In Table 2.2 the learning purposes are listed vertically in the first column, followed by tools and types of interactions in the second and the third column. Detailed usages of these tools can be found in Appendix 11. The codes of the five types of interactions appeared in the table are explained below:

- S-T: There are interactions between students and teaching staff;
- S-S: There are interactions among students themselves;
- S-F: There are interactions between students and faculties;
- OT: Independent teaching preparation without interacting with students;
- OS: Students' independent learning without interacting with teaching staff.

Table 2.2. *A framework of Web adoption in university contexts*

| Learning purposes | Tools | Interactions |
|---|---|---|
| **Communication**<br>(Hsu, et al., 1999; Khan, 1998) | Email | S-S; S-T |
| | Forum; Discussion board | S-S; S-T |
| | MSN; Facebook | S-S; S-T |
| | Newsgroups; Bulletin board | S-F; S-T |
| | Listserv | S-F; S-T |
| | Conferencing tools | S-S; S-T |
| **Information acquisition**<br>(Chin, 2004; Zaiane, 2001) | Search engines (e.g. Google &Yahoo) | OS |
| | Online database; E-Journal | OS |
| | Bulletin | S-F; S-T |
| | Email | S-S; S-F; S-T |
| **Collaboration**<br>(El-Seoud, et al., 2007; Ng, 2000) | Online forum; Discussion board | S-S; S-T |
| | Conferencing tools | S-S; S-T |

| Learning purposes | Tools | Interactions |
|---|---|---|
| **Reflective learning** | Reflective journal | OS; OT |
| (Ma, 2010) | Recorded lecture; Lectopia | OS; OT |
| **Online assessment** | Exam and test | S-T |
| (Cooper, et al., 2007) | Assignment | S-T |
| | Quiz; Respondus | S-T |
| | Questionnaire | S-T |
| **Assignment submission** | Assignment drop box | S-T |
| | Turnitin | OS; OT |
| **Feedback** | Forum | S-S; S-T |
| (Aggarwal, 2003; Zaiane, 2001) | Questionnaire | S-F; S-T |
| | Survey | S-F; S-T |
| | Group discussion | S-S; S-T |
| | Checklist | S-F; S-T |
| **Work management** | Calender tools | OS; OT |
| (Blair, 2007; El-Seoud, et al., 2007) | Reminder | OS; OT |
| | Work management tools | OS; OT |

To create an effective and meaningful virtual learning environment, students, staff and faculties have their own roles and responsibilities. These three main stakeholders are required to work collaboratively and interact with each other effectively (Bodomo, 2008; Chickering & Ehrmann, 1996; Vonderwell, 2002). Without collaborations, cooperation and effective interactions between learners, instructors and education institutions, a meaningful learning environment would not exist. The interactions and relationships between students, staff and faculties for the eight learning purposes are further illustrated in Figure 2.2 below:

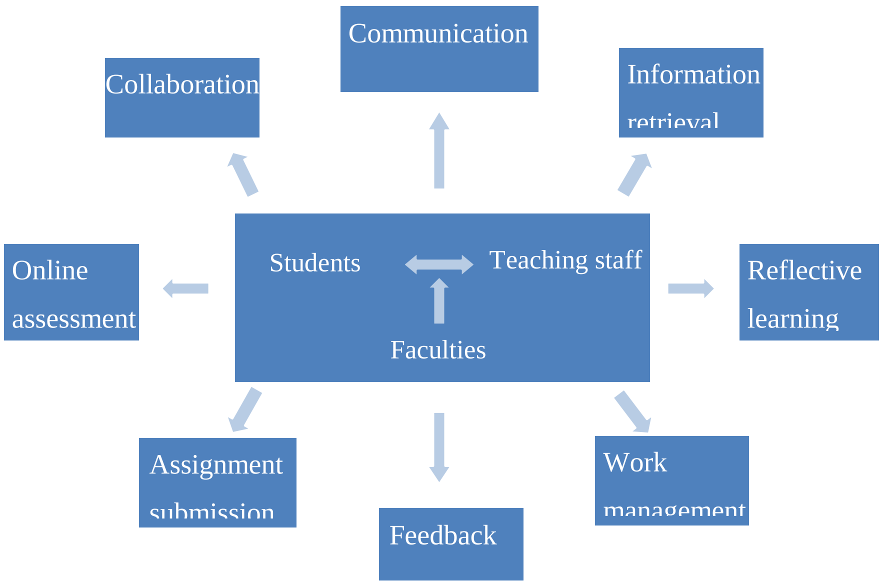


*Figure 2.2.* Collaborations between students, staff and faculties

Teaching staff and faculties have equally important roles as students in incorporating the Web in teaching activities. Learning is a group endeavour; efforts from all aspects are crucial in effective web-based learning practices. Students take the main responsibility in learning because the web-based learning style encourages independent and self-directed learning and places students as the main actors in the learning process (Trigwell, et al., 1994). Teaching staff, however, are also required to take a positive role to support students' learning (Trigwell, et al., 1999). In some web-based learning activities, the instructors' work and competence in activating and shaping the educational experiences are highlighted (Mari, et al., 2008).

Although students are the leading actors in a learning process, sometimes teaching staff take more responsibilities in preparing and encouraging their students to participate in the learning activities, and in creating opportunities for them in the web-based learning process. There is evidence that students are more engaged in the learning process when feedback and encouragement is gained from their instructors and/or lecturers (Trigwell, et al., 1999). Although web-based learning involves more independent learning than in a regular classroom, supervision of teaching staff is still an important factor that ensures the overall direction of learning activities and the degree of students' involvement. It is argued in the literature that in most learning activities, careful planning and constant monitoring from instructors are required (Woolfolk & Margetts, 2007).

As facilitators, the role of faculties is also important. They are responsible for building a well organised web-based learning environment which can enable students to try out different learning strategies and to train their students and staff to become information-literate. Building and maintaining an effective web-learning environment require a great deal of work of the faculties. Bradburn and Zimbler (2002) point out that more course preparations are needed for the faculties teaching web-based courses than the ones only teaching face-to-face. Aggarwal and Legon (2008) also point out some essential elements for those institutions aiming at creating efficient web-based learning environments, such as a reliable backup server for content management and delivery, sufficient dial-up lines, text and non-text content delivery to any place in the world, and uninterrupted access and troubleshooting responses.

## 2.8 The web-based environment in Australian universities

### 2.8.1 The overall web-based learning environment

There are three most common models of web-based education in Australian universities: Web support for information storage, dissemination, and retrieval; Web support for two-way teaching; Web-based teaching (Aggarwal & Legon, 2000). Within the first model, face-to-face contact and print-based materials are still recognised as the primary mode of knowledge delivery. However, the Web provides convenience, flexibility and an alternative way of learning to on-campus students who have considerable sophistication and expectations in information technology (Pilgrim & Creek, 1997). Many teaching staff in traditional classrooms use web-based applications to deliver a portion of the learning experiences to increase both the efficiency and the effectiveness of teaching, therefore, to enrich the face-to-face learning practice (Aggarwal, et al., 2008; Mari, et al., 2008; Parikh, 2003).

The second learning model is a hybrid and blended learning style which indicates a mixture of traditional learning method and web-supported learning. Learning activities in this model involve a greater degree of Web adoption than in traditional classrooms. However, these activities do not fully depend on the Web to deliver course materials. In this case print-based learning packages, audiotapes, and CD resources operate as complements to web-based learning instead of the basic delivery mode. This learning style is highly recommended by researchers (Aggarwal, et al., 2008), who state that hybrid courses and blended programs allow students to "mix-and-match" traditional face-to-face and asynchronous courses, so that they can take advantage of the strengths of both ways. They also permit institutions to make more efficient use of classroom facilities.

Web-based teaching involves the highest degree of Web adoption among all the three models. In this model the Web is used to substitute the traditional face-to-face classroom teaching, and all the learning materials and experiences are transferred entirely online. As students enrolled in the web-based courses do not make physical appearance on the campus, the university has become a “virtual learning environment” for them (Parikh, 2003; Wilson, 1996). This learning style is called “asynchronous learning” by several researchers (Aggarwal, et al., 2008) because students communicate with teaching staff over the Web and web-based technologies at different places and different times. This learning mode invites many students from different age groups to rethink about education in universities as they see an opportunity to work and learn at the same time (Neville, Adam, & McCormack, 2003). Therefore, there is a distinct and growing student audience for fully asynchronous programs as well as in blended programs in recent years (Aggarwal, et al., 2008).

The University of Tasmania implements a variety of web-based technologies and a courseware platform to support teaching and learning in a variety of ways. It highly values the integration of different technologies in enhancing the teaching and learning experiences. Creating an enabling policy environment that can promote the implementation of web-based applications, as well as allocating the appropriate financial and human resources are key factors in pursuing successful web-based education (Naidoo, Nhavoto, & Reddi, 2005). To meet students’ demands in a flexible and accessible manner is one of the key aims of web-based learning (University of Tasmania, 2010a). The university (2008, p. 10) sees maximising, broadening the use of the Internet to ensure that it supports the university’s academic and business objectives as one of the top priorities. The university web-based environment contains two components, the MyLO system and other supplementing web-based tools. The dominant models of web-based learning has also been categorised into three models. These three types of web-based learning environments are introduced below (University of Tasmania, 2010b), and followed by a table of comparison of Aggarwal and Legon’s (2000) three “Internetalising” models and learning models at the university (2010b):

- Web-supported model: MyLO and web-based applications are used to supplement face-to-face or print-based distance education delivery;

- Web-dependent model: MyLO and web-based applications operate as an integral part of the unit program and complements face-to-face or print-based distance delivery;
- Fully online model: MyLO and web-based applications are used for access to, and interaction with educational content, communications between teaching staff and students, and for aspects of assessment.

Table 2.3. *Models of web-based learning at the University of Tasmania*

| Aggarwal and Legon's (2000) models | University of Tasmania (2010b) |
|---|---|
| • Web support for information storage, dissemination, and retrieval | • The web-supported (or supplementary) model |
| • Web support for two-way teaching | • The web-dependent (or "blended") model |
| • Web-based teaching | • The fully online model |

Among the three models, the web-supported model is seen as the most common form of Web usage at the university. However, it is believed that along with the improvement of student access to on-campus computers and the enhancement of cross campus access to programs, the number and proportion of web-dependent units are expected to steadily increase in the future (University of Tasmania, 2010b).

### 2.8.2 Web-based courseware systems

Web-based courseware systems are used as a key strategy in supporting students' learning in Australian universities to deliver learning materials and learning contexts. These learning systems are sometimes the spirit of a university's web-based learning environment because the effectiveness and efficiency of the courseware systems adopted in one university has distinct influences on the quality of web-based learning in that specific learning context. They are adopted by institutions to support the transition from "provider-directed, print-based distance education to the new educational paradigm of flexible and interactive, student-centred, online-enhanced learning" (Corbitt, Holt, & Segrave, 2008, p. 283). Courseware systems have revolutionised educational institutions by creating opportunities and challenges for educators to develop their courses and deliver course materials in novel ways (Chang, et al., 2008). They are an alternative way for teaching staff to embed their curriculum using web-based technologies.

Alongside the rapid development of networks and web-based technologies students' demand for well-designed courseware systems is also increasing. Especially in tertiary education institutions nowadays, students call for high quality software that is designed particularly for educational purposes to enhance their learning; educators also seek pathways to deliver computer-based distance learning and meet students' "just-in-time" education needs (ATRC, 1999). De Moor (2007a) and Dewever (2008) group current web-based learning management systems into two types: commercial platforms like WebCT, Blackboard and Moodle; and open platforms that can be completely or partially open source to the public for free. The open platforms are not discussed in this study. Instead, this research grouped courseware systems used by Australian universities into two types, commercial platforms which are purchased by universities and "homemade" courseware platforms that are designed by information technology support teams of the university.

At the University of Tasmania, the MyLO courseware system is the key approach for web-based learning . To systematically support its teaching staff and students, the University of Tasmania adopted what was then WebCT Campus edition as its centrally-supported learning management system in 2001. In 2005, WebCT Vista fully replaced Campus edition. A year after, WebCT company merged with Blackboard and the product name changed to Blackboard Learning System Vista Enterprise License, and UTAS took the opportunity to give the learning management system a new name as MyLO, also named My Learning Online (University of Tasmania, 2010b). The MyLO system provides a range of tools to broaden access to programs, allow communication between staff and students, and assist staff in managing their working load (University of Tasmania, 2010b).

An evaluation of the MyLO system is in demand. MyLO is the platform of on-line teaching and learning across all campuses in Hobart, Launceston and Burnie. It involves all students and staff. An investigation of the views of these stakeholders on this web-based learning system will provide an insight to end-users' expectations and requirements of web-based courseware systems, and would be helpful for the future adoption of the Web and web-based technologies at the university. Despite that the MyLO system is indispensible and formal assessments and evaluations on teaching staff and students' views are in demand, only limited formal evaluation has been conducted to investigate its effectiveness.

### 2.8.3 Web-based learning environment evaluation

Evaluation of web-based learning can be conducted to find out end-users' perceptions and assumptions toward the tools and courseware systems adopted. Evaluation is a compulsory process in searching for excellence in education. Educators conduct evaluation of programs, activities, task, as well as teaching related resources to give insights about aims, achievements, performances, and improvements in teaching and learning (Q. Le & Le, 2007). The findings of such evaluation help evaluators investigate the advantages and shortcomings of the particular web-based courseware, and seek better ways of resource adoption. The two main types of courseware evaluation are formative and summative evaluation (Hammond, Trapp, & McKendree, 1994; Kazlauskas, 1996; T. Le & Le, 1997; Squires & McDougall, 1994). Formative evaluation is usually performed during the development of courseware, to make modifications to the vocabulary, pacing, reinforcements and other variables of the system, and ensure its suitability to the intended user population (Karoulis & Pombortsis, 2003; Kazlauskas, 1996). On the other hand, summative evaluation is conducted to see if the objectives of the design process are met after publication; and it is concerned with the quality and variety of experiences that the courseware can support (T. Le & Le, 1997). Evaluation processes should be carried out at all times while the courseware is being designed and put in use.

Evaluators suggest different criteria and principles for courseware evaluation. There is not a single set of criteria or evaluation which is suitable for all evaluation processes of web-based courseware. Selection of courseware packages and courseware evaluation tools depends heavily on the specific teaching context. To help overcome difficulties associated with courseware evaluation, a growing number of support tools have been developed, such as models, frameworks, handbooks and toolkits (Mulholland & Au, 2002). Some of the criteria are commonly emphasised and adopted. The principles that are mostly highlighted include usability; accessibility; suitability for the teaching context; and user-friendliness and learner-friendliness.

Usability, or more specifically pedagogical usability, refers to how easy it is to use and learn an interactive system, and how effective for a user to learn something using it (Furtado, et al., 2003; Ghaoui, 2003; Rentroia-Bonito & Jorge, 2003). Some researchers believe that a sound pedagogical basis is essential in ensuring the usability of a learning system (Klassen & Vogel, 2003), Accessibility, however, supports inclusive teaching, respects diversities of different populations, and involves people with disabilities (W. N. Myhill, Samant, & Klein, 2007; Wilss, 1997). It is necessary to ensure the accessibility of online educational resources to the widest possible audience (ATRC, 1999; Rowan, 2001; Sloan, Gibson, Milne, & Gregor, 2003).

Suitability for the teaching context emphasises the teaching environment within which the courseware is implied (Squires & McDougall, 1994). Courseware systems are required to have different features in different context; for instance, in a primary classroom setting, being attractive to keep students occupied would become one important feature that is required in addition to the educational value (Marr, Randall, & Mitchell, 2003). Lastly, user-friendliness and learner-friendliness emphasise the involvement of learners (Wilss, 1997). This principle aims at shifting the focus of attention away from software itself to its users, so that the end-users become the centre in the operation of courseware instead of passive receivers (M. Myhill, et al., 1999; Squires & McDougall, 1994).

Recommendations and principles have been made by researchers to create meaningful web-based learning environment. Chickering and Ehrmann (1987a) suggest seven principles of good practice, in implementing web-based technologies, which have been widely adopted in valuating web-based learning environments by other researchers. Graham, Cagiltay, Craner, Lim, and Duffy (2000) found these principles helpful and valuable in finding out strengths of their own web-based courses as well as areas for improvement. On the other hand, Bonk and Cummings (1998) list 12 recommendations to create a learner-centred web-based learning environment from a web-based learning designers' perspective. Both sets of principles will be considered in the design of the questionnaire to find out views of students and staff toward the effectiveness of the web-based learning environment at the University of Tasmania.

## 2.9 Issues and challenges

Developing web-based learning environments and technologies is not without obstacles. Academic institutions, educators and students are continually facing issues and challenges that keep surfacing. The three major challenges faced by the faculties are how to respond to constant technological changes, how to engage and support teaching staff, and how to survive in a competitive web-based learning environment (Bradburn & Zimbler, 2002; A. R. Johnson, 2009). Firstly, some faculties that believe web-based technologies can enhance learning outcomes consider the rapid change in technologies could be a source of stress. According to Hsu, et al. (1999), university faculty navigates a steep and continually changing learning curve to keep pace with the explosion of new online tools that are appearing almost daily. To deal with this challenge, some faculties experiment with new online technologies before they actually implement them in real teaching practice or research contexts (El-Seoud, et al., 2007).

Engaging and maintaining learners has become the second major challenge. Many authors (Bento & Schuster, 2003; Jones & Vollmers, 2008; Purcell-Robertson & Purcell, 2000) believe that it requires more efforts from teaching staff to motivate and engage students in a web-based learning environment as the taking over of face-to-face communication by technologies may cause isolation and disconnection of learners. Karoulis and Pombortsis (2003) describe the isolation of students, and the subsequent inactivity and loss of interest as the "childhood disease" of web-based learning. The feeling of alienation and isolation has been identified as one main factor associated with higher dropout rate in web-based courses (Vesely, Bloom, & Sherlock, 2007). Carr (2000) also gives evidence that the dropout rate of online students are often 10-20 % higher than in traditional courses. Some other researchers have different results on this point. In contrast, students' isolation is not reported as a significant problem in Adams and Timmins's (2006) study because students are encouraged to keep in touch by phone and group discussions. Team work that facilitates interactions between teaching staff and students and among students themselves can help reduce this problem (Ng, 2000).

Apart from these, universities and faculties need to overcome other challenges if they want to navigate in the increasingly competitive web-based environments. Limited access to the Internet worldwide encountered by some institutions is considered as a drawback (Hsu, et al., 1999), as web-based learning cannot occur without an efficient network. Education institutions have to shift to new and alternative teaching and learning paradigms or methodologies to survive in this rapidly developing web-based learning environment. Lastly, ethical considerations like privacy, security, copyright are also issues that need to be considered (Hsu, et al., 1999). Anne Adams and Blandford (2003, pp. 331-333) claims that some risks accompany web-based learning are "authenticating users, intellectual property rights and privacy issues, such as excluding intended users while allowing sensitive data to be released to unacceptable recipients".

The increasing implementation of the Web in education has also brought challenges to educators. On the one hand, some teaching staff are averse to try new technologies due to the challenge of getting familiar with new teaching paradigms and the change of the long existing traditional methods. Quality assurance is one major concern within web-based degree level programmes (Grasso & Leng, 2003). Some of them are afraid that the video screen will not allow for the same level of inspiration experienced in a live performance (Klassen & Vogel, 2003). Those who are willing to adopt the Web and web-based learning technologies also encounter some challenges. The difficulties have shifted from limited technology access, technical support, and training in the use of computer devices and computer applications in the past, to planning, researching, and designing of course methods and materials for computer-based and Internet-based environments in the present (Pagan, 2009). On the other hand, students' lack of information technology skills can also cause challenges in web-based teaching. Students need to know the technical basics, such as using the browser and hypertext, in order to undertake web-based learning. Some students may not have been required to use computers and web-based technologies in their previous study (Chin, 2004). Some others may not be able to select information that is reliable enough for their learning when much of the information is available on the Web without verification (Grey, 2001). Therefore, asking these students to learn with the aid of the Web may cause problems since they are not trained and prepared to do so.

To deal with these issues, it is suggested that trainings should be provided to both academic staff and students. On the one hand, more training is desired by educators who want to develop their strategies in the use of electronic course delivery and web-based applications (Pagan, 2009). There is a constant need for training and skills updating by academic staff with new developments, functions, and applications of the technology (Clulow & Brace-Govan, 2003). On the other hand, adequate training sessions and preparation need to be provided to help students establish their own learning goals, manage their time and utilise group discussion tools in web-based learning (Klassen & Vogel, 2003). Grey (2001) suggests the need of teaching students the way of evaluating Web information and websites. Chin (2004) also recommends that, to prepare students in an online course, they should be demonstrated the way in which technology can be used, guided by IT support sessions and services, and provided with formal IT training. Although it is considered as time-consuming, these trainings should be organised by education institutions to meet the increasing demand of teaching staff.

## 2.10 Conclusion

This chapter has explored the literature detailing concepts in relation to web-based learning. Definitions of different concepts and their relationships, as well as the development history and trend of web-based learning have been discussed. The learning theories that underpin web-based education have also been introduced, followed by the instrumentality of the Web in teaching and learning. The usage of the Web and web-based technologies were grouped into eight components according to the purposes of adoptions. Roles of students, teaching staff, and faculties were analysed. Issue and challenges emerged were also introduced. Through a discussion of the point of views of different researchers and writers from different perspectives, the researcher obtained a clearer idea about the position of this study in the web-based learning practice.

This chapter has provided a theoretical foundation for the further development of the research project. Theories mentioned in this chapter will be considered and used for three main purposes. Methodological principles used by the other researchers in web-based learning will be considered in the selection of methodology of this study. Hypotheses will be made, according to these theories, into questions and statements of the research instruments. Most importantly, these theoretical perspectives will be tested and discussed in the discussion and recommendation chapter. This study will provide an in-depth discussion to see whether the theories read and quoted can be applied to the specific university context, the University of Tasmania. Based on the theories discussed, the next chapter will look into the methodology involved in this study. Both the quantitative and qualitative data collection stages will be introduced. Tools and methods for the data analysis, including the use of SPSS software, the constructivist grounded theory and thematic analysis will also be introduced, and followed by the analysis of the validity and credibility of the study.

# Chapter 3: Methodology

## 3.1 Introduction

The previous chapter has examined the relevant literature and theories which inform how the Web is being adopted as a learning resource in the Australian university context. Investigations were designed based on these theories and conducted in one particular Australian university, the University of Tasmania. The purpose of this research was to investigate the significance of the Web as a learning resource at this university. The research was also emancipatory in its intention to make transparent how students and teaching staff evaluate the web-based learning environment in their own academic faculties/disciplines. The discussions and recommendations provided in this study will enable a further development and modification of the adoption of the Web and web-based applications as well as help create a better web-based environment to accommodate the needs of future students and staff.

This chapter provides an overview of the research approach, as well as a discussion of the two data collection stages. It outlines the methodology principles of the study which are underpinned by a mixed method approach to research. Research instruments designed for the two stages are introduced. This chapter also outlines the data analysis tools and methods utilised. The SPSS statistical data analysis software was used to analyse the participants' responses to the questionnaire. A constructivist grounded theory approach and the NVivo software were adopted to analyse their contributions in the semi-structured interviews. Lastly, this chapter addresses issues of legitimacy in the research, such as validity, reliability, credibility and triangulation of the study.

## 3.2 Research aim and objectives

The dominant aim of this study was to investigate how the Web, as a learning resource, affects student learning at the University of Tasmania. It examined the views of students and teaching staff toward the significance of the Web in teaching and learning activities. It intended to identify in which ways the Web is used by these end-users to facilitate learning, as well as differences between the views and understandings of these two perspectives. The research also sought ways how the web-based learning environment can be enhanced, from the university's perspective, by looking into the adoption of web-based learning systems and tools in different academic faculties/disciplines at the university. The main aim, which is the axis around which the whole research effort revolves, was then divided into more manageable sub-problems, which in this case were stated as research objectives and written to show the detailed goals of the research project (Leedy & Ormrod, 2005). These research objectives helped guide the goals and directions the research. They are explained below.

Research objective 1: *To examine the views of students and teaching staff on the significance of the Web in learning and teaching.* The Web is serving as an important resource in many Australian tertiary education institutions including universities. This objective was to examine how the Web, as a learning resource, affects students' learning process and learning outcomes, and how teaching staff and students self-evaluate the influence of the Web in their teaching and learning.

Research objective 2: *To identify the ways in which the Web is used by teaching staff and students to facilitate learning.* Both teaching staff and students at universities have their own ways and different aims of Web adoption. The second objective of this study was to identify the ways in which they adopt the Web to support learning, the purpose of Web adoption, what web-based technology they adopt and how often the Web is used to support learning activities.

Research objective 3: *To compare the views of students and teaching staff on the use of the Web in teaching and learning.* In relation to the use of the Web in teaching and learning activities, teaching staff and students have different points of views from their own perspectives. It is important that staff and the university know about students' needs. A comparison of teaching staff and students' views can help the researcher find out differences between their understandings, and possible ways to enhance student satisfaction in future web-based education.

Research objective 4: *To evaluate the web-based learning environments in different academic areas at the university.* This objective was to examine the effectiveness and usefulness of the overall web-based learning environment in student learning. The performance of teaching staff and the effectiveness of web-based applications were both examined. As the representative of web-based learning recourses, the MyLO system was evaluated for its flexibility, accessibility, suitability for the learning context and its learner-friendliness.

Research objective 5: *To provide some recommendations for enhancing web-based learning in the university context.* The last research objective of this study was to provide recommendations to universities to improve web-based teaching and learning. The recommendations are based on the findings of the study, and focused on what actions can be taken to improve the web-based learning environment and to better assist future students.

This research intended to use a range of quantitative and qualitative data collection methods and tools to achieve the research aim and objectives. Conducting a questionnaire and semi-structured interviews allowed the researcher to generate theories from the discussions, and allowed the main aim and the objectives to be fully achieved.

## 3.3 Research approach

This study was in a mixed method research paradigm which utilised both quantitative and qualitative methods to gather and analyse data. In a mixed method research paradigm, quantitative and qualitative research methods are used separately in different phases in a study (Tashakkori & Teddlie, 1998). The results of a mixed method study are more likely to have complementary strengths and non-overlapping weakness (R. B. Johnson & Turner, 2002). It provided complementary and comprehensive insights into the research findings (Frechtling, Sharp, & Westat, 1997). Qualitative and quantitative approaches are not polar opposites or dichotomies; instead, they represent different ends on a continuum (Newman & Benz, 1998). The combination of these two methods resided on the middle of this continuum as it incorporates elements of them both (Creswell, 2009). Hence, the mixed method approach was chosen in this study to adopt the strengths of both methods, and to potentially offset their respective weaknesses.

The study utilised both quantitative and qualitative methods to gather and analyse data. A questionnaire was used in the quantitative stage and two sets of questions were designed for the qualitative stage. The questionnaire tended to examine a certain number of variables across a large number of units. However, the semi-structured interviews tended to examine a smaller number of participants over a large number of variables and conditions (Huxley, 1995). The combination of quantitative and qualitative methods enabled the researcher to collect broader and more significant ideas and gain deeper insights into the views of the participants within the research area. Therefore, the findings of the study are believed to be more likely to have complementary strengths and non-overlapping weakness (R. B. Johnson & Turner, 2002). Thus, the overall strength of this research is potentially greater than the studies based on only one method (Creswell, 2009; Teddie & Tashakkori, 2009). Figure 3.1 below gives an illustration of the concept map of this study, which includes the two research stages, data collection methods, as well as the data analysis approach adopted:

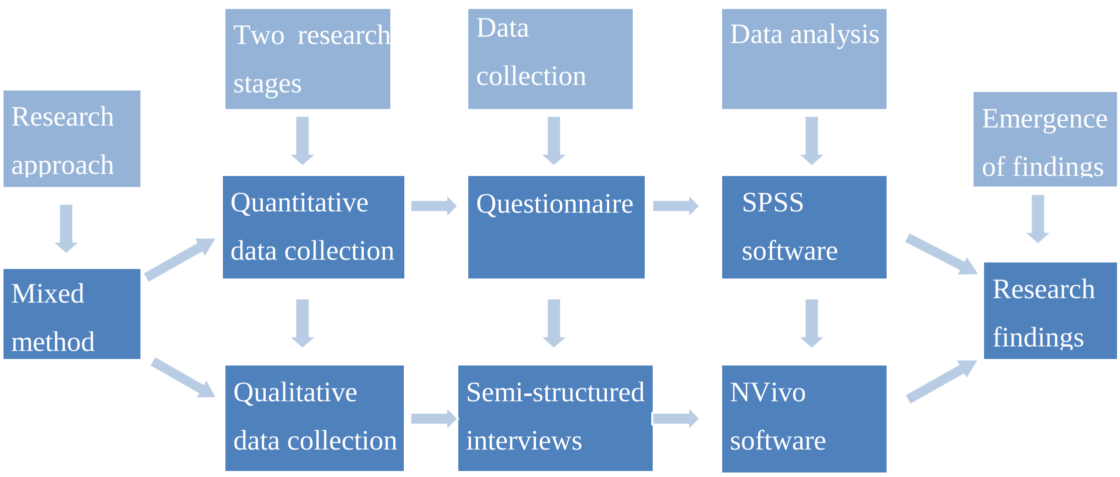


*Figure 3.1*. Concept map of the study

## 3.4 Data collection

This research involved 602 participants from different faculties/disciplines at the university. Data collection methods were in the forms of questionnaire and semi-structured interviews (Burns, 2000), and were conducted in relation to these stakeholders' teaching and learning experiences in web-based education at the University of Tasmania. The quantitative data collection stage (phase one), was conducted with all the students and staff involved. Afterwards, at the qualitative data collection stage (phase two), semi-structured interviews were organised with a group of 25 participants chosen from the participants who volunteered for the interviews after being involved in the first stage. The following section discusses participant recruitment and the sampling process in both of the data collection stages as well as the pilot study conducted.

### 3.4.1 Participants and sampling

This research involved the participation of 502 students and 100 teaching staff who were self-chosen from seven faculties/disciplines, including Arts, Business, Education, Health Science, Law, Science, Engineering and Technology and Australian Maritime College. They were from all three campuses of the university: the Sandy Bay campus in Hobart, the Newnham campus in Launceston, and the Cradle Coast campus in Burnie. It is common for survey researchers to collect information from some of the individuals, groups, or organizations rather than all of them (Berends, 2006; Chromy, 2006). The sample size for the studies which have a population size of 5000 or more should be approximately 400 (Garry & Airasian, 2003). The sample size of 502 students and 100 staff was thus seen as considerable. The steps of the participant recruitment can be seen in Appendix 7.

The sampling strategies for the two stages varied due to the different methods of data collection. Generally, sampling is a more necessary consideration in quantitative research (Burns, 1994). The sampling in the quantitative stage was purposive and opportunistic. All university students and staff who were involved in web-based learning were invited and provided with information in relation to this study. They were able to decide whether to participate in either of the research stages or both of them. On the one hand, these end-users were purposely chosen because they could best demonstrate the significance of the Web as a learning resource in this university context. They were believed to be the most significant constituency which could be seen as most centrally involved in the learning process (Corbitt, et al., 2008). Aggarwal, Turoff, Legon, Hackbarth, and Fowler (2008) also argue that as the final users of web-based learning, students and educators who are involved in traditional on-campus learning, in blended learning and in virtual learning activities should all be considered. Selection of the University of Tasmania instead of other Australian universities was opportunistic as the researcher was commencing the PhD degree in the Faculty of Education and therefore she had the convenience of access to information and participants.

The sampling at the qualitative stage was purposive and stratified. According to Cohen, Manion, and Morrison (2007, p. 111), a stratified sampling method "involves dividing the population into homogenous groups, each group containing subjects with similar characteristics". The homogenous groups in this study consisted of participant groups which were divided according to their faculties/disciplines. It is believed that stakeholders from the same academic background would be more likely to have similar understanding and experiences in relation to web-based learning as well as be able to give evaluations on the same web-based learning environment (Biglan, 1973). The participants at this stage were chosen from the students and teaching staff who participated at the first research stage and then signed and returned the consent form provided. Eight interview participants were chosen from 15 lecturers who volunteered. Responses were obtained from all academic areas within the university; therefore, the researcher was able to select a number of participants from each faculty/discipline. The stratified sampling provided the researcher with a useful blend of randomisation and categorisation and enabled her to target the participant group who would be able to be approached (L. Cohen, et al., 2007). Also, it ensured the integration of views, opinions and evaluations from all perspectives. Table 3.1 on the following page gives the detailed numbers of participants involved in both data collection stages:

Table 3.1. *Numbers of participants from each faculty/discipline*

| | Students | | Teaching staff | |
|---|---|---|---|---|
| | Questionnaire % (n/N) | Interview n/N | Questionnaire % (n/N) | Interview n/N |
| **Academic faculties/schools/disciplines** | | | | |
| • Arts | 10.3 (52/502) | 2/17 | 12.0 (12/100) | 1/8 |
| • Business | 19.3 (97/502) | 2/17 | 11.0 (11/100) | 1/8 |
| • Education | 12.5 (63/502) | 6/17 | 16.0 (16/100) | 2/8 |
| • Health Science | 17.9 (90/502) | 2/17 | 24.0 (24/100) | 1/8 |
| • Law | 6.9 (35/502) | 1/17 | 10.0 (10/100) | 1/8 |
| • Science/ Engineering /Technology | 15.5 (78/502) | 2/17 | 11.0 (11/100) | 1/8 |
| • AMC | 17.3 (87/502) | 2/17 | 13.0 (13/100) | 1/8 |
| **Gender** | | | | |
| • Male | 44.6 (224/502) | 9/17 | 42.0 (42/100) | 5/8 |
| • Female | 55.4 (278/502) | 8/17 | 58.0 (58/100) | 3/8 |
| **Length of learning/teaching at the UTAS** | | | | |
| • Less than 1 year | 22.7 (114/502) | 4/17 | 5.0 (5/100) | 0/8 |
| • Over 1 to 3 years | 56.6 (284/502) | 11/17 | 25.0 (25/100) | 2/8 |
| • Over 3 years | 20.7 (104/502) | 2/17 | 70.0 (70/100) | 6/8 |

### 3.4.2 Quantitative stage: The questionnaire

As introduced in the previous sections, the data collection process contained two stages: the quantitative and the qualitative stage. At the first stage a questionnaire was used to gather the participants' views, thoughts, feelings, attitudes, beliefs, values, perceptions, personalities toward the significance of the Web in their learning and teaching experience (B. Johnson & Christensen, 2004; Wolf, 1997). The questionnaire items were typical multiple choice questions/statements used in most questionnaires. The participants were guided to consider and respond to the questions/statements in relation to their learning or teaching experience with the Web. Their responses appeared as variables which could be organised and analysed using statistical methods and tools. This research stage provided the researcher with an opportunity to gain concrete evidence within the research area and allowed a further exploration of the research matter at the further stage. Details of the questionnaire contents and development process will be introduced in Chapter 4.

The completed questionnaires were collected in two ways: manually and online. The students and teaching staff were informed about this study through emails. A link to the online questionnaire was provided so that they could read the information sheet together with instructions about how to complete and return the questionnaire. Once the participants had finished and clicked on the “Done” button, the complete questionnaire would be automatically posted onto the Survey Monkey website. Paper copies of the questionnaire were also provided at the reception desk of each faculty in all the three campuses. The participants could choose to pick up a blank questionnaire, an information sheet, and a pre-addressed envelope at the reception desks after reading the information in the email received. They could place the completed questionnaire into the pre-addressed envelope and post them to the researcher.

### 3.4.3 Qualitative stage: Semi-structured interviews

Qualitative researchers conduct interviews in the form of face-to-face, telephone interviews or focus group meetings to elicit views and opinions from the participants by asking open-ended questions (Creswell, 2009). Interviews allow social researchers to get access to the context of people’s behaviour and provide an opportunity to understand the meaning of that behaviour (Seidman, 1998). A semi-structured interview is different from a non-structured interview in that questions are prepared and given to all respondents by interviewers who have been trained to treat all interview situations in a like manner (Fontana & Frey, 2000). In this study, the researcher adopted semi-structured interviews. Therefore, questions were prepared in relation to the research contents prior to the interviews. These questions were few in number but allowed for in-depth probing of views, attitudes, thoughts, beliefs, knowledge, reasoning, motivations and feelings that are associated with the research topic (B. Johnson & Christensen, 2004). The semi-structured interviews gave the researcher an opportunity to gain a much deeper and richer understanding of the rationale behind the participants’ interpretation of the Web adoption in their teaching and learning practice. The conversations that occurred in the interviews were tape recorded, transcribed an made into data source in the second phase of the research.

Face-to-face and telephone interviews were chosen to collect the participants' responses. Face-to-face interviews enabled the researcher to observe the participants and use nonverbal communication and visual aids to achieve a better result (Neuman, 2004). However, telephone interviews were conducted with two of the participants who were not able to physically present in a face-to-face interview. It was also understood by the researcher throughout the interview process that some factors, like the social settings in which the interviews took place and the characteristics (e.g. gender & personality) of the interviewer, may affect the responses of interviewees. Hence, some techniques were taken into consideration to avoid bias. For example, the researcher ensured that there was no presence of a third person in the interview room, so that the interviewees would feel secure and confidential (Neuman, 2004). The participants were allowed enough time to express their ideas and interruption was avoided during their thinking, so that concrete details could be gained without reinforcement. Interview questions were also open-ended and designed to avoid misleading, and thus to avoid bias (Seidman, 1998).

Two sets of ten open-ended questions were designed in advance for university students and teaching staff. These questions were used to investigate the participants' thoughts, to discover the factor which were really important to them, and to get an answer to questions which may have many possible answers (B. Johnson & Christensen, 2004). During the interviews, the researcher also asked some closed-ended questions to guide the participants. Mixing these two types of questions offered a change of pace and helped interviewers establish rapport (B. Johnson & Christensen, 2004). The detailed contents and development of the questions are introduced Chapter 4.

### 3.4.4 Pilot study

A pilot study was conducted before the final implementation of the questionnaire and interview questions. The research used the pilot study to ensure the clarity and effectiveness of the questions and statements and to enhance the validity of this study by pre-testing the particular research instrument (Teijlingen & Hundley, 2001). The pilot study helped to find out the weakness of the research design, which may lead to a failure of the study, and whether the proposed instruments or data collection methods were inappropriate or too complicated (Teijlingen & Hundley, 2001). Conducting and reporting the pilot study also helped increase the likelihood of success in the study as they allowed the researcher to reconsider and rework in the last minute before the main research started (Berends, 2006; Burns, 2000; Mason, 1996; Seidman, 1998; Teijlingen & Hundley, 2001).

The pilot study of the questionnaire and the interview questions both included two parts. The first draft of the questionnaire was tested with 60 students and 32 teaching staff to ask for their responses and comments, and then discussed with 5 academics to seek recommendations and suggestions. The initial interview questions were also tested with 2 students and 1 lecturer as well as discussed with the academics in the same meeting. During the pilot study, few changes were made to both research instruments. The pilot study process effectively enhanced the clarity of the questions and statements and the structures of these tools. Detailed adjustments made to the question items are introduced in the following chapter. The following Figure 3.2 provides the model of the pilot study:

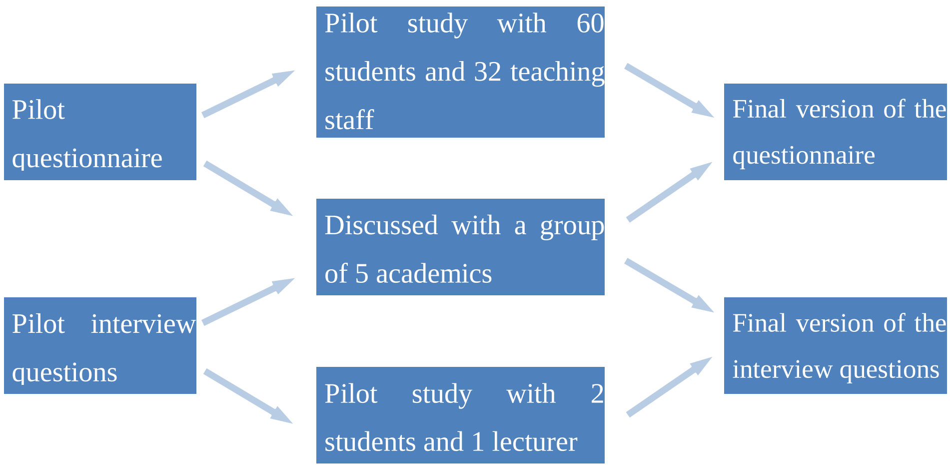


*Figure 3.2.* The model of pilot study

## 3.5 Data analysis

The data were analysed after the data collection process. The data were in two forms: the numerical data gathered in the quantitative stage and the textual data collected from both stages. As it can be seen in Figure 3.1 in Section 3.3, the numerical data were analysed using the SPSS software version 18.0, and the textual data were analysed using the NVivo software version 8, adopting a constructivist grounded theory approach as the underlying theory.

### 3.5.1 Quantitative data analysis

The first stage of this research was conducted using a questionnaire. The data gathered were in a form of descriptive statistics, as the goal of the data analysis at this stage was to describe, summarise and make sense of this particular set of data (B. Johnson & Christensen, 2004). Statistical data in this study indicate numerical data which show the strength of participants' responses to the questionnaire items. In order to convey the essential characteristics of the data, the SPSS software package was used to arrange them into a more interpretable form. This software was adopted to develop a range of methods of analysis, such as frequency tables, crosstabs, charts and t-tests, to show the relationships between the variables (Bryman, 2008; Huizingh, 2007; Yockey, 2007). As this research stage intended to analyse numerical data collected and find relationships between different variables, SPSS was considered to be the most appropriate tool.

SPSS was adopted to analyse the participants' responses to the questionnaire questions/statements which are in relation to the significance of the Web as a learning resource in their teaching or learning experiences. The analysis results were presented in the forms of frequencies and proportions. Median values were employed when continuous data were available. Inferential statistical techniques were adopted where possible to determine the significance of the results. Non-parametric tests, such as Kruskal-wallis test, Mann-Whitney U Test and Spearman's Rank Order Correlation (rho), were applied for variables with the categorical data.

Using SPSS to analyse data was divided and described in several steps. The raw data were coded into a grid format that was readable for the computer, cleaned to avoid errors, and then entered into SPSS (Neuman, 2004). The researcher assigned certain numbers to variable attributes collected (Neuman, 2004). For instance, the number “1” was assigned to “Strongly Agree”, so the number “1” was typed in standing for “Strongly Agree” in the data profile. The researcher also examined the data carefully to avoid any mistakes that might cause misleading results or threaten the validity of measurements (Neuman, 2004). Details of the quantitative data analysis will be further explained in Chapter 5.

### 3.5.2 Qualitative data analysis

The data collected from the semi-structured interviews were analysed using a constructivist grounded theory and theme analysis and the NVivo software as a tool. NVivo is popularly used by researchers to organise qualitative data in various formats, such as documents and texts, audiotapes, videotapes and pictures. It provided an organised and efficient approach to data analysis. At this research stage, the NVivo software was adopted in the transcription, organisation and interpretation of the textual data and audio records of interviews.

The theory underpinning the qualitative data analysis was the constructivist grounded theory approach, which is considered to be an important approach for theory generation (L. Cohen, et al., 2007; Flick, 2002, 2006b). Charmaz (2006, p. 2) states that constructivist grounded theory “consists of systematic, yet flexible guidelines for collecting and analysing qualitative data to construct theories ‘grounded’ in the data themselves”. Instead of getting numerical data, a qualitative research method enabled the researcher to gain an insider’s view of the field through close association with both participants and activities within the natural setting (Burns, 1994). That is, at this stage, the researcher sought to find patterns and develop theories in relation to ways in which university teaching staff and students view the Web as a learning resource. The constructivist grounded theory approach allowed the researcher to interpret and interrogate the textual data to find the dominant discourses presented in the university teaching staff and students’ experience in web-based education.

