Measuring First Year Information Systems Students’ Satisfaction with Asynchronous E-learning Systems in Three Universities within Australia

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Statement of Authenticity

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Nadira Nor Hisham
June 2004
Abstract

Higher education institutions are increasingly implementing and using various forms of electronic delivery and communication in their courses. In Australia, universities are embracing the concept of online delivery using Information and Communication Technology for teaching and learning. A current study conducted by the Department of Education, Science and Training, Australia in 2002 predicted that all university students in the near future will need to use the Internet as a regular part of their university studies, even if only to download lecture notes or access the library catalogue. One main area of interest are Electronic Learning Systems that are used in universities to enhance the learning process for the students. Existing literature has indicated that there were limited studies done on E-learning Systems used in university education.

The focus of this research was to measure the students’ level of satisfaction with Asynchronous E-learning Systems. A quantitative method was implemented in this research. A web-based questionnaire was sent out to 1079 students currently studying in three universities within Australia. This research found that the students were satisfied with the Asynchronous E-learning Systems. A number of factors were analysed in relation with student satisfaction. Content reported being the factor that correlated highest with the students’ level of satisfaction while Access reported being the lowest factor that correlated with the students’ level of satisfaction. This research also reported that electronic mails, course online notes and website links are the most used Asynchronous E-learning tools, based on students familiarity with the tools. Also, this research managed to highlight other issues with regards to E-learning Systems, such as the investment considerations in E-learning as well as the need for prior training in the systems for the users. Overall, this research managed to extend the knowledge in the area of university students’ satisfaction, specifically with Asynchronous E-learning Systems.
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Chapter 1: Introduction

1.1 Introduction
This chapter includes an overview of the research undertaken in this research and substantiates why research on first year Information Systems students’ satisfaction with Asynchronous Electronic Learning Systems used in three universities within Australia should be conducted. It also includes definition of terms used throughout this thesis and that are essential to this research. The research objectives, research question and hypotheses of this research are also stated in this chapter. In addition, the research scope, and the significance of this research were identified in this chapter.

1.2 Background
Today, Information and Communication Technology (ICTs) has exerted a significant influence on the development of learning. Increasingly, the educational sector has been using ICTs to facilitate teaching and learning. Both teaching and learning are no longer restricted within traditional classrooms and therefore electronic learning or E-learning has been crucial to meet this new challenge. E-learning in universities is still at its nascent stage (Zhang & Nunamaker, 2003). Rather than replacing traditional classroom teaching, E-learning serves as a complementary mechanism to lifelong or remote learning. Universities throughout the world are currently found to be employing E-learning Systems, from commercial course management solutions to in-house learning systems, to enhance the classroom experience and ease administration of classes.

Learning Management Systems, or E-learning Systems are a major component in E-learning. Bostrom (2003) stated that application of E-learning in Information Systems teaching or research is still limited. However, Johnson and Ruppert (2002) reported that E-learning Systems are becoming a major means of delivering web-based content in higher education. In Australia, a recent study conducted by the Department of Education, Science & Training (DEST) in 2002 discovered that many
Australian universities have gone 'online' and are currently using numerous types of E-learning Systems in their institutions. WebCT was reported to be the most preferred institution-wide system in Australia.

Given the level of commitment by universities to E-learning, one main interest in this topic is the effectiveness of E-learning. Chute, Thompson, and Hancock (1999) indicated that the most immediate measure of program effectiveness is the quality of the individual learning experiences, with learner satisfaction being found to be one of the important components. User satisfaction, especially with ICTs has always been an interest among past researchers (Aladwani, 2003; Doll & Torkzadeh, 1988; Muylle, Moenaert & Despontin, 2004; Somers, Nelson & Jahangir, 2003; Wang, 2003). In a university setting, the literature has suggested that satisfaction for both teaching and learning, for using any form of E-learning tools has been of great interest recently (Arbaugh & Duray, 2002; Gunawardena & Duphorne, 2001; Chute et al., 1999; Swan, 2001). Yet studies focusing on E-learning Systems in an education setting are very limited (Bostrom, 2003), especially in the area of learner satisfaction in an education setting.

1.3 Definition of Terms

The terms and definition below have used periodically throughout this research. They are as follows:

- **Electronic learning (E-learning) Systems**

  E-learning Systems, also known as Learning Management Systems, is a broad term that is used for a wide range of systems that organize and provide access to online learning services for students, teachers and administrators. These services usually include access control, provision of learning content, communication tools and organizations of user groups (Paulsen, 2002).

- **Asynchronous E-learning Tools**

  Asynchronous tools enable communication and collaboration over a period of time through a "different time-different place" mode. These tools allow people to connect together at each person's own convenience and own schedule (Ashley, 2003).
• **Blended Learning**

Blended Learning describes a learning strategy that combines several different delivery methods, such as collaboration software, web-based courses, and face-to-face delivery (Valiathan, 2002).

• **Student Satisfaction**

Student satisfaction is defined in this research as the extent to which students believe the Asynchronous E-learning Systems information fulfil or meet their learning requirements.

1.4 *Perceived Research Problem*

E-learning has been of interest to both educational and organizational training worldwide (Zhang & Nunamaker, 2003). At present time, a considerable body of knowledge on E-learning has been established. Urden and Weggen as cited in Wentling & Park (2000), discussed the need for different learning models, to cater for the demand for flexible access and life-long learning. Wang (2003) examined learner satisfaction with Asynchronous E-learning Systems and this research will adopt his research instrument. However, there is lack of research on E-learning Systems (Bostrom, 2003) used in the educational sector. Distinctively, research focusing on Asynchronous E-learning Systems that is used to enhance on-campus course units is very limited, especially in the context of Australian universities.

The researcher found that there is a need to investigate the level of satisfaction with Asynchronous E-learning Systems among students in Australian universities used within their course units. Furthermore, first year students currently taking an Information Systems course unit are suitable candidates for this research based on previous statistics (DEST, 2002), given the discipline is one of the courses that reported a high use of online delivery.
1.5 Research Objectives

The principle objective of this study is to examine the first year Information Systems students' level of satisfaction with the asynchronous E-learning system used in their universities. In addition to the principal objective, there are a number of secondary objectives that are considered in this research area.

- To examine the extent of use of Asynchronous E-learning Systems in three universities
- To assess students' familiarity with Asynchronous E-learning tools used within their course units
- To examine the factors that contribute to the level of satisfaction in using Asynchronous E-learning Systems
- To extend knowledge in the area of Asynchronous E-learning Systems in Australia with respect to university students' satisfaction.

1.6 Research Question and Hypotheses

The above objectives can be defined into the following research question:

"How do first year Information Systems students from the three universities describe their level of satisfaction with Asynchronous Electronic Learning (E-learning) Systems?"

Based on existing literature (Graham, Scarborough & Goodwin, 1999; Wang, 2003), six variables have been reported to have an impact on students' satisfaction with Asynchronous E-learning Systems. Therefore, these variables were examined in this research to find whether relationships exist. Hence, the six preliminary hypotheses were proposed as following:

**H₀₁:** Students' satisfaction with Asynchronous E-learning Systems is not related to the content provided through the E-learning Systems.

**H₁₁:** Students' satisfaction with Asynchronous E-learning Systems is related to the content provided through the E-learning System.
**Introduction**

H₀₂: Students’ satisfaction with Asynchronous E-learning Systems is not related to the learner interface displayed by the E-learning Systems.

Hₐ₂: Students’ satisfaction with Asynchronous E-learning Systems is related to the learner interface displayed by the E-learning Systems.

H₀₃: Students’ satisfaction with Asynchronous E-learning Systems is not related to the feedback and assessment provided through the E-learning Systems.

Hₐ₃: Students’ satisfaction with Asynchronous E-learning Systems is related to the feedback and assessment provided through the E-learning Systems.

H₀₄: Students’ satisfaction with Asynchronous E-learning Systems is not related to the personalization option provided through the E-learning Systems.

Hₐ₄: Students’ satisfaction with Asynchronous E-learning Systems is related to the personalization option provided through the E-learning Systems.

H₀₅: Students’ satisfaction with Asynchronous E-learning Systems is not related to the learning community provided by the E-learning System.

Hₐ₅: Students’ satisfaction with Asynchronous E-learning Systems is related to the learning community provided by the E-learning System.

H₀₆: Students’ satisfaction with Asynchronous E-learning Systems is not related to gaining access to the E-learning System.

Hₐ₆: Students’ satisfaction with Asynchronous E-learning Systems is related to gaining access to the E-learning System.

The researcher also included a seventh hypothesis to investigate if there is a difference in the students’ satisfaction level between the three universities participating in this research. Stated below is the seventh hypothesis:

H₀₇: There are no differences in the students’ satisfaction with Asynchronous E-learning Systems between the three universities.

Hₐ₇: There are differences in the students’ satisfaction with Asynchronous E-learning Systems between the three universities.
1.7 Scope of Study
This research is partially drawn from the work of Wang (2003), which focused on learner satisfaction with Asynchronous E-learning Systems. The targeted population were first year Information Systems students that were currently undertaken a campus-based introductory Information Systems course unit. These students were selected from three universities in Australia — the University of Tasmania, the University of Adelaide, and the University of Melbourne. The research is therefore analysing the perception of students from these three universities.

1.8 Significance of the Study
Research in this area will help researchers to recognize the students' level of satisfaction from using Asynchronous E-learning Systems in campus-based course units offered in Australian universities. Further comparative studies can be conducted between other educational levels, universities, or even countries on the use and satisfaction of Asynchronous E-learning Systems in the learning environment. Researchers will also be able to discover the extent of students' familiarity with Asynchronous E-learning tools used in their course units. Other than that, it is hoped that this research will allow researchers to scrutinise the challenges of measuring learning in computer-supported environment, specifically in Australia.

Further study in this area will help practitioners make better use of Asynchronous E-learning Systems in order to make the learning process more effective for students. Practitioners would also be aware of the key issues and benefits of using Asynchronous E-learning Systems as used in a blended learning environment. This research will, hopefully, bring practitioners to a better understanding of how technology used in university education can assist students in improving learning activities and increasing their satisfaction level.
1.9 Chapter Outline

This thesis is divided into six chapters. There are as follows.

Chapter One is an introductory chapter, presenting a brief background to the research area. It also include definition of terms used throughout this thesis and which are essential to this research. The research objectives, research question and hypotheses of this research are also stated in this chapter. In addition, the research scope and the significance this research were identified in this chapter.

Chapter Two is the literature review supporting this research. This chapter will provide an extensive coverage of the body of knowledge related to e-learning worldwide and specifically, in Australia. This chapter will also look into Asynchronous E-learning Systems used in the educational sector. An in-depth look of Asynchronous E-learning tools used in universities is also described in this chapter. Other than that, satisfaction with information technology is also scrutinised to gain a better understanding of this research.

Chapter Three considers the methodology applied in this research. This chapter will describe the research methodology used in the research. Hypotheses are presented as well as the details of the questionnaire development. This chapter also covers the issues that related to the research process; beginning from ethical compliance, data collection technique, pilot test, and sample selection to data analysis.

Chapter Four focuses on the data analysis of the data collected from respondents. The demographic results and other general information are included in this chapter. Both descriptive and inferential statistics will be used in order to interpret and analyse the collected data.

Chapter Five provides discussions of the outcomes of this research, based on the data analysed in the previous chapter. The conclusion will provide the overview of this research as well as any potential directions for future research. The limitations of this research are addressed in this chapter, followed lastly by potential directions for future research.
Chapter 2: Literature Review

2.1 Introduction
The aim of this chapter is to present existing literature in the area of e-learning systems used in higher education institutions. Neuman (2003) stated that literature reviews are undertaken to familiarise, establish credibility, show the progress of prior research and integrate and summarise what is known in the study area, learn from others and stimulate new ideas and insights. As a result, it will then be possible to conduct the current research in the associated wider body of established research. An examination of literature and previous studies conducted in the area of user satisfaction with relations to Asynchronous E-learning Systems was conducted in order to achieve a clear focus and understanding of the research.

2.2 Electronic Learning
In the current knowledge-based economy, learning has become the most requisite activity that is required as a result of industrial change, globalisation, increased intensive competition, knowledge sharing and transfer, and information technology revolution (Zhang & Nunamaker, 2003). Learning, according to Wang (2003), occurs as people acquire knowledge through education, discovery, experience and experimentation. With the current increased use of networked computers and telecommunication technology, the Internet has been widely recognized as a medium for network-enabled transfer of skills, information and knowledge in various areas (Carswell, as cited in Zhang & Nunamaker, 2003). Teaching and learning are no longer restricted within traditional classrooms (Marold, Larsen & Moreno, 2000).

Zhang and Nunamaker (2003) stressed that electronic learning or E-learning has been crucial to meet this new challenge. E-learning has been defined in a variety of ways throughout the world. In reality, the term E-learning is used as a general term to cover a range of activities. To some, E-learning brings the same meaning as online learning, web-based learning, and even computer-based learning. Interestingly enough, Urdan and Weggan as cited in Wentling & Park (2002: 1) identify E-learning as “a subset of distance learning, online learning as a subset of E-learning,
and computer-based learning as a subset of online learning". Hall and Snider (2000) concurred with Urdan and Weggan that E-learning should be defined more narrowly than distance learning, since distance learning includes text-based learning and courses conducted via written correspondence.

Having said that, the Australian Flexible Learning Framework Quick Guides series (2003) defined E-learning “as a broader concept [than online learning], encompassing a wide set of applications and processes which use all available electronic media to deliver vocational education and training more flexibly.” Wentling et al. (2000) identified E-learning as the acquisition and use of knowledge distributed and facilitated primarily by electronic means. Wentling et al. (2000) went on to explain that E-learning would evolve to systems consisting of a variety of channels and technologies and can take the form of courses as well as modules and smaller learning objects and may incorporate synchronous or asynchronous access and be distributed without geographical limits.

2.2.1 Benefits of E-learning

Past research done on E-learning has highlighted several important benefits of E-learning. These researchers include Hiltz and Wellman (1997), Beam and Cameron (1998), Benbunan-Fich (1999), Rosenberg (2001), and Zhang and Nunamaker (2003).

- **Time and location flexibility** – E-learning eliminates the barriers of time and distance and has potential to reach a global audience (Zhang & Nunamaker, 2003). It also eliminates or significantly reduces the need for a classroom/instructor infrastructure (Rosenberg, 2001).

- **Cost and time savings** – E-learners would have significant cost savings on indirect expenses since they do not have to travel to a specific location (Zhang & Nunamaker, 2003). Rosenberg (2001) also explained that it reduces the time it takes to train people.

- **Self-paced and just-for-me learning** – Each e-learner can select learning activities that best fit his or her own background, interest, and career at the moment, rather than being a passive receptor of information. Rosenberg (2001) stated that people can access E-learning anywhere and anytime.
research has also reported that E-learning can be the same or more effective as compared to traditional methods (Beam & Cameron, 1998).

- **Collaborative learning environment** – Through E-learning, learners and experts can come together to form online collaborative learning community. Benbunan-Fich (1999) in her research reported that there is a significant interaction between teamwork and technology, with regards to learning perception results.

- **Better access to the instructors** – Hiltz and Wellman (1997) reported that e-learners usually perceive greater opportunities for communication than those in traditional classroom.

- **Unlimited use of learning materials** – Through E-learning, learners are allowed unlimited access and retrieval of electronic learning materials. Zhang and Nunamaker (2003) explained that an E-learning system would never lose patience with learners, who can retrieve knowledge and information 24 hours a day. Rosenberg (2001) also stressed that E-learning content can be upgraded easily and quickly, and immediately distribute new information to large number of people.

### 2.3 E-learning in Universities

Daniel, as cited in Alexander (2001: 240) reported that “technology provides the most fertile ground for growing these keys ingredients of university renewal: lower costs and unique attractions”. Bates (1997) stated that there are four reasons why technology should be use in higher education; to improve the quality of learning, to improve access to education and training, to reduce the cost of education and lastly, to improve the cost-effectiveness of education. Koehler (1998) warned that some uses of information technology are merely technological replacements for the standard mode of lecture delivery, and may be primarily effective at lower level learning domains.

Alexander (2001) believes, despite the investment decisions for E-learning, much of the activity in E-learning is taking place at the level of development of courses and their resources. Zhang and Nunamaker (2003) agreed that E-learning in universities is still at the nascent stage. They went on to explain that rather than replacing traditional classroom teaching, E-learning serves as a complementary mechanism to
lifelong or remote learning. Pailing as cited in Roy and Elfner (2002) also believed that E-learning should complement and not replace traditional training methods.

2.3.1 Blended Learning

The concept of blended learning or hybrid learning has emerged in tertiary education, as the Internet increasingly becomes an important medium in teaching and learning. In a sense, the best of the web interactions were used to integrate with the best of campus interactions. Irons, Jung and Keel (2002) believe that these 'virtual classes' are now increasingly a part of traditional course curriculum, rather than limited to on-going or adult education. A whitepaper series, published by Sun Microsystems, Inc. (2003) found that blended learning was found in the majority of the institutions surveyed. Blended learning often employed course management solutions to enhance the classroom experience and ease class administration (Sun Microsystems, 2003). Willet (2002: 415) agreed and stated that “hybrid or blended learning allows students and faculty to take advantage of the convenience distance education offers while still spending some time face-to-face”. Wentling et al. (2000) explained that instructional designers of E-learning courses are finding that blending is often done to enhance the quality of the learning experience. Light, Nesbitt, Light and Burns (2000) gave an example of a tutor who constructed online course discussions to run alongside face-to-face tutorials. Another example would be placing course materials on the Internet and establishing email and discussion boards as a basis of communication between lecturers and their students.

2.3.2 Asynchronous Learning

According to McMullen, Goldbaum, Wolff and Sattler (1998) Asynchronous Learning started in the 1980s, when some faculty and students began to teach and learn asynchronously using e-mail. As the Internet and browser technologies have improved, there has been a major move by universities to employ this medium in a variety of ways.

Light et al. (2000) also believed that the computer-mediated communication tools, used by distance learners in E-learning, are also increasingly being introduced in
conventional campus-based courses. The E-learning Systems and its' tools are used to enhance the course and are not meant to replace the conventional classroom. Therefore, most of the tools used from the E-learning Systems in this type of courses are asynchronous in nature.

