An Exploration of Learning Environments used by students in a first year University course

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Abstract

This research involved the design, development and implementation of an online survey instrument to identify the physical learning environments and resources students use when studying an online course. It was found, through a review of the literature, that there was no appropriate instrument available for this purpose. It was also found that the term physical learning environment actually is not well defined in the literature. These two factors have been addressed in this research.

The results obtained from the survey found that students used a mixture of physical learning resources such as textbooks, and online resources such as email and online submission of assessment items. However, none of these resources were used all the time. It was also established that the majority of students preferred to learn at home using either online or paper-based resource material. The results also showed that the library both as a resource and as a learning environment was not being used to its full potential.

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Acronyms

CES – Classroom Environment Scale

CL – Computer Literacy

CSCL – Computer Supported Collaborative Work

CUCEI – College and University Classroom Environment Inventory

CQU – Central Queensland University

DOVILES – Distance and Open Virtual Learning Environment Scale

EBAP_ECOM – Online environment used by a Brazilian college

GRSLSS – Grasha–Riechmann Student Learning Style Scales

HTML – Hypertext Markup Language

ICEQ – Individualised Classroom Environment Questionnaire

ICT – Information and Communication Technology

IT – Information Technology

LEQ – Learning Environment Questionnaire

LEI – Learning Environment Inventory

LSI – Dunn instrument for learning style preferences

MCI – My Class Inventory

OLE – Online Learning Environment

RTS – Research Training Scheme

SAD – Systems Analysis and Design

SPI – Student Perception Inventory

TROFI – Technology–Rich, Outcomes–Focused Learning Environment Inventory

URL – Universal Resource Locator

VLE – Virtual Learning Environment

VSM – Viable Systems Model

WIHIC – What is Happening in this Class questionnaire

WWW – World Wide Web

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Declaration

I declare that the work presented in this dissertation is to the best of my knowledge and belief, original, except as acknowledged in the text, and that the material has not been submitted either in whole or in part for a degree at this or any other university.

The submission of this dissertation is in partial fulfillment of the requirements of the Master of Informatics at Central Queensland University.

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Chapter 1– Introduction

1.1 Introduction

This thesis concerns an aspect of the way students in the higher education sector do their learning. In the past the traditional way that students have learned the lecturer was at the front of a class of students and supplying all the knowledge. Beller and Or (1998) describe this method of education as the sage on the stage. However in today's educational environment, this is changing to where the lecturer is seen more as a facilitator of learning or as described by Beller and Or (1998), as a guide on the side. This is especially true where the courses of study are delivered online.

With the use of Information and Communication Technologies (ICTs) for the learning and teaching process in higher education, a stage has now been reached where extensive use is being made of web based courses at all levels of education and for all modes of learning. This particularly applies in the higher education context (Berge, 2000;Foley, 2000). Despite the increased level of use of web-based courses, there is limited research concerning the effectiveness of these courses when students are learning using different learning environments. The design of online courses tends not to be well informed by theory and best practice that takes into account the needs and demands of students and their prior learning experiences. Specifically to date, little research has been done in the area of the types of physical learning environments that students have used previously and how this affects their current approach to study.

This research will explore this issue through the design, development and implementation of an instrument and its use to identify the types of physical learning environments and resources that students have used in their learning experiences. The study concentrates on physical learning environments that require the use of ICTs by students to carry out their study.

1.2 Background

John Dewey (1916/1966) believed that the school is a learning environment that should be free of the social stratifications and influences of the world. He believed that students should be introduced to these things over time as the student becomes more able to assimilate the information. From this early beginning, the learning environment has grown to encompass not only the physical but the virtual environments that students use to learn. With the introduction of distance education and online learning, these physical learning environments have also expanded to include the students home, place of work and libraries to name a few.

With the emergence of ICTs in the early 1990's, this resource has been used more and more to enhance the content of courses offered in educational institutions. Resources used include Compact Discs (CDs), audio tapes, video tapes, television broadcasts and online resources such as the World Wide Web (WWW). The online resources have then been used to develop Online Learning Environments (OLEs).

In this area, research has been undertaken that has explored the success rates of students undertaking a course within an OLE compared to students undertaking

the same course in a classroom environment (Ladyshewsky, 2004;Marold, Larsen and Moreno, 2002), as well research has addressed the attrition rates of students when undertaking a course offered in an OLE (Diaz, 2002). The findings from most of these studies have been rather mixed as to student performance and preference for OLEs when compared to traditional learning environments. As will be considered in Chapter 2 literature review, lacking in most research on the learning environments is a consideration of the learning environment used by students from a holistic perspective. If the term learning environment is considered from a holistic perspective in the context of the learner then clearly a learning environment has two components; a physical component, for example the place for study; and the psychological and sociological component, for example influences of a students cognitive style. This thesis, as alluded to above, focuses on the physical learning environments used by students.

The reemergence of research into learning environments commenced in the early 1970's with Anderson and Walberg (1974), and Majoribanks (1974) being the pioneers in this area. This early research mainly concentrated on primary and secondary school students. The focus of some later works then shifted to tertiary education (Biggs, 1999;Laurillard, 2002;Ramsden, 1992;Walker and Fraser, 2005). Other research has also addressed the design of specific learning environments, such as science classrooms and online learning environments. However, all the research to date has concentrated on one specific environment namely the classroom and the students' perceptions of that environment.

These specific learning environments were discussed in detail however the literature appears to be devoid of a clear definition of what a physical learning environment is or the types of learning environments students use when undertaking their studies. This dissertation, through the design, development and implementation of an online survey instrument, will endeavour to identify the types of physical learning environments and resources students use when studying. As part of this, a definition for a physical learning environment will also be presented.

1.3 Scope and Aims of the Study

The research has two main aims.

- The design, development and use of an instrument to enable an examination of aspects of a physical learning environments.
- To explore the nature of student physical learning environments used by students in an undergraduate course that has a number of ICT components.

1.4 Research Questions and Objectives

The following research questions will be addressed in examining the learning environments adopted by students in the web–based course Systems Analysis and Design (SAD).

Research Question 1

What physical learning environments do 1st year students' use in the course SAD?

RQ1.1 How is a physical learning environment defined in the literature?

RQ1.2 What types of physical learning environments are used by students?

RQ1.3 What types of physical learning environments are preferred by students and to what extent are they used?

Research Question 2

To what extent is the student learning environment influenced by specific student characteristics?

RQ2.1 What is the influence of mode of study and attendance on the types of learning environments used by students?

RQ2.1.1 face–to–face vs flex.

RQ2.1.2 full time vs part time.

RQ2.2 What is the influence of age and gender on the types of learning environments used by students?

RQ2.2.1 mature age vs school leaver?

RQ2.2.2 male vs female?

The research objectives to be used in order to explore the research questions are

- Examine the research literature to define the term physical learning environment. This definition is required to provide a basis for addressing the aims and research questions. (RQ1.1)

- Undertake a review of the literature to identify the research in the area of physical learning environments for delivery of online courses. Such review intends to identify the range of components associated with physical learning environments and those that apply specifically to the use of ICTs. (RQ1.2)

- To develop a physical learning environment survey instrument to obtain data on the participants' current learning experiences and their previous learning environment. (RQ1.3 and 1.4, and RQ2)

- To examine the physical learning environments used by students from different modes of study and attendance and from different age groups and genders. (RQ2)

- Based on the analysis of the data, develop a framework that can be used to better design online courses that develop a support system for the different student physical learning environments.

1.5 Rationale and Significance of Research

At Central Queensland University (CQU), as with other higher education institutions in Australia, there has been an increasing use of online material by course developers and teachers. This has resulted in a need for theory and practice that can inform course designers and teachers regarding the design and

use of appropriate teaching strategies and student support systems to meet the needs and demands of students. It is also important to know the efficacy of online course delivery for student learning. This is required to give the developers and designers of online courses an appropriate foundation on which to build these courses. This latter point may lead to the topic of further research. This study addresses issues concerning the appropriateness of physical learning environments used by students in studying an online course.

The significance of this research is twofold. Firstly, the design, development and implementation of an instrument for use to establish the nature of student physical learning environments addresses a shortcoming in research in the study and use of physical learning environments as is shown in Chapter 2 literature review. This chapter will also show there are very few instruments available for this purpose. Secondly, the proposed investigation will explore aspects of the students' physical learning environments and the types of resources used when studying. This is intended to give some insight into the ways and means that students use to enable them to successfully complete their tertiary studies. Such information can contribute to theory and practice on the use of online teaching and learning.

1.6 Study Limitations

Three limitations are associated with this study. The first limitation is that the research is limited to one particular group of students studying the 1st year course, Systems Analysis and Design at CQU. The course has a cross-section of students and contains an online component. This course was chosen as students

would have completed previous courses with online components as well which would have given them sufficient knowledge to complete the online survey.

A second limitation is that the use of the survey instrument was only be a relatively small number of students and consequently detailed statistical analysis to examine the influence of different variables was not possible.

A third limitation is that the research is restricted to specific issues concerning the development of a survey instrument that can identify the physical learning environments students use for study. It is not concerned with how successful they have been in the course nor does it take into consideration the comparison of students' results when undertaking courses in different learning environments.

1.7 Definitions

The research undertaken draws on a number of terms. Definitions of the terms are provided here to avoid any ambiguity and to ensure they are not misunderstood. The current literature concerning the exploration of learning environments uses a number of terms when referring to the way that students receive and assimilate information gained within an educational situation. The two main terms that are used consistently throughout the literature, and are pertinent to this research, are learning environment and Information and Communication Technologies (ICTs). The term learning environment is further fully considered in Chapter 2. The other common terms used are provided below and are provided to give a background understanding of what this research is focused on and ensure that the definitions are not misunderstood.

Cognitive Style

The term cognitive style is being defined as it directly relates to the way that students learn in different situations or physical learning environments. Witkin, Moore, Goodenough and Cox (1977), while not giving a concise definition, describe a person's cognitive style as

> '…the characteristic approach the person brings with him to a wide range of situations – we called it his "style" – and because the approach encompasses both his perceptual and intellectual activities – we spoke of it as his "cognitive" style' (Witkin et al., 1977 p. 10).

The difference between a learning style and a cognitive style is that cognitive style refers to the approach a person uses in a particular situation, whereas their learning style is the way that students receive and process information depending on their particular personal traits.

Computer literacy

Computer literacy (CL) is a common term used in the literature to describe how efficiently students use ICTs. Several definitions (Newhouse, 1987;Pfaffenberger, 2002;Reid, 1997) have been put forward. These are outlined below.

The University of South Australia (Reid 1997) defines the term 'computer literacy' by describing four types of users and then characterising each one. The types are the emergent user, the progressive user, the high user and the dependent user. The emergent user is

'…characterised as

- Having access to computer(s) at home or work
- Has access to, and knows how to use word processing, email and web browsing software through designated University machines.
- Can download information to diskette for printing elsewhere' (Reid, 1997 p. 2).

Pfaffenberger (2002) defines computer literacy as

> 'A standard of knowledge and skills regarding computers that is sufficient to prepare an individual for working and living in a computerised society' (Pfaffenberger, 2002 p. G.5).

He also defines another term 'computer fluency' as a

> '…high level of computer conceptual knowledge and skills sufficient to enable a user to apply the computer creativity in novel situations' (Pfaffenberger, 2002 p. G.5).

In his thesis, Newhouse (1987) defines computer literacy

> '…in terms of the knowledge, skills and attitudes required to use computers to facilitate the completion of necessary tasks presently associated with life and required to enhance perceptions of the future use of computers' (Newhouse, 1987 p. i).

For the purposes of this study computer literacy will be defined as having the ability, knowledge and skills to operate computers efficiently enough to complete necessary tasks.

Information and Communication Technologies (ICTs)

ICT is a term used frequently throughout the literature when considering applications for Information Technology (IT). For instance, Heeks (2002) in discussing the emergence of the use of ICT notes

> 'Where before we talked simply of information technology (IT), we now talk of information and communication technology (ICT). This reflects the convergence of digital computing and telecommunications. Computers were largely focused on the processing of information, ICTs undertake both processing *and* communication of information' (Heeks, 2002 p. 1).

Van der Velden (2002) expands on this by stating that

> 'ICT has established itself as an important tool for communication and information exchange between people working for development' (Van Der Velden, 2002 p. 26).

While not actually using the term ICTs, Taylor (1995) lists various media technologies that can enhance the teaching and learning process. These include audio and videotapes, computer–based learning packages, interactive video, audio–teleconferencing, audiographic communication systems and video conferencing. All these tools are now also

> '…supplemented by the advent of the opportunities for interactivity and access to instructional resources provided by the computer communications network popularly referred to as the "Internet" or the "Information Super Highway"' (Taylor, 1995 p. 1).

The definition that will be used for this research is the one put forward by Taylor (2002) namely

> 'the use of the computer and Internet-based communications technologies including e-mail, online groups of all types, and web based communication processes' (Taylor, 2002 p. 24).

Learning Strategy

A learning strategy is a term that describes the way that a student learns. In Kolody, Conti and Lockwood's study (1997) learning strategies are defined as

> '… the techniques and skills that an individual elects to use in order to accomplish a specific learning task…Such strategies vary by individual and by learning objective' (Kolody et al., 1997 p. 2).

Learning Styles

Learning styles have been the topic of research since Kolb's Learning Styles Inventory (LSI) (1984) in the early 1980's. It classifies the students into different categories depending on the way that they learn and assimilate information. Grasha (1996) defines learning styles as

> 'personal qualities that influence a student's ability to acquire information, to interact with peers and the teacher, and otherwise participate in learning experiences' (Grasha, 1996 p. 41).

Felder (1996) describes student learning styles as

> '…characteristic strengths and preferences in the ways they (the students) take in and process information' (Felder, 1996 p. 1).

For the purposes of this study a learning style will be defined as the personal qualities or characteristics used by students to interact with other students and teachers and the way they assimilate information.

By examining both learning styles and learning strategies, a broader picture can be obtained about the way that students gain knowledge and skills. This can be useful in gaining an understanding of how students assimilate information. The difference between learning strategies and learning styles is that learning strategies are the techniques that a student uses to accomplish a certain task. These can vary depending on the situation. Learning styles are the personal qualities or characteristics that influence the way that a student acquires or takes in information. Both of these attributes are essential in determining the factors that influence a student's ability to learn new skills in a variety of situations.

Online Learning

The majority of the literature relating to online learning and education has only emerged since the beginning of the 1990's (Volery and Lord, 2000). Hicks, Reid and George (1999) state that

> '…the online environment provides students with particular opportunities and challenges. It provides new and possibly better opportunities than face–to–face teaching, and also changes the educational process in fundamental ways' (Hicks et al., 1999 p. 3).

They specify that the online learning environment contains the following characteristics; computer–mediation, the ability to access large amounts of dynamic information through the World Wide Web (WWW), the use of hypertext and working with materials in a non linear way, access to real–world contexts via the internet, the use of email and ICTs to communicate with lecturers and other students, online submission of assignments and obtaining results, networking, and internationalizing the curriculum.

Laurillard (2002) also states that the WWW

> 'supports the needs of the lifelong learner who has learned how to learn and has the skills needed to explore and evaluate the multiply–connected network of knowledge in their own fields' (Laurillard, 2002 p. 120).

For the purposes of this study online learning or e-learning will be defined as 'an approach to facilitate and enhance learning through both computer and communication technology' (Wikipedia, 2006).

Physical learning environment

For the purposes of this study, a physical learning environment will be described as

> 'a place or the surroundings where a person can gain knowledge or skills through study or experience, whether independently or by interaction with a teacher or other students' (Carpenter and Dekkers, 2006 p. 95).

1.8 Chapter Organisation

Chapter 1 – Introduction

This chapter has presented the nature and the scope of the research and the structure of the thesis.

Chapter 2 – Putting learning environments into perspective

This chapter presents a review of previous studies to provide an historical and holistic perspective on learning environments.

Chapter 3 – Design, Development and Implementation of an Online Survey Instrument

This chapter details the design and development of the learning environment instrument, the Learning Environment Questionnaire (LEQ) used in this research.

Chapter 4 – Exploration of students' learning environments

This chapter presents the results and analysis of the data obtained from using the LEQ.

Chapter 5– Conclusions and further research

This chapter will formulate the conclusions from the research, present the answers to the research questions and outline recommendations and areas for further study.

1.9 Summary

This chapter has formed a basis for the study by identifying the topic and sets out the rationale and significance of the research. The aims, research questions and objectives have been stated together with the main definitions that will be referred to in the following chapters.

Chapter 2 - Putting Learning Environments Into Perspective

2.1 Introduction

This chapter reviews the literature to establish the extent of research that has been undertaken in the area of learning environments. The review is also intended to give an overview of learning environments, including how they are evaluated and the types of learning environments that have been identified with particular reference to those involving the use of ICTs.

The review seeks to determine when research into learning environments was first reported and what the focus of this research was. Despite the early recognition of learning environments by Dewey in 1886 (Ream and Ream, 2005), detailed research into learning environments received little attention until the mid 1970's. Studies at that time, in the area of learning environments such as those conducted by Anderson and Walberg (1974), Fraser (1986a), Majoribanks (1974; 1979) and Tobin and Gallagher (1986), concentrated mainly on primary and secondary school students and did not address the use of learning environments by tertiary students. Their research concentrated on sociopsychological perspectives of learning environments, and the students' perceptions of their use of the learning environments in which they learnt. More recently, researchers such as Ramsden (1992) and Laurillard (2002) have researched at the tertiary level concentrating, in the most part, on the students' experiences, proposing how teaching methods as part of the learning environment can be adapted to accommodate the students' needs. With the introduction of ICTs studies that have concentrated on the design of specific

online or web-based learning environments have become more prevalent. For example, the work of Hicks et al (1999), Holzl (1999), and later Marschalek (2002), Steffes (2004), and Sun and Sunny (2004) discuss the implications on student learning of the researcher's intervention to construct virtual and unique learning environments.

These studies and others will be positioned and discussed in terms of the need to distinguish between a non physical and the physical learning environment and a definition of the latter will be proposed based on the literature review. While it is an objective of this research study to define the types of physical learning environments, the definition developed in this chapter will be used to inform this researcher in the development of the survey instrument.

2.2 The use of the term learning environment

A review of the literature revealed that the earliest mention of learning environments was by Dewey (Ream and Ream, 2005) and dates back to 1886. Dewey (1916/1966), whose research focused mainly on children just starting their education, believed the school should provide a 'simplified environment' void of distractions of the world so that the student could learn uninhibited. As the student progressed they would gain 'insight into what is more complicated' (Dewey, 1916/1966 p. 20). Ream and Ream (2005) in their review of Dewey, make the important distinction between humans and their environment to state that

> 'John Dewey's intellectual efforts left a theoretical understanding that views the architectural composition of learning environments as

> instrumental mediums which house the educational process. This understanding of learning environments is precipitated by a separation of human agents as subjects and their learning environments as objects' (Ream and Ream, 2005 p. 586).

Anderson and Walberg (1974) identify the learning environment as just one part of the learning process and insist that it must be measured in any educational study. While their study considered the social climate of the school classroom it emphasized the importance of the learning environment and the need to focus on the students perceptions of this. Downes (2004), Cochrane (2005) and McMahon and Pospisil (2005) have added to the discussion on learning environments by identifying the need to consider the technological side of the learning environment.

Other research such as that by Ramsden (1992) does not explicitly mention the term learning environment, but establishes the learning environment in contextual terms as part of the educational environment, referring to it as the 'context of learning' (Ramsden, 1992 p. 62). Biggs' (1999) constructivist approach defines the learning environment in terms of learning styles. How a student learns is influenced by their learning style which in turn influences the learning environment that they use.

Researchers such as those identified above have tended to describe the learning environment broadly and often in intangible terms. Some even have relied on the fact that 'everyone knows what a learning environment is' while others have considered goals, learning contexts, student interactions, the learning style used

and behaviour of the student as being integral to the definition of a learning environment.