The constructivist grounded theory and thematic analysis was considered to be the most appropriate strategy to be used at this stage for a number of reasons. Firstly, it "consists of systematic inductive guidelines for collecting and analysing data to build middle range theoretical frameworks that explain the collected data" (Charmaz, 2000, p. 509). It assisted in the development of theories grounded in data systematically gathered and analysed (Strauss & Corbin, 1994, 1998b). Theory development was emphasised as one of the most important issues throughout the data gathering and analysis. This study sought to derive theories from an analysis of the patterns, themes and categories that were discovered in the participant responses to the open-ended section of the questionnaire and the interview questions (Babbie, 2002). The theory development also helped the researcher build an interplay between theories and the statistical data analysis (Babbie, 2004).

The qualitative data analysis was organised according to a three-step coding approach to identify categories and concepts and link these concepts into substantive and formal theories of how the Web is used as a learning resources to support university student learning (Charmaz, 2006; Ryan & Bernard, 2000). This three-step coding approach included the open, axial and selective coding process, within which the researcher studied the initial data, compared and contrasted the themes and concepts, and then synthesised them into categories (Charmaz, 2006; Ryan & Bernard, 2000). The coding approach was the central pathway to theoretical construction (Sarantakos, 1998, 2005). It provided the researcher with an opportunity to examine and re-examine the various meanings the data represented.

The open coding process was the initial stage of the data analysis within which first-order concepts and substantive code were identified and developed (Sarantakos, 2005). The researcher remained open to exploring any theoretical possibilities that can be concerned in the data in this process (Charmaz, 2003, 2006). She remained close to the data, named each line or segment of the raw data, and moved quickly through it to construct meanings of teaching staff and students' experience with the Web (Charmaz, 2006). The codes generated related closely to the participants' learning and teaching experience that were discussed in the questionnaire and interview transcripts. These codes were identified from the textual data and labelled into 61 open codes in this process. The responses to the identified codes were recorded and constructed according to the frequency of their occurrences (as shown in Appendix 3).

Axial coding, the second step of the data analysis, was about putting an “axis” through the data to make connections between the concepts (Sarantakos, 2005). It aimed to interconnect the substantive codes to construct higher-order concepts (Sarantakos, 2005). Different from the open coding process, which is seen as fracturing data into separate prices and distinct cods, the axial coding process “brings the data beck together in a coherent whole” (Charmaz, 2006, p. 60). This process allowed the researcher to make visible the links between open codes and to group them into themes according to these interconnections. The links between axial codes in turn assisted the researcher to fully understand the meaning represented in the data. This step has developed 37 axial codes (as shown in Appendix 3).

The final stage of the qualitative data analysis was the selective coding process. In order to interpret the data into higher levels of abstraction, the researcher worked through the axial codes and searched for the central phenomenon and the central category in relation to the participants’ experiences in web-based education. This selective coding step was performed by “selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development” (Strauss & Corbin, 1990, p. 116). It enabled the researcher to determine the key elements of the codes and make connections among theories. The aim of this process was to outline the eight key categories in the views of the participants on the significance of the Web as a learning resource. The qualitative data analysis will be further elaborated in Chapter 6.

## 3.6 Validity, reliability and credibility

Validity and reliability were seen as important as the central issues in the measurement (Neuman, 2004; Silverman, 2005). Validity of the research referred to the match between the construct and the measurement. It addressed "the question of how well the social reality being measured through research matches with the constructs researchers use to understand it" (Neuman, 2003, p. 179). Reliability was easier to be achieved than validity, as it refers to the ability to produce the consistent results every time the research procedure is repeated. It indicates the dependability or consistency of the findings of the study. It is suggested that the result should remain the same when a research project is repeated or recurs under identical situations or very similar conditions (Neuman, 2003). Validity and reliability play different roles in quantitative and qualitative study. Researchers in these two types of study achieve validity and reliability differently in practice. As this study utilised both quantitative and qualitative methods to collect and analyse data, this section discusses how validity and reliability were achieved from three perspectives: in general, at the quantitative stage, and at the qualitative stage.

In general, this research aimed to gain both validity and reliability through rigorous data collection and interpretation. The data collection involved students and academic teaching staff from different faculties/disciplines. The systematic data collection and triangulation of various sources of data helped ensure that the finding of the research accurately reflect the phenomenon under investigation (Henn, Weinstein, & Foard, 2006). This study is reliable as the findings would not be markedly different if it is conducted again under the same rule of participant recruitment. The participants were from different academic areas and diverse language and cultural backgrounds, with different genders, degrees and levels of information technology skills. The various backgrounds and statures of participants allowed the findings of the study to generalise its sample to the whole population of target-users within the university.

The research is also considered as credible. All the participants in this research were involved only if they were willing to and comfortable to participate. They were informed that their names would not be identified in any research output. Therefore, their ideas could be expressed without any apprehension. They were also informed in the information sheet that their data could be withdrawn at any time within 28 days of the interview. Some participants may reveal emotional information as the questions were related to their teaching and learning experiences. However, this risk was mitigated by the assurance of confidentiality and anonymity they received. These strategies ensured that the participants could give responses comfortably and confidently, and thus the credibility of this study could be achieved.

### 3.6.1 Validity and reliability at the quantitative stage

The data collection method adopted at the quantitative stage was a questionnaire. At this stage, the efforts made to ensure the validity and reliability included clear conceptualising constructions, a precise level of measurement, multiple indicators and a pilot test (Neuman, 2004). Firstly, the questions/statements in the questionnaire were purposely and consistently designed and arranged. They were considerably designed according to a pre-designed outline which appeared as the titles of each subsection. This outline contained the central issues that the researcher intended to investigate. Questionnaire items were then designed according to this outline to ensure that the questionnaire was focused and well structured.

Moreover, the research involved multiple sources of responses. Opinions from both teaching staff and students allowed the researcher to gain a complete picture of the Web adoption in this university context. Opinions from the two perspectives were tested and compared. Observing from two dimensions avoided the occurrence of bias and prejudices. Furthermore, students and staff from all the seven faculties/disciplines were invited. Involving participants with different points of views further ensured the validly and reliability of this study.

Thirdly, the pilot study was used as an important tool to ensure the validity and reliability of this research. A pilot study of the draft questionnaire was conducted with some sample participants, including 60 university students and 32 teaching staff. The researcher then discussed the questions and statements with five other researchers in a group meeting from which she gained valuable recommendations and suggestions. The validity of the questionnaire was then tested through the SPSS software via the sample participants' responses. Adjustments made according to the test results are introduced in the following chapter.

### 3.6.2 Validity and reliability at the qualitative stage

Validity and reliability in qualitative research are achieved in a different way from how it is considered in quantitative research. Burns (2000, p. 11) argues that "qualitative research places stress on the validity of multiple meaning structures and holistic analysis, as opposed to the criteria of reliability and statistical compartmentalisation of quantitative research". The central concern about validity in qualitative research is whether the findings of a research study accurately reflect the phenomenon under investigation (Henn, et al., 2006). At this stage, the researcher asked pre-designed open-ended questions from multiple dimensions in relation to the participants' views and the actual usage of the Web in web-based education. Abundant valid information was obtained through their responses to the pre-designed open-ended questions and some follow up questions proposed according to the particular interview contexts.

Reliability is assessed in a variety of ways in qualitative research. Qualitative methods, such as "increasing the variability of perspectives", or "setting up a list of possible errors which they aim to avoid", was used to increase the reliability (Sarantakos, 2005, p. 86). The researcher in this study intended to achieve the reliability by asking questions from different aspects. The interview questions were designed in a way that allows the interviewer to investigate the participants' thoughts from both a practical and a theoretical perspective. The research asked for responses from both dimensions of teaching staff and students. This variability enabled the researcher, to some extent, to achieve the reliability of the study. In addition, the researcher also adjusted her interview skills and schedules according to the experiences gained from the pilot study. Suggestions and recommendations from the pilot interviewees helped enhance the reliability. It is believed that if this qualitative stage is conducted again under a similar context, the results will not be markedly different. Hence, this stage is seen as reliable.

## 3.7 Triangulation

The triangulation process used in the project design and the data collection helped enhance the validity and credibility of the research (Neuman, 2006). various methods and data sources were used to ensure the validity and reliability of research findings (Bryman, 2008). This procedure allowed the researcher to view a particular point from various perspectives, and thereby to enrich knowledge and test validity (Sarantakos, 2005). Involving multi-site, multi-method and multi-person enhanced the validity and reliability of the study. In other words, this researcher corroborated evidence from different individuals, types of data, or methods of data collection, and therefore ensured the research was valid and reliable (Creswell, 2005).

The participants in this study were recruited from all the three campuses of the university to ensure that students and teaching staff served by different network facilities and systems were involved. In addition, this research used two data collection methods: questionnaire and semi-structured interviews. The combination of different methods and instruments allowed the researcher to gain a more accurate and credible picture within the research area. Also, this study asked for perceptions of both staff and students. By comparing their views, understandings and behaviours, the researcher was given the access to a multi-dimension data sources and opinions. The triangulation process allowed the researcher to observe her participants from different angles and viewpoints, and thus she felt more confident about the observations, interpretations and conclusions made (Eisner cited in Creswell, 1998).

## 3.8 Conclusion

Methodology is essential in a research process as it indicates the direction in which a research project is carried out and the justification of the approach and tools used to carry out data collection and analyse. Thus research methodology forms a valid basis for judging the success of a research project and the researchers' knowledge and ability to conduct research. This chapter provides detailed descriptions of the methods and tools used and rationale for using them in this study. One of the strengths of this study is the use of mixed methods approach as it could provide multiple perspectives for understanding the complexity of a web-based educational discourse. This chapter is also a connection between the theoretical background of the study and the data analysis and findings. It provided a methodological foundation on which the actual research actions could be built. In the light of this chapter, Chapter 4 will provide detailed development process of the researcher instruments: the questionnaire and interview questions.

# Chapter 4: Design of the Research Instruments

## 4.1 Introduction

The previous chapter has discussed the research approach and data collection methods utilised in this study. It introduced the detailed background and participant recruitment. Data collection methods used in the quantitative and qualitative stages were discussed, followed by the data analysis tools and strategies adopted at both stages. The validity, reliability and triangulation of the research were also analysed. This chapter, however, is built in the light of the last chapter. Validity and reliability of the research instruments were believed to be the central issue which helped ensure the quality of the entire research project. Therefore, a great deal of time and attention were given to the development of these instruments, including the questionnaire and interview questions. Both tools were designed through three steps: the initial developmental stage, pilot study and discussing with other academics and the finalising step. The questionnaire, as a quantitative research tool, was also tested with the SPSS software against its validity, reliability and the grouping of the questions/statements within. This chapter will concentrate on the detailed design processes as well as how adjustments and changes were made during the development.

## 4.2 Design of the questionnaire

A questionnaire was used in the quantitative stage of the study. It was designed to investigate views of university students and teaching staff toward the Web in learning and teaching activities. The items in the questionnaire were carefully constructed, modified and finalised in order to best achieve the research objectives and to reach the participants' thoughts. The following three step development processes are discussed in detail in this section:

- Initial design of an outline and the questionnaire items;

- Pilot study with 60 students and 32 teaching staff and discussing with other 5 academics;
- Adjusting to the final version of the instrument.

### 4.2.1 Initial stage of the development

The initial questionnaire items were developed according to the research objectives and theories reviewed from relevant literature. The first part of the questionnaire consisted of seven questions and was designed to collect participants' biographic information. The second part of the questionnaire included 40 scaled items about the participants' views and attitudes toward e-learning, as well as an open-ended section (As shown in Appendix 5.1). The 40 scaled items were rated on a 5-point Likert Scale (Likert, 1932). To respond to these scaled question items, the participants were instructed to indicate how strongly they agree or disagree (1 = Strongly Agree to 5 = Strongly Disagree), or how frequently they use the Web for different academic purposes (1 = Very Often to 5 = Never). The participants were indicated to select a single choice from the scale of each question or statement (As shown in Appendix 5.2).

To test the reliability of responses to the questionnaire, a pair of questions of opposite meanings was included. Question 21 stated that web-based learning enhances interpersonal relationship between lecturers and students, whereas, Question 24 stated that web-based learning lacks interpersonal interactions. Therefore, if the "1 = Strongly Agree" option is selected in Question 21, "5 = Strongly Disagree" should be chosen in Question 24.

### 4.2.2 The pilot study of the questionnaire

After item selection and modification, the questionnaire was tested with a sample group of 92 participants (60 university students and 32 teaching staff). The questionnaire was also presented to a group of five academics for feedback to enhance content validity. Study information sheets and the questionnaire were made available for prospective participants at the reception desks of the targeted faculties/schools. Participants were also invited to comment on the clarity of the language and logical organisation of the questionnaire items. They were also encouraged to provide recommendations and endorsements for the final version of the instrument.

### 4.2.3 Statistical methods

Scaled question items were entered, coded and tested using Statistical Packages for Social Science (SPSS) version 18.0 to ensure the reliability and construct validity. The reliability of the 40 scaled items was conducted using Alpha reliability. Cronbach's Alpha coefficient examines the internal consistency of scaled items by examining the average inter-item correlation (Q. Le, Spencer, & Whelan, 2008). This is considered to be a fundamental measure of the reliability of research instruments (Pallant, 2007). Calculation of Cronbach's Alpha coefficients provides the researcher with information on which questionnaire items are related to each other and which items should be removed or changed. According to Nunnally (1967), all Cronbach's Alpha coefficient values above 0.6 are considered to be acceptable.

After conducting Alpha reliability analyses, items in the questionnaire were tested against their construct validity by using exploratory factor analysis. The two steps involved in the factor analysis were factor extraction and factor rotation. The Kaiser-Meyer-Olkin (KMO) statistical test was conducted prior to factor extraction and rotation to examine the adequacy of the samples for factor analysis.

Factor extraction and factor rotation were carried out on the 40 scaled items of the questionnaire. Principle Component Analysis for factor extraction and Varimax for factor rotation were used to interpret the questionnaire items. According to Kaiser (1960), all factors with eigenvalues greater than 1 should be retained as this value represents a substantial amount of variation. Cattell (1966) further recommends the use of scree plots to plot a graph of each eigenvalue against the factor with which it is associated. Eigenvalues are helpful in deciding how many factors should be used in the analysis. However, this option may not always yield accurate results (S. B. Green, Salkind, & Akey, 2000). Another option is to examine the plot of the eigenvalues or scree test and to detain all factors with eigenvalues in the sharp descent part of the plot before the eigenvalues start to level off. This criterion yields accurate results more frequently than the eigenvalue-greater-than-1 criterion (Cattell, 1966). After the factors have been extracted, factor rotation helps to present the pattern of loadings in a manner which is easier to interpret (Pallant, 2007). This process involves a calculation of what degree variables load onto these extracted factors. In other words, each variable loads strongly on one component, and each component is represented by a number of strongly loading factors (Field, 2000; Pallant, 2007).

### 4.2.4 Results

A total of 105 participants picked up the questionnaires and 92 of them responded and returned the questionnaires, yielding a response rate of 87.6% (n/N=92/105). Details of the participants' characteristics are presented in Table 4.1.

Table 4.1. *Participants' characteristics*

| | Students | Teaching staff |
|---|---|---|
| | % (n/N) | % (n/N) |
| **Academic faculties/schools/disciplines** | | |
| • Education & Arts | 16.3 (15/92) | 8.6 (8/92) |
| • Science/ Engineering /Technology & AMC | 16.3 (15/92) | 8.6 (8/92) |
| • Health Science | 16.3 (15/92) | 8.6 (8/92) |
| • Business & Law | 16.3 (15/92) | 8.6 (8/92) |
| **Gender** | | |
| • Male | 31.5 (29/92) | 17.3 (16/92) |
| • Female | 33.6 (31/92) | 17.3 (16/92) |
| **Length of teaching/learning at the UTAS** | | |
| • Less than 1 years | 15.2 (14/92) | 3.3 (3/92) |
| • Over 1 to 3 years | 29.3 (27/92) | 10.9 (10/92) |
| • Over 3 years | 20.7 (19/92) | 20.7 (19/92) |

#### *4.2.4.1 Reliability*

The reliability analysis showed that the Cronbach's Alpha coefficient was 0.9, which indicates substantial reliability of the instrument. However, the results indicate that questions Q15 (r = 0.07), Q18 (r = -0.04), Q19 (r = 0.26), Q30 (r = 0.17), and Q31 (r = 0.13) (where r denotes as corrected item-total correlation) had the lowest corrected item-total correlation. Thus, they were eliminated from the questionnaire. The reliability analysis procedure was rerun without each of these items until all were eliminated from the scale. Cronbach's Alpha coefficient was improved from 0.9 to 0.914. This confirmed that items Q15, Q18, Q19, Q30, and Q31 should not be included in the instrument; therefore, they were removed from the final draft of the questionnaire.

#### *4.2.4.2 Validity*

*Content validity*

To ensure the content validity of the instrument, items were discussed with a group of five researchers and experts in the e-learning field. Changes were made to the questionnaire based on the feedback of these experts. For example, Question 7 was changed from "Knowledge of IT" to "Knowledge of Information Technology (IT)" and Question 10 was changed from "The Web provides powerful resources for gaining latest articles and news" to "The Web provides powerful resources for gaining academic knowledge".

*Construct validity*

The sample population of students and teaching staff for factor analysis was 60 and 32 respectively. These sampling numbers resulted in a KMO statistical value of 0.767. As proved by Kaiser (1970, 1974), KMO values greater than 0.5 are considered as acceptable. Therefore, the measurement of 0.767 for the sampling adequacy of the questionnaire is considered to be satisfactory. The scree plot of eigenvalues for the 40 scaled questionnaire items is shown in Figure 4.1. Table 4.2 describes the factor loadings for questionnaire items after Factor Extraction and Rotation.

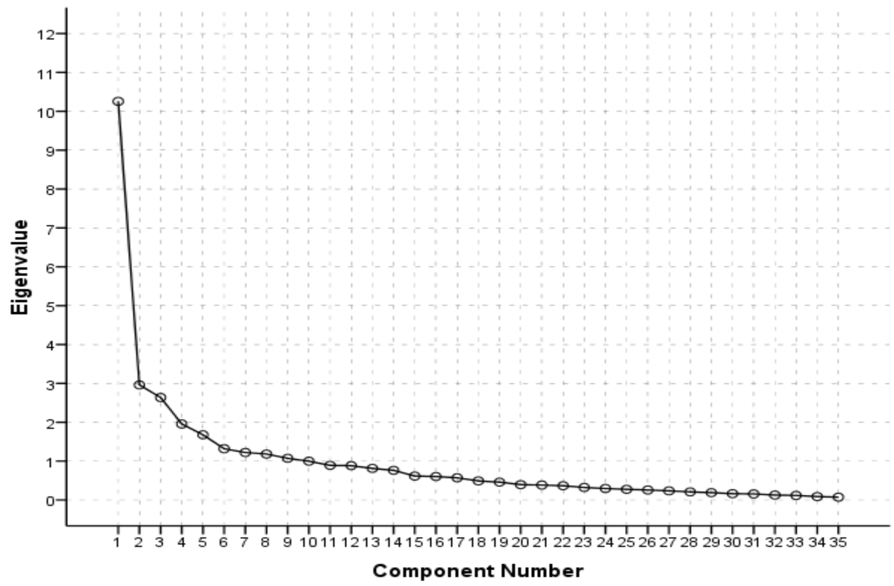


*Figure 4.1.* Scree plot of eigenvalues for the scaled questionnaire items

The scree plot in Figure 4.1 shows the sharp descent of the eigenvalues 1 to 5, and a levelling off from 6 onwards. It is concluded that five factors should be rotated in the questionnaire items. The result of this rotation is shown in Table 4.2.

Table 4.2. *Factor loadings for the scaled questionnaire items*

| Items | Question Content | Factor Loadings |
|---|---|---|
| **Factor 1: Instrumentality of the Web in different academic areas** | | |
| **Q.13** | The Web is helpful in developing students' problem-solving skills. | 0.40 |
| **Q.33** | How often is the Web used to support students' learning in your course? | 0.47 |
| **Q.34** | How often is the Web used as a communication tool in your course? | 0.51 |
| **Q.35** | How often is the Web used to find reading materials in your course? | 0.56 |
| **Q.36** | How often do you participate in online discussion in your course? | 0.75 |
| **Q.37** | How often do you get feedback via the Web in your course? | 0.78 |
| **Q.38** | How often do you share learning resources via the Web with other/your students? | 0.77 |
| **Q.39** | How often is the Web used as an assessment tool in your course? | 0.76 |
| **Q.40** | How often is the Web used as a management tool in your course? | 0.62 |
| **Factor 2: The Web as a social enhancement platform** | | |
| **Q.16** | Web-based learning can replace face-to-face learning. | 0.75 |
| **Q.17** | Learning via the Web is more motivating than learning face-to-face. | 0.76 |
| **Q.21** | Web-based learning enhances interpersonal relationships between lecturers and students. | 0.77 |
| **Q.22** | Online communication among students and lecturers is more effective than face-to-face communication. | 0.68 |

| Items | Question Content | Factor Loadings |
|---|---|---|
| **Q.23** | Web-based learning provides good facilities for interacting with lecturers and other students. | 0.62 |
| **Q.24** | Web-based learning lacks interpersonal interaction. | -0.46 |
| **Q.45** | The MyLO system can replace face-to-face teaching. | 0.44 |
| **Factor 3: Effectiveness of the MyLO system** | | |
| **Q.12** | The Web can provide useful ways of giving feedback to students. | 0.48 |
| **Q.41** | Every course should include MyLO in teaching and learning. | 0.67 |
| **Q.42** | The lecturers use the MyLO system effectively in my course. | 0.69 |
| **Q.43** | The MyLO system is learner-friendly. | 0.77 |
| **Q.44** | Most functions of the MyLO system are useful. | 0.77 |
| **Q.46** | The information of my course can be easily found in the MyLO system. | 0.64 |
| **Q.47** | Many learning tasks are done via the MyLO system in my course. | 0.44 |
| **Factor 4: The Web and learners** | | |
| **Q.20** | The Web creates an interactive learning environment. | 0.47 |
| **Q.25** | The Web can enhance independent learning. | 0.58 |
| **Q.26** | The Web can accommodate learners having different learning styles. | 0.73 |
| **Q.27** | The Web can accommodate learners from different cultural backgrounds. | 0.73 |
| **Q.28** | The Web can encourage learners to take an active part in learning. | 0.52 |
| **Q.29** | Web-based learning provides learners with great flexibility. | 0.45 |
| **Q.32** | Using the Web can enhance students’ learning outcomes. | 0.63 |
| **Factor 5: The Web as a teaching and learning resource** | | |
| **Q.8** | The Web is a good tool for teaching and learning. | 0.68 |
| **Q.9** | The Web can provide good facilities for exploring in learning. | 0.60 |
| **Q.10** | The Web provides powerful resources for gaining academic knowledge. | 0.81 |
| **Q.11** | The Web can provide useful ways of assessing students’ learning. | 0.57 |
| Extraction Method: Principal Component Analysis; Rotation method: Varimax with Kaiser Normalisation (Rotation converged in 6 iterations). | | |

The result of the factor extraction and rotation indicates that the five factors explain 55.66% of the total variance in the data. The highest factor loadings of the scaled questionnaire items are listed in Table 4.2. Some items appeared in more than one factor. However, they were loaded onto the most important factor in which they had the highest loading. Question 14 does not appear in Table 4.2 as its loading was lower than 0.4, which indicates an irrelevance to the factors concluded after factor rotation. Question 24 had a negative value of -0.46, which means that there is a consistency in the participants’ disagreement with the statement given. This meets the expectation of the researcher as this question was designed to have an opposite meaning to Question 21.

This exploratory factor analysis process helped to determine the construct validity of the questionnaire. It also helped to determine whether there is a single dimension or multiple dimensions underlying the 40 scaled questionnaire items, and whether there are items that are not associated with the identified factors which should be eliminated from the measure because of the irrelevance (S. B. Green, et al., 2000). After factor analysis, the scale items in the questionnaire were rearranged and regrouped according to the factor loadings suggested by the result of the factor extraction and rotation. The finalised version of the instrument can be found in Appendix 5.2.

## 4.3 Design of interview questions

As the second phase of this research, the qualitative stage, was built in the light of the quantitative stage. Cognitive interviews, which gather respondents' verbal reports, were believed to be a suitable approach to follow up for deeper understanding of some particular questions in the questionnaire (Berends, 2006). The development of the interview questions also went through three steps including the initial design stage, the pilot study and the finalising step of the instrument.

### 4.3.1 Initial stage of the development

The interview questions were initially designed according to the research objectives, the results of the pilot questionnaire, as well as the comments given by the participants in the open-ended section of the questionnaire. The researcher was inspired by the comments given and interests shown by the participants. Some interview questions were designed to collect information that could not be explored by the questionnaire. Different from the questionnaire, which focused on finding information or determining the frequency of different responses, the interviews allowed the researcher to directly infer the participants' meaning and thoughts by encouraging them to open up and expand on their responses (Berends, 2006; Brenner, 2006; Kvale, 1996). Hence, open-ended questions were asked to allow the participants to further explore their views on the significance of the Web in their learning and teaching practice. Two sets of interview questions were developed respectively from teaching staff and students' perspectives.

### 4.3.2 The pilot study of interviews

A pilot study of interviews was carried out to test the clarity of the questions initially designed as well as the entire interview schedule. Two students and one lecturer were involved. The procedures of the pilot interviews were kept similar to the main study as they were also seen as a valuable opportunity for the researcher to practice interviewing skills. In the pilot interviews, the interviewees were allowed time to give opinions on the structure and contents of the interview process.

Valuable recommendations on further improvements were obtained from both the student and lecturer interviewees. Only minimal changes and adjustments were made to produce the final version of the question items as the pilot participants and the academics in the discussion group had given some positive evaluation. However, the researchers gained some valuable suggestions and feedback on interview skills and how to guide the participants. Interviews should not be simply approached as a conversation with a purpose (Kvale, 1996). Instead, the researcher practiced on interview techniques with different theoretical assumptions that derive from a variety of disciplines (Brenner, 2006). The pilot study provided the researcher with an opportunity of incorporating advice and recommendations from third parties, who had abundant research experiences, different ways of questioning, and various research styles (Mason, 1996). The research instruments and materials were better developed, and thus a better research schedule was achieved in the main research. Hence, the pilot study created an opportunity to enhance the overall validity and reliability of the study (Burns, 2000). The interview questions were finalised after the initial stage, the pilot interview stage and modification. Each set of questions contains ten items which are shown in Table 4.3.

Table 4.3. *Interview questions for students and teaching staff*

| Students | Teaching staff |
|---|---|
| Q.1 What do you consider about the significance of the Web in your learning? | Q.1 What do you consider about the significance of the Web in your students' learning? |
| Q.2 In your view, what are the benefits you may get from the Web, but cannot be gained from other resources in your study? | Q.2 In your view, what are the benefits your students may get from the Web, but cannot be gained from other resources? |
| Q.3 Can you give a few examples on how the Web has changed your learning styles? | Q.3 Can you give a few examples on how the Web has changed your students' learning styles? |
| Q.4 Please share with me some experiences of learning with the Web in your study. | Q.4 How would you use the Web to support your students' learning? |
| Q.5 How would your lectures use the Web to support your learning? | Q.5 Please share with me some experiences of teaching with the web in your teaching activities. |
| Q.6 How would you evaluate the ways your lecturers use the Web to support your learning? What are your expectations apart from what they have already provided? | Q.6 Would you consider your students' expectations on using the web when you adopt it? How would you adjust if your ways of using the Web (the way you believe as the most appropriate) cannot satisfy your students? |
| Q.7 How would you consider the usefulness of the MyLO system we are currently using at the University of Tasmania? | Q.7 How would you consider the usefulness of the MyLO system we are currently using at the University of Tasmania? |
| Q.8 What do you think can be done to enhance the use of the MyLO system at the university? | Q.8 What do you think can be done to enhance the use of the MyLO system at the university? |
| Q.9 How would you evaluate the web-based learning environment in your faculty? | Q.9 How would you evaluate the web-based learning environment in your faculty? |
| Q.10 What would you suggest to improve the web-based learning environment in your faculty? | Q.10 What would you suggest to improve the web-based learning environment in your faculty? |

## 4.4 Conclusion

This chapter has introduced the detailed development process of the research instruments utilised at both research stages. In order to well address the research objectives and questions, the design process of the questionnaire and interview questions both went through three steps: the initial design stage, pilot study stage and adjusting to the final version. The questionnaire items were tested against their validity and reliability via the SPSS software. These explicit and comprehensive development processes double ensured the quality of the instruments as well as the quality of the entire study. These instruments were then put into practice during the formal data collection. A considerable number of responses were gathered, and then analysed and reported in the following chapters. Chapter 5 will focus on the analysis of the quantitative data gathered using the questionnaire. Chapter 6, however, will introduce the themes and theories emerged from the participants' responses to the open-ended questionnaire section and the interview questions.

# Chapter 5: Quantitative Data Analysis

## 5.1 Introduction

The last chapter has introduced the development processes of the research instruments. The Cronbach's Alpha coefficient test and the exploratory factor analysis conducted on the responses of 92 pilot participants were introduced. After the pilot study and the tests conducted, the finalised questionnaire was utilised in the formal data collection. Responses from the students and teaching staff were entered, coded and tested using the Statistical Packages for Social Science (SPSS). This chapter introduces the analysis of the quantitative data which were gathered from the participants' responses to Part A to Part F of the questionnaire. The first part included independent variables of the participants' occupation, age, teaching position/degree, academic faculty, length of studying/teaching at the university and knowledge of Information Technology (IT). The other section, however, were constructed of dependent variables (scaled items) which were grounded according to the five dominant themes suggested by the exploratory factor analysis. This chapter examines the participants' responses to each question item within these themes.

Three types of SPSS statistical analysis were used to analyse the individual question within each theme. Firstly, SPSS was adopted to calculate the median values of the participants' responses to each question items. This was followed by an analysis of the Kruskal-Wallis test for two or more groups to see whether statistically significant differences existed between groups according to five of the independent variables (gender, teaching position/degree, academic faculty, length of studying/teaching at the university, and knowledge of IT). Once a significant variance of opinion was found, a Mann-Whitney U test would be utilised to determine where this significant relationship occurs. Lastly, the Spearman's Rank Order Correlation (rho) was used to calculate the strength of the relationship between the participants' behaviours in Web adoption and their views on web-based learning. The following section will start with the underlying theories of the data analysis and the biographic information of the participants. The emphasis of this chapter is the quantitative data analysis process and the results emerged.

## 5.2 Quantitative data analysis

As it is introduced within the last chapter, the questionnaire items were designed carefully to address the five research objectives. The questionnaire had one biographical section, five scaled sections and one open-ended section. Each section aligned with one or two research objectives. Table 5.1 below gives the detail information about the question items and the objectives they were related to. The last research objective was addressed in the open-ended section, which will be discussed in the next chapter.

Table 5.1. *Research objectives, questionnaire sections and question items*

| Research objectives | Sections | Question items |
|---|---|---|
| **Objective 1:** Views of students and teaching staff on the significance of the Web.<br>**Objective 3:** Differences in views of students and teaching staff on the use of the Web in teaching and learning. | Part C: The Web as a social enhancement. | Q16, Q17, Q18, Q19, Q20, Q21. |
| | Part D: The Web and learners. | Q22, Q23, Q24, Q25, Q26, Q27, Q28, Q29, Q30, Q31. |
| | Part E: The Web as a teaching and learning resource. | Q32, Q33, Q34, Q35. |
| **Objective 2:** Ways in which the Web is used by students and teaching staff to facilitate learning. | Part B: Instrumentality of the Web in different academic areas. | Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15. |
| **Objective 4:** Evaluation of the web-based learning environments in different academic areas in the university. | Part F: Effectiveness of the MyLO system in different academic areas. | Q36, Q37, Q38, Q39, Q40, Q41, Q42. |
| **Objective 5:** Providing recommendations for enhancing the web-based learning in a university context. | Open-ended section | One open-ended question |

### 5.2.1 Quantitative data analysis

The quantitative data analysis in this study was performed using the SPSS software version 18.0. The grouping strategies suggested by the factor analysis helped the researcher in performing the data analysis at this stage. The relationships between independent variables and dependent variables were the most important factor emphasised by SPSS (Faherty, 2008). Independent variables provided the researcher with nominal data which had independent response categories; however, dependent variables provided ordinal data which concerned with response categories that formed a scale (Huizingh, 2007). The questionnaire included 6 independent variables and 35 dependent variables, covering research objectives one to four. These independent variables were chosen because these factors may be used to yield some interesting results in regarding to the participants' views and behaviours in web-based learning. It was anticipated that operating the statistical analysis on SPSS with the two types of variables may help determine the inter-connections and relationships between views and/or behaviours of the different participant groups.

Two types of statistical analysis were performed to analyse the teaching staff and students' responses to the questionnaire: descriptive and inferential statistics. Descriptive statistics were run as the first step to provide information about each variable, such as the median value and the distribution and frequency of responses within each category of the variables. Median values were pursued in the analysis of ordinal data instead of mean or mode values (Huizingh, 2007). Most importantly, the distributions of scores on the dependent variables were examined by assessing the skewness, kurtosis and Kolmogorov-Smirnov statistic (Coakes, Steed, & Ong, 2010). Skewness and kurtosis provided an indication of the symmetry of the distribution and the "peakedness" of the distribution respectively (Pallant, 2005, 2007). However, a Sig. value which is less than 0.05 obtained from the Kolmogorov-Smirnov statistic would suggest violation of the assumption of normality (Coakes, et al., 2010; Pallant, 2007). As the Sig. values obtained from the Kolmogorov-Smirnov tests on the dependent variables were all 0.000, which is common in large samples, these variables were considered to be non-normally distributed. Therefore, the statistical techniques chosen for the data analysis were non-parametric tests which are suitable for the analysis of non-normally distributed data.

After the analysis of the descriptive statistics, inferential statistics were used to explore the relationships between the variables. Based on the median values calculated from the descriptive tests, decisions were made on which variable to check using the Kruskal-Wallis Test. As the median values of some variables appeared to be 3, which indicated that the participants' views on these questions were divided, Kruskal-wallis tests were conducted to find out the factors that might be influential to these responses. This test was used to determine whether the participants' occupation, gender, academic faculties, length of studying/teaching and skills of IT were associated with their views and behaviours in relation to web-based learning. It is a "between groups" analysis which is often used to compare the scores on continues variables (Pallant, 2005, 2007). As the participants were divided into two or more groups and it was anticipated that there would be differences among the views of the different groups, the Kruskal-Wallis Test was considered to be the most suitable technique. Within this test, scores were converted to ranks and the mean rank for each participant group (Muijs, 2004; Pallant, 2007). It also identified effect sizes which indicates to what extent the results could be generalised for all levels of the variable. Examining statistical significance through Kruskal-Wallis tests provided the researcher with information about whether the groups differ; however, it did not inform where the significance was. Therefore, post-hoc comparisons were conducted to find out where the differences lie. In this case, it used the Mann-Whitney U Test which tests for differences between two independent variables on a continuous measure (Pallant, 2005, 2007).

Spearman's Rank Order Correlation (rho) was then applied to find out the strength of relationships between the participants' views and behaviours in web-based learning. This test allowed the researcher to "calculate the strength of the relationship between two continuous variables" (Pallant, 2005, p. 297), which in this case refer to the participants' behaviours investigated in Part B of the questionnaire and their views examined by Part C, D and E. The Spearman's Rank Order Correlation (rho) was used to request the Spearman correlation and Pearson's r correlation coefficients between each pair of variables. This test calculated the directions and strength of relationships by determining the values of Pearson's r which ranged from -1.00 to 1.00 (J. W. Cohen, 1988). According to Pallant (2005), positive and negative correlation coefficients indicate to positive and negative correlations respectively between the two examined variables. The values can be categorised into three levels as shown on the next page (J. W. Cohen, 1988; Pallant, 2005):

- Small strength: r=0.01 to 0.29 or r=-0.01 to -0.29
- Medium strength: r=0.30 to 0.49 or r=-0.30 to -0.49
- Large strength: r=0.50 to 1.00 or r=-0.50 to -1.00

### 5.2.2 The sample

The data were gathered from two participant groups, a student group (N = 502) and a teaching staff group (N = 100). These participants could choose to do the paper questionnaire, or to complete the online questionnaire which was provided through the Survey Monkey website. Most students responded using the paper copies of questionnaire, and most teaching staff chose to participate through the electronic form. After the data collection, the participants' responses to the questionnaire items were entered and analysed using the SPSS software version 18.0. It is important to mention that although the participants were invited from seven different faculties/disciplines, their responses were divided into four groups during the data analysis process according to the interconnections in the natures of the academic areas. To give a more in-depth analysis of the independent variables making up the sample population, a number of bar charts were developed. Bar charts were considered to be the most suitable method to show the number of population in each category.

From Figure 5.1, 5.2 and 5.3 it can be seen that within the 602 participants, there were 502 students (83.4%) and 100 teaching staff (16.6%). Within the 502 students, 365 of them were undergraduate students (72.7%), 106 were postgraduate students (21.1%), 13 students were commencing graduate research degrees (3.6%), and 18 were undertaking graduate certificates, diplomas or bridge courses (2.6%). The 100 teaching staff, however, were including 91 academic staff (91%), 7 general support staff (7%) and 2 staff from other disciplines (2%). The study considered opinions from various perspectives, with an emphasis on the students and academic staff. These statistics are shown in the three charts on the following page:

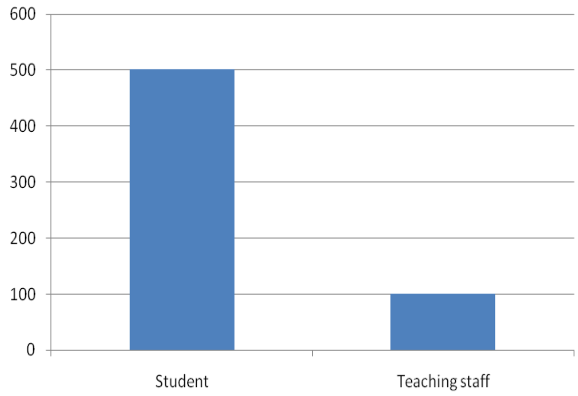


*Figure 5.1.* Numbers of students and teaching staff

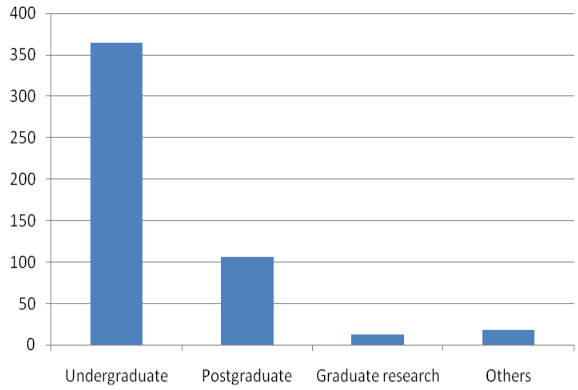


*Figure 5.2.* Degrees undertaken by the students

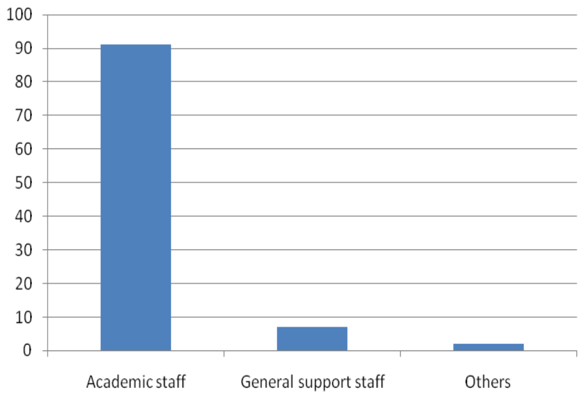


*Figure 5.3.* Teaching positions of staff

Figure 5.4 shows the number of student and teaching staff participants from each academic category. The involvement of this factor was to address Objective 2 and Objective 4 which deal with the instrumentality of the Web and the web-based learning environment in different academic faculties/disciplines. As it can be seen from the following graph, the numbers of responses from the four sectors were relatively even. This means that the data collected included considerable number of responses from each category. Within the 602 participants, about one quarter (25.4%, N = 153) were studying/teaching in the Faculty of Business and the Law Faculty. The participants from the Faculties of Education and Arts had a slightly smaller proportion of 24.3% (N = 146). The Faculty of Science, computing and engineering and AMC had the largest proportion within the entire participant population (31.4%, N = 189). The Health Science group had the smallest proportions of responses (18.9%, N = 114) as it could not be grouped with any other disciplines due to its nature.

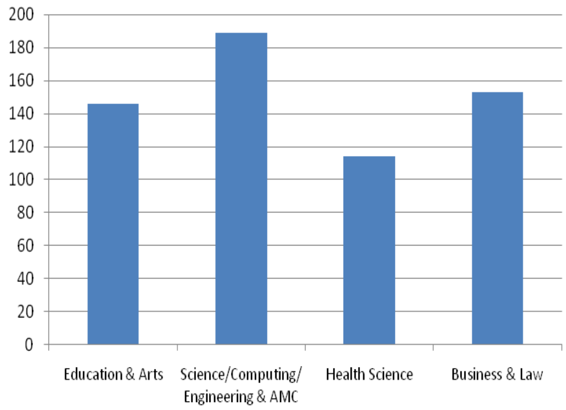


*Figure 5.4.* Numbers of participants from each academic faculty/discipline

To obtain a detailed picture of the research matter, the participants' gender, lengths of studying/teaching at the university, and knowledge of IT were also taken into consideration. These factors were believed to be influential to the participants' views and adoption of resources in web-based learning, Therefore, they may be used to yield some interesting results. The proportion of female participants (55.8%, N = 336) was slightly larger than the proportion of male participants (44.2%, N = 266). It was considered that there may be significance between the behaviours and views of the different gender groups. The proportions of male and female participants are shown in Figure 5.5 on the next page:

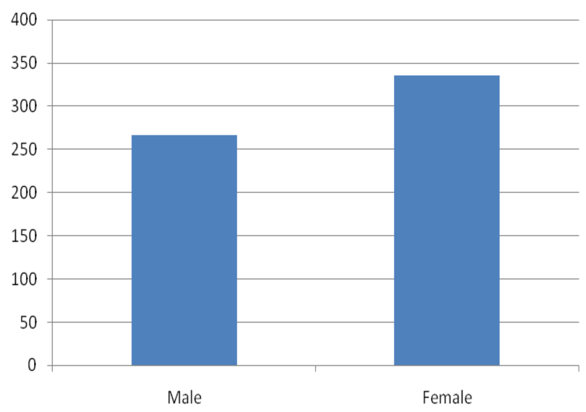


*Figure 5.5.* Numbers of male and female participants

The percentages in the length of studying/teaching at the university varied between students and teaching staff. The majority of students (56%, N = 284) had been studying at the University of Tasmania for over one year to three years at the time of data collection. There were 22.7% (N = 114) of them had been at the university for less than one year. Only 20.7% (N = 104) of them had been studying for more than three years. However, the majority of teaching staff had been teaching/working at the university for more than three years (70%, N = 70), 25% (N = 25) of them had been teaching/working for over one year to three years, and only 5% (N = 5) of the lecturers had been to the university for less than one year. This was corresponding to the proportion of students and teaching staff within the whole university context, as the majority of the student population were undergraduate students and undertaking their second, third year or fourth year of studying. However, the majority of the teaching staff group had been at the university for more than three years. It was believed that this staff group has the most powerful voice as they had more experiences in web-based education. These statistics are illustrated in the following Figure 5.6:

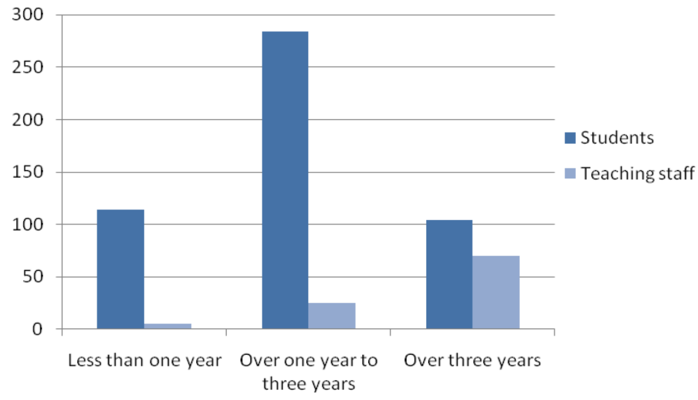


*Figure 5.6.* Lengths of studying/teaching at the university

Lastly, the participants' level of information technology skills was considered as one influential factor. Within the 602 participants, the majority considered themselves to have just fine (38.7%, N = 233) or good (38.0%, N = 229) IT skills. A small number of students and teaching staff believed their IT skills were excellent (11.5%, N = 69); while 9.3% (N = 56) considered themselves having poor IT skills. Only a minority of them considered themselves to have very poor IT skills (2.5%, N = 15). The correlations between the participants' IT skills and their adoptions of web-based resources will be analysed within the following sections. Figure 5.7 were drawn to show the participants' level of IT skills:

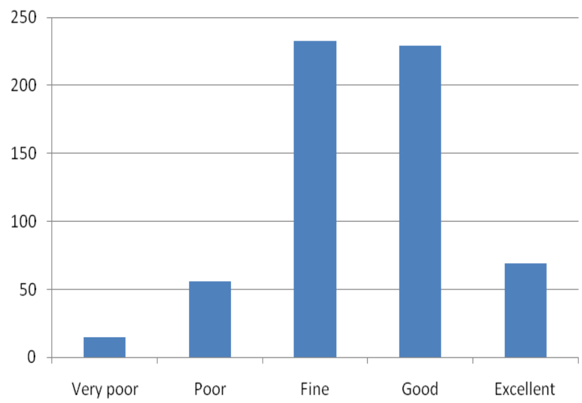


*Figure 5.7.* Level of IT skills of the participants

## 5.3 Results

This section examines the correlations between the independent variables and dependent variables, as well as the correlations between the dependent variables themselves. Question items in Part A were independent variables which asked for the participants' biographic information. Questions in Part B to Part F were designed based on Likert's Measurement of Attitudes (Likert, 1932). Within Part B, the Likert scale was designed with value 1 corresponding to the highest frequency of Web adoption and 5 to the lowest. However, in Part C to Part F, the Likert scale was designed with value 1 corresponding to the most positive judgment and 5 to the least. The participants were instructed to answer each question by choosing a single value from the scale. For each section, Frequencies and median values were determined to find out if there was an agreement in the participants' responses. Kruskal-Wallis tests were performed to find out the possible influential factors where their answers were divided (median = 3). The analysis process and results for all the scale items are introduced in this section.