Wilson and Weiser (2001) commented that few studies have explored how or why traditional on-campus students utilize the technology intended for distance learners. Novitski (2004) however implied that the use of such tools is not a panacea or even a replacement for poor instruction. He stressed that when implemented correctly, it can have a significant positive effect, but if implemented poorly, it can have a negative effect.

Wolverton and Wolverton (2003) found in their research on asynchronous augmentation in traditional course delivery that there are many advantages for implementing asynchronous learning that can benefit both the lecturers and the learners. Students that attended this course commented that they have more freedom in scheduling and effective in using their time, have the ability to access additional learning resources such as notes and answers to exercises, and more productive study routines. Unfavourable comments received from the students in this research also include the extent to which the course requires more self-discipline.

2.3.3 E-learning and Australian Universities

Due to the small population and vast geographic distances, Australia has always been among the world leaders in the move to online education. A study commissioned by the Department of Education, Science and Training (DEST), conducted by Bell, Bush, Nicholson, O'Brien and Tran, in March 2002, reported on the current extent of online education in Australian universities.

The survey found that there were 207 fully online courses offered by 23 Australian universities. Of these courses, 31% were delivered purely by online mode. Universities have also reported that 54% of their units have content available on the web. The use of the Internet in university units were as high as 99% or as low as 9% in one university.
Another study was done by McNaught, Philips, Rossiter and Winn (2000) for the Department of Education, Training and Youth Affairs (DETYA), focused on developing a framework for a useable and useful inventory of computer-facilitated learning and support materials in Australian universities. This study produced interesting findings, with regards to delivery of electronic learning courses. It was concluded that "sharp distinctions between totally on-campus and distance mode are disappearing; many universities are seeing that online technologies can enable them to use the same course materials to support student learning totally on or off campus or as a mixture of both modes" (McNaught et. al, 2002: 24).

2.4 Electronic Learning Systems

Since the end of the last decade, E-learning has moved from "will we?" to "how will we?". E-learning systems, according to Alstete (2001), are becoming widely used at educational institutions for web-enhancement of on-campus program or fully virtual distance learning courses, since these systems are easy to use, technology stable, upgradeable and very convenient to use from home or the work site. However, Bostrom (2003) stated that application of E-learning in Information Systems teaching or research is still limited. He indicated that while research on complex systems such as Enterprise Resource Planning is rich, the research on Learning Management System (LMS) employed in E-learning is virtually non-existent. Macchiusi and Trinidad (2000) also indicated that there is a lack of uniformity in computer hardware and software systems, even where an institution has adopted a commercial E-learning system solution.

E-learning Systems are also known as Learning Management Systems used in E-learning. Bostrom (2003) explained E-learning could employ the following technologies;

- Distribution technology, where technologies provide information distribution and exchange that allows distance learning to take place (for example the Internet and CD-ROMs)
- Learning Management or Content Management Software, which are technologies that simulate the experience of a classroom
Literature Review

- Communication and Collaboration Software, which includes Asynchronous and Synchronous tools that offers a rich, shared, virtual workspace
- Course Support Software, which offers a rich set of tools including electronic libraries and other instructional programs to support specific courses

Bostrom (2003) noted that the core software in an E-learning Systems would be the Learning Management System (LMS) or Content Management System (CMS). Both systems manage the interaction between the learner and learning resources. He further explained that in an academic environment, the typical system used for E-learning are, for example, WebCT and Blackboard, focused on learning content management for a given course or set of learning topics. Johnson and Ruppert (2002) agreed that these systems are becoming a major means of delivering web-based content in higher education. They explained that rather than building from scratch an in-house learning system, institutions now have the option to consider adapting commercial content management systems, such as WebCT and Blackboard.

2.4.1 E-learning Systems In Australian Universities

The survey conducted by DEST (2002) indicated the preferences of E-learning Systems used by Australian universities to support online teaching and learning. It is significant to note that some of these universities used more than one system in their institutions. WebCT was the highest used system, with 38.2% (Figure 2.1). This figure indicates that almost all the universities that responded to this survey have, to a degree, implemented and use E-learning Systems in their institution.
Interestingly, a study conducted by Deakin University in 2002 on Learning Management Systems used in Australian universities discovered that 51.2% of the universities that responded to the survey used WebCT as their Learning Management Systems. This is followed by Blackboard (29.3%) another 4.9% of the respondents used their own in-house systems while the rest of the universities that participated in this study used different types of commercial E-learning Systems. From both studies, it appears that WebCT, a commercial learning management system, is the most used E-learning Systems amongst the universities in Australia. According to Paulsen (2002), WebCT and Blackboard are in strong position, since both systems presently are the two dominant Learning Management Systems on the international market.

2.4.2 Synchronous Vs. Asynchronous Tools

E-learning System tools are used to create, maintain, and manage the modes of learning. These tools and systems come in different forms and functionalities. They help improve and manage the learning process through the provision of tracking and recording mechanisms, enrichment through incorporation of multimedia, flexibility, repeatability and a platform for global collaborative learning.

Johnson and Ruppert (2002) stated that E-learning Systems provide the ability to include a framework into which course materials can be placed. There are primarily
two modes of providing collaboration or instructional service within a learning delivery environment, synchronously or asynchronously. Both type of tools have their own strength and weaknesses that lecturers as well as learners should be aware of.

For synchronous interaction, the parties involved will have to be online at the same time and communicate in real-time. Ashley (2003) explained that synchronous tools enable real-time communication and collaboration in a "same time-different place" mode. Obviously, synchronous tools have the advantage to connect and engage people instantly. However, Ashley (2003) argued that the primary drawback of this tool is that they require same-time participation in different time zones, and have conflicting schedules can create communication challenges. Other than that, Ashley (2003) explained these types of tools, which include text-based online chat, computer, audio, video conferencing, and even white boarding (Simpson, 2002) tend to be costly and may require significant bandwidth to be efficient.

Asynchronous interaction involves the parties communicating over elapsed time, not real time. Asynchronous interaction includes straightforward discussions, group project activity, assessments, surveys, and votes. These activities may be completely open-ended or may be constrained with a defined start or end time. The key benefit of asynchronous interaction is its flexibility and ability to fit into everyone's working day. Accordingly, participants engage with the system when it suits them, and information of all kinds including documents and file attachments can be shared, not just discussions (IT-Analysis.com, 2001).

The disadvantage of asynchronous learning is that it occurs over an elapsed period of time. Often it means that it is difficult to come to group decisions, or for rapid and controlled discussion of ideas to take place (IT-Analysis.com, 2001). Table 2.1 in the next following page is a compiled list of asynchronous tools with explanation of its usefulness as well as its drawbacks (Ashley 2003). The most common Asynchronous E-learning tools includes electronic mail, discussion boards, website links and shared calendars.
### Table 2.1: Types of Asynchronous Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Useful for</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging (e-mail)</td>
<td>One-to-one or one-to-many communications</td>
<td>May be misused as a &quot;collaboration tool&quot; and become overwhelming</td>
</tr>
<tr>
<td>Discussion boards</td>
<td>Dialogue that takes place over a period of time</td>
<td>May take longer to arrive at decisions or conclusions</td>
</tr>
<tr>
<td>Web site links</td>
<td>Providing resources and references</td>
<td>May become outdated and &quot;broken&quot;</td>
</tr>
<tr>
<td>Shared Calendars</td>
<td>Coordinating activities</td>
<td>System compatibility</td>
</tr>
<tr>
<td>Web logs (Blogs)</td>
<td>Sharing ideas and comments</td>
<td>May take longer to arrive at decisions or conclusions</td>
</tr>
<tr>
<td>Streaming audio</td>
<td>Communicating or teaching</td>
<td>Static and typically does not provide option to answer questions or expand on ideas</td>
</tr>
<tr>
<td>Streaming video</td>
<td>Communicating or teaching</td>
<td>Static and typically does not provide option to answer questions or expand on ideas</td>
</tr>
<tr>
<td>Narrated slideshows</td>
<td>Communicating or teaching</td>
<td>Static and typically does not provide option to answer questions or expand on ideas</td>
</tr>
<tr>
<td>&quot;Learning objects&quot; (Web-based training)</td>
<td>Teaching and training</td>
<td>Typically does not provide option to answer questions or expand on ideas in detail</td>
</tr>
<tr>
<td>Document libraries</td>
<td>Managing resources</td>
<td>Version control can be an issue unless check-in / check-out functionality is enabled</td>
</tr>
<tr>
<td>Databases</td>
<td>Managing information and knowledge</td>
<td>Requires clear definition and skilled administration</td>
</tr>
<tr>
<td>Web books</td>
<td>Teaching and training</td>
<td>Not dynamic and may lose interest of users</td>
</tr>
<tr>
<td>Surveys and polls</td>
<td>Capturing information and trends</td>
<td>Requires clear definition and ongoing coordination</td>
</tr>
</tbody>
</table>

(Source: Synchronous vs. Asynchronous Learning, Ashley 2003)
2.5 Online Learners

Traditionally, students would have met their lecturers or tutors face-to-face in a physical setting such as a classroom. In E-learning, students stay in contact with their lecturers, tutors and other students via electronic media. Wentling et al. (2000) reviewed and discussed four important issues that concern these electronic learners. The issues include learning styles, learner's attitude towards using technology, desirable learning skills, and online interaction and communication.

The past literature had always stressed that all learners have their own individual way of learning. Learning styles refer to the consistent way in which a learner responds or interacts with stimuli in the learning context (Loo, 2002). Hartman (1995) concluded it was evident from the existing educational literature that academic success for an individual is more achievable where the learner is actively involved in the learning process. This style of learning is widely known as the constructivist model and is also referred to as active learning or experientialism (Bostrom, 2003). Gery (2002: 421) in explaining constructivism stated that, “learning is an active process in which learners construct new ideas or concepts based on their current base of knowledge”. Interestingly, Romiszowski and Corso (1990) also suggested that computer-mediated communication is essentially social constructivist in nature. Oliver and Harrington (2003) also stated that team-based approaches to learning provide many opportunities for constructivist learning, through their provision and support for resource-based, student-centred settings and by enabling learning to be related to context and to practice.

The literature also suggested that learners are perceived to have more responsibility for their own learning as compared to the traditional way of learning (Anderson, Reder & Simon, 1995; Bredo, 1997; Chen, 2002). Leidner and Jarvenpaa (1995) explained individuals are assumed to learn better when they are forced to discover things themselves rather than when they are told or instructed to do so. This method of learning aligns with the constructivist model of learning.

O'Keefe (2000) described that it is anticipated that increasingly sophisticated technology such as Learning Management Systems, will be able to support the
constructivist approach to teaching and learning more effectively. He however stressed that the teacher is partly responsible for providing experiences from which students can construct their own meaning.

Gunawardena and Boverie, as cited in Wentling et al. (2000) concluded that learning styles do not impact how students interact with media and methods of instructions, but does affect satisfaction with other learners. Larsen (1992) in his research found that there were no significant differences between learning style groups and suggested that both effectiveness and satisfaction are independent of students learning style or preference.

Research done by Coggins and Gee, as cited in Wentling et al. (2000) have found out that the key determinants in predicting student motivation and success in traditional classroom are from their perceptions about the characteristics of instructional delivery media and their ability to learn using these media. Wentling et al. (2000) went on explaining that past researchers had also argued that the successful implementation of any new technology depends on factors related to users attitude and opinions.

Gibson (1996) found that it is very important for distance students, who are online students, to be focused, better time managers, and able to work both independently and as a group members. Wentling et al. (2000) described that other studies suggested that strong self-motivation, self-discipline, independence and assertiveness are important characteristics of online students. Harasim, Hiltz, Teles and Turoff (1995: 195) believed that “the factors that make a difference in student success in online are access, attitudes, motivation and self-discipline”. Alexander (2001) summarised that students are aware that their own level of skills with ICTs has a significant impact on their participation with E-learning activities.
2.5.1 First Year Australian Universities Students

Holt, Rice and Armatas (2003) described that inexperienced students might face different challenges when trying to build an understanding of discipline concepts, compared to experienced students. However, Holt et al. (2003) also argued that many benefits could be expected from students in an online learning community at first year level. First year students will have opportunities to share ideas, clarify and extend difficult concepts, provide and receive encouragement, motivation and performance feedback from both peers and staff, and to decrease the isolation felt by some students.

McInnis, James and Heartley (2000) prepared a study for DETYA that covered the topic of trends in the first year experience in Australian universities. This study had an extensive focus on new technologies used by first year students for teaching and learning. A clear change has emerged; there has been an increasing exposure of students to a greater range of technology for teaching and learning. It was interesting to learn that in 1999, almost 60% of these students used university email systems either daily or weekly. There was a limited use of online discussion groups. One-third of the students worked from home using the university email and online material either weekly or daily, and more than half of the students used web-based resources and information designed specifically for their course daily or weekly.

McInnis et al. (2000) also discovered that just over half of the first year students commented that they regularly used web-based resources and information specifically designed for a course, and were more likely to access them at university than at home. McInnis et al. (2000) detected that there are also indications that a high percentage of the students who use such web-based resources use them regularly.

Lim and Lee’s (2000) found in their research that most of the first year students have some reasonable computer skills at the start of their university studies. However the level of skill is not uniformly high. Meredyth, Russell, Blackwood, Thomas and Wise (2000) found that a high percentage of students from Australian high schools perceived themselves as having ‘expert computer skills’, supporting the assumption that all school leavers would be highly computer literate.
2.6 Measuring User Satisfaction

Studies of user satisfaction have been of interest to researchers in the past years. User satisfaction, among others, has been one of the factors used for measuring successful use of ICT systems. According to Gelderman (1998), user satisfaction is the most widely used surrogate of computing success in Information Systems (IS) research. User satisfaction defined by Ives, et al. (1983) is the extent to which users believe the information technology available to them meets their information requirements.

There are now a number of instruments used to measure user satisfaction developed by reputable researchers (Bailey and Pearson, 1983, Ives et al. 1983, Doll and Torkzadeh, 1988). Bailey and Pearson’s (1983) developed a tool measuring and analysing user satisfaction, which, according to Otto (2000), employed a model that is the sum of one’s feeling and attitudes toward a variety of factors affecting the situation. Ives et al. (1983) later revised Bailey and Pearson’s (1983) instrument. Doll and Torkzadeh (1988) later developed an end-user computing satisfaction instrument, extending Ives et al. (1983) research on user information satisfaction. The research focused on user satisfaction with the human-computer interface and usability of specific end-user Information Systems. Their instrument measures five important factors, which includes information content, accuracy, format, ease of use, and timeliness. Doll and Torkzadeh’s (1988) instrument is still currently used to measure end-user computing satisfaction (Aladwani, 2003; Muylle, 2004, Palvia, 1996, Otto, Najdawi and Caron, 2000, Wang, 2003), indicating that the instrument is reliable over time. Wang (2003) reviewed and adapted instruments on user information satisfaction and end-user computing satisfaction in existing literatures and constructed a new instrument that measured learner satisfaction with Asynchronous E-learning Systems.
2.6.1 Learner Satisfaction

Chute et al. (1999) and Smith (as cited in Wentling et al., 2000: 22) reported that learner satisfaction was found to be an important component in the effectiveness of E-learning Systems. Wentling et al. (2000) explained that the learners' level of satisfaction with the media and processes used to create the learning environment plays upon the learners' desire to participate in future E-learning courses. Wisher and Curnow (as cited in Wentling et al., 2000: 22) suggested that while favourable reactions to training and learning do not necessarily indicate that learning has taken place, they are useful to collect for three primary reasons. Firstly, positive reactions received from theses studies could help to gain or maintain organizational support. Other than that, reaction measures can serve as a source of immediate feedback to training providers. Lastly, insights can be gained from subgroup analysis, allowing for analysis of training impact across subgroups.

There has been many past research concentrating on learner satisfaction through different modes of learning, including distance learning, E-learning, computer-based learning, and also online learning. Wentling et al. (2000) described that level of participation and interaction, the amount and quality of feedback, the learning environment, and technology are some of the aspects that are frequently mentioned in existing literature. Swan (2001) highlighted that design factors affecting student satisfaction and perceived learning in an asynchronous online courses include interaction with content, interaction with lecturers, and interaction with classmates. Indeed, Thomas (2000) made a valid point by stating that success in technology-based learning courses are based on an orientation to the learner and not the instructor.

Arbaugh and Duray (2002) discovered that student satisfaction with web-based courses is likely to determine whether the student takes subsequent courses in this format or with the same education provider. Wang (2003) agreed and explained that students with high level of satisfaction are expected to have higher levels of intention of reusing and make fewer complaints.
2.7 Measuring Learners’ Satisfaction With Asynchronous E-learning Systems

In his paper, Wang (2003) employed an exploratory e-learner satisfaction instrument involving 26 items, with two global measures. He studied and reviewed existing literature and instruments on user information satisfaction, end-user computing satisfaction, customer satisfaction and learner satisfaction. To make sure that important aspects of satisfaction were not omitted, Wang (2003) conducted experience surveys and personal interviews on E-learning satisfaction with professionals, teachers and even e-learners.

His instrument has presented five variables that influenced learners’ satisfaction with Asynchronous E-learning Systems. This includes satisfaction with Content, Learner Interface, Feedback and Assessment, Personalization, and Learning Community. However, based on past literature, Access also plays an important role when considering factors affecting the learner’s satisfaction with Learning Management Systems (Graham et al., 1999; Irons et al., 2002, Schrum & Hong, 2002; Swan, 2001). Therefore, the researcher decided to include another variable, Access, into this research. The association of learner satisfaction with each of the variables are discussed in order to understand the theoretical connection between each variable and student satisfaction with E-learning Systems as reported in the literature.

2.7.1 Learner Satisfaction With Content

Swan (2001) described that in general, learners are aware of the enormous amount of content available through the Internet, however, many are overwhelmed by it. Shank, as cited in Swan (2001) nevertheless warns that information is not learning. Swan (2001) found in her study that the greater the consistency among the course modules, the more satisfied students were. She stressed that course designers should keep in mind that when student lack in face-to-face communication, it is easy for them to get confused or lost in complex course structures thus making interaction with content more difficult. Thompson and McGrath (1999) implied that students need to be assured that the academic content made available through the E-learning Systems is of the same quality as that offered with traditional instructions.
Magalhaes and Schiel (1999) in their study on learner satisfaction with students taking a web-based course found that students had a high level of satisfaction with the use of technology, course content and instructor support. They concluded that, when packaged carefully, and with the student in mind, online learning courses can be preferred to that of traditional instruction. Ocker and Yaverbaum (1999) found in their study that the level of satisfaction is the same between asynchronous learning and face-to-face learning, and therefore, found that, overall, there is no significant differences between face-to-face and asynchronous on measures of learning and quality.