This research study considers the need to develop a definition of the learning environment not just by these latter descriptors but in terms of physical attributes. The following sections consider the existing literature by addressing the learning environment from a number of different aspects including an historical overview, the tertiary learning environment, student evaluation of their learning environment and the impact of technology on the learning environment. In doing so it seeks to establish a definition of what constitutes a physical learning environment.

2.2.1 An Historical Review

2.2.1.1 Early Research on Learning Environments

Since Dewey's (1916/1966) initial identification of the learning environment, research in this area has received little attention until the early 1970's when as Walker (2003) notes it became 'an established and internationally recognized field of educational research' offering '… investigators insight on what goes on in school and university and educational settings beyond that of student achievement' (Walker, 2003 p. 1). Authors such as Anderson and Walberg (1974), Fraser (1986a), Majoribanks (1974;1979) and Tobin and Gallagher (1986) contributed at that time to the development of an understanding of a learning environment. Their research of the learning environment concentrated mainly on the perceptions of the students towards the particular environments in which they were learning. The review of the literature into these earlier studies,

as well as giving a general indication of the type of research that has been undertaken, also forms a basis for this current research as these studies fail to address aspects of the physical learning environment such as the various locations in which students learn.

There has also been research into the psychological aspects of the learning environment. Majoribanks (1974;1979) is one researcher who has approached the learning environment not so much as an educational setting, but as a setting where life skills are obtained. The work concentrates on how children gain the basic knowledge to operate within society. Factors such as parental income, sibling relationships and ethnic class, were seen to potentially contribute to a person's "learning environment". Majoribanks labeled this form of research as 'environmental social psychology'. His 'environmental approach' investigated the 'relationships between environments and the cognitive and affective characteristics of students' (Majoribanks, 1979 p. 13). In terms of this research Majoribanks' work provides a general understanding of the beginnings of learning for a student.

Fraser (1986b) also takes a psychological perspective when researching the learning environment. His research focused '…upon students' and teachers' perceptions of important social and psychological aspects of the learning environments of school classrooms' (Fraser, 1986b p. 1). His approach, referred to as "high inference", requires a 'judgment about the meaning of classroom events' (Fraser, 1986b p. 2); for example how friendly the teacher is. He also examined the psychological significance of these events. The work concentrated solely on the classroom environment and did not consider whether the students

use other environments to study. Fraser also provides an historical background into the emergence of research into classroom environments and the instruments for measuring learning environments. These include the *Learning Environment Inventory* (LEI) developed by Anderson and Walberg in 1974, the *Classroom Environment Scale* (CES) developed by Moos in 1973, the *Individualised Classroom Environment Questionnaire* (ICEQ) developed by Rentoul and Fraser in 1979, the *My Class Inventory* (MCI), a simplified version of the LEI developed by Fisher and Fraser in 1981 and the *College and University Classroom Environment Scale* (CUCEI) developed by Treagust and Fraser in 1985. Fraser's work gives an overview of these instruments including the educational level at which the instrument was aimed.

Anderson and Walberg (1974), through the use of the LEI, the MCI and the *Class Activities Questionnaire* ascertained the students' perceptions of their classroom learning environment. They list various determinants that make up the "learning environment" including the curriculum, the size of the class, the cognitive processes used by students, the perceived levels of difficulty of the subject, and the biographical characteristics of the class members.

Other researchers such as Tobin and Gallagher (1986) addressed the students' perceptions in a science classroom environment and hypothesized that certain students within the same classroom, experienced a different learning environment from that of other students depending on their level of interaction with the teacher. The research involved the observation of high school science teachers undertaking science classroom activities and also addressed the

students' perceptions of their learning environment and whether their perceptions had any impact on their success in the class.

When evaluating these earlier studies that concerned the psychological aspects of the learning environment and the students' perceptions of their particular learning environment, it was found that, depending on the researchers' point of view and instruments used, various factors influenced a person's learning environment and so affected the interpretation of what constitutes a learning environment. Factors such as teacher contact, the number of students in a class, and the characteristics of the individual, for example ethnic background and economic class, should be considered here. These aspects of the non-physical learning environment can differ from individual to individual and regardless of whether they use the same physical environment to learn their experience and perceptions of their situation may be different. While it is important to understand these factors and how they impact on student learning, allowing teachers to plan and develop learning materials to meet the needs of the student, there is also a need to consider the physical environment that the student uses as this may impact on the way that the student learns. For example if the student studies at home or at the student's place of work what different approaches to their learning would they take and what factors in these different locations impact on the way they learn.

This researcher has found little research in student learning to suggest that the physical learning environment has been given due consideration over the past thirty years. The research has been predominantly concerned with the psychological aspects of learning in formal educational settings. This is in direct

contrast to this research study which seeks to address the physical learning environment by identifying other environments where students learn.

2.2.1.2 Learning in the tertiary sector

A preliminary review of research on students' learning environments in the tertiary sector revealed limited research in this area and indeed no research was identified that addressed physical learning environments. Despite the foregoing a number of researchers have explored aspects of the learning environment. This includes research by Ramsden (1992), Biggs (1999), and Laurillard (2002) and is briefly considered below.

Ramsden (1992), while not referring to the learning environment, does discuss the educational environment, or what he describes as the students 'context of learning' (Ramsden, 1992 p. 62). This is

> '...created through our students' experience of our curricula, teaching methods and assessment procedures. Remember that we are dealing here with the students' own perceptions of assessment, teaching and courses, and not with objective characteristics…' (Ramsden, 1992 p. 62).

The majority of his work is aimed at tertiary teachers and how they can improve their teaching strategies to become better teachers. He states that '…the quality of undergraduate education needs to improve, and it has needed to improve for a long time' (Ramsden, 1992 p. 3). One method that he advocates in improving teaching is 'by studying our students' learning' (Ramsden, 1992 p. 4). This suggests that if this is the case then research to identify the student's physical

learning environments becomes an important aspect of any process to improve teaching and learning.

Biggs (1999) investigation of student/ teacher interaction points to the need for the teacher to adapt their teaching style in order to more actively engage the students in learning. He states that 'learning has been the subject of research by psychologists for the whole of this century, but remarkably little has directly resulted in improved teaching' (Biggs, 1999 p. 59). This aligns with the sentiments of Ramsden (1992). Biggs (1999) belief is that 'the teacher's job is … to organize the teaching/learning context so that all students are more likely to use the higher order learning processes which 'academic' students use spontaneously' (Biggs, 1999 p. 57).

The conclusions that Biggs' (1999) arrived at indicate that with the upturn in the number of universities, teachers are now held more in the 'spotlight' in regard to their teaching than previously and that students are not doing as well as they should be. He also concludes that universities are no longer the pinnacles of excellence in learning that they once were, and given that more students are obtaining admission than ever before, the situations that were previously observed in primary and secondary schools are now evident in universities. This again is in agreement with Ramsden (1992).

Laurillard's (2002) work centres initially on the evaluation of online environments that attempt to replicate traditional learning environments. The template she constructed using the *Conversational Framework,* undertakes an 'initial analysis of what it will take for the student to learn, and how the teaching can best support this' (Laurillard, 2002 p. 190). It is mainly concerned with

designing courses, especially online courses, that enable the student to ‘emulate the scholar’ (Laurillard, 2002 p. 190). Several useful techniques are listed that can be built into an interface to provide maximum support to the student within an Online Learning Environment (OLE). These include using algorithms to: generate repeatable tasks, match student answers in order to give constructive feedback, and interpret student descriptions, answers or requests. Other techniques can be used to encourage students to construct their own narratives concerning their research, findings and descriptions.

The knowledge gained from these three authors (Biggs, 1999;Laurillard, 2002;Ramsden, 1992) indicates that in today’s tertiary sector, teachers need to become more aware of the needs of their students. In order to do this the needs of the students have to be identified. This includes support mechanisms and appropriate learning materials suited to the particular course of study. The above researcher also points out the need to give some thought to the physical learning environments used for study.

2.2.1.3 Online Teaching and Learning

As part of the focus of this research concerns the extent students use online learning activities a consideration of the development in online teaching and learning is briefly considered in order to establish how this literature can inform this research. Research relating to online teaching and learning predominantly emerged from the beginning of the 1990’s (Chin, 2004;Volery and Lord, 2000) and has had the most bearing on enhancing the delivery of courses in the tertiary sector. The current technologically-literate tertiary student no longer learns just in the classroom (Cochrane, 2005; McMahon and Pospisil, 2005). The

introduction of online teaching and learning has allowed teachers and developers of courses to provide improved resources and learning opportunities for students and as Hicks et al (1999) state in their study

> '…the online environment provides students with particular opportunities and challenges. It provides new and possible better opportunities than face-to-face teaching, and also changes the educational process in fundamental ways' (Hicks et al., 1999 p. 3).

Chin (2004) continues along these lines by stating that using technology can supplement the four general learning activities (presenting information, guiding the learner, practicing, assessing learning) by providing online tutorials, simulations, knowledge reinforcement exercises, open-ended learning environments and computer assisted assessment. The introduction of the online learning environment means that the student can learn any time and any place without the need to attend formal classes making the traditional classroom no longer the only physical location highly relevant to student learning. The literature suggested that the development of these environments however, needs careful planning. It is not enough just to transfer the traditional material to a web-based format Laurillard (2002). McLoughlin (2000) also echoes this view by indicating that educators have to make the distinction between 'the effects of using technology to support learning as opposed to providing information' (McLoughlin, 2000 p. 141) and also being able to 'recognise the potential of online delivery…as opposed to putting courseware online and calling it a "learning experience"' (McLoughlin, 2000 p. 141). When designing courses that

are to be offered online, McLoughlin (2000) citing Ramsden (1992) poses four questions that should be answered by educators. These are

> ‘What do I want my students to learn?
>
> How should I manage teaching and learning?
>
> How can I find out whether my students have learned?
>
> How can I estimate the effectiveness of my teaching?’ (McLoughlin, 2000 p. 143)

McLoughlin (2000) also notes that from a constructivist point of view rethinking the pedagogy of face-to-face teaching also needs to take into consideration the learners needs and motivation.

From a teachers standpoint Chin (2004) states that for online teaching and learning to succeed it ‘…must be embedded within the curriculum, with well thought out delivery mechanisms and learning outcomes that provide appropriate support for students’ (Chin, 2004 p. 124). He also states that with this delivery method ‘…students can no longer expect to be spoon fed…(they) have to take control of their own learning’ (Chin, 2004 p. 124).

This viewpoint is echoed by Ameigh (2000) who indicates that adult learners will choose the most efficient and convenient resources relating to their study programs. He believes that the adult student is uncomfortable in a traditional learning setting and states that ‘…well designed distance learning is ideal under these circumstances’ (Ameigh, 2000 p. 341).

Hicks et al, (1999) does mention however, that there can be drawbacks with an online teaching approach especially where the student is not confident in their ability to use this technology. Laurillard (2002) continues along this line saying

that if the user is a ”novice” then they require additional resources to enable them to use this technology effectively. Benfield (2000) cites numerous major educational issues that have to be dealt with when delivering online courses. These include the design of the tasks given to students and the suitability of the material.

The work of the researchers considered above, indicate that there are many benefits to online teaching and learning if the course is prepared properly. There is however also a responsibility of the course designer to ensure that courses are prepared with some forethought into the types of students that will be undertaking the course. Students with limited skills operating within such an environment also have to be acknowledged so that additional resources and support can be provided. The onus is also placed on the student to ensure that all the required tasks are completed. The review of the literature relating to online teaching and learning has identified a need to determine the types and needs of the student. If this is to be accomplished, the types of physical learning environments that these students will be using needs to be identified, as does the types of resources that they prefer to use.

2.2.1.4 Design of new learning environments

A number of studies have focused on the design of specific customized environments for learning. A discussion of this literature introduces the idea that some learning environments have been created artificially by way of this research investigation There are researchers who have set about to construct a learning environment specifically for their students and these learning environments can been seen as distinct and unique. This literature is briefly

considered below because it identifies the different environments that are currently being used in the educational sector. The authors reviewed are a cross-section of those referred to in the literature and provide an overview of what work is being undertaken in this area. The authors all take slightly different approaches for the different environments that they were designing.

The following authors concentrate their research on the creation of online learning environments for their students and have made explicit reference to the concept of learning environments. Hicks et al (1999) investigated approaches to supporting students by the design of responsive OLEs; Vrasidas (2002) presents a systematic approach for designing hypermedia environments for online learning; and Marschalek (2002) provides a framework for designing more effective Web–based learning environments for art instruction.

Hicks et at (1999) state that certain factors have to be present to produce an effective OLE. These factors include computer–mediation, the ability to access large amounts of dynamic information through the World Wide Web (WWW), the use of hypertext and working with materials in a non linear way, access to real–world contexts via the internet, the use of email and ICTs to communicate with lecturers and other students, online submission of assignments and obtaining results, networking, and internationalizing the curriculum (Hicks et al., 1999). They also outline different forms of support that should be available for students when operating within an OLE. These include downloadable text-based documents or interactive online workshops. This work by Hicks et al (1999) has also been useful for this researchers study as it identifies some of the resources that could be used by students.

Another author that has had input into the area of designing specific environments for learning is Vrasidas (2002). His study outlines the steps taken to design a hypermedia as opposed to a hypertext environment for the delivery of online courses. A hypertext environment contains, as the name would suggest, only text-based resources. The hypermedia environment however, as well as text can contain sound, video and image links. Vrasidas' (2002) approach involves 3 phases. Each one of these phases is broken up into several steps. Phase 1 includes identifying the goal of the project; who the audience will be; what skills, knowledge and concepts need to be taught; the limitations of the audience (access to hardware) as well as the developers (budget, technical); how the information will be structured; what tasks will the students be expected to undertake; and identifying the objectives that the learners will be expected to know. Phase 2 involves determining how the learners will be assessed, the design of the system and the user interface, and the creation of a prototype for the system. Phase 3 is the implementation and evaluation of the system itself.

When designing web pages for his art students', Marschalek (2002) describes the idea of "thinking in 3s", which means that '…for every attribute of a category, there are at least three layers developed' (Marschalek, 2002 p. 1). Each attribute refers to a different component of the environment. For example a graphics interface can have three types of structures; topdown, branching and linear depending on the type of information presented. Images again can be broken down into three sections depending on their scale; physical, contextual and psychological. The layers consist of three key components; image, text and technology and are in the author's opinion, '…essential to the design and

fabrication of interactive web-based learning environments' (Marschalek, 2002 p. 1).

Hicks et al (1999), Marschalek (2002) and Vrasidas (2002) believe that there should be not only text, but images, sound and other components present within the OLE. This allows the student to engage with the materials more and improve the effectiveness of the medium in the learning process. In their view it is also important to identify the goals and outcomes of the environment prior to the design process starting. Communication options are also an important consideration. The one point that is not addressed, as with previous literature reviewed, is the physical environment where the students are to undertake these courses.

2.2.1.5 Contemporary approaches for new learning environments

The following authors, although still addressing the design of OLEs, take a slightly different view than those considered in the previous section. Holtz (1999), and Sun and Sunny's (2004) research take a constructivist view and consider the diversity not only of the student undertaking the course but the diversity in the skills of the designers.

The work by Holtz (1999) discusses the design of a model for an online constructivist learning environment that '…encourages diversity among students by valuing the different perspectives they bring to an issue…' (Holzl, 1999 p. 1). This diversity comes from not only the more traditional reasons such as prior knowledge and experience, but factors such as, age, gender, ethnic background and disabilities. He takes a problem-based learning approach with "Related

Cases" that each has a different cultural context. The students would work through these in groups that have been formed with a mixture of cultural backgrounds. Other resources that are to be included are information resources such as repositories that include graphics, sound and animations that are appropriate for assisting the student in understanding the problem. Tools such as graphical user interfaces (GUIs), databases, spreadsheets and calculators as well as conversation tools such as email and bulletin boards should also be available. In his conclusion Holtz (1999), states that

> 'The major advantage of this learning model is that one of its key design goals is to encourage students to bring multiple perspectives to questions/cases/problems/issues and projects as part of their learning' (Holzl, 1999 p. 9).

Sun and Sunny (2004) use a social constructivist theory approach to design a web–based interactive learning environment, called the CORAL–View system to '… enhance Taiwanese university students collaborative skills via design projects' (Sun and Sunny p. 1). This environment has been designed in modules that allow the students to undertake such tasks as investigating different design products, examining theory, modifying their designs and discuss their ideas with other students. There is also the facility for the teacher to match students' skills in order to create teams.

Jones and Creese (2000) uses a collaborative e–education cross–functional team model for academic and general staff to determine the content of and design of online courses. They deem that in most cases, an academic does not have the necessary skills to adequately design an online course. This is where the team

approach is beneficial, bringing together the academic and the technical support staff to design and develop online courses. They also address the issue of how a team approach to the design and development of a course might assist the facilitation of student learning.

Steffes (2004) addresses the issue of service learning, where the student takes an internship or work experience with organisations outside the traditional educational environment. She states that ‘non–traditional educational experiences connect students’ cognitive learning inside the classroom with their affective learning in the lab, on the job or at the service learning site’ (Steffes, 2004 p. 1). Within these learning environments she continues by stating that ‘students can learn to translate knowledge into action or research into practice during such non–traditional educational activities, something that the most intense study in the classroom cannot easily convey’ (Steffes, 2004 p. 1).

The work by Steffes (2004) has been the only one of the authors reviewed that takes into consideration the physical setting where the student will be learning. She points out the relevance of the physical learning environment as vital to the overall learning experience of the student where they can apply the knowledge they have gained in the classroom.

Each one of the authors outlined above takes a slightly different perspective on the design of their learning environment. These depend on the type of course, for example if the course is for art students or for students training in the workplace. There is however some common factors present with all these approaches. One of the main factors is consideration of the needs of the student, whether this is the student’s ethnic background or their previous exposure to technology. Apart

from Steffes (2004), there is no mention of the type of physical learning environments that the student will be using when undertaking these online courses which, if considering the needs of the student should also be addressed.

2.2.1.6 Conclusions

This section has provided a brief overview of the foundations of the study into learning environments from when the topic was first identified by Dewey in 1886 through to the present. It has highlighted that the majority of early research was psychologically-based and concentrated on one environment only. As the research expanded to include the tertiary sector, the needs of the students started to be considered, especially where courses were being designed for specific learning situations. It has also given some insight into the types of resources that can be used in the design of courses. This latter point provides this researcher with insights appropriate to the design of the survey instrument to be completed as part of this research study. However, there has been no mention of the identification of the physical learning environments students use when undertaking these courses.

2.2.2 Evaluation of learning environments

When undertaking the literature review for this study, it was found that most of the research into learning environments had an evaluation focus. Two perspectives can be identified: where the evaluation is done by the student, giving their perceptions of their learning environment; or by the teacher/researcher evaluating the content of the environment especially where this is an Online Learning Environment (OLE) or a Virtual Learning

Environment (VLE). Each of these foci are addressed separately in the following sections. As the majority of literature relating to learning environments takes a psychological perspective, it is important to review this literature to obtain a more holistic view of the literature relating to learning environments.

2.2.2.1 Teacher/researcher evaluation of specific learning environments

In the case of the evaluation of the learning environments undertaken by teachers/researchers, the evaluations are done on the basis of the content of the environment and the course that is being taught in this environment. Britain and Liber (1999), using the Conversational Framework devised by Laurillard in 1993, and the Viable Systems Model (VSM) proposed by Beer in 1981, developed a framework for the pedagogical evaluation of VLEs. The Conversational Framework has been used as 'and evaluation methodology for virtual learning environments' (Britain and Liber, 1999 p. 12). It is based on the interaction between the teacher and the student and is '…constructed around the dialogue and should be supplemented by constructive and meaningful feedback from the teacher' (Britain and Liber, 1999 p. 12).