### 5.3.1 Instrumentality of the Web in different academic areas

Part B of the questionnaire has 8 questions which enquire about the instrumentality of the Web in different academic areas. Frequencies and median values were pursued to examine whether there was a statically significant difference in the adoption of web-based learning resources within different participant groups. Kruskal-Wallis tests were performed on some of these questions, which had obtained divided answers from the participants, to find out whether their occupation, gender, academic faculty, length of studying/teaching, and knowledge of IT were associated with their behaviours in web-based learning. The questions examined within this section are as follows:

Q8. How often is the Web used to support students' learning in your course?

Q9. How often is the Web used as a communication tool in your course?

Q10. How often is the Web used to find learning materials in your course?

Q11. How often do you participate in online discussions in your course?

Q12. How often do you get feedback via the Web in your course?

Q13. How often do you share learning resources via the Web with other/your students?

Q14. How often is the Web used as an assessment tool in your course?

Q15. How often is the Web used as a management tool in your course?

Table 5.2. *Frequencies and median values obtained on Q8 to Q15*

| | | VO | O | S | R | N | Total | Median |
|---|---|---|---|---|---|---|---|---|
| **Q8** | Count | 239 | 244 | 86 | 25 | 4 | 598 | 2.00 |
| | % of Total | 40.0 | 40.8 | 14.4 | 4.2 | 0.7 | 100.0 | |
| **Q9** | Count | 168 | 257 | 130 | 35 | 8 | 598 | 2.00 |
| | % of Total | 28.1 | 43.0 | 21.7 | 5.9 | 1.3 | 100.0 | |
| **Q10** | Count | 281 | 220 | 76 | 18 | 3 | 598 | 2.00 |
| | % of Total | 47.0 | 36.8 | 12.7 | 3.0 | 0.5 | 100.0 | |
| **Q11** | Count | 43 | 97 | 176 | 172 | 109 | 597 | 3.00 |
| | % of Total | 7.2 | 16.2 | 29.5 | 28.8 | 18.3 | 100.0 | |
| **Q12** | Count | 53 | 151 | 189 | 130 | 74 | 597 | 3.00 |
| | % of Total | 8.9 | 25.3 | 31.7 | 21.8 | 12.4 | 100.0 | |
| **Q13** | Count | 68 | 178 | 199 | 102 | 50 | 597 | 3.00 |
| | % of Total | 11.4 | 29.8 | 33.3 | 17.1 | 8.4 | 100.0 | |
| **Q14** | Count | 60 | 157 | 175 | 119 | 86 | 597 | 3.00 |
| | % of Total | 10.1 | 26.3 | 29.3 | 19.9 | 14.4 | 100.0 | |
| **Q15** | Count | 72 | 189 | 182 | 110 | 44 | 597 | 3.00 |
| | % of Total | 12.1 | 31.7 | 30.5 | 18.4 | 7.4 | 100.0 | |

**Descriptive statistics results obtained by participants' responses with respect to Q 8 to Q 15; Median scored on Likert scale: 1=Very Often to 5=Never.**

As it can be seen from Table 5.2, the participants had a positive view on the overall Web adoption. They claimed that the Web was often used to support students' learning in their courses (Q8, median value = 2.00). They also agreed that the Web was often used for the purposes of communication (Q9, median value = 2.00) and finding learning materials (Q10, median value = 2.00). Interestingly, the participants' views on Q11, Q12, Q13, Q14 and Q15 were divided (median values = 3.00). Therefore, further analysis was conducted to identify factors that have influenced their views on these questions. The Kruskal-Wallis test was chosen to examine whether these questions were associated with their personal and academic background.

*5.3.1.1 Analysis of Q11*

Kruskal-Wallis tests were performed on Q11 by the five factors which may be influential to the participants' responses. The results indicate that gender ($\chi$= 1.068, df = 1, p-value = 0.301 > 0.05), length of studying/teaching at the university ($\chi$ = 0.415, df = 2, p-value = 0.813 > 0.05) and IT skills ($\chi$ = 5.194, df = 4, p-value = 0.268 > 0.05) do not correlate with the participants' adoption of online discussions (As shown in Appendix 4). However, their responses are significantly associated to their occupation ($\chi$ = 11.378, df = 1, p-value = 0.001 < 0.05) and academic faculty ($\chi$ = 49.114, df = 3, p-value = 0.000 < 0.05). The significant results obtained from the tests are shown below:

Table 5.3. *Kruskal-Wallis test on Q11 "How often do you participate in online discussions in your course?" by occupation*

| Occupation | N | Mean Rank | Median |
|---|---|---|---|
| 1 Student | 500 | 309.17 | 3.00 |
| 2 Teaching staff | 97 | 246.59 | 3.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 11.378, df = 1, p-value = 0.001 < 0.05** | | | |

According to Pallant (2005, 2007), a statistically significant difference is indicated in the continues variable if the significance level is a value less than 0.05. In the output presented above, the significance level is 0.001 which is less than the alpha level of 0.05. Therefore, the result suggests that there is a significant difference in the teaching staff and students' participations in online discussions. An inspection of the mean ranks suggests that the teaching staff group (mean rank = 246.59) participated in online discussions more frequently than the student group (mean rank = 309.17), although both group recorded a same median score of 3.00. According to Pallant (2007), effective size (r value) should be pursued to obtain a standardised measure of the size researcher observed which can be compared to other studies. In this case, the r value 0.14 is considered as a small effect size (J. W. Cohen, 1988).

Table 5.4. *Kruskal-Wallis test on Q11 "How often do you participate in online discussions in your course?" by academic faculty*

| Academic faculty | N | Mean Rank | Median |
|---|---|---|---|
| 1 Education & Arts | 145 | 343.53 | 4.00 |
| 2 Science/Computing/Engineering & AMC | 188 | 340.07 | 4.00 |
| 3 Health Science | 113 | 251.31 | 3.00 |
| 4 Business & Law | 151 | 240.80 | 3.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 49.114, df = 3, p-value = 0.000 < 0.05** | | | |

The above table shows the output of Kruskal-Wallis test on Q11 by academic faculty. The results indicate that the significance level is 0.000 which is less than the alpha level of 0.05. Therefore, it suggests a statistical significant difference in the frequency of Web adoption as a discussion tool across the different academic areas (Kinnear & Gray, 2009). An examination of the mean ranks indicates that the Business and Law Faculties (mean rank = 240.80) used the Web highest frequency for the purpose of discussion, while the Education and Arts Faculties (mean rank = 343.53) reported the lowest. In addition, to find out which groups are statistically significantly different from one another, follow-up Mann-Whitney U tests were performed between all the groups. No difference appeared in the adoption of online discussions between the groups of Education & Arts and Science/Computing/Engineering & AMC (U = 13357.5, r = 0.02, p-value = 0.745 > 0.05), or between the groups of Health Science and Business & Law (U = 8194.0, r = 0.04, p-value = 0.568 > 0.05). However, statistical significant differences were found between the following groups:

- Education & Arts and Health Science (U = 5681.5, r = 0.27, p-value = 0.000 < 0.05);
- Education & Arts and Business & Law (U = 7274.5, r = 0.30, p-value = 0.000 < 0.05);
- Science/Computing/Engineering & AMC and Health Science (U = 7406.0, r = 0.26, p-value = 0.000 < 0.05);
- Science/Computing/Engineering & AMC and Business & Law (U = 9416.5, r = 0.30, p-value = 0.000 < 0.05).

This can also be seen from the median value of the groups. The Education and Arts Faculties, the Science, Computing and Engineering Faculty and AMC recorded a median score of 4.00, which is higher than the median value of 3.00 reported by the Faculty of Health Science and the Faculties of Business and Law. This means that the first two groups had less participation in online discussions than the other two groups.

### *5.3.1.2 Analysis of Q12*

Kruskal-Wallis tests were performed on Q12 by the five factors: occupation, gender, academic faculty, length of studying/teaching and knowledge of IT. Most of these factors, including occupation ($\chi$= 1.101, df = 1, p-value = 0.294 > 0.05), gender ($\chi$= 0.087, df = 1, p-value = 0.768 > 0.05), length of studying/teaching at the university ($\chi$ = 1.786, df = 2, p-value = 0.409 > 0.05) and knowledge of IT ($\chi$ = 0.351, df = 4, p-value = 0.986 > 0.05), do not correlate with the participants' views on this question (As shown in Appendix 4). However, the responses are significantly correlated to their academic faculty ($\chi$ = 34.164, df = 3, p-value = 0.000 < 0.05). The output of the test is shown below:

Table 5.5. *Kruskal-Wallis test on Q12 "How often do you get feedback via the Web in your course?" by academic faculty*

| Academic faculty | N | Mean Rank | Median |
|---|---|---|---|
| 1 Education & Arts | 145 | 355.62 | 4.00 |
| 2 Science/Computing/Engineering & AMC | 188 | 313.37 | 3.00 |
| 3 Health Science | 113 | 257.75 | 3.00 |
| 4 Business & Law | 151 | 257.61 | 3.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 34.164, df = 3, p-value = 0.000 < 0.05** | | | |

The result of the Kruskal-Wallis test indicates that the significance level is 0.000 which is less than the alpha level of 0.05. Therefore, there is a statistically significant difference in the frequency of obtaining feedback via the Web across different academic areas (Kinnear & Gray, 2009). An inspection of the mean ranks suggests that the Business and Law Faculties (mean rank = 257.61) used the Web most frequently for getting feedback, with the Education and Arts Faculties (mean rank = 355.62) reporting the least. Follow-up Mann-Whitney U tests were then conducted between all the groups to investigate which groups are statistically significantly different from one another. No difference were found in how frequent participant get online feedback between the groups of Health Science and Business & Law (U = 8463.0, r = 0.007, p-value = 0.907 > 0.05). However, statistically significant differences were found between the following groups:

- Education & Arts and Science/Computing/Engineering & AMC (U = 11738.0, r = 0.12, p-value = 0.026 < 0.05);
- Education & Arts and Health Science (U = 5433.5, r = 0.30, p-value = 0.000 < 0.05);
- Education & Arts and Business & Law (U = 7389.0, r = 0.29, p-value = 0.000 < 0.05);
- Science/Computing/Engineering & AMC and Health Science (U = 8651.0, r = 0.16, p-value = 0.005 < 0.05);
- Science/Computing/Engineering & AMC and Business & Law (U = 11571.5, r = 0.16, p-value = 0.003 < 0.05).

This result is supported by the median values of the academic groups. The Education and Arts Faculties recorded a median score of 4.00, which is higher than the median value of 3.00 reported by the other three groups. This means that the participants in the Education and Arts Faculties had fewer opportunities to give/receive online feedback than the other three groups.

#### *5.3.1.3 Analysis of Q13*

Kruskal-Wallis test was performed on Q13 by the five factors mentioned. Amongst all these factors, gender ($\chi$= 0.360, df = 1, p-value = 0.548 > 0.05), academic faculty ($\chi$ = 6.210, df = 3, p-value = 0.102 > 0.05), length of studying/teaching at the university ($\chi$ = 4.490, df = 2, p-value = 0.106 > 0.05) and knowledge of IT ($\chi$ = 9.387, df = 4, p-value = 0.052 > 0.05) do not correlate with the participants' views on this question (As shown in Appendix 4). Occupation ($\chi$= 33.021, df = 1, p-value = 0.000 < 0.05) is the only factor that is significantly correlated to their responses on this question. The result is shown in Table 5.6 on the following page:

Table 5.6. *Kruskal-Wallis test on Q13 "How often do you share learning resources via the Web with other/your students?" by occupation*

| Academic faculty | N | Mean Rank | Median |
|---|---|---|---|
| 1 Student | 500 | 316.23 | 3.00 |
| 2 Teaching staff | 97 | 210.21 | 2.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 33.021, df = 1, p-value = 0.000 < 0.05** | | | |

In the output presented above, the significance level is 0.000 which is less than the alpha level of 0.05. This indicates a statistical difference in the behaviours of students and teaching staff in sharing learning resources via the Web (Kinnear & Gray, 2009). An inspection of the mean ranks suggests that the teaching staff group (mean rank = 210.21) used the Web more frequently to share learning resources than the student group (mean rank = 316.23). This is also evident in the median scores in which the teaching staff reported a value of 2.00 while the student group reported a larger value of 3.00. The r value 0.23 is between the small effect size of 0.1 and the medium effect size of 0.3 (J. W. Cohen, 1988).

#### *5.3.1.4 Analysis of Q14*

Kruskal-Wallis tests were also conducted on Q14 by the five factors mentioned previously. The results suggest that three of the factors are correlated to the participants' responses on this question. These factors include occupation ($\chi$= 10.357, df = 1, p-value = 0.001 < 0.05), academic faculty ($\chi$ = 75.214, df = 3, p-value = 0.000 < 0.05) and length of studying/teaching at the university ($\chi$ = 7.670, df = 2, p-value = 0.022 < 0.05). The other two factors, gender ($\chi$= 0.488, df = 1, p-value = 0.485 > 0.05) and knowledge of IT ($\chi$ = 1.479, df = 4, p-value = 0.830 > 0.05) do not correlate with the participant responses (As shown in Appendix 4).The results that show the significances are introduced below:

Table 5.7. *Kruskal-Wallis test on Q14 "How often is the Web used as an assessment tool in your course?" by occupation*

| Occupation | N | Mean Rank | Median |
|---|---|---|---|
| 1 Student | 500 | 289.27 | 3.00 |
| 2 Teaching staff | 97 | 349.13 | 3.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 10.357, df = 1, p-value = 0.001 < 0.05** | | | |

As it can be seen from the table above, the significance level obtained is 0.001 which is less than the alpha level of 0.05. There is a statistical difference in the behaviours of students and teaching staff in using the Web as an assessment tool (Kinnear & Gray, 2009). An inspection of the mean ranks suggests that the student group (mean rank = 289.27) used the Web more frequently for the purpose of assessing learning than the teaching staff group (mean rank = 349.13), although both participant groups recorded a same median score of 3.00. The r value 0.13 is considered to be a small effect size (J. W. Cohen, 1988).

Table 5.8. *Kruskal-Wallis test on Q14 "How often is the Web used as an assessment tool in your course?" by academic faculty*

| Academic faculty | N | Mean Rank | Median |
|---|---|---|---|
| 1 Education & Arts | 145 | 381.48 | 4.00 |
| 2 Science/Computing/Engineering & AMC | 188 | 322.22 | 3.00 |
| 3 Health Science | 113 | 246.35 | 3.00 |
| 4 Business & Law | 151 | 230.29 | 3.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 75.214, df = 3, p-value = 0.000 < 0.05** | | | |

Table 5.8 shows the result obtained from the Kruskal-Wallis test on Q14 by academic faculty. It suggests a significance level of 0.000 which indicates a statistically significant difference in the frequency of Web adoption as an assessment tool across the four academic areas (Kinnear & Gray, 2009; Pallant, 2007). An examination of the mean ranks suggests that the Business and Law Faculties (mean rank = 230.29) used the Web most frequently for assessing learning, while the Education and Arts Faculties (mean rank = 381.48) reported the least. Furthermore, follow-up Mann-Whitney U tests were performed between all the groups to investigate which groups were statistically significantly different from one another. No differences were found in how frequently participants used online assessment tools between the groups of Health Science and Business & Law (U = 8018.5, r = 0.05, p-value = 0.380 > 0.05). However, statistically significant differences were found between the following groups:

- Education & Arts and Science/Computing/Engineering & AMC (U = 11046.5, r = 0.17, p-value = 0.002 < 0.05);

- Education & Arts and Health Science (U = 4398.0, r = 0.41, p-value = 0.000 < 0.05);
- Education & Arts and Business & Law (U = 5365.5, r = 0.45, p-value = 0.000 < 0.05);
- Science/Computing/Engineering & AMC and Health Science (U = 7954.0, r = 0.22, p-value = 0.000 < 0.05);
- Science/Computing/Engineering & AMC and Business & Law (U = 9914.0, r = 0.27, p-value = 0.000 < 0.05).

This is also evident in the median value obtained. The Education and Arts Faculties recorded a median score of 4.00, which is higher than the median value of 3.00 reported by the other three groups. This means that the participants in the Education and Arts Faculties used the Web as an assessment tool less than the other groups.

Table 5.9. *Kruskal-Wallis test on Q14 "How often is the Web used as an assessment tool in your course?" by length of studying/teaching*

| Length of studying/teaching | N | Mean Rank | Median |
|---|---|---|---|
| 1 Less than one year | 118 | 291.09 | 3.00 |
| 2 Over one year to three years | 308 | 285.48 | 3.00 |
| 3 Over three years | 171 | 328.80 | 3.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 7.670, df = 2, p-value = 0.022 < 0.05** | | | |

The result obtained from the Kruskal-Wallis test also showed statistically significant difference in the frequency of Web adoption to assess learning between the participant groups who had been studying/teaching at the university for different lengths of period ($\chi$ = 7.670, df = 2, p-value = 0.022 < 0.05) (Kinnear & Gray, 2009). An investigation of the mean ranks suggests that the Over one year to three years group (mean rank = 285.48) used the Web most frequently for the purpose of getting/receiving feedback, while the Over three years group (mean rank = 328.80) reporting the least. To find out which groups were statistically significantly different from one another, follow-up Mann-Whitney U tests were performed between all the groups. Differences were found between the groups of Over one year to three years and Over three years (U = 22.503.5, r = 0.12, p-value = 0.007 < 0.05), although all the participant groups recorded a same median score of 3.00. However, no difference were found in how frequent the participants adopted online assessment tools between the group of Less than one year and the group of Over one year to three years ($U = 17839.0$, $r = 0.01$, p-value = 0.763 > 0.05), or between the group of Less than one year and the group of Over three years ($U = 8823.0$, $r = 0.11$, p-value = 0.062 > 0.05).

### *5.3.1.5 Analysis of Q15*

Kruskal-Wallis tests were also performed on Q15 by the five factors which may be influential to the participants' responses. It is shown in the results that only the academic faculties appeared to be correlating to the participants' views on this question ($\chi$= 19.720, df = 3, p-value = 0.000 < 0.05). The other factors, including occupation ($\chi$= 0.595, df = 1, p-value = 0.440 > 0.05), gender ($\chi$= 1.236, df = 1, p-value = 0.266 > 0.05), length of studying/teaching at the university ($\chi$ = 0.355, df = 2, p-value = 0.0.837 > 0.05) and knowledge of IT ($\chi$ = 7.517, df = 4, p-value = 0.111 > 0.05), do not correlate with their responses (As shown in Appendix 4).The result that shows the significance is introduced below:

Table 5.10. *Kruskal-Wallis test on Q15 "How often is the Web used as a management tool in your course?" by academic faculty*

| Academic faculty | N | Mean Rank | Median |
|---|---|---|---|
| 1 Education & Arts | 145 | 341.73 | 3.00 |
| 2 Science/Computing/Engineering & AMC | 188 | 306.14 | 3.00 |
| 3 Health Science | 113 | 287.42 | 3.00 |
| 4 Business & Law | 151 | 257.75 | 2.00 |
| Total | 597 | | 3.00 |
| **Chi-Square value = 19.720, df = 3, p-value = 0.000 < 0.05** | | | |

As it can be seen from the above table, the significance level is 0.000 which suggests a statistically significant difference in the frequency of Web adoption as a management tool across the four academic areas (Kinnear & Gray, 2009; Pallant, 2007). An investigation of the mean ranks indicates that the Business and Law Faculties (mean rank = 257.75) used the Web most frequently for the purpose of managing learning/teaching, while the Education and Arts Faculties (mean rank = 341.73) reporting the least. Furthermore, follow-up Mann-Whitney U tests were performed between all the groups to investigate which groups were statistically significantly different from one another. No difference were found in how frequent participant used online management tools between the groups of Education & Art and Science/Computing/Engineering & AMC (U = 12011.0, r = 0.10, p-value = 0.055 > 0.05), the groups of Science/Computing/Engineering & AMC and Health Science (U = 9954.5, r = 0.05, p-value = 0.345 > 0.05), or between the groups of Health Science and Business & Law (U = 7697.5, r = 0.09, p-value = 0.157 > 0.05). However, statistically significant differences were found between the following groups:

- Education & Arts and Health Science (U = 6717.0, r = 0.16, p-value = 0.010 < 0.05);
- Education & Arts and Business & Law (U = 7845.5, r = 0.25, p-value = 0.000 < 0.05);
- Science/Computing/Engineering & AMC and Business & Law (U = 11901.0, r = 0.14, p-value = 0.008 < 0.05).

This can also be seen from the median value obtained. The Business and Law Faculties recorded a median score of 2.00, which is higher than the median value of 3.00 reported by the other three groups. This indicates that the participants in the Business and Law Faculties used the Web more frequently as a management tool than the other groups.

### 5.3.2 The Web as a social enhancement

Part C of the questionnaire has 6 questions which emphasis the significance of the Web as a social enhancement platform. Firstly, frequencies and median values were pursued to investigate whether there was a statically significant difference in the views of different participant groups on these questions. Kruskal-Wallis tests were performed on Q18, which had obtained divided answers (median value = 3.00) from the participants, to find out whether their occupation, gender, academic faculty, length of studying/teaching and knowledge of IT were associated with their views on the Web as a social enhancement. The questions examined within this section are listed below:

Q16. Web-based learning can replace face-to-face learning.

Q17. Learning via the Web is more motivating than learning face-to-face.

Q18. Web-based learning enhances interpersonal relationships between lecturers and students.

Q19. Online communication among students and lecturers is more effective than face-to-face communication.

Q20. Web-based learning can provide good facilities for interacting with lecturers and other students.

Q21. Web-based learning lacks interpersonal interactions.

Table 5.11. *Frequencies and median values obtained on Q16 to Q21*

| | | SA | A | N | D | SD | Total | Median |
|---|---|---|---|---|---|---|---|---|
| **Q16** | Count | 32 | 91 | 111 | 196 | 171 | 601 | 4.00 |
| | % of Total | 5.3 | 15.1 | 18.5 | 32.6 | 28.5 | 100.0 | |
| **Q17** | Count | 17 | 57 | 137 | 239 | 151 | 601 | 4.00 |
| | % of Total | 2.8 | 9.5 | 22.8 | 39.8 | 25.1 | 100.0 | |
| **Q18** | Count | 20 | 138 | 170 | 205 | 69 | 602 | 3.00 |
| | % of Total | 3.3 | 22.9 | 28.2 | 34.1 | 11.5 | 100.0 | |
| **Q19** | Count | 21 | 99 | 140 | 226 | 115 | 601 | 4.00 |
| | % of Total | 3.5 | 16.5 | 23.3 | 37.6 | 19.1 | 100.0 | |
| **Q20** | Count | 52 | 342 | 135 | 63 | 10 | 602 | 2.00 |
| | % of Total | 8.6 | 56.8 | 22.4 | 10.5 | 1.7 | 100.0 | |
| **Q21** | Count | 126 | 295 | 123 | 49 | 9 | 602 | 2.00 |
| | % of Total | 20.9 | 49.0 | 20.4 | 8.1 | 1.5 | 100.0 | |
| **Descriptive statistics results obtained by participants' responses with respect to Q 16 to Q 21; Median scored on Likert scale: 1=Strongly Agree to 5=Strongly Disagree.** | | | | | | | | |

Table 5.11 above shows the descriptive statistical results obtained in relation to the participants' views on the questions in this section. Generally, the participants agreed that Web-based learning can provide good facilities for learners to interact with lecturers and other students (Q20, median value = 2.00). However, these participants disagreed that web-based education can replace face-to-face learning (Q16, median value = 4.00) or learning via the Web can be motivating than learning face-to-face (Q17, median value = 4.00). In addition, their views on online communication are also negative. This means that communicating via the Web is less effective than face-to-face communication (Q19, median value = 4.00).

It is important to mention that Q18 and Q21 were designed to have opposite meanings. This means that if the "1 = strongly agree" option is selected in Q18, the "5 = strongly disagree" option should be selected in Q21. Interestingly, the participants' views are positive on Q21 (median value = 2.00) which states that web-based learning lacks interpersonal interactions. However, their responses to Q18 (median value = 3.00) are divided. Therefore, further analysis was conducted to investigate the possible factors that had influenced their answers. An adoption of Kruskal-Wallis test found out that these participants' views are not associated with their gender ($\chi$ = 1.311, df = 1, p-value = 0.252 > 0.05) or knowledge of IT ($\chi$ = 7.395, df = 4, p-value = 0.117 > 0.05) (As shown in Appendix 4). However, their responses are strongly correlated to their occupation ($\chi$ = 7.036, df = 1, p-value = 0.008 < 0.05), academic faculty ($\chi$ = 15.674, df = 3, p-value = 0.001 < 0.05) and length of studying/teaching at the university ($\chi$ = 12.253, df = 2, p-value = 0.002 < 0.05). The significant results are presented in Table 5.12 below.

Table 5.12. *Kruskal-Wallis test on Q18 "Web-based learning enhances interpersonal relationships between lecturers and students." by occupation*

| Occupation | N | Mean Rank | Median |
|---|---|---|---|
| 1 Student | 502 | 293.43 | 3.00 |
| 2 Teaching staff | 100 | 342.01 | 4.00 |
| Total | 602 | | 3.00 |
| **Chi-Square value = 7.036, df = 1, p-value = 0.008 < 0.05** | | | |

As it can be seen from the above table, the significance level obtained is 0.008 which is less than the alpha level of 0.05. Therefore, there is a statistical difference in the views of students and teaching staff on the Web as a tool to enhance interpersonal relationships (Kinnear & Gray, 2009; Pallant, 2005, 2007). An inspection of the mean ranks suggests that the student group (mean rank = 293.43) held a more positive view on this statement than the teaching staff group (mean rank = 342.01). This is evident in the median scores obtained, as the value of 3.00 recorded by the student group is less than the value of 4.00 reported by the staff group. The r value 0.11 is believed to be a small effect size (J. W. Cohen, 1988).

Table 5.13. *Kruskal-Wallis test on Q18 "Web-based learning enhances interpersonal relationships between lecturers and students." by academic faculty*

| Academic faculty | N | Mean Rank | Median |
|---|---|---|---|
| 1 Education & Arts | 146 | 315.59 | 3.00 |
| 2 Science/Computing/Engineering & AMC | 189 | 321.48 | 4.00 |
| 3 Health Science | 114 | 311.87 | 3.00 |
| 4 Business & Law | 153 | 255.65 | 3.00 |
| Total | 602 | | 3.00 |
| **Chi-Square value = 15.674, df = 3, p-value = 0.001 < 0.05** | | | |

The significance level 0.001 shown in the above output suggests a statistical significant difference in the participant views on the Web as an tool to enhance interpersonal relationships across different academic areas (Kinnear & Gray, 2009; Pallant, 2007). An investigation of the mean ranks indicates that the Business and Law Faculties (mean rank = 255.65) held the most positive view on this question, with the Education and Arts Faculties (mean rank = 315.59) reporting the least. In order to investigate which groups are statistically significantly different from one another, Mann-Whitney U tests were performed between all the groups. The results reported no difference in the responses between the groups of Education & Art and Science/Computing/Engineering & AMC (U = 13529.0, r = 0.02, p-value = 0.750 > 0.05), the groups of Education & Art and Health Science (U = 8224.0, r = 0.01, p-value = 0.865 > 0.05), or between the groups of Science/Computing/Engineering & AMC and Health Science (U = 10443.5, r = 0.03, p-value = 0.641 > 0.05). However, statistically significant differences were found between the following groups:

- Education & Arts and Business & Law (U = 8941.5, r = 0.18, p-value = 0.002 < 0.05);
- Science/Computing/Engineering & AMC and Business & Law (U = 11280.5, r = 0.20, p-value = 0.000 < 0.05).
- Health Science and Business & Law (U = 7111.5, r = 0.16, p-value = 0.007 < 0.05).

This can also be seen from the median value obtained. The Faculty of Science, Computing and Engineering and AMC recorded a median score of 4.00, which is higher than the median value of 3.00 reported by the other three groups. This indicates that the participants in this group hold a less positive view on this statement than the other groups.

Table 5.14. *Kruskal-Wallis test on Q18 "Web-based learning enhances interpersonal relationships between lecturers and students." by length of studying/teaching*

| Length of studying | N | Mean Rank | Median |
|---|---|---|---|
| 1 Less than one year | 119 | 272.86 | 3.00 |
| 2 Over one year to three years | 309 | 292.50 | 3.00 |
| 3 Over three years | 174 | 337.06 | 4.00 |
| Total | 602 | | 3.00 |
| **Chi-Square value = 12.253, df = 2, p-value = 0.002 < 0.05** | | | |

The result obtained from the Kruskal-Wallis test also shows that the length of studying/teaching is influential to their views on this question ($\chi$ = 12.253, df = 2, p-value = 0.002 < 0.05) (Kinnear & Gray, 2009). An examination of the mean ranks suggests that the Less than one year group (mean rank = 272.86) held a most positive view on the Web as an enhancement of interpersonal relationships, while the Over three years group (mean rank = 337.06) reported the least. Post hoc Mann-Whitney U tests were performed to investigate which groups were statistically significantly different from one another. Differences were found between the groups of Less than one year and Over three years (U = 8071.5, r = 0.19, p-value = 0.001 < 0.05) and the groups of Over one year to three years and Over three years (U = 22977.0, r = 0.12, p-value = 0.006 < 0.05). However, no difference were found in their views on this question between the groups of Less than one year and Over one year to three years (U = 17259.0, r = 0.06, p-value = 0.307 > 0.05). This result is supported by the median scores in which the group of Over three years recorded a higher value of 4.00 than the value of 3.00 reported by the other two groups. This indicates that this group held a less positive view on the Web as a tool for enhancing interpersonal relationships than the other groups.

As Q18 and Q21 were designed with opposite meanings, it was anticipated that these two questions should have a negative correlation. To investigate the direction and strength of the correlation, Spearman's Rank Order Correlation test was conducted. The result is shown in Table 5.15 on the following page.

Table 5.15. *Spearman's Rank Order Correlation test on Q18 Web-based learning enhances interpersonal relationships between lecturers and students. and Q21 Web-based learning lacks interpersonal interaction.*

| | | Q18 | Q21 |
|---|---|---|---|
| **Q18** | Correlation Coefficient | 1.000 | -0.377** |
| | Sig. (2-tailed) | Null | 0.000 |
| | N | 602 | 602 |
| **Q21** | Correlation Coefficient | -0.377** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 602 | 602 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

The correlation coefficient of Q18 and Q21 is -0.377, indicating a negative correlation between these two questions. This means that the stronger the participants' agreement is on Q18 (Web-based learning enhances interpersonal relationships between lecturers and students), the stronger they would disagree with Q21 (Web-based learning lacks interpersonal interactions). According to Cohen (1988), the strength of correlation of r is medium if r=0.30 to 0.49 or r=-0.30 to -0.49. Therefore, there is a medium correlation between the two variables shown. To get an idea of how much variance the two variables share, the r value was squared and converted to "percentage of variance" (Pallant, 2005, p. 127). The r value is 0.377, which when squared indicates 14.21% shared variance.

### 5.3.3 The Web and learners

Part D of the questionnaire has 10 questions which highlight the role of the Web as a tool in developing students' learning skills and facilitating students' learning practice. Similar to the other sections, frequencies and median values were pursued firstly to examine whether there was a statically significant difference in the views of different participant groups on these questions. The questions examined within this section are shown below:

Q22. The Web can provide useful ways of giving feedback to students.

Q23. The Web creates an interactive learning.

Q24. The Web can enhance independent learning.

Q25. The Web can accommodate learners with different learning styles.

Q26. The Web can accommodate learners with different cultural backgrounds.

Q27. The Web can encourage learners to take an active part in learning.

Q28. Web-based learning provides learners with great flexibility.

Q29. Using the Web can enhance students' learning outcomes.

Q30. The Web is helpful in developing students' problem-solving skills.

Q31. The Web provides an opportunity for collaborative leaning.

Table 5.16. *Frequencies and median values obtained on Q22 to Q31*

| | | SA | A | N | D | SD | Total | Median |
|---|---|---|---|---|---|---|---|---|
| **Q22** | Count | 112 | 305 | 139 | 42 | 3 | 601 | 2.00 |
| | % of Total | 18.6 | 50.7 | 23.1 | 7.0 | 0.5 | 100.0 | |
| **Q23** | Count | 52 | 310 | 166 | 68 | 6 | 602 | 2.00 |
| | % of Total | 8.6 | 51.5 | 27.6 | 11.3 | 1.0 | 100.0 | |
| **Q24** | Count | 111 | 392 | 79 | 16 | 4 | 602 | 2.00 |
| | % of Total | 18.4 | 65.1 | 13.0 | 2.7 | 0.7 | 100.0 | |
| **Q25** | Count | 87 | 349 | 120 | 35 | 11 | 602 | 2.00 |
| | % of Total | 14.5 | 58.0 | 19.9 | 5.8 | 1.8 | 100.0 | |
| **Q26** | Count | 88 | 361 | 120 | 27 | 4 | 600 | 2.00 |
| | % of Total | 14.7 | 60.2 | 20.0 | 4.5 | 0.7 | 100.0 | |
| **Q27** | Count | 56 | 330 | 155 | 56 | 5 | 602 | 2.00 |
| | % of Total | 9.3 | 54.8 | 25.7 | 9.3 | 0.8 | 100.0 | |
| **Q28** | Count | 142 | 356 | 81 | 21 | 2 | 602 | 2.00 |
| | % of Total | 23.6 | 59.1 | 13.5 | 3.5 | 0.3 | 100.0 | |
| **Q29** | Count | 59 | 325 | 193 | 22 | 2 | 601 | 2.00 |
| | % of Total | 9.8 | 54.1 | 32.1 | 3.7 | 0.3 | 100.0 | |
| **Q30** | Count | 95 | 253 | 200 | 44 | 4 | 596 | 2.00 |
| | % of Total | 15.9 | 42.4 | 33.6 | 7.4 | 0.7 | 100.0 | |
| **Q31** | Count | 109 | 287 | 146 | 51 | 6 | 599 | 2.00 |
| | % of Total | 18.2 | 47.9 | 24.4 | 8.5 | 1.0 | 100.0 | |
| **Descriptive statistics results obtained by participants' responses with respect to Q 22 to Q 31; Median scored on Likert scale: 1=Strongly Agree to 5=Strongly Disagree.** | | | | | | | | |

The descriptive statistics showed a high degree of agreement of the participants in this section. From Table 5.16 it can be seen that the participants had a positive view on all the statements. For example, they supported that the Web can provide useful ways of giving feedback to students (Q22, median value = 2.00) and create an interactive learning (Q23, median value = 2.00). They also agreed that the Web can enhance independent learning (Q24, median value = 2.00), as well as accommodate learners with different learning styles (Q25, median value = 2.00) and cultural backgrounds (Q26, median value = 2.00). In addition, the participant responses to the other statements were also positive. They supported that the Web can encourage learners to take an active role in learning (Q27, median value = 2.00) and web-based learning provides learners with great flexibility (Q28, median value = 2.00). They also agreed that using the Web can enhance students' learning outcomes (Q29, median value = 2.00) and the Web is helpful in developing students' problem-solving skills (Q30, median value = 2.00). Lastly, they claimed that the Web provides an opportunity for collaborative leaning (Q31, median value = 2.00). The high degree of agreement suggests that there is no need for further investigations or tests.

### 5.3.4 The Web as a teaching and learning resource

Part E of the questionnaire has only 4 questions which focus on the significance of the Web as a teaching and learning resource. Frequencies and median values were pursued to examine whether there was a statically significant difference in the views of different participant groups on the question items within this section. The questions are listed below:

Q32. The Web is a good tool for teaching and learning.

Q33. The Web can provide good facilities for exploring in learning.

Q34. The Web provides powerful resources for gaining academic knowledge.

Q35. The Web can provide useful ways of assessing students' learning.

Table 5.17. *Frequencies and median values obtained on Q32 to Q35*

| | | SA | A | N | D | SD | Total | Median |
|---|---|---|---|---|---|---|---|---|
| **Q32** | Count | 239 | 311 | 38 | 10 | 4 | 602 | 2.00 |
| | % of Total | 39.7 | 51.7 | 6.3 | 1.7 | 0.7 | 100.0 | |
| **Q33** | Count | 240 | 333 | 22 | 6 | 1 | 602 | 2.00 |
| | % of Total | 39.9 | 55.3 | 3.7 | 1.0 | 0.2 | 100.0 | |
| **Q34** | Count | 232 | 301 | 61 | 7 | 1 | 602 | 2.00 |
| | % of Total | 38.5 | 50.0 | 10.1 | 1.2 | 0.2 | 100.0 | |
| **Q35** | Count | 127 | 270 | 175 | 25 | 3 | 600 | 2.00 |
| | % of Total | 21.2 | 45.0 | 29.2 | 4.2 | 0.5 | 100.0 | |

**Descriptive statistics results obtained by participants' responses with respect to Q 32 to Q 35; Median scored on Likert scale: 1=Strongly Agree to 5=Strongly Disagree.**

Table 5.17 provides the descriptive statistical results obtained on the participants' views on the Web as a teaching and learning resource. It is indicated in the above table that the participants had an agreement on the Web as a good tool for teaching and learning (Q32, median value = 2.00). They also supported that the Web can provide good facilities for exploring in learning (Q33, median value = 2.00) and powerful resources for gaining academic knowledge (Q34, median value = 2.00). Lastly, the participants agreed that the Web can provide useful ways of assessing student learning (Q35, median value = 2.00).

### 5.3.5 Effectiveness of the MyLO system in different academic areas

Part F of the questionnaire has 7 questions which investigate the end-users' views and usage of the My Learning Online (MyLO) system adopted in all faculties at the University of Tasmania. Similar to the previous sections, frequencies and median values were pursued to investigate whether the views of different participant groups were statically significantly different. The questions examined within this section are listed below:

Q36. Every course should include MyLO in teaching and learning.

Q37. Lecturers use the MyLO system effectively in my course.

Q38. The MyLO system is learner-friendly.

Q39. Most functionalities of the MyLO system are useful.

Q40. The information in my course can be easily found on the MyLO system.

Q41. Many learning tasks are done via the MyLO system in my course.

Q42. The MyLO system can replace face-to-face learning.

Table 5.18. *Frequencies and median values obtained on Q36 to Q42*

| | | SA | A | N | D | SD | Total | Median |
|---|---|---|---|---|---|---|---|---|
| **Q36** | Count | 208 | 231 | 96 | 28 | 10 | 573 | 2.00 |
| | % of Total | 36.3 | 40.3 | 16.8 | 4.9 | 1.7 | 100.0 | |
| **Q37** | Count | 106 | 283 | 118 | 51 | 15 | 573 | 2.00 |
| | % of Total | 18.5 | 49.4 | 20.6 | 8.9 | 2.6 | 100.0 | |
| **Q38** | Count | 92 | 295 | 107 | 62 | 17 | 573 | 2.00 |
| | % of Total | 16.1 | 51.5 | 18.7 | 10.8 | 3.0 | 100.0 | |
| **Q39** | Count | 80 | 327 | 112 | 44 | 10 | 573 | 2.00 |
| | % of Total | 14.0 | 57.1 | 19.5 | 7.7 | 1.7 | 100.0 | |
| **Q40** | Count | 77 | 264 | 160 | 52 | 20 | 573 | 2.00 |
| | % of Total | 13.4 | 46.1 | 27.9 | 9.1 | 3.5 | 100.0 | |

| | | SA | A | N | D | SD | Total | Median |
|---|---|---|---|---|---|---|---|---|
| **Q41** | Count | 65 | 232 | 149 | 94 | 33 | 573 | 2.00 |
| | % of Total | 11.3 | 40.5 | 26.0 | 16.4 | 5.8 | 100.0 | |
| **Q42** | Count | 20 | 74 | 98 | 170 | 211 | 573 | 4.00 |
| | % of Total | 3.5 | 12.9 | 17.1 | 29.7 | 36.8 | 100.0 | |

**Descriptive statistics results obtained by participants' responses with respect to Q 36 to Q 42; Median scored on Likert scale: 1=Strongly Agree to 5=Strongly Disagree.**

As shown in Table 5.18, the participants had a positive view on the effectiveness of the MyLO system. The data show a high degree of agreement on most of these statements at 95% confidence interval. The participants agreed that every course should include MyLO in teaching and learning (Q36, median value = 2.00) and the lecturers in their own courses perform satisfactorily on adopting MyLO (Q37, median value = 2.00). In addition, they held a positive view on the learner-friendliness (Q38, median value = 2.00) and the functionalities of MyLO (Q39, median value = 2.00), the ability of information delivery of MyLO (Q40, median value = 2.00), as well as the involvement of MyLO in their own courses (Q41, median value = 2.00). However, a disagreement was shown on Q42 (median value = 4.00). This means that face-to-face learning was seen as the preferred mode and was believed to be more effective.

### 5.3.6 Relationships between the participants' behaviours and views

It was anticipated that the participants' views and their behaviours in web-based learning were positively inter-related. That is, their adoptions of web-based applications were influenced by the way in which they viewed the Web as a learning resource. Relatively, their views would also be affected by their behaviours in web-based learning. Therefore, each question in Part B had a question designed accordingly in Part C, D or E. It was a hypothesis that each pair of questions should have a positive inter-correlation. These correlations were examined using the Spearman's Rank Order Correlation test. The results of the tests, including the strengths and directions of correlations and shared variance, are introduced on the following page.