2.7.2 Learner Satisfaction With Learner Interface

Information format has always been of interest when studying user satisfaction (Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Palvia, 1996). Information produced from information technology should be presented in such a way that it is interpretable, easy to understand, easy to manipulate, and is presented concisely and consistently. Wentling et al. (2000) explained that selecting a delivery technique or combination of techniques is one of the most important concerns in an E-learning environment.

Hall (1997) explained that the user interface design refers to the overall look and feel of the program that allows learner to access information. Gunawardena and Duphore (2001) in their study discovered that there is a strong positive correlation between online features and learner satisfaction, hence, having online features are the best predictors of learner satisfaction. Van Rennes and Collis, based on Wentling et al. (2000), studied student reactions to the interface design of a web-based course in Netherlands and discovered seven principles to designing a learner-friendly user interface. This included all aspects of a good website, ranging from the white space used, to the length of each page as well as the timeliness of the information presented in the website.

Leung (2003) stated that design of computer-based programs for learning-oriented purposes should have sufficient and appropriate navigation aids and online learning help. This is essential for the users so that they can have more control over their own
learning and exploration without causing disorientation, and can improve their learning effectiveness.

2.7.3 Learner Satisfaction With Feedback And Assessment

Feedback is particularly important to the effective delivery of E-learning courses. Thurmond, Wambach, Connors and Frey (2002) explained that students need information on their progress and performance so that they can receive timely information on their assignments and questions. Soon, Sook, Jung and Im (2000) also highlighted the importance of timely responses in a study reporting students' negative comments about not receiving timely feedback from teachers.

Rossman (1999) rated feedback given by the faculty as one of the most important aspect for students studying online and suggested several ways on how lecturers could increase feedback for their students. Wentling et al. (2000) explained that E-learning delivery methods such as web-based instruction could provide barriers to traditional type classroom feedback and therefore suggested that emphasis should be put forward to the design and integration of the feedback mechanisms.

Peat and Franklin (2003) conducted a study on how student learning has improved through the online and offline formative assessment opportunities. Their findings concluded that although the student perceived that the use of online and offline assessment resources are beneficial to their learning, there appears to be no different effect of those resources on their performance as measured by their final mark. Peat and Franklin (2003) however stressed that further research was needed since other factors such as transition from secondary school to university could be an issue.

Neal and Ingram (1999) suggested, based on their research, that the teacher-learner feedback loops that allow teachers to measure how the class and particular students are progressing were largely absent in an asynchronous environment. They however suggested the integration of real-time discussions and chats will help to better facilitate learner-to-learner and instructor-to-learner communication. There do however exist some asynchronous tools, which can be employed to provide feedback; these include email, discussion boards and assessment tools. Special
attention must be given to obtaining student feedback in E-learning (Neal & Ingram, 1999). Interestingly, Thurmond et al. (2002) found in their study that a sense of 'connection' with the instructor fosters a belief that they were being adequately assessed.

2.7.4 Learner Satisfaction With Personalization

Schrum and Hong (2002) identified learning preferences as one of the dimensions that are deemed important for experiencing online success. They explained that individuals must be able to recognize their own abilities and styles, in order to modify the learning necessary for online environments. One important factor of E-learning, especially when using asynchronous E-learning tools is that students have the option to personalize their learning that best suits their lifestyles. E-learning allows them to choose when, where and even what they want to study. Schrum and Hong (2002) indicated that students need to understand how to balance the complex aspects of their lives with their study programs.

One of the aspects of Personalization is having individualized learning support. Thompson and McGrath (1999) in their article stated that by having ready access to suitable academic advising and support services, the students could receive the guidance and personal support required to complete their programs in a successful and timely manner. In other words, E-learning Systems can help automate elements to develop 'self-help' strategies that will release staff to attend personally to those situations where 'high-touch' approach is appropriate (Thompson and McGrath, 1999: 59).

Leung (2003) believed that with more user control in the E-learning environment, users are likely to encounter difficulties during their learning process and will then tend to look more frequently for help. He suggested that sufficient and well-placed online learning help is essential for effective and efficient learning. A study conducted by Freeman (1997) found that students largely had positive perceptions of the interactive features, self-testing, and monitoring facilities in the web-based teaching program. Students claimed that these features encouraged them to understand and thus take a deeper approach to learning.
2.7.5 Learner Satisfaction With Learning Community

Learning community is an important aspect for a given E-learning System. Moore (as cited in Swan, 2001) reported that interaction, whether it is with the course lecturers or with the rest of the classmates, are two kinds of interactivity that may affect learning in online courses. Dehler and Poirras-Hernandez (1998) added that it was useful to include a component that required students to interact with their colleagues in some way when using computer-based education.

There have been many studies with regards to lecturers’ role in online communities in a learning environment. Picciano (1998) found that the instructor’s activity was related to student’s perceived learning in online education courses. Other researches went even further by trying to explain the shift of responsibilities in the lecturers’ role and discovering the ‘teaching presence’ (Fuller, Norby, Pearce & Strand, 2000; Coppola et al., as cited in Swan, 2001).

Rogers (2000) found that students are willing to engage in mutual engagement, joint enterprise and shared repertoire in their course activity. Ruberg, Moore and Taylor (1996) found that in order for online discussion to be successful, it required a social environment that encouraged peer interaction facilitated by instructor structuring and support. Picciano (1998) has also found that students’ perceived learning from online courses was related to the amount of discussion that actually had taken place in them.

Woods Jr. (2002) in his paper discussed the relationship between learners’ perceptions of the student-faculty relationship and learner’s satisfaction with the overall learning experience. His study found that some students, regardless of the frequency of contact (through emails) with their instructor, were positively affected by and benefited from receiving instructor-initiated personal emails outside of required group discussion formats.
2.7.6 Learner Satisfaction With Access

Schrum and Hong (2002) discovered that the more difficulty the student experienced in getting to the equipment, the easier it was to find reasons to drop the course. "Students without regular access to appropriate tools, at home or at their work tend to have more difficulty in succeeding in online learning" (Schrum & Hong, 2002: 60). Graham et al. (1999) stressed that in an online learning environment, access is critical to success. Graham et al. (1999) explained that all effort expended in implementing computer-mediated communication in a teaching program will be wasted if students are unable to ‘attend the classroom’.

Irons et al. (2002) found that when the geographic location is considered, student attending classes which have a web requirement in urban settings were more likely to express positive degrees of satisfaction that students attending classes with a web requirement in non-urban settings. They went on to explain in detail that urban locations are advantaged due to their individual access to network resources (dial-up access and residential broadband access) than compared to non-urban locations.

Johnson and Ruppert (2002) in their research had discovered that E-learning Systems, or specifically Learning Management Systems vendors are quickly and aggressively addressing the problem of accessibility. The World Wide Consortium (W3C) has developed a guideline that sets the technical specifications and the standards for the Web, through their website, www.W3.org. However, Johnson and Ruppert (2002) argue that we cannot hope to give Learning Management Systems administrators one correct answer about which system is the most accessible, since the quickly changing snapshot of “accessible Learning Management Systems” is nearly impossible to capture (Johnson & Ruppert, 2002).
2.8 Chapter Summary

This chapter reviewed the literature about E-learning and how it is applied to an education setting. E-learning Systems as well as the tools, synchronous versus asynchronous were discussed in detail in this chapter. An examination of online learners and their characteristics were also considered here in this chapter. The chapter included a review of user satisfaction with E-learning Systems were generally discussed in general. A special focus on learner satisfaction and the factors influencing satisfaction was explored at the end of the chapter.
Chapter 3: Methodology

3.1 Introduction

This chapter will review the research aims and then consider the ontology and epistemology employed in this research. The research approach, ethics approval, as well as the methods used for this research will be considered and discussed later in this chapter. The measurements of reliability as well as validity are also discussed in this section. This chapter will also consider the data analysis method to be conducted in this research; this will consider both descriptive and inferential statistics.

3.2 Research Aims

Based on the literature review in the previous chapter, it can be said that there is very limited research on students' satisfaction with Asynchronous E-learning Systems in Australian universities setting. It is important then to consider the aims of this research before adopting and explaining the epistemology as well as the ontological stance of this research.

Therefore, below are the aims of this research:

- To examine the extent of use of Asynchronous E-learning Systems in three universities
- To assess students' familiarity with Asynchronous E-learning tools used within their course units
- To examine the factors that contribute to the level of satisfaction in using Asynchronous E-learning Systems
- To extend knowledge in the area of Asynchronous E-learning Systems in Australia with respect to university students' satisfaction.
• Figure 3.1 represents the model that was used in this research to measure student satisfaction with Asynchronous E-learning Systems within the three Australian universities. All six variables, Content, Learner Interface, Feedback and Assessment, Personalization, Learning Community and Access are treated as the independent variables that can influence the level of the students’ satisfaction with Asynchronous E-learning Systems.

![Figure 3.1: A Model for Measuring Learner Satisfaction with Asynchronous E-learning Systems](image)

3.3 Research Philosophy

The research presented in this thesis will be based on a positivist approach and an objective ontology. A brief explanation of epistemology and ontology are as follows.

3.3.1 Ontological Position

Ontology is concerned with “whether the empirical world is assumed to be ‘objective’ and hence independent of humans, or ‘subjective’ and hence having existence only through the action of humans in creating and recreating it” (Orlikowski & Baroudi, 1991: 7). Objectivism is defined as removing feeling relating to the objects being examined and analysing the object independently of personal feelings (Ticehurst & Veal, 1999). A researcher who adopts this stance takes the approach that they are removed from the environment that they are
studying, and therefore do not influence the research results. Subjectivism, on the other hand, is defined based on relativism. It holds the belief that the world consists of social constructs and that no reality exists outside the perspective of the participants (Ticehurst & Veal, 1999).

The researcher has taken an objective stance. The aim of this research was to identify student satisfaction with Asynchronous E-learning Systems within Australia's tertiary setting. Moreover, data collected in this research does not contain any of the researcher's perception on satisfaction with Asynchronous E-learning Systems. Therefore, an objective stance of ontology was adopted in this research.

3.3.2 Epistemological Position

The research world is very complex, bringing different beliefs about how research should be conducted. According to Cavana, Delahaye and Sekaran (2001), these beliefs can be broadly divided into three schools of thoughts, positivist, interpretivist, and critical research. Neuman (2003) explained that most ongoing social research is based on the first two, with positivism being the oldest. Neuman (2003) indicated that each approach is associated with different traditions in social theory and uses diverse research techniques.

Positivist research is also known by other names in the research field: logical empiricism, the accepted or conventional view, post positivism, naturalism, the covering law model and behaviourism (Neuman, 2003). Cavana et al. (2001) explained that positivist research use precise; objective measures and is usually associated with quantitative data. Neuman (2003) agreed with this statement and added that this type of research often use experiments survey and statistics. They seek rigorous, exact measure and 'objective' research, and they test hypotheses by carefully analysing numbers from the measures. According to Cavana et al. (2001), positivist research uses deductive reasoning – beginning with a theoretical position and moving towards concrete empirical evidence – to identify a set of universal laws that can be used to predict general systems of human activity. This is based on the assumption that there is a set of universal laws already existing that needs to be discovered.
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Cavana et al. (2001) explained that interpretivist research believes that it is more likely that people experience physical and social reality in different ways. That is, researchers adopting this stance will assume that the world is largely what people perceive it to be (Cavana et al., 2001).

This research focused on the level of satisfaction with Asynchronous E-learning Systems used in university settings. It aims to examine the relationship between factors with satisfaction from the perspective of students in three universities within Australia. Therefore, a positivist epistemology has been applied in this research. Furthermore, due to the nature of the research question, the researcher found that the most appropriate research method to answer the question was the positivist approach, employing quantitative statistical methods.

3.4 Human Ethics

This research gained Ethics approval from the Southern Tasmania Social Sciences Human Research Ethics Committee. This Committee is accountable to the Pro-Vice-Chancellor (Research) of the university, Department of Health and Human Services (under the HREC (Tasmania) Network) and the National Health and Medical Research Council (NHMRC).

The researcher completed a Minimal Risk Assessment Form (Social Science Application) in order to gain the approval by the Ethics Committee. An Information Sheet (see Appendix A) as well as a copy of the web-based questionnaire (see Appendix B) distributed to the sample must be submitted to the committee. Several issues such as privacy legislation, potential risks for participants, and confidentiality and anonymity were considered by the Ethics Committee before the research was approved.

After Ethics application had been approved (see Appendix C), the researcher employed a web-based questionnaire to collect data for this research.
3.5 Research Method

A detailed description of the method adopted in this research is discussed in this section. The sample population will be discussed, followed by the survey instrument. The conduct of the pilot testing will then be explained, and lastly a discussion of the questionnaire administration will be looked into.

3.5.1 Survey Scope

The main objective of this research is to study student satisfaction with Asynchronous E-learning Systems in a university setting. With that being the main focus, the researcher identified the sample for this research from three different universities in Australia. The universities are the University of Adelaide, University of Melbourne and University of Tasmania. All three universities are public universities situated in three different states within Australia.

It is worth noting that all three universities use different E-learning Systems. The University of Tasmania uses WebCT, while the University of Adelaide uses MyUni (Blackboard) and lastly, University of Melbourne uses WebRAFT. Both the University of Tasmania and the University of Adelaide uses commercial Learning Management Systems while University of Melbourne uses an in-house built system. These systems can be accessed through the Internet with popular web-browsers such as Internet Explorer and Netscape.

The common factor for all the universities are their students, which are first year Information Systems students taking an introductory class in this discipline. Feedback from Course Unit Co-ordinators from the three universities has helped the researcher to identify the size of the samples from each university. The total size of sample from the three universities was 1079 students, 490 students from University of Tasmania, 453 students from the University of Adelaide and 136 students from the University of Melbourne. Even though the University of Melbourne is known as the largest university among the three, the number of students that are targeted in this research is small compared to the other two universities. This is because the first year IS students in this university have been broken into a number of different introductory course units, and this research only focused on one of these introductory course units.
3.5.1.1 Population Size

It was found that the whole population, based on the three universities, are 1079 students. A decision was made to include the whole population of the first year Information Systems students from the three universities, and therefore, a sampling population approach was unnecessary. Furthermore, a web-based questionnaire was implemented, and no extra cost will be incurred.

Within the proposed population, 45.4% (490 students) are from University of Tasmania, 42.0% (453 students) are from University of Adelaide and 12.6% (136 students) are from University of Melbourne. Concurrently, 87.4% of the students use commercial Learning Management Systems (WebCT and MyUni (Blackboard)) while the rest uses an in-house systems (WebRAFT).

3.5.2 Survey Instrument

This research partially replicated and adapted some aspects of the previous research conducted by Wang (2003). The questionnaire instrument used in this research was derived and adapted from an instrument used to measure learner satisfaction with Asynchronous E-learning Systems developed by Wang (2003). There were a few reasons why Wang’s instrument was used in this research. Firstly, the instrument is up-to-date and focused on learner satisfaction. This instrument also focused on Asynchronous E-learning Systems, which the researcher found suited to the context of this research, and concentrated on student satisfaction with an on-campus university environment. Lastly, Wang’s instrument was derived from other existing instruments that have been validated and widely used by other researchers (Ives et al., 1983; Doll & Torkzadeh, 1988). A minor change was carried out to a phrase that is used in Wang’s (2003) instrument. ‘Learner satisfaction’ was revised to ‘student satisfaction’ to better reflect the instrument to this research. Furthermore, Merill, Drake, Lacy and Pratt (1996) stated that while all of us are learners, only those who submit themselves to deliberate instructional situations are students. It is obvious that the sample population here are students and therefore, the change in the phrase.
An additional variable was also adapted from another instrument (University of Wollongong, 2003). This variable was added based on their research on students' satisfaction with information services offered in this university. The researcher selected only one section of this instrument, which focused on Access, and this will be explained in detail in the following section of this chapter. Based on past literature (Schrum & Hong, 2002; Irons et al. 2002), the researcher decided that Access plays an important role, this will then be considered as another variable that can affect students' satisfaction in this research.

3.5.2.1 Questionnaire Format

The choice of the questionnaire communication method or format may depend on personal preference, cost, time constraints, potential response rate or many other criteria important to a particular research project (Frazer & Lawley, 2000). The format of the questionnaire chosen for this research was an online survey, or otherwise known as a web-based questionnaire.

Sekaran (2000) also stated that web-based surveys are fast in delivery, very inexpensive and respondents can answer at their convenience. Neuman (2003) stated that web survey might be best for carefully targeted, highly motivated populations. Cavana et al. (2001) explained that electronic questionnaires are similar to mail questionnaires since they are easy to administer and respondents can answer at their convenience.

There are, however, some disadvantages of using a web-based questionnaire. Firstly, respondents must be computer literate and have access to computers and/or email (Sekaran, 2000; Cavana et al., 2001). Respondents, according to Cavana et al. (2001) must also be willing to complete the survey. Other than that, the response rates in web-based questionnaire are rather ambiguous (Couper, Blair, & Triplett, 1999; Klassen & Jacobs, 2001; Schaefer & Dillman, 1998).

This research used a web-based questionnaire due to the population size from three universities in Australia. Other than that, the targeted respondents of this research are mainly students using an E-learning Systems. The assumption here would be that these students would have knowledge and access to the Internet in order to view the
web-based questionnaire. These students are targeted through their Course Unit Co-ordinators from each university. The Course Unit Co-ordinators are contacted and the URL address of the web-based questionnaire would be emailed to them, and then be forwarded to the students, along with the information sheet for this research.

This web-based questionnaire used Mod_Survey version 3.0.16 (pre-release), a program that allows programmers to write web-based questionnaires using XML language (Palmius, 2004). Mod_Survey is a mod_perl module for Apache. It is used as a content-handler for "survey" files, that is to say for files containing questionnaires described in an XML-based tag notation defined in the Survey v3.0.0 DTD (Palmius, 2004). Mod_Survey allows direct data transfer or direct download to a number of statistical program including SPSS, which was used for data analysis in this research.