One of the main limitations of this model is stated as that '…it fails to reflect functionality associated with managing groups of learners' (Britain and Liber, 1999 p. 21). The VSM was therefore used to evaluate the commercially available educational software used to develop a VLE. They describe the VLE software as

> ‘learning management software systems that synthesise the functionality of computer-mediated communication software and online methods of delivering course materials’ (Britain and Liber, 1999 p. 2).

Several commercial software systems were evaluated including WebCT, CoMentor, TopClass, and Virtual-U. The evaluation was undertaken in two parts. The first part was to determine the level of usage of VLEs in United Kingdom universities. In this part of the research there were only 11 responses received from 100 surveys sent out. This was insufficient to make any definitive conclusions. However all of the respondents did indicate that they used the WWW to some extent for teaching and learning. The second part was the evaluation of the identified VLEs. This framework focuses solely on the VLE and does not take into account the actual physical learning environment that the student uses to study when undertaking a course using the VLE. The evaluation framework included the tools the teacher has to create presentations, student/teacher interaction through the system, and the ability for students’ to modify set activities once they have received feedback from their teacher.

The research undertaken by Joia (2002) investigates the use of a VLE (WebCT) for the delivery of e-commerce classes within the Masters in Business Administration Program at a Brazilian college located in Rio de Janeiro. Groups of students are based at various locations throughout Brazil. Although not defined in the research the online environment created for this purpose is known by the acronym EBAP_ECOM. Five questions are stated as part of the study. Two pertinent questions relevant to this authors work are

> ‘How does the physical location of the students influence their participation in the group?
>
> Can EBAP and ECOM be considered a Computer Supported Collaborative work (CSCL) environment? Why?’ (Joia, 2002 p. 5)

The other questions posed addressed the issues of the students’ perceptions of the environment, the need for a moderator and how the environment enhances collaborative work. The conclusions reached indicated that the groups of students outside the Rio de Janeiro area participated in the environment more than their on-campus counterparts. The rationale for these have been given includes the lack of direct access to the library, the computer labs and to the teachers. The EBAP_ECOM has been deemed to be a CSCL as it promotes group interaction and provides the basis for the gaining of knowledge and skills.

Even though learning through the use of online resources is classed in the literature as a learning environment it does not identify the physical place where the students undertake their learning. Reviewing the research relating to the teacher or researchers evaluation of learning environments has highlighted a need for research to be undertaken into the different types of physical learning environments used by students.

2.2.2.2 Student Evaluation of their learning environments

The second focus into the evaluation of learning environments was from the perspective of the student. Several instruments were identified through the review of the literature that concerned the students’ perceptions of their learning environments. The focus of each instrument is different depending on the age group of the students. Several of these instruments such as the LEI and the

CUCEI, have been previously identified and are discussed here in more detail. They highlight the psychological perspective that has been taken by researchers over the past 30 years. They also highlight that as well as obtaining the students' perceptions of their learning environment; credence should also be given to the physical learning environment as well. The LEI was created by Anderson in 1971 and outlined by Anderson and Walberg (1974) and Fraser (1986a), concentrates on the classroom environment only and examines factors such as relationship characteristics (cohesiveness, friction and favouritism), personal development (speed, difficulty and competitiveness) and system maintenance and change (formality, goal direction and democracy). The LEI is also aimed for use with primary school students. The questions posed do not have any mention of the teacher and as stated by Anderson and Walberg '…does not pose any threat of other instruments that explicitly focus on teacher characteristics an (sic) behaviour' (Anderson and Walberg, 1974 p. 154).

Another instrument outlined by Fraser (1986a) is the *College and University Classroom Environment Inventory* (CUCEI). As the name suggests it is aimed at tertiary level students. This instrument however is only suitable for classes with less than 30 students. The questions posed in the CUCEI are very similar to those used at CQU in their course and teaching evaluations conducted at the end of each term. These questions address such issues as if the student has received timely feedback on their assignments, if the course objectives were clearly stated, if the resource material was received in time for the beginning of class and if they felt that the materials provided were in line with the weekly study schedule.

The Centre for Research in Distance and Adult Learning (2003) at the Open University of Hong Kong has developed an instrument – the *Distance and Open Virtual Learning Environment Scale* (DOVILES). This instrument is an online survey that asks participants for their views on certain areas of their learning experience that relate to the online learning environment. The questions are also very similar to those used by CQU in its teaching and course evaluations. Both the CUCEI and the DOVILES instruments ask the student to give their opinion on various aspects of the course/class/teacher and do not address the topic of the types of physical learning environments students use now or have previously been associated with.

Fisher et al's (2001) study outlined the development of the *Technology–Rich, Outcomes–Focused Learning Environment Inventory* (TROFI). The TROFI was developed for '…assessing students' perceptions of their actual and preferred classroom learning environments in technology–rich, outcome–focused learning settings' (Fisher et al., 2001 p. 5).

As mentioned by Fraser et al (2001) the TROFI was based on a previous instrument, the *What Is Happening in this Class* (WIHIC) questionnaire. Fraser et al (2001) state that the WIHIC was developed by Fraser, McRobbie and Fisher in 1996. This study uses Grade 11 students as the cohort. The instrument itself contains 69 items in nine scales and addresses factors such as student cohesiveness, involvement in class, task orientation, equity, and computer usage. As with Fraser (1986b) and Anderson and Walberg's (1974) works, Fisher et al (2001) take the perspective of the students' perceptions of their classroom environment only. They also investigate whether male and female students'

perceptions of their actual and preferred learning environments are different, and whether the outcomes-focused and ICT rich learning environments were associated with student outcomes.

A more recent instrument is *The Student Perception Inventory* (SPI) that was developed by Rayneri and Gerber (2004). This instrument gives some understanding of compatibility with the classroom. It is an instrument that 'quantifies student perceptions of elements within the environment' (Rayneri and Gerber, 2004 p. 1). The target cohort for the study was gifted students and was found to provide information that could be used to improve the learning environments of these gifted students, especially underachieving students. This information was determined by using the SPI in conjunction with the Dunn instrument of learning style preferences (LSI) developed in 2000.

Reviewing these instruments has given this author an insight into the work that has been done to date in the area of student evaluations of learning environments. Although not identifying the types of physical learning environments that the students use, it has highlighted a need for research to be done in this area.

2.2.2.3 Conclusion

The previous section, whilst not identifying the types of physical learning environments used by students, provides an insight on different aspects and perceptions of learning environments that have been explored. From a teacher/researcher's perspective, the evaluation of specific learning environments highlights factors that should be present in order to engage the students more in those particular environments. From a student perspective, it allows this

researcher to understand what perceptions each individual student has in regard to a particular learning environment. These research studies are important in obtaining a more holistic view of learning environments as a whole and also indicating the need for more research to be undertaken into identifying other physical learning environments used by students.

2.2.3 Additional research on learning environments

Additional research on learning environments was also reviewed that did not fall into the areas already discussed. This included the comparison of student outcomes when the student undertook the same course via different delivery methods (Diaz and Cartnal, 1999;Ladyshewsky, 2004;Marold et al., 2002). One other source also referred to (Buros Institute of Mental Measurements, n.d) listed numerous instruments to measure various aspects of the learning process. None of these instruments however identified the physical learning environments that students use.

Diaz and Cartnal (1999) while not concentrating solely on learning environments did give some insight into the types of learning environments, such as classrooms and group sessions, that students prefer. In this study the *Grasha–Reichmann Student Learning Style Scales* (GRSLSS) was used to '…determine student social learning preferences in six learning style categories' (Diaz and Cartnal, 1999 p. 1).

These six styles which included independent students, dependent learners, competitive students, collaborative learners, avoidant learners and participant learners, each have their own preferential learning setting, whether that is in the

classroom, in a lecture theatre, in small group sessions or alone at some undefined place. The main context of the study was aimed at comparing the learning styles of distance students to their on-campus counterparts. One of the main conclusions coming from the study has indicated that '…there may be drastic learning style, as well as other characteristic differences between distance and traditional students that warrants consideration' (Diaz and Cartnal, 1999 p. 12). This comment was directed at faculty members who have simply transferred their traditional classroom learning materials referred to as "shovelware" to an online environment without any alterations.

A comparison of the performance of students undertaking a course in both online and face-to-face mode was also undertaken by Ladyshewsky (2004). This study was of two year duration and covered nine courses at the Curtin University of Technology's Graduate School of Business. It was found that there were no significant differences in achievement between the two delivery methods for either gender or the age group over 33. It was however found that students under 33 years of age did significantly better in the online environment when all courses were taken into consideration.

Marold et al's (2002) study compared the performance of students completing a computer information systems course a Metropolitan State University in Denver. Students were able to enrol in the course as an Internet student or as a classroom student. The study involved comparing the students' results over three semesters using 18 classes (9 Internet and 9 classroom-delivered) and three levels of students (junior, intermediate and advanced). These results were measured using eight homework assignments and exam scores. The final grades were also

examined. It was found that the final grades did not differ significantly, but the marks for different assessment items did for two of the three levels of students. The instructor remained the same for all courses and all levels.

It was interesting to note the results of the comparisons of students' successes in a course when different delivery methods and different learning environments were used. At the very least this type of data can be used to justify the inclusion of the physical learning environment as an important factor when planning or designing courses and for addressing the needs of students whose success in a course could depend on the type of physical learning environment they use.

Finally another source reviewed was the Buros Institute for Mental Measurements (n.d) to determine if there were any appropriate instruments already available to identify the physical learning environments that students use. This is a web site that lists numerous instruments that can be used in the testing of various factors of education and gives a review of the various questionnaires and instruments available within the educational setting. There were some questionnaires that addressed areas such as learning styles and strategies, predicting if a student with disabilities would succeed in mainstream education, teacher evaluations and student expectations. There are also questionnaires listed that address other educational issues such as literacy and numeracy. No instruments were found that could be used to identify the types of physical learning environments that students use when studying.

The studies undertaken by Diaz and Cartnal (1999), Ladyshewsky (2004), and Marold et al (2002) have informed this research by identifying that students learning methods and success rates in courses undertaken, differ depending on

the learning environment that are being used. These studies suggest the need for research into the identification into the types of physical learning environments students use to be completed to assist course designers and developers to better meet the needs of students. Reviewing the Buros (n.d) site further provided evidence that no instrument available that could identify the physical learning environments students use.

2.2.4 Summary

The preceding section has outlined the extent of the literature relating to learning environments beginning with a general historical overview through to the present day. The majority of the research has taken a psychological perspective, with the inference on the non-physical characteristics of the learning environment. The remaining literature examined the design of specific learning environments and how students' results varied when undertaking courses in different learning environments. It was shown that whilst the term "learning environment" is used frequently throughout the literature no actual definition was identified.

2.3 The physical learning environment defined

It was alluded to in Chapter 1 that there is a need to consider the learning environment from a holistic perspective. Indeed the review of the literature demonstrated that very limited research has been done that concerns the physical learning environment. Furthermore whilst it was shown that the term learning environment has been used frequently throughout the literature it is evident from the foregoing review of the literature that the focus of most research has taken a psychological perspective. Most research has not taken into account the place of

learning as a factor. Even though the students might be learning in the same physical learning environment, this learning situation can differ from student to student depending on various factors such as the amount and type of contact with the teacher, the size of the class or the ethnic background of the students themselves. In this respect numerous types of learning environments can be identified including the online learning environment, the virtual learning environment, and the classroom learning environment. However none of the research studies examined have provided a specific definition of what a physical learning environment is. The closest to a definition was made by Ream and Ream (2005) when reviewing the work of Dewey (1916/1966). Here the distinction was made that there should be a 'separation of human agents as subjects and their learning environments as objects' (Ream and Ream, 2005 p. 586). Therefore, in order to undertake a study on physical learning environments used by students the term must firstly be clearly defined.

The Concise Oxford Dictionary (Pearsall, 2001 - online) defines an environment as 'the surroundings or conditions in which a person, animal, or plant lives or operates'. It continues by defining learning as 'knowledge or skills acquired through experience or study or by being taught'. From these definitions and for the purposes of this study, a physical learning environment will be described as

> 'a place or the surroundings where a person can gain knowledge or skills through study or experience, whether independently or by interaction with a teacher or other students' (Carpenter and Dekkers, 2006 p. 95).

2.4 Conclusion

Since the identification by Dewey (1916/1966) of a learning environment, the exploration of this area of research has grown significantly, not only in the research area but in the physical sense with more learning environments being identified which include not only the virtual environment but workplace environments as well. The foregoing review of the literature has shown that there has been research in the areas of evaluation of specific learning environments, both from a student's perspective and from a teacher/researchers perspective, and for the design of specific learning environments. The literature reviewed overwhelmingly concentrated on one environment only, whether that was a classroom environment or a virtual learning environment. In the case of the student's perspective the research explored that environment from a sociopsychological viewpoint. This tended to take into consideration such matters as the students' attitudes towards their teacher and the amount of friction and favouritism with the classroom.

It was also from this review that when the research concerned the tertiary sector, the emphasis is on the needs of the student and the ability for the teacher to adapt to meet these needs. The aspect that is rarely addressed is the actual physical environment where this learning is to take place. None of the studies reviewed have concentrated on identifying the types of physical learning environments that the student uses and little research has been done in the area of identifying the types of physical learning environments that students have used previously and how this relates to their current abilities to use ICTs. The studies that compared student outcomes when different delivery methods were used however, did in

this researcher's view draw attention to the fact that the physical surroundings that a student used to study should be taken into consideration when planning and designing courses.

Finally, while this chapter reports on the small amount of research that has been done into the physical learning environment, it recognizes the importance of research literature that addresses aspects of the non-physical learning environment. It does so under the premise that by examining both types of literature helps present a more holistic view of learning environments where identifying and discussing non-physical learning environments. It also provides insight into the unique contribution made by the physical learning environment thereby facilitating a more expansive understanding of the role of learning environments in student learning. Nevertheless, from this review it was found that there were no appropriate instruments available that would identify the types of physical learning environments or resources students used when studying. The literature review has also highlighted a gap in the knowledge relating to the types of physical learning environments students have used in the past and if this has had an effect on their current study and provides the basis for this study. Highlighting this gap has also provided a justification for carrying out this research.

Chapter 3 - Design, Development And Implementation Of An Online Survey Instrument

3.1 Introduction

This chapter concerns the design and development of an instrument to enable the examination of a student's physical learning environment. Whilst a number of instruments have been developed that examine aspects of learning environments, none of these concentrate on the use of physical learning environments. As a result for the purpose of this research, a new instrument called the Learning Environment Questionnaire (LEQ) was developed. This chapter examines the steps taken in the design and development of the LEQ. It will also discuss the procedures adopted for the administration of the survey. Figure 3-1 presents a chart outlining these steps.

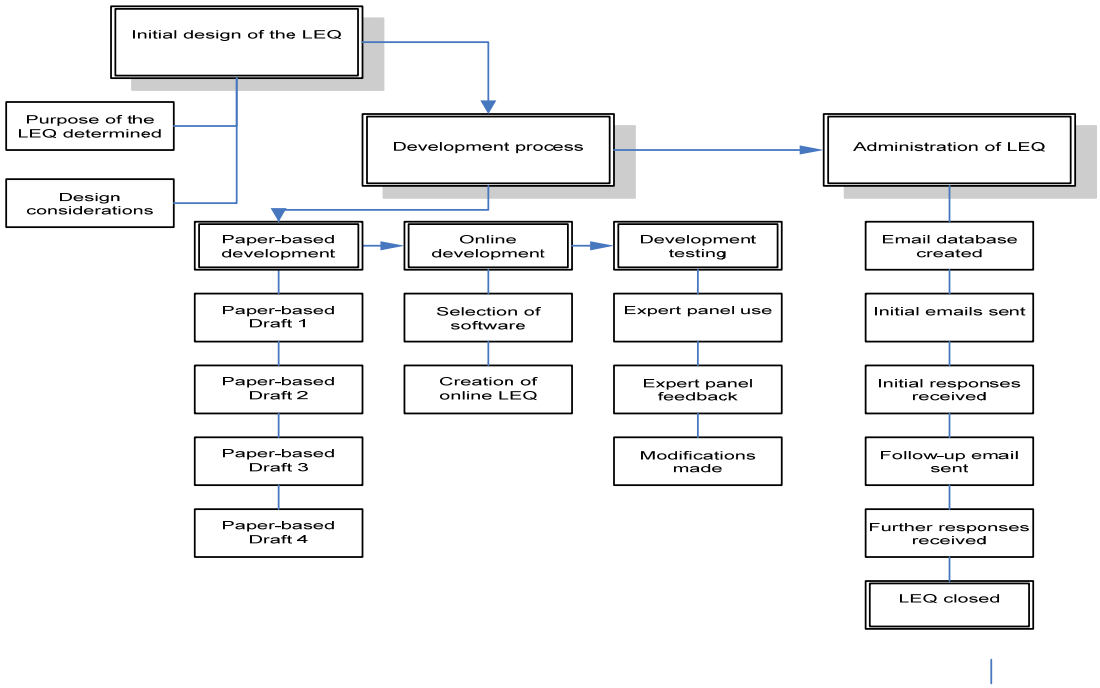

Figure 3-1 - Overview of design, development and administration process

3.2 Design of Instrument

3.2.1 Purpose of the instrument

The LEQ will be used to find out the students' previous learning environments and the types of resources they have used. To accomplish this, the LEQ has been developed in three sections. One section gathers general demographic information about the participant, including their previous level of education. Another section specifically seeks participants' opinions on how they relate to their previous learning environments. This includes the types of information gathering techniques used, how often they have participated in different physical learning environments and the types of resources they have used in previous study. The last section of the LEQ asks the students if they are willing to participate in follow–up interviews.

The instrument that has been designed will be seeking information about how the participants learn, the resources they use and the types of physical learning environments they have used when studying. The remainder of this section outlines the steps taken for the design and development of the LEQ. It also provides details of the procedures for the use of the instrument.

3.2.2 Design considerations

Initial ideas for the design of the instrument were obtained from other online survey instruments, for example the (Center for Research in Distance and Adult Learning, 2003;Williamson, 2004). Although these instruments were not addressing the same purposes as the LEQ, they did supply features that could be used in its layout and set up which included resources used by students within an

online learning environment and demographic information. For instance the Distance and Open Virtual Learning Environment Scale (DOVILES) instrument (Center for Research in Distance and Adult Learning, 2003) highlighted some of the resources that are used by students within an online learning environment. Also both DOVILES and the instrument used by Williamson (2004) outlined demographic information that applied to the use of the LEQ such as gender and age. Other demographic features also included were previous level of education and current qualifications. This researcher's own knowledge of the modes of the different offerings of courses at CQU was also used to establish categories to be included the LEQ, for example undertaking a course in Flex mode with either paper–based study materials or web–based materials.

It was decided by this researcher that the LEQ be an online instrument. The reason for this was for ease of administrating the survey to the participants and for data collection purposes. In doing this it was assumed that students would have the necessary skills to undertake the online questionnaire as they should have already undertaken previous courses that would give them the required skills to undertake the online survey, as prerequisites for SAD. Another reason for placing the LEQ online was a time issue. Administering the LEQ online meant that responses would be received instantaneously and there would be no time delay in posting out the questionnaires and then having to wait for them to be posted back. It also meant that the data could be automatically transferred into a database instead of having to manually enter in the responses from each survey individually. This would also eliminate any possible errors in data entry as well.

Ethical clearance guidelines from CQU require the written consent of parents or guardians of participants that are under 18 years of age. As the survey was to be administered online, problems were envisaged that involved obtaining this consent. Therefore the research was limited to respondents 18 years of age or older. In the introduction/instruction page of the LEQ, there was a 'Consent to Participate' that set out the conditions of the survey to the participants. This included a statement that asked the participants to certify that they were 18 years of age or older.