Table 5.19. *Spearman's Rank Order Correlation test on*

*Q8 How often is the Web used to support students' learning in your course? and*

*Q32 The Web is a good tool for teaching and learning.*

| | | Q8 | Q32 |
|---|---|---|---|
| **Q8** | Correlation Coefficient | 1.000 | 0.260** |
| | Sig. (2-tailed) | Null | 0.000 |
| | N | 598 | 598 |
| **Q32** | Correlation Coefficient | 0.260** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 598 | 602 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

Table 5.19 above indicates that the correlation coefficient is 0.260, suggesting a positive correlation between Q8 and Q32. This means that the more frequently the Web is used to support students' learning, the more positively the participants view the Web as a teaching and learning tool. According to Cohen (1988), the strength of correlation of r is small if r=0.10 to 0.29 or r=-0.10 to -0.29. In this case, the r value 0.260 indicates a small correlation between the two variables shown. To get an idea of how much variance the two variables share, the r value was squared and converted to "percentage of variance" (Pallant, 2005, p. 127). The r value is 0.260, which when squared indicates 6.76% shared variance. The frequency of Web adoption to support students' learning helped to explain 6.76% of the variance in respondents' scores on how they viewed the Web as a teaching and learning tool.

Table 5.20. *Spearman's Rank Order Correlation test on*

*Q9 How often is the Web used as a communication tool in your study? and*

*Q20 Web-based learning can provide good facilities for interacting with lecturers and other students.*

| | | Q9 | Q18 |
|---|---|---|---|
| **Q9** | Correlation Coefficient | 1.000 | 0.145** |
| | Sig. (2-tailed) | Null | 0.000 |
| | N | 598 | 598 |
| **Q20** | Correlation Coefficient | 0.145** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 598 | 602 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

It is shown in Table 5.20 that the correlation coefficient is 0.145, indicating a positive correlation between Q9 and Q20. That is, the more frequently the Web is used as a communication tool, the more positively the respondents view the Web as a tool for providing interactive facilities. As 0.145 is between 0.10 and 0.29, there is a small correlation between the two variables shown (J. W. Cohen, 1988). The r value was then squared and converted to “percentage of variance” to calculate how much variance the two variables share (Pallant, 2005, p. 127). The r value is 0.145 which when squared indicates 2.10% shared variance. Therefore, the frequency of the Web adoption as a communication tool helped to explain 2.10% of the variance in respondents’ scores on the Web as a facilitator of interactive learning.

Table 5.21. *Spearman’s Rank Order Correlation test on*
*Q10 How often is the Web used to find reading materials for your study? and*
*Q34 The Web provides powerful resources for gaining academic knowledge.*

| | | Q10 | Q34 |
|---|---|---|---|
| **Q10** | Correlation Coefficient | 1.000 | 0.290** |
| | Sig. (2-tailed) | Null | 0.000 |
| | N | 598 | 598 |
| **Q34** | Correlation Coefficient | 0.290** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 598 | 602 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

From Table 5.21 it can be seen that the correlation coefficient is 0.290, indicating a positive correlation between Q10 and Q34. This suggests that the more frequently the participants use the Web to find reading materials, the more positive they view the Web as a resource for gaining academic knowledge. The r value in this case indicates a small correlation between the two variables (J. W. Cohen, 1988). The amount of variance these two variables shared was then pursued (Pallant, 2005). The r value is 0.290, which when squared indicates 8.41% shared variance. That is, the frequency of Web adoption for finding reading materials helped to explain 8.41% of the variance in respondents’ scores on how they viewed the Web as a resource for gaining academic knowledge.

Table 5.22. *Spearman's Rank Order Correlation test on*

*Q11 How often do you participate in online discussion in your study? and*

*Q27 The Web can encourage learners to take an active part in learning.*

| | | Q11 | Q27 |
|---|---|---|---|
| **Q11** | Correlation Coefficient | 1.000 | 0.157** |
| | Sig. (2-tailed) | Null | 0.000 |
| | N | 597 | 597 |
| **Q27** | Correlation Coefficient | 0.157** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 597 | 602 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

Table 5.22 shows that the correlation coefficient is 0.157 which indicates a positive correlation between Q11 and Q27. This means that the more frequently the respondents are involve in online discussions, the more positively they view the Web as a resource for engaging learners. Again, as the r value obtained is between 0.10 and 0.29, there is a small correlation between the two variables shown (J. W. Cohen, 1988). The r value is then squared and converted to "percentage of variance" to get an idea of the amount of variance the two variables share (Pallant, 2005, p. 127). The squared r value indicates 2.46% shared variance. Therefore, the frequency of participation in online discussion helped to explain 2.46% of the variance in the respondents' scores on how they view the Web as an encouragement for learners to take an active role in learning.

Table 5.23. *Spearman's Rank Order Correlation test on*

*Q12 How often do you get feedback via the Web for your study? and*

*Q22 The Web can provide useful ways of giving feedback to students.*

| | | Q12 | Q22 |
|---|---|---|---|
| **Q12** | Correlation Coefficient | 1.000 | 0.245** |
| | Sig. (2-tailed) | Null | 0.000 |
| | N | 597 | 596 |
| **Q22** | Correlation Coefficient | 0.245** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 596 | 601 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

The correlation coefficient shown in the table above is 0.245 which suggests a positive correlation between Q12 and Q22. This means that the more frequently online feedback is received, the more positive the participants view the Web as a useful way of giving feedback. The r value 0.245 is considered to be a small correlation between the two variables (J. W. Cohen, 1988). Here, the squared r value indicates 6.0% shared variance. The frequency of Web adoption for online feedback helped to explain 6.0% of the variance in respondents' scores on how they viewed the Web as a resource for giving/receiving feedback (Pallant, 2005).

Table 5.24. *Spearman's Rank Order Correlation test on*
*Q13 How often do you share learning resources via the Web with other students? and Q31 The Web provides an opportunity for collaborative learning.*

| | | Q13 | Q31 |
|---|---|---|---|
| **Q13** | Correlation Coefficient | 1.000 | 0.141** |
| | Sig. (2-tailed) | Null | 0.001 |
| | N | 597 | 594 |
| **Q31** | Correlation Coefficient | 0.141** | 1.000 |
| | Sig. (2-tailed) | 0.001 | Null |
| | N | 594 | 599 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

Table 5.24 indicates that the correlation coefficient of Q13 and Q31 is 0.141, indicating a positive correlation. That is, the more frequently the Web is used to share learning resources, the more positive the respondents view the Web as an opportunity for collaborative learning. The r value is between 0.10 and 0.29, and therefore the correlation between the two variables is considered to be small (J. W. Cohen, 1988). The r value 0.141 was then squared and converted to percentage. The result indicates 1.99% shared variance (Pallant, 2005). Therefore, the frequency of Web adoption to share learning resources helped to explain 1.99% of the variance in the participants' views on the Web as a collaboration tool.

Table 5.25. *Spearman's Rank Order Correlation test on*
*Q14 How often is the Web used as an assessment tool in your study? and*
*Q35 The Web can provide useful ways of assessing students' learning.*

| | | Q14 | Q35 |
|---|---|---|---|
| **Q14** | Correlation Coefficient | 1.000 | 0.212** |
| | Sig. (2-tailed) | Null | 0.000 |

| | | Q14 | Q35 |
|---|---|---|---|
| | N | 597 | 595 |
| **Q35** | Correlation Coefficient | 0.212** | 1.000 |
| | Sig. (2-tailed) | 0.000 | Null |
| | N | 595 | 600 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

It can be seen from Table 5.25 that the correlation coefficient is 0.212 which indicates a positive correlation between Q14 and Q35. This means that the more frequently the participants use the Web as an assessment tool, the more positively they would view the Web as a resource for assessing learning. The strength of correlation of r indicates a small correlation between the two variables (J. W. Cohen, 1988). Moreover, the r value 0.212 was squared and converted to percentage to pursue the amount of variance the two variables shared. Therefore, the frequency of the Web adoption as an assessment tool helped to explain 4.49% of the variance in respondents' scores on how they view the Web as a tool for assessing learning (Pallant, 2005).

Table 5.26. *Spearman's Rank Order Correlation test on*
*Q15 How often is the Web used as a management tool in your study? and*
*Q24 The Web can enhance independent learning.*

| | | Q15 | Q24 |
|---|---|---|---|
| **Q15** | Correlation Coefficient | 1.000 | 0.130** |
| | Sig. (2-tailed) | Null | 0.001 |
| | N | 597 | 597 |
| **Q24** | Correlation Coefficient | 0.130** | 1.000 |
| | Sig. (2-tailed) | 0.001 | Null |
| | N | 597 | 602 |
| ****. Correlation is significant at the 0.01 level (2-tailed).** | | | |

Lastly, Spearman's Rank Order Correlation test was conducted on Q15 and Q24 to calculate the strength of their relationship. The correlation coefficient suggested in the result is 0.130 which indicates a positive correlation between these two variables. This means that the more the Web is adopted as a management tool, the more positive the respondents would view the Web as an enhancement for independent learning. The r value 0.130 suggests a small correlation (J. W. Cohen, 1988). In addition, the amount of variance the two variables shared was pursued. It is indicated in the result that the frequency of Web adoption for the purpose of managing learning/teaching helped to explain 1.69% of the variance in the respondents' scores on how the Web is viewed as an enhancement of independent learning (Pallant, 2005).

## 5.5 Conclusion

The purpose of the chapter is to present the detailed process and results of the quantitative data analysis in this research. Prior to presenting the results of the analysis, the strategies and techniques used and the background of the sample population were discussed. The chapter introduced the results from the analysis of the scaled items within Part B to Part F against the independent variables within Part A of the questionnaire. As the data obtained were non-normally distributed, non-parametric data analysis techniques were adopted. Median values, frequencies and percentages were pursued to investigate whether statistically significant differences existed between different participant groups. Kruskal-Wallis tests Mann-Whitney U test were performed on some specific questions to examine the factors that had influenced the participants' answers and which respondent group significantly differed from other groups. Lastly, Spearman's Rank Order Correlation tests were used to examine the correlations between the participants' behaviours and views in web-based learning.

The following chapter will present the qualitative component which includes an analysis of the answers to the open-ended section of questionnaire as well as the interview transcripts. It will give a different type of insight and present the themes, categories and issues emerged from the qualitative stage. Compared to the numerical data, the data concerned within Chapter 6 are in a textual nature. Instead of looking at statistics and testing hypothesis, it intends to find out the emerging theories grounded in the participants' conversations. The eight categories emerged and examples of interview responses will be introduced in detail.

# Chapter 6: Qualitative Data Analysis

## 6.1 Introduction

The previous chapter has outlined the analysis process and results of the quantitative research stage. The data analysis found notable and statistical significance according to the participants' occupation, gender, academic faculty, length of studying/teaching at the university and knowledge of IT. This chapter, however, will focus on the analysis of the qualitative component of the data, including the participants' responses to the open-ended questionnaire section and the interview questions. These two components will be discussed as a whole as they are both a form of textual data. The theory underlying the qualitative data analysis was the constructivist grounded theory and thematic analysis (Charmaz, 2003, 2006) which indicated to a three-step coding approach (Sarantakos, 2005; Strauss & Corbin, 1998b). The NVivo software was used to assist the qualitative data analysis (Bazeley, 2007).

This chapter provides a descriptive discussion of the themes and categories that have emerged from the qualitative data analysis process. Eight emerging categories were generated. Some themes and categories happened to confirm and re-visit the issues emerged in the quantitative chapter; while the others were not featured in the previous chapter. Within these dominant themes, some issues seem to concern the participants more than the others. There are more data concerning some particular themes and categories. For instance, the category *Instrumentality of the Web*, which had 219 responses, was apparently concerned by the participants more than the last category *Adjustments made* which had 14 responses.

## 6.2 Qualitative data analysis

As introduced in Chapter 4, the interview questions were designed according to the five research objectives. Each set of question had ten items addressing one or more research objectives. Table 6.1 below gives the detail information about the question items and the objectives they addressed.

Table 6.1. *Research objectives, instruments and question items*

| Research objectives | Instruments | Question items |
|---|---|---|
| **Objective 1:** Views of students and teaching staff on the significance of the Web.<br>**Objective 3:** Differences in views of students and teaching staff on the use of the Web in teaching and learning. | Both sets of interview questions | Q1, Q2, Q3. |
| **Objective 2:** Ways in which the Web is used by students and teaching staff to facilitate learning. | Both sets of interview questions | Q4, Q5. |
| **Objective 4:** Evaluation of the web-based learning environments in different academic areas in the university. | Both sets of interview questions | Q6, Q7, Q9. |
| **Objective 5:** Providing recommendations for enhancing the web-based learning in a university context. | Both sets of interview questions | Q8, Q10. |
| | Open-ended questionnaire section | Open-ended question |

### 6.2.1 Qualitative analysis

Different from the quantitative data analysis, which followed a deductive method, the qualitative data analysis was moving towards an inductive direction (B. Johnson & Christensen, 2004). Instead of having hypotheses at the very beginning, the researcher generated theories from the participants' responses to the questions in the research instruments (Creswell, 2009). The focus of this stage maintained the reconstruction of meanings and interpretations in the participants' teaching and learning experiences in web-based education (Liamputtong & Ezzy, 2005). The qualitative data provided a much richer understanding and exploration of meanings on the base of the numerical data collected at the quantitative stage.

The qualitative data collected included the participant responses to the open-ended questionnaire section and the interview questions. Data in both components were textual. The audio taped interviews were made into transcripts and combined with the participants' answers to the open-ended question in the questionnaire. Instead of reading through the participants' responses line by line in a paper format, this process was conducted using the NVivo software. The researcher read through the opinions given by the students and staff and identified emerging theories within the texts. The analysis process was a theoretically saturated activity which depended upon the generation of research matters out of a particular theoretical orientation (Silverman, 2005). Within this process, theories existed as part of the entire process instead of preceding inquiry and discovery (Lichtman, 2010).

The theory underlying the qualitative data analysis process was the constructivist grounded theory and thematic analysis. It is a “general methodology for developing theory that is grounded in data systematically gathered and analysed” (Strauss & Corbin, 1998b, p. 158). This methodology involves three steps: sampling, coding and writing the theory (Flick, 2002, 2006a). This chapter focuses on the coding and writing theory steps which followed Strauss and Corbin’s (1990, 1994, 1998a, 1998b) three-step coding approach. Within this theory generation, the researcher read the textual data line-by-line, sometimes iteratively, to identify themes and categories that are grounded in the data. Afterwards, the concepts identified were linked into substantive and formal theories (Grbich, 2007; Ryan & Bernard, 2000), and formulated into a logical, systematic and explanatory scheme (Strauss & Corbin, 1998a). The rigorous steps ensured that the data was interpreted in a flexible but valid manner. The themes and core categories developed through the three step coding process are introduced in the following sections.

### 6.2.2 Participants and messages

The first component of the qualitative data, which is the participants’ responses to the open-ended questionnaire section, involved 197 participants, including 156 students and 41 teaching staff. Only one question was asked in this section: “Any comments/remarks you would like to make in regarding to the Web-based learning environment or the MyLO system?” The lengths of the messages ranged from only one sentence to two paragraphs with around 100 words in each paragraph. Most students and a few teaching staff participants chose to do the paper-based questionnaire; therefore, their responses were in writing and some of the massages contained spelling and grammatical errors. It was difficult to recognise or understand some of the hand writing massages when they were being transcribed into computers. However, despite the errors and differences in hand writings, most massages were easy to translate and understand. The number of participants of the open-ended section of the questionnaires across academic faculties/disciplines is summarised in Table 6.2:

Table 6.2. *Participants of the open-ended section of the questionnaire*

| Academic Faculty/Discipline | Students | Teaching staff |
|---|---|---|
| | n/ N | n/ N |
| Education & Arts | 56/170 | 16/31 |
| Science, Engineering, Technology & AMC | 31/123 | 14/24 |
| Health Science | 23/89 | 15/24 |
| Business & Law | 46/132 | 6/20 |
| **Total number of participants** | **156/502** | **41/100** |

The second component was the participants' responses in the semi-structured interviews. The 25 participants included 17 students and 8 lecturers from seven faculties/disciplines within the university. Two sets of questions were prepared to investigate these target users' views on the significance of the Web as well as the evaluations on the web-based learning environment in their own academic faculties/disciplines. The lengths of interviews ranged from 18 minutes to 37 minutes. The conversations between the researcher and the participants were guided by the pre-determined questions; however, the participants were allowed extra time to discuss about any particular question or experience if they wish to. Afterwards, the tape records of the interviews were transcribed into a textual format for further analysis. The number and academic backgrounds of the interview participants are summarised in Table 6.3.

Table 6.3. *Participants of semi-structured interviews*

| Faculty/Discipline | Students | Gender | Lecturers | Gender |
|---|---|---|---|---|
| Faculty of Arts | Student 1-A (U) | F | Lecturer 1-A | F |
| | Student 2-A (U) | M | | |
| Faculty of Business | Student 1-B (U) | M | Lecturer 1-B | M |
| | Student 2-B (P) | M | | |
| Faculty of Education | Student 1-E (U) | F | Lecturer 1-E | F |
| | Student 2-E (U) | F | Lecturer 2-E | M |
| | Student 3-E (P) | F | | |
| | Student 4-E (P) | F | | |
| | Student 5-E (GR) | F | | |
| | Student 6-E (GR) | M | | |

| Faculty/Discipline | Students | Gender | Lecturers | Gender |
|---|---|---|---|---|
| Faculty of Health Science | Student 1-HS (U) | M | Lecturer 1-HS | F |
| | Student 2-HS (GR) | F | | |
| Faculty of Law | Student 1-L (U) | M | Lecturer 1-L | M |
| Faculty of Science, Engineering & Technology | Student 1-SET (U) | M | Lecturer 1-SET | M |
| | Student 2-SET (GR) | F | | |
| Australian Maritime College | Student 1-AMC (U) | M | Lecturer 1-AMC | M |
| | Student 2-AMC (GR) | M | | |
| **U = Undergraduate; P = Postgraduate; GR = Graduate Research; F = Female; M = Male.** | | | | |

### 6.2.3 The coding processes

As the qualitative data analysis follows an inductive direction, the aim of this process was to generate theories from the information given by the participants in relation to their experiences, views and beliefs. A constructivist grounded theory and thematic analysis approach, which involved three coding stages, was adopted to identify the dominant discourses presented in the data (Charmaz, 2006). According to Charmaz (2006),

> A constructivist grounded theory approach places priority on the phenomena of study and sees both data and analysis as created from shared experiences and relationship with participants and other sources of data…Constructive grounded theory lies squarely in the interpretive tradition. Constructivists study how - and sometimes why - participants construct meanings and actions in specific situations. (p. 130)

In this study, the researcher interpreted the data by reading the raw data line-by-line, paragraph-by-paragraph, generated initial codes and themes, and then saw how theories evolved at the end of the coding process. Within the analysis, not only the codes were generated, by also the relationships among the codes/themes were examined. The initial codes obtained in the open coding process were grouped into themes in the axial coding step. These themes were then re-examined and re-grouped into categories in the last step: the selective coding. Meanings within the data and the relationships between different codes and themes were considered and discussed.

#### *6.2.3.1 Open coding*

The open coding was the first step in the three coding processes (Strauss & Corbin, 1990, 1998b). It was used to identify and label first-order concepts and substantive codes (Sarantakos, 2005). The researcher gained the initial codes through a line-by-line analysis of the raw data. That is, she stayed close to the data to construct meanings of participants' experiences (Charmaz, 2006). Initial codes emerged from the raw data of the staff and students' experiences in web-based learning and their views on the Web as a learning resource. In this process, the researcher firstly developed initial codes to classify the participants' responses, and then compared and labelled them with 61 open codes (As shown in Appendix 3). This analysis step was built on the researcher's personal experiences of research, teaching and learning and was only one representation of the data. Thus, these initial codes are only one possible interpretation of the data and therefore are open to reconstruction.

#### *6.2.3.2 Axial coding*

Axial coding is also named the "second pass" through the data (Neuman, 2006, p. 462). It is about moving towards the development of themes to identifying the axis of key concepts in analysis (Neuman, 2006). A feature of this process was that the researcher reviewed and re-examined the open codes, and elaborated the concepts represented in the themes. Understanding the classification of these themes in terms of certain conditions assisted in achieving the purpose of axial coding, which was to sort and organise a large amount of data and reassemble them in new ways (Creswell cited in Charmaz, 2006). The researcher worked in the light of the open coding process and asked questions about causes, consequences, conditions and other forms of the interconnections between the codes (Strauss & Corbin, 1990). Afterwards, themes were classified, specified and named "in terms of the conditions that give rise to it; the context in which it is embedded; the action/interaction strategies by which it is handled, managed, carried out; and the consequences of these strategies (Strauss & Corbin, 1990, p. 97)". The main themes emerged were incorporated in relation to the participants' experiences and views in web-based education. The axial coding process provided the researcher with a richer understanding of the particular phenomenon represented in the data. The open codes were reclassified into 37 themes (As shown in Appendix 3).

#### *6.2.3.3 Selective coding*

The last coding process is selective coding within which "themes are further summarised and selected and made into central phenomenon and major categories" (Sarantakos, 2005, p. 350). At this stage, the researcher compared and contrasted the themes obtained from the axial coding process, and organised the overall analysis around core generalisations and ideas (Neuman, 2003). The themes were further compared, contrasted and constructed into higher order core categories which were a higher level of abstraction of data analysis. The dominant categories were integrated as abstractly as possible, as "the higher the abstract level of the categories, the wider the applicability of the theory" (Bohm cited in Sarantakos, 2005, p. 350). Conditions which may influence the categories were considered, for example, instrumentality of the Web for different academic purposes and positive and negative experiences in web-based learning. According to these interrelations, the 37 themes were refined into 8 categories.

## 6.3 Results

At the end of the coding process, 8 categories were constructed from the participants' responses to the open-ended questionnaire section and the interview questions. These categories enabled the researcher to recognise dominant discourses surrounding the teaching staff and students experiences in web-based education. Also, the researcher started to observe these categories moving closely towards a grounded theory on how the participants view the significance of the Web within this particular university context. The following 8 categories are discussed in detail in this section.

1. Instrumentality of the Web (219 responses);
2. Evaluation of web-based learning environments (197 responses);
3. Significance of the Web (141 responses);
4. Usability of MyLO (132 responses);
5. Experiences with the Web (131 responses);
6. Influences on Web adoptions (90 responses);
7. Participants' expectations (87 responses);
8. Adjustments made (14 responses).

### 6.3.1 Category 1: Instrumentality of the Web

The most significant category emerged from the selective coding process was "Instrumentality of the Web" which had 219 responses. It was constructed from eight themes emerged in the axial coding process. This category emphasised the adoptions of the Web as an instrument, and the instrumentality of various types of web-based and web-related tools. It focused on the actual usage of the Web as a learning resource for different academic purposes, such as communication, information retrieval, source of learning tools, supplementing learning, facilitating collaborative learning, assessment and giving/receiving feedback, as well as for entertaining purposes. The significant number of codes and responses indicated that most participants were actively involved in the adoption of web-based technologies. The themes and numbers of responses are shown in the following Table 6.4:

Table 6.4. *Instrumentality of the Web*

| **Instrumentality of the Web** | **Responses** |
|---|---|
| **Themes:** | **219** |
| • Web adoption for communication | 35 |
| • Web adoption for information retrieval | 35 |
| • Web adoption for online tools<br>Assignment submission<br>Calender tools<br>Research data collection<br>Lectopia<br>Turnitin<br>Online dictionaries | 29 |
| • The Web as a supplementary tool | 28 |
| • Web adoption for collaborative learning | 28 |
| • Web adoption for assessment | 21 |
| • Web adoption for feedback | 5 |
| • Web adoption for entertainment | 5 |

#### *6.3.1.1 Web adoption for communication*

Within the eight major themes in this category, "Web adoption for communication" and "Web adoption for information retrieval" appeared to be the largest themes (Ns = 35). Communication and information retrieval were identified to be the two dominant purposes of Web adoption. The Web was adopted for these reasons by participants from different academic backgrounds, including Arts, Business, Education, Health science, Law, Science, Engineering and Technology and AMC, and from different academic levels, including undergraduate, postgraduate and graduate research. The participants used the Web on a daily basis to communicate with lecturers, research supervisors and students. Apart from emails, the other communicative tools that were being used include Face Book, Pebble Pad, MSN, Twitter and Skype. The purposes of adoption include making appointments, asking/answering questions, getting help, giving/receiving instructions, sharing resources and discussing course contents. These were evident in most interview conversations. Two examples are given below:

> *It (the Web) is a simple and fast way of communicating. If there is anything you don't understand, just simply send an email to your lecturers and ask. The lecturer will reply on the spot. That's how I get information.*
>
> *Student 2-Arts*

> *Email contact, definitely, particular from lecturers to students, because in the unit that I am teaching and coordinating students from all over the world contact me by directly emailing me as their lecturer. So it (using emails for communication) has been pretty huge.*
>
> *Lecturer 2-Education*

*6.3.1.2 Web adoption for information retrieval*

Information retrieval also appeared to be one dominant purpose of Web adoption. The Web was frequently used by both the students and lecturer participants to search for and retrieve information. Lecturers provided academic readings and course information through the Web to support student learning. Apart from obtaining information from lecturers, the students used the Web to look for course related articles and books. Two types of information was being exchanged or retrieved: administrative information and academic related information, such as journal articles and books in electronic forms. This information was mainly searched and retrieved through online search engines, such as Google Scholar, databases, online journals and websites of the university library or faculties. Web pages like Wikipedia and You Tube were also used when general information and fresh ideas, instead of academic references, were sought. Apart from these commonly used search engines, lecturers uploaded course materials, such as recorded lectures, academic readings, useful Web links and PowerPoint documents onto the MyLO system to support students in their courses. For the administrative purposes, most lecturers announced recent changes and news within their faculties via emails or the online announcement system on MyLO. Arguments given by a student and a lecturer from the Faculty of Business are shown below:

> *I use Google very often to "Google" information. It is quick and convenient. And I can download many documents as PDF files. There is heaps of information (on the Web), so most of the time I prefer to surf on the Internet instead of going to the library. Books and ideas you get from the library can be old sometimes.*
>
> *Student 1-Bussiness*

> *Journal articles can be found from Internet resources like ProQuest, students can use these databases to complete their research without necessarily going to libraries which is sometimes time-consuming and does not allow thorough search for a topic.*
>
> *Lecturer 1-Bussiness*

#### *6.3.1.3 Web adoption for online tools*

Apart from communication and information retrieval, the Web was also considered to be a good resource for online tools. This theme appeared to be one of the main reasons for Web adoption (N = 29). Some online tools were found particularly useful by the interview participants, such as assignment submission boxes, calendar tools, data collection websites, Lectopia, online dictionaries and Turnitin. Assignments were submitted through online submission systems within some faculties. Students were able to "*submit assignment through MyLO*"; lecturers, however, could "*give deadlines and requirements online and then give marks and feedback through MyLO*". The calendar tool on MyLO enabled lecturers to "*put up online announcements, timetables and unit outlines*". Data collection websites recently developed for research purposes were highly evaluated by the graduate research level students. Student 6-Education argues that "*I was able to use a professional website to collect data for my research. It* *is very convenient, and it saved time and money on printing and collecting paper-based questionnaires*."

In addition, Lectopia and Turnitin in MyLO were emphasised by the participants to be an important means of tools. Student 1-HS indicated that "*Some lecturers in my course use Lectopia to record lectures for us. It is very helpful for the students who can't make it to the lecture or can't fully understand the lecture contents*." The Turnitin software was used by students and lecturers to check whether plagiarism had occurred. Using Turnitin to check students' own assignments before submission was required by some lecturers. Lastly, online dictionaries were highly valued by the student participants who had an ESL (English as a Second Language) background and a lecturer from a Mandarin language course. It was conveyed that "*online dictionaries from official websites can be very helpful in looking for new vocabularies and exploring related knowledge*".

*6.3.1.4 The Web as a supplementary tool*

The forth theme included in this category was "The Web as a supplementary tool" which had 28 responses. One important purpose of Web adoption was to supplement learning. That is, the Web served as a supplementary tool to facilitate the learning process. This theme was partially overlapping with some other themes in this category; however, it emphasised the supplementary aspect of the Web as a tool to face-to-face learning. For instance, appointments were made online to arrange times for face-to-face conversations. The Web was also used to look for guidelines and policies such as the APA (American Psychological Association) referencing styles. The participants could request books and academic readings online before going to the library to collect them. Furthermore, a number of students from the Arts background expressed that "*It (the Web) brings us good ideas and inspirations for design tasks.*" The Web adoption as a supplementary tool can be related to some other functions of the Web, such as communication and information retrieval; nevertheless, the emergence of this theme and its considerable responses highlighted the value of the Web as a supplementary tool and "*an additional benefit to face-to-face teaching and learning*".

*6.3.1.5 Web adoption for collaborative learning*

The theme "Web adoption for collaborative learning" emerged to be the fifth theme (N = 28). Within this theme, conflicts emerged in the use of online discussions. It was revealed that online discussion boards were used as a common strategy for facilitating collaborative learning. Both positive and negative evaluations were given on the adoption of this tool. Students from some faculty reflected that "*People who would participate in online discussions could find it helpful, if you post questions on the discussion board, anyone, even someone on the other side of the world can answer it.*" A lecturer from the AMC also argued that "*We do have forums for them to share opinions and ask questions…and again, the more active they are, the more benefit the whole group can get.*" However, collaborative learning tools like discussion boards were not used effectively in some academic areas. One participant disclosed that "*Lecturers (in my course) rarely give instructions or participate in the discussion board. At the beginning of the semester I was hoping someone would start the conversation first, but they never did.*" Despite the problems and obstacles encountered, the Web was used effectively in most faculties to enable collaborative learning. Evidence is given below:

> *My students share online resources with me all the time. When they find something useful and interesting, they share with me and the other students and then we test it together.*
>
> *Lecturer 1-Arts*

> *I use it (the Web) in lectures to show You Tube and other websites. There are experts out there to make their contents available for free, and I think it is good to use their expertise.*
>
> *Lecturer 1- Science, Engineering & Technology*

*6.3.1.6 Web adoption for assessment*

The sixth theme was "Web adoption for assessment" which had 21 responses. This theme provided some evidence on the Web adoption for assessment purposes in different academic areas. It was shown in the data that online assessments were being conducted in most faculties. The most common assessment formats were multiple choice questions and reflective journals. Students' responses to online assessments varied. The student participants from some faculties thought that online assessments were considerably helpful and were an effective assessment method which saved time and paper-based materials. Some other students, however, argued that "*writing online assignments is a pain*" because "*you cannot imagine how long it takes to complete this kind of tasks*". As peer reviews were involved in online reflections, a large amount of time may be wasted on waiting for others' input. Also, the assessment tools provided on the MyLO system may not be user-friendly for all courses. A lecturer from a language course gave an evidence that "*I could only use one assessment tool to assess students' translation skills but not the other tools because the nature of my course.*"

*6.3.1.7 Web adoption for feedback*

The seventh theme emerged within this category was "Web adoption for feedback" (N = 5). The participants indicated that the Web was only occasionally used by students and lecturers to give/receive feedback. Some participant believed that the users take a more important role, and whether the feedback function can be used effectively "*depends on the lecturers*". Some others, however, complained that "*the system sometimes is too slow and it takes such a long time to upload and download*". Nevertheless, positive evidence was also given:

> *The Lecturers draw figures, like bar charts, to show the number of students at different levels in the assessment. (The figures show) How many people are at the 30 to 40 level and how many are at the 50 to 60 level, so that you know where your position is in the class. If you did well, keep going; if you didn't, try harder.*
>
> *Student 2-Bussiness*

*6.3.1.8 Web adoption for entertainment*

The last theme emerged in this category was "Web adoption for entertainment" (N = 5). Different from the other purposes mentioned in this category, this theme discussed about a non-academic purpose of Web adoption. A small number of participants mentioned that the Web was used for entertainment for a small amount of time during learning or working. A student from the Business Faculty recounted that "*I am on the Web around six to eight hours every day. Sometimes*

*I may watch a movie after I study for three or four hours*". Another student, from a computing background, expressed that "*I use the Web to learn other languages, cultures, customs and geography...mainly for entertainment, but I think it is another way of learning.*" Some other students also used the Web to "*look up for recipes*" or to "*chat with people, because you can talk to more than one person at a time on the Web*." Although this theme only received a small number of responses, entertainment was still counted as a main purpose of Web adoption.

### 6.3.2 Category 2: Evaluations of web-based learning environments

In the selective coding process, "Evaluations of web-based learning environments" emerged to be the second largest category and had 197 responses from the participants. The open codes in relation to the evaluation of web-based learning were grouped into three dominant themes: "Evaluation of web-based learning environments", "Comparing to face-to-face communication" and "Comparing to print-based materials". This category emphasised the evaluative view of the participants on the web-based learning environment in their own academic areas. A considerable number of responses were obtained. The participants' evaluations were various. Also, they tended to compare the Web as a learning resource with the traditional mode of teaching and learning which was presented as face-to-face communication and paper-based materials. The themes and frequency of responses are introduced in Table 6.5 below:

Table 6.5. *Evaluations of web-based learning environments*

| **Evaluations of web-based learning environments** | **Responses** |
|---|---|
| **Themes:** | **197** |
| • Evaluations of web-based learning environments | 107 |
| Satisfactory | |
| Unsatisfactory | |
| Neutral | |
| • Comparing to face-to-face communication | 59 |
| Advantage of web-based communication | |
| Disadvantage of web-based communication | |
| • Comparing to print-based materials | 31 |
| Advantage of web-based materials | |
| Disadvantage of web-based materials | |

*6.3.2.1 Evaluations of web-based learning environments*

The first theme involved in this category was "Evaluations of web-based learning environments". Two of the interview questions, which were asked in relation to the evaluations of web-based learning environments, led to the large number of responses in this theme. The 107 responses included both positive (50 responses) and negative comments (43 responses), as well as neutral evaluations (14 responses). The student participants evaluated factors such as email systems, frequency of MyLO adoption by lecturers, computer facilities and organisations of online courses. In addition to these factors, the lecturer participants were also able to self-evaluate the use of the Web and MyLO in their courses and their students' satisfaction. Generally, most participants were satisfied with the Web adoption in their academic faculties, because "*Most lecturers are willing to try out new things and are quite supportive*."

While most participants showed satisfaction, some showed dissatisfaction, disappointments and frustrations. One student argued that "*I wouldn't say it (the web-based environment) is perfect. For example, some lecturers forgot to upload their lecture notes onto MyLO, and then we wouldn't have the lecture notes for this lecture.*" Another participant disclosed that "*I don't think we are using the Web to its full potential at all*", and "*In a lot of ways I don't think the faculty really capitalised on opportunities in flexible delivery which is probably the university's highlight.*" Student satisfaction on the web-based learning environments was closely related to how the Web and web-based materials were used and provided by lecturers. In the situations when the lecturers were not actively involved, disappointments and frustrations would appear among students. Accordingly, the students who were unsatisfied would show a stronger expectation on the further improvement on the web-based learning environments in their own faculties/disciplines.

Apart from the positive and negative evaluations, a number of participants gave arguments from a neutral perspective. This theme emerged from a small number of responses which commented "*all right*" or "*just OK*". Some students disclosed that although the Web was used in their faculties/courses, they were not familiar with some of the offers because their preference of the face-to-face learning mode. Some teaching staff, however, showed more expectations and excitements other than satisfactions or disappointments. Lecturer 1-Education discussed that "*I think it is exiting that this faculty is being a forerunner that they have really gone with online learning. But as far as I can see is here we have got to a point where we are able to build on what is done before and open up the possibilities, so I think we are at a point where things can become more exciting.*"

*6.3.2.2 Comparing to face-to-face communication*

The theme "Comparing to face-to-face communication", which had 59 responses, emerged to be the second largest theme. When being asked to evaluate the web-based learning environment, the participants tended to give evaluations that are relating to the two most significant purposes of Web adoption: communication and information retrieval. They tended to compare the effectiveness of web-based learning with the traditional methods: face-to-face communication and paper-based materials. When being asked about their views on the Web as a communicative tool, participants gave opinions from both positive and negative aspects. However, the number of responses in relation to the disadvantages of web-based communication was nearly three times as the positive responses. Some of the shortcomings of web-based communication included lack of inter-personal interactions and motivations and being time consuming.

Firstly, without the involvement of facial expressions and body languages in communication, understandings were less likely to be enhanced. Some students argued that "*in face-to-face communication you can guess what your lecturers' are trying to say by listening to their tones and watching expressions on their faces and body languages.*" Secondly, being together with other learners and seeing lecturers in person can help provide a more motivating learning environment. This was evident by a number of students who discussed that "if *you were in the lecture theatre, in which everyone else is recording, you would feel more motivated and involved…It is like something is pushing and motivating you to learn.*" Thirdly, face-to-face education can provide more opportunities for students to participant in the learning process and better cater for their individual needs. For instance, one student from the Psychology background felt uncomfortable asking questions in a video conference. She claimed that "*It is very difficult to concentrate, even ask questions, because the lecturer is always in Hobart. I think if you have the confidence you can ask through the video link, but I don't have the confidence. I am shy. If the lecturer is in the class then I can ask him later after the class, but I can't do it in a video conference.*" A lecturer from the Faculty of Education also discussed from his point of view that:

> *In a face-to-face situation, a good lecturer is more likely to provide information and learning opportunities in a variety of ways to adapt to individual learning styles…there is far greater feedback happening; it is an ongoing feedback that is occurring. As a lecturer, you are well able to see what is happening and to see whether people understand something not only from their actual communication verbally, but also non-verbal communication.*
>
> *Lecturer 2-Education*

Nevertheless, although a large number of arguments were given on the disadvantages of the Web as a communication tool, advantages were also revealed. Most students and teaching staff had used web-based communication to supplement learning and teaching activities, especially in the situations when face-to-face communication was impossible or not necessary. One the one hand, the Web was used as a function tool for some simple purpose communication, such as making appointments and research questionnaire collection. On the other hand, the Web became more important in the situations within which face-to-face communications were impossible to be conducted. For instance, one student from the engineering background conveyed that "*Once I had some questions to ask a researcher who was overseas but I didn't have the budget to actually go to him and ask, so I emailed him. He was very kind and sent me emails back and answered my questions. It saved me a trip from going overseas and a lot of money and time.*" In addition, some students benefited from online communication due to their personal preference. These students felt more comfortable communicating through the Web because they could express their opinions more clearly in writing instead of orally. They claimed that web-based communication can avoid embarrassments, while some participants from the other group concerned that it would negatively affect the students who are lacking of social skills and deprive their opportunities of social interactions.

#### *6.3.2.3 Comparing to print-based materials*

The third theme included in this category was “Comparing to print-based materials” which had 31 responses. Compared to their evaluations on web-based communications, the participants held a more positive attitude on the effectiveness of web-based materials. Some advantages mentioned included updated information, on-time access, easier delivery, abundant formats and the great amount of information. One student from the Psychology background described that “*finding books according to a certain key word is hard, but if you type in a key word on the Web, you get thousands of articles.*” Another student from the Accounting background argued that “*getting information through online search engines are fast and convenient. It (the Web) contains a lot of information that you can choose from. It is also easier to download lecture notes and readings now, as you can always find them on MyLO*”. Nevertheless, there is one confliction emerged from the interviews and questionnaire responses. While some participants thought that “*there can be too much information to sort through at times*” because “*it is hard to know which source can be trusted and which cannot be*”, some other participants believed that “*the Web is useful if you know what you need to know, learn or search for.*” A student from a Law background found a solution that “*there are a number of quite strictly controlled case study bases. They are just as reliable as printed materials*.”

### 6.3.3 Category 3: Significance of the Web

The third dominant category emerged from the coding process was the “Significance of the Web” (N = 141). This category focused on the significance of the Web as a teaching and learning resource. The considerable number of responses was a reflection on one of the interview questions, “What do you consider about the significance of the Web in your (students’) learning?” The Web played a significant role in teaching and learning activates. It provided end-users with unmeasurable resources which could be delivered within a few seconds irrespective of locations. Many services and materials provided on the Web were free of charge and in abundant formats. Additionally, web-based information delivery catered for students’ independent learning and personalised learning, as well as helped develop their problem-solving skills. The themes and numbers of responses are shown in Table 6.6 below:

Table 6.6. *Significance of the Web*

| Significance of the Web | Responses |
|---|---|
| **Themes:** | **141** |
| • Significance of the Web in students' learning | 45 |
| • Irrespective of time and distance | 31 |
| • Powerful resources | 29 |
| • Abundant formats of materials | 9 |
| • The Web and independent learning | 5 |
| • The Web and individualised learning | 5 |
| • Free of charge | 4 |
| • The Web and problem solving skills | 3 |

*6.3.3.1 Significance of the Web in students' learning*

"Significance of the Web in students' learning" was the first theme emerged in this category (N = 45). This theme involved the participants' views on the effectiveness of the Web, time spent on using the Web and how much the Web had contributed in their (or their students') learning. Therefore, many codes in this theme were presented as numeral data which appeared as the number of hours or proportion of learning tasks completed via web-based technologies and materials. It is evident in the data that most students and staff relied heavily on the Web in their learning and teaching practices. They described the Web positively using words "*important*", "*effective*", "*essential*", "*useful*", "*awesome*", "*incredible*" and "*powerful*". When being asked about the degree of importance of the Web, the participants' tended to fall in two groups. One representative of the first group argued that "*The Web makes everything a lot easier; however, I am still able to work without it. It will just be slower.*" However, a student from the other group believed that "*The Web occupied all my time, around 6 to 8 hours a day. I can't survive without it.*" A lecturer who showed strong confidence in web-based learning stated that "*It plays a substantial role in teaching and learning. I think it has largely replaced textbooks. And where it hasn't, it should. It is probably the 'number one' research tool for students nowadays, so yea, it is very important.*" While most students and staff valued the Web as a significant tool, a small number of participants shared some negative experience which had discouraged them. Evidence gathered from the open-ended sections of the questionnaires is introduced below:

> *Online learning is all very well but it can encourage people to be lazy and it doesn't teach you how to deal with people.*
>
> *Open-ended section of questionnaire*
>
> *I found the motivation to complete online tasks absent, they do not seem as important even if assessed. I don't like discussion boards, if I had to question or wanted to talk to the lecturers or other students, it is better to talk face-to-face.*
>
> *Open-ended section of questionnaire*

*6.3.3.2 Irrespective of time and distance*

Apart from the general comments, the participants evaluated the Web as a tool from different perspectives. The most frequently mentioned perspective was the opportunity of learning and teaching that can be obtained irrespective of time and distance (N = 31). Different from the traditional education mode, web-based education made the learning process more convenient and flexible by enabling learning activities to occur without a here-and-now presence. One lecturer from the Faculty of Arts commented that "*As long as you have a computer, you can study anywhere at any time. And even on the go you can have mobile phones, like iphone, to keep up to the Internet.*" Within some certain circumstances, the Web was even considered as the only strategy which could enable learning to happen. For instance, for the students who could not make a physical presence to the campuses, online courses were the most suitable solution for them to continue tertiary education. A lecturer of an online course argued that "*The students in my course rely heavily on the Web. Everything they do is through the Web, such as discussing course contents, obtaining materials and submitting assignments. Because this course is offered to audiences across the state that can't physically come. So the Web is doing pretty much everything.*" Moreover, the Web was also seen as an essential tool for students and teaching staff who were involved in face-to-face learning. It did not only provide them with on-time access to updated information, but also saved time on searching for resources and communicating with others. This is evident in the following discussions:

> *The main benefit of the Web is that you can use it at anytime you want, as long as you have the connection. The resources on the Internet are available 24 hours. You can log on and use at any time and it is there.*
>
> *Student 2-AMC*
>
> *The concept of putting in two key words and you get 25 thousands options is just amazing. If you search in the library with these two key words you may only get a couple of related books.*
>
> *Student 1-Arts*

*6.3.3.3 Powerful resources*

The third theme emerged within this category was "Powerful resources" (N = 29). Both the student and teaching staff participants agreed that the Web was a highly significant resource for information retrieving. With its help, massive information could be delivered easily and quickly within a small amount of time. Online journal articles were the most common academic source used by participants in all faculties and disciplines. However, participants from different academic backgrounds also had their preferences and focuses in information selection. For example, a lecturer from the Business Faculty emphasised that "*The Web is now making huge progress that many resources of real business practices can be sourced from it.*" In addition, a student from an Engineering background argued that "*I would have valuable and direct information from the Web, for example, I could see what a particular type of engine is like in graphic details.*" A student from the Law Faculty, however, addressed that "*If you could reach things like Legal Law Case databases, and this kind of stuff which normally takes you hours and hours looking in the book in the Law Library, and then you can do it quickly and easily online.*"

The change in information delivery during the last two decades was emphasised by a number of participants who had experiences learning and/or teaching both in the past and in present. For instance, a research background student from AMC indicated that "*Today there is no need for us to buy hard copies of research journals anymore. All we need is to download these beautiful drawn pictures and diagrams from the Web.*" A lecturer from the Education background also discussed that "*I think it is really exciting because it gives the students access to* *high quality journal articles and really current materials in a way that we really struggled in the past.*" A student who studied 20 years ago and came back to the university to continue her study recently gave the following comments:

> *In the old days you go to the library shelves and feel really frustrated because somebody else had the book and they won't be returning it for a week and a half. Nowadays you have access to so many more authors and writers and thoughts and opinions…It has been hugely overwhelming in a sense that the amount of information that you can get is just incredible. The exiting part is being able to come up with an area of interest and to research it and to know that you have the access to that information. So I want to be a student forever, because you wouldn't want to let go of the facility.*
>
> *Lecturer 4-Education*

*6.3.3.4 Abundant formats of materials*

"Abundant formats of materials" appeared to be the fourth theme (N = 9). The participants were impressed by not only the amount of the information provided on the Web, but also the abundant formats of the materials. Compared to traditional learning materials, such as books and CDs, web-based resources were more diverse in the presentations. Their formats ranged from e-books, which appeared in a format of PDF documents, to videos which integrated both sounds and images. Besides, students could receive a variety of course materials which were designed and illustrated with well written wording and colourful pictures and diagrams. A student from the Law Faculty commented that online law databases contained more realistic cases, compared to which books could be too "*theoretical and dry*". A student from an Engineering background pointed out that "*I benefited a lot from the Web when I was doing a design project, because there were more stereoscopic graphs and illustrations online which cannot be found in books.*"

*6.3.3.5 The Web and independent learning and individualised learning*

The theme "The Web and independent learning" and "The Web and individualised learning" both had 5 responses. These responses were obtained from a small number of students and staff who recognised the inter-relationship between web-based learning and the two learning theories: independent and individualised learning. The great amount of information and the flexibility provided facilitated students' self-directed learning. The Web also gave a sense of freedom which allowed learners to develop their own interests and research capabilities. A student from the Law Faculty discussed that "*Web-based learning is almost like one-to-one contact in a lot of ways rather than just a big group session…and your own thinking emphasises a lot more on you rather than just sitting back and listening to what other people have to say.*" The following arguments were given by a student and a lecturer from a same online course:

> *One of the main benefits (of web-based learning) is having to find their own focus and to develop their own learning from not being in a face-to-face situation. They actually focus on separate interests and separate elements of the subjects that we are looking at, and they go into their own directions and find their own information to go along with that. They are in charge of their own learning and they develop their own learning styles.*
>
> *Lecturer 2-Education*

> *The beauty of this is everybody is working at their own paces. In a class where everybody is at different levels, one teacher cannot possibly go to all these students and help them individually. So the students at the middle (level) are OK, the student at the one end are struggling and getting left behind. The students at the other end, the gifted students are bored, and they don't get any extra help.*
>
> *Student 3-Edcuation*

*6.3.3.6 Free of charge and The Web and problem solving*

The last two theme of this category are "Free of charge" (N = 4) and "The Web and problem solving" (N = 3). The numbers of responses indicate that these two perspectives were only mentioned by a small number of participants. Firstly, the Web as a learning resource does not only save time on looking for information, but also saves money in various situations. A considerable amount of materials on the Web are free of charge. This gives students and teaching staff access to more valuable and globalised information, especially high quality journal articles and databases.