The web-based questionnaire is supported through a password protected URL address hosted by the School of Information Systems, University of Tasmania. It was under direct supervision of the researcher to ensure confidentiality and security of data collected. Data collected was imported directly to SPSS through the administration control from Mod_Survey version 3.0.16 (pre-release).

3.5.2.2 Questionnaire Structure

The layout of the questionnaire was important since the overall impression given by the questionnaire can be all-important in obtaining a good response (Ticehurst & Veal, 1999). Since the researcher opted for a web-based questionnaire, there were certain matters that the researcher had to consider, in order to present a professionally laid-out web-based questionnaire. Factors that the researcher had considered include the use of white space, ease of navigation, and choice of fonts.

According to Lengel (2002), site designers have discovered by trial and error that text on a computer screen is easier to read if it is displayed in relatively large type, in a single column about five inches wide, with plenty of white space around the edges.

The researcher included a ‘target hyperlink’ at the end of the Section A, which allowed the respondents to be transferred to the bottom of the same page where they
can click and submit the web-based questionnaire. Respondents would not have to scroll all the way down to the end of the web page if the rest of the questions were not applicable to them.

The researcher decided to use black text on plain white background. Lengel (2002) assures that this choice is the easiest to read and also recommended to use serif fonts, such as Times New Roman for easier reading on the Internet.

The researcher included an introductory page as the first page when respondents enter into this secured website. Information regarding the research would be displayed in the introductory page. A hyperlink at the end of this page, Proceed to Questionnaire, will then transfer the respondents to the actual web-based questionnaire once it is selected.

The web-based questionnaire consists of nine main sections, numbered alphabetically from Section A to Section I.

Section A was comprised of ten main questions that were organised as below:

- Two questions were created using the ‘list tag’, which present alternatives to the question in a list-box instead of as an enumeration with radio buttons,
- Six questions were created using the ‘choice tag’ that allows respondents to choose an answer by selecting one of the radio buttons,
- The researcher used the ‘memo tag’ to accompany one of the ‘choice tag’ question, where the respondents were given the option for including additional information about their level of education,
- Two groups of questions were created using the ‘matrix tag’ that used a table where respondents can select and choose their familiarity with the listed E-learning tools and E-learning Systems.

Section B through to Section H evaluated respondent’s overall reaction based on Content, Learner Interface, Feedback and Assessment, Personalization, Learning Community and Access, with regards to satisfaction with Asynchronous E-learning Systems. All 34 statements used in this questionnaire were divided and organised using a ‘matrix tag’ that defined these statements into groups of tables. The
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Statements were then rated using a 7-point Likert scale, ranging from 'Strongly Disagree' to 'Strongly Agree'. The researcher had also decided to include another scale, 'Don’t Know', as there were some statements that might not be applicable to all respondents. The data collected from these sections were treated as ordinal scale. Argyrous (1996: 9) explained that, "ordinal scales are particularly common when measuring attitude or satisfaction in opinion surveys".

The questionnaire ended with Section I, which consisted of one open-ended question. Respondents were asked to give comments about other factors that they thought influenced their satisfaction with the use of E-learning Systems in their university units. The actual web-based questionnaire is attached to this report at Appendix B.

3.5.2.3 Questionnaire Content

- **Section A - General Information**

In Section A of the questionnaire, general information about the respondents was collected. As well demographic enquiries, they were also asked about their level of computer experience and their extent of use with E-learning Systems in university units.

If respondents used an E-learning System in his university course, they were given instructions to proceed to the following questions, which ranged from the respondents E-learning System usage and their familiarity with E-learning Systems and tools. If respondents indicated not having used an E-learning system in their university course they were thanked and was asked to click a hyperlink to the bottom of the web-based questionnaire in which they can click the submit button to send in their responses.

Respondents that confirmed their use of E-learning Systems then proceeded with the remaining section of the web-based questionnaire. The next seven Sections were aimed to determine the respondents’ response to the E-learning Systems used in their university courses based from different factors. These Sections include:
Methodology

- **Section B - Content**
  This section contained four statements related to the respondents overall reaction to content gathered from an Asynchronous E-learning Systems. Statements with regards to usefulness and timeliness of content were asked in this section.

- **Section C - Learner Interface**
  There were five statements in this section pertaining to the learner's interface. Respondents were asked if the Asynchronous E-learning Systems were user-friendly, easy to use, stimulating and stable for them to use.

- **Section D - Feedback and Assessment**
  In this section, six statements with regards to feedback and assessment of the Asynchronous E-learning Systems were included. Respondents were asked to indicate their overall reaction on testing environment and the evaluation of their learning performance gathered through the Asynchronous E-learning Systems.

- **Section E - Personalization**
  This section contained six statements related to the personalization of the asynchronous E-learning Systems experienced by the respondents. This section mainly asked the respondents to indicate if they believed that the Asynchronous E-learning Systems assisted the user by allowing personalization.

- **Section F - Learning Community**
  There were four statements in this section related to the learning community within the Asynchronous E-learning Systems. Respondents were asked to testify if the Asynchronous E-learning Systems managed to support interaction between respondent and instructor or even between respondent and other students in the community.
• **Section G - Access**

In this section, the researcher included six statements that focused on access to the Asynchronous E-learning Systems. Statements in this section covered the issue of access from home as well as the facilities such as computer labs in the universities. Respondents were even asked to rate their overall reaction to the disability access features used in the Asynchronous E-learning Systems.

### 3.5.3 Pilot Testing

As explained earlier, employing a pilot test is one of the means to increase reliability of the research instrument (Neuman, 2003). A pilot test was conducted within one tutorial session, and managed to generate 21 respondents. Based on the responses, the researcher had made adjustments on the Likert scale, from five-point to seven-point to maintain the reliability of the instrument based on the previous research conducted by Wang (2003).

Other than that, the layout of the web-based questionnaire was also adjusted, mainly in the introductory page. The researcher had took into considering greater use of white space, as well as making sure that all information, including the hyperlink fitted into one page without having to scroll down, for the convenience of the respondents.

It was noted by one of the respondents that certain characters used in the comment box were not being accepted and caused an error when submitted. This was noted, and due to security reasons, the problem could be resolved through better documentation in the questionnaire. Therefore, the researcher had included an instruction before the comment box, informing the respondents that characters such as ; & " <> ' $ are invalid and cannot be used when submitting the questionnaire.

Another difficulty faced during the pilot testing was the compatibility of the Internet browsers. One of the Unit Co-ordinators found that the hyperlink from the introductory page to the questionnaire when viewed using Netscape Navigator could not be seen. However, when opened using Internet Explorer or Mozilla, the hyperlink
button is visible. After a few adjustments using Microsoft FrontPage, the researcher managed to fix the problem. All the major Internet browsers could then access the web-based questionnaire.

3.5.4 Questionnaire Distribution

The web-based questionnaire went live and was distributed to the students through their respective Course Unit Co-ordinators on 31\textsuperscript{st} of March 2004. Students were contacted through email by their Course Unit Co-ordinators, in which a hyperlink to the introductory page of the web-based questionnaire was included. The URL address was \url{https://survey.infosys.utas.edu.au/еВlearning/}. The students were then encouraged by the Course Unit Co-ordinators to complete the questionnaire.

Interested respondents were transferred to the introductory page through the hyperlink where they were able to read detailed information regarding the research and the web-based questionnaire. The information also included the contact details of the Chief Investigator and the researcher for further inquiries. Additionally, the estimated time to complete a questionnaire was also stated. The introductory page also included information about the assurance confidentiality assurance for the respondents as well as the ethical issues related to it.

3.5.5 Follow-up

The researcher decided to include a follow-up of the invitation to participate in this research to the whole population. A follow-up is done to help increase the response rate. For the University of Tasmania, the first invitation email was sent out on 29\textsuperscript{th} March 2004 by the Course Unit Co-ordinators, while the follow-up reminder email was sent out on 24\textsuperscript{th} April 2004. The Course Unit Co-ordinators of the University of Adelaide emailed the first invitation letter to participate in this research to his students on 30\textsuperscript{th} March 2004, while his follow-up reminder email was sent out on 19\textsuperscript{th} April 2004. The Course Unit Co-ordinators from the University of Melbourne, on the other hand, only managed to send out an invitation email to his students on 19\textsuperscript{th} April 2004. He did not send a follow-up reminder email to his students, due to reasons that were out of the control of the researcher.
3.6 Reliability and Validity

Both reliability and validity, according to Neuman (2003) are core issues in conducting measurement in all research. Therefore, it is important that reliability and validity of this research instrument be thoroughly tested.

3.6.1 Reliability

Ticehurst and Veal (1999: 24) defined reliability as, “the extent to which research findings would be the same if the research were to be repeated at a later date, or with a different sample of subjects”. Babbie (1999) explained that reliability refers to the likelihood that a given measurement procedure will yield the same description of a given phenomenon if that measurement is repeated. Page and Meyer (2000: 84) went on to define total reliability as being, “achieved when the instrument provides identical repeated measures relating to some constant factor”. Neuman (2003) explained that an instrument’s reliability could be increased through four measures: through clearly conceptualised constructs, by using a precise level of measurement, by using multiple indicators, and by using pilot tests.

The instrument used in this research was a replication of a previous study conducted by Wang (2003) and also included an additional section focusing on Access (University of Wollongong, 2003). Furthermore, Wang (2003) developed this instrument based on other well-known instruments (Ives, Olson & Baroudi, 1983; Doll & Torkzadeh, 1988) that have proven their reliability by being tested repeatedly with by other researchers (Palvia, 1996, Otto, Najdawi & Caron, 2000).

Neuman (2003) reported that indicators at higher or more precise levels of measurement are more likely to be reliable than less precise measures because the latter identify less detailed information. The researcher decided to maintain and follow the existing instrument by Wang (2003) of using a 7-point Likert scale to preserve reliability.

A pre-testing of the questionnaire was carried out and the constructive feedback provided was considered to have improved the questionnaire. Other than that, the researcher performed a pilot test prior to the actual questionnaire to help increase reliability (Neuman, 2003).
3.6.2 Validity

Page and Meyer (2000) explained that an instrument is valid when it provides precisely the same measure every time. Babbie (1999: 115) defined validity as, "the extent to which a specific measurement provides data that relate to commonly accepted meanings of a particular concept". The previous instrument used in the study conducted by Wang (2003) was tested with content validity, criterion-related validity, discriminant and convergent validity and lastly, nomological validity.

Face validity indicates that the items being presented on the questionnaire are clear and understandable to the subjects (Cavana et al., 2001). This was done through the pre-test as well as the pilot-testing period, based on the feedback given.

Content validity requires a measure to represent the full content of a definition. According to Wang (2003: 80), "the procedures used in conceptualising the e-learner satisfaction (ELS) construct, generating items, and purifying the ELS measures suggest that the ELS instrument has strong content validity".

Concurrent validity requires the measure to yield similar results with a pre-existing indicator, which has been judged as valid (Neuman, 2003). In this research, construct validity was verified due to the use of Wang's (2003) instrument from a previous research.

Cavana et al. (2000: 213) stated that, "construct validity testifies to how well the results obtained from the use of the measure fit the theories around which the test is designed". They went on to explain that two specific forms of construct validity are convergent and discriminant validity. Convergent validity is established when scores obtained by two different instruments measuring the same concept are highly correlated, while discriminant validity is established when, based on theory, two variables are predicted to be uncorrelated, and the scores obtained by measuring them are indeed empirically found to be so (Cavana et al., 2000). Wang (2003: 80) applied the correlation matrix approach to evaluate the convergent and discriminant validity of his instrument and demonstrated that his instrument was valid.
Nomological validity, according to Pennings and Smidts (2000: 4), “refers to whether measures are related to other constructs in a way that is meaningful from a theoretical perspective”. It is the degree to which predictions from a formal theoretical network containing the concept under scrutiny are confirmed and sometimes are labelled as construct validity by others. Wang (2003: 81) indicated through his hypotheses testing, his instrument supported the nomological validity of the proposed e-learner satisfaction measures.

3.7 Analysis of Data

Ticehurst and Veal (1999: 153) stated, “Most questionnaire data are analysed by computer. This means that the information in the questionnaire must be coded- that is, converted into numerical codes and organised in a systematic machine-readable manner”. Data collected from the web-based questionnaire can be directly imported to a statistical analysis software, Statistical Package for the Social Sciences (SPSS) version 11.5 through the administration control of the Mod_Survey program.

3.7.1 Data Cleaning

Accuracy is vital when coding data for any quantitative research. Neuman (2003: 335) stated, “errors made when coding or entering data into a computer threaten the validity of measures and cause misleading results”. By using the option of directly importing data from the Mod_Survey program to SPSS, ensuring that the researcher does not have to use the direct-entry method to key in the raw data into SPSS. The researcher, however, did perform a recheck on the data enter to make sure the reliability of data imported.

Due to the fact that the researcher used a web-based questionnaire program, Mod_Survey, there are some outcomes that the researcher cannot control. This is caused from having no control on the manipulation of the data outcome. Therefore, by using the Recode option in SPSS, the researcher had recoded two sets of data. Firstly, the Don’t Know column was coded as 8 by the Mod_Survey program, and had been recoded into 0 in SPSS. Secondly, missing data, or unanswered questions were recoded from −1 to 999 in SPSS.
3.7.2 Data Coding

After the data has been collected from the web-based questionnaire, it must then be organized in accordance with its measurement scale. There are four basic types of measurement scale: nominal, ordinal, interval and ratio. Organizing the data variables into these measurement will increase the sophistication of the data analysis that can be preformed, which in turn means that more meaningful answers can be found through the research questions (Cavana et al., 2000). Data collected from the web-based questionnaire adhered to the following coding scheme:

- Nominal data such as university location (Australian Capital Territory, New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria, and Western Australia) were coded as 1 through to 8 respectively.

- Ordinal data such as student’s familiarity with E-learning tools (very familiar, familiar, familiar, but no knowledge, and not familiar) were coded as 1, 2, 3 and 4 respectively.

- Ordinal data such as in Section B through H that asked the student’s overall reaction (ranging from Strongly Disagree to Strongly Agree in a seven-point scale) were coded 1 – 7 respectively. Another column (Don’t Know) were coded as 0.

- Blank responses or missing data were coded as 999.

3.7.3 Data Analysis

Data collected from the web-based questionnaire were analysed using two types of statistics, descriptive statistics and inferential statistics to help answer the research question.

3.7.3.1 Descriptive Statistics

Descriptive statistics describe numerical data. According to Argyrous (1996: 15), descriptive statistic can be described as “the numerical and graphical technique for organizing, presenting, and analysing data. …reducing a large set of data into a few statistics, or into some picture such as a graph or table”. This will result in a clear and concise summary of the research.
Frequency distribution an easy way to describe the numerical data of one variable (Neuman, 2003). The data can be represented in many common forms of graphic portrayal, including histogram, bar chart, and pie chart. Central tendency measures the centre of the frequency distribution through the mode, median and mean.

In this research, the researcher used descriptive statistic to describe the frequency distribution and the central tendency on the demographic data collected. This applied to all data collected on the location of the respondents university, their study duration in the respective university, the age range, their highest level of education, their computer level experience, the time duration used on the E-learning Systems and the number of units in which they are using E-learning Systems. Descriptive statistics were also applied to describe the respondent's familiarity with the E-learning Systems as well as the tools used in the E-learning Systems.

Also, descriptive statistics were used to describe the mean, standard deviation, median and Interquartile Range (IQR) for variables that influenced the students' satisfaction with Asynchronous E-learning Systems.

3.7.3.2 Inferential Statistic

Inferential statistics are statistics that help to establish relationships among variables and draw conclusion from them (Cavana et al., 2000). Neuman (2003: 356) explained that, inferential statistics use probability theory to test hypotheses formally, permit inferences from a sample to a population, and test whether descriptive results are likely to be due to random factors or to a real relationships". Cavana et al. (2000) explained that inferential statistics allow us to infer from data through analysis, (1) the relationship between two variables; (2) differences in a variable among different subgroups; and (3) how several independent variables might explain the variance in a dependent variable.

Prior to the testing of the hypotheses, the factors were tested for normal distribution. This is done to help determine the appropriate statistical test that could be used to test the hypotheses.
A factor analysis test was done on the original 31-item instrument. This test is known as a data reduction technique to reduce a large number of variables to a smaller set of underlying factors that summarizes the essential information contained in the variables (Coakes & Steed, 2003).

Spearman’s Rho correlation, a non-parametric test, was applied to the first six hypotheses. It was considered as the appropriate method to test the hypotheses because data were collected on an ordinal scale and the majority of the variables tested as having data that was not normally distributed. Other than that, Spearman’s Rho correlation would help in determining the direction as well as the significance of the bivariate relationship between the dependent variable and the independent variables. The dependent variable in this research was the satisfaction, while the independent variables were the factors that could influence the satisfaction with the Asynchronous E-learning Systems. These include Content, Learner Interface, Feedback and Assessment, Personalization, Learning Community and Access.

Spearman’s Rho correlation is known to be a Proportional Reduction in Error (PRE) measure of association. According to Argyrous (1996), the great advantage of PRE measures is that they have a direct interpretation since they measure something meaningful. Black (1993) suggested a terminology, Table 3.1 below, as a guide in describing the strength of the relationship for the hypotheses tested with Spearman’s Rho correlation in this research.

<table>
<thead>
<tr>
<th>Range (+/-)</th>
<th>Relative Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.2</td>
<td>Very weak, negligible relationship</td>
</tr>
<tr>
<td>0.2 - 0.4</td>
<td>Weak, low association</td>
</tr>
<tr>
<td>0.4 - 0.7</td>
<td>Moderate association</td>
</tr>
<tr>
<td>0.7 - 0.9</td>
<td>Strong, high, marked association</td>
</tr>
<tr>
<td>0.9 - 1.0</td>
<td>Very high, very strong relationship</td>
</tr>
</tbody>
</table>

(Source: Evaluating Social Science Research, Black 1993)
For the last hypothesis on the difference of satisfaction between the universities, the researcher conducted the Kruskal-Wallis H test. This test was used to compare the scores on a variable of more than two independent groups (Foster, 2001). Kruskal-Wallis H test compares rank sums for each sample being compared (Argyrous, 1996). This test allowed the researcher to examine possible differences in the satisfaction between the three universities in this research.