3.3 Development process for LEQ

The development of the LEQ contained three steps as shown in Figure 1 namely the initial paper-based development, the online development and development testing. Each one of these steps also has subsections.

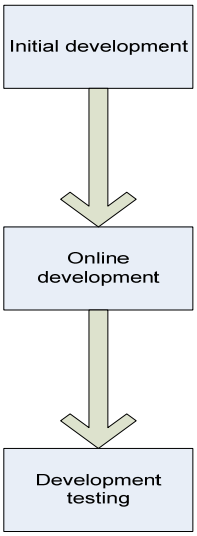

Figure 3-2 - Development process for LEQ

The remainder of this section provides details of the development process that is described in Figure 3-2.

3.3.1 Initial Development

3.3.1.1 Overview

In the draft stage of development Microsoft Word was used to create a simple version of the questionnaire. The original idea behind the LEQ was to administer it in paper form but as mentioned in Section 3.2.2 this was amended to an online version for the reasons stated.

3.3.1.2 Draft 1

This draft concentrated on item generation. In the original version there were 6 questions relating to the learning environment and 7 questions in the demographic information section and is presented in Appendix A. In the learning environment section the categories used were the student's

- interaction with materials,
- interaction with others,
- approach to learning,
- opinion on the tutor's approach to learning,
- accessibility to materials and
- the physical environments that they use.

For the categories 'interaction with materials' and 'interaction with others' only the category name was identified. For 'tutor approach to learning' and 'accessibility' the questions are written so that the respondent is asked for their perceptions of the situation. The idea for both these questions were sourced from

the DOVILES instrument (Center for Research in Distance and Adult Learning, 2003). The demographic information included

- age group,
- gender,
- number of online courses taken
- the student's program of study,
- the Faculty that the student belongs to and
- the student's previous level of education

There was also a question that asked the respondents how often they had used certain resources when studying. These included online course materials, email, bulletin boards, chat rooms, online tests/quizzes and online search tools to name a few. All of the resources that were identified were online resources.

3.3.1.3 Draft 2

This draft sought to finalise the basic framework of questions for the LEQ. From comments received from this researcher's supervisor on Draft 1 no additional questions were added in the learning environment section in the second draft. However in the initial draft only the category name was identified for 'interaction with materials' and 'interaction with others' and the section needed to be further expanded upon. In this draft the types of learning environments were added. For the category of 'interaction with materials', the following responses were added

- demonstrations of procedures,
- prepared written notes and
- researching your own ideas.

As well for the category ‘interaction with others’ this was modified in a way so that the respondents were asked to nominate the type of situation that they felt most comfortable. The choices were

- learning by yourself,
- learning in small groups
- learning in large lectures,
- being guided by the tutor and
- giving presentation in front of a class.

An additional choice was also added to the accessibility category, this being whether the respondents study materials arrived on time. There were no changes made to the demographic section.

3.3.1.4 Draft 3

This draft focused on the finer details of the use of the LEQ by its respondents. Again, in consultation with this researcher’s supervisors an additional question was added to the demographic information section in the third draft. This allowed for the respondent to indicate whether they already held any formal qualifications (None, Certificate, Diploma, Masters, PhD, Other). The question relating to student approach to learning was moved from the learning environment section to the demographic section. The initial question asked whether the respondent had been given a choice when selecting their mode of study. If the response was yes to this question the participant was then asked what factors affected their choice such as the distance from the campus, work or family commitments, the timing of classes, tutorial support and the availability of resources.

The questions in the learning environment section were put into tables and scales were added. As the questions asked the for respondents frequency of use, preferences for and majority of use of learning environments it was decided, in consultation with this researcher's supervisor to use the scale Never, Seldom, Sometimes, Often and Always. This differs from the survey instruments available that concentrate on the psychosocial aspects of the learning environment where multiple items are used and whose scores are added to form dimensions or scales. (Fraser, 1998;Zandvliet and Fraser, 2005)

Extra choices to each question were also added. This included the expansion of the question on learning environments into two sub questions. The first sub question asked how often the respondent had participated in different learning situations such as private tuition, classroom learning with either paper-based or web-based resources, and distance learning with either paper-based or web-based resources. The second part of the question asked the respondent to nominate where the majority of their learning takes place such as at home, in the classroom, at work or in the library. The actual question was added to the 'interaction with materials' category. This asked the respondent to indicate what type of information gathering techniques suited them the most. Additional choices were also added to include use of textbooks, use of online materials and use of self-instructional material. These were identified in consultation with this researcher's supervisor as other forms of resources that students might use. In the 'interaction with others' category the wording of the question was changed from 'What type of situation do you feel most comfortable in?' to 'What type of situation do you prefer most?' Additional choices were also added that included learning through interactive video conference sessions and self-help groups. An

‘other’ choice was also added if the respondent preferred another setting other than those listed. These two additional choices were added as these facilities are available for students at the institution where the research was undertaken. In the ‘tutor approach to learning’ category, the wording of the choices were shortened and changed. The original questions can be found in Appendix A. These were changed to clarification of problems, constructive feedback, encouragement to express myself, prompt replies to my queries, the tutor’s feedback is encouraging, and facilitation of online discussion sessions. The ‘accessibility’ category was also modified in a similar manner, with the choice relating to the speed of the internet connection and timing of delivery of study materials being removed. One additional choice was added for the accessibility of database and library services.

3.3.1.5 Draft 4

A further draft needed to be prepared in response to comments from this institution’s Ethical Clearance Committee. It was requested by this committee to remove the question relating to the tutor. As well and at the suggestion of this researcher’s supervisor the question contained in the demographic section relating to the use of resources was also moved to the learning environment section of the instrument. At this stage a refinement in the wording of some of the questions was also carried out. For example the word learning was substituted for studying.

The final draft in the initial development saw the inclusion of additional questions in the demographic section. An option was added that allowed the respondent to indicate if they had not been given a choice when selecting their

mode of study, what factors would have affected their choice. At this point it was then decided that for convenience and cost effectiveness, the LEQ would be administered online. This draft was the final draft paper version of the LEQ.

3.3.2 Online Development

3.3.2.1 Overview

This section sets outs the steps that were taken to develop the LEQ for online use. Draft 4 of the paper-based version for the LEQ was used. These steps include the structure of the online instrument, the reasons why the particular software package was chosen, the functionality and use of the software and the development process used. A description of the online survey instrument will also be provided.

3.3.2.2 Structure of the online instrument

The LEQ was developed in 2 parts for use on the WWW. This was done as two separate software packages had to be used. Part One contained the introduction and information for participants and was produced using Macromedia Dreamweaver. Part Two containing the questionnaire was designed using the website SurveyMonkey (SurveyMonkey.com, 2004).

The introduction/information section contained the aim of the research, participant project information, the definitions to be used within the research project, and the consent to participate. Under CQU's Ethical Clearance guidelines, when any person participates in data collection activities, they have to be informed about the study being undertaken. This includes the reasons for the

research, definitions of the terminology, anonymity of the research data, their right to withdraw from the study at any time and the security of the collected data. The introduction/information section can be found in Appendix B. The software package used, Macromedia Dreamweaver, is a package that allows the user to design and create web pages. Prior to undertaking this study, this researcher attended a training course to learn how to use the package.

3.3.2.3 Choice of software package

When the decision was made to administer the LEQ online, several options were considered. The first option considered by this researcher was writing a program that could be placed on CQU's web site. This option was dismissed due to a lack of knowledge in computer programming by this researcher. The second consideration was to use a web-based survey creation site. The Internet lists thousands of these sites, all differing in their features, functionality and cost. Through discussions with other postgraduate students several of these sites were reviewed. All of these except SurveyMonkey (2004) were rejected due to either the cost involved for subscription or due to the site not having the features required by this researcher.

3.3.2.4 Functionality of the software

SurveyMonkey (2004) is a subscription survey creation site that allows the user to create individualized surveys. The user is able to create a small survey with up to 10 questions and 100 respondents without subscribing to the site. However the choice of questions and other features available are limited unless a Professional subscription is taken out. The monthly subscription was US$19–95. As the

number of questions and prospective respondents were greater than allowed for the basic features, application was made to CQU for funding.

The site allows the user to customize the look of their survey with different backgrounds and colour schemes. There are also different formats for questions that can be used including single answer questions, multiple answer questions, matrices, and open–ended questions.

This site also has other features that can be used to administer the survey and collect the ensuing data. For the administration of the survey there were three different options that can be used

- Create a link for an email message – Send a link to the survey in the creators own email message. The respondents to the survey will not be tracked.
- Create a link for a web page – Create a link for another website that directs participants to the survey. The respondents to the survey will not be tracked.
- Send a link to an email list – SurveyMonkey will send the link to the survey in an email message to the required participants. Responses will then be tracked by the system.

The option used in the creation of the LEQ was the second where the URL link was copied into the introduction/information page. This option also enabled the SurveyMonkey system to store the data once it was received from the respondents. This data could then be downloaded in either a spreadsheet format or as a HTML document. Search and sort facilities were also available which enabled the data to be sorted into cohorts depending on the responses to certain

questions such as gender, age, and mode of study. The facility was also available to download each returned questionnaire individually.

3.3.2.5 Use of software

First-time users of SurveyMonkey (2004) are required to complete an online registration form stating the users details. Users are then required to provide a username and password to access their individual workspace. This gives some degree of security for the survey being developed and any ensuing data that is collected. Whilst the survey is being created, it has a “closed” status. This means that no one can view the survey. Once completed, the survey can then be “opened” for the participants to use. The option is then selected to create a new survey. From this screen the user can select the “theme” or background colours for the survey, and add a company logo if desired. The user can then start adding questions.

When composing questions, the user firstly nominates the type of question format required such as an open-ended question or a matrix. The user is then taken to another screen where the particular question and responses if required can be entered. For example if the user selects a matrix type question with a rating scale, there is one section for the question itself, an option to make the question compulsory to answer, a section to nominate the rows in the matrix and a section for the rating scale to be used. This process is repeated until all questions have been entered.

Once the survey has been finalised, the user can then select additional features that can be used. These include the ability to allow participants to take the survey

more than once, to be able to exit the survey at any point and return to complete the remainder of the questions, security features where respondents have to log in to complete the survey and the option to provide an exit URL that the respondent is taken to once they have completed the survey.

3.3.2.6 Development process used

The question formats used in the development of the LEQ were a mixture of a majority of those available from the software package. Matrices were used for the questions in the learning environment section where the respondents had to nominate the frequency of use of the types of environments and resources they use. Single answer questions were used mainly in the demographic section where the respondents had to nominate their age, gender, number of online courses taken previously, their level of previous education, and any qualifications they currently hold. Open-ended questions were used where there was an option for an 'Other' response. These questions were in the demographic section, in particular the level of previous education question, if none of the provided responses matched the respondent's situation. The age groupings were also changed in the online version from 5 year intervals to 10 year intervals.

Another change in the online version compared to the paper version was moving the question addressing the use of resources from the demographic section and placing it in the learning environment section. This original question only asked the respondents about their use of online materials and communication technologies so additional choices were also added to this question to include paper-based resources such as textbooks, printed study guides, handouts provided by the lecturer and library resources such as journal articles. The

categories of the questions for example, interaction with materials and interaction with others were removed and only the questions were used in the online version.

When the LEQ was being developed to go online, two other sections were added. The first of these asked the students if they were willing to participate in follow–up interviews. If the students indicated that they would, they were then asked for their name and contact details. This was to identify some of the reasoning behind the choices that the respondents made. The second additional section asked for feedback on the questionnaire itself. The information requested was to find out how long it took the respondents to complete the LEQ, if any of the questions were confusing or hard to answer, and if there were any improvements or areas of their learning environment that they felt were not addressed. These questions were open-ended questions that allowed for the respondents to voice their opinions.

3.3.2.7 Description of the online survey

As stated in Section 3.3.2.6, there were five sections to the online version of the LEQ. The total number of questions in the initial online version of the LEQ was 28. Of these 7 related to the learning environment and resources, 6 were demographical, 4 asked about the respondents current mode of study, 4 were for follow-up interviews and 7 asked for feedback on the survey itself. The final version of the LEQ used in the data collection can be found in Appendix C.

Each section has a name and a brief description of what type of questions are contained within the section. These sections are as follows

- The learning environment

- Your background
- About your current studies
- Follow-up interview
- Feedback survey

The survey name and logo of CQU is displayed at the top of each page. There is also an “Exit the survey” link available in the top right-hand corner of each page and navigation buttons at the bottom of each section to go to the next page.

Figure 3-3 shows a screenshot of part of the LEQ.

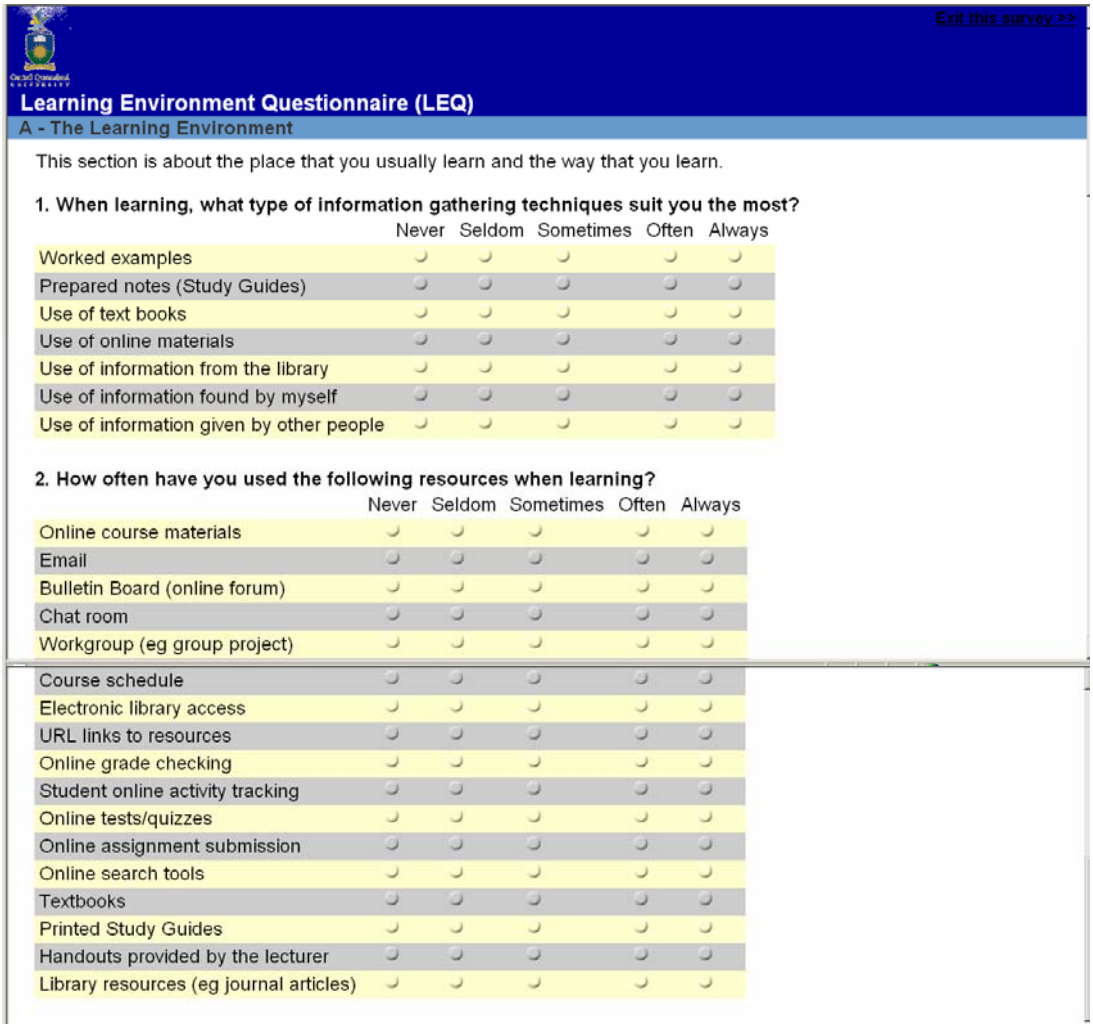

Figure 3-3 - Screenshot from LEQ

3.3.3 Development Testing

3.3.3.1 Overview

In the development testing stage, feedback was sought from colleagues and other postgraduate students regarding the layout of the questionnaire and the types of questions asked. Opinions were also sought from the expert panel to determine whether any of the questions were ambiguous or contained terminology that was not easily understood. From feedback received modifications to the LEQ were made. The version of the LEQ shown in Appendix C is the final version used for collection of the data and contains all the modifications suggested by the expert panel.

3.3.3.2 Expert Panel use

When the LEQ was put online initially, the URL was given to 8 experts, which included university lecturers and postgraduate students. As the LEQ was to use only students from the SAD course, which is situated within the Faculty of Business and Informatics, the experts chosen represented a cross-section of expertise in these academic disciplines. As well as academic feedback in the academic discipline area, they could also provide feedback from a student's perspective. The panel was requested to complete the LEQ as if they were a respondent to the survey. The members of the expert panel were asked to complete the feedback survey contained in the final section of the LEQ. The questions they were requested to answer regarding the LEQ were

- How long did it take you to complete the questionnaire?
- Were there any questions that were ambiguous or difficult to answer?

- If yes, which questions were they and in your opinion what needs improving?
- Were there and areas of your learning environment that you feel were not addressed in this questionnaire?
- If yes, what were these areas?
- Are there any other comments or suggestions you would like to make regarding this questionnaire?

These questions were asked to identify any areas that needed clarification or improvement, or if any of the terminology was too technical.

3.3.3.3 Feedback from Expert Panel

The overall response from feedback received from the panel of experts was very positive in so far that only a very few problems and issues in the uses of the LEQ were identified. However, feedback received resulted in making some changes to the LEQ. The answers given by the panel to the feedback questions posed resulted in the reorganization of the order and rewording of some of the questions in the LEQ. From the suggestions received from the experts, the questions relating to the learning environment were ordered first. Another suggestion was to change the colour scheme of the background used. The original colour scheme was light blue with black writing. This was changed to a pale yellow and blue background.

An additional question was also added to the demographic section of the questionnaire at this point. This question asked the respondent to indicate what country the majority of their previous education had been undertaken in. This was suggested by members of the expert panel as CQU has a large international

cohort. This additional question also allows for the LEQ to be used in further research outside the scope of this current study. The respondents mode of study was also changed to allow for the selection of full-time/part-time and internal/flex.

3.4 Administration of LEQ

3.4.1 Overview

The commencement of the administration of the LEQ took place on 29th March in Term 1 2005. The participants were contacted by email asking them to take part in the survey. Originally only half of the students were contacted but due to a low response rate, the remaining students were also included in the sample. This section discusses the administrations procedures taken.

3.4.2 Sample

The enrolment for Term 1 2005, when the implementation was carried out, was 240 students. The email addresses of these students were obtained from the course enrolment details and were copied into an Excel spreadsheet. From these every second address was selected giving 120 email addresses to be used initially. Using Microsoft Outlook a Distribution List was set up. However because of the format of the software each address had to be entered individually into the list. This proved too time-consuming and was not used.

3.4.3 Administration procedures

A group email was sent to the selected students on 29th March 2005, Week 4 of term, asking them to participate. From this mail out, 6 emails 'bounced' and were

not delivered. From this initial mail out 8 responses were received within the first 3 days. After this time no other responses were received.