In addition, web-based learning as a strategy to enhance problem solving skills was mentioned. Compared to large group lectures, web-based learning emphasised more on learners. It gave them more opportunities to participate in the decision making process, and thus encouraged independent learning and individualised learning. Nevertheless, students' efforts were required in managing their own learning paces, interests and directions. This is supported by a lecturer from the Faculty of Education: "*Web-based learning means students can be more discerning, because they have got such a range of materials to draw upon. They need to learn to be more discerning in terms of what is relevant and the level of stages of the material, so whether it has been peer reviewed and so on. So it actually encourages them, hopefully, to have a more scholarly approach.*"

### 6.3.4 Category 4: Usability of MyLO

The fourth dominant category "Usability of MyLO" (N = 132) had two themes which concentrated on the current adoption of the MyLO system and evaluations on this web-based courseware resource. MyLO was one important means of web-based support at the university. Its usages were partially overlapping with the role of the Web in general, such as communication, information retrieval, collaborations and online tools. These functions were mentioned in the previously category: "Instrumentality of the Web". This section, however, discusses the current adoption of MyLO from another angle, the administrative and academic perspectives. Also, it reveals the different evaluative views of the participants on MyLO. The themes and the frequency of responses are shown in Table 6.7:

Table 6.7. *Usability of MyLO*

| Usability of MyLO | Responses |
|---|---|
| **Themes:** | **132** |
| • Current adoption of MyLO | 59 |
| • Evaluation of MyLO<br>Advantage of MyLO<br>Disadvantage of MyLO<br>Neutral | 45 |

*6.3.4.1 Current adoption of MyLO*

"Current adoption of MyLO" emerged to be the first theme which had a significant number of responses (N = 59). This theme indicated that MyLO was widely used by participants from all academic faculties and disciplines. As the central courseware platform at the university, MyLO played an essential role in a wide range of teaching and learning activities. Compared to the Web adoption in general, the adoption of MyLO was more focused and course-oriented. The dominant purposes of adoption included two perspectives: administrative and academic. The administrative activities were mainly performed through the announcement system and the calendar tool in MyLO. Changes, important events and assignment deadlines were announced and reminded through these tools by teaching staff throughout the semester. The academic activities, on the other side, were achieved through a number of software and tools, such as mail boxes, Lectopia, Turnitin, assignment drop boxes and discussion boards. The most frequently used function was the Course Content component in which teaching staff could upload course-related materials, readings and assignment requirements. This is evident in the following discussions which show strong satisfaction on the adoption of MyLO:

> *It is a part of the requirement (of the faculty) to upload lecture notes and recorded lecturers on MyLO. Using Lectopia (recorded lecturers) is the same as going to the real lecturers as it records the voice and screen captures of the lectures. Personally I think it's very useful. Lecturers communicate with us using the announcement tools so it's very important that we check MyLO everyday for updated information.*
>
> *Student 1- Health Science*

The usability and significance of MyLO depended greatly on how it was used. Apart from the most widely used function, the Course Content component, MyLO had some other functions, such as discussion boards, online test systems and evaluation systems. However, the adoptions of these tools were unbalanced in different programs, as not all teaching staff were active in using these resources and providing support. MyLO was found particular helpful within the academic areas in which it was effectively adopted. A student commented that

"*Discussion forums are organised by some lecturers in our faculty. They gave us topics and monitor the discussion happened across the week. Although we only had two online quizzes this semester, I found they are very helpful. Lecturers provide us with on-time feedback straight after the tests.*"

It was also disclosed in the data that the faculty culture had a great influence on the participants' performances in MyLO adoption. Students from some programs showed stronger satisfaction on the adoption of MyLO by their lecturers as the lecturers' involvement and students' participations in web-based learning were encouraged and standardised by these faculties. For instance, a student from the Nursing background evaluated that "*The lecturers in my program have put in a lot of effort in using MyLO. I think it is the faculty's requirement to record all lectures and upload them onto MyLO. Although the quality of the records and materials may different because of the IT skills of the lecturers, they (the lecturers) are all trying very hard to meet the faculty's requirements and are willing to try out these new technologies.*"

*6.3.4.2 Evaluation of MyLO*

The second theme emerged was "Evaluation of MyLO" (N = 45) which emphasises the evaluative views of students and staff on MyLO. Their views differed greatly depending on the MyLO usage in their own academic areas. Students from the same faculty may also give different opinions due to the differences in adoption between the courses. Basically, the evaluations were presented in three groups: advantage of MyLO, disadvantage of MyLO and neutral opinions. Firstly, most participants considered MyLO as a powerful tool in supporting their teaching and learning practice. Having such a central courseware was essential in organising and systemising student learning. As a resource, MyLO was positively valued by from the aspects of contents and accessibility. Most participants gave a positive evaluation on the adoption of MyLO in their own academic faculties/disciplines.

In contrast, while some participants showed satisfaction, other students and teaching staff expressed dissatisfaction and frustration on some functions of MyLO. A low user-friendliness of these functions was reported. For instance, a lecturer was disappointed by the large amount of time taken on uploading files: "*I spent two hours on uploading the marks I gave on students' assignments yesterday. It is such a slow process and there is no way to speed it up*." A student participant also showed his frustration that "*The Turnitin software is so confusing and I couldn't work out what it is all about. It is a learning software and it should be easy to use, but it is not.*"

Apart from the satisfaction and dissatisfaction expressed, some neutral opinions were given by the participants who believed that the effectiveness of MyLO depended heavily on its users' attributes. Imbalances in users' IT skills could cause great barrier in the use of MyLO. It was mentioned that MyLO could be hard to use if users did not have enough IT knowledge and skills or were not familiar with the functions. In addition, further improvements on its functions were expected and suggested. This is evident in a lecturer's interview response: "*MyLO is a good backup for lecture notes, handouts and assignments, and is effectively used for these. It is also effectively used to direct self study. A much more in depth system would be needed to replace lecture-based learning.*"

### 6.3.5 Category 5: Experiences with the Web

The fifth category developed was "Experiences with the Web" (N = 131) in which the students and staff shared both positive and negative experiences in relation to web-based education. As they were encouraged to share challenges and obstacles encountered, a large number of codes emerged were in relation to these issues. These problems were examined from different perspectives, rather than being simply viewed as negative experiences. They were considered even as positive factors in some cases, such as motivations for learning. Therefore, although the first theme "Problems encountered" had the largest number of responses (N = 42) and appeared to be the most significant theme in this category, it did not necessarily mean that the participants were experiencing a negative web-based learning environment. Table 6.8 on the following page gives the details of the dominant themes and the number of responses.

Table 6.8. *Experiences with the Web*

| Experiences with the Web | Responses |
|---|---|
| **Themes:** | **131** |
| • Problems encountered | 42 |
| • The Web changing learning styles | 32 |
| • Positive experiences in web-based learning<br>Developing of learning skills<br>Easier access to information<br>Experiencing new facilities<br>Gaining more experiences<br>Getting support from lecturers<br>Integrating web-based tools in teaching<br>Learning collaboratively | 39 |
| • Negative experiences in web-based learning<br>Having difficulties with the Web<br>Lacking of experiences<br>Lacking of interactions<br>Lacking of support from faculties and/or lecturers<br>Misunderstandings between lecturers and students<br>Physical influence<br>Unreliability of Web retrieved information | 18 |

### *6.3.5.1 Problems encountered*

In responding to two interview questions which asked the participants' expectations and evaluations, a large number of codes were uncovered in relation to the problems encountered in web-based education (N = 42). These problems were usually accompanied by suggestions and recommendations for solutions. The large number of responses indicated that the students and staff faced various challenges and problems due to different reasons. On the one side, technical reasons caused some obstacles in using web-based facilities and/or new technologies. It was complained by some students that the computer facilities and networks in their faculties were antiquated and insufficient. Therefore, it may take a long time to log on to the computers or to open a webpage. Also, it is a challenge for students and staff to learn new technologies without relevant training or IT support from the faculty. Different degrees of concerns were expressed on the use of MyLO, databases, Turnitin and some other resources. One student from the Education background gave an example that "*A new software called Pebble Pad was used by my lecturers to collect assignments. It is good, but it is new. The lecturer didn't know how to upload the assignments either so I had to ask someone from computing (background) to teach me*".

On the other side, some personal reasons have caused a number of problems, such as selection of information, difficulties in web-based communication, imbalance in IT knowledge and lack of time. The participants who were used to the traditional teaching method and materials addressed the difficulty of choosing from the overwhelming amount of information on the Web. One student expressed that "*Having to look through 80 journals and to pick up the ones you wanted at the beginning, it is just overwhelming. Well, I found myself saving most of them because I didn't really have the time to…you know I am not experienced in skimming, so I thought I will just copy them in case I will need them later*". In addition, the difficulty in communicating through web-based tools was mentioned: "C*ommunication through the Internet is very basic in a sense. If you send out a very long instruction or ask a long question through emails people may not have the time to look at it. Internet is a very quick thing so what happens is that people do not have a lot of time doing one particular task online.*"

Moreover, the imbalance in users' IT skills was mentioned to be the trigger of many problems in web-based learning. For instance, although using Lectopia to provide recorded lectures was required in some faculties, the qualities of records varied. It was pointed out that "*Some lecturers who are not experienced in using this facility were not able to provide high quality records since very small things can affect the quality, like where they put the microphone and whether they have uploaded the screen captures.*" There were indeed some factors that could not be measured by faculties or the university or regulated by policies. Lastly, lack of time was one obstacle encountered by both students and staff. Although they were desired to apply new web-based technologies in their learning or teaching, they could not succeed due to the huge time requirement on designing relevant learning activities and getting to know the functions of the applications. In short, the above factors were mentioned as the dominant problems. The participants who encountered these problems had also suggested some possible solutions which will be discussed in Section 6.3.7.

*6.3.5.2 The Web changing learning styles*

The second theme within this category was “The Web changing learning styles” which had 32 responses. This theme revealed that, as a significant learning resource, the Web had influenced and changed students’ learning styles from various aspects. It had not only changed the way in which learning was conducted and in which information was transferred, but also the ways of thinking. Compared to the traditional teaching method, web-based education provided teaching staff and students with a quicker and more convenient way of teaching, learning and collaborating. For instance, a lecturer compared the experiences of writing assignments 20 years ago and nowadays. She shared that “*When I studied last time I had an electric type writer that I have on the dining room table. I would pick this great big type writer up and put it on the floor to eat with my family, and then I would put it back on the table when I need it to continue with my work.*” Moreover, the large amount of irrelevant information can become a distraction. A student discussed that “*Sometimes I am getting buried by a whole lot of information, so now the time is spent more on recognising the information that I need from a lot of information which probably is not the most relevant.*”

The Web had changed the ways in which learning materials and instructions were being transferred. In the traditional learning mode, face-to-face contacts allowed all instructions to be given to students in detail. Therefore, students were given directions on every learning step. In web-based learning, however, instructions were more likely to concentrate on independent learning and development of students’ learning skills. Students were required to log on to web-based courseware systems to find materials or to enter databases to search for articles. A student from an online course argued that “*my learning style is that I need help along the way, so it took me a long time into this semester to actually get the hang of using the databases and the e-journals and finding them*.” This is further evident in the discussion of a lecturer from the same online course:

> *Students in the past expected everybody to learn the same thing. They expected that if they had any queries that they would immediately go*

> *along to see someone and that would be fulfilled immediately, but there wouldn't be a problem. There is a big challenge now in that they are forced to plan ahead. They can't do things that are so simultaneously. They have to seek the information themselves because it is not provided to them. So again they have to put perhaps a little more efforts, different kinds of efforts, to be able to get this information.*

Web-based learning had also influenced students' learning styles in terms of attitudes, problem solving and thinking patterns. Involving various formats of materials and different teaching methods helped enhance students' motivation and creativity. It was proved by a lecturer from a Mandarin language course that introducing Chinese keyboard input method has changed her students' views on learning this language. The students within this course realised that learning can be fun. Being able to produce complete piece of texts also gave them a sense of achievement. In addition, the Web helped improve students' problem solving skills by allowing them to be more independent. A lecturer from the Education background indicated that "*The Web has enabled them a sense of freedom and independence. I guess maybe in terms of, again it is not really a learning style, but they reiterate in a lot of different ways, so they are using a lot of modes of communication at once. They might be listening to something and observing things and the visual layout of the websites. It means that they are using different sorts of different forms of accessing the materials.*" Lastly, web-based learning had changed students' thinking patterns. It provided them with an advanced approach in choosing information and urged them to become more critical and selective.

*6.3.5.3 Positive experiences in web-based learning*

The third theme emerged was "Positive experience in web-based learning" (N = 39). This theme was closely related to Category 3 "Significance of the Web" as the participants tended to discuss the significance using examples of learning experiences. Therefore, some cases mentioned in this theme seemed overlapping with the other category. However, the discussions in this section focused more on the participants' actual experiences. Generally, most participants indicated that their overall web-based learning experience was positive. Due to the easy access and great flexibility provided by web-based technologies, they were able to develop advanced learning skills, access to abundant information, experience new facilities, learn collaboratively and gain an enriched learning experience. Moreover, some students expressed that being supported by lecturers and experiencing a blended teaching style gave them confidence and excitements. It was also believed that a positive experience did not mean to be successful in every action taken in the learning process. Experimenting new technologies could be considered as a positive experience even if the action had failed in achieving its initial intention. A lecturer who had been teaching in both the Computing Faculty and the Accounting Faculty gave evidence as follows:

> *I was in an accounting information system lecture, and we were talking about a software that could be used with internal controls. We did not get it right, but the students were very happy with what they have learnt from it, because now they know they are able to use this free content management system to create web pages. Well, I think we failed in that subject, however, the concept was really good and if we did it differently it could become a success.*
>
> *Lecturer 1-Science, Engineering and Technology*

*6.3.5.4 Negative experiences in web-based learning*

Negative experiences were also shared by the students and staff. Some examples included having difficulties with web-based technologies, lack of relevant experience, and lack of support from faculties and/or lecturers. Without relevant experience and necessary trainings, some participants encountered difficulties in using MyLO or integrating web-based applications in learning activities. Also, due to the nature of web-based education, the students who preferred traditional teaching method were unsatisfied with the limited face-to-face interactions and the unreliable web-retrieved information. Ineffective communications would lead to misunderstandings. For instance, while the teaching staff in the Nursing Faculty considered online reflective journals to be an effective way to enhance student interactions and reflective learning skills, some students saw this kind of tasks as a pain. It was disclosed that "*You can't imagine how long it takes to complete this kind of assignments. You have to write some reflections, and then* *you need to wait for other students to give responses and comments on yours. If they are delayed by something else, you can't continue either. It is a waste of time.*" Another student from the Accounting background also argued that "*Some lecturers wait until the last minute to put the lecture notes onto MyLO. It seems that if they do it earlier students would not come to the lectures. I mean, it makes it so much harder for us to get the lecture notes ready before the lectures. Of course students would still come even they have got the notes.*" Lastly, a small number of participants listed the physical influences as one negative experience as using computers could cause tiredness and myopias more easily than using paper-based materials.

### 6.3.6 Category 6: Influences on Web adoptions

The sixth category emerged from the qualitative data analysis was "Influences on Web adoptions" which involved 97 codes. This category emphasised the influential factors in the participants' performances and decision making in web-based learning. Three themes were involved, including support from lecturers, external influences and influences of students' internal attributes. Factors impacting web-based education were various. To produce positive and meaningful web-based learning environments and learning activities, efforts should be made from all perspectives including students, staff, faculties, and the university. The themes and number of responses are shown in Table 6.9.

Table 6.9. *Influences on Web adoptions*

| Influences on Web adoptions | Responses |
|---|---|
| **Themes:** | **97** |
| • Support from lecturers | 47 |
| • External influences | 28 |
| • Influences of students' internal attributes | 15 |
| • Pedagogical soundness | 7 |

#### *6.3.6.1 Support from lecturers*

"Support from lecturers" emerged to be the most significant theme within this category (N = 47). It was evident in the data that whether supportive guidance and assistances were provided had a strong influence on the effectiveness of web-based learning as well as students' decision making. The learners who had stronger support from teaching staff tended to give more positive evaluations and hold stronger beliefs about web-based learning. Common support strategies include email contacts, introducing of relevant resources and Web links, uploading recorded lectures, directing online discussions, organising online tests and providing online feedback. Most support strategies could be related to MyLO which provided relevant software and space for these activities. One student from the Faculty of Law shared that "*The best experience I had is accessing contents through MyLO and being able to pick up all my lecture notes, course outlines, announcements and a lot of research materials that are put on there by our lectures.*" In addition, being supportive in web-based learning was not only about adopting resources, but also about implementing them in a meaningful way. A lecturer explained that "*…be explicit about how I set it up and why that's been the case, and to maintain these conversations through the unit. You know, to encourage the students to talk about how they are managing to access materials and so on.*"

Apart from the common support strategies, some lecturers gave their students extra assistances in relation to their course contents. For example, lecturers in the Faculty of Health Science set up a link which connected to the e-reserve of the university library. Therefore, students could easily find and read course-related books in an electronic format. Lecturers in the Architecture background downloaded and introduced designers' fresh ideas and newly invented products to their students. However, a lecturer from the Faculty of Arts introduced that "*I encourage them (the students) to use official websites and the online dictionary tools that I have tested before…They need guidance to use all these tools, the Web and whatever software and materials that other people put there and would like to share.*" It was agreed by most participants that lecturers should encourage students to use web-based resources by introducing relevant tools, uploading learning materials and giving guidelines. In addition, lack of sufficient support may cause a negative impact on students' attitudes on web-based learning. This was evident in one student's discussions: "*In my first year, we had a workshop to introduce the databases, but it wasn't detailed, so I had never used them during the last one and half years, until this semester when we had a unit called 'evidenced-based research' which is about how to use the databases. I think if we* *had this unit in the first year, I would be able to make a better use of this resource.*”

*6.3.6.2 External influences*

There were also a number of external factors influencing the effectiveness of web-based learning (N = 28). One important factor that impacted the Web adoption was the nature of the courses. As introduced in the previous sections, the Web provided learners and educators with a great amount of information that were presented in abundant formats. Therefore, users from different academic areas could select the most relevant resources for themselves. However, due to the different natures and focuses of the courses, web-based tools and resources were used less in some programs while some other courses were taught entirely online. For instance, a lecturer from a language course introduced that “*I only use the basic functions of web-based tools because of the nature of the course that I teach decides my students would rely heavily on the text books.*” A research student from an Aquaculture background thought it was impossible to teach science subjects online as these courses involved technical experiments and tests which must be presented to students face-to-face.

The other dominant factors mentioned by the participants were requirements of the faculty, lecturers’ IT skills. Within the faculties in which policies and regulations were made for web-based learning, students showed a higher satisfaction on the web-based environment. For example, the participants from the Nursing and Architecture backgrounds addressed that faculty requirements were one important principle used by teaching staff to self-evaluate the performance and involvement of web-based applications in their own courses. In addition, inadequate IT skills could strongly affect the enthusiasm and motivation of teaching staff in adopting web-based technologies. Staff who had advanced IT skills were more likely to experiment and introduce new resources to students. The others who had a low level of IT skills, however, were more likely to use the traditional face-to-face communication and paper-based materials rather than challenging themselves with new technologies.

Lastly, low accessibility of web-based resources and networks was another issue. Without relevant equipments and resources, staff and students' motivation would be decreased and many activities could not be put into practice. It was revealed by a student from an Engineering background that "*Only one teacher (in my course) used the Web in the class, the others just recommend websites to us. We don't have the connection to the Internet very often. Some of the rooms have the devise to the Internet; the others don't, so the classes are not well equipped with the network access*." In one word, not only relevant IT skills were needed, but also the hardware to enable students and staff to effectively participate online.

### *6.3.6.3 Influence of students' internal attributes*

The third theme emerged was "Influence of students' internal attributes" which had 15 responses. This theme indicated the strong influence of students' internal attributes on the effectiveness of web-based education. Firstly, students' motivation and attitudes had a significant impact on their performances. That is, students who preferred a flexible learning style would benefit as they were more comfortable interacting with teaching staff and peer students through the Web and engaging themselves in web-based learning activities. However, students who were more engaged in a face-to-face and structured teaching style would encounter challenges as a great deal of independent learning and decision making were required. According to a student participant, web-based learning could be "*very free flowing, and you can go anywhere you want.*" Therefore, without the motivation and engagement, students' performances and learning outcomes may be decreased.

In addition, students' ability and IT skills played an important role. On the one side, the term "generation" was mentioned by a number of participants. It was pointed out that younger students, who entered the university straight from colleges or undergraduate degrees, would have fewer problems adopting web-based technologies as they were more likely to have advanced IT skills and relevant experiences. However, mature age students who came back to the university after working for a long period would face more obstacles due to the lack of skills in mastering newly developed web-based applications. On the other side, students needed to have the ability in choosing academically valuable information from the large amount of resources. A lecturer from an online course commented that “*The more refined skills they have in the curriculum, there will be better information they will find.*” A student also pointed out that “*To be able to succeed, we must have the ability to choose reliable information from the overwhelming information which is not entirely reliable sometimes.*”

#### *6.3.6.4 Pedagogical soundness*

“Pedagogical soundness” was mentioned by a small number of participants (N = 7). This theme emphasised that web-based materials and software should be developed based on sound educational/pedagogical principles. While most participants considered the purpose of Web adoption as to facilitate and enable learning, a small number of participants emphasised the indispensible role of educational theory and pedagogical soundness. It was believed that without sound pedagogical support, web-based learning would lose its meaning and its potentials would not be achieved. This was evident in one participant’s responses to the questionnaire: “*It is not MyLO or the Web that limits or enhances the potential for learning. It is the pedagogical soundness of what the unite coordinator creates, and the regular presence of the lecturer/tutor in the online environment. This large time requirement (development and facilitation) needs to be recognised by the Head of School in each faculty, and appropriate resources made available.*”

### 6.3.7 Category 7: Participants’ expectations

The seventh category emerged was “Participants’ expectations” which had 87 responses. This category focused on the suggestions proposed by students and teaching staff in relation to the future adoption of web-based resources and MyLO. It also emphasised the desired support strategies of students in relation to web-based education. The considerable number of responses was corresponding to two of the interview questions which asked for the participants’ evaluations and suggestions for the future adoption of web-based learning and MyLO. Details of the themes and number of responses are shown in Table 6.10 on the next page:

Table 6.10. *Participants' expectations*

| Participants' expectations | Responses |
|---|---|
| **Themes:** | **87** |
| • Suggestions for a better adoption of web-based resources | 45 |
| • Suggestions for the improvement of MyLO | 31 |
| • Seeking support from teaching staff and faculties | 11 |

*6.3.7.1 Suggestions for a better adoption of web-based resources*

The first theme focused on the participants' expectations on the overall web-based learning environment in their own faculties/disciplines (N = 45). Suggestions were made in regarding to web-based facilities and the adoption of these resources. Firstly, an access to updated computers, licences of relevant software and high speed networks was desired. It was mentioned that having the access to Internet in all lecture theatres could allow more web-based activities to be organised in lectures. Students from some faculties/disciplines suggested an update of the computer facilities in these academic areas to ensure a more effective learning environment. A number of research students and supervisors recommended licences of research software to be provided for their personal computers so that research activities could be continued at a flexible time. In addition, in some faculties/disciplines, within which an active online discussion platform was not available, students were calling for well organised discussion boards and forums which could allow all students and staff to exchange ideas and learning materials. Importing more e-journals was suggested by students who were not able to obtain the articles they needed from the library databases.

Suggestions were also put forward by the participants to perform a better Web adoption. It was recommended that the overall web-based learning environment could be improved by a more considerable and structured adoption of resources. On the one hand, both students and staff should build advanced approaches in distinguishing and using web-based resources. They should also be taught how to select more suitable web-browsers. One student from the Computing background addressed that "*Some people think there is no difference between the four kinds of browsers, IE, Firefox, Safari and Opera, but we (computing students) think some of these Internet explorers have more advantages or security vulnerabilities. For example, Firefox is more commonly used because it works on all computer* *systems; Safari has more advantages for academic use because it has more connections with academic databases.*" On the other hand, students' needs must be taken into consideration if a more meaningful web-based learning environment is to be created. Effective and regular student-lecturer communication is necessary in obtaining a good learning outcome. Therefore, communication tools, such as Blogs and discussion boards, should be used to create more opportunities for interacting and discussing over learning concepts. Participating in online discussion could provide teaching staff with an access to students' understandings and enable individual learners to be better assisted.

#### *6.3.7.2 Suggestions for the improvement of MyLO*

The second theme "Suggestion for the improvement of MyLO" (N = 31) concentrated on two perspectives: the contents of MyLO and its adoptions. A considerable number of responses were obtained in regarding to the further development of its formats and interfaces. For instance, it was suggested by a lecturer that "*Careful formatting and layout should be utilised in MyLO to enable more efficient and enjoyable learning.*" Flexibility of the system was also emphasised: "*I would suggest to set it up in such a way that have a more open structuring of the materials, which gives the lecturers more freedom. So that you have got the freedom to bring your professional judgement to the way you work with MyLO, rather than fitting in with some locked step kind of approach.*"

Moreover, making more use of the MyLO functions, such as discussion boards and recorded lecturers, was highly desired. According to a number of participants, MyLO was rarely used by supervisors to support research students. Therefore, it was suggested that MyLO should be utilised to provide materials in relation to research methodology and articles within the field. Some coursework students, however, recommended lecturers to give an introduction on how MyLO would be used throughout the semester so that students could have an overall picture about the lecturers' expectations. Generally, most suggestions were focusing on the future development and improvement of MyLO. Only one lecturer suggested that the Blackboard system should be replaced by the Moodle courseware which was believed to be more learner-friendly and flexible, as well as free of charge.

*6.3.7.3 Seeking support from teaching staff and faculties*

The third theme “Seeking support from lecturers and faculties” (N = 11) emphasised the desired support strategies of students. Using MyLO and other web-based tools efficiently and effectively was an expectation on both teaching staff and students. However, due to various reasons, some users had insufficient skills in using these technologies. Regular training sessions, however, could provide them with updated information and mitigate the imbalance in IT skills. Some students claimed that although the university libraries organised regular sessions on the use of MyLO, databases and endnote at the beginning of each semester, this was not enough to solve the problem of insufficient IT skills. Faculties were expected to organise more training for both students and staff on information selection, adoption of MyLO and application of web-based resources.

6.3.8 Category 8: Adjustments made

The last category emerged from the qualitative data analysis process was “Adjustments made” which had the smallest number of responses (N = 14). This category focused on the adjustments made by lecturers to suit students’ needs as well as the adaption made by both staff and students to meet the requirements of new web-based technologies. The two relevant themes are shown in Table 6.11:

Table 6.11. *Adjustments made*

| **Adjustments made** | **Responses** |
|---|---|
| **Themes:** | **14** |
| • Adjustments made to suit students’ needs | 8 |
| • Adapting to new technologies | 6 |

*6.3.8.1 Adjustments made to suit students’ needs*

This theme was mainly developed from the interview discussions with the lecturers. These lecturer participants were asked in which ways they would accommodate students’ needs in teaching. The majority of the eight lecturers would take actions to meet their students’ suggestions, whilst one lecturer from AMC addressed that not all requests could be satisfied as these requests may not be beneficial for students’ learning. For example, a lecturer from a language course introduced that “*Sometimes they ask me to put all the answers for the* *tutorials in the Web to help them prepare for the final exams. And sometimes I use references in teaching and they would ask me to upload the reading and lecture materials online for them. There is no problem for me to make these resources available for them.*" The lecturer from AMC, however, claimed that "*I do consider my students' requests, but I wouldn't give everything they ask for. Some lecturers tend to upload their lecture notes and let them stay for the whole semester, I only have the notes availed for about four weeks or a months to make sure the students catch up with the classes all the time.*"

#### *6.3.8.2 Adapting to new technologies*

The second theme "Adapting to new technologies" had 6 responses as only a few participants had given comments on the adaption they made. Due to the imbalance in IT skills and the unfamiliarity with new technologies, some learners and teaching staff had to make more efforts than the others to adapt to the web-based learning mode. One student from an online course addressed that "*Web-based learning is a big learning curve…a lot of things that I did at the beginning, maybe towards the last month of the semester I was doing differently.*" It was also emphasised that adjusting and adapting to a new learning mode had to be done gradually along the learning process.

### 6.3.9 Free themes

Apart from the eight dominant categories, there were three free themes emerged in the selective data analysis process. These were independent themes which could not be grouped into any of the dominant categories. Although there was no inter-relationship between these themes and the dominant categories, they were still seen as valuable information which contributed in the data analysis and the generation of findings. For instance, taking the participants' personal and academic backgrounds into consideration gave the researcher an access to the circumstances and backgrounds in which the information was given. These free themes are shown in Table 6.12 on the following page.

Table 6.12. *Free themes*

| Free themes | Responses |
|---|---|
| • Personal and academic backgrounds | 20 |
| • Beliefs in the future of web-based learning | 13 |
| • Requirements for students in web-based learning | 11 |

### *6.3.9.1 Personal and academic backgrounds*

"Personal and academic backgrounds" was the first free theme (N = 20). It introduced the participants' biography information in relation to their personalities, learning styles, academic backgrounds and the lengths of studying/teaching at the university. This theme enabled the researcher to identify inter-relationships between the other themes and find inter-connections between the data collected and the theories reviewed. For example, a student shared his previous learning experience in the Faculties of Business and Education. Therefore, the researcher was able to encourage him to compare the web-based learning environments within the two areas. Moreover, a student from an Architecture background was able to give discussions from a designer's perspective as he had worked as a designer before attending the university. In short, the background information in this theme was highly valuated and considered by the researcher as an indispensible data component.

### *6.3.9.2 Beliefs in the future of web-based learning*

The theme "Beliefs in the future of web-based learning" (N = 13) indicated a positive view of the participants on the future of web-based education. Generally, both the students and staff believed that more web-based technologies would be invented and adopted to accommodate future learners' needs. Within some particular courses, new educational software was being developed and could be expected to be put in use within a few months' time to enrich students' learning experience. In addition, although a large number of participants had highly valued web-based learning and its future, they also addressed that it was impossible to replace the face-to-face mode entirely. Due to the nature of web-based learning, it still remained limitations, such as lack of interactions and unreliability of information. Compared to the face-to-face learning mode, it was more likely to be affected by other factors such as users' IT skills and the access to computer and network facilities. Also, some courses could not be taken over by web-based education as the nature of these courses required face-to-face communications and presentations. Therefore, most participants believed that web-based learning would remain as a supplementary mode to face-to-face learning in most courses, while a small number of courses which were possible to be managed without face-to-face contact could shift to online programs entirely.

#### *6.3.9.3 Requirements for students in web-based learning*

The last free theme “Requirements for students in web-based learning” had only 11 responses. It was indicated that students should have sufficient skills in order to achieve a satisfactory performance in web-based learning. The proficiency in using technologies was an important requirement agreed by most teaching staff. It was discussed that “*Students do need some IT skills. There is kind of a basic level that they need without a doubt.*” In addition, skills in accessing and selecting information were also required. This was evident in one lecturers’ discussion: “*It is important that they (students) actually know how to access the information …they need to be more discerning in terms of what is relevant and the level of stages of the material.*” Lastly, it was believed by the staff participants that building these skills takes a great amount of time and effort, and students may not take full advantage of these resources before they have the basic skills in place.

## 6.4 Conclusion

This chapter has introduced the qualitative data analysis process of the study. The data involved were from two sources: the participants’ responses to the open-ended questionnaire section and the interviews questions. The background of the analysis was discussed, prior to presenting the results. The analysis process was performed via the NVivo software using constructivist grounded theory and thematic analysis as the underpinning theory. This chapter has discovered eight dominant categories and three free themes. The results indicate that the Web was adopted for a variety of academic and non-academic purposes. The significance of the Web as a learning resource was highly valued by the participants. An evaluation was given on the adoption of web-based resources and the MyLO system. Expectations, suggestions and recommendations were also provided on the future development of web-based learning environments.

Based on the results obtained from the quantitative and qualitative analysis, the following chapter will give an analytic discussion of the findings. It will provide a comparative examination of the data analysis results and relate these finding to the relevant theories reviewed in Chapter 2. It seeks to find out in which ways the discoveries of these two phases support and against each other. Findings will be presented in the order of the five research objectives. Finally, it gives a discussion on how these findings have fulfilled the aims and objectives of the research.

# Chapter 7: Discussion and Recommendation

## 7.1 Introduction

The last two chapters have introduced the quantitative and qualitative data analysis processes and the results that have emerged. The quantitative analysis was presented in the order of the five questionnaire sections. Based on the quantitative analysis, the qualitative stage introduced the eight dominant categories and three free themes emerged from the participants' discussions. Some of these categories support the statistical data gathered, for instance: Category 1: Instrumentality of the Web and Category 3: Significance of the Web. The other categories, however, provide a much further insight into the participants' views, evaluations and expectations in relation to web-based education.

In the light of the two previous chapters, this chapter intends to examine to which extend the five research aim and objectives are addressed and achieved. Based on the results of the data analysis, five dominant findings were uncovered in understanding the significance of the Web as a learning resource at this particular university. These findings are presented in five sections in the order of the research objectives. Discussions are made to examine whether the research questions have been satisfactorily answered. The data gathered are revisited, and then compared with the theories reviewed in relevant literature. Some of the findings are strongly supported by the literature; contrastively, some appeared to be different or opposite to those arguments made by other researchers.

## 7.2 Research objective 1: Significance of the Web

The first research objective of this study is to investigate the views of students and teaching staff on the significance of the Web as a learning resource. This objective was addressed by both the quantitative and qualitative research. The following five questions were asked in relation to this research objective:

- How do students and teaching staff describe the significance of the Web in learning and teaching?
- What are the views of students and staff toward the Web as a learning resource?
- How does the Web as a learning resource change students' learning styles?
- What is the influence of the Web on students' learning performance?
- What are the factors that influence the effectiveness of web-based learning?

### 7.2.1 Significance of the Web

The Web, as a platform for learning delivery, was highly valued from various perspectives by the participants within this study. Its significant role was recognised by the students and teaching staff from the seven faculties/disciplines that were under investigation. The involvement of web-based education has brought learners a revolutionary experience which would be otherwise literally beyond their reach. This finding supports Benke, et al.'s (2004, p. 15) study within which the participants reported high levels of satisfaction with the entryway to opportunities and resources provided by web-based learning. While the participants showed general satisfaction on the Web as a learning resource, there were few outstanding arguments emerged. These are listed below:

- The Web has brought a high degree of freedom and flexibility.
- It facilitates collaboration among learners.
- It supports a learner-centred pedagogy.
- It fosters a more individualised approach.

It was an agreement among the students and teaching staff that the Web had brought freedom and flexibility which had never been achieved by any other learning resource. It served as a powerful tool for exploring, obtaining academic knowledge, facilitating communication as well as conducting assessment and evaluation. It was especially emphasised as a tool for information/instruction delivery. The speedy delivery, abundant formats and the large amount of online materials were highlighted. Its ease of use for collecting, sharing and distributing information makes the Web a ubiquitous and an ordinary tool for everyday teaching activities (Zaiane, 2001).

Another significance of the Web was its role as a facilitator for collaboration. Newly invented technologies have made collaboration possible even without face-to-face contact. In addition to the discussion boards which were commonly used within all the faculties/disciplines, a variety of cloud-based communication tools were adopted by university students and staff to exchange ideas and files and collaborate over learning contents (Ma, 2010). Some examples were Skype, Face Book, MSN, Twitter, You Tube, Google Wave, Pebble Pad and Second Life. In some courses, these tools had become an integral component within which learning activities and assessment tasks were performed and organised. The adoption of these tools helped create a multimedia learning practice and placed students into interactive groups for a cooperatively construction of knowledge (Fortino & Nigro, 2003).

The third revolutionary change brought by the Web was a learner-centred pedagogy. The pedagogical approach within web-based learning can be a radical departure from the traditional face-to-face mode due to its fine reputation for being learner-centred (Peters, et al., 2005). Web-based technologies facilitated a learner-centred pedagogy by decreasing the affects of institutions' scheduling and resource needs, and handing the control of time, place, contents, and outcomes to learners (Geith, 2003). A successful knowledge construction process emphasises a greater control of students on their own learning. Effective lecturers or instructors should perform as a "guide on the side", instead of a "star" or the "sage on the stage" (Repman & Logan, 1996, p. 36). Learners, however, should be placed in the central focus for all rational derivation of instructional techniques (Nguyen & Kira, 2000). They are required to take greater responsibility for their own competency and proficiency, while instructors become more facilitative (Dziuban, Hartman, Moskal, Sorg, & Truman, 2004; Geith, 2003).

The last unique feature of web-based learning was its facilitation of independent learning, individualised learning and adaptive learning. The Web helped enhance individualised learning by accommodating learners with different needs, styles and backgrounds (Martinez & Bunderson, 2008). Its flexibility had made teaching a more adaptive practice. Within web-based education, teaching can be conducted for "various individual traits", such as learning styles, preferences and prior knowledge (Danchak, 2004, p. 93). Students were supplied by more abundant materials and sources while the time and location of learning were no longer restricted. Therefore, students were able to choose their own pace and content for learning, and to contact any people that would be helpful. Compared to traditional lectures, web-based learning activities can be organised with more considerations of students' learning styles, preferences, as well as the development of problem solving skills. The focus of teaching was shifted from teachers to learners and from the transfer of knowledge to the construction of understandings. Therefore, it supported a more constructivist, collaborative and student-centred approach which effectively enhanced students' independent learning, individualised learning and adaptive learning.

### 7.2.2 Web-based learning versus face-to-face learning

Supplementing face-to-face teaching was the primary aim of Web adoption within the University of Tasmania. This aim was also the focus of many other institutions and projects, such as the Swiss Federal Institution of Technology Zurich (Hagstrom & Schaufelberger, 2003) and the De Montfort University which intended to enhance the availability and quality of traditional provision through web-based delivery (S. Brown, 2001). Among all the three learning modes within the university: the web-supported model, web-dependent model and fully online model (University of Tasmania, 2010b), the web-dependent model was particularly emphasised by the participants. Within this mode, web-based tools played as an essential platform to enable teaching and learning. MyLO and other web-based resources operated as an integral part for communication and course material delivery, while face-to-face lectures still remained as the primary mode of learning delivery. In addition to the web-dependent courses, the number of web-supported courses was also a large proportion within the university web-based programs. At the meantime, the number of fully online courses was obviously smaller. Within these virtual courses, MyLO and various web-based tools were adopted as a complete substitution of traditional lectures.

The university students and teaching staff believed that hybrid courses involving both face-to-face and web-based contacts were the most effective. This is supported by some researchers who argue that face-to-face courses that are skilfully blended with web-based technologies are an improvement on the classes supported by traditional teaching methods only (Felix, 2001; Hiltz & Turoff, 2005). These blended courses were infiltrating the ordinary face-to-face classes and changing people's views of education (Hiltz & Turoff, 2005). Therefore, similar to many other Australian educational institutions, the university was moving from face-to-face only courses, which used a more objectivist and teacher-centred pedagogy, towards web-based hybrid courses which used a constructivist, collaborative and student-centred pedagogy (Hiltz & Turoff, 2005).

The Web and web-based technologies have greatly changed students' learning styles. The traditional teaching mode is challenged by the abundant materials and the flexible learning delivery provided by web-based learning. As argued by Perrone, Repenning, Spencer, and Ambach (1996), web-based education has fundamentally changed the way people think and learn. Hybrid courses and blended programs allow students to "mix-and-match" traditional face-to-face and asynchronous courses, so that they can take advantage of strengths of both ways (Aggarwal, et al., 2008). As most courses nowadays are moving towards a hybrid mode which has advantages of both face-to-face and web-based learning delivery (Hiltz & Turoff, 2005), support for student is not restricted to only traditional lectures or web-based learning. Therefore, students' learning styles also appear to include characteristics of both learning modes. Here at the University of Tasmania, the shift in students' learning styles appeared in the materials used, the ways in which information and instructions were delivered, assessed methods, learning climates, as well as the ways in which time was spent and in which communication was achieved. Details in the characteristics of traditional learning and web-based learning styles are shown in Table 7.1 on the next page. Hybrid courses, however, have the advantages of both styles.