3.8 Chapter Summary
The quantitative approach was applied to this research. The instrument used in this research was partially adapted from Wang (2003) and other relevant literatures. A web-based questionnaire was created and placed on a secure server in the School of Information Systems, University of Tasmania. A pilot test was conducted prior to distributing the web-based questionnaire. The URL address to the web-based questionnaire was sent to the sample population (1079 students) through a third party, which were the Course Units Co-ordinator for an introductory Information Systems class in each university. A follow-up was done and another invitation to participate in this research were done to help increase response rate. Data collected were analysed using SPSS. Both descriptive and inferential statistics were applied to analyse data and test hypotheses.
Chapter 4: Analysis of Results

4.1 Introduction
This chapter will present the results from the analysis of data captured by the questionnaire administered in this research. The chapter begins with data cleaning, response rate and test of non-response rate bias. This is then followed by the descriptive analysis that reports on general information about the respondents and their use of the Asynchronous E-learning Systems. The reliability test was carried out on the sub-items in every factor. Other than that, inferential analyses were conducted to test the hypotheses explained in earlier chapters. Lastly, a summary of this chapter was included.

4.2 Data Cleaning
Data cleaning was conducted on the data collected from the respondents. Since the data could be downloaded directly into SPSS, the researcher found that some data had to be recoded in order to analyse the data at a later stage. Mod_Survey recognizes the option ‘Don’t Know’ as number 8. The researcher then recoded the number 8 to the number 0 by using the recode option in SPSS. This change is vital, since the researcher would not want to include the option ‘Don’t Know’ as one of the Likert-scale measurement. Data that were missing from the responses were replaced with ‘999’.

4.2.1 Data Recoding.
For Section G, Access, the data received was recoded to reverse the scoring in the items. All items in this section were asked in a negative note, while the other sections in the web-based questionnaire were asked in a positive note. An example of an item in Section G is, “The E-learning system is difficult to access”. The items are ranked on a 7-point Likert Scale, from 1 being ‘Strongly Disagree’ and 7 being ‘Strongly Agree’. In order to make section G consistent with the rest of the items in other sections, Section G is then recoded and the scoring were reversed, with 1 being ‘Strongly Agree’ and 7 being ‘Strongly Disagree’. This is conducted by using the Recode format option in SPSS.
4.3 Response Rate

The hyperlink to the web-based questionnaire was forwarded to 1079 students currently taking an introductory Information Systems course unit in the three universities. This was done through the Course Units Co-ordinators of each introductory Information Systems unit from the three universities. Therefore, it is important to note that the researcher relies heavily on the cooperation from these respective Course Unit Co-ordinators. Since the researcher depended on a third party to invite fellow participants to complete the web-based questionnaire, it is important to state that all three universities had slightly different initial invitation and follow-up reminder dates for the web-based questionnaire.

The researcher received 149 responses, 74 after the initial email of the web-based questionnaire and 75 after the follow-up reminder. For the University of Tasmania, the first invitation email was sent out on 29th March 2004, while the follow-up reminder email was sent out on 24th April 2004. The course unit co-ordinator of the University of Adelaide emailed the first invitation letter to participate in this research to his students on 30th March 2004, while his follow-up reminder email was sent out on 19th April 2004. The Course Unit Co-ordinators from the University of Melbourne, on the other hand, only managed to send out an invitation email to his students on 19th April 2004. He did not send a follow-up reminder email to the 136 students of the University of Melbourne. The overall response rate is therefore approximately 13.8%.

4.4 Test of Non-Response Bias

A test of non-response bias was conducted on the data received to establish the representativeness of the sample. The test was employed to investigate any differences between the group who returned the questionnaires and the group who did not return the questionnaire. Consequently, this analysis allowed a determination of whether results could be generalised to the non-respondents.

Table 4.1 shows the responses from both initial and follow-up reminder for all three universities. The University of Tasmania and the University of Adelaide included a follow-up reminder to its students while the University of Melbourne had only managed to send an initial invitation to participate in this research. It should be noted
that all course unit co-ordinator were emailed the instructions at the same time and follow-up telephone calls were made in order to ensure consistencies as far as possible. Therefore, all respondents from the University of Melbourne are treated as early responses. There were 32 early respondents and 50 late respondents from the University of Tasmania. For the University of Adelaide, there were 30 early respondents and 25 late respondents. And lastly, for the University of Melbourne, there are only 12 early respondents and no late respondents reported.

Table 4.1: Responses received based on Universities

<table>
<thead>
<tr>
<th></th>
<th>First Responses (early)</th>
<th>Follow-up Responses (late)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Tasmania</td>
<td>32</td>
<td>50</td>
<td>82</td>
</tr>
<tr>
<td>University of Adelaide</td>
<td>30</td>
<td>25</td>
<td>55</td>
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<tr>
<td>University of Melbourne</td>
<td>12</td>
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<tr>
<td>Total</td>
<td>74</td>
<td>75</td>
<td>149</td>
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</tbody>
</table>

Responses received in this research then had to be tested for any non-response bias. This is essential to the research since late respondents seem to have more characteristics in common with non-respondents than with early respondents. Therefore, statistical tests were conducted to determine whether the two groups, the early and late respondents, were independent. The distribution of the two groups was examined based on socio-economic variables collected, such as respondent’s university, the student duration of study in the universities, the respondent’s age range, and respondent’s computer experience level.

Table 4.2 shows the result of the Mann-Whitney test that were applied, based on the early and late responses received from the respondents. This test was employed to measure the independence of these two groups. It can be seen that p value was greater than 0.05 at a confidence level of 95% for the selected socio-economic variables; University (0.668), Study Duration (0.322), Age (0.647), and Computer Experience Level (0.580). Therefore, it can be said that there was no significance difference in respondent’s university, the student duration of study in the universities, the respondent’s age range, and respondent’s computer experience level. In
Conclusion, the early and late respondent groups were similar for these characteristics.

**Table 4.2: Mann-Whitney test for Non-Response Bias**

<table>
<thead>
<tr>
<th></th>
<th>University</th>
<th>Study Duration</th>
<th>Age</th>
<th>Comp. Exp. Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>2675.000</td>
<td>2592.500</td>
<td>2689.500</td>
<td>2659.000</td>
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<tr>
<td>Wilcoxon W</td>
<td>5525.000</td>
<td>5367.500</td>
<td>5464.500</td>
<td>5509.000</td>
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<tr>
<td>Z</td>
<td>-.429</td>
<td>-.990</td>
<td>-.458</td>
<td>-.553</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.668</td>
<td>.322</td>
<td>.647</td>
<td>.580</td>
</tr>
</tbody>
</table>

Note - Grouping Variable: Return date
- N=149

The two groups (late and early respondents) were then measured to determine whether they had the same distribution by using the Kolmogorov-Smirnov Z test at a 95% confidence level. The results show in Table 4.3 that the significance value, p, was greater than 0.05, with University at 0.281, Study Duration at 0.978 and both Age and Computer Experience level at 1.000. Therefore, it can be concluded that the early and the late respondents have no significant difference based on distributions.

**Table 4.3: Kolmogorov-Smirnov Z test for Distribution**

<table>
<thead>
<tr>
<th></th>
<th>University</th>
<th>Study Duration</th>
<th>Age</th>
<th>Comp. Exp. Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolmogorov-Smirnov Z</td>
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<td>.475</td>
<td>.235</td>
<td>.249</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.281</td>
<td>.978</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note - Grouping Variable: Return date
- N=149

Based on the two tests conducted above, the researcher can assume that there is no response bias between the early and late response group. It can then be concluded that the data from both groups could be pooled and results are then reported on a single population.
4.5 Analysis of Data

4.5.1 Descriptive Analysis of General Information

This section focused on descriptive statistics of the general information related to the responses received. This is based on Section A of the web-based questionnaire. The main objective of this section is to build a profile of the respondents that have participated in this research and their familiarity with Asynchronous E-learning Systems. This section covers the following information:

- Distribution of respondents by Universities,
- Respondents' length of study,
- Age range of respondents,
- Educational background of respondents,
- Respondents' level of computer experience,
- The use of E-learning Systems in respondents' first year course units,
- The extent of use of the E-learning Systems in respondents' first year course units,
- Number of respondents first year course units employing Asynchronous E-learning Systems,
- Respondents' familiarity with asynchronous electronic learning tools (this include university electronic email, online course notes, discussion boards, text file sharing, streaming audio, streaming video, narrated slideshows, shared calendars, and website links),
- Respondents' familiarity with different types E-learning Systems (this include WebCT (Vista), Blackboard, Lotus Learning Space, Topclass, QM Perception, Smartforce, and in-house systems used in respective universities).
4.5.1.1 Distribution Of Respondents By Universities

The total number of responses received was representative of the three universities in this research. Figure 4.1 below set out the distribution of the respondents based on their universities. The University of Tasmania was represented by slightly more than half of the percentage (55%) of the 149 students that responded to the web-based questionnaire. This is followed by University of Adelaide, with 37% and lastly, University of Melbourne, with 8%.

![Pie chart showing distribution of respondents by universities]

Figure 4.1: Distributions of Respondents by Universities

4.5.1.2 Respondents Length Of Study In Universities

Figure 4.2 represents the distribution of respondents’ length of study in their respective universities. The majority of the 149 students had only been in their universities for less then one year (79%). There were 9% of the responses that have been in their universities for at least one year and 6% for at least two years. Lastly, there are 3% respectively that have been studying in their Universities, for both at least three years and at least four years.
4.5.1.3 Age Range Of Respondents

Figure 4.3 represents the distribution of percentages of the age range of the respondents in this research. There were 149 students that answered this question. Respondents within the age range of 18 years old to 25 years old had the highest percentage, which is 80%. There were 8% of the responses were 17 years old or below. There were 7% of the responses within the age range of 26 years old to 35 years old, and lastly 5% were between the age range of 36 years old to 45 years old. There were no responses within the age range of 46 years old and above.
4.5.1.4 Respondents Education Background

Figure 4.4 below represents the highest education background of the respondents in this research. This question was answered by a total of 149 students. The highest percentage, 57% consists of graduates from Secondary Colleges, which included TAFE College. There were 34% of the responses that entered the universities after high schools. Lastly, 9% of the responses have completed at least an undergraduate course. No respondents reported any level of education higher than the mentioned above.

N=149

Figure 4.4: Respondents Education Background

4.5.1.5 Respondents Level Of Computer Experience

Figure 4.5 represents the Level of Computer Experience of the respondents. This question was answered by a total of 149 students. The majority of the respondents (71%) described themselves having an intermediate level of computer experience. There were 17% of the respondents that depicted themselves as advanced users. Another 9% of the respondents described themselves as novice, with regards to computer experience while 3% of the respondents depicted themselves as expert.
4.5.1.6 Usage Of E-learning Systems In First Year Course Units

Figure 4.6 represents the percentage of the respondents that used E-learning Systems in their first year courses. There were 149 students that provided an answer to this question. The majority of the respondents (95%) answered that they do use an E-learning system in their first year courses. Approximately 5% of the respondents answered No or Not Sure, when asked if they used an E-learning system in their first year courses.

Figure 4.5: Respondents Level of Computer Experience

Figure 4.6: Usage of E-learning Systems in First Year Course Units
4.5.1.7 Extent of Use of the E-learning Systems in First Year Course Units

Figure 4.7 represents the extent of the use of the E-learning Systems in first year courses. This question was answered by a total of 142 students. The majority of the respondents (56%) answered that they used the E-learning Systems less than one hour a day. 37% of the respondents reported using the E-learning Systems between one to two hours a day. Only 5% reported using the E-learning Systems between two to three hours a day. Lastly, 2% of the respondents answered that they almost never used the E-learning system.

![Figure 4.7: Extent of Use of the E-learning Systems in First Year Course Units]

4.5.1.8 Number of First Year Course Units Using E-learning Systems

Figure 4.8 represents, the number of the respondents first year course units that use E-learning Systems. There were 142 students that replied to this question. The highest percentage, 43%, reported using the E-learning system in four of their first year course units. The second highest, 20% of the respondents reported using the E-learning system in three of their first year course units. Another 17% of the respondents reported using the E-learning system in two of their first year course units. Around 8% was reported for both students using E-learning system in one and also five or more first year course units respectively. Lastly, 4% of the respondents reported not using the E-learning system in any of their first year course units.
Analysis of Results

![Pie Chart: Number of First Year Course Units Using E-learning Systems]

N=142

Figure 4.8: Number of First Year Course Units Using E-learning Systems

4.5.1.9 Familiarity Of Asynchronous E-learning Tools

As revealed in Figure 4.9, 24.1% of the respondents were very familiar, with an extensive knowledge, of their university’s electronic email, while a majority of the respondents (68.1%) reported that they were familiar, with a good knowledge. 7.8% of the respondents reported that they were familiar, but with no knowledge of electronic email, while no respondents reported of having no familiarity or knowledge with electronic email. As for online course notes, 29.1% of the respondents reported being familiar, having an extensive knowledge, while a majority of the respondents (60.3%) reported that they are familiar, with good knowledge. 9.2% reported that they are familiar, but with no knowledge, while 1.4% reported that they were not familiar at all with online course notes.

As for discussion boards, the majority of the respondents (36.9%) reported that they are familiar, with good knowledge of this E-learning tool. Interestingly, 35.5% of the respondents also reported that they are familiar with discussion boards, but have no knowledge of this tool. As for text file sharing, the majority of the respondents reported having no knowledge or familiarity with this tool (37.6%), while both familiar, with good knowledge and familiar with no knowledge shared the same percentage of 27.0%. Narrated slideshows had similar results with text file sharing, with the majority of the respondents (32.6%) having no knowledge or familiarity with this E-learning tool. Lastly, 29.1% reported that they are familiar, with good
knowledge of the narrated slideshows, while 29.8% reported that they are familiar, with no knowledge with this tool.

The largest proportion of respondents (39.0%) reported that they are not familiar with shared calendars. This is followed by 35.8% of the respondents reporting being familiar but have no knowledge of this tool and 22.7% reported that they are familiar with good knowledge when it comes to shared calendars. Respondents reported a percentage of 31.2% for being familiar with extensive knowledge of website links provided by the E-learning Systems. The majority of them (50.4%) reported that they are familiar with good knowledge of this tool. 15.6% of the respondents reported that they are familiar with no further knowledge with this tool and 2.8% respondents reported having no knowledge or familiarity of website links provided by the E-learning Systems.

![Figure 4.9: Respondents’ Familiarity with the Asynchronous E-learning Tools](image-url)
4.5.1.10 Familiarity With Various Types Of E-learning Systems

Figure 4.10 shows the view of the respondents' familiarity with different types of electronic learning systems. The majority of the respondents reported not having any familiarity with the following E-learning Systems; Lotus Learning Space (76.4%), Topclass (82.9%), QM Perception (81.4%), and Smartforce (82.7%).

For WebCT (Vista) and in-house systems, the response on the familiarity of these E-learning Systems varies. Therefore, the researcher decided further scrutiny was needed. These systems were further analysed according to the specific systems used by each university. As explained in earlier chapters, students from the University of Tasmania used WebCT (Vista), while the University of Adelaide students used another commercial Learning Management System, Blackboard, but known as MyUni and the University of Melbourne students also used an in-house system known as WebRAFT.

![E-learning Systems](image)

Figure 4.10: Respondents familiarity with various types of E-learning systems
Figure 4.11 represents the students of the University of Tasmania familiarity with WebCT, the E-learning system used in this university. Based on the 78 responses received from University of Tasmania, 28.2% of the respondents reported with being very familiar, with extensive knowledge with WebCT (Vista). There were 62.8% of the respondents reported with being familiar, with good knowledge with WebCT (Vista). This is followed by 6.4% of the respondents reported with being familiar, with no knowledge of WebCT (Vista), and lastly 2.6% reported of having no familiar knowledge of WebCT (Vista) at all.

![Familiarity Chart](image)

Figure 4.11: University of Tasmania respondents about familiarity and knowledge with WebCT (Vista)

The Figure 4.12 represents respondents from the University of Adelaide’s familiarity and knowledge with MyUni, a system that used Blackboard as its platform for teaching and learning. Out of the 52 respondents that responded, 55.8% of them reported being familiar with the system, with good knowledge. A percentage of 23.1% of the respondents reported of being very familiar with the system, with extensive knowledge. Another 17.3% stated that they are familiar but have no knowledge with the MyUni system. Lastly, 3.8% of the respondents indicated that they are not familiar with the system at all.
Figure 4.12: University of Adelaide respondents about familiarity and knowledge with MyUni

Figure 4.13 represents the University of Melbourne respondents' familiarity and knowledge with their in-house system, WebRAFT. The Majority of them (63.6%) stated that they were familiar and had good knowledge with WebRAFT. There were 18.2% of the respondents reported with being very familiar, with extensive knowledge of the E-learning system. Only 9.1% of the respondents reported with being familiar, but with no knowledge of WebRAFT, and another 9.1% of the respondents reported not being familiar at all with this E-learning system.

Figure 4.13: University of Melbourne respondents about familiarity and knowledge with WebRAFT.
4.5.2 Factor Analysis Test

A factor analysis test was conducted on the original 31-item instrument (excluding the 3 items in satisfaction) before any other further data analysis was conducted on the data. Factor analysis is a data reduction technique used to reduce a large number of variables to a smaller set of underlying factors that summarizes the essential information contained in the variables (Coakes and Steed, 2003). Wang (2003) in his previous paper had conducted a factor analysis based on his 24-item instrument. The researcher decided to conduct this test since some additional items were included in this research as a result of the literature review. Other than that, the previous study was conducted in an organisational learning setting and in a different country, and therefore the items may have also varied between both studies, hence an analysis was undertaken.

There are a few assumptions that need to be considered before attempting a factor analysis test. Firstly, the number of respondents should be no less than 100 (Foster, 2001; Coakes and Steed, 2003). The researcher received 149 respondents for this research. Next, there should be at least twice as many respondents as variables (Foster, 2001). Foster (2001) explained that both the number of respondents and the ratio of respondents to variables should be as large as possible. There was 31 items or variables that were considered in this research, which brings a factor of 4.8 respondents to one variable. Lastly, the respondents should be heterogeneous on the abilities or measures being studied (Foster, 2001).