After discussions with supervisors it was agreed that a reminder email be sent. It was also decided upon that the invitation to participate should be sent to the remaining students so that a sufficient response rate was obtained for the LEQ. A two-week interval from the initial contact was agreed upon with supervisors, as the students had assignments that were due within this period and they might not be checking their emails nor had time to complete the LEQ. A reminder email was sent to the initial participants on 15th April with six of these emails unable to be delivered. An email was also sent on this date to the remaining students from SAD. From the emails sent to the remaining students, nine were undeliverable. This second mail out resulted in another six responses being received within 24 hours. A further 8 responses were received over the following 3 days. A reminder email was sent to the second set of students on 21st April. 10 of these were not delivered. Up until 23rd April, 27 responses were received altogether with 12 of the respondents indicating that they would participate in follow-up interviews. The response rate to this date was well down and did not give sufficient responses to gain any meaningful data. Again, after discussions with supervisors it was decided to phone the students individually to explain the importance of completing the LEQ. Prior to doing this, a further email was sent. This time addressed to each individual student and not to a group as was done in the first two emails.

The individual emails were sent using the Faculty of Informatics and Communication “MyInfocom” web interface. MyInfocom stores data on all the

Faculty's students and is a tool for the staff of the Faculty to administer their courses. There is provision within this interface, using the student database for SAD, to use the "Mail Merge" facility to send individual emails to the SAD cohort. From this individual mail out, conducted on the 27th and 28th April further responses were received up to 29th April, giving a total response of 43. The LEQ was closed on 6th May with 61 responses received.

3.5 Problems with Design, Development and Administration

The original design of the LEQ did not require the participants to answer all the questions. SurveyMonkey does have an option available to make any question compulsory. Initially this researcher was not aware of this option. After receiving three responses where not all questions were answered, the option was discovered and adjustments to the LEQ were made.

The question in the LEQ relating to the student's mode of study asked the respondent to nominate all the options that applied to them ie full-time, part-time, internal, flex. It was found that respondents were not selecting all the relevant options. This led to some confusion in analysing the data. For future uses of the LEQ this question will be changed to eliminate any inconsistencies.

One aspect that was contained in the LEQ was asking respondents if they were willing to participate in follow-up interview. These interviews were to ascertain additional data on the respondents' previous learning environments and why they elected to use such learning environments. Of those that responded there were 27 respondents who indicated that they were willing to participate in these

interviews. A problem arose when contact was initiated to set up these interviews. Because of the amount of time that had elapsed between the completion of the LEQ and scheduling of the interviews only 6 were able to be interviewed. This meant that there was insufficient data obtained to gain any viable data. The responses however, have been used as anecdotal evidence only.

3.6 Summary

As discussed in Chapter 2 there was no appropriate instrument found through a review of the literature, consequently a new instrument was developed to identify the types of physical learning environments and resources used by students when studying. This chapter has outlined the design, development and implementation of the LEQ. This included the various drafts of the initial paper-based development through to the online development for the LEQ. Feedback received from experts prior to implementation and subsequent changes to the LEQ have also been discussed. The data collection procedures were also outlined.

Chapter 4 - Exploration Of Students' Learning Environments

4.1 Introduction

As outlined in the previous chapter, the LEQ was developed using the online survey creation site SurveyMonkey (2004). The site also has the capabilities to collect the responses to the survey on the user's behalf. The user can then download this data directly as a .csv file that can be imported into either Microsoft Excel, where the data can then be analyzed, or put into HTML format. Provision is also made within the web site to analyse the data collected by way of filters, which allow data to be grouped into categories. For the analysis of the data collected from the LEQ an initial file was downloaded to provide a summary of the overall results. This enables the researcher to obtain an overview of the data for the entire cohort. The filters can then be used to divide the data into the different categories such as gender and age,. This chapter will present an analysis of the overall results, and comparisons between different cohorts based on age, gender, mode of study and type of attendance.

4.2 Study Sample

The particular cohort of participants was selected, as the researcher is coordinator for the course Systems Analysis and Design (SAD). SAD is a first year, second semester, core course for students studying the Bachelor of Information Technology and the Bachelor of Business (Information Systems) degrees at CQU. It is also an elective course for other degrees offered in the Faculty of Business and Informatics. All study material and resources relating to the course, are web–based. There are prerequisites that have to be completed before a

student can enrol in this course. These prerequisites include other courses Foundations of Business computing and Conceptual Foundations of Computing that would give the student some prior knowledge of ICTs and computer literacy.

Typically approximately 300-400 students are enrolled in the course in any one term however, in the term when the analysis was undertaken, the enrolment in SAD was only 240 students. Table 4-1 provides a breakdown of the proposed sample to be involved. From this sample of 240 students, 34 were deleted because they had either not submitted their first assignments, or their email addresses were incorrect and could not be contacted. A further 4 students were deleted from this sample because they had withdrawn from the course. As a consequence the final sample of students used in the research was comprised of 202 students. The number of students who responded to the survey was 61 students. A description of this cohort is presented in Table 4-1.

Table 4-1 - Participant breakdown

Group	**Full Sample – 202 students**		**Respondents – 61 students**			
	Number of Students	**% of full sample**	**Number of Students**	**% of Respondents**	**% of group total**	**% of full sample**
Male	176	87.1	46	75.4	26.1	22.8
Female	26	12.8	15	24.6	57.7	7.4
Older age group – 30 years or older	21	10.2	15	24.6	71.4	7.4
Younger age group – Under 30 years	181	89.8	46	75.4	25.4	22.8
Flex	22	10.9	22	36.1	100.0	10. 9
On-campus	180	89.1	39	63.9	21.7	19.3
Full–time	178	88.1	41	67.2	23.0	20.3
Part–time	24	11.9	20	32.8	83.3	9.9

Of the 61 respondents it was found that 3 had not answered any questions relating to the resources or the learning environments used and had only answered demographic questions.

4.3 Results

The LEQ as described in Chapter 2, asked a number of questions pertaining to the students' physical learning environment and the resources that they use when learning. These questions addressed the frequency of use of particular learning environments, the preferred learning environment, the way that information is obtained, and the types and frequency of use of resources. All data presented in tables in this chapter are the percentage response from participants.

4.3.1 Results from all respondents

Initial analysis was carried out on the total responses received (n = 61) to identify the overall trends of the responses and to provide a basis for a more detailed analysis of the various groups. A complete summary of the results for all respondents for all items on the LEQ is presented in Appendix C and are further considered in this section.

4.3.1.1 Learning Environment

Participants were asked how often they had participated in different learning situations. The results from this question are shown in Table 4-2. From this Table it can be seen that over 45.0% of respondents had never been in a one–on–one private tuition and over 42.0% had never been involved in a self–help group. Over 51% have also indicated that they have "never" or "seldom" been involved in an online discussion forum.

Table 4-2 - Participation in different learning environments - all respondents

	Percentage of respondents choosing each response				
Types of Environments	Never	Seldom	Sometimes	Often	Always
	%	%	%	%	%
Private tuition (one on one learning)	45.6	24.6	21.1	7.0	1.8
Learning with a friend	8.8	24.6	33.3	29.8	3.5
Small group sessions	19.3	29.8	33.3	14.0	3.5
Learning alone at home with paper-based learning materials	0.0	0.0	15.5	37.9	46.6
Learning alone at home with web-based learning materials	0.0	3.5	20.7	31.0	44.8
Classroom learning with paper-based materials	8.8	10.5	33.3	35.1	12.3
Classroom learning with web-based materials	21.1	19.3	35.1	19.3	5.3
Online Discussion forums	21.4	30.4	26.8	14.3	7.1
Self-help groups	42.1	22.8	19.3	12.3	3.5

By far, the situation that most participants have been involved in most was represented by the responses “often” or “always” and was learning at home either with paper–based resources (84.5%) or web–based resources (75.8%) respectively.

It can also be seen in Figure 4-1 that 70.0% of respondents indicated their most frequently used learning environment is at home.

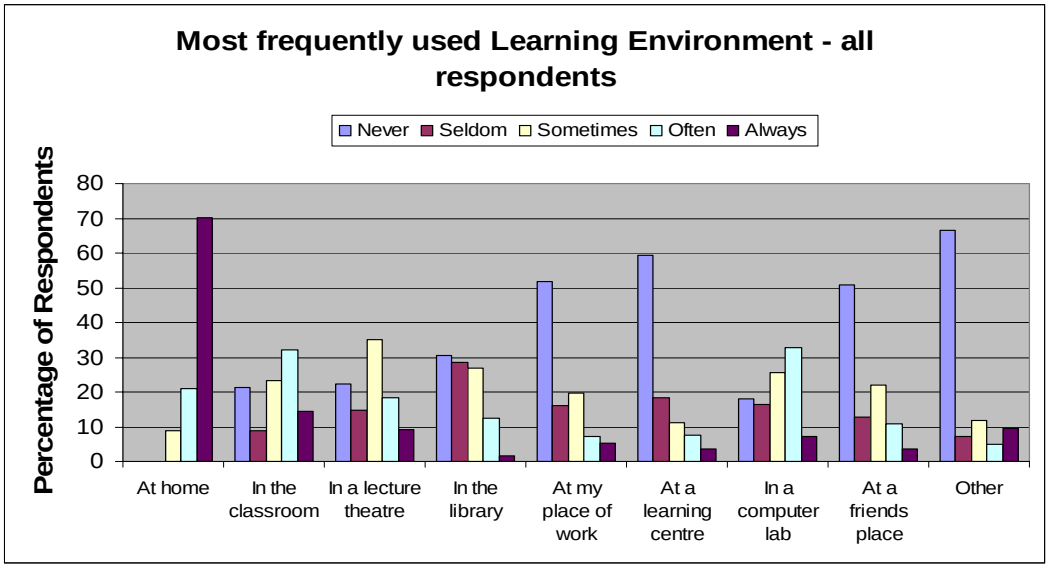

Figure 4-1 - Most frequently used learning environment - all respondents

Only 14.3% of respondents indicated that the classroom was their most frequently used learning environment and 9.3% indicated that their most frequently used learning environment was a lecture theatre.

Figure 4-2 shows that participants (48.2%) indicated their most preferred learning environment is learning by themselves.

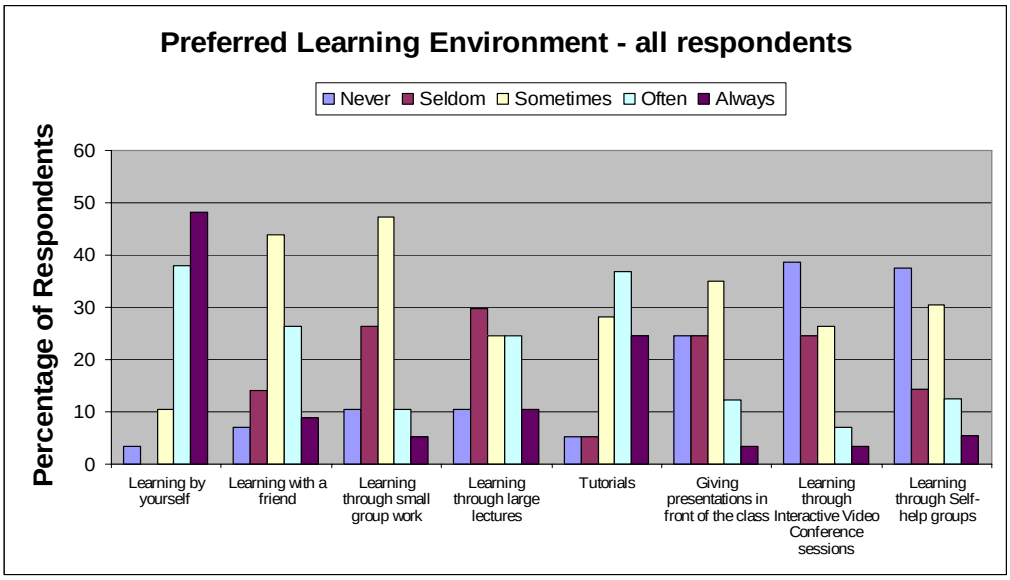

Figure 4-2 - Preferred learning environment - all respondents

This also shows that the least preferred learning environment is learning through interactive video conference sessions with only 10.5% of respondents indicating that they “often” or “always” prefer this environment. Giving presentations in front of the class are also not well favoured as are self-help groups with 15.8% and 17.9% respectively.

4.3.1.2 Resources

The types of resources used by students when studying has been divided into two parts, using ICT and paper-based. The different ICTs have then been separated into online communication and online resources.

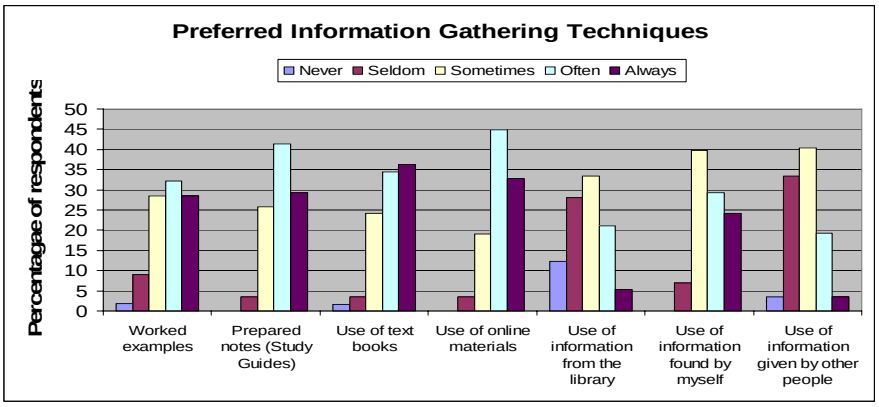

Figure 4-3 - Preferred Information gathering techniques - all respondents

When asked what type of information-gathering techniques the respondents preferred most, 77.6% indicated that the use of online materials was “often” or “always” their preferred choice, followed closely by textbooks and prepared notes such as study guides both at 70.7%. This data is further examined and presented in Figure 4-3 and shows that 40.4% of respondents indicated that they “never” or “seldom” use information from the library. The use of the library both as a resource and as a learning environment will be discussed in more detail later in this section.

Online Communication

Table 4-3 shows the use of online communication by respondents. Results show that 39.7% of respondents have “never” or “seldom” used an online forum; 74.2% “never” or “seldom” use a chat room and 50.9% have “never” or

Table 4-3 - Use of online communication - all respondents

	Percentage of respondents choosing each response				
Types of online communication	Never	Seldom	Sometimes	Often	Always
Email	6.9	19.0	24.1	29.3	20.7
Bulletin Board (online forum)	20.7	19.0	36.2	13.8	10.3
Chat room	46.6	27.6	15.5	5.2	5.2

"seldom" used a workgroup when learning. Email is the most common form of online correspondence used with 50.0% of respondents indicating that this is "often" or "always" used when learning.

Online Resources

As shown in Table 4-4 online resources have been analysed on the basis of types used by students, those relating to administrative activities such as course schedule, online grade checking, online activity tracking, online tests/quizzes and online assignment submission; and those relating to data gathering such as electronic library access, URL links to resources, online search tools and online course materials.

Table 4-4 - Use of online resources - all respondents

	Percentage of respondents choosing each response				
Types of online resources	Never	Seldom	Sometimes	Often	Always
Administrative					
Course schedule	3.5	14.0	24.6	36.8	21.1
Online grade checking	6.9	17.2	27.6	25.9	22.4
Student online activity tracking	17.9	26.8	35.7	14.3	5.4
Online tests/quizzes	0.0	6.9	25.9	39.7	27.6
Online assignment submission	3.4	1.7	20.7	41.4	32.8
Data gathering					
Electronic library access	9.1	21.8	38.2	21.8	9.1
URL links to resources	3.4	15.5	24.1	39.4	17.2
Online search tools	0.0	5.4	17.9	41.1	35.7
Online course materials	1.7	1.7	17.5	43.9	35.1

Answers to questions relating to the types of administrative tools used, indicate that 74.2% of respondents have "often" or "always" used online assignment submission, 67.3% have "often" or "always" used online tests/quizzes, 57.9% have "often" or "always" used the course schedule and 48.3% have "often" or "always" used online grade checking. Online activity tracking is not used as often with 44.7% indicating that they "never" or "seldom" use this resource. When gathering data online course materials are used most frequently with

79.0% indicating that they “often” or “always” use this resource. Online search tools are “often” or “always” used by 76.8% of respondents and URL links to resources are “often” or “always” used by 56.6% of respondents. Electronic library access is not used as often with 29.9% of respondents indicating that they “never” or “seldom” use this resource. All respondents have indicated that at some stage of their learning experience they have used online tests/quizzes and online search tools.

Paper-based Resources

The use of textbooks as a resource as shown in Table 4-5 is the most used with 81.0% of respondents indicated that they “often” or “always” using them followed by printed study guides at 70.7%.

Table 4-5 - Use of paper-based resources - all respondents

	Percentage of respondents choosing each response				
Types of paper-based resources	Never	Seldom	Sometimes	Often	Always
Textbooks	1.7	1.7	15.5	31.0	50.0
Printed Study Guides	3.5	3.5	22.4	32.8	37.9
Handouts provided by the lecturer	14.0	5.3	21.1	21.1	38.6
Library resources (eg journal articles)	10.3	19.0	34.5	22.4	13.8

Handouts provided by the lecturer were “often” or “always” used by 59.7% of respondents. Library resources were only “often” or “always” used by 36.2% of respondents with 29.3% of respondents indicating that they “never” or “seldom” use this resource.

4.3.1.3 Library Use

The data obtained from the LEQ that addressed the use of the library both as a learning environment and as a resource for gathering information are presented in Figures 4-4 to 4-6. Figure 4-4 and Figure 4-5 show the use of library resources

and the convenience of these resources whereas Figure 4-6 shows the use of the library as a learning environment.

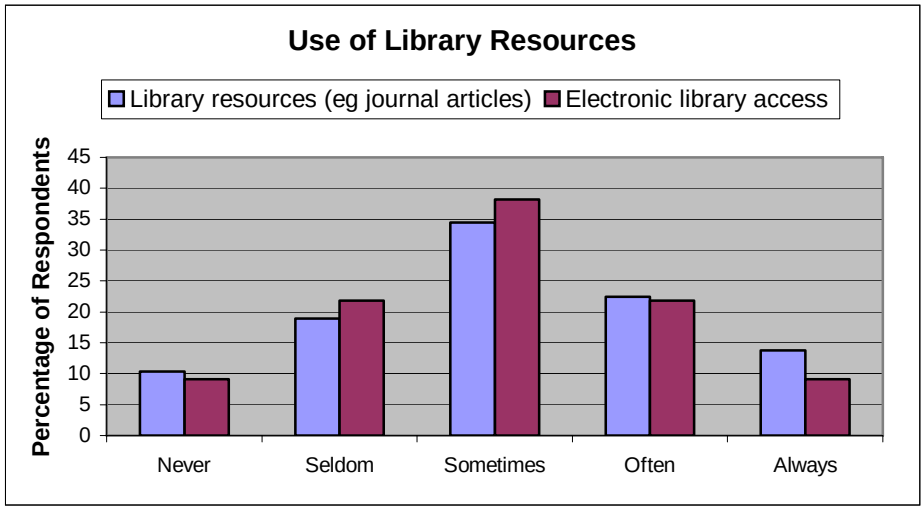

Figure 4-4 - Use of library resources - all respondents

It can be seen from Figure 4-4 that 34.5% of respondents indicated they only "sometimes" use library resources, for example journal articles, with 29.3% indicating that they "never" or "seldom" use library resources. Only 13.8% have indicated that they always use library resources. Electronic library access was also only used by 38.1% of respondents "sometimes" with 30.0% indicating that they "never" or "seldom" access the library electronically.