Table 7.1. *Comparison of the traditional and the web-based learning mode*

| Component | Traditional learning mode | Web-based learning mode |
|---|---|---|
| **Learning materials** | • Paper-based materials and CD ROMs<br>• Limited learning materials | • Learning materials in various formats<br>• Abundant learning materials |
| **Delivery of information/ instructions** | • Traditional lectures and tutorials<br>• Collaboration through tutorials<br>• Lecturers are the only source<br>• Restricted to library opening hours | • Recorded lectures and online tutorials<br>• Collaboration through online discussion boards<br>• Learning from a variety of sources<br>• Obtaining resources at anytime |
| **Assessment** | • Paper questionnaires and surveys<br>• Hard copies of assignments<br>• Manually marking by teachers<br>• Presenting themselves physically for examinations | • Online questionnaires and surveys<br>• Electronic copies of assignments<br>• Online marking by software systems<br>• Online tests and examinations |
| **Pedagogy** | • A more objectivist and teacher-centred pedagogy<br>• All the students are required to learn at the same pace | • A more constructivist, collaborative and student-centred pedagogy<br>• A more adaptive and individualised teaching approach |
| **Time spent** | • Most time is spent on reading books and paper-based materials<br>• Time is spent on searching for more learning materials | • Most time is spent on web-based learning activities<br>• Time is spent on selecting appropriate learning materials from a large amount of resources |
| **Communication** | • More face-to-face contact<br>• More interactive, effective and interpersonal<br>• Restricted by time and locations | • Communication is achieved via web-based learning tools<br>• Communication can be interactive, but can easily be interrupted. Less interpersonal<br>• Communication can be achieved at the time of need, despite of the hurdle of time and distance |

One dilemma emerged within the research finding was that while the greatest freedom and flexibility provided by the Web was in the areas of information/instruction delivery and communication; some significant limitations were disclosed in relation to web-based communication. It was agreed by the participants that interpersonal interactions play an essential role in the learning process, despite what the learning mode it is. This supports the theory which indicates that better quality learning evolves from the greater personalisation of communications (Swan, 2003). Achieving effective communication is one top priority within all learning modes (Hsu, et al., 1999; Rugelj, 2003). However, while the same researcher (Swan, 2003) argues for a "hyper-personal" characteristic of web-based communication, the students and staff in this study claimed this type of communication to be lacking of interpersonal interactions and motivations, and to be time consuming.

The various web-based technologies offered learners with geographic independence and temporal independence which helped enable synchronous and asynchronous communication (McCormack & Jones, 1998). When the Web was adopted in addition to traditional face-to-face lectures, it helped enhance the effectiveness and opportunities of communication. However, communication that relied on web-based tools only was far less effective due to its reduced ability in developing interpersonal relationships. This had, to some degree, influenced the effectiveness of web-based education. One potential reason of this unpleasant result could be the inadequacy the teacher presence. As it is argued by Swan (2004, p. 63) and Shea, Fredericksen, Pickett, and Pelz (2003), to make web-based learning "as good as face-to-face", adequate teaching presence and careful course design must follow. Therefore, the participants within this study strongly recommended that the Web should be used complementary to face-to-face teaching, within whichever situation that face-to-face communications can possibly be managed.

### 7.2.3 Influential factors in web-based learning

While the Web was widely recognised as a significant learning resource, it was also considered that its effectiveness depended greatly on how it was used and treated. Firstly, the success of web-based learning relied largely on the involvement of teaching staff and students. There was no doubt that the Web provided valuable opportunities for communication and education delivery (Parikh, 2003). However, it cannot be expected that these technologies would completely take over teachers or automatically make learning occur. Adopting web-based resources does not necessarily mean learning will follow (Q. Le & Le, 2007). In addition to the usability, users' intentions, expectations and willingness are also influential factors which affect the accountability and effectiveness of the resource. That is, careful instructions and active involvements must follow to ensure and embed the education value into the adoption of learning resources. Both students and staff must closely involve themselves into the learning process through observing, participating and seeking solutions for the problems encountered (Bodomo, 2008; Chickering & Ehrmann, 1996).

In addition, users' IT skills and knowledge have a great impact on the effectiveness of web-based learning. Basic ability and understandings in using web-based applications are essential in performing web-based activities and material delivery. Efficient training methods are crucial to ensure that students and staff are equipped with the latest information and advanced skills (Zhang, et al., 2004). As it was evident by the student participants, the lack of IT skills was a negative factor which led to the unbalanced quality of web-based activities. To improve the necessary skills and knowledge and to enhance the quality of future web-based learning, students and staff called for regular training sessions. It has become a constant need for trainings which can equip academic staff with new developments, functions, and applications of the technology (Clulow & Brace-Govan, 2003; Pagan, 2009) and prepare students in establishing their own learning goals, managing their time and utilising online discussion tools (Klassen & Vogel, 2003).

## 7.3 Research objective 2: Instrumentality of the Web

The second research objective is to identify in which ways the Web is used by students and teaching staff to facilitate learning. This research objective was addressed by both research stages. Two questions were asked in relation to this research objective:

- In what way is the Web used by students to facilitate their learning?
- In what way is the Web used by teaching staff to facilitate student learning?

The Web and web-based technologies were adopted for various academic purposes at the university. Eight dominant purposes of Web adoption were summarised in the qualitative data analysis, including communication, information retrieval, online tools, supplementing face-to-face learning, collaborative learning, assessment, feedback and entertainment. Within these purposes, the first five are relevant to both students and staff. That is, the Web and web-based technologies were adopted by both user groups for these five purposes. However, these resources were mainly used by the teaching staff group for the purposes of assessment and feedback, and adopted by the students for the entertainment purpose. Most of these Web usages were concerned within both research stages. The Web adoptions for supplementing face-to-face learning and for entertainment were not examined within the quantitative stage; instead, these emerged to be dominant purposes in the qualitative data. All the purposes are illustrated in the following Figure 7.1 and Table 7.2:

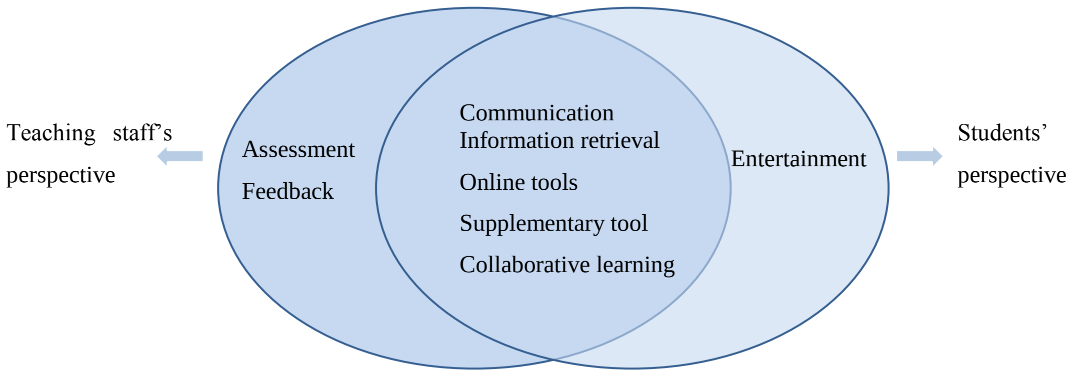


Figure 7.1. *The eight dominant purposes of Web adoption*

Table 7.2. *Comparison of the results from the two research stages*

| Purposes | Stages | Students | Teaching staff |
|---|---|---|---|
| **Communication** | Both stages | Often | Often |
| **Information retrieval** | Both stages | Often | Often |
| **Collaborative learning:** | Both stages | ___ | ___ |
| Online discussions | Both stages | Sometimes * | Often * |
| Sharing learning resources | Both stages | Sometimes * | Often * |
| **Online tools:** | Both stages | ___ | ___ |
| Management | Both stages | Sometimes | Sometimes |
| **Assessment** | Both stages | Sometimes * | Rarely * |
| **Feedback** | Both stages | Sometimes | Sometimes |
| **Supplementary tool** | Qualitative stage only | ___ | ___ |
| **Entertainment** | Qualitative stage only | ___ | ___ |
| * Different results were obtained from students and staff. | | | |

In Table 7.2, the items in the first column are the dominant purposes that were identified within the data analysis. As it can be seen from the table, the purposes concerned within the two data analysis stages are overlapping. The dominant purposes summarised at the qualitative stage are “bolded”. Some items that were examined within the quantitative stage, however, were seen as a specific Web usage instead of a dominant purpose of Web adoption. For instance, collaborative learning was categorised as one predominant purpose; however, online discussion was identified as a sub-level usage under this purpose, although it was examined in particular in the questionnaire. The frequency of Web usages is introduced within the third and forth columns. It was less straightforward to estimate the frequency of the Web adoption for the purposes that only emerged within the qualitative stage; therefore, the relevant cells are left blank. Also, the frequencies of Web adoption for online discussions, sharing learning resources and assessment were reported differently by the students and teaching staff. Therefore, the relevant data are marked with an asterisk, and will be further explained in section 7.4.

Two of the eight purposes, communication and information retrieval, were particularly emphasised by the participants in this study. Achieving more effective communication is one primary aim of Web adoption. Being used in addition to face-to-face communication, the Web can effectively enhanced the interactions between staff and students and among learners themselves (El-Seoud, et al., 2007; Klassen & Vogel, 2003). Communication tools, such as emails, MSN, Face Book and Skype, allowed synchronous and asynchronous communications to be achieved. They ensured the just-in-time delivery of enquiries and instructions (Beuschel, Gaiser, & Draheim, 2003), and thereby strongly stimulated student participation and collaboration (Mari, et al., 2008). In addition, information retrieval was the second dominant purpose. With the assistance of web-based tools, students and staff can get instant access to a wide range of resources (Chin, 2004; Zaiane, 2001). For students, tedious and cumbersome manual searching was no longer a barrier to information access; while for universities and faculties, the increasing demands from students for resources had become less of an issue (Chin, 2004). The emergence and diffusion of web-based technologies had offered learners the capability and flexibility of a variety of information delivery systems and methods of presentations (Magoulas, et al., 2003). The result, to some extent, enhanced students’ learning outcomes.

Apart from the two dominant purposes mentioned above, the Web has served as a resource for other academic purposes, including collaborative learning, online tools, supplementary tools, assessment, feedback and entertainment. Web-based resources allowed learners more opportunities for collaboration. The University of Tasmania owned server, which supported MyLO and the Webmail system, and other cloud-based technologies, such as Google Wave, Pebble Pad and Second Life, allowed users from different locations to exchange information and collaborate over learning contents. At the meantime, a variety of online tools were used by students and teaching staff to supplement face-to-face learning. For instance, bibliographic and data distribution systems were adopted by research students to organise and manage the large number of references and to deliver anonymous surveys for data collection (Chin, 2004). Moreover, the Web has created opportunities for conducting assessment and providing feedback (Picciano, 2004a, 2004b). Students' motivations were greatly stimulated by the online feedback and encouragement given by their instructors/lecturers (Trigwell, et al., 1999). Lastly, both the staff and students mentioned the Web adoption for entertainment. It was argued that some official websites provided them with global wide news which kept them updated. Some appropriate games can also become a powerful source of learning.

The Web usages differ among the participants from academic backgrounds. Generally, it was used frequently in all areas, especially for the purposes of communication and information retrieval. It was also used sometimes for collaboration. However, for the other purposes of Web adoption, participant responses in this study differed among the different faculties/disciplines. For example, undergraduate coursework students revealed far more support from teaching staff than research students, while the Web adoption for research purposes was greatly emphasised by both groups (Dempster, 2003). Also, the Business and Law Faculties at the university used the Web more often for the purposes of online discussion, feedback, assessment and learning management than the other faculties. The differences are shown in Figure 7.2 on the following page.

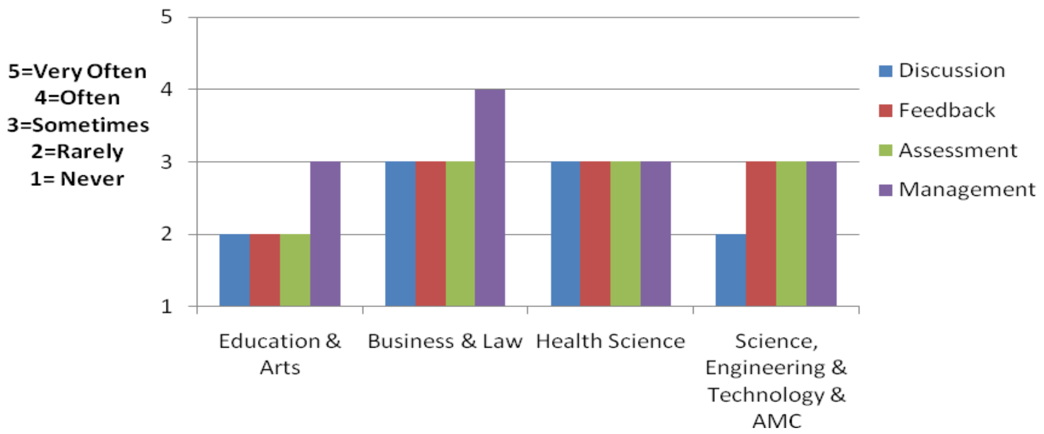


Figure 7.2. *Difference in Web adoptions among academic faculties/disciplines*

## 7.4 Research objective 3: Differences in views and behaviours of students and teaching staff

The third research objective is to compare views of students and teaching staff on the Web adoption in learning and teaching. Enquiries were made in both stages to achieve this research objective, while two questions were asked:

- What are the differences in views between students and staff toward the significance of the Web in learning and teaching?
- What are the differences in views between students and staff toward Web adoption in supporting learning activities?

Gaps were uncovered between the teaching staff and students' behaviours and views of web-based education, although both groups have given a positive evaluation on web-based learning in overall. There were small differences between perceived expectations of web-based learning by students and staff and the ways in which it was conducted and managed. For instance, the student participants revealed less involvement in online discussions and assessment than the teaching staff group. This is conflicting to what has been discovered in Grasso and Leng's (2003) study within which students involved themselves enthusiastically in online forums and therefore a substantial commitment of time from instructors was required to maintain their involvement in the debate. Unfamiliarity and low user-friendliness of resources were believed to be the main reasons of the poor student participation (Cahill, Cook, & Jenkins, 2003). This problem may be solved by linking discussion activities to a component of the course assessment (Bernardes & O'Donoghue, 2003).

In addition, there were differences in the views of web-based learning between the two participant groups. Some students were disappointed due to their unfulfilled expectations, while their teaching staff considered themselves to have contributed a great deal of efforts in the teaching activities. Inconsistency and discrepancy in the behaviours and/or views of the two parties may cause underproductivity in learning (Q. Le & Fan, 2010). However, a match of student performances and teaching staff presentations requires a high degree of communication between these two groups (Khan, 1998). Efforts are especially needed from educators to understand students' demands, preferences and learning outcomes. As argued by Shea, Pickett, and Pelz (2004), educators are responsible to identify agreements and disagreement, seek to reach consensus and understanding, as well as to promote positive climates, frequent discussions and regular assessment.

The involvement of all users and effective communication among them are the key to successful web-based learning. Although the adoption of web-based applications has the potential to enhance learning outcomes and provide learners with a great deal of conveniences (Wills & McNaught, 1996), inappropriate use may lead to gaps between teachers' intentions and students' understandings. As argued by a number of researchers, in both traditional classroom-based and web-based learning, there are often gaps between what is taught and what is learned (El-Seoud, et al., 2007), between what is intended and what is achieved (Oliver & Omari, 2001), and between perceptions of students and teachers (Trigwell, et al., 1999). Again, providing relevant equipment and resources does not ensure learning will follow. Teaching staff must play an active role in reinforcing learning, interacting with students and motivating learners to participate. At the meantime, students must be clearly informed about their opportunities and the expectations placed on them.

A positive correlation was found in the data analysis between the participants' behaviours and views in web-based education. That is, the more often they adopted the Web, the more confidence and understandings they would have in relation to web-based learning. In contrast, the students who were involved less in Web adoption tended to have more fear and less confidence in applying web-based technologies. An examination of relevant literatures found very limited discussions in terms of the correlation between the behaviours and views of stakeholders. However, it is anticipated in this study that an investigation of this correlation may contribute to a better organised web-based learning environment and a higher student motivation. Therefore, there is a potential for this research to fill in the gap. It is suggested in this study that to encourage students and staff to adopt these web-based resources, it is necessary to provide them with adequate knowledge and understanding about these tools. Accordingly, through providing opportunities for them to adopt web-based technologies, their willingness will be increased, and therefore a stronger belief in web-based learning will be upheld.

## 7.5 Research objective 4: Evaluation of web-based learning environment and MyLO

The forth research objective emphasises the evaluation of the web-based learning environments in different academic areas. This research objective was addressed by both the quantitative and qualitative stages. The following three questions were asked in relation to this objective:

- How do students and staff evaluate the web-based learning environments in their own academic areas at the university?
- What are the views of students and staff on the usefulness of the My Learning Online (MyLO) system at the University of Tasmania?
- How do students and staff evaluate the adoption of MyLO in their courses?

### 7.5.1 Evaluation of web-based learning environment in overall

The web-based learning environments within the University of Tasmania were examined in terms of the frequencies and effectiveness of Web adoption. Generally, high student satisfaction was shown in all the seven faculties/disciplines. It was an agreement among the participants that the Web was effectively used as a learning resource in their own academic areas. The participants within the disciplines of Health Science, Business and Law showed a more positive view than the other faculties due to the more frequent adoption of web-based tools and the more adequate support provided within these areas. Apart from communication and information retrieval which are the dominant purposes in all faculties/disciplines, the frequencies of Web adoption for the other purposes varied due to the different natures of the academic areas.

In addition to the positive evaluations, few limitations were also revealed. These limitations were related to four factors: lack of resources, technical issues, imbalance in IT skills, and short in relevant support or trainings. These factors were also evident in other literatures to be critical influences on student satisfaction (Benke, et al., 2004; Sener & Humbert, 2003). Due to these reasons, some students and staff claimed that the potential of web-based learning has not been fully achieved. Within some faculties/disciplines, student expectations on their faculties were not fulfilled. Therefore, further input from teaching staff and the faculties was needed in order to reach a higher student satisfaction (Sener & Humbert, 2003).

As it was discussed in the previous sections, the Web adoption is positively correlated to the end-users' views on web-based technologies. The involvement of resources indeed had an influence on the degree of satisfaction among users. However, increased adoptions do not necessarily indicate a more positive student evaluation, as web-based learning requires more efforts than just the adoption. According to Bradburn and Zimbler (2002), building and maintaining an effective web-learning environment requires even more course preparations than the courses that are taught face-to-face only. This effort must be made by teaching staff along with the faculties and the university. The later party is responsible for building a well organised web-based learning environment, which can enable their students to experiment different learning strategies, as well as training their students and staff to become information-literate (Bradburn & Zimbler, 2002). In addition, a reliable backup server for content management and delivery, sufficient dial-up lines, text and non-text content delivery to any place in the world, together with uninterrupted access and troubleshooting responses, are all essential elements for those universities which aim to create efficient web-based learning programs (Aggarwal & Legon, 2008).

### 7.5.2 Evaluation of MyLO

As the central courseware platform at the university in this study, the MyLO system plays an essential role in all the academic faculties/disciplines. Web-based courseware systems like MyLO are serving as a supportive tool to enhance individualised learning, adaptive learning and collaborative learning within the whole Australian university context (ATRC, 1999). The adaptability of MyLO to various learning styles, paces and contents has made it an essential component in the learning and teaching practice within the University of Tasmania. It performs as a significant representative of educational technologies across faculties/disciplines and provides support for a variety of academic purposes (De Moor, 2007a). Compared to other communicative technologies, courseware platforms like MyLO have more educational value as they provide accurate and varied contents in which lecturers may build their courses on. Being used appropriately, MyLO presents a great potential to promote interactions between staff and students and maximise learning outcomes (Wills & McNaught, 1996).

This study indicates that courseware that has higher usability, a learner-friendly design and suitability for the teaching context is highly desired. MyLO was evaluated from the perspectives of frequency of adoption, contents, functionalities, learner-friendliness and user-friendliness, suitability for the teaching context, as well as accessibility. Generally, within the seven academic areas, most students and staff admitted that MyLO was used effectively and frequently in their faculties/disciplines. Firstly, this courseware was highly evaluated for its usability, which refers to how easy it is to use and learn about the system, and how effective it is for a user to learn something using it (Ghaoui, 2003; Rentroia-Bonito & Jorge, 2003). Specifically, MyLO was highly valued for its structure, which provides clear directions and accurate and educational valuable contents for target-users, as well as its well designed interoperable configuration (De Moor, 2007a, 2007b; Squires & McDougall, 1994).

In addition, learner-friendliness and user-friendliness were emphasised by the stakeholders. It was indicated that inflexible courseware functions can cause inconvenience, disappointment and frustration (Q. Le & Le, 2007). Attentions should be shifted from the software itself to the end-users, so that the users become the centre in the operation instead of passive receivers (M. Myhill, et al., 1999; Squires & McDougall, 1994). Interestingly, different evaluations were given by the participants on the learner-friendliness of MyLO at the two research stages. While a positive response was given by the participants in the questionnaire, it was disclosed by students and staff in the interviews that MyLO was expected to be improved in terms of its learner-friendliness and user-friendliness. Some of its functionelities, such as the time used to upload files, and the Turnitin examination software, were reported to be inflexible and had caused some inconveniences and frustrations.

Furthermore, accessibility was mentioned by both end-user groups. It is important to make the web-based tools available to all users (ATRC, 1999; Wilss, 1997). Accessibility is emphasised by Wilss's (1997) study which points out that courseware should support inclusive teaching and respect the diversities in learners' needs, backgrounds, abilities and preferences. MyLO is expected to have more personalised functions which can cater for different learning styles. To meet this requirement, more efforts are expected from teaching staff and faculties. As it is argued by Sener (2003, p. 119), no web-based resource by itself is "sufficient as a strategy for improving access". Educators are required to identify the access issues of the particular student group that they serve to ensure no learner is being "screened out" (Sener, 2003).

Suitability for the teaching context was addressed by the participants in this study as an important criterion. A suitable courseware in one education context may not be suitable in another; therefore, assessing the suitability of courseware for the specific teaching context is an essential step in courseware evaluation (Squires & McDougall, 1994). The results of this study affirmed the suitability of MyLO as the central courseware platform within this university, although there was a suggestion made by a very small number of participants that some other courseware systems, such as Moodle, could have been a better choice.

Lastly, it was mentioned that the effectiveness of MyLO as a tool heavily dependents on how it is handled. The students and staff members within this research positively valued the role of MyLO as a supportive supplementary tool for face-to-face learning. MyLO was used as an integral component of teaching activities. It did not only supplement face-to-face lectures by delivering course material and providing a platform for discussion and collaboration, but also performed as an essential deliverer of lecture contents for the learners who could not make physical presence to the campuses. To make a better use of MyLO, both students and staff need to improve their skills in adopting this resource. On the one hand, the personalisation features and flexibility of MyLO should be enhanced to better suit its end-users' needs (Dinevski, 2007). On the other hand, support sessions on the use of MyLO should be organised on a regular basis, particularly at the beginning of each semester when some students and teaching staff are initially introduced to this learning resource.

## 7.6 Research objective 5: Challenges and recommendations

The last research objective of this study is to provide recommendations for enhancing the web-based learning at the university. This research objective was addressed by the data collection and analysis in the qualitative stage within which the following four research questions were asked:

- What are the challenges and obstacles in web-based teaching and learning practice?
- In what way web-based learning environment can be enhanced?
- What are the expectations of students and staff on the web-based learning environment in their faculties?
- What support strategies are expected by the students and teaching staff in relation to Web adoption for learning activities?

### 7.6.1 Challenges and obstacles

A number of challenges and obstacles were also disclosed, while an overall positive evaluation was given by the participants. As argued by Anne Adams and Blandford (2003), the increased potential of web-based learning come a myriad of risks. These risks need to be addressed in order to successfully achieve the intended teaching objectives and the expected learning outcomes. From a lecturer perspective, there was an imbalance in the adoption of web-based learning by teaching staff in some faculties. This issue was partially caused by the unwillingness of some staff members in using new technologies. Some lecturers were afraid that the video screen would not allow for the same level of inspiration which can be offered in a live performance (Klassen & Vogel, 2003). Therefore, these staff members refused a large scale adoption of web-based applications in order to maintain the quality of their teaching. In addition, adequate IT skills of teaching staff were an important factor in ensuring high standard web-based education. Some of them rejected web-based learning because of their limited IT skills (Pagan, 2009). Due to the uncertainty about new technologies and low self-confidence, web-based technologies were avoided in the courses taught by these teachers. Therefore, their students would not benefit from the abundant formats of materials or conveniences of flexible information delivery. Also, a small number of teaching staff suffered from the heavy time requirement for the preparation of web-based resources and course materials. According to Bernardes and O'Donoghue (2003), early experimental work in web-based learning can become an inevitably addition to the existing workload, at least in terms of time commitments. As a result, students may suffer from poor quality materials due to the limited preparation time.

From a student's perspective, while most learners had successfully shifted from the traditional face-to-face style to the blended learning mode, which involved web-based applications to varying degrees, a small number of students were not able to fit into this new education mode. Learners who preferred a structured face-to-face style felt isolated or disconnected due to the absence of step-by-step instructions and face-to-face contacts. These students lost enthusiasm and motivation for learning. Some even considered giving up studying. As argued by Vesely, Bloom, and Sherlock (2007), the feeling of isolation is identified as one main factor associated with the higher dropout rate in web-based courses. The drop rates in these courses are sometimes 10 to 20 percent higher than in traditional courses (Carr, 2000). Although the limitation of isolation was not the main topic investigated in this study, and dropping out was not reported in the findings, this issue was still mentioned by some participants as a problem encountered. Therefore, team work and regular interactions between students and teaching staff and among students themselves are strongly recommended as activates like this can effectively reduce the feeling of isolation and enhance student participations (Ng, 2000).

Students' ability in selecting information and mastering web-based applications had a significant influence on their performance. Selecting reliable information from a great amount of resources is a challenge for some students since much of the information spread on the Web is without verification (Grey, 2001). The overwhelming online information can be a distraction for the learners who do not have a strong self-discipline. As argued by Schrum (2000) and Matthews (2003), web-based courses provide students with greater freedom to schedule their own work, with a requirement of self-discipline, self-motivation and efficient time management. Due to the limited opportunities of web-based learning in previous study, some students were lacking of relevant experiences (Chin, 2004; Dyer, 2003). These student participants found web-based learning overwhelming as the unauthorised information may cause problems, such as misleading, wasting time and distractions. This learner group need the most instructions and guidance to become familiar with the techniques in finding resources which are a new set of requirements to skills in face-to-face education.

The lack of support strategies was reported as one major challenge within some faculties/disciplines. Personal assists with onsite facilitating and support are key factors within web-based learning (Meyer-Peyton, 2000). The constant need of guidance, support and training session are revealed in some other education contexts, such as the UK Open University (Dyer, 2003). As discussed within the previous sections, the main limitations occurred within the university web-based learning environment are lack of resources, technical issues, imbalance in IT skills, and short in relevant support or trainings. The last limitation was considered to be the fundamental trigger of the other three limitations. Without effective support and updated resources, these problems may lead to low student and faculty satisfaction and impede the development of web-based education. As adequate training sessions were not in place to support the students and staff in some faculties/disciplines, the technical issue encountered and lack of IT skills had caused low participation and poor performance of users in these academic areas. Lastly, the participants within this study called for an improvement and update of web-based resources. Interactive systems and platforms that are with poor learner-friendliness or functionalities may cause inconveniences and even failure in teaching and learning performances (El-Seoud, et al., 2007). In responding to the challenges mentioned above, the recommendations made by the participants within this study are discussed and summarised as follows.

### 7.6.2 Recommendations

Three recommendations were made by the students and staff for the future development of web-based education within the university. Firstly, effective communication is required to create a more meaningful learning environment. On the one hand, communications provide teaching staff with information about students' characteristics, expectations, preferences and desires which should be placed as parameters of the design of any particular program or instructions (Nguyen & Kira, 2000). An understanding about students' preferences is particularly beneficial for teaching staff who need to make a decision on how to package the knowledge for their students, as materials can be managed in so many contexts and styles with modern technologies (Martinez & Bunderson, 2008; Ng, 2000). One the other hand, communications allow clear instructions and guidelines to be delivered to students. Learners must understand the expectations that have been placed on them, especially in terms of critical and self-directed learning (Garrison & Cleveland-Innes, 2004). At the meantime, constant monitoring and assistance should be organised accordingly. As argued by McClelland (2001), providing information and guidance, such as time of study, place of study, frequency of interactions with tutors and availability of scarce resources, is essential in reinforcing student learning.

Secondly, support strategies must be put in place to equip both students and staff with necessary skills and capabilities. From a teacher's perspective, a certain degree of familiarity with web-based technologies and relevant IT skills are basic requirements to perform satisfactorily in web-based activities. Teaching staff should be able to provide students with a “rich diet of materials along with the key skills and the relevant intellectual or conceptual frameworks with which to make use of those resources” (Bernardes & O'Donoghue, 2003, p. 24). From a student’s aspect, relevant guidelines and instructions are desired. According to Mills, Marchessou, Nonyongo and Tau (2005), assistance should be provided through the elements of assessment, tutoring, learner support and course materials. This led to the need of support strategies from faculties and the university. Furtado, Furtado, Mattos, and Vanderdonckt (2003, p. 71) recommended three types of assistance for students: strategies that can be used, information and knowledge involved and motivation to solve the related problem. It is suggested within this study that regular support and trainings, which can provide end-users with relevant skills in using web-based technologies, should be organised for both students and staff. In the following Table 7.4, three types of support strategies are suggested:

Table 7.3. *Recommended support strategies*

| Types of assistance | To be provided by teaching staff | To be provided by faculties and the university |
|---|---|---|
| **Strategies that can be used** | • Experimenting new tools with students.<br>• Encouraging students to use online collaborative tools.<br>• Giving suggestions on how to select resources and distinguish the quality and reliability of resources.<br>• Teaching students to explore using the Web and web-based technologies. | • Encouraging staff and students to involve abundant resources.<br>• Having a structured web-based learning module.<br>• Training in using the MyLO system and self-assessment software, such as Turnitin.<br>• Providing students and staff with access to a wide range of resources. |
| **Information and knowledge involved** | • Teaching students the relevant skills in using the web-based tools chosen.<br>• Involving abundant web-based materials and resources into teaching.<br>• Providing regular evaluation on students’ work. | • Ensuring a reliable network within the campuses.<br>• Providing students and staff with a reliable server within the university wide.<br>• Having relevant principles to standardise the involvement of web-based resources of teaching staff.<br>• Providing students and staff with updated hardware, software and computer facilities. |
| **Motivation to solve the related problem** | • Interacting face-to-face with students who cannot fully adapt to web-based learning.<br>• Giving students the freedom to choose the pace and styles of learning.<br>• Closely monitoring students’ learning practice. | • Monitoring teaching staff to ensure a high quality performance in web-based learning.<br>• Encouraging and leading a positive attitude towards web-based learning among students and teaching staff. |

Thirdly, web-based learning should be based on sound educational theories. Web-based activities and applications must be organised and designed based on strong learning theories. The pedagogical dimension of learning is considered in university education more than any other contexts, and therefore, the quality of teaching becomes nonnegotiable and high levels of disciplinary learning have to be guaranteed (Trentin, 2007). Universities are concerned with educational technologies which are considered to be different from information technology due to their stronger potential in helping educators reach their pedagogical aims (Biggs, 2003). To ensure the educational value, the rationale, teaching objectives and learning theories must be taken into consideration throughout the design and implementation of any web-based resources. The pedagogical assumptions underpinning the web-based technologies must be understood by educators who intend to use these resources to enhance learning outcomes (Leidner & Jarvenpaa, 1995).

At the university in this study, the Web serves as a significant tool in supporting individualised learning and accommodating students with different needs. According to Leidner and Jarvenpaa (1995), teaching strategies and instructional methods that mostly match an individual's learning style are the most effective. Web-based learning is accepted and valued by the educators and students within this university as it caters for learners with various backgrounds, characteristics, needs and abilities. Students are able to participate in instructional decisions and be supported according to their personal goals (Magoulas, et al., 2003). One limitation identified was that the MyLO systems did not have the ability to identify individuals' unique learning styles, or assessment tools that could be used to monitor, support and assess learners' individual progress (Martinez & Bunderson, 2008). The teaching and learning practice, therefore, relied heavily on the input of teaching staff.

The other dominant theories that were relating to web-based learning were cognitive theory, constructivist theory, collaborativism and behaviourism. Yan (2004) suggested web-based education to be studied as a psychological phenomenon, within which students' cognitive capacity should be considered and purposely maximised during learning activities. Most participants believed that web-based learning supported cognitive and constructivist theory, which emphasis the interactions between individuals and learning materials. Collaborativism, which supports learning by facilitating interactions between an individual and other individuals (e.g., lecturers and peer students) was also emphasised by the students and staff (Leidner & Jarvenpaa, 1995; Slavin, 1990). Due to the nature of web-based technologies, the Web has far greater potential in facilitating interactions and collaborations. Therefore, the role of web-based education within this university was relatively positive within the perspectives of knowledge construction and collaborations among different learner groups. This finding is supported by Talbot's (2003) study which suggests that peer support is the one greatest assets in web-based learning. Lastly, a considerable number of staff members held a strong belief in behaviourism which argues that learning is the acquisition and strengthening of responses (Wilson & Myers, 1999) and occurs as a result of experience (Konza, 2005). The educators who supported this learning theory highly valued the role of the Web in problem solving situations and in the transition from theory learning to real life practice.

## 7.7 Conclusion

As the discussion and recommendation component, this chapter has provided a comprehensive discussion of the research findings in relation to the research objectives and questions raised in this study. The theories emerged from the two data analysis stages were examined and compared with the theories reviewed in the relevant literature. The findings were presented relating to the five research objectives. This chapter revealed that the significant role of the Web and web-based technologies were well received by the students and staff within this particular university context. The various purposes of Web adoption were recounted. The usages of web-based applications by the student and staff groups were slightly different; also, there were small gaps between their understandings of the Web as a learning resource. However, both participant groups have given an overall positive evaluation on the web-based learning environment in their own faculties/disciplines. Challenges and obstacles were also disclosed, followed by relevant recommendations made by the participants in creating a more positive and meaningful web-based practice in the future.

The following chapter is the conclusion of the thesis. It will give a summary on the research journey, including the achievement of the study, the shift in the project aims and objectives during the research period, as well as a general discussion of the findings. Most importantly, it gives recommendation for the future development of the Australian university web-based education sector. Implications are suggested from the aspects of Web adoption as a complementary, possible support strategies, and movement towards cloud-based applications. Lastly, it presents the future of the research and looks into the possibilities of directions of future study.

# Chapter 8: Conclusion

## 8.1 Overview

The previous chapter has provided a comprehensive discussion of the research findings. The discussions were presented according to the five research objectives. As discussed by Q. Le (1999), any research project is like an excursion, the entirety can only be seen when the excursion ends. There is no guarantee that the excursion will follow what was planned at the beginning. By the end of the study, the researcher started to have a complete picture of the whole research journey. Similar to many other projects, this research did not exactly follow the original plan. It had the curves, exiting moments and obstacles. However, this chapter presents the picture of its achievement, excitement and discoveries. It also examines to what extend the research aim and objectives have been fulfilled.

As the conclusion of the thesis, this chapter provides an overview of the entire research journey and an overall discussion of the findings. It examines the elements that have been successfully achieved, the ones that have been partially achieved, as well as the discoveries that were not expected or planned at the beginning. The chapter gives a discussion of the research findings that relates directly to the five research objectives. Recommendations are given with a consideration of these findings as well as the suggestions made by the participants. Lastly, it looks into the future of the research and assesses the possible directions and aspects that can be investigated in future studies.

## 8.2 The research journey

This research was conducted as a part of the Doctoral Degree requirements. As mentioned in the introductory chapter, the initial inspiration of this study was derived from the researcher's own learning experience. Back in the early 80s, the researcher grew up along with the rapid growing computer and web-based technologies. The different learning experiences obtained in China and in Australia sparked her interest in looking into the role of the Web as a learning resource in everyday education practice. One of the main reasons, which triggered her first foray into the research journey, was the apparent gap between the intentions of web-based education organisers and the views of end-users on the technologies used. Finally, the PhD study allowed her an opportunity to formally conduct this research to look into the evaluative views and thoughts of the stakeholders.

The study was conducted within one particular university context, the University of Tasmania. It involved 502 students and 100 teaching staff. Data collected through a questionnaire and semi-structured interviews were analysed using the SPSS software and the NVivo software. The data analysis allowed the researcher to see the multiple dimensions in the participants' experience in web-based education. The discussion of findings was presented with five components: significance of the Web, adoption of the Web, different view of students and teaching staff, evaluation of web-based learning environment and MyLO, and challenges and recommendations. The construction of the dominant findings allowed the researcher to see gaps within the existing web-based learning at this particular university and to generalise evaluations on the overall web-based environments in the different academic faculties/disciplines.

The initial aim of the research was to investigate the behaviours of students and staff in web-based learning, their views on the Web as a learning resource, as well as the influential factors that may affect these behaviours and views, such as gender and academic backgrounds. There are significant gaps between perceived web-based learning and how it is conducted in many education institutions which are shifting towards a web-based era from the face-to-face dynasty. None of the innovations within the technology revolution is easy or inexpensive, especially in the midst of change (Johnstone, et al., 2005). Efforts are made by universities and schools to survive the rapid changing world while maintain a satisfactory service. The University of Tasmania is also trying the best to provide its students and staff with the best quality support strategies that can be possibly achieved. Therefore, it is especially important for the university to understand the end-users views on the effectiveness of web-based applications and the significance of these resources in the educational practice.

The research aim was then extended to examining the differences between the views of students and teaching staff. This extension occurred when this issue emerged from a further investigation of literature. The mismatch of teacher intentions and learning outcomes is, to some degrees, triggered by the mismatched views and usages of these two parties (El-Seoud, et al., 2007). The learning objectives can hardly be achieved if the teacher is holding a contrary teaching philosophy to his/her students or applying teaching strategies that are unsuitable for the learner group (Shea, et al., 2004). For instance, teaching activities that are designed based on objectivism or behaviourism will not be effective within a class that prefers constructivist learning. Therefore, the aim of the research was extended to examine to what extent the web-based learning activities designed are matching the students' learning styles, and what the further expectations are of these students in terms of future web-based learning.

This research has achieved both the original and the extended aims. Significant results were found according to gender, academic faculty/discipline, length of studying/teaching, and level of IT skills, in terms of instrumentality of the Web and the role of the Web as a social enhancement. Statistically significant differences were found between the student and teaching staff groups when it comes to the Web adoption for academic purposes of online discussion, collaboration, assessment and interpersonal enhancement. The statistical results obtained from the questionnaire enabled the researcher to conduct further research to obtain more detailed opinions on the role of the Web in university tertiary education. In particular, in which way the Web has changed students' learning styles and the further expectation of these end-users were the focus.

Generally, the project was completed within a reasonable time frame with its research aim and objectives well achieved. The advantages and successful points are that the research used both quantitative and qualitative methods to ensure a triangulation of the data source and a high reliability of the results. The soundness of the research instruments was strengthened by the adequate theories considered, the testing via SPSS and the carefully designed pilot study. The considerable number of participants ensured the high generalisability of the research findings. The data collection and analysis were systematically performed with professional tools and methods to assure the reliability of the analysis process and to avoid possible mistakes. Hence, the careful design and purposeful actions ensured the achievement of the research objectives and the completion of the entire project.

## 8.3 Overall discussion of findings

This research has uncovered five dominant findings which respond directly to the research objectives. This section intends to provide a brief summary of the results. The discussion revealed the significant role of the Web at this particular university. Web-based resources were widely adopted by the students and teaching staff within all the seven faculties/disciplines, although there were small gaps between the views and behaviours of these two participant groups. The overall web-based learning environment and the MyLO system were positively valued by these end-users. Expectations and recommendations were also made on the future development of web-based education within the university.

### 8.3.1 Significance of the Web

The significant role of the Web was widely recognised by the students and teaching staff at the University of Tasmania. A variety of web-based tools were adopted for various academic purposes. These web-based resources had indispensible contributions in teaching and learning, especially in collaboration, individualised learning, as well as the development of a learner-centred pedagogy. The Web and web-based technologies had greatly changed students' learning styles in terms of learning materials, delivery of information/instructions, assessment, learning climate, the ways in which time was spent and in which communications were achieved. In particular, the flexible information delivery and abundant materials had provided the end-users with a great deal of conveniences and opportunities for further education (Bradshaw, 2005). It had, to some extent, changed peoples' views of education. As argued by Matthews (2003),

> The ever-accelerating growth in information technology and the proliferation of distance education are exciting developments in higher education that could bring about some of the most profound changes to the ways we teach and learn. They provide extraordinary opportunities to transform the when, where, and how of what we teach. (p. 17)

The web-dependent model was the preferred mode among the three web-based learning models at the university. The majority of courses were developed within the web-supported model and the web-dependent model, while only a small number of courses were organised in the fully online model (University of Tasmania, 2010b). Hybrid courses, within which web-based applications operated as the supplementary or an integral part of face-to-face learning delivery, were preferred (Felix, 2001). Within these blended courses, web-based tools were valued to be highly powerful and effective on the basis that adequate face-to-face contacts were also provided. However, within the fully online courses, more face-to-face interactions and stronger support strategies were highly desired. Therefore, while the rapid diffusion of web-based education is being recognised, it cannot be summarised that face-to-face teaching had been phased out (Wong, Gerber, & Toh, 2003).

There also emerged a number of influential factors that affected the accountability and effectiveness of web-based resources. Apart from the usability of the tools, users' intentions, expectations, willingness and ability in managing the tools can also affect their performances in web-based education and thereby influence the learning outcome. Therefore, an active involvement of both students and staff is crucial to stimulate a more positive web-based learning environment and to ensure the educational value of the learning activities (Vonderwell, 2002). At the meantime, relevant training methods can help enhance the effectiveness of Web adoption by equipping end-users with the latest information and advanced skills (Zhang, et al., 2004).

### 8.3.2 Instrumentality of the Web

The Web was used in a variety of ways to support the teaching and learning practice. The eight dominant purposes summarised were communication, information retrieval, online tools, supplementary tool, collaborative learning, assessment, feedback and entertainment. While the Web was adopted by both students and staff for the first five purposes, it was used by the staff only for the purposes of assessment and feedback, and by the students only for the entertainment purpose. Although the participants' responses to these Web usages vary among genders, academic faculties/disciplines, lengths of studying/teaching and different levels of IT skills, it was a general agreement that the Web and MyLO had become essential tools that enabled teaching activities to be performed. Without the support of web-based technologies, many courses could not be successfully performed, especially programs that are designed base on the web-dependent model and the fully online model (University of Tasmania, 2010b).

Despite the fact that some faculties/disciplines used the Web and MyLO more effectively and frequently than the others, web-based resources had permeated into the everyday education practice within the whole university context. Communication and information retrieval were emphasised as the dominant purposes of Web adoption at this university as well as in many other tertiary education contexts (Chin, 2004; Mari, et al., 2008). Also, the Web was used selectively by the participants for some other academic purposes, such as assessment and collaboration. The academic areas of Health sciences, Business and Law reported a more frequent Web adoption for these purposes than the other faculties/disciplines.