This test followed the decision rules applied by Wang (2003) with his original 24-item instrument. Below are the decision rules:

- The principal components factor analysis is applied as the extraction technique,
- Varimax is applied as the orthogonal rotation method,
- A minimum eigenvalue of 1 is applied as a cut-off value for extraction
- Factor loadings less than 0.5 or greater than 0.5 on two or more factors are deleted
- A simple factor structure
- Exclusion of single factors from the standpoint of parsimony.
The factor analysis test that was undertaken by the researcher reported that the Bartlett test of sphericity was significant at a value of 1009.419, with a significance level of 0.000. The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.839, which is far greater than 0.6. This suggested that the intercorrelation matrix contained sufficient common variance to make factor analysis worthwhile (Coakes and Steed, 2003; Wang, 2003). Table 4.4 showed the 25-item instrument that was extracted by using the factor analysis test. From the original 31-item instrument, factor analysis test managed to reduce the instrument to 25 items. The factor analysis test confirmed that there are seven components that can be extracted. It confirms that feedback and assessment, personalization, learning community, learner interface, content and access are factors in this instrument. The factor analysis test had also generated two sets for Access, bringing to mind that Access will now be considered as two different factors, Access (1) and Access (2). The 25 items used below were then taken into consideration for the remainder of the data analysis in this research. The details of the factor analysis test were also attached in Appendix D.
Table 4.4: Factor Analysis – 25-Item Instrument

<table>
<thead>
<tr>
<th>Items Number</th>
<th>Feedback &amp; Assessment</th>
<th>Learning Community</th>
<th>Learner Interface</th>
<th>Content</th>
<th>Personalization</th>
<th>Access (1)</th>
<th>Access (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>304</td>
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</table>

Table 4.5 is a summary of the 25-item instrument obtained from the factor analysis test. The table summarized the number of items listed in each factors influenced the students’ satisfaction with Asynchronous E-learning Systems.

Table 4.5: Summary Of The 25–Item Instrument

<table>
<thead>
<tr>
<th>Variables</th>
<th>Question Numbers</th>
<th>Number of items</th>
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</thead>
<tbody>
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<td>Content</td>
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</tr>
<tr>
<td>Learner Interface</td>
<td>Q3 – Q5, in section C</td>
<td>3</td>
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<tr>
<td>Feedback and Assessment</td>
<td>Q2 – Q6, in section D</td>
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<td>Personalization</td>
<td>Q3 – Q6, in section E</td>
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<tr>
<td>Learning Community</td>
<td>Q1 – Q4, in section F</td>
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<td>Access (2)</td>
<td>Q4 – Q6, in section G</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>25</strong></td>
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</table>
4.5.3 Reliability Tests

Before further data analysis was conducted, a data reliability test must be undertaken. Reliability refers to the consistency of the results (Foster, 2001). Cavana et al. (2000) explained that reliability of measures indicates the extent to which the measure is without bias and hence offers consistent measurement across time and across the various items in the instrument. The Cronbach's Alpha model is used in this research to test reliability across items group based on factors.

Table 4.6 below shows the reliability of items that were grouped into factor based on the previous factor analysis test. According to Cavana et al. (2000), reliabilities of less than 0.60 are generally considered poor. Foster (2001) explained that tests should not be below 0.70. Based on the results in Table 4.8, all the factors are reliable since all of them are above 0.70, including satisfaction. However, for Access (2), the Cronbach's Alpha reliability reported is 0.000 for all three items. This factor (Access (2)) is therefore dropped from further analysis in this research. As a result, there are now only 22 items with another 3 items on overall satisfaction to be considered. The rest of the statistical tests will only consider Content, Learner Interface, Feedback and Assessment, Personalization, Learning Community and Access (1) as factors or variables effecting student's satisfaction with Asynchronous E-learning Systems. Access (1) is considered as only Access throughout the rest of the data analysis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N of items</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Community</td>
<td>3</td>
<td>0.8936</td>
</tr>
<tr>
<td>Feedback and Assessment</td>
<td>5</td>
<td>0.8870</td>
</tr>
<tr>
<td>Learner Interface</td>
<td>3</td>
<td>0.8758</td>
</tr>
<tr>
<td>Personalization</td>
<td>4</td>
<td>0.8695</td>
</tr>
<tr>
<td>Content</td>
<td>3</td>
<td>0.8055</td>
</tr>
<tr>
<td>Access</td>
<td>3</td>
<td>0.7115</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>3</td>
<td>0.9082</td>
</tr>
</tbody>
</table>
4.5.4 Normality Tests

Prior to testing the proposed hypotheses, the seven variables, including Overall Satisfaction, were tested for normal distribution by using the Kolmogorov-Smirnov normality distribution tests. The assumption of normality is a prerequisite for many inferential statistical techniques (Coakes and Steed, 2003). Table 4.7 shows the Kolmogorov-Smirnov and Shapiro-Wilk normality distribution tests that were applied to all seven variables. The Shapiro-Wilk test was displayed if there were less than 50 cases. According to the results from the Kolmogorov-Smirnov test, four (Content, Feedback and Assessment, Personalization and Learning Community) out of the seven variables reported having normal distributions. However, from the Shapiro-Wilk test, only one variable (Feedback and Assessment), was reported having a normal distribution. As well, another issue to consider is that these variables are measured on an ordinal scale. Foster (2001, p. 7) explained that data measured by ordinal scale should select non-parametric tests. Therefore, all proposed hypotheses were tested using non-parametric tests.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>Content</td>
<td>0.118</td>
<td>48</td>
</tr>
<tr>
<td>Learner Interface</td>
<td>0.129</td>
<td>48</td>
</tr>
<tr>
<td>Feedback and Assessment</td>
<td>0.092</td>
<td>48</td>
</tr>
<tr>
<td>Personalization</td>
<td>0.113</td>
<td>48</td>
</tr>
<tr>
<td>Learning Community</td>
<td>0.124</td>
<td>48</td>
</tr>
<tr>
<td>Access</td>
<td>0.152</td>
<td>48</td>
</tr>
<tr>
<td>Overall Satisfaction</td>
<td>0.209</td>
<td>48</td>
</tr>
</tbody>
</table>

* This is a lower bound of the true significance.
4.5.5 **Descriptive Analysis Of Variables Affecting The Students’ Level Of Satisfaction**

The level of satisfaction with Asynchronous E-learning Systems (dependent variable) was identified along with six factors (independent variables) using a 7-point Likert scale, where 1 represents the highest dissatisfaction and 7 represents the highest satisfaction and 4 indicates neutral. Table 4.8 shows the mean, standard deviation, median and the IQR for all variables with its items that were taken into consideration.

The Content factor reported the highest overall mean, 5.47 with a standard deviation of 0.95. This is followed by the Learner Interface factor, reporting an overall mean of 5.17 and a standard deviation of 1.13. The Feedback and Assessment factor had an overall mean of 5.05 and a standard deviation of 1.02. The Learning Community factor reported a mean of 4.91 and a standard deviation of 1.11. This was followed by the Access factor, which reported an overall mean of 3.86 and a standard deviation of 1.34. Lastly, the Personalization factor reported an overall 4.74 mean value and a standard deviation of 1.05. Satisfaction reported an overall 5.25 mean value, with a 1.12 standard deviation.

The Content factor is reported to have the highest median, of a 5.67 and an IQR value of 1.67. This is followed by the Learner Interface factor, reporting a median of 5.00 and an IQR value of 1.67. Next was the Feedback and Assessment factor, which reported a median of 5.00 and an IQR value of 1.50. The Learning Community and Access factor both have a median of 5.00 with an IQR value of a 1.50. The Personalization factor reported the lowest median, 4.75 and an IQR value of 1.50. Satisfaction had a median of 5.00 with an IQR value of 1.33.

All of the items from each variable that was considered in this research were also reported in Table 4.8. It is important that some of the means and medians of the items from each variable reported notable differences in the opinions of the respondents.
### Analysis of Results

Table 4.8: Mean, Standard Deviation, Median and Interquartile Range of Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>IQR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content (3 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- provides content exactly to needs</td>
<td>5.22</td>
<td>1.23</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- provides useful content</td>
<td>5.81</td>
<td>1.02</td>
<td>6.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- provides up-to-date content</td>
<td>5.38</td>
<td>1.12</td>
<td>5.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Overall (after items are averaged out)</td>
<td>136</td>
<td>5.47</td>
<td>0.95</td>
<td>5.67</td>
<td>1.67</td>
</tr>
<tr>
<td><strong>Learner Interface (3 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- content provided is stable</td>
<td>5.19</td>
<td>1.20</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- ELS is user-friendly</td>
<td>5.32</td>
<td>1.23</td>
<td>5.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>- operation of ELS is stable</td>
<td>5.02</td>
<td>1.35</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>Overall (after items are averaged out)</td>
<td>133</td>
<td>5.17</td>
<td>1.13</td>
<td>5.00</td>
<td>1.67</td>
</tr>
<tr>
<td><strong>Feedback and Assessment (5 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ease of evaluating my learning performance</td>
<td>4.99</td>
<td>1.39</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- ease of understanding testing methods</td>
<td>5.16</td>
<td>1.16</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- testing methods are fair</td>
<td>5.05</td>
<td>1.12</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- provides secure testing environments</td>
<td>4.95</td>
<td>1.27</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- provides testing results promptly</td>
<td>5.14</td>
<td>1.20</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>Overall (after items are averaged out)</td>
<td>111</td>
<td>5.05</td>
<td>1.02</td>
<td>5.00</td>
<td>1.60</td>
</tr>
<tr>
<td><strong>Learning Community (4 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ease of discussing questions with lecturer/tutors</td>
<td>4.95</td>
<td>1.30</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- ease of discussing questions with other students</td>
<td>4.95</td>
<td>1.27</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- ease of sharing information with others</td>
<td>4.78</td>
<td>1.28</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- ease of accessing information from others</td>
<td>4.98</td>
<td>1.28</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>Overall (after items are averaged out)</td>
<td>112</td>
<td>4.91</td>
<td>1.11</td>
<td>5.00</td>
<td>1.50</td>
</tr>
<tr>
<td><strong>Access (3 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ease of access to ELS</td>
<td>5.22</td>
<td>1.46</td>
<td>5.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>- speed of access to ELS from University</td>
<td>5.00</td>
<td>1.74</td>
<td>5.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>- speed of access to ELS from home</td>
<td>4.36</td>
<td>1.84</td>
<td>5.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Overall (after items are averaged out)</td>
<td>77</td>
<td>4.86</td>
<td>1.34</td>
<td>5.00</td>
<td>1.50</td>
</tr>
<tr>
<td><strong>Personalization (4 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- freedom of learning choice</td>
<td>4.91</td>
<td>1.27</td>
<td>5.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>- ELS records learning process</td>
<td>4.75</td>
<td>1.27</td>
<td>5.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>- ELS records learning performance</td>
<td>4.80</td>
<td>1.24</td>
<td>5.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>- ELS provides personalized learning support</td>
<td>4.50</td>
<td>1.21</td>
<td>5.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Overall (after items are averaged out)</td>
<td>103</td>
<td>4.74</td>
<td>1.05</td>
<td>4.75</td>
<td>1.50</td>
</tr>
</tbody>
</table>

Scale: 1 (Strongly Disagree) – 7 (Strongly Agree)
4.5.6 Hypotheses Testing

This section presents the analysis of the 7 proposed hypotheses from Chapter One. Since the variables differ from a normal distribution, non-parametric tests were used to test the hypotheses. The first six hypotheses were tested using bivariate correlation tests, where the Spearman’s Rho correlation is reported. Spearman’s Rho correlation is a non-parametric test, which was used to examine the relationship between two variables. The six null and alternative hypotheses, as outlined below, were tested using bivariate correlation.

Hypothesis 1

H₀₁: Students’ satisfaction with Asynchronous E-learning Systems is not related to the content provided through the E-learning Systems.

H₁₁: Students’ satisfaction with Asynchronous E-learning Systems is related to the content provided through the E-learning System.

Table 4.9: Spearman Rho’s Correlation between Content and Satisfaction

<table>
<thead>
<tr>
<th>Coefficient Correlation</th>
<th>0.666</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>Direction</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Note: - Correlation is significant at the 0.01 level (2-tailed)
- N = 132

After applying the Spearman Rho’s correlation test, the p value (0.000) at the 99% confidence level, as shown in Table 4.9. Furthermore, the coefficient correlation, \( r \) value = 0.666. Based on the PRE value terminology from Table 3-1, this indicates that Content has a moderately positive relationship with students’ satisfaction. Therefore the null hypothesis is rejected and the alternative hypothesis is accepted. In conclusion, there is a significant positive relationship between students’ satisfaction and Content provided by the Asynchronous E-learning Systems.
**Hypothesis 2**

**H₀₂**: Students’ satisfaction with Asynchronous E-learning Systems is not related to the learner interface displayed by the E-learning Systems.

**H₁₂**: Students’ satisfaction with Asynchronous E-learning Systems is related to the learner interface displayed by the E-learning Systems.

Table 4.10: Spearman Rho’s Correlation between Learner Interface and Satisfaction

<table>
<thead>
<tr>
<th>Coefficient Correlation</th>
<th>0.610</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>Direction</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Note: - Correlation is significant at the 0.01 level (2-tailed)
- N = 133

As Table 4.10 revealed, the *p* value (0.000) indicates that it is smaller than 0.01 at a 99% confidence level. The *r* value is reported at 0.610, which indicates that there is a moderately positive relationship between Learner Interface and students’ satisfaction, when referred to the PRE value terminology Table. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. It is concluded that there is a significant statistical relationship between students’ satisfaction and the Learner Interface that is provided by the Asynchronous E-learning Systems.
Hypothesis 3

**H₀₃:** Students' satisfaction with Asynchronous E-learning Systems is not related to the feedback and assessment provided through the e-learning Systems.

**Hₐ₃:** Students' satisfaction with Asynchronous E-learning Systems is related to the feedback and assessment provided through the E-learning Systems.

Table 4.11: Spearman Rho's Correlation between Feedback and Assessment and Satisfaction

<table>
<thead>
<tr>
<th>Coefficient Correlation</th>
<th>0.641</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>Direction</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Note: - Correlation is significant at the 0.01 level (2-tailed)
- N = 109

Table 4.11 reported a p value of 0.000 at a 99% confidence level. This indicated that the null hypothesis is rejected while the alternative hypothesis is accepted. Furthermore the r value is 0.641 and is significant at the 0.01 level. This shows that Feedback and Assessment has a moderately positive relationship with the students' satisfaction when referred to the PRE value terminology Table in Chapter Three.
Hypothesis 4

**H₀₄**: Students' satisfaction with Asynchronous E-learning Systems is not related to the personalization option provided through the E-learning Systems.

**H₄₄**: Students' satisfaction with Asynchronous E-learning Systems is related to the personalization option provided through the E-learning Systems.

Table 4.12: Spearman Rho’s Correlation between Personalization and Satisfaction

<table>
<thead>
<tr>
<th>Coefficient Correlation</th>
<th>0.608</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>Direction</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Note: - Correlation is significant at the 0.01 level (2-tailed)
- N = 103

As showed in Table 4.12, the *p* value (0.000) is smaller than 0.01 at the 99% confidence level. The coefficient correlation value (0.608) is reported, based on the PRE value terminology, of having a moderately positive relationship between Personalization and the students' satisfaction. All of this indicates that the null hypothesis is rejected and the alternative hypothesis is accepted. In conclusion, there is a significant statistical relationship between students' satisfaction and Personalization in the Asynchronous E-learning Systems.
Hypothesis 5

H₀₅: Students’ satisfaction with Asynchronous E-learning Systems is not related to the learning community provided by the E-learning System.

H₅: Students’ satisfaction with Asynchronous E-learning Systems is related to the learning community provided by the E-learning System.

Table 4.13: Spearman Rho’s Correlation between Learning Community and Satisfaction

<table>
<thead>
<tr>
<th>Coefficient Correlation</th>
<th>0.661</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>Direction</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Note: - Correlation is significant at the 0.01 level (2-tailed)
- N = 112

The Spearman Rho’s test indicated that the p value (0.000) is smaller than 0.01 at the 99% confidence level, as shown in Table 4.13. Therefore, the null hypothesis is rejected while the alternative hypothesis is accepted. Furthermore, the r value is reported at 0.661. Based on the PRE value terminology in Table 3-1, this indicates that there is a moderately positive relationship between Learning Community and the students’ satisfaction with the Asynchronous E-learning Systems.
Hypothesis 6

H⁰₆: Students’ satisfaction with Asynchronous E-learning Systems is not related to gaining access to the E-learning System.

H₆: Students’ satisfaction with Asynchronous E-learning Systems is related to gaining access to the E-learning System.

Table 4.14: Spearman Rho’s Correlation between Access and Satisfaction

<table>
<thead>
<tr>
<th>Coefficient Correlation</th>
<th>0.292</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (2-tailed)</td>
<td>0.010</td>
</tr>
<tr>
<td>Direction</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Note: - Correlation is significant at the 0.05 level (2-tailed)
- N = 77

After employing the Spearman Rho’s correlation test as shown in Table 4.14, it was revealed that the p value (0.10) was below 0.05 at the 95% confidence level. It was concluded that there is a low positive relationship between Access and the students’ satisfaction, based on the PRE value terminology in Table 3.1. It can then be said that the null hypothesis is rejected while the alternative hypothesis is accepted.

Table 4.15 summarised the relationship of the variables in the six hypotheses. The Spearman’s Rho correlation is reported, along with the direction of the relationship. Overall, the six null hypotheses were rejected as the p values are lower than 0.05. Therefore, all the six alternative hypotheses were accepted. All hypotheses reported a positive direction. This means that a positive association or relationship exists between both independent and dependent variables. A movement along the scale of a variable in one direction is associated with a movement in the same direction along the scale of the other variable (Argyrous, 1996). Interestingly enough, the correlation coefficient, r, differs from each independent variable. Content reported having the highest correlation coefficient value (r = 0.666) while Access reported the smallest value (r = 0.292).
As for the last hypothesis, the researcher wanted to test the difference of the students' satisfaction with the Asynchronous E-learning Systems between the three universities. A Kruskal-Wallis H test was used to test the seventh hypothesis, since this test allows the researcher to compare the scores on a variable of more than two independent groups. Below is the hypothesis that was tested using the Kruskal-Wallis H test.

### Hypothesis 7

**H₇:** There is no difference in the students' satisfaction with asynchronous E-learning Systems between the three universities.

**H₇:** There is a difference in the students' satisfaction with asynchronous E-learning Systems between the three universities.