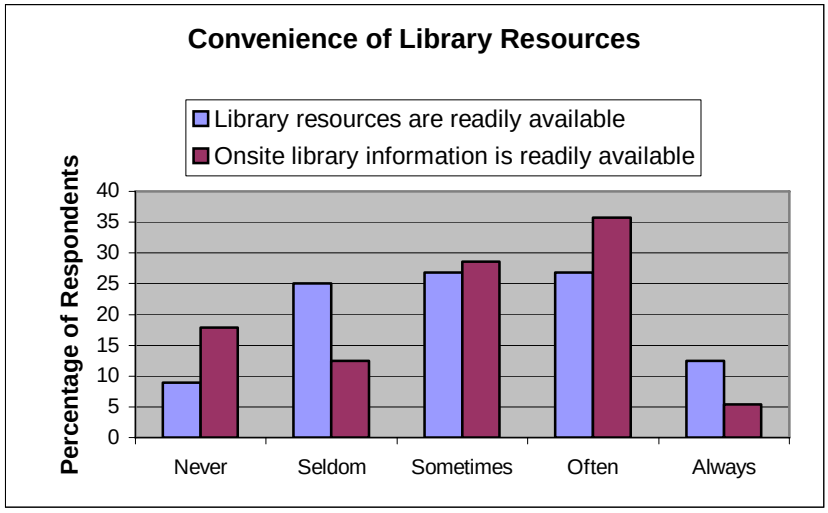

Figure 4-5 - Convenience of Library resources - all respondents

Figure 4-5 shows that 41.1% of respondents have indicated however, that onsite library information is “often” or “always” readily available. This is nearly identical to the availability of library resources with 39.3% of respondents indicating that they are “often” or “always” available. 30.3% however have indicated that onsite library resources are ‘never” or “seldom” readily available.

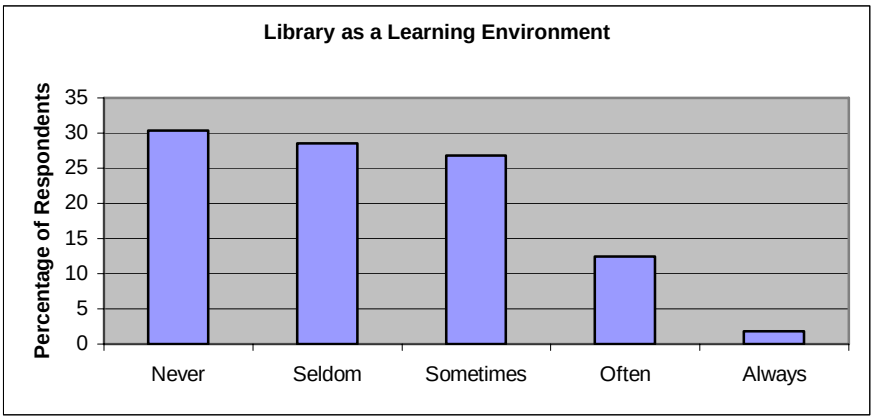

Figure 4-6 - Library as a learning environment - all respondents

It can be seen from Figure 4-6 that the use of the library as a learning environment is relatively low with 58.9% of respondents “never” or “seldom” using the library as a place for study and 26.8% indicating that they only “sometimes” use the library. Only 14.3% have stated that they “often” or “always” use the library as a learning environment.

4.3.1.4 Summary

An analysis of the results from all respondents indicates that the majority of student learning is completed at their place of residence. This is done using either web-based or paper-based materials. The results show that very little learning is done in either the classroom or in a lecture theatre. Some respondents also indicated that they do use other places to learn such as travelling to and from

work and on public transport. This particular use is considered more fully later in this chapter.

It has also been indicated that proliferation of online resources available, do not appear to be extensively utilised. Even though they are not being extensively utilised, it would be that the majority of respondents have used them on occasions. This includes the use of online search tools and online tests/quizzes where all respondents have indicated that they have used these resources at some stage. The use of paper-based resources does show a slightly different result, especially in relation to handouts provided by the lecturer where nearly 20% of respondents indicated that they “never” or “seldom” the resource and library resources which indicated that nearly 30% “never” or “seldom” used the resource.

In any tertiary institution the library is usually viewed as both a place where students can meet and study together and also as a research tool for the completion of the student’s study. The results from the LEQ have indicated that the library is seldom used for either purpose. The reasoning for this lack of use was in part addressed when the respondents to the LEQ were asked about the convenience of the resources they use. Over 30% of respondents indicated that onsite library resources were “never” or “seldom” readily available.

4.3.2 Comparison – on-campus vs flex students

This section presents the results of data analysis which compares on-campus and flex students. The term flex is used at CQU to refer to students who elect to undertake their studies by distance education. Depending on their distance from a

campus, students are able to use all the facilities afforded to on-campus students. The only difference is the attendance at lectures and tutorials. If classroom space is available however, lecture and tutorial attendance by the student is possible.

In certain situations the students may not have been given the choice when selecting whether they study by distance or not. In the overall results of this survey presented in Appendix D, 22.7% of students were not given that choice. Figure 4-7 presents the results of respondents that did have a choice were then asked for their reasons for selecting distance study. The survey allowed the student to select all options that applied to them.

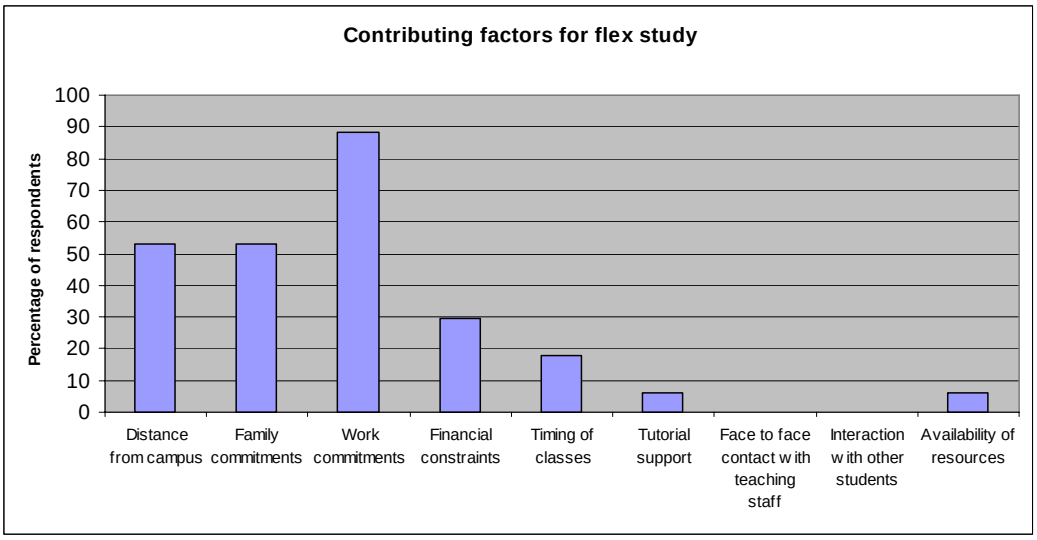

Figure 4-7 - Factors contributing to selecting flex study

This can be seen in Figure 4-7 where the most common reason for selecting to study by flex, was work commitments at 88.2%, followed by the distance from a campus and family commitments both at 52.9%. From those indicating work as their reasons for studying by flex 45% state that they “never” or “seldom” study at work.

4.3.2.1 Learning Environment

The types of physical learning environments that respondents prefer can be seen in Figure 4-8.

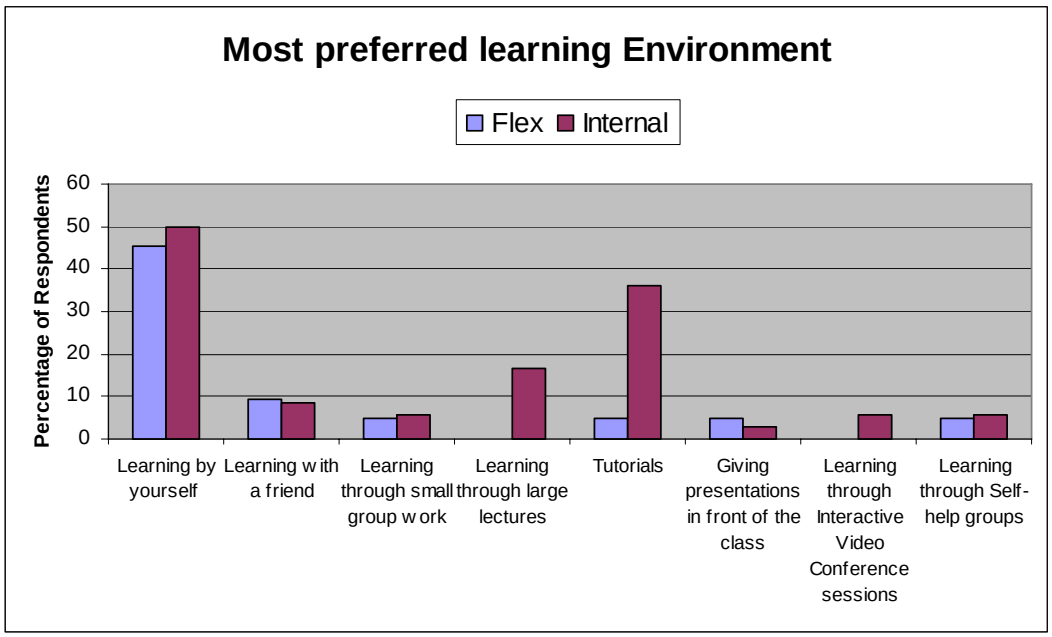

Figure 4-8 – Most preferred learning environment - comparison flex vs. on-campus

This shows that both flex and on-campus students prefer to learn by themselves. The on-campus students (over 35.0%) also have a preference for learning in tutorials. With both groups less than 10.0% prefer to learn with a friend. Only around 5.0% of both groups prefer learning by giving presentations in front of the class and learning through self-help groups.

This lack of preference for specific learning environments can be seen more clearly in Figure 4-9. This Figure shows that flex respondents least preferred

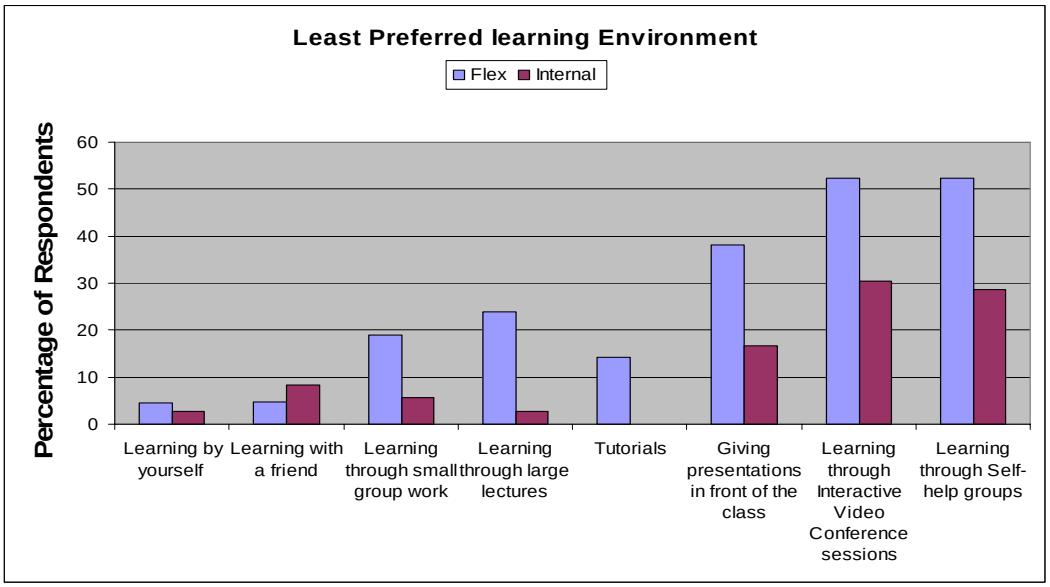

Figure 4-9 - Least preferred learning environment - flex vs on-campus

learning environments are giving presentations in front of a class (38.1% compared to 16.7%), video conference sessions (52.4% compared to 30.6%) and self-help groups (52.4% compared to 28.6%). For on-campus respondents these three learning environments are also the least preferred but to a far lesser extent than their flex counterparts.

4.3.2.2 Resources

When comparing ICT component usage with on-campus students, flex students tend to use the technology more often as shown in Table 4-6. It is shown in Table 4-6 that flex students use email and online grade checking nearly twice as much as on-campus students (72.6% compared to 36.1% for email and 63.6% compared to 38.9% for online grade checking). As stated previously it is a requirement of SAD that all students are to subscribe to the course email list. Overall only about 40.0% of students do so. The use of online library access is also nearly double with 45% of flex students using this resource compared to 22.8% of on-campus students.

Table 4-6 - Comparison between flex and on-campus students - use of ICT components

	Percentage of respondents choosing each response									
	Never		Seldom		Sometimes		Often		Always	
Types of ICT components	Flex	On-campus	Flex	On-campus	Flex	On-campus	Flex	On-campus	Flex	On-campus
Online course materials	4.5	0.0	0.0	2.8	4.5	25.7	40.9	45.7	50.0	25.7
Email	4.5	8.3	4.5	27.8	18.2	27.8	36.3	25.0	36.3	11.1
Online forum	13.6	25.0	9.1	25.0	36.3	36.1	18.2	11.1	22.7	2.7
Chat room	50.0	44.4	22.7	30.6	13.6	16.7	4.5	5.6	9.1	2.7
Electronic library access	10.0	8.5	25.0	20.0	20.0	48.6	30.0	17.1	15.0	5.7
URL links to resources	9.1	0.0	4.5	22.2	22.7	25.0	36.3	41.7	27.3	11.1
Online grade checking	0.0	11.1	9.1	22.2	27.3	27.8	27.3	25.0	36.3	13.9
Student online activity tracking	15.0	19.4	20.0	30.6	45.0	30.6	15.0	13.9	5.0	5.5
Online tests/quizzes	0.0	0.0	4.5	8.3	27.3	25.0	36.3	41.7	31.8	25.0
Online assignment submission	0.0	5.6	4.5	0.0	22.7	19.4	36.3	44.4	36.3	30.5
Online search tools	0.0	0.0	0.0	8.3	15.0	19.4	30.0	47.2	55.0	25.0

Flex students also use the online course materials (50.0% compared to 25.7%) and online search tools (55.0% compared to 25.0%) more than their on-campus counterparts. When comparing the results for the use of chat rooms, neither cohort use this resource very often. Half of the flex respondents (50.0%) and 44.4% of on-campus respondents indicate that they “never” use chat rooms.

4.3.2.3 Summary

The above survey results show that both cohorts prefer learning in their home environment. The difference however is in the resources used to carry out their study with the flex students tending to use ICT components more than on-campus students. However, the majority of flex students are not really taking advantage of the online resources or the range of communication options available to them to facilitate their study. Additional help facilities such as self-help groups are also not being utilised to their full potential. Even though the

usage ratio is higher with flex students compared to on-campus students one may have expected that the flex students may have made more extensive use of their online resources rather than using their textbooks. There could be a number of possibilities why this occurs. One could be the students' have less direct access to other forms of resources and their ability to access these resources quickly when required. Another could relate to the particular student's learning style, or the learning strategies they use when learning.

4.3.3 Comparison – Full-time vs part-time

This section presents an analysis of the data by comparing full-time students with part-time students. The full cohort for SAD comprised of 88.1% full-time and 11.9% part-time students. From these 23.0% of the full-time students and 83.3% of the part-time students completed the survey. This gave a response rate of 67.2% for full-time and 32.8% for part-time as shown in Table 4-1.

4.3.3.1 Learning Environment

The learning environment where the majority of the respondents' learning takes place is shown in Figure 4-10.

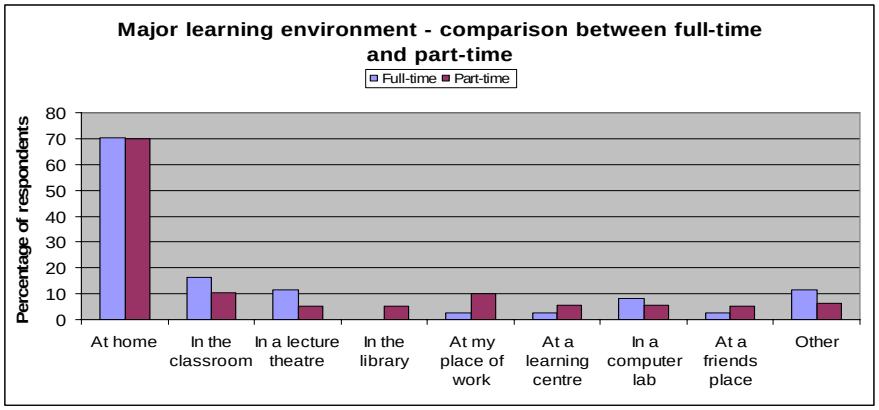

Figure 4-10 - Major learning environment - comparison between full-time and part-time

The results in this Figure indicate that for both cohorts their major learning environment is learning at home (70.3% for full-time respondents and 70.0% for part-time respondents). Only a small percentage, 16.2% for full-time respondents and 10.5% for part-time respondents, have indicated that the majority of their learning is undertaken in the classroom. An even smaller percentage, 8.1% of full-time respondents and 5.6% of part-time respondents, indicated that a computer lab is where the majority of their learning takes place.

By far the most preferred learning environment as shown in Figure 4-11, for both cohorts is learning by themselves with 52.6% of full-time and 40.0% of part-time respondents indicating that this is the case. 31.6% of full-time respondents and to a lesser extent 10.5% of part-time respondents prefer learning in tutorials.

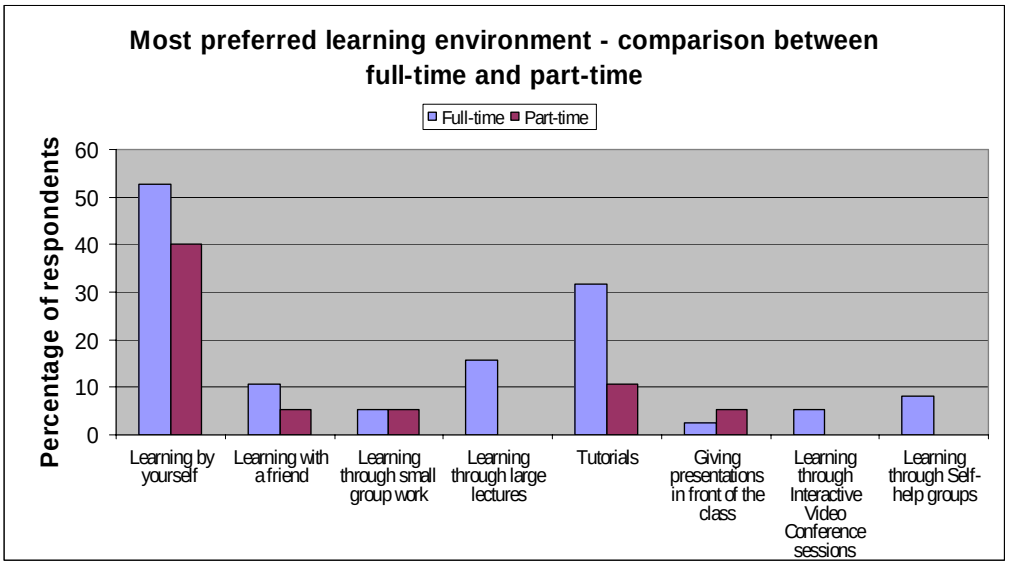

Figure 4-11 - Most preferred learning environment - comparison between full-time and part-time

It would also seem from these results large lecture room presentations are also preferred by a small percentage of full-time respondents (15.8%) whereas no part-time respondents prefer this environment. The data also shows the part-time respondents have a lower preference for learning through interactive video

conference session or learning through self-help groups. This is shown in Figure 4-12 where 52.6% of part-time respondents have indicated that their least preferred learning environment is learning through interactive video conference sessions. This percentage response is similar for learning through self-help groups.