### 8.3.3 Different views and behaviours of students and teaching staff

A mismatch was uncovered between the views and behaviours of students and teaching staff. While both groups agreed on the significant role of the Web in teaching and learning, there also appeared varied understandings on the Web as a learning resource. The lack of communication and inadequate understandings about each other's expectations had, to some extent, caused low student and faculty satisfaction (Shea, et al., 2004). Some web-based applications and related teaching activities, which were seen as valuable by teaching staff, were not well received by the students. Therefore, these activities did not receive the expected participation and the resources remained unused. These mismatches, if not solved, may lead to underproductivity and poor student achievement (Q. Le & Fan, 2010).

Effective communication between students and staff is the key to a more efficient and meaningful web-based learning. Communications stimulate good understandings about the other party's preferences, expectations and reasons of adoption. A high degree of communication and interactions are crucial to assure concordant performances of students and teaching staff (Khan, 1998). The result obtained from the questionnaire showed positive correlations between the participants' views and behaviours in web-based learning. Increased adoption with appropriate support will stimulate users' enthusiasm and reduce the fear and unfamiliarity of new resources, and thus help achieve a more positive attitude. Therefore, this study argues that effective communications and understandings about each other's expectations can lead web-based education into a more positive cycle. To achieve this, teaching staff are in the key position to identify agreements and disagreements, seek to reach consensus and promote positive learning climates (Shea, et al., 2004).

### 8.3.4 Evaluation of web-based learning environment and MyLO

Generally, both the overall web-based learning environment and the MyLO system were positively valued by the students and staff members. The end-users from the seven faculties/disciplines showed various degrees of satisfaction on the web-based learning environment within their own academic areas. High student satisfaction was expressed especially within the faculties/disciplines which have set up strict and detailed guidelines and principles on the support strategies. Students, in particular, provided evaluations on the web-based activities designed by their lecturers and relevant teaching staff, such as administrators and tutors. While the majority of evaluations appeared to be positive, there also emerged some indispensible limitations and disadvantages in the web-based education within some academic areas. These limitations were summarised into the following four aspects:

- Lack of resources;
- Technical issues;
- Unbalanced IT skills;
- Lack of relevant support or trainings.

As an essential component of web-based learning, MyLO was evaluated in terms of its contents, functionalities, usability, accessibility, suitability for the learning context and learner/user-friendliness. Both positive evaluation and limitations of the courseware were given by the participants. Suggestions on the further improvement were also made. As the central platform which supports the web-based education for the whole university, MyLO was required to provide its end-users with accurate contents and a structured and convenient way to access to these resources. MyLO was highly valued for its contents, functionalities, usability, accessibility and suitability for the learning context. However, some of its functions and interfaces were reported to be inflexible. This low learner/user-friendliness has caused some inconvenience, disappointment and frustration (Q. Le & Le, 2007). Therefore, MyLO was expected to be improved in terms of its interfaces and learner/user-friendliness to gain a higher student satisfaction in the future.

### 8.3.5 Challenges and recommendations

Challenges and obstacles in relation to web-based learning were revealed. The advanced web-based technologies have brought some risks and challenges for both educators and students (Anne Adams & Blandford, 2003). In this study, the root causes of the problems can be summarised as the imbalance in the adoption and the lack of support strategies. On the one hand, inadequate IT skills, uncertainty about the technology and low self-confidence can draw back educators and students from using web-based resources (Pagan, 2009). For students, a high degree of self-motivation and self-direction is required in web-based learning (Schrum, 2000). The feeling of isolation and poor ability in selecting learning resources are also influential factors in students' performance.

On the other hand, the lack of adequate trainings in some faculties had caused a low self-confidence of students and staff in their own IT skills. Some teaching staff's rejections to experimenting new resources had discouraged and disadvantaged their students in benefiting from these tools. Without systematic training, students would also be unconfident or inefficient in selecting and obtaining web-based resources.

Recommendations and suggestions were given by the participants for the further improvement of web-based learning environment and the MyLO system. The three recommendations mentioned by the participants were effective communication among students, teaching staff and the faculties; training sessions; and the development of pedagogical sound learning activities. Firstly, knowing about students' characteristics, expectations, preferences and desires is important in achieving the intended teaching aims and the best potential of web-based resources (Nguyen & Kira, 2000). Effective communication can help in obtaining this information and allow a more effective learning practice to be achieved. Secondly, a series of training sessions were suggested in relation to the development of IT skills, selection and obtaining of web-based materials, up-dated resources as well as on-site technical support (Mills, et al., 2005). Lastly, the pedagogical soundness of learning activities was greatly emphasised. When it is effectively organised and managed, web-based learning has a great potential to enhance individualised and adaptive learning, constructivist learning, collaborativism and in some cases behaviourism. A strong support of learning theories may help enhance the pedagogical value of activities and therefore achieve a better learning outcome and a higher student satisfaction (Trentin, 2007).

## 8.4 Recommendations and applications

This section gives recommendations from the researcher's point of view instead of summarising the suggestions made by the participants. It takes into consideration both the participants' desires and the theories reviewed in the literature. It suggests changes and improvements to be made from the following three perspectives:

- The Web adoption as a complementary to face-to-face teaching;
- Possible support strategies; and
- Future movement towards cloud-based applications.

### 8.4.1 The Web adoption as a complementary to face-to-face teaching

This study suggests that face-to-face contacts should be managed in the situations where it can possibly be done. It is shown in the findings that the web-dependent model, within which MyLO and web-based applications were used complementary to face-to-face teaching, was the most comfortable form of learning (University of Tasmania, 2010b). While the web-supported model had also obtained a high student satisfaction, a need of face-to-face interactions was reported within the fully-online courses. This finding is supported by Q. Le and Le (2001) and Howard (2009) who found that maintaining a level of face-to-face teaching is essential in order to maintain the learner motivation, as web-based applications are perceived as somewhat impersonal, unreliable, and sometimes pedagogically ineffective. Therefore, the desire for communication and collaboration is particularly high in web-based learning (Rugelj, 2003).

Due to the increasing demands for web-based materials and flexibility, the desire of students and teaching staff on Web adoption will continue to increase (Aggarwal, et al., 2008). Accordingly, the number of fully online courses may also increase. To avoid the feeling of isolation and disconnection, a number of strategies can be used to support students within these courses. On the one side, organising orientation programs at the beginning of each semester may give students a sense of belonging and promote active learning (Benke, et al., 2004). On the other side, collaborations and adequate teacher presence must follow (Shea, et al., 2003). Feedback and encouragement given by instructors/lecturers and peer students are seen as great assets within all web-based programs (Shea, et al., 2004; Trigwell, et al., 1999).

### 8.4.2 Possible support strategies

Support strategies need to be provided to both students and teaching staff. These strategies may include training sessions, supportive policies, effective communications between students and staff, and up-dated web-based resources. Maintaining and developing an effective web-based learning environment requires a great deal of effort from faculties and universities (Bradburn & Zimbler, 2002). Support systems that are organised with different support souces are nassesary in serving students throughout the educational experience (Baker, Schihl, & Aggarwal, 2003). Instructional support, including both technological and pedagogical assistance, is a pivotal point for faculty and student satisfaction, especially within institutions which are rapidly expanding their online course delivery efforts (Fetzner, 2003).

Training sessions need to be organised to equip academic staff with new developments, functions and applications of the technology (Clulow & Brace-Govan, 2003), and to assist students establish learning goals and manage their own learning practice (Klassen & Vogel, 2003). A certain amount of knowledge and skills are required for both students and staff in order to perform satisfactorily in web-based education. Training sessions should be organised to provide them with such essentials, including MyLO adoption, reference search and the use of databases and self-assessment software. In addition, support workshops which can help develop students' self-directing and self-managing skills are highly recommended. Sessions like this can assist learners in the role adjustments which are required by the high expectations of critical thinking and self-directed learning in web-based courses (Garrison & Cleveland-Innes, 2004).

Supportive policies play an indispensible role in institutional web-based education. Web-based learning has the potential to generate high student achievement and faculty satisfaction, while ensuring plans and policies are mutually beneficial. Factors such as institutional support, professional rewards and personal satisfaction are also an important component of faculty commitment (Thompson, 2003). To ensure a successful delivery of quality web-based courses, universities are responsible in creating enabling policy environments which can both promote the implementation of web-based applications as well as allocate the appropriate financial and human resources (Naidoo, et al., 2005). At the meantime, policies should also be created to emphasise the social, collaborative and interactive nature of learning, so that web-based resources are situated within a sound learner-centred pedagogical framework (Oliver & McLoughlin, 2001).

Moreover, effective communication is one of the key elements in a successful web-based learning environment. While it is emphasised that students' characteristics, expectations, preferences and desires must be taken into account as parameters of web-based learning (Nguyen & Kira, 2000); communication, however, is the only effective way to obtain this information. Also, high-level collaborations must be achieved by "communication channels of high capacity and advanced tools for manipulation of shared information" (Rugelj, 2003, p. 257). Therefore, communication, including both formal and informal interactions, is of prime importance (Beuschel, et al., 2003). It is recommended in this study that effective communication should be put in place to ensure an onward learning progression, delivery of instructions and collaboration.

Furthermore, the importance of updated web-based resources is highlighted. Although some services within the university have already been improved, such as the Webmail system; some were still considered to be in an urgent need of improvement, such as the interfaces and user/learner-friendliness of MyLO. The usability of user interface was emphasised as a key success factor to the design and development of interactive systems, such as MyLO (Belkhiter, Boulet, Baffoun, & Dupuis, 2003; Karoulis & Pombortsis, 2003; Nielsen, 1993). Also, students in some faculties called for updated computer facilities, hardware, and software licences. These requirements need to be considered and fulfilled to ensure a positive and effective web-based environment within the faculties. This study suggests that faculties collect information of their requirements in relation to web-based resources, consider careful, and then take actions selectively to meet the achievable requests.

### 8.4.3 Future movement towards cloud-based applications

The last recommendation made by this research is the involvement of more cloud-based applications, which are considered as a new trend within web-based education (Pretlow & Jayroe, 2010). Working together with the local server, cloud-based technologies can provide a more powerful and colourful educational experience for learners. However, searching over databases did not obtain many relevant results. Therefore, cloud-based learning is a new field which has a strong potential in the future web-based education. This potential is evident in Pretlow and Jayroe's (2010, p. 18) research within which cloud-based applications were used in successful implementing a technology training program and had made four achievements of increased one-on-one computer lessons, increased number of classes, increased student knowledge and the development of a sustainable system of recruiting and training instructors. The trend towards cloud-based applications can also be seen from the Learning Technology Environment chart concluded by the University of Tasmania in August 2010 (As shown in Appendix 10) (CALT, 2010). This chart indicates that more cloud-based services are implemented in recent planning or being considered for the future learning. It can be expected that these technologies will become a part of the core production in the university web-based learning in the near future.

## 8.5 Future of the research

This research attempted to fill a gap in the literature, by looking at some contemporary perspectives from students and staff in relation to web-based learning. This has been achieved by investigating the ways in which participants' academic backgrounds have influenced their views and behaviours in teaching and learning online. Statistical significances were found between the participant groups, according to occupation, academic faculty, length of studying/teaching at the university and levels of IT skills. Differences were found in their Web adoption for online discussions, giving/receiving online feedback, sharing online resources and assessment, as well as their views on the Web as a social relationship enhancement. This research has filled a final gap in the literature through the evaluation of the web-based learning environment within the seven academic faculties/disciplines, as well as giving informative recommendations for the future adoption of web-based technologies.

As argued by Howard (2009), research studies sometimes tend to generate more questions than they answer. The completion of this study has brought a number of possibilities and temptations in conducting research to seek answers for the questions generated. The researcher in this study suggests that the following areas could be explored within future research:

- Investigating the expectation of ender-users on the MyLO system in terms of its instructional design;
- Investigating whether language and cultural backgrounds have an influence on learners' willingness of Web adoption;
- Examining whether the length of teaching/studying in web-based courses has an influence on end-users' learning skills;
- Investigating the differences between the views of the younger generation (new graduates from colleges or university) and the older generation (adult learners);
- Examining the shifting of university courses from face-to-face to a hybrid mode;
- Investigating the proportions of face-to-face, blended and fully online courses within different academic faculties;
- Examining the ways in which university policies have influenced the performance of students and teaching staff in web-based education;
- Establishing a standard in Web usage which can help regulate the learning environment within the university;
- Reaffirming the role of the Web in constructivist and behaviourism learning environments;
- Determining the degree of correlations between users' views toward web-based technologies and their behaviours in the actual adoption.

## 8.6 Conclusion

The Web, as the most transformative technology in history, is not only "reshaping business, media, entertainment, and society in astonishing ways but also perceived to dramatically transform the learning process" (Kamel & Wahba, 2003, p. 331). The last 30 years have seen an incredible growth and development in the web-based education industry. The excitements and benefits web-based technologies will bring to the tertiary education institutions in the next 30 years will be beyond the imagination of people nowadays. However, these advantages have also come with challenges. The study has made transparent the continual need for the university to provide supportive strategies that can better assist its students and teaching staff. Nevertheless, while the research questions are well answered, the study has also brought a number of queries and fascinating areas which can be answered and explored in future studies. Therefore, instead of an end, the conclusion of findings is seen as a beginning which can open up more possibilities and excitements.

The study journey has finally reached its destination. Through this research experience, the researcher has developed a deeper understanding of the web-based learning in tertiary education. The Web has also brought to the researcher a great experience in terms of research discovery and intellectual growth. The newly invented data collection and analysis tools, increased functions of the Word 2007 and Endnote, have facilitated the research journey tremendously. However, the most valued elements of this study were the participants in this research: students and staff at the University of Tasmania. They were an inspiring source and a strong motivating force for this research, and without their kind assistance this research would never reached its destination.

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# Appendix 1: Ethics Approval and Application

Appendix 1.1: Ethics approval

Appendix 1.2: Minimal risk ethics application form

COPY

MEMORANDUM

Private Bag 01 Hobart
Tasmania 7001 Australia
Telephone (03) 6226 2764
Facsimile (03) 6226 7148
Marilyn.Knott@utas.edu.au
http://www.research.utas.edu.au//index.htm

UTAS

**HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK**

# MINIMAL RISK COMMITTEE APPLICATION APPROVAL

18 August 2009

Dr Thao Le
Education
Private Bag 1307
Launceston

**Ethics Reference: H10792**

**The Web as a learning resource for students in an Australian University context.**

**PhD Candidate: Ms Si Fan**

Dear Dr Le

Acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 16 August 2009.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on Ethical Conduct in Human Research* (NHMRC 2007).

Therefore, the Chief Investigator's responsibility is to ensure that:

1) All researchers listed on the application comply with HREC approved application.
2) Modifications to the application do not proceed until approval is obtained in writing from the HREC.
3) The confidentiality and anonymity of all research subjects is maintained at all times, except as required by law.
4) Statement 5.5.3 of the National Statement states:

   Researchers have a significant responsibility in monitoring approved research as they are in the best position to observe any adverse events or unexpected outcomes. They should report such events or outcomes promptly to the relevant institution/s and ethical review body/ies and take prompt steps to deal with any unexpected risks.

5) All participants must be provided with the current Information Sheet and Consent form as approved by the Ethics Committee.

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

6) The Committee is notified if any investigators are added to, or cease involvement with, the project.

7) This study has approval for 4 years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. You will be sent a courtesy reminder closer to this due date.

8) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of project.

Yours sincerely

Emily Freeman

for **Ethics Executive Officer**

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

HUMAN RESEARCH ETHICS COMMITTEE

(TASMANIA) NETWORK

# SOCIAL SCIENCE HREC

# MINIMAL RISK APPLICATION

**Important: Please send an electronic copy of this application (may be unsigned) and all attachments by email to Marilyn.Knott@utas.edu.au. All electronic copies should be submitted as Microsoft Word documents. A signed hard copy must also be sent to: Marilyn Knott, Private Bag 1, Hobart, 7001**

**If you have any questions, please call: 6226 7479**

| **1. Title of proposed investigation** |
|---|
| Please be concise but specific. Titles should be consistent with those used on any external funding application.<br>The Web as a Learning Resource for Students in an Australian University Context |

| **2. Expected commencement date:** | **Expected completion date of project** |
|---|---|
| 1st August 2009 | 31st October 2010 |

**3. Investigators:**

**A. Chief Investigator (Note: This is the researcher with ultimate responsibility for the project. The CI may not be a student)**

| **Given Name** | **Surname** |
|---|---|
| Thao | Lê |

| | | | |
|---|---|---|---|
| **Staff Position:** | Senior Lecturer | **Qualifications:** | Doctor of Philosophy |
| **Staff ID:** | | | |

| | | | |
|---|---|---|---|
| **School & Division:** | School of Education | | |
| **Contact Address:** | Locked bag 1307 | | |
| **Telephone:** | (03) 6324 **3696** | **Email:** | Thao.Le@utas.edu.au (Required) |

**B. Co-Investigator(s)**

| | | | |
|---|---|---|---|
| **i) Given Name** Daniel | | **Surname** Rolf | |
| **Staff Position:** | Assoc. Head | **Qualifications:** | Doctor of Philosophy |
| **Staff ID:** | | | |
| **Contact Address:** | Locked Bag 1359 | | |
| **Telephone:** | (03) 6324 **3450** | **Email:** | Daniel.Rolf@utas.edu.au (Required) |
| **ii) Given Name** Quynh | | **Surname** Lê | |
| **Staff Position:** | Graduate Research Coordinator | **Qualifications:** | Doctor of Philosophy |
| **Staff ID:** | | | |
| **Contact Address:** | Locked Bag 1372 | | |
| **Telephone:** | (03) 6324 **4053** | **Email:** | Quynh.Le@utas.edu.au (Required) |

**C. Student Investigator(s):**

| **i) Given Name** | **Surname** |
|---|---|
| Si | Fan |

**Gender:** F **Date of Birth:** 13/06/1983 **Preferred Title:** Mr / Ms / **Miss** /Mrs /Dr

**Student Number:** 060945 **Level**: Undergraduate / Hons / Masters / Postgraduate Diploma / **PhD**

**Contact Address:** 3 Monash St. Mowbray TAS 7248

**Telephone:** 0413725838 **Email:** sfan@utas.edu.au (Required)

**4. Purpose**

What is the main purpose of this project?

Research for Publication ☐ Teaching ☐

Research for Thesis ☒ Quality Assurance/Audit ☐

**5. Brief Outline of Proposal**

**Aims:**

Please give a concise description of the main objectives and/or hypothesis of the study.

This study aims to investigate how the Web, as a learning resource affects students' learning at an Australian university context by examining views of students toward the significance of the Web in teaching and learning activities, as well as identifying in which ways the Web is used by students to facilitate their learning. Conducting of interviews and questionnaires with university teaching staff members and university students will help the researcher find out differences between the views of staff and students on the use of the Web. This research will also seek ways of how the web-based learning environment could be enhanced, from the university's perspective, by looking into the adoption of web-based learning tools in different academic areas at the university.

In term to the research objectives, the researcher intends to

- examine the views of students on the significance of the Web in teaching and learning;
- identify the ways in which the Web is used by students to facilitate their learning;
- compare the views of staff and students on the use of the Web in teaching and learning;
- evaluate the web-based learning environments in different academic areas in a university;
- provide some recommendations for enhancing the web-based learning in a university context.

**Justification:**

Explain why this particular study is worth doing; and the main advantages to be gained from it.

This study will contribute insights into the significant influences of the Web on educators' teaching and students' learning, as well as the ways in which the Web is adopted by teaching staff and students to facilitate their teaching and learning in an Australian university context. It will analyse the different understandings between teaching staff and students toward using the Web, as well as provide suggestion of how the adoption of the Web can be improved to better suit students' needs, by analysing direct feedbacks from current university teaching staff and students. This research will also contribute suggestions of the effectiveness of the web-based learning environments, in different academic areas at the University of Tasmania, from perspectives of independent learning, flexibility, accessibility, interactivity, etc. The findings of the research will assist teachers at education institutions develop support strategies in assisting future students in their learning with the Web, as well as help universities select and adopt effective and productive web-based courseware that can meet specific needs of varies users in the future.

**6. Review of Ethical Considerations**

*Research is only considered to be Minimal Risk if you answer "No" to all the following questions. If you answer "Yes", you must complete a full application using the Social Sciences Full Application Form*

| | |
|---|---|
| Does your research involve the collection of human tissue samples? Human tissue samples include blood and other bodily fluids. | Yes ☐ No ☒ |
| Does your research involve the deception of participants, including concealing the purposes of research, covert observation and/or audio or visual recording without consent? | Yes ☐ No ☒ |
| Does your research involve the participation of people without their prior consent? | Yes ☐ No ☒ |
| Does your research involve withholding from one group specific treatments or methods of learning from which they may benefit? | Yes ☐ No ☒ |
| Does your research involve the access or use of medical records where participants can be identified or linked to their records in some way? | Yes ☐ No ☒ |
| Does your research involve the use of ionising radiation? | Yes ☐ No ☒ |
| Does your research involve the use of personal data obtained from a Commonwealth or State Government Department/Agency without the consent of the participants e.g. getting a list of addresses from the Australian Electoral Commission? | Yes ☐ No ☒ |
| Does your research **specifically target** any of the following groups of people; (specifically target means they are the central group of participants, as opposed to potentially being incidentally recruited as part of the general population)<br><br>• Women who are pregnant and the human foetus<br>• Children and young people | Yes ☐ No ☒ |

| | |
|---|---|
| • Those highly dependent on medical care who are unable to give consent<br>• People with a cognitive impairment, intellectual disability or mental illness<br>• People who may be involved in illegal activities or residents of custodial institutions<br>• Aboriginal and Torres Straight Islander Peoples<br>• People in other countries<br>• People who are unable to give informed consent because of difficulties in understanding an information sheet (i.e. non English speakers etc)<br>• | |
| Does your research pose any risks for participants under medical care beyond those of their routine care? (Risks include not only physical risks but also psychological, spiritual and social harm or distress eg stigmatisation or discrimination) | Yes ☐ No ☒ |
| Does your research involve the in depth discussion of any of the following topics whether by interview or as part of a questionnaire or survey;<br>• Parenting practices,<br>• Sensitive personal issues,<br>• Sensitive cultural issues,<br>• Grief death or serious traumatic loss,<br>• Depression mood states or anxiety,<br>• Gambling,<br>• Eating disorders,<br>• Illicit drug taking or substance abuse,<br>• Psychological disorders,<br>• Suicide,<br>• Gender identity and/or sexuality,<br>• Race and/or ethnic identity,<br>• Fertility and/or termination of pregnancy | Yes ☐ No ☒ |
| Does your research involve the potential disclosure of illegal activities or criminal behaviour? | Yes ☐ No ☒ |
| Are there any specific risks to the researcher (e.g., will the research involve the use of hazardous materials or be undertaken in a politically unstable area)? | Yes ☐ No ☒ |

| | |
|---|---|
| If your research will take place in an overseas setting do any of the following apply: is the research to be undertaken in a politically unstable area? Does it involve sensitive cultural issues? And/or: will the research take place in a country in which criticism of the government and institutions might put participants and/or researchers at risk? | Yes ☐ No ☒ |
| Does your research explore potentially confidential business practices or seek to elicit potentially confidential commercial information from participants? | Yes ☐ No ☒ |
| Does your research explore potentially divergent political views or involve the collection of politically sensitive information? | Yes ☐ No ☒ |

**7. FUNDING**

*Under the National Statement (2.2.6) a researcher must disclose:*

- *the amount and sources or potential sources of funding for the research; and*
- *financial or other relevant declarations of interest of researchers, sponsors or institutions*

Is this research being funded? Yes ☐ No ☒

*If yes*, please detail amount and source of funds

(NS 5.2.7)

If this application relates to Grant(s) and/or

Consultancies, please indicate the Title and No.

Grant Number relating to it

If no external funding has been obtained, please indicate how any costs of research will be met:

The budget for this study is minimal. Some expense will be incurred in printing, photocopying the questionnaires and consent forms; reply-paid envelopes will also be required. The audio-tape recorder can be borrowed from the Education faculty. If any expense is required, the researcher will seek assistant form the Faculty of Education.

| | |
|---|---|
| Do the investigators have any financial interest in this project?<br>*If yes*, please provide details | Yes ☐ No ☒ |

**8. Participants**

**Selection of Participants**

*Clearly describe the experimental and, where relevant, control groups. Include details of number of subjects, sex, age range, and any special characteristics. Give a justification for your choice of participant group(s).*

This research will involve the participation of students and teaching staff at the University of Tasmania.

**Recruitment of Participants**

*Give specific details about how participants will be recruited. Some questions to consider include:*

- *Are you recruiting through advertisements? If so, indicate where they will be placed and append a copy*
- *Are you recruiting through 3rd parties like associations, schools or clubs? If so, detail how you will approach the organisations and the process that the stakeholders will use to pass on information to potential participants. Please attach copies of letters of introduction, emails, and telephone preambles if appropriate*
- *Are the participants University or DHHS staff, or regular patients in a particular clinic? If so, detail how they will be approached i.e. through personal invitation, email etc*

The participants will be recruited following these steps:

1. A letter will be written to head of departments to ask the permission of undertaking this research in that school (the letter is attached to this form); an information sheet for the head of departments will provide them with detailed information about this study.
2. With the permission of head of departments, information sheet and consent forms will be provided at the reception desks of each school for the teaching staff and students who are interested to participate to pick up.
3. Questionnaires will be available on both the reception desk in each school and online. The online questionnaires will be designed and collected using the Survey Monkey survey designer website, which is also used by many other professional researchers and professors at universities. Pre-addressed envelops will also be provided to the teaching staff and students who choose to do the paper questionnaires. A box will be provided in the reception of each school for the participants who want to put their completed questionnaires in.
4. Teaching staff and students who are interested in attending an interview may pick up an information sheet and consent form from the receptions, and contact the researchers of this study via the contact details written in the information sheet.

| 9. Data Identifiability |
| --- |
| Which of the following best describes the identifiability of the data (including tissues) collected? |

a) Non-identifiable data is data which have never been labelled with individual identifiers or from which identifiers have been permanently removed, and by means of which no specific individual can be identified. A subset of non-identifiable data are those that can be linked with other data so it can be know that they are about the same data subject, but the person's identity remains unknown. ☒

b) Re-Identifiable data is data from which identifiers have been removed and replaced by a code, but it remains possible to re-identify a specific individual by, for example, using the code or linking different data sets ☒

c) Identifiable data is data where the identity of a specific individual can reasonable be ascertained. Examples of identifiers include the individuals name, image, date of birth or address, positions in some companies. ☐

If the information is Re-Identifiable or Identifiable, please give details of the information that will be collected. Also indicate how the confidentiality and anonymity of the participants will be protected:

Participants' responses to the questionnaires will be non-identifiable data, as the completed questionnaires will be collected on line or via mails, and no specific individual can be identified by anyone including the researchers. Pre-addressed envelops will also be provided to the teaching staff and students who choose to do the paper questionnaires. A box will be provided in the reception of each school for the participants who want to put their completed questionnaires in. The participants can choose to do the questionnaire online, or to do a paper questionnaire and put it into the box at the reception, or to mail it back to the researchers using the re-addressed envelope. Their identities cannot be identified in either of these ways.

Participants' responses to the interview questions will be re-identifiable data. However, the confidentiality of the participants will be well protected. The tape recorded data of the semi-structured interviews will be collected and stored in a locked cabinet in the chief investigator's office. Transcripts of the data will erase any reference to any particular named participant so that the information is known to the researchers only but that the participants are not identified in the research. The researchers will be using the photocopier in the Faculty of Education if any photocopying is required, so that no other people have access to the confidential information. Names of schools, teaching staff and students will be erased from these initial data and will be replaced by pseudonyms. Confidentiality from the semi-structured interviews will be protected with no discussion of the participants' with other people. The participants will be given a pseudonym in the initial collection of the data and will be recorded as student A, B, or teaching staff A, B, etc.

## 10. Relevant Literature References


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**11. Procedures**

Researchers should explain how the investigators intend to conduct the study including the methodological approach, the specific procedures employed and the methods of analysis of data. This should be consistent with the aims of the project.

Please provide detailed procedures (describe exactly what you are going to do):

The proposed study will be in a mixed research paradigm, which utilises both quantitative and qualitative methods to gather and analyse data. It will ask for the participation of students, teaching staff, IT support staff, computer experts, and administrators at the University of Tasmania. Data collection methods are shown in the table below:

| **Research objectives** | **Data organisation** | **Data** | **Analysis procedures** |
|---|---|---|---|
| • examine the views of students on the significance of the web in teaching and learning;<br>• identify the ways in which the web is used by students to facilitate their learning;<br>• compare the views of staff and students on the use of the web in teaching and learning;<br>• evaluate the web-based learning environments in different academic areas in a university;<br>• provide some recommendations for enhancing the web-based learning in a university context. | Data will be organised in two groups, the participants' response to the questionnaires and surveys, and the transcripts of semi-structured interviews. | • Questionnaires for students at the University of Tasmania, in relation to their learning experiences with the web.<br>• Questionnaires for teaching staff at the University of Tasmania, in relation to their teaching experiences with the web.<br>• Transcripts of semi-structured interviews with students at the University of Tasmania, in relation to their expectations on how the web can be used to support teaching.<br>• Transcripts of semi-structured interviews with teaching staff at the University of Tasmania, in relation to how they would use the web to support their teaching. | • Analysis of participants' responses to the questionnaires using a Statistical Package for the Social Science (SPSS) software.<br>• Open coding of survey responses and semi-structured interview transcripts, (Babbie 2002; Charmaz 2002, 2006).<br>• Development of categories and themes which involves axial and selective coding (Charmaz 2002, 2006). |

Where is this project to be conducted? Researchers should attach a letter of agreement/support to participate from any organisation or department whose resources will be accessed as part of this project.

This research will be conducted within the Launceston campus at the University of Tasmania.

| 12. Monitoring |
|---|
| What mechanisms do you intend to implement to monitor the conduct and progress of the research project? (NS 5.5)<br>A timetable of the research project will be designed in the preliminary plan form, which can be downloaded from the university website. The timetable will include every single step of the progress of this study for over the three-year research period. The project will be conducted strictly according to the timetable. |

| 13. Data Storage |
|---|
| All raw data (including blood and/or tissue) must be held by the responsible institution (i.e. UTas, DHHS, AMC) for a period of at least five (5) years from the date of the first publication (this includes publication of the thesis). The data may be kept for longer than five (5) years but must eventually be destroyed, unless explicit consent is obtained from the participants to archive their data.<br><br>Where will the data be kept?<br>The data will be kept in the Faculty of Education in Launceston campus, University of Tasmania, Tasmania.<br><br>How will the data be kept secure?<br>The data will be stored and kept in a locked filing cabinet in the chief investigator’s office. The data analysis and subsequent writing of the thesis will be protected by secure servers which are password protected. |

How and when will the data be destroyed?

The data will be destroyed after a period of five years by placing them in sealed bags which are then removed and shredded by a contractor employed specifically to remove confidential waste from the University of Tasmania.

Will any personal information be collected from sources other than the subjects themselves (Please refer to Privacy Legislation Section 95A - National Privacy Principles)?

No ☒ Yes ☐

*If yes*, please detail including a declaration of the sources of the Information i.e. medical records, databases, registries, lists of members from Associations, clubs etc:

Will data on individual subjects be obtained from any Commonwealth Government agency without seeking the consent of the individuals?

No ☒ Yes ☐

*If yes, please detail including a declaration concerning which agency and what information is being sought. If you wish to obtain data containing personal information from any Commonwealth Government agency state the names of these agencies, describe the nature of this data and explain the justification for obtaining this information. At the Commonwealth level the collection, storage, use and disclosure of personal information by Commonwealth agencies is regulated by the Privacy Act 1988. The NHMRC requires the HREC to provide information on the cases in which it has approved access to, and use of, data held by Commonwealth Government agencies.*

| **14. Information Sheet** |
|---|
| With few exceptions, it is essential that subjects are provided with an information sheet about the study in which they are being asked to participate. The Chair of the HREC will |

pay close attention to the information that is given.

A copy of the proposed information sheet must be attached to your application form.

(*Information Sheet Pro forma is available on our website at:*

http://www.research.utas.edu.au/human_ethics/social_science_forms.htm)

**Is your proposed Information sheet attached to this application?**

Yes ☒ No ☐ (please provide an explanation as to why)

**15. Consent Form**

Written evidence of consent is usually required for research involving human subjects. If written consent is to be obtained a copy of the actual consent form that you propose to use. In certain circumstances, the HREC may give approval for consent to be waived (see Chapter 2.3 of the *National Statement*). While written consent is the norm, there are various kinds of studies for which other procedures for obtaining consent are more appropriate (See Chapter 2.2 of *National Statement*).

If you consider that written consent is inappropriate for this project please state your reasons clearly referring to the appropriate sections of the National Statement.

(*Consent Form Pro forma is available on our website at:*

http://www.research.utas.edu.au/human_ethics/social_science_forms.htm)

**Is a proposed consent form attached to this application?**

Yes ☒ No ☐

If no, please explain.

| 16. Approvals from other Departments / Institutions | |
|---|---|
| **Does this project need the approval of any institution other than the University of Tasmania and/or the Department of Health and Human Services (e.g., Department of Education, particular wards in hospitals, prisons, government institutions, or businesses)?**<br><br>No ☒ Yes ☐<br>*If yes*, Please indicate below the Institutions involved and the status of the Approval.<br><br>Name of Other Institution(s):<br>Status: | |
| **Does this project need the approval of any other HREC?**<br>*If yes*, Please indicate below which HREC and the status of the application. | No ☒ Yes ☐ (please detail):<br>Other HREC(s):<br>Status: |

| 17. Declarations |
|---|
| **The Head of School or the Head of Department is required to sign the following statement of scientific merit:**<br><br>"This proposal has been considered and is sound with regard to its merit and methodology."<br>The Head of School or Head of Department's signature on the application form indicates that he/she has read the application and confirms that it is sound with regard to:<br>(i) educational and/or scientific merit and<br>(ii) research design and methodology.<br>This does not preclude the Committee from questioning the research merit or methodology of any proposed project.<br><br>If the Head of School/Department is one of the investigators, this statement must be signed by an appropriate person. This may be the Head of School/Department in a related area or |

the Dean. The certification of scientific merit may not be given by an investigator on the project.

| | |
|---|---|
| Name | |
| Position | |
| Signature | |
| Date | |

**Conformity with NHMRC Guidelines**

The *Chief Investigator* is required to sign the following statement:

I have read and understood the *National Statement on Ethical Conduct in Human Research 2007 and the Australian Code of Conduct for Responsible Research 2007*. I accept that I, as Chief Investigator, am responsible for ensuring that the investigation proposed in this form is conducted fully within the conditions laid down in the *National Statement* and any other conditions specified by the HREC.

| | |
|---|---|
| Name of chief investigator | Thao Lê |
| Signature | |
| Date | |

**Signatures of Other Investigators**

I acknowledge my involvement in the project and I accept the role of the above researcher as chief investigator of this study.

| | | |
|---|---|---|
| (Name)<br>Daniel Rolf<br>(Name)<br>Quynh Lê | (Signature)<br><br>(Signature) | (Date)<br><br>(Date) |
| (Name) | (Signature) | (Date) |

# Appendix 2: Information Sheets

Locked Bag 1307 Launceston
Tasmania 7250 Australia
Telephone: (03) 6324 3696; Fax: (03) 6324 3048
Email: T.Le@utas.edu.au
Website: www.utas.edu.au/educ

UTAS

**Faculty of Education - University of Tasmania**

DATE:

## INFORMATION SHEET FOR STUDENTS

Title: The Web as a Learning Resource for Students in an Australian University context

**Purpose of the study**: The study examines how the Web, as a learning resource, affects students' learning in an Australian university context. The investigator will use questionnaires with participants to examine what their teaching and learning experiences are with the support of the Web, as well as the effectiveness of the web-based learning environments in different academic areas at the University of Tasmania. Participants will also be invited to semi-structured interviews, which will help investigate in which ways the teaching staff would adopt the Web as a resource in supporting teaching activities, and what are students' expectations toward using of the Web in their learning.

This study is being undertaken by the Chief Investigator Dr. Thao Lê and PhD student Si Fan in partial fulfilment of the requirements for a PhD in Education under the supervision of Dr Thao Lê.

As a student at the University of Tasmania, you are invited to participate in this study. The major benefit to you of being involved is the chance to share your learning experiences with the assistance of the Web, as well as offer suggestions for the future development of web-based learning and teaching.

Participation in this study is voluntary and any research data gathered during this study will be kept confidential. Also the identity of the participants will be kept confidential, and any information you supply will not identify you as a participant. If you choose to participate, you are entitled to withdraw from the study at any time. If you wish, request that any data you have contributed to that point also be withdrawn.

Taking part in the study involves the following:

**For the questionnaire**: Our questionnaires with a stamped addressed return envelope will be made available at your school. Also this questionnaire will be available online in an electronic version if you are interested in doing this questionnaire online. The questionnaires will take proximately 10 minutes to complete. Your completion and submission of the questionnaire signifies your consent to participate in the questionnaire part of the study.

**For the interview**: Students who would be interested in participating in an interview will be asked to please contact Dr. Thao Lê or Si Fan at the contacts given at the end of this information sheet.

1. Interviews will be conducted by telephone or face-to-face at the place and time of mutual convenience.
2. Participants will be provided with an outline of the questions prior to the interview.
3. Participants will need to allow about 20-30 minutes for the interview.
4. Participants will be contacted by email or telephone to arrange an appropriate time and date to undertake the interview.
5. At the start of the interview we will seek the participant's permission to audio-record the interview, you may decline permission.
6. As part of the study process participants will be able to withdraw their data at any time within twenty eight [28] days of the interview.
7. All interview data used in this study will be kept in a locked and secure filing cabinet and password protected computers in the Department of Education, University of Tasmania and will be destroyed five[5] years after the completion of the study.
8. A copy of the paper reporting the results of the work will be made available to you and to those interviewees who indicate an interest in the final outcomes.

The Human Research Ethics Committee (Tasmania) Network has approved this study. If you have any concerns about the manner in which the project is conducted you may contact the Executive Officer of the Human Research ethics committee (Tasmania) who can be contacted on (03)-6226 7479 or human.ethics@utas.edu.au.

If you are happy to take part in this study, please sign the consent form, place it in the pre-addressed envelope and mail it back to the chief investigator Dr. Thao Lê or PhD student Si Fan.

More information on the study can be obtained from the chief investigator Dr. Thao Lê at T.Le@utas.edu.au or PhD student Si Fan at sfan@utas.edu.au. Thank you for your time in reading this information sheet and we look forward to your reply.

Dr. Thao Lê Si Fan

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Website: www.utas.edu.au/educ

UTAS

**Faculty of Education - University of Tasmania**

DATE:

## INFORMATION SHEET FOR ACADEMIC STAFF

Title: The Web as a Learning Resource for Students in an Australian University context

**Purpose of the study**: The study examines how the Web, as a learning resource, affects students' learning in an Australian university context. The investigator will use questionnaires with participants to examine what their teaching and learning experiences are with the support of the Web, as well as the effectiveness of the web-based learning environments in different academic areas at the University of Tasmania. Participants will also be invited to semi-structured interviews, which will help investigate in which ways the teaching staff would adopt the Web as a resource in supporting teaching activities, and what are students' expectations toward using of the Web in their learning.

This study is being undertaken by the Chief Investigator Dr. Thao Lê and PhD student Si Fan in partial fulfilment of the requirements for a PhD in Education under the supervision of Dr Thao Lê.

As a teaching staff at the University of Tasmania, you are invited to participate in this study. The major benefit to you of being involved is the chance to share your teaching experiences with the assistance of the Web, as well as offer suggestions for the future development of web-based learning and teaching.

Participation in this study is voluntary and any research data gathered during this study will be kept confidential. Also the identity of the participants will be kept confidential, and any information you supply will not identify you as a participant. If you choose to participate, you are entitled to withdraw from the study at any time. If you wish, request that any data you have contributed to that point also be withdrawn.

Taking part in the study involves the following:

**For the questionnaire**: Our questionnaires with a stamped addressed return envelope will be made available at your school. Also this questionnaire will be available online in an electronic version if you are interested in doing this questionnaire online. The questionnaires will take proximately 10 minutes to complete. Your completion and submission of the questionnaire signifies your consent to participate in the questionnaire part of the study.

**For the interview**: Teaching staff who would be interested in participating in an interview will be asked to please contact Dr. Thao Lê or Si Fan at the contacts given at the end of this information sheet.

1. Interviews will be conducted by telephone or face-to-face at the place and time of mutual convenience.
2. Participants will be provided with an outline of the questions prior to the interview.
3. Participants will need to allow about 20-30 minutes for the interview.
4. Participants will be contacted by email or telephone to arrange an appropriate time and date to undertake the interview.
5. At the start of the interview we will seek the participant's permission to audio-record the interview, you may decline permission.
6. As part of the study process participants will be able to withdraw their data at any time within twenty eight [28] days of the interview.
7. All interview data used in this study will be kept in a locked and secure filing cabinet and password protected computers in the Department of Education, University of Tasmania and will be destroyed five[5] years after the completion of the study.
8. A copy of the paper reporting the results of the work will be made available to you and to those interviewees who indicate an interest in the final outcomes.

The Human Research Ethics Committee (Tasmania) Network has approved this study. If you have any concerns about the manner in which the project is conducted you may contact the Executive Officer of the Human Research ethics committee (Tasmania) who can be contacted on (03)-6226 7479 or human.ethics@utas.edu.au.

If you are happy to take part in this study, please sign the consent form, place it in the pre-addressed envelope and mail it back to the chief investigator Dr. Thao Lê or PhD student Si Fan.

More information on the study can be obtained from the chief investigator Dr. Thao Lê at T.Le@utas.edu.au or PhD student Si Fan at sfan@utas.edu.au. Thank you for your time in reading this information sheet and we look forward to your reply.

Dr. Thao Lê Si Fan

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Website: www.utas.edu.au/educ

UTAS

**Faculty of Education - University of Tasmania**

DATE:

## INFORMATION SHEET FOR HEAD OF SCHOOL

Title: The Web as a Learning Resource for Students in an Australian University context

**Purpose of the study**: The study examines how the Web, as a learning resource, affects students' learning in an Australian university context. The investigator will use questionnaires with participants to examine what their teaching and learning experiences are with the support of the Web, as well as the effectiveness of the web-based learning environments in different academic areas at the University of Tasmania. Participants will also be invited to semi-structured interviews, which will help investigate in which ways the teaching staff would adopt the Web as a resource in supporting teaching activities, and what are students' expectations toward using of the Web in their learning.

This study is being undertaken by the Chief Investigator Dr. Thao Lê and PhD student Si Fan in partial fulfilment of the requirements for a PhD in Education under the supervision of Dr. Thao Lê.

Your school has been invited to take part in this study. We would appreciate your assistance by making this research project known to your teaching staff and students. We hope that your teaching staff and students will be happy to participate in a questionnaire and also in an interview. We would invite 10 participants, including 5 academic staff and 5 students, to take part in an individual interview.

Participation in this study is voluntary and any research data gathered during this study will be kept confidential. Also the identity of the participants will be kept confidential, and any information your teaching staff or students supply will not identify them as participants.

Taking part in the study involves the following:

**For the questionnaire**: With your permission, our questionnaires with a stamped addressed return envelope will be made available at your school. Also this questionnaire will be available online in an electronic version for the teaching staff and students who would be interested in doing this questionnaire online. The questionnaires will take approximately 10 minutes to complete. Completion and submission of the questionnaires signifies participants' consent to participate in the questionnaire part of the study.

**For the interview**: Teaching staff and students who would be interested in participating in an interview will be asked to please contact Dr. Thao Lê or Si Fan at the contacts given at the end of this information sheet.