Table 4.16: Kruskal-Wallis H test – Differences in the Students Satisfaction between the Three Universities

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Chi-Square</th>
<th>df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.373</td>
<td>2</td>
<td>.503</td>
</tr>
</tbody>
</table>

Note: - Kruskal Wallis Test
- Grouping Variable: University
Table 4.16 summarised the findings for the seventh hypothesis. The significance level was 0.503. Therefore, the alternative hypothesis is rejected and the null hypothesis is accepted. An examination of the chi-square value, which has been corrected for ties, indicates the test is not significant since $p>0.05$. This shows that there is no significant difference in the students' satisfaction with Asynchronous E-learning Systems between the three universities. In other words, respondents from all three universities found that overall, they are satisfied with the Asynchronous E-learning Systems used in each respective university.

Figure 4.14: Boxplot of Students' Satisfaction based on Different Universities

Figure 4.11 is a Boxplot that displays the students' satisfaction based on the three Universities that had participated in this research. Each box shows the median, quartiles, and extreme values within each university. It can be seen that only a few found that they were dissatisfied with the Asynchronous E-learning Systems. The majority of the students seem to find that they are somewhat satisfied with the Asynchronous E-learning Systems used in their course units.
4.6 Chapter Summary

This research received a 13.8% response rate and based on the non-response bias test, all data can be pooled and represent the whole population in this research. Both descriptive and inferential statistics were employed to analyse the data by using SPSS. A factor analysis test was conducted to confirm the items and variables that are found to be important and related to this research, based on the response received. Reliability tests using Cronbach’s Alpha were also conducted on the variables extracted after the factor analysis test. A normality test, using the Kolmogorov- Smirnov test concluded that the data collected were not normal and therefore non-parametric test were applied to test the hypotheses. These tests include Spearman Rho’s correlation test and Kruskal-Wallis SH test. It was concluded, through the Spearman Rho’s correlation test that the strongest relationship with overall satisfaction was Content, followed by Learning Community, Feedback and Assessment, Learner Interface and Personalization, while the lowest was Access. The Kruskal-Wallis H test confirmed that there is no statistical difference between the levels of satisfaction with the Asynchronous E-learning Systems between the three universities.
Chapter 5: Discussion and Conclusion

5.1 Introduction
This chapter provides a discussion of the analysis of the results as well as drawing conclusions. This chapter will discuss the response rate, the general information collected through the web-based questionnaire as well as the hypotheses test results. A conclusion is drawn from the discussion. Limitations in this research were also discussed in this chapter. The final section will present future research work in the area of students' satisfaction with asynchronous E-learning systems.

5.2 Response Rate and Reliability
This research used a web-based questionnaire to collect data for the analysis. This research managed to reached a response rate of 13.8%. Previous studies (Couper et al., 1999; Klassen and Jacobs, 2001; Schaefer and Dillman, 1998) reported that web response rates can be expected to be approximately half of the other data collection methodologies, such as mail or telephone surveys. Dillman (2000) however explained that it is expected that the responses to web-based questionnaires are closer to those observed for mail questionnaire than those observed for interview surveys. Green, Medlin, and Medlin (2001) in their research in Strategic Management using web surveys managed to gain a response rate of 8.5% while Klassen and Jacobs (2001) reached a 14% response rate on their research of comparison studies of data collection methodologies. Liu, Arnett, Capella and Taylor (2001) also reported response rates of 5% and 18% in their web-based survey on webmasters. All of the results mentioned above suggested that response rate may vary dramatically and may be quite low. It is important to remember that in this research, the course unit co-ordinator from University of Melbourne did not send out a follow-up invitation and this indirectly affected the response rate achieved.

Bauman, Airey and Atak (1998) indicated that most potential respondents would complete and return the web-based surveys within 1-2 days, or not at all. The researcher found that this true, since the researcher received most of the response between the first three days from the time the population group received an invitation
email to participate in this research. The researcher also made a decision to include all the potential sample population from the three Universities, to maximise validity.

Early and late respondents were tested for non-response bias, and found that there were no differences between the groups. Therefore, these two groups of data can be pooled together and the rest of the data analysis was reported on a single population. Apart from this, reliability tests were conducted on the items used in the web-based questionnaire. It is found that all seven variables used in this research have a Cronbach's Alpha higher than 0.7, which is the acceptable level recommended by Cavana (2000) and Foster (2001).

5.3 Discussion of Findings

In this section, findings from Chapter Four are discussed in detail. Firstly, findings from the general information section of the web-based questionnaire are reviewed. This is followed by a discussion on the variables that may have influenced the students' overall satisfaction with Asynchronous E-learning Systems.

5.3.1 General Information of the Respondents

From the data analysis in Chapter Four, it was found that University of Tasmania had the highest amount of respondents while University of Melbourne had the lowest amount of respondents participating in this research. This is mainly because the number of targeted students from University of Melbourne was small compared to the other two universities participating in this research. Other than that, the course unit co-ordinator from University of Melbourne had decided not to include a follow-up email invitation to encourage the students to participate in this research. To some extent, this has an effect when testing some of the hypotheses, especially the seventh hypothesis. This hypothesis sought to find the difference of the level of students' satisfaction between these three universities. Having said that, it is also important to note that there was no response bias in the socio-economic data collected. Therefore, all the data could be pooled together to be reported in a single group for the rest of the data analysis.

The majority of the students that responded in this research were between the age range of 18 to 25 years old for all three universities. Also, these students have been
Discussion and Conclusion

studying in their current institution for less than a year. Other than that, they were admitted to their current university directly from secondary colleges and also from high schools (it is important to note that local students from high school in South Australia goes through a year 7 to 12 experience). Another interesting fact was the majority of the respondents, that is 71% of the students, classified themselves as having an intermediate level of computer experience (as compared to advance or expert users). These findings were similar to Lim and Lee's (2000) research on IT skills of university undergraduate students enrolled in a first year unit. They found that most first year students that responded to their research have some reasonable computer skills at the start of their university studies. However the level of skill is not uniformly high. Nevertheless, the findings were slightly different from the research conducted by Meredyth et al. (2000). They found that a high percentage of students from Australian high schools perceived themselves as having 'expert computer skills', supporting the assumption that all school leavers would be highly computer literate.

It is also reported that the 56% of the students confirmed that they use the E-learning Systems less than an hour a day. This indicates, to a certain level, that the students rely on the systems, and based on their familiarity of the tools, these students might be referring to the E-learning Systems to check their e-mail, download online course notes and even update themselves with news from their lecturers. Also, most of the students reported using the E-learning Systems for four course units in their universities. This could also contribute to the reason why the students might be using the systems, for less than one hour a day.

The majority of the students that responded reported being familiar, with a good knowledge with Asynchronous E-learning tools such as University’s electronic mail, online course notes and website links used in the E-learning Systems. As for discussion boards, there was a notable difference on how they perceived their extent of knowledge with this tool. When scrutinised further, it was apparent that students from University of Tasmania have a better understanding of this tool compared to the students from the other two universities. This indicates that discussion boards might be under utilised in course units offered in both University of Adelaide and University of Melbourne. As for other Asynchronous E-learning Tools such as
narrated slideshows, text file sharing and shared calendars, it is apparent that these tools are not utilized as much as the other the tools provided by the E-learning Systems.

As for E-learning Systems, it was found that students participating in this research were not familiar with any other types of E-learning Systems, except for the system used in their universities. All the three universities reported of not being familiar at all with E-learning Systems such as Lotus Learning Space, Topclass, QM Perception and Smartforce. Out of the three universities, two of them, the University of Tasmania and the University of Adelaide used commercial Learning Management Systems while University of Melbourne used their own in-house built Learning Management Systems, the former with WebCT while the latter with Blackboard. This coincided with the DEST study in 2002, where the study reported that 26.3% of the universities in Australia implemented and use their own in-house version of the E-learning Systems while the rest of the Australian universities opted for commercial or well-established E-learning Systems. This is significant when taken in conjunction with the students' satisfaction and the level of commercialisation of Learning Management Systems.

Most of the students from the University of Tasmania that participated in this research reported of being familiar, with a good knowledge of WebCT (Vista). For the University of Adelaide, most of the students that have participated in this research also reported with being familiar, and having a good knowledge of the E-learning System used in this University, MyUni. The majority of the respondents from the University of Melbourne, however, reported of being very familiar, with good knowledge of Webrate, the E-learning System used in this University. It must be remembered that the University of Melbourne had a limited response rate compared to the other universities.

5.3.2 Factors Influencing Overall Satisfaction

The main objective of this research was to examine the first year Information Systems students' level of satisfaction with the asynchronous E-learning system used in their universities. Generally, this research found that, on average, students are
satisfied with the Asynchronous E-learning Systems used in their first year course units.

The factor analysis test conducted on the items from the previous instrument by Wang (2003) and University of Wollongong (2004) came up with interesting results. Through factor analysis, Wang (2003) discovered that Feedback and Assessment is not one of the factors that influenced his sample population's overall satisfaction with Asynchronous E-learning Systems. In this research, however, the researcher discovered that not only Feedback and Assessment is one of the factors, it was the third highest factor that has a positive correlation with the students' overall satisfaction. The researcher even found that Access, even though having a low correlation with the students' overall satisfaction, is one of the factors in this research.

There could be a few reasons for the differences between Wang (2003) study and the current research. One reason is that Wang (2003) conducted his research with his sample data focusing on learners from international organizations (organizational learning) that have been using at least one E-learning system prior to the survey. This research focused on a tertiary setting, with university students. Furthermore, Wang's study was conducted in Taiwan, while the current research was conducted in Australia.

Other than that, based on the literature, the Feedback and Assessment plays an important part in students' satisfaction. Soon et al. (2000) and Thurmond et al. (2002) testified that students need information on their progress and performances regardless of the mode of delivery of the course. This research shows the importance of feedback and assessment with regards to student satisfaction. Access for students in this research is likely to differ from learners in organizational, in the sense that these students would need access to the E-learning system not only in the university grounds, but from off the campus as well, such as from home or from work. Graham et al. (1999) reported that all the effort required to implement ICTs in teaching programs would be wasted if the main users, the students were unable to 'attend the classroom'.
The four other factors found in this research that were similar to Wang (2003) and were found to contribute to the students' overall satisfaction with Asynchronous E-learning Systems. Each factor is discussed in detail below.

- **Content**

The statistical analysis conducted in Chapter Four found that Content displayed the highest mean of 5.47 with a standard deviation of 0.95, based on a seven-point Likert scale. The median for Content was 5.67 while the IQR was 1.67. Furthermore, the hypothesis testing found that there is a reasonable positive relationship between Content and the students' overall satisfaction ($r = 0.666, p < 0.01$). These findings were supported by other previous research that link course structure to student satisfaction (Eastmond, 1995; Irani, 1998; Swan, 2001). A study done by Magalhaes and Schiel (1991) also revealed that the university students in their study had a high level of satisfaction with the use of technology and the course content. Most of the students agreed that the E-learning Systems provided useful content (mean = 5.81, standard deviation = 1.02). A few even commented that they rely on the E-learning Systems for course units notes as well as news or latest information from their lecturer or tutor.

Furthermore, the students that responded to the web-based questionnaire reported that more than 90% are either very familiar, with an extensive knowledge, or familiar, with a good knowledge when it comes to online course notes. The students also reported being familiar with website links provided by the E-learning Systems that provided web-links to other useful resources. This implied that the students rely heavily on the E-learning Systems when it comes to content related to their course units. However, although mostly satisfied, the respondents reported a lower mean (5.22, standard deviation = 1.23) when asked if the E-learning Systems provided content that exactly fits the students' needs. This may happen, as it is difficult to measure between expectation and experience (Shaw et al, 2002) with any end-user system. It is important to remember whilst Content and Instruction do not equate to learning, they are a necessary component in order to facilitate learning, particularly in a collaborative learning environment.
• **Learning Community**

Learning Community reported the second highest positive correlation with the students’ overall satisfaction, after Content ($r = 0.661, p < 0.01$). This finding is supported with other research in the existing literature of E-learning (Coppola *et al.*, 2001; Fuller *et al.*, 2000; Picciano, 1998; Ruberg *et al.*, 1996). Moore (1989) reported that interaction, whether it is with the course lecturers or with the rest of the classmates, are two kinds of interactivity that may affect learning in online courses. Overall, the students found that a Learning Community exists between the users of the E-learning Systems. They rated their overall satisfaction with Learning Community’s median as 4.91 with a standard deviation of 1.11. Although it was not relatively high, the students found that communicating and sharing with the rest of the community, including other students as well as the lecturers were comparatively uncomplicated.

Picciano (1998) in his research found that the instructor’s activity was related to student’s perceived learning in online education courses. This is relatively true in this research. One student commented that the lecturers should try to integrate the Asynchronous E-learning tools more within their course units. The researcher believed that the students’ satisfaction with Asynchronous E-learning Systems could have been higher if the lecturers incorporate more of the tools with the learning process, such as giving personal emails with regards to their progress (Woods Jr, 2002) or include a part of the course units’ assessment for contribution to a discussion through the discussion boards.

Online Community whilst an important factor in student satisfaction may be achieved with a number of Asynchronous E-learning tools. Although some of the students reported with having some familiarity and a good knowledge of discussion boards, there was also a substantial percentage of them who reported that they are familiar, but with no knowledge at all with this asynchronous E-learning tool. There is also a slightly similar finding with the text file-sharing tool. However, it is also important to note that communication and information sharing through the E-learning Systems is not limited by these tools. There is also the University’s email,
which the students are more accustomed to, which still a form of interaction between
members in the community.

- **Feedback and Assessment**

Feedback and Assessment reported a moderate positive correlation with students' overall satisfaction ($r = 0.641, p < 0.01$). Most of the students agreed that feedback and assessment from their lecturers was important to them. Thurmond *et al.* (2002, p. 182) commented that "students need information on their progress and performance, and the lecturers must be able to handle the workload in the web-based environment so that students can receive timely information on their assignments and questions".

There is a moderately positive correlation with Feedback and Assessment and the students’ overall satisfaction may be due to the fact that the University’s email is widely used by most of the students. It is reported that the University’s email is the most utilized asynchronous E-learning tool, with more than 92% of the students reporting high familiarity and a good knowledge with this tool. In fact, University’s email tool was the only asynchronous E-learning tool that had no students reporting unfamiliarity with this tool. By being familiar with this tool, students can therefore have direct contact with their lecturers, through email, to receive feedback on their assignments and questions. Other than that, some E-learning Systems, such as WebCT, offers some assessment reporting tools. Yet, some students explained that they were not too confident in using these types of tools, especially when submitting their assignments. One commented, “when submitting assignments online, there is still a terrible feeling they are not being sent and students may find out too late that this has occurred”.

In an educational setting, the two most important factors for a student would be content of what they are learning as well as receiving feedback and assessment on their progress based on the learning outcomes from the course units. Nevertheless, it is essential to point out that the course units offered to the students in this research are campus-based and the E-learning Systems are used to enhance the class. Even though the students agreed that they are moderately satisfied with the Asynchronous E-learning Systems, it is important to remember that there are another means for the
Discussion and Conclusion

student to receive Feedback and Assessment in this learning environment, such as direct face-to-face meeting with the lecturers.

• **Personalization**

Personalization reported a moderate positive correlation with students' overall satisfaction ($r = 0.608, p < 0.01$). However, Personalization reported the overall lowest means among the other factors that were considered in this research (mean = 4.74, standard deviation =1.05) when using the 7-point Likert scale. This showed that most of the students were inclined to be between neutral and agree when considering Personalization as a factor that influenced their overall satisfaction with Asynchronous E-learning Systems. In other words, the students indicated that there was not a high degree of freedom for them to 'personalize' their learning through the E-learning Systems, especially for learning support. It was reported that most of the students agreed that the systems gave them a freedom of learning choice (mean = 4.91, standard deviation = 1.27) but they were almost impartial when stating that the E-learning Systems provides personalized learning support (mean = 4.50, standard deviation = 1.21).

These finding were slightly different to Freeman's study (1997). He found that students had positive perceptions of the interactive features, self-testing, and monitoring facilities in the web-based teaching program since it encouraged them to understand and take a deeper approach to learning. Whilst some students in this research had a similar positive perception, there were a few negative comments given by the students. Most of the students who provided comments indicated that they were never given any formal training to use the E-learning Systems, and therefore did not know where to look for help. Some students reported that the systems were under utilised by the lecturers and even with the assessment tools provided by the E-learning Systems. They reported that seeing the lecturers face-to-face was far more adequate and timely, whenever they needed help with the learning process.
**Learner Interface**

The Learner Interface factor reported a mean of 5.17 and a standard deviation 1.13. The median for this factor was 5.00 and the IQR = 1.67 on a 7-point Likert scale. There is a moderate positive correlation between Learner Interface and the students' overall satisfaction \((r = 0.610, p <0.01)\). This was very similar to Gunawardena and Duphorne (2001) findings. They discovered that there is a strong positive correlation between online features and learner satisfaction. Most of the students agreed the E-learning Systems that they use on a regular basis are user-friendly (mean = 5.32, standard deviation = 1.23).

This was similar to Lee *et al.* (2002) findings where the students agreed that information in an information technology based system should be presented in such a way that it is interpretable, easy to understand, easy to manipulate, and is presented concisely and consistently. Shrum and Hong (2002) found that students must have a level of comfort when using the tools. Students considered it as a significant challenge if they had to learn both technology and content at the same time. The medium should assist and not distract them from the learning process.

The students, however, reported a lower mean when asked if the content (median = 5.19, standard deviation = 1.20) and operation of the E-learning Systems were stable (median = 5.02, standard deviation = 1.35). It is important to the students that the systems as well as the content provided by the systems are reliable. One student even commented, "Some of my decisions were based on peak times, when getting access immediately can be difficult". This issue could also be linked to the Access factor.

**Access**

The original questionnaire consisted of two parts of Access; one was about Access to the E-learning System and another concerning the accessibility issue. However, after conducting the factor analysis and the reliability tests, the accessibility issue was dropped from further analysis in this research. Therefore, the discussion here consists of the issue of access with the E-learning Systems. The Access factor reported a low positive correlation with the students' overall satisfaction with Asynchronous E-
learning Systems \( (r = 0.292, p < 0.05) \). Although the majority of them agreed that it was easy to access the E-learning Systems, the measure of dispersion was rather high compared to others (mean = 5.22, standard deviation = 1.46).