Similarly Figure 4-12 indicates that full-time respondents also have a relatively low preference for these environments. Over 30% indicated that their least preferred environment is learning through interactive video conference sessions and 29.7% indicating that their least preferred learning environment is learning through self-help groups.

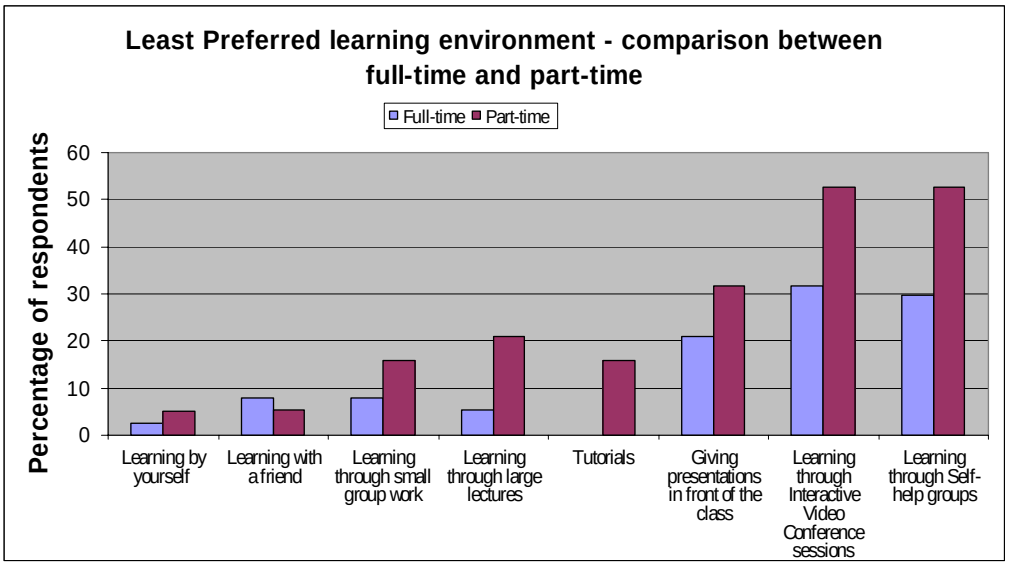

Figure 4-12 - Least preferred learning environment - comparison between full-time and part-time

Table 4-7 shows that the learning environment that both cohorts have participated in most is learning at home alone with either paper-based or web-based learning materials. This result coincides with the respondents' most preferred learning environment where both cohorts indicated that they prefer to learn by themselves.

Table 4-7 - Participation in different learning environments - comparison between full-time and part-time

	Percentage of respondents choosing each response									
Types of environments	Never		Seldom		Sometimes		Often		Always	
	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T
Private tuition (one on one learning)	52.6	31.6	18.4	36.8	21.1	21.1	5.3	10.5	2.6	0.0
Learning with a friend	5.3	15.8	21.1	31.6	39.5	21.1	28.9	31.6	5.3	0.0
Small group sessions	15.8	26.3	36.8	15.8	28.9	42.1	13.2	15.8	5.3	0.0
Learning alone at home with paper-based learning materials	0.0	0.0	0.0	0.0	15.8	15.0	26.3	60.0	57.9	25.0
Learning alone at home with web-based learning materials	0.0	0.0	2.6	5.0	26.3	10.0	21.1	50.0	50.0	35.0
Classroom learning with paper-based materials	0.0	26.3	10.5	10.5	36.8	26.3	36.8	31.6	15.8	5.3
Classroom learning with web-based materials	10.5	42.1	18.4	21.1	44.7	15.8	21.1	15.8	5.3	5.3
Online Discussion forums	27.0	10.5	32.4	26.3	21.6	36.8	13.5	15.8	5.4	10.5
Self-help groups	36.8	52.6	26.3	15.8	18.4	21.1	13.2	10.5	5.3	0.0

Likewise this trend is similar for the participation in self-help groups where 52.6% of part-time respondents and 36.8% of full-time respondents have indicated that they have “never” participated in this situation. There is also a large percentage for both cohorts, 71.0% for full-time respondents and 68.4% for part-time respondents respectively, who have “never” or “seldom” participated in private tuition.

4.3.3.2 Resources

A comparison of use of online communication resources by full-time and part-time respondents is displayed in Table 4-8.

Table 4-8 - Comparison between full-time and part-time - use of online communication

	Percentage of respondents choosing each response									
Types of online communication	Never		Seldom		Sometimes		Often		Always	
	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T
Email	7.9	5.0	28.9	0.0	23.7	25.0	23.7	40.0	15.8	30.0
Bulletin Board (online forum)	23.7	15.0	23.7	10.0	39.5	30.0	7. 9	25.0	5.2	20.0
Chat room	52.6	35.0	26.3	30.0	15.8	15.0	2.6	10.0	2.6	10.0

The results in this Table show that for all three types of communication resources the part-time respondents use these technologies more than the full-time respondents. Email is “often” or “always” used nearly twice as many times by the part-time cohort (70.0%) compared to the full-time cohort (39.5%). This result is mirrored in the low use. In the case of chat rooms where 52.6% of full-time respondents indicated that they “never” use this resource compared to 35.0% of part-time respondents. Bulletin boards are also used more frequently by the part-time respondents with 45.0% of the cohort “often” or “always” using the resource compared to only 13.1% for the full-time respondents.

The use of online administrative tools is similar for both cohorts as shown in Table 4-9. These results show that both cohorts all have used at some stage

Table 4-9 - Comparison between full-time and part-time - use of online administrative tools

	Percentage of respondents choosing each response									
Types of online administrative tools	Never		Seldom		Sometimes		Often		Always	
	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T
Course schedule	2.7	5.0	10.8	20.0	29.7	15.0	40.5	30.0	16.2	30.0
Online grade checking	10.5	0.0	21.1	10.0	28.9	25.0	23.7	30.0	15.8	35.0
Student online activity tracking	18.9	15.8	27.0	26.3	37.8	31.6	13.5	15.8	2.7	10.5
Online assignment submission	2.6	5.0	0.0	5.0	23.7	15.0	47.4	30.0	26.3	45.0
Online tests/quizzes	0.0	0.0	5.3	10.0	28.9	20.0	42.1	35.0	23.7	35.0

of their learning experience online tests/quizzes. However, for the use of online grade checking results differ between full-time and part-time with 10.5% of full-time respondents “never” using this resource whereas part-time respondents have indicated that at some stage of their learning they have used this resource.

There is a larger percentage of non-use for student activity tracking with 18.9% of full-time respondents and 15.8% of part-time respondents indicating that they have never used this resource. Online assignment submission and online

tests/quizzes are used frequently by both cohorts with 73.7% of full-time and 75.0% of part-time respondents “often” or “always” using online assignment submission and 65.6% of full-time and 70.0% of part-time respondents “often” or “always” using online tests/quizzes.

The comparison in the use of online resources between full-time and part-time students is shown in Table 4-10 and indicates that at some stage of their learning experience all full-time respondents have used online course materials, URL links to resources and online search tools. As well all part-time respondents have indicated that at some stage they have used online search tools.

Table 4-10 - Comparison between full-time and part-time - use of online resources

	Percentage of respondents choosing each response									
Types of online resources	Never		Seldom		Sometimes		Often		Always	
	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T
Online course materials	0.0	5.0	2.7	0.0	24.3	5.0	40.5	50.0	32.4	40.0
URL links to resources	0.0	10.0	15.8	15.0	28.9	15.0	36.8	45.0	18.4	15.0
Electronic library access	8.1	11.1	24.3	16.7	48.7	16.7	10.8	44.4	8.1	11.1
Online search tools	0.0	0.0	8.1	0.0	18.9	15.8	45.9	31.6	27.0	52.6

The results show that there are a small percentage of part-time respondents that have never used online course materials (5.0%) and URL links to resources (10.0%). Even with this small percentage of non-use, 90.0% of part-time respondents have indicated that they “often” or “always” use online course materials compared to only 72.9% of full-time respondents. The results also indicate that 8.1% of full-time and 11.1% of part-time respondents have never used electronic library access. Library access is however used “often” or “always” more by part-time respondents (55.5%) compared to full-time respondents (18.9%).

When comparing the use of paper-based resources between the two cohorts as shown in Table 4-11 below, the results indicate that 50.0% of both cohorts "always" use textbooks.

Table 4-11 - Comparison between full-time and part-time - use of paper-based resources

	Percentage of respondents choosing each response									
Types of paper-based resources	Never		Seldom		Sometimes		Often		Always	
	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T	F/T	P/T
Textbooks	2.6	0.0	2.6	0.0	18.4	10.0	26.3	40.0	50.0	50.0
Printed Study Guides	2.6	5.0	5.3	0.0	21.1	25.0	36.8	25.0	34.2	45.0
Handouts provided by the lecturer	7.9	26.3	2.6	10.5	21.1	21.1	23.7	15.8	44.7	26.3
Library resources (eg journal articles)	7.9	15.0	23.7	10.0	36.8	30.0	21.1	25.0	10.5	20.0

It can be seen from this Table that there are differences between the two cohorts for handouts provided by the lecturer which indicate that 44.7% of full-time respondents "always" use the resource compared to only 26.3% of part-time respondents. Printed study guides on the other hand are used more frequently by part-time respondents (45.0%) compared to 34.2% of full-time respondents.

4.3.3.3 Summary

The foregoing results show that for both cohorts, the learning environment where the majority of the respondents' learning takes place and which the respondents' mostly prefer is learning at home alone. There is a low preference for learning in classrooms, lecture theatres and computer labs and only "sometimes" is learning undertaken in these environments. As may be expected the full-time cohort does tend to use these environments more than the part-time cohort. Interactive video conference sessions and self-help groups are used even less frequently more so by part-time respondents than full-time respondents. In the majority of categories that relate to the use of online resources and administrative tools, and it was found that the part-time cohort tend to use the technology more that their full-

time counterparts. The use of paper-based resources by both cohorts differs depending on the types of resource. Handouts provided by the lecturer are used more frequently by the full-time cohort than the part-time cohort and printed study guides used more by the part-time cohort compared to the full-time cohort..

4.3.4 Comparison – age groups

The research questions presented in Chapter 1 sought to establish differences between mature age and school leaver. In the LEQ the age categories used were namely, under 20, 20-29, 30-39, 40-49 and 50 years and over. This was done to simplify the choices given to the participants. For the purposes of the analysis the cohort was divided into two broad age categories. A group that will be referred to as the younger age group – these were all students younger than 30, and an age group that will be referred to as the older age group – these were all students 30 years of age or older. As shown in Table 4-1 the older age group accounted for 10.2% of the possible sample and the younger age group accounted for 89.8% of the possible sample. From these 71.4% of the older age group and 25.4% of the younger age group responded, giving a breakdown of 24.6% for the older age group and 75.4% for the younger age group.

4.3.4.1 Learning Environment

Figures 4-13 and 4-14 present the results of the participation in different learning environments. The learning environment that respondents have participated in most is learning at home either with web-based materials or paper-based materials.

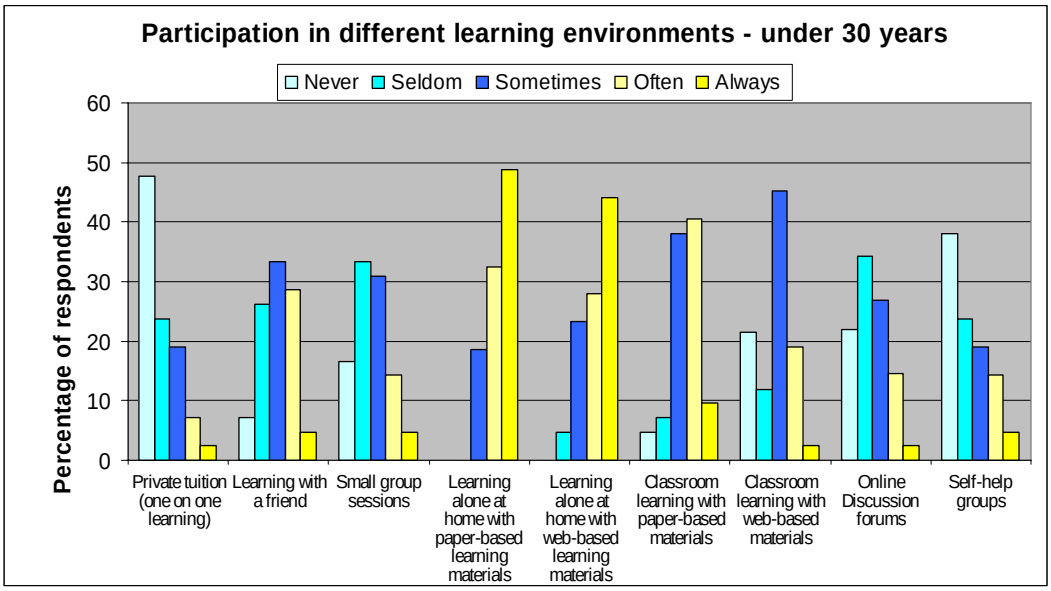

Figure 4-13 - Participation in different learning environments - younger age group

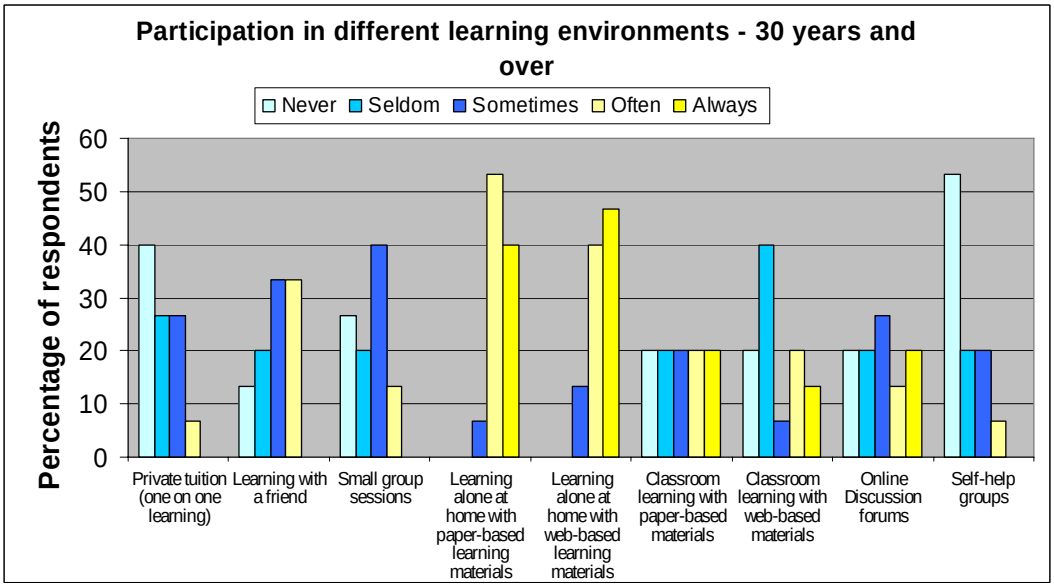

Figure 4-14 - Participation in different learning environments - older age group

It can be seen in Figures 4-13 and 4-14, where 81.4% of the younger age group and 93.3% of the older age group have indicated that they “often” or “always” study at home using paper-based materials and 72.1% of the younger age group and 86.7% of the older age group indicated that they “often” or “always” study at home using web-based materials. There is also a large percentage (47.1% for the younger age group and 40.0% of the older age group) that has “never” participated in private tuition.

Figure 4-15 provides a comparison of the major learning environments used by both cohorts. The overall results are very similar nevertheless, the home as a learning environment is greater for the majority of the older age group (80.0%) than the younger age group (66.7%). The results also show that the older age group uses the classroom (20.0%) more than the younger age group (12.2%).

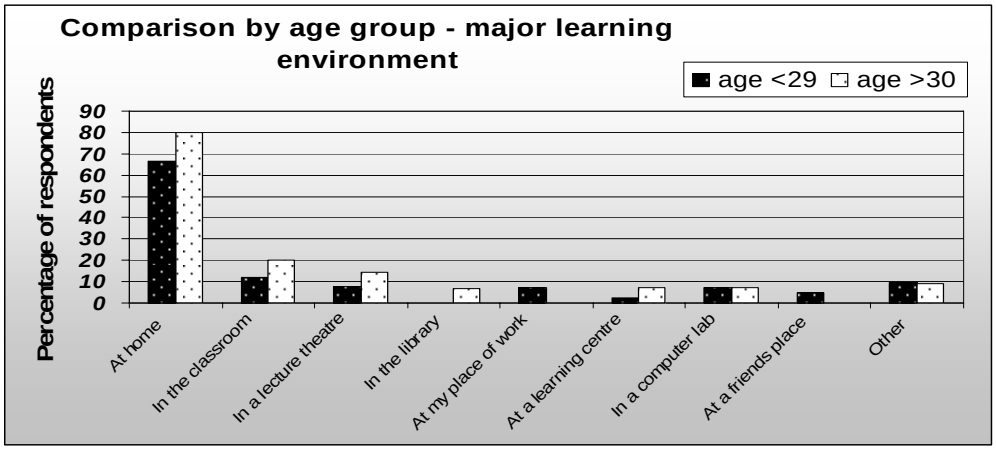

Figure 4-15 - Comparison by age group - major learning environment

4.3.4.2 Resources

Online Communication

Table 4-12 compares the use of online communication between the two cohorts. In the majority of instances the results are very similar, however, email is 'often' and 'always' used more by respondents in the older age group (66.7%) compared to the younger age group (44.2%). A similar result was obtained for the use of bulletin boards with 33.3% of the older age group "often" or "always" using the resource compared to 20.9% of the younger age group.

Table 4-12 - Comparison between age groups - use of online communication

	Percentage of respondents choosing each response									
Types of online communication	Never		Seldom		Sometimes		Often		Always	
	29-	30+	29-	30+	29-	30+	29-	30+	29-	30+
Email	7.0	6.7	20.9	13.3	27.9	13.3	23.3	46.7	20.9	20.0
Bulletin Board (online forum)	18.6	26.7	18.6	20.0	41.9	20.0	11.6	20.0	9.3	13.3
Chat room	46.5	46.7	27.9	26.7	16.3	13.3	2.3	13.3	7.0	0.0

Chat rooms are the least used of all for both cohorts with 74.4% of the younger age group and 73.4% of the older age group “never” or “seldom” using the resource.

Paper-based resources

Table 4-13 shows that at some stage of their learning experience all respondents in the older age group have used textbooks for learning.

Table 4-13 - Comparison between age groups - use of paper-based resources

	Percentage of respondents choosing each response									
Types of paper-based resources	Never		Seldom		Sometimes		Often		Always	
	29-	30+	29-	30+	29-	30+	29-	30+	29-	30+
Textbooks	2.3	0.0	2.3	0.0	18.6	6.7	27.9	40.0	48.8	53.3
Printed Study Guides	2.3	6.7	4.7	0.0	25.6	13.3	30.2	40.0	37.2	40.0
Handouts provided by the lecturer	9.5	26.7	4.8	6.7	23.8	13.3	21.4	20.0	40.5	33.3
Library resources (eg journal articles)	11.6	6.7	20.9	13.3	34.9	33.3	18.6	33.3	14.0	13.3

Apart from a small percentage (4.6%), all the respondents in the younger age group have used textbooks. Printed study guides are also used frequently with 80.0% of the older age group “often” or “always” using the resource and 67.4% of the younger age group “often” or “always” using the resource. The results are different for the use of handouts provided by the lecturer, In this case 33.4% of the older age group have “never” or “seldom” used this resource compared to only 14.3% of the younger age group. As well Table 4-13 shows that resources from a library are also not being extensively utilised, more so with the younger age group where responses have indicated that 33.5% “never” or “seldom” use the resource compared to 21.0% of the older age group.

Online resources

A comparison between the age groups in the use of online resources is shown in Table 4-14.