1. Interviews will be conducted by telephone or face-to-face at the place and time of mutual convenience.
2. Participants will be provided with an outline of the questions prior to the interview.
3. Participants will need to allow about 20-30 minutes for the interview.
4. Participants will be contacted by email or telephone to arrange an appropriate time and date to undertake the interview.
5. At the start of the interview we will seek the participant's permission to audio-record the interview; he/she may decline permission.
6. As part of the study process participants will be able to withdraw their data at any time within twenty eight [28] days of the interview.
7. All interview data used in this study will be kept in a locked and secure filing cabinet and password protected computers in the Department of Education, University of Tasmania and will be destroyed five[5] years after the completion of the study.
8. A copy of the paper reporting the results of the work will be made available to you and to those interviewees who indicate an interest in the final outcomes.

The Human Research Ethics Committee (Tasmania) Network has approved this study. If you have any concerns about the manner in which the project is conducted you may contact the Executive Officer of the Human Research ethics committee (Tasmania) who can be contacted on (03)-6226 7479 or human.ethics@utas.edu.au.

If you are happy for your teaching staff and students to take part in this study, please contact the chief investigator Dr. Thao Lê at T.Le@utas.edu.au, or the PhD student Si Fan at sfan@utas.edu.au.

More information on the study can be obtained from the chief investigator Dr. Thao Lê, phone 03 6324 3696, or the PhD student Si Fan, phone 04 13725838. Thank you for your time in reading this information sheet and we look forward to your reply.

Dr. Thao Lê Si Fan

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Website: www.utas.edu.au/educ

UTAS

**Faculty of Education - University of Tasmania**

Date:
Dear (Head of School),

I am a PhD student in the Faculty of Education, University of Tasmania. I am conducting a research project, with the chief investigator Dr. Thao Lê, titled '*The Web as a learning resource for students in an Australian university context'*.
The study examines how the Web, as a learning resource, affects students' learning in an Australian university context. The study will use questionnaires and interviews with participants to examine what their teaching and learning experiences are with the support of the Web, as well as the effectiveness of the web-based learning environments in different academic areas at the University of Tasmania.

I would be grateful if you could disseminate information about this project to your teaching staff and allow them to participate in this research. Please find attached to this letter the following items.

- Information sheet for head of school
- Information sheet for academic staff
- Information sheet for students
- Interview question sheet
- Questionnaire sample

If you need further information, please kindly contact me via the email address sfan@utas.edu.au or the chief investigator Dr. Thao Lê at the address given at the top of this letterhead.

Thank you for your assistance.
Si Fan
PhD student
School of Education
University of Tasmania

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UTAS

**Faculty of Education - University of Tasmania**

# Consent Form

THE WEB AS A LEARNING RESOURCE FOR STUDENTS IN AN AUSTRALIAN UNIVERSITY CONTEXT

1. I have read and understood the 'Information Sheet' for this study.
2. The nature and possible effects of the study have been explained to me.
3. I understand that I will participate in an interview of 20-30 minutes which will seek information relating to my teaching/learning experiences with the web.
4. The semi-structured interviews will be audio taped with my permission, and I am entitled to receive a transcript, which I may edit or modify if I wish.
5. I understand that the study involves exploring the views of students and teaching staff on the significance of the web on university students' learning.
6. I understand that all research data will be securely stored on the University of Tasmania premises for a period of 5 years. The data will be destroyed at the end of 5 years.
7. Any questions that I have asked have been answered to my satisfaction.
8. I agree that research data gathered for the study may be published in a way that I cannot be identified as a participant.
9. I understand that my identity will be kept confidential and that any information I supply to the researchers will be used only for the purpose of the research.
10. I agree to participate in this investigation and understand that I may withdraw at any time without any effect, and if I so wish, may request that any data I have supplied to data be withdrawn from research.

**Name of Participant**

**Signature** **Date**

Statement by Investigator

- I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.
- The participant has received the Information Sheet where my details have been provided so participants have the opportunity to contact me prior to consenting to participate in this project.

**Name of Investigator**

**Signature of Investigator** **Date**

# Appendix 3: Open Codes and Axial Codes

## Tree Nodes

| Name | Sources | References |
|---|---|---|
| Adjustments made | 7 | 14 |
| Adapt to new technologies | 3 | 6 |
| Adjustments made to suit students' needs | 4 | 8 |
| Evaluation of the web-based learning environments | 24 | 197 |
| Compare to face-to-face | 18 | 59 |
| Advantages of the Web-based communication | 8 | 15 |
| Disadvantages of the Web-based communication | 14 | 44 |
| Compare to print-based materials | 18 | 31 |
| Advantage of the Web-based materials | 17 | 29 |
| Disadvantage of the Web-based materials | 2 | 2 |
| Evaluation of web-based learning environment | 24 | 107 |
| Neutral | 10 | 14 |
| Satisfactory | 20 | 50 |
| Unsatisfactory | 16 | 43 |
| Experiences with the Web | 23 | 131 |
| Negative experiences with the Web | 16 | 39 |
| Having difficulties with software | 2 | 3 |
| Lacking of experiences | 3 | 6 |
| Lacking of interactions | 2 | 3 |
| Lacking of support from faculty or lecturers | 4 | 12 |
| Misunderstandings between lecturers and students | 3 | 3 |
| Physical influences | 3 | 3 |
| Unreliability of Web retrieved information | 6 | 9 |
| Positive experiences with the Web | 13 | 18 |
| Developing students' learning skills | 2 | 2 |
| Easier access to information | 3 | 3 |
| Experiencing new facilities | 2 | 2 |
| Gaining more experiences | 2 | 2 |
| Getting support from lecturers | 3 | 3 |
| Intergrating Web-based tools in teaching | 1 | 2 |
| Learning collaboratively | 4 | 4 |
| Problems encountered | 13 | 42 |
| The Web changing learning styles | 20 | 32 |
| Influence on the Web adoption | 23 | 90 |
| External influences | 12 | 28 |
| Influence of students' internal attributes | 8 | 15 |
| Web-based support from lecturers | 20 | 47 |
| Instrumentality of the Web | 24 | 219 |
| The Web as a supplementary | 13 | 28 |
| Web adoption for assessment | 11 | 21 |

## Tree Nodes

| Name | Sources | References |
|---|---|---|
| Web adoption for collaborative learning | 13 | 28 |
| Web adoption for communication | 18 | 35 |
| Web adoption for entertainment | 5 | 5 |
| Web adoption for feedback | 4 | 5 |
| Web adoption for information retrival | 23 | 68 |
| Web adoption for online tools | 15 | 29 |
| Assignment submission | 3 | 4 |
| Calender tools | 3 | 3 |
| Data collection | 1 | 1 |
| Databases | 6 | 9 |
| Lectopia | 3 | 4 |
| Online dictionaries | 4 | 6 |
| Turnitin | 2 | 2 |
| Significance of the Web | 24 | 141 |
| Abundent formats of materials | 7 | 9 |
| Despit of time and distance | 13 | 23 |
| Free of charge | 3 | 4 |
| Great amount of resources | 19 | 29 |
| On time access | 15 | 18 |
| Significance of the Web in students' learning | 20 | 45 |
| The Web and independent learning | 4 | 5 |
| The Web and personalised learning | 3 | 5 |
| The Web and problem solving | 3 | 3 |
| Students' expectations | 23 | 87 |
| Expectations to lecturers and faculties | 18 | 31 |
| Seeking support from lecturers and faculties | 7 | 11 |
| Suggestions for a better adoption | 19 | 45 |
| Usability of MyLO | 22 | 132 |
| Current adoption of MyLO | 18 | 59 |
| Evaluation of MyLO | 18 | 73 |
| Advantages of MyLO | 14 | 41 |
| Disadvangtage of MyLO | 11 | 19 |
| Neutral | 9 | 13 |

# Appendix 4: Results Obtained from SPSS

Results of Kruskal-Wallis tests on Question 11, 12, 13, 14, 15, 20

| | Occupation | | Gender | | Academic faculty | | Length of studying/teaching | | IT skills | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Chi-square** | **P value** | **Chi-square** | **P value** | **Chi-square** | **P value** | **Chi-square** | **P value** | **Chi-square** | **P value** |
| **Q11** | 11.378 | 0.001* | 1.068 | 0.301 | 49.114 | 0.000* | 0.415 | 0.813 | 5.194 | 0.268 |
| **Q12** | 1.101 | 0.294 | 0.087 | 0.768 | 34.164 | 0.000* | 1.786 | 0.409 | 0.351 | 0.986 |
| **Q13** | 33.021 | 0.000* | 0.360 | 0.548 | 6.210 | 0.102 | 4.490 | 0.106 | 9.387 | 0.052 |
| **Q14** | 10.357 | 0.001* | 0.488 | 0.485 | 75.214 | 0.000* | 7.670 | 0.022* | 1.479 | 0.830 |
| **Q15** | 0.595 | 0.440 | 1.236 | 0.266 | 19.720 | 0.000* | 0.355 | 0.837 | 7.517 | 0.111 |
| **Q20** | 7.036 | 0.008* | 1.311 | 0.252 | 15.674 | 0.001* | 12.253 | 0.002* | 7.375 | 0.117 |
| *** p value < 0.05** | | | | | | | | | | |

# Appendix 5: Questionnaire (Initial and Final)

Appendix 5.1: Initially designed questionnaire instrument

Appendix 5.2: Final version of the questionnaire instrument

## Appendix 5.1: Initially designed questionnaire instrument

Part A: Information about the participants' background.

Q.1 You are a : a. Student – please go to Q3
b. Staff
Q.2 What is your teaching position at the University of Tasmania? – Please go to Q4
Q.3 What is your degree at the University of Tasmania?
Q.4 Your gender
Q.5 Which academic faculty/institution are you studying/teaching in?
Q.6 Length of studying/teaching at the University of Tasmania.
Q.7 Level of knowledge of Information Technology (IT).

Part B: Scale items for enquiring participants' views on the significance of the Web and web-based learning environments.

Q.8 The Web is a good tool for teaching and learning.
Q.9 The Web can provide good facilities for exploring in learning.
Q.10 The Web provides powerful resources for gaining academic knowledge.
Q.11 The Web can provide useful ways of assessing students' learning.
Q.12 The Web can provide useful ways of giving feedback to students.
Q.13 The Web is helpful in developing students' problem-solving skills.
Q.14 The Web provides an opportunity for collaborative learning.
Q.15 Web-based learning should be based on sound educational principles.
Q.16 Web-based learning can replace face-to-face learning.
Q.17 Learning via the Web is more motivating than learning face-to-face.
Q.18 Learners can be easily lost in web-based learning.
Q.19 Using the Web saves a great deal of time on finding learning resources.
Q.20 The Web creates an interactive learning.
Q.21 Web-based learning enhances interpersonal relationships between lecturers and students.
Q.22 Online communication among students and lecturers is more effective than face-to-face communication.
Q.23 Web-based learning can provide good facilities for interacting with lecturers and other students.
Q.24 Web-based learning lacks interpersonal interaction.
Q.25 The Web can enhance independent learning.
Q.26 The Web can accommodate learners having different learning styles.
Q.27 The Web can accommodate learners from different cultural backgrounds.
Q.28 The Web can encourage learners to take an active part in learning.
Q.29 Web-based learning provides learners with great flexibility.
Q.30 Learners should have some basic IT knowledge before embarking on web-based learning.
Q.31 Web-based learning can be threatening to learners with poor IT skills.
Q.32 Using the Web can enhance students' learning outcomes.
Q.33 How often is the Web used to support students' learning in your course?
Q.34 How often is the Web used as a communication tool in your course?
Q.35 How often is the Web used to find reading materials in your course?
Q.36 How often do you participate in online discussion in your course?
Q.37 How often do you get feedback via the Web in your course?
Q.38 How often do you share learning resources via the Web with other/your students?
Q.39 How often is the Web used as an assessment tool in your course?
Q.40 How often is the Web used as a management tool in your course?
Q.41 Every course should include MyLO in teaching and learning.
Q.42 Lecturers use the MyLO system effectively in my course.
Q.43 The MyLO system is learner-friendly.
Q.44 Most functionalities of the MyLO system are useful.
Q.45 The MyLO system can replace face-to-face teaching.
Q.46 The information in my course can be easily found on the MyLO system.
Q.47 Many learning tasks are done via the MyLO system in my course.

Open-ended section: Any comments/remarks you would like to make in regarding to the web-based learning environment or the MyLO system?

## Appendix 5.2: Final version of the questionnaire instrument

Research topic: The Web as a Learning Resource for Students in an Australian University Context

**Part A: Part A: Information about the participants' background. Please tick (v) the most appropriate response.**

1. You are:
   - ☐ Student – please go to Q3
   - ☐ Staff

2. What is your teaching position at the University of Tasmania? – Please go to Q4
   - ☐ Academic teaching staff
   - ☐ General support staff
   - ☐ IT support staff
   - ☐ Research related position
   - ☐ Other(s) (please specify) _______________

3. Which degree are you undertaking at the University of Tasmania:
   - ☐ Undergraduate
   - ☐ Postgraduate
   - ☐ Graduate research
   - ☐ Other(s) (please specify) _______________

4. Gender:
   ☐ Male ☐ Female

5. Academic Faculty:
   - ☐ Education
   - ☐ Arts
   - ☐ Science/Computing/Engineering
   - ☐ AMC
   - ☐ Health Science/Pharmacy/Nursing
   - ☐ Commerce/Business
   - ☐ Law

6. Length of studying at the University of Tasmania (up to now):
   ☐ Less than one year ☐ Over one year to three years ☐ Over three years

7. Knowledge of Information Technology (IT):
   - ☐ Very poor
   - ☐ Poor
   - ☐ Fine
   - ☐ Good
   - ☐ Excellent

**Part B: Instrumentality of the Web in different academic areas. Please circle your most appropriate response.**

Directions: To answer Part B, please indicate your most appropriate response by using the following criteria:

1= Very Often
2= Often
3= Sometimes
4= Rarely
5= Never

| No. | Instrumentality of the Web in different academic areas | Weighted scores |
| --- | --- | --- |
| 8 | How often is the Web used to support students' learning in your course? | 1 2 3 4 5 |
| 9 | How often is the Web used as a communication tool in your course? | 1 2 3 4 5 |
| 10 | How often is the Web used to find reading materials in your course? | 1 2 3 4 5 |
| 11 | How often do you participate in online discussion in your course? | 1 2 3 4 5 |
| 12 | How often do you get feedback via the Web in your course? | 1 2 3 4 5 |
| 13 | How often do you share learning resources via the Web with other/your students? | 1 2 3 4 5 |
| 14 | How often is the Web used as an assessment tool in your course? | 1 2 3 4 5 |
| 15 | How often is the Web used as a management tool in your course? | 1 2 3 4 5 |

**Part C: The Web as a social enhancement. Please circle your most appropriate response.**

Directions: To answer Part C to Part F, please indicate your most appropriate response by using the following criteria:

1= Strongly Agree
2= Agree
3= Not Sure/Not Applicable
4= Disagree
5= Strongly Disagree

| No. | The Web as a social enhancement | Weighted scores |
| --- | --- | --- |
| 16 | Web-based learning can replace face-to-face learning. | 1 2 3 4 5 |
| 17 | Learning via the Web is more motivating than learning face-to-face. | 1 2 3 4 5 |
| 18 | Web-based learning enhances interpersonal relationships between lecturers and students. | 1 2 3 4 5 |
| 19 | Online communication among students and lecturers is more effective than face-to-face communication. | 1 2 3 4 5 |
| 20 | Web-based learning can provide good facilities for interacting with lecturers and other students. | 1 2 3 4 5 |
| 21 | Web-based learning lacks interpersonal interaction. | 1 2 3 4 5 |

**Part D: The Web and learners. Please circle your most appropriate response.**

| No. | The Web and learners | Weighted scores |
| --- | --- | --- |
| 22 | The Web can provide useful ways of giving feedback to students. | 1 2 3 4 5 |
| 23 | The Web creates an interactive learning. | 1 2 3 4 5 |
| 24 | The Web can enhance independent learning. | 1 2 3 4 5 |
| 25 | The Web can accommodate learners having different learning styles. | 1 2 3 4 5 |
| 26 | The Web can accommodate learners from different cultural backgrounds. | 1 2 3 4 5 |
| 27 | The Web can encourage learners to take an active part in learning. | 1 2 3 4 5 |

| | | |
|---|---|---|
| 28 | Web-based learning provides learners with great flexibility. | 1 2 3 4 5 |
| 29 | Using the Web can enhance students' learning outcomes. | 1 2 3 4 5 |
| 30 | The Web is helpful in developing students' problem-solving skills. | 1 2 3 4 5 |
| 31 | The Web provides an opportunity for collaborative learning. | 1 2 3 4 5 |

**Part E: The Web as a teaching and learning resource. Please circle your most appropriate response.**

| No. | The Web as a teaching and learning resource | Weighted scores |
|---|---|---|
| 32 | The Web is a good tool for teaching and learning. | 1 2 3 4 5 |
| 33 | The Web can provide good facilities for exploring in learning. | 1 2 3 4 5 |
| 34 | The Web provides powerful resources for gaining academic knowledge. | 1 2 3 4 5 |
| 35 | The Web can provide useful ways of assessing students' learning. | 1 2 3 4 5 |

**Part F: Effectiveness of the MyLO system in different academic areas. Please circle your most appropriate response.**

(Please complete this section if using MyLO **is** involved in your course)

| No. | Effectiveness of the MyLO system in different academic areas | Weighted scores |
|---|---|---|
| 36 | Every course should include MyLO in teaching and learning. | 1 2 3 4 5 |
| 37 | Lecturers use the MyLO system effectively in my course. | 1 2 3 4 5 |
| 38 | The MyLO system is learner-friendly. | 1 2 3 4 5 |
| 39 | Most functionalities of the MyLO system are useful. | 1 2 3 4 5 |
| 40 | The information in my course can be easily found on the MyLO system. | 1 2 3 4 5 |
| 41 | Many learning tasks are done via the MyLO system in my course. | 1 2 3 4 5 |
| 42 | The MyLO system can replace face-to-face teaching. | 1 2 3 4 5 |

Any comments/remarks you would like to make in regarding to the Web-based learning environment in your faculty:

________________________________________

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________________________________________

________________________________________

Thank you for your participation.

# Appendix 6: Interview Questions

Appendix 6.1: Interview questions for students

Appendix 6.2: Interview questions for lecturer

## Appendix 6.1: Interview questions for students

Research topic: The Web as a Learning Resource for Students in an Australian University Context

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Questions for semi-structured interviews to examine students' views toward using the Web as a learning resource at the University of Tasmania

1. What do you consider about significance of the Web in your learning?
2. In your view, what are the benefits, you may get from the Web, which cannot be gained from other resources in your study (e.g. books and lectures)?
3. Can you give a few examples on how the Web has changed your learning styles?
4. Please share with me some experiences of learning with the Web in your study.
5. How would your lectures use the Web to support your learning?
6. How would you evaluate the ways your lecturers use the Web to support your learning? What are your expectations apart from what they have already provided?
7. How would you consider the usefulness of the MyLO system we are currently using at the University of Tasmania?
8. What do you think can be done to enhance the using of MyLO system at the university?
9. How would you evaluate the web-based learning environment in your faculty?
10. What would you suggest to improve the web-based learning environment in your faculty (e.g. email systems, development of discussion board, easier access to the database, etc.)?

## Appendix 6.2: Interview questions for lecturers

Research topic: The Web as a Learning Resource for Students in an Australian University Context

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Questions for semi-structured interviews to examine teaching staff's views toward using the Web as a learning resource at the University of Tasmania

1. What do you consider about significance of the Web in your students' learning?
2. In your view, what are the benefits your students may get from the Web, which cannot gain from other resources in your study (e.g. books and lectures)?
3. Can you give a few examples on how the Web has changed your students' learning styles?
4. How would you use the Web to support your teaching?
5. Please share with me some experiences of teaching with the Web in your teaching activities.
6. Would you consider your students' expectations on using the Web when you adopt it? How would you adjust if your ways of using the Web (the way you believe as the most appropriate) can not satisfy your students?
7. How would you consider the usefulness of the MyLO system we are currently using at the University of Tasmania?
8. What do you think can be done to enhance the using of MyLO system at the university?
9. How would you evaluate the web-based learning environment in your faculty?
10. What would you suggest to improve the web-based learning environment in your faculty (e.g. email systems, development of discussion board, easier access to the database, etc.)?

## Appendix 7: Questionnaire Participant Recruitment

Step 1: A letter was addressed to head of departments to ask permission to undertaking this research in that school. An information sheet with detailed information about this study was also provided.

Step 2: With the permission of heads of departments, information sheet and consent forms were provided both at the reception desks of each school and online.

Step 3: The questionnaire was made available on both the reception desks and online. The online questionnaire was designed and collected using a popular survey designer website, the Survey Monkey designer. Pre-addressed envelops were provided to the participants who preferred paper copies. Completed questionnaires were collected at the reception desks.

Step 4: Teaching staff and students who were interested in attending an interview were invited to collect an information sheet and consent form from the reception desks of the various faculties or schools, and to contact the researchers via the contact details provided.

# Appendix 8: An Example of the Interview Transcripts

R: Research
I: Interviewee

R: What do you consider the significance of the Web in your students' learning?

I: It is impossible for people not to be aware using the Web in learning has become something that is unavoidable. Yea, so I think it's highly significant the way it is being used. You just got every course at the university.

R: Can you think of in which ways the Web is used by your students in their learning?

I: Email contact, definitely, particularly from lecturer to student because in the unit that I am teaching and coordinating students from all over the world by directly emailing me as their lecturer. So that has been pretty huge. I can do that.

R: Apart from communicating, would be getting information from the Web?

I: They would get a lot of information from the Web. They are expected to not only use the information we provide for them. We provide for them CDs, which has information. But they are expected to follow that up by looking at journals or from finding other sources if they can. So they could Google it, and go further into finding things, or they could access things from the university library system. So there are whole ranges of ways that they can access to the information, and they are expected to… you know for the students that we have, as I mentioned, they are from different parts of the world. And because of that, they don't actually have access to the same information as other students. For example, students on-campus would have access to the library and to the solid resources; you know the hard resources that are there. Whereas our students don't have that, so they have access to the (information on the Web), so it is not really an option for them to find information.

R: Apart from communication through emails and encouraging your students to use the Web to find information, is there any other ways that you would use the Web to support your students?

I: At the present time, we are keeping it very focus in that way, because that is the way we presented it and that is the way it seems to do well for our students. There is talk of chat rooms, but it is in process and we are getting it to happen. There has never been a stated demand from our students, but that doesn't necessarily matter, because when it is possible, maybe the demand will happen, maybe when people know that is available. Nobody has suggested to us that they wanted that that much. They seemed very happy with the direct contact that they get.

R: They seem to be very satisfied with how it is currently organised?

I: Yea, we don't get any criticism of the way we organise it. I think a part of it is that though we are very up front with, when somebody comes into the course, this is what you are expected to do, this is what you are going to get, and this is some ways that you may choose how to do it. So I think by providing such a clear statement of what you expect from the students and what the potentials are of using the Web or any other, contact and have them, it is more likely that they are not going to be upset about the fact that something is not provided, because you never mentioned it is going to be provided.

R: What are the benefits the students get from your teaching through the Web?

I: I think there are few benefits from it. I think one of the main ways students benefit is in having to find their own focus, and to develop their own learning from not being in a face-to-face situation. So they can't be with the other students find doing exactly the same thing in the same subject in the same interest, they actually focus on separate interest and separate elements of the subjects that we are looking at, and they go into their own directions and find their own information to go along with that. So part of that is they are in charge of their own learning and they develop their own learning styles, from being more independent and being focused to being in a residential situation.

R: So that is the main benefit?

I: I'd say the main benefit is that they develop their own interests learning and research capabilities. I think they develop them from themselves.

R: Right, the internet is used a lot by the students nowadays. How do you think the internet has changed your students' learning styles?

I: I think there has been a bit of change. I think students in the past expected everybody to learn the same thing. They expected things to be provided week by week. They expected that if they had any queries that they would immediately go along to see someone, and that would be fulfilled immediately, but there wouldn't be a problem. I think there is a big change now in that they are forced to plan ahead. They can't do things that are so simultaneously. They have to seek the information themselves because it is not provided to them…Ur…even if, for example, in the past they were provided, they went to a lecture and they turned up and the lecture happened, now they have to, even if the lecture is online they have to find where that is and to download it so that they can listen to it. So again they are having to put perhaps a little more efforts, different kinds of efforts, to be able to get this information.

R: They do need some IT skills.

I: I think they do need some IT skills. There is kind of a basic level that they need without a doubt, but I think the more refined they are in the skills that they have in the curriculum, there will be better information they will find. And I think it is important that they actually know how to access the information and another capabilities of information they can get over.

R: What are the shortages of web-based learning compare to face-to-face learning?

I: Shortage? Yea, I think that is quite big actually. I think the face that they are not presented necessarily with the person who is providing the learning opportunities for them. I think it can mean that the information might be provided only instead of what is, and so is that limitations in the way it's provided, and there can be limitations in the ways they choose to learn from it. Whereas in a face-to-face situation, then a good teacher or a good lecturer is more likely to provide information and learning opportunities in a variety of ways to adapt to individual learning styles for example. And also in a face-to-face situation, there is far greater feedback happening; it is an ongoing feedback that is occurring, and as a teacher or a lecturer, you are well able to see what is happening and to see whether people are understanding something not only from their actual communication verbally, but also non-verbal communication. It is very easy to see what is being effective and what is not. And I think from a students' point of view, they are losing a lot if they don't have that at all in their learning.

R: So you think the Web is better to be used as a supplementary tool instead of the main approach in teaching?

I: They don't defend us. In the courses that I am coordinating at this moment, the students just aren't here, they are actually not in the university, most of them, and they are not in Tasmania, a lot of them. So they are choosing to learn in this way because it fits in with what their life style is. And so for example, if they want to learn what we have to offer, and then there is only certain ways that they occur. And online is a great way for it to happen, otherwise it wouldn't happen, we wouldn't have contact with them in that kind of way, but it's not the only way, if you are actually here, if you do have face-to-face, then I think online learning can be useful supplement to the learning, but I don't think it solves all the problems. There are definitely restricts in the way learning happens.

R: Is the MyLO adopted in your unit?

I: We don't use it at the present time. We have adopted only a system of what is effective for students that we have got. And at this moment that's the way we are making.

R: Right. How would you evaluate the overall web-based learning environment in our faculty?

I: All right. In the units from what we got from the students you mean?

R: Yea from the students' perspective as well as from a lecturer's perspective.

I: All right. Yea, it is very effective. I think we realised that wasn't very effective if we start to have problems from the students and lot confusion for example if they are very confused about what if happening, if they don't know what is going to occur. And I think that would be quite difficult for them to actually do that. But they seem very positive in the kind of information and in the kind of interchanges that happened. And that is quite beneficial. I mean the other part of that is we are attracting students who like the way that we are choosing to provide learning opportunities. And if we are providing other kinds of learning opportunities maybe we would attract some other students but we probably lose some of the students that we presently got, because the same kind of learning opportunities they may find it somewhere else.

R: Last question. What would you suggest to enhance the web-based learning in the future?

I: I think being aware of the changes that are happening all the time on the Web, you know, I think it is really important to know that. I think to have the realisation that this isn't going to go away; this is something that is going to develop for the whole of now on. And therefore, to always be looking at the ways that we are providing learning opportunities, the benefits students learning and students' learning styles in a best possible way. So if we are thinking about that as an aim, then I think we have look and see while what is it we are presenting, what styles have been attraction we presenting that fit with making students' learning experiences that they best possibly can. And for that to happen I think we have to be very open to what students think about the learning that is occurring, and I think we have to not be blocked into thinking about what is best from the university's point of view, but what is best from the students' point of view. Sometimes, that might not be financially the best way from the university's point of view, and I think that's the problem. Or a big problem is that universities are tending more and more to use web-based facilities and web-based activities and web-based learning. As something which stops some having to pay somebody to actually be there for students, in particular small groups of students, so it's cheaper for universities. And I think they have to be careful, universities have to be very careful, the faculty has to be very careful, in making sure that the learning that happens is the best for the students, and not just the best making the money we can from the students. And I think that is the one thing that does come across quite clearly from the students is that they want value from the money that they are spending on courses. And that's kind of core relates with the effectiveness of the learning experiences they have.

R: So we are actually looking for a balance that can satisfy the students as well as can be doable for the university.

I: Yea. You are right. It is a balance. And I think it for that to happen in think the universities have to aware that it is not just something to make money out of, and they have to regard it as they would the other learning experiences that have provided and not be limited into thinking that this is the best way to students' learning because obviously it isn't the only best way of students learning and there are a lot of ways in students' learning and different situations. And some ways that the Web provides might not be the most effective, but in some cases it does fit in very well with what the students want to do and the way they approach their learning, so there is a bit of mixture, but as you said there has to be some balance between what the university is providing and what the students are receiving, and I really think, very very strongly, that there has to be the principles of learning dominating what is happening in the learning interaction between the Web and the students and the universities. And there must be these principles that are operating and the principles don't include that you are trying to make as much money as you possibly can.

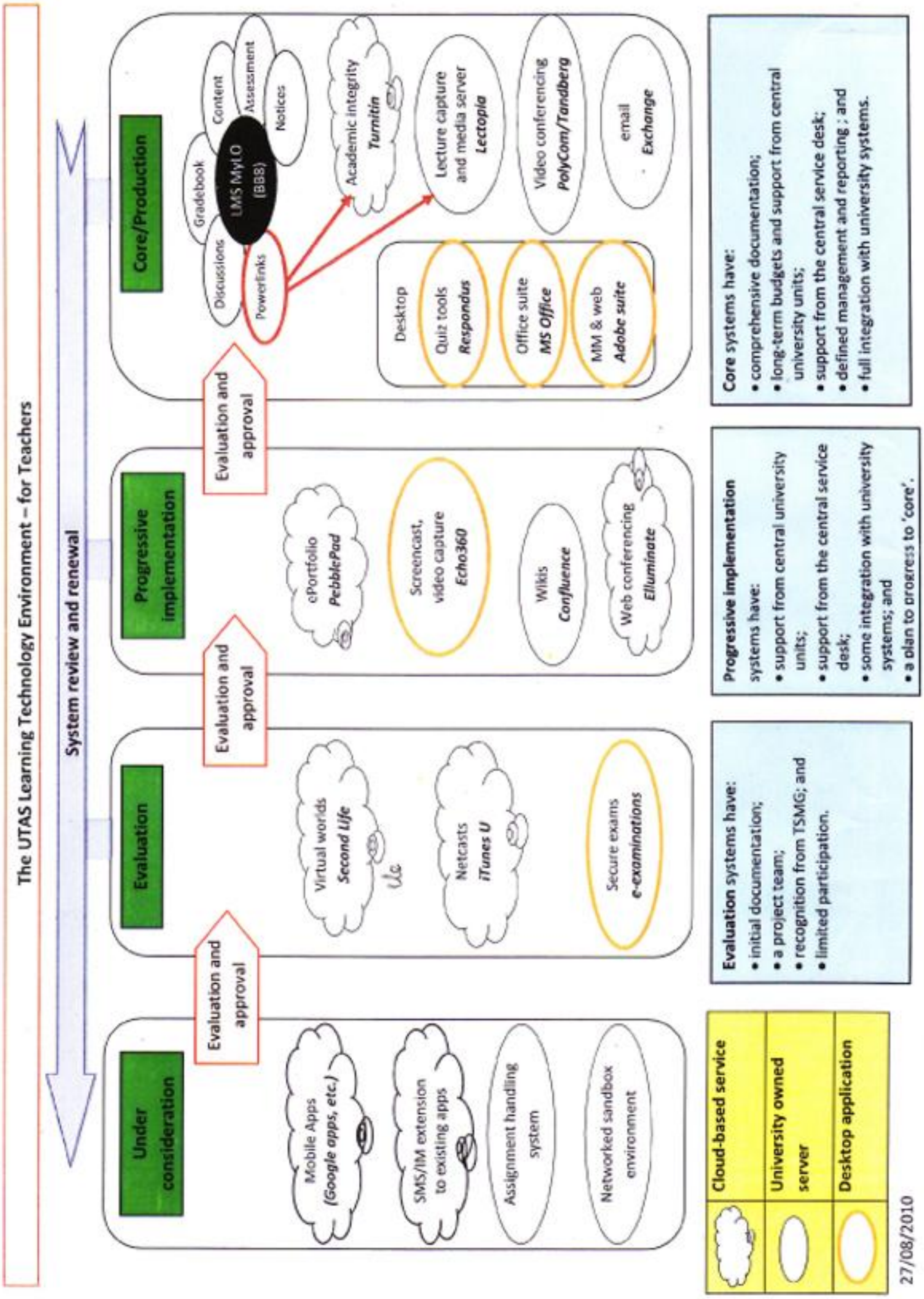
# Appendix 9: Web-based Learning in the Australian University Context

| Name of Universities& Websites of information on courseware and learning systems | Wether adopted web-based learning | Courseware and software in use | Name of online learning system |
|---|---|---|---|
| Australian Catholic University (ACU) http://www.acu.edu.au/student_resources/elearning/ | Yes | Blackboard | eLearning |
| Australian National University (ANU) http://iguide.anu.edu.au/OnlineServices/OnlineLearningEnvironments.html | Yes | Wattle will replace WebCT in 2010 | iGuide |
| Bond University (Bond) http://www.bond.edu.au/about-bond/teaching-and-learning/resources/ilearn@bond/index.htm | Yes | Blackboard | iLearn@Bond |
| Central Queensland University (CQU) http://cqunianswers.cqu.edu.au/selfservice/php/searchEntry.do | Yes | Moodle will replace Blackboard and Webfuse in 2010 | 1. Learning Management System (LMS) 2. MyCQU Portal |
| Charles Darwin University (CDU) http://online.cdu.edu.au/webapps/portal/frameset.jsp http://www.cdu.edu.au/tlqg/rp/learnline.html | Yes | Blackboard | Learnline |
| Charles Sturt University (CSU) http://www.csu.edu.au/division/studserv/online/interact/index.htm | Yes | N/A | CSU Interact |
| Curtin University of Technology (CURTIN) http://www.curtin.edu.au/?inst=18 | Yes | FLECS-Blackboard | OASIS |
| Deakin University (Deakin) http://www.deakin.edu.au/dso/index.php | Yes | Blackboard | Deakin Studies Online (DSO) |
| Edith Cowan University (ECU) http://www.ecu.edu.au/OnlineLearning/ | Yes | Blackboard 7.3 | MyECU |
| Flinders University (FLINDERS) https://flo.flinders.edu.au/webct/entryPage.dowebct?glcid=URN:X-WEBCT-VISTA-V1:f0fdc250-8160-fc4b-005a-4e0fa72f4d27&insId=5116001&insName=Flinders%20University | Yes | N/A | Flinders Learning Online (FLO) |
| Griffith University (GRIFFITH) http://www.griffith.edu.au/griffith-english-language-institute/university-initiatives/englishhelp/learning@griffith | Yes | N/A | Learning@Griffith |
| James Cook University (JCU) http://www.jcu.edu.au/td/topics/JCUPRD_016731.html | Yes | N/A | LearnJCU |
| La Trobe University (LATROBE) http://www.latrobe.edu.au/lms/what.html | Yes | Blackboard/ WebCT | Learning Management System (LMS) |
| Macquarie University (MACQUARIE) http://www.sith.mq.edu.au/estudent.html; http://www.sith.mq.edu.au/mymq.html | Yes | N/A | myMQ eStudent |

| | | | |
|---|---|---|---|
| Monash University (MONASH)<br>http://www.monash.edu.au/portal/ | Yes | Blackboard | Monash University Studies Online (MUSO)<br>my.monash |
| Murdoch University (MURDOCH)<br>http://www.murdoch.edu.au/students/mymurdoch/about/ | Yes | N/A | MyMurdoch |
| Queensland University of Technology (QUT)<br>http://www.qut.edu.au/about/servdirect/technology/olteach.jsp | Yes | Blackboard | QUT |
| RMIT University (RMIT)<br>http://www.rmit.edu.au/students/aboutmyrmit | Yes | N/A | myRMIT |
| Southern Cross University (SCU)<br>http://www.scu.edu.au/docs/handbook/index.php/4/#myscu | Yes | N/A | MySCU |
| Swinburne University of Technology [SWINBURNE]<br>http://my.swinburne.edu.au/portal/page?_pageid=53,1&_dad=portal&_schema=PORTAL | Yes | Blackboard<br>WebCT | My.Swinburne |
| University of Adelaide (ADELAIDE)<br>http://www.alumni.adelaide.edu.au/s/923/community.aspx?sid=923&gid=1&pgid=61&cid=160;<br>http://www.alumni.adelaide.edu.au/s/923/community.aspx?sid=923&gid=1&pgid=446&sparam=Adelaide%20onLION&scontid=0 | Yes | N/A | Adelaide onLION |
| University of Ballarat (BALLARAT)<br>http://www.ballarat.edu.au/servicedesk/tafevc.shtml | Yes | WebCT; TAFEVC;<br>Blackboard | myUB Gateway |
| University of Canberra (CANBERRA)<br>http://learnonline.canberra.edu.au/ | Yes | Moodle | LearnOnline |
| University of Melbourne (MELBOURNE)<br>http://www.lms.unimelb.edu.au/support/accessibility/jaws_guide_pdf.html | Yes | N/A | Learning Management System (LMS) |
| University of New England (UNE)<br>https://login.une.edu.au/login?service=https://my.une.edu.au/Login | Yes | WebCT | myUNE |
| University of New South Wales (UNSW)<br>http://www.elearning.unsw.edu.au/ | Yes | Vista<br>Blackboard | TeLT |
| University of Newcastle (NEWCASTLE)<br>http://www.newcastle.edu.au/service/blackboard/ | Yes | Blackboard | Blackboard |
| University of Notre Dame Australia - The (UNDA)<br>http://www.nd.edu.au/portal.shtml | Yes | Blackboard | Blackboard;<br>Portal |
| University of Queensland (UQ)<br>http://www.uq.edu.au/sinet-support/docs/mySInet_Student_Guide.pdf | Yes | N/A | my.UQ<br>mySI-net |
| University of South Australia (UniSA)<br>http://www.unisa.edu.au/ltu/staff/practice/online/default.asp | Yes | UniSAnet will be replaced by Moodle in 2011 | UniSAnet |
| University of Southern Queensland (USQ)<br>http://www.usq.edu.au/currentstudents/usqconnect/default.htm | Yes | N/A | UConnect replaced USQConnect in Sep. 2009 |
| University of Sydney (SYDNEY)<br>http://www.usyd.edu.au/handbooks/university_information/05_general_uni_info.shtml#myuni<br>http://whale.ee.usyd.edu.au/login/index.php | Yes | Moodle | MyUni<br>IWRITE |

| | | | |
|---|---|---|---|
| University of Tasmania (UTAS)<br>http://tlo.calt.utas.edu.au/about/mylo.aspx | Yes | Blackboard | MyLO |
| University of Technology Sydney (UTS)<br>https://online.uts.edu.au/uts/files/Blackboard_Academic_Suite_User_Manual_for_Release_8.pdf<br>https://online.uts.edu.au/webapps/login/ | Yes | Blackboard | MyUTS<br>UTSOnline |
| University of the Sunshine Coast (USC)<br>http://www.usc.edu.au/NR/rdonlyres/DF7EE119-79D2-4CEB-90C6-569124EADFFC/0/2009_INT_Enrolment_Guide_USCCentral_1410.pdf | Yes | Blackboard | USC Central<br>USC Portal |
| University of Western Australia (UWA)<br>http://www.catl.uwa.edu.au/elearning/online/definition<br>http://www.catl.uwa.edu.au/elearning/webct.community | Yes | WebCT | MyUWA |
| University of Western Sydney (UWS)<br>http://www.uws.edu.au/currentstudents/current_students/using_uws_online_systems<br>http://www.uws.edu.au/currentstudents/current_students/using_uws_online_systems/e-learning/about_vuws | Yes | N/A | MyUWS<br>Virtual UWS (vUWS) |
| University of Wollongong (UOW)<br>http://www.uow.edu.au/student/lol/ | Yes | WebCT | Learning Online |
| Victoria University (VU)<br>http://tls.vu.edu.au/projects/projects_1.pdf | Yes | WebCT/ Blackboard | MYVU |

# Appendix 10: The UTAS Learning Technology Environment




Reference: CALT. (2010). *The UTAS learning technology environment - for teachers*. Launceston: University of Tasmania.

# Appendix 11: A Framework of Web Adoption in University Contexts

- S-T: There are interactions between students and teaching staff;
- S-S: There are interactions among students themselves;
- S-F: There are interactions between students and university and faculties;
- OT: Independent teaching preparation without interacting with students;
- OS: Students' independent learning without interacting with teaching staff.

| Learning purposes | Tools | Interactions | Detailed usage of the tools |
|---|---|---|---|
| **Communication** (Hsu, et al., 1999; Khan, 1998) | Email | S-S<br>S-T | • Exchanging ideas.<br>• Asking/answering questions in relation to learning tasks. |
| | Forum;<br>Discussion board | S-S<br>S-T | • Exchanging ideas and having discussions over learning contents. |
| | MSN;<br>Facebook | S-S<br>S-T | • Exchanging ideas and having discussions over learning contents synchronously. |
| | Newsgroups;<br>Bulletin board | S-F<br>S-T | • Sharing news, announcements, and other up-to-date information. |
| | Listserv | S-F<br>S-T | • Informing groups of students of news, announcements.<br>• Sending out learning materials to groups of learners. |
| | Conferencing tools | S-S<br>S-T | • Communicating, changing ideas and having discussions through video-/tele-conferencing tools. |
| **Information acquisition** (Chin, 2004; Zaiane, 2001) | Search engines (e.g. Google & Yahoo) | OS | • Searching for general or course related information. |
| | Online database;<br>E-Journal | OS | • Searching for journal articles or course related materials. |
| | Bulletin | S-F<br>S-T | • Sending/getting news and announcements. |
| | Email | S-S<br>S-F<br>S-T | • Getting information through emails.<br>• Asking/answering questions in relation to learning tasks. |
| **Collaboration** (Akkoyunlu & Yilamz Soylu, 2006; El-Seoud, et al., 2007; Ng, 2000) | Online forum | S-S<br>S-T | • Exchanging ideas and having discussion over learning contents. |
| | Discussion board | S-S<br>S-T | • Exchanging ideas and having discussion over learning contents. |
| | Conferencing tools | S-S<br>S-T | • Communicating, changing ideas and having discussions through video-/tele-conferencing tools. |

| Learning purposes | Tools | Interactions | Detailed usage of the tools |
|---|---|---|---|
| **Reflective learning** (Ma, 2010) | Reflective journal | OS<br>OT | • Keeping regular reflective journals on learning/teaching practice. |
| | Recorded lecture;<br>Lectopia | OS<br>OT | • Capturing and recording lectures on a tape or as video. |
| **Online assessment** (Cooper, et al., 2007) | Exam | S-T | • Taking exams online. |
| | Assignment | S-T | • Completing assignments online. |
| | Test | S-T | • Taking tests online. |
| | Quiz<br>Respondus | S-T | • Creating/taking quizzes online. |
| | Questionnaire | S-T | • Assessing/self-assessing learning progress. |
| **Assignment submission** | Assignment drop box | S-T | • Submitting assignments online. |
| | Turnitin | OS<br>OT | • Originality checking, grade marking and peer reviewing. |
| **Feedback** (Aggarwal, 2003; Zaiane, 2001) | Forum | S-S<br>S-T | • Giving/getting feedback on teaching/learning performance by discussing in the online forums. |
| | Questionnaire | S-F<br>S-T | • Giving/getting feedback on teaching/learning performance via questionnaires. |
| | Survey | S-F<br>S-T | • Giving/getting feedback on teaching/learning performance via surveys. |
| | Group discussion | S-S<br>S-T | • Giving/getting feedback on teaching/learning performance by discussing with group members. |
| | Checklist | S-F<br>S-T | • Giving/getting feedback on teaching/learning performance. |
| **Work management** (Blair, 2007; El-Seoud, et al., 2007) | Calender tools | OS<br>OT | • Informing and getting reminders of important dates/events. |
| | Reminder | OS<br>OT | • Getting reminders of important dates/events. |
| | Work management tools | OS<br>OT | • Managing workloads and monitoring learning/teaching progress. |