The results were similar when the students were asked about the speed of access from both on-campus as well from off-campus (home). The former, reported a mean value of 5.00 and a standard deviation value of 1.74 while the latter reported a mean value of 4.36 and a standard deviation value of 1.84. Based on the comments received at the end of the web-based questionnaire, most of the students, especially students from University of Tasmania mentioned that although they can access the E-learning system easily, the speed of accessing it were very slow at times, even if it was accessed on-campus. As for off-campus access, this might be influenced by the students' Internet connection, among other factors. The measure of dispersion for speed of access to the E-learning system outside the university was highest among other factors in this research. This basically indicated that there is a notable difference in the opinion of students regarding the speed of access.

Past literature suggested that it is important for students to have regular access to the systems, whether at home or on campus (Graham et al., 1999; Schrum and Hong, 2002). This research managed to highlight that Access is one of the factors that the students found to have difficulty with, having a the low correlation with overall satisfaction with the E-learning Systems. Based on the data analysis and the additional comments, this problem is mostly due to the speed of access on the Internet especially from home and to some extent to the time it took for the systems to load, especially during peak times.
5.3.3 Comparing Overall Satisfaction between the Three Universities

The last hypothesis in this study was to compare the difference of the students’ overall satisfaction with Asynchronous E-learning Systems between the three universities that had participated in this research. Interestingly, there is no significant difference in the students’ overall satisfaction with Asynchronous E-learning Systems between the three universities. In other words, students from all three universities found that overall, they are satisfied with the Asynchronous E-learning Systems used in each respective university.

What is interesting to note is that all three universities implemented and used different types of E-learning Systems. For the University of Melbourne, although the response rate were low, the students that did respond to the web-based questionnaire reported of being statistically, slightly more satisfied than the students from the other two universities (mean = 5.5, standard deviation = 1.26). This university implemented their own in-house E-learning System, WebRAFT, while the other two universities uses commercial E-learning Systems (WebCT and MyUni (Blackboard)). This is important given the investment in E-learning that was made by the three universities.

Nevertheless, it is important to note that the Asynchronous E-learning Systems in all three universities are used to compliment the course units for the students. The systems are not meant to fully replace the traditional classes such as in distance learning and therefore, these students retained some direct contact with the lecturers and/or tutors at least once a week. However, it is also important to note that the Asynchronous E-learning Systems is essential for these students, since they rely on this E-learning Systems for online course notes, submission of assignments, as well as online communication with the lecturers, tutors and other students. In conclusion, some reported that if even the system can be under utilised at times, they would rather have the systems than not have them at all.
Discussion and Conclusion

5.4 Conclusion

Even though this research found that most of the students claimed to be satisfied with the Asynchronous E-learning Systems, it was also evident that the tools provided by the systems are not fully utilised. Perhaps this is because the students regard the E-learning Systems as only an amenity where they can download their online course notes, check their emails and occasionally update on the news from their lecturers or tutors. Students also commented with not having any formal training of the systems. Quoting Merrill in an article by Kruse (2004), "If you don’t provide adequate practice, if you don’t have an adequate knowledge structure, if you don’t provide adequate guidance, people don’t learn".

All things considered, it is important to acknowledge that each student learns best in their individual ways. In other words, it is important to acknowledge that different students will thrive under different learning conditions. As Thomas (2000) commented success in technology-based learning courses are based on an orientation to the learner and not the instructor. Therefore, the inclusion of these technologies should be considered for all students and not just distance learners.

This research successfully managed to discover the first year Information Systems students’ level of satisfaction with Asynchronous E-learning Systems from three universities within Australia; the University of Tasmania, the University of Adelaide and the University of Melbourne as well as the factors that affected their satisfaction. Also, this research explored the students’ familiarity with Asynchronous E-learning tools used within their course units. Each factor that contributed to the overall satisfaction with Asynchronous E-learning Systems was explored and discussed in detail.

Finally, students’ satisfaction with Asynchronous E-learning Systems, is multifaceted, requiring students not only having reasonable access to appropriate content in an user-friendly interface, but also importantly to have a learning experience that involves community and timely feedback and communication.
Discussion and Conclusion

5.5 Limitations of the Research

There are number of limitations in this research. Firstly, the instrument used in this research was partially adapted from a previous research that was conducted in an organizational training setting. However, the instrument is still valid, and a few alterations were needed to adapt it to an educational environment.

The research was aimed specifically to first year Information Systems students in three universities within Australia. It would be beneficial if the research could include a wider range of participations from more universities throughout Australia. The three selected universities used different platforms for Asynchronous E-learning Systems, which also lead to a limitation of this study.

Due to ethical constraints, the researcher could only contact the targeted sample through the Course Unit Co-ordinators from the respective three universities. This was a limitation since the researcher had to rely on a third party to communicate details about the web-based questionnaire. Responses from the University of Melbourne were very low due to the fact that a follow-up reminder was not given to the students by their Course Unit Co-ordinators. Therefore, all responses from this university were excluded from any inferential statistic analysis since it could not be generalised to the whole population for this university. The response rate, although acceptable, is considered low even though the whole population of first year Information Systems users of the Asynchronous E-learning Systems in each university were targeted.

As a result of the lack of response from University of Melbourne, this research had to focus on Asynchronous E-learning Systems used in two universities, and therefore the results can only be generalised for these two universities. Moreover, data analysis was conducted based on the information obtained through the web-based questionnaire addressed to first year Information Systems students. Therefore, the analysis only reflects their opinions. Lastly, validity in this research was reliant and dependent on the instrument used by Wang (2003).
5.6 Future Research

This research has added to the existing body of knowledge about student satisfaction, especially in the arena of blended learning where E-learning Systems are used to enhance the learning experience. Further research into satisfaction with different types of E-learning Systems can be looked into. Also research based on the cost-effectiveness of implementing different types of Learning Management Systems in Australian universities could also be considered.

Another aspect that could be considered in future research is formal training received by new students into the environment of E-learning. Students in this research were found to be enthusiastic is using the E-learning Systems but found it could be difficult due to the limited training they received. Also, research could be conducted on the instructors, who are the lecturers and the tutors, and study their level of satisfaction with using the E-learning Systems. Reasons for having some of the asynchronous tools being under utilised can be determined. In fact, it would also be interesting to conduct a research, focusing on each of the Asynchronous E-learning tools, and how it affects students’ satisfaction in a blended learning environment.

This research only considered a few factors that could affect students’ satisfaction with Asynchronous E-learning Systems. There might be other factors that other research can look into that might affect students’ satisfaction with these systems. Also, further research into the nature of learning that has been achieved could be looked into.

This research only considered three universities within Australia. It would be interesting with it was done nationwide, involving other universities throughout this country. A comparison study could be conducted involving other countries as well as a study to measure the changes that have occurred with the students’ level of satisfaction as they progress through their courses.
References


References


References


INFORMATION SHEET

Title of investigation: Measuring First Year Information Systems Student Satisfaction with Asynchronous Electronic Learning Systems used in Three Universities within Australia.

Chief investigator: Mr. Paul Campton,
Lecturer,
School of Information Systems,
University of Tasmania.

Other investigator: Miss Nadira Hisham,
Student enrolled in Master of Information Systems,
University of Tasmania.

Purpose of the study

This project is being undertaken to fulfil part of the requirements for a Masters Degree in Information Systems.

It is anticipated that this study will:

1. Acquire a broad perspective and knowledge of student satisfaction with the asynchronous electronic learning systems used in higher education institutions.
2. Discover the extent of use of asynchronous electronic learning systems in the universities.
3. Identify the factors that contribute to the level of satisfaction from using asynchronous electronic learning systems for learning.
4. Discover the expectation of first year students with asynchronous electronic learning system used in higher education institutions.

Benefits of the research

This study will provide valuable insight for researchers and practitioners in making better use of asynchronous electronic learning systems in order to make the asynchronous learning process more effective for the students. Researchers and practitioners would also be made aware of the added issues and benefits of using asynchronous electronic learning systems as compared to the traditional way of teaching. This study will, hopefully, bring a better understanding of how computers can assist them in improving learning activities.

Study procedures

You are invited to participate in this research as you are enrolled in a first year Information Systems Unit at your University. Your involvement in this study will be limited to the completion of one web-based questionnaire that is anticipated to take approximately fifteen minutes or less to complete. The questionnaire is supported through a password protected URL address hosted by the School of Information Systems, University of Tasmania.
Confidentiality

Data and information collected from all questionnaires will be treated in a confidential manner. Participants of this questionnaire will not be asked for identifying information therefore the data collected will be totally anonymous. The data collected will be stored on a password protected secure server in the school. It will be kept for the mandatory five years period after which the data will be destroyed under the supervision of an appropriate officer in the school.

Freedom to refuse or withdraw

Your participation is entirely voluntary. You may decide to take part in the study and you can withdraw at any time without prejudice.

Contact person

If you require further information about this research, please contact the Chief Investigator, Mr. Paul Campton, on (03) 62266212, or by email to: paul.campton@utas.edu.au

Statement regarding approval

This project has received ethical approval from the Southern Tasmania Social Sciences Human Research Ethics Committee.

Concerns or complaints

If you have any concerns of an ethical nature or complaints about the manner in which the project is conducted, you can contact the Chair of the Ethics Committee, Associate Professor Gino Dal Pont (03 6226 2078) or Executive Officer, Ms Amanda McAully (03 6226 2763).

Results of investigation

Results of the investigation in this study will be published in a Master's thesis in the School of Information Systems. This research may also be used in academic research papers. In either circumstance, confidentiality and anonymity will be upheld.

A copy of this research will be made available to those interested in the outcomes of the research at the following URL: http://www.infosys.utas.edu.au/research/papers. Alternatively, if you are interested in obtaining a copy of this research, please contact the chief investigator.

Information sheet and consent form

Thank you for your assistance with this research.
Appendix B

Questionnaire
Measuring Student Satisfaction with Electronic Learning Systems in Higher Education Institutions

You are invited to participate in this research as you are enrolled in a first year Information Systems course at your University. Your involvement in this study will be limited to the completion of one web-based questionnaire that is anticipated to take approximately fifteen minutes or less to complete. The questionnaire is supported through a secure URL address hosted by the School of Information Systems, University of Tasmania.

Data and information collected from all questionnaires will be treated in a confidential manner. Participants of this questionnaire will not be asked for identifying information therefore the data collected will be totally anonymous. The data collected will be stored on a password protected secure server in the school. It will be kept for the mandatory five years period after which the data will be destroyed under the supervision of an appropriate officer in the school.

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Your participation is entirely voluntary. You may decide to take part in the study and you can withdraw at any time without prejudice. Thank you for your assistance with this research.

Proceed to Questionnaire
Measuring Student Satisfaction with Electronic Learning Systems in Higher Education Institutions

General Information
This section of the survey is focused on obtaining demographic information about the respondent. Please select or tick the appropriate box(es).

1. In which state is your university located?

Australian

2. How long have you been studying in this university?

☐ less than 1 year
☐ 1 year
☐ 2 years
☐ 3 years
☐ 4 years or more

3. What is your age range?

Choose...
Appendix B

4. What is your highest level of education?

- High School
- Secondary College
- Bachelor Degree
- Master Degree
- Other (Please state)

5. What is your computer level experience?

- Novice
- Intermediate
- Advanced
- Expert

6. Do you use electronic learning systems (ELS) in your first year courses? (Eg. WebCT(Vista), Webraft, MyUni, etc.)

- Yes
- No
- Not Sure

If you answered Not Sure or No in question 6, then this completes your participation in this research. Thank you for your time. Please click this link and enter the submit button. If you answered Yes then please continue answering the following questions.
7. How often do you use the e-learning systems in your courses?

- Almost never
- Less than 1 hour a day
- 1 to 2 hours a day
- 2 to 3 hours a day
- More than 3 hours a day

8. How many of your units this semester require you to use an e-learning system?

- None
- 1
- 2
- 3
- 4
- 5 or more
Please indicate the level of your familiarity and knowledge of the following e-learning tools.

<table>
<thead>
<tr>
<th>For each of the following e-learning tool, please tick the appropriate box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiar with extensive knowledge</td>
</tr>
<tr>
<td>University Electronic Mail</td>
</tr>
<tr>
<td>Online Course Notes</td>
</tr>
<tr>
<td>Discussion Boards</td>
</tr>
<tr>
<td>Text File Sharing</td>
</tr>
<tr>
<td>Narrated Slideshows</td>
</tr>
<tr>
<td>Shared Calendars</td>
</tr>
<tr>
<td>Website Links</td>
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</tbody>
</table>

Please indicate the level of your familiarity and knowledge of the following systems.

<table>
<thead>
<tr>
<th>For each of the following e-learning system, please tick the appropriate box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiar with extensive knowledge</td>
</tr>
<tr>
<td>WebCT(Vista)</td>
</tr>
<tr>
<td>Blackboard</td>
</tr>
<tr>
<td>Lotus Learning Space</td>
</tr>
<tr>
<td>Topclass</td>
</tr>
<tr>
<td>QM Perception</td>
</tr>
<tr>
<td>Smartforce</td>
</tr>
<tr>
<td>In-house systems (e.g WebRAFT)</td>
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For each of the following issues related to CONTENT, please tick the appropriate box.
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<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
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<tbody>
<tr>
<td>The e-learning system provides content that exactly fits my needs.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>The e-learning system provides useful content.</td>
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<td>The e-learning system provides sufficient content.</td>
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<tr>
<td>The e-learning system provides up-to-date content.</td>
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<th>Moderately Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
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<td>The e-learning system is easy to use.</td>
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<tr>
<td>The e-learning system makes it easy for me to find content I need.</td>
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<tr>
<td>The content provided by the e-learning system is stable.</td>
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<tr>
<td>The e-learning system is user-friendly.</td>
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<td>The operation of the e-learning system is stable.</td>
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<th>Moderately Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
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<tr>
<td>The e-learning system responds to my requests fast enough.</td>
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<td>The e-learning system makes it easy for me to evaluate my learning performance.</td>
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<td>The testing methods provided by the e-learning system are easy to understand.</td>
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<td>The testing methods provided by the e-learning system are fair.</td>
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<td>The e-learning system provides secure testing environments.</td>
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<td>The e-learning system provides testing results promptly.</td>
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<th>Moderately Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
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<tbody>
<tr>
<td>The e-learning system enables me to control my learning progress.</td>
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<td>The e-learning system enables me to learn the content I need.</td>
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<td>The e-learning system enables me to choose what I want to learn.</td>
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<tr>
<td>The e-learning system records my learning progress.</td>
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<tr>
<td>The e-learning system records my learning performance.</td>
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<td>The e-learning system provides the personalized learning support.</td>
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<th>Moderately Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
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</thead>
<tbody>
<tr>
<td>The e-learning system makes it easy for me to discuss questions with my lecturers and/or tutors.</td>
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<tr>
<td>The e-learning system makes it easy for me to discuss questions with other students.</td>
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<tr>
<td>The e-learning system makes it easy for me to share what I learn with the learning community.</td>
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<tr>
<td>The e-learning system makes it easy for me to access the shared content from the learning community.</td>
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<th>Moderately Agree</th>
<th>Strongly Agree</th>
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<tbody>
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<td>The e-learning system is difficult to access.</td>
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<tr>
<td>The speed of access to the e-learning system is slow when accessed from the university.</td>
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</tr>
<tr>
<td>The speed of access to the e-learning system is slow when accessed from home.</td>
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<tr>
<td>The standard/level of computers provided in the university computer labs are suitable for the subjects accessed from the e-learning system.</td>
<td>○</td>
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<tr>
<td>The e-learning system is available when I need to use it.</td>
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<tr>
<td>The World Wide Web Consortium (W3C) disability access features in the e-learning system were useful.</td>
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For each of the following issues related to OVERALL SATISFACTION, please tick the appropriate box.

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<th>Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
<th>Don't Know</th>
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</thead>
<tbody>
<tr>
<td>As a whole, I am satisfied with the e-learning system.</td>
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<tr>
<td>As a whole, the e-learning system is successful.</td>
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<tr>
<td>Using e-learning systems to enhance my educational experience is valuable.</td>
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</tbody>
</table>

You are welcome to make comments on any other factors that may have affected your satisfaction with the e-learning system used in your first year courses. (Please avoid from using characters such as ; & " < > ' $, as this would cause problem when submitting).

Thank you once again for your valuable participation to this research.
Your contribution is highly appreciated.

If you have any questions, please do not hesitate to contact the chief investigator (Mr. Paul Campton, 03 - 62266212, paul.campton@utas.edu.au) or student researcher Nadira Hisham (nhisham@utas.edu.au) for further clarification.
Appendix C

Ethics Approval
Human Research Ethics Committee
(Tasmania) Network

Southern Tasmania Social Sciences Human Research Ethics Committee (HREC)
APPLICATION APPROVAL

To: Mr PF Campton
Information Systems, University of Tasmania
Private Bag 87

From: Amanda McAully (Executive Officer)

Date: 19 March 2004

Subject: H0007691: Measuring First Year Information System Students’ Satisfaction with Computer-mediated Communication Systems for Learning in Three Universities within Australia

The Southern Tasmania Social Sciences Human Research Ethics Committee has approved the above project.

You are required to report immediately anything that might affect ethical acceptance of the project, including:

- serious or unexpected adverse effects on participants;
- proposed changes in the protocol;
- unforeseen events that might affect continued ethical acceptability of the project.

You are also required to inform the Committee if the project is discontinued before the expected date of completion, giving the reasons for discontinuation.

Please Note:
Approval is subject to annual review. You will be asked to submit your first report on this project by 3rd March 2005.

Kind regards

Amanda McAully

Contact: University of Tasmania
Research and Development Office
Private Bag 1
Hooper Tas 7001
Phone: 6226 2763
Fax: 6226 2765
Email: Amanda.McAully@utas.edu.au

126
The Southern Tasmania Social Sciences Human Research Ethics Committee on 25 March 2004 approved the following amendment:

H7691 Considerable changes to Instrument and minor changes to title. Nothing poses ethical concern

Kind regards

Amanda McAully
Executive Officer
Appendix D

Factor Analysis Test
### KMO and Bartlett's Test

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
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<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td>Approx. Chi-Square</td>
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<tr>
<td></td>
<td>df</td>
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<tr>
<td></td>
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### Rotated Component Matrix (a)

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a Rotation converged in 9 iterations.