Table 4-14 - Comparison between age groups - use of online resources

Types of online resources	Percentage of respondents choosing each response									
	Never		Seldom		Sometimes		Often		Always	
	29-	30+	29-	30+	29-	30+	29-	30+	29-	30+
Online search tools	0.0	0.0	7.3	0.0	19.5	13.3	43.9	33.3	29.3	53.3
URL links to resources	2.3	6.7	18.6	6.7	25.6	20.0	37.2	46.7	16.3	20.0
Electronic library access	10.0	6.7	25.0	13.3	45.0	20.0	12.5	46.7	7.5	13.3
Online course materials	0.0	6.7	2.4	0.0	21.4	6.7	45.2	40.0	31.0	46.7

At some stage of their learning experience both cohorts have used online search tools with 73.3% of the younger age group and 86.6% of the older age group "often" or "always" using this resource. Only a small percentage (6.7% of the older age group and 2.4% of the younger age group) of respondents have "never" or "seldom" availed themselves of using of online course materials with 76.2% of the younger age group and 86.7% of the older age group "often" or "always" using this resource. Electronic library access is used far more frequently by the older age group with 60.0% of respondents in this group "often" or "always" using the resource compared to 20.0% in the younger age group.

Online administrative tools

The comparison between the cohorts in the use of administrative tools is shown in Table 4-15. The results indicate that online tests/quizzes have been used at

Table 4-15 - Comparison between age groups - use of online administrative tools

Types of online administrative tools	Percentage of respondents choosing each response									
	Never		Seldom		Sometimes		Often		Always	
	29-	30+	29-	30+	29-	30+	29-	30+	29-	30+
Online grade checking	7.0	6.7	18.6	13.3	25.6	33.3	27.9	20.0	20.9	26.7
Student online activity tracking	14.6	26.7	31.7	13.3	34.1	40.0	14.6	13.3	4.9	6.7
Online tests/quizzes	0.0	0.0	4.7	13.3	25.6	26.7	41.9	33.3	27.9	26.7
Online assignment submission	2.3	6.7	0.0	6.7	20.9	20.0	41.9	40.0	34.9	26.7

some stage of all the respondents learning experience with 69.8% of the younger age group and 60.0% of the older age group “often” or “always” using this resource. Online assignment submissions is also extensively utilised with 76.8% of the younger age group and 66.7% of the older age group indicating that they “often” or “always” use the resource. Student online activity tracking is used the least with 46.3% of the younger age group and 40.0% of the older age group never or only seldom availing themselves of this resource.

4.3.4.3 Summary

In comparing the two age cohorts it was found the results although similar in some areas, show that the older age group use their home environment for learning more so than their younger counterparts. They also have a tendency to use online resources such as online course materials and online search tools, more frequently than their younger counterparts. Online communication such as email is also used more frequently by the older age group. The use of textbooks and printed study guides also shows a similar result. There is a difference however, when it comes to the use of online administrative tools with the younger age group using these resources more than the older age group. The library as a major learning environment is not used frequently by either cohort however electronic access to the library is used far more by the older age group than by the younger age group.

4.3.5 Comparison – gender

The LEQ asked the respondents to nominate their gender. This was required to determine if there were any differences in the types of learning environments used by both cohorts. The participant breakdown for gender as shown in Table 4-1 indicates that from the full sample 87.1% were males and 12.8% were females. From this 26.1% of the males and 57.7% of the females responded to the survey giving the breakdown by gender for respondents as 75.4% males and 24.6% females.

4.3.5.1 Learning Environment

Table 4-16 shows the gender comparison for the learning environments where the majority of respondents' learning takes place. As with previous comparisons between different cohorts, the majority of learning by both genders is done at home.

Table 4-16 - Comparison by gender - major learning environment

	Percentage of respondents choosing each response									
Types of environments	Never		Seldom		Sometimes		Often		Always	
	M	F	M	F	M	F	M	F	M	F
At home	0.0	0.0	0.0	0.0	7.1	13.3	19.1	26.7	73.8	60.0
In the classroom	19.5	26.7	9.8	6.7	26.8	13.3	29.3	40.0	14.6	13.3
In a lecture theatre	22.5	21.4	15.0	14.3	32.5	42.9	17.5	21.4	12.5	0.0
In the library	34.2	20.0	26.8	33.3	24.4	33.3	12.2	13.3	2.4	0.0
At my place of work	48.8	60.0	14.6	20.0	21.9	13.3	7.3	6.7	7.3	0.0
At a learning centre	55.0	71.4	22.5	7.1	10.0	14.3	7.5	7.1	5.0	0.0
In a computer lab	17.1	21.4	12.2	28.6	24.4	28.6	36.6	21.4	9.8	0.0
At a friends place	51.2	50.0	12.2	14.3	28.6	19.5	12.2	4.9	7.1	0.0
Other	64.7	75.0	8.8	0.0	0.0	14.7	5.9	5.9	0.0	25.0

There are some differences when comparing the male and female cohorts other environments as listed in Table 4-16. The results in the Table show that females (53.3%) "often" or "always" use classrooms more than males (43.9%), but

males (46.4%) “often” or “always” use computer labs more than females (21.4%).

As with previous results the most preferred learning environment of the respondents is learning at home as shown in Figure 4-16.

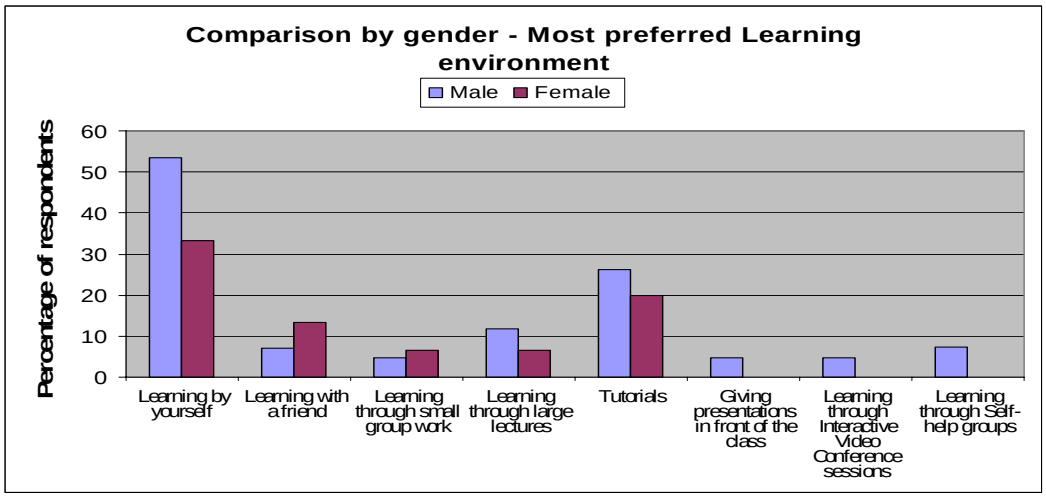

Figure 4-16 - Comparison by gender - most preferred learning environment

However in comparing male and female genders, the preference for this environment is higher with the male respondents (53.5%) compared to the female respondents (33.3%). Similar results were also obtained for the preference for learning in tutorials with 26.2% of males preferring this environment compared to 20.0% of females; and in large lectures where 11.9% of males preferred this environment compared to 6.7% of females. With the preference for learning with a friend the results were reversed with the females (13.3%) preferring this environment compared to 7.1% of males. There was a low preference for learning in interactive video conference sessions, giving presentations in front of class and self-help groups by the male cohort. The female cohort did not prefer these environments at all.

4.3.5.2 Resources

The results for the comparison between males and females for the use of online communication tools, as shown in Table 4-17, are very similar. The results show neither group makes high level use of chat rooms with 46.5% of males and 46.7% of females indicating that they "never" use this resource when learning.

Table 4-17 - Comparison by gender - use of online communication

	Percentage of respondents choosing each response									
Types of online communication	Never		Seldom		Sometimes		Often		Always	
	M	F	M	F	M	F	M	F	M	F
Email	4.6	13.3	6.7	23.3	20.9	33.3	26.7	30.2	20.9	20.0
Bulletin Board (online forum)	20.9	20.0	20.0	18.6	39.5	26.7	26.7	9.3	11.6	6.7
Chat room	46.5	46.7	40.0	23.3	16.3	13.3	0.0	7.0	7.0	0.0

Bulletin boards are even used less frequently with 20.9% of males and 20.0% of females indicating that they "never" use this resource. Whilst email is used the most for both cohorts, there are a number of respondents who have indicated that they never use this resource. This is more so with the females where 13.3% have indicated that they "never" use this resource compared to only 4.6% of males.

Table 4-18 shows the comparison between the genders in the use of online resources. It can be seen that whilst at some stage of both cohorts' learning experience they have used online search tools and online tests/quizzes these resources are more used by the male cohort than females. The results show that 72.6% of males indicating that they "often" or "always" use online tests/quizzes compared to 52.8% of females. Also 85.7% of males have "often" or "always" used online search tools compared to 65.7% of females.

Table 4-18 - Comparison by gender - use of online resources

	Percentage of respondents choosing each response									
Types of online resources	Never		Seldom		Sometimes		Often		Always	
	M	F	M	F	M	F	M	F	M	F
Online course materials	0.0	7.1	0.0	2.3	20.9	7.1	57.1	39.5	37.2	28.6
Course schedule	2.4	6.7	20.0	11.9	26.2	20.0	33.3	38.1	21.4	20.0
Electronic library access	10.0	6.7	13.3	25.0	40.0	33.3	40.0	15.0	10.0	6.7
URL links to resources	2.3	6.7	13.3	16.3	30.2	6.7	46.7	37.2	13.9	26.7
Online grade checking	9.3	0.0	20.0	16.3	23.3	40.0	26.7	25.6	25.6	13.3
Student online activity tracking	12.2	33.3	33.3	24.4	41.5	20.0	13.3	14.6	7.3	0.0
Online tests/quizzes	0.0	0.0	20.0	2.3	25.6	26.7	40.0	39.5	32.6	13.3
Online assignment submission	0.0	13.3	6.7	0.0	16.3	33.3	33.3	44.2	39.5	13.3
Online search tools	0.0	0.0	0.0	7.3	14.6	26.7	46.7	39.0	39.0	26.7

There is relatively low level use of online course materials, males indicated use of online course materials in their learning at some stage however, 9.4% of females have indicated that they “never” or “seldom” use this resource. The results show through with 94.3% of males indicating that they “often” or “always” use this resource compared to 68.1% of females.

Table 4-19 presents the results concerning the use of paper-based resources. There is little difference between males and females in actual use. However, the results show that females (27.1%) “never” or “seldom” use handouts provided by the lecturer compared to 11.9% of males. A reverse result is obtained but to a lesser extent, for the use of library resources with 31.6% of males “never” or “seldom” using this resource compared to 25.3% of females.

Table 4-19 - Comparison by gender - use of paper-based resources

	Percentage of respondents choosing each response									
Types of paper-based resources	Never		Seldom		Sometimes		Often		Always	
	M	F	M	F	M	F	M	F	M	F
Textbooks	2.3	0.0	0.0	2.3	16.3	13.3	33.3	30.2	48.8	53.3
Printed Study Guides	2.3	6.7	0.0	4.6	25.6	13.3	33.3	32.6	34.9	46.7
Handouts provided by the lecturer	11.9	20.0	0.0	7.1	21.4	20.0	20.0	21.4	38.1	40.0
Library resources (eg journal articles)	11.6	6.7	20.0	18.6	34.9	33.3	26.7	20.9	13.9	13.3

4.3.5.3 Summary

It tends to be assumed that technology has usually been a male-dominated field of expertise (Livingstone and Thumim, 2003;Lohan, 1997). The results presented above confirm this assumption with the male cohort using online resources and communication tools more than the female cohort. This result aligns itself as to where the majority of the respondents learning takes place. It was found that computer labs are used by males nearly twice as much as females. However, the use of paper-based resources was found to be similar for both cohorts. An unexpected find was the apparent lack of use by both cohorts of handouts provided by the lecturer. This was more so by the female cohort than the male cohort. It has also been indicated that females had a higher preference for learning with a friend that their male counterparts, but there was low preference for learning in interactive video conference sessions, giving presentations in from of the class and learning through self-help groups by the male cohort.

4.4 Discussion of Results

The majority of studies undertaken on learning environments, as outlined in Chapter 2, have concentrated on the classroom learning environment of primary and secondary school-age children. However, when addressing the issue of physical learning environments used by students in the tertiary sector, limited literature was identified that could inform this research. This research using tertiary students found that the main physical environment used for learning is the home.

Overall the results obtained from the breakdown of the sample into the various cohorts indicate that there is not much variation to the results. The home was by far the most used and most preferred place to study, with either the use of paper-based or web-based resource materials. The results also indicated the use of on-line resources tends to be mainly for assessment related tasks and to a lesser extent for on-line resources associated with delivery of course content and reference materials.

The similarity in the physical learning environments and resources used by all students were somewhat a surprising outcome of this study. The CQU on-campus students have access to a range of resources and support facilities such as the library, a Mathematics Learning Centre and a Communications Learning Centre for assistance with assignment preparation and submissions. The Faculty of Business and Informatics also has IC Assist. This is a peer support mechanism in which senior students provide assistance to beginning students in course content and study support. The results from this study intimate that on-campus students make limited use of such resources. As well, it would have been expected that on-campus students would have been making greater use of student-to-student interaction opportunities and student-teacher interactions such as small group sessions and tutorials. This however, has not been the case.

The extent and the way some of the physical learning environments and resources are used by students warrant further discussion. The majority of students have undertaken courses with an online component previously, but the extent of the online options available to the students is not known nor is it known how extensive resource usage was required. Furthermore, it is not known from

this research investigation whether the design and development of these previous courses enabled students to fully integrate with their online environment, or if the entire range of online components were available for use. This may well have influenced the way students used the online resources available in SAD.

Another issue that has been identified is that some students could be at a disadvantage if the course that they are undertaking contains an online component and they use other places for their learning that does not give the student access to ICTs such as travelling to and from work. This could change as the adoption of 'mobile learning', for example the use of Personal Digital Assistants and mobile phones to access learning content (Downes, 2004) becomes more prevalent. It would also facilitate meeting the students' needs and enable them to then learn any time and any place that suited them.

The lack of use of the library by students, both as a learning environment and as a resource has also been highlighted in the results. It has been indicated by nearly one third of respondents one of the main reasons why this occurs is that onsite library information is "never" or "seldom" readily available.

With the range of communication options made available to students, email was the most used. The nature of these email messages is not known but based on a study by Ruth and Carpenter (2002), these could include 'consolidation of knowledge, checking for understanding, expanding ideas and making connections between ideas' (Ruth and Carpenter, 2002 p. 259). On the other hand there was limited use of a chat rooms and discussion forums. In SAD the major form of communication is the student email list. Over half of students have never used forms of online correspondence such as chat rooms, email, and online

forums when learning. This observation is interesting as only 9 respondents in this sample indicated they had never undertaken an online course before. There could be many reasons for this. Some of these reasons could include that the facilities were not available, the course was not set up correctly as an online course or online correspondence was not a requirement for the course. With SAD, students are advised in the Course Profile that it is a requirement of the course to subscribe to the course mailing list. Even though it is a requirement, only one third of the students actually subscribe.

In the SAD course all students all receive the same on-line learning resources and materials that are all self-contained and self-explanatory and are given the same opportunities for teacher contact, assignment feedback and course advice. As well, there are no requirements for students to work together on assessment items. Whether the results obtained from this survey would be indicative of students across other courses and Faculties warrants further investigation and should be the topic of future research to determine whether the results presented here can be generalized.

4.5 Conclusions

The foregoing has presented the results and discussed the findings of the use of the LEQ by a cohort of SAD students. The next chapter further comments on the results in terms of the Research Questions and areas of further research.

Chapter 5 - Conclusions And Further Research

5.1 Introduction

The purpose of this thesis was to design, develop and use a survey instrument that could be used to identify the types of physical learning environments and resources that are used by 1st year university students enrolled in the course SAD. A review of the literature was first undertaken to determine firstly what constituted a physical learning environment and secondly if there was an appropriate instrument already available that would identify these physical learning environments. This chapter discusses the results obtained from the LEQ by answering the research questions. Implications from this research and areas for future research are also examined.

5.2 The Learning Environment Questionnaire (LEQ)

The LEQ was developed to identify the types of physical learning environments and resources used by students in a 1st year university course. It was demonstrated through a review of the literature presented in Chapter 2 that no instrument existed that could be used for this purpose. The design and development of the instrument went through a number of stages. The initial design was for a paper-based instrument, but it was decided that it would be more economical both in time and monetary terms to develop and administer the LEQ online. The online version was developed using the online survey site, SurveyMonkey (2004). The process of using this site was relatively easy to use by inserting each of the previously developed questions on the site. However, the process of administering the survey was rather more involved. Obtaining the

email addresses of the students and creating a mailing list for the participants took considerable time and effort. Considerable time was also expended in obtaining enough responses to the survey to gain any viable data. Through the development of LEQ, an instrument is now available that can identify the types of physical learning environments and resources students use when learning. With further modifications and extensions of some of the questions the LEQ could become a valuable tool to be included in the holistic study of learning environments by course designers, developers and fellow researchers.

5.3 Limitations of the research investigation

There were two main limitations identified that imparted on a more detailed examination of the results. These were

- The sample size – only students from one course of study were used
- Sample contained a rather uneven mix of variables that were to be examined, for example full-time/part-time, online/flex, age, gender

The original sample size was 202 students but the response was only 25% (n = 61) students. From these, in all categories, there was a significant (approximate 90%/10%) split in the respondents. For example males far outnumbered females and the younger age group outnumbered the older age group. It would have been desirable to have had a larger response rate with a more balanced sample to allow for a more detailed analysis. However, the number of responses received prevented the use of statistical testing for significant difference between the variables. As a consequence only a comparative analysis was performed.

5.4 Outcomes from the research investigation

The expected outcomes from the research were

- the development of an instrument that would serve to identify the types of physical learning environments and resources that students used in their learning experiences.

- the development of a framework and/or a set of recommendations that could be used to design courses that take into account the physical learning environments used by students.

These aspects are considered in further detail in the following section. A further section presents the results of the research questions posed for the study.

5.4.1 Instrument development

This expected outcome was achieved and the data obtained from the LEQ has assisted in the identification of the physical learning environments and resources used by students. However, based on research findings this instrument needs to be amended and expanded to include questions that can determine and clarify why students elect to use a particular learning environment and what factors affect these particular environments. This clarification is needed to further explore student choices regarding their physical learning environments. It is also needed to identify why students elect to use particular resources when studying.

5.4.2 Recommendations for a student support system

Based on the results from this study no significant information has been collected to realistically make for a student support system that takes into account the physical learning environments students' use. However the identification of the types of physical learning environments students' use in this research does highlight the need for designers and developers of courses to take into consideration the fact that students do use places other than the classroom or lecture theatre to carry out the majority of their learning. At the institution where this research was conducted, the Faculty that provides this course currently has in place facilities such as IC Assist and study groups for flex students. This resource however, only assist students in course content at the campus and do not give assistance for students' who undertake their learning in particular physical learning environments.

5.4.3 Research Questions

Two main research questions were posed on the research component of this study. The first question sought to ascertain the types of physical learning environments used by students in the 1st year tertiary course, Systems Analysis and Design (SAD). In order to do this a definition of what constitutes a physical learning environment first needed to be identified. This was to be done through a review of the literature. The second research question sought to identify whether there were any similarities or differences in the types of physical learning environments used by different cohorts within the research sample. These cohorts included age, gender, attendance type, and mode of study.

5.4.3.1 Research Question 1

What physical learning environments do 1st year students' use in the course SAD?

The question was posed to attempt to identify the types of physical learning environments used by students in the course SAD.

RQ1.1 How is a physical learning environment defined in the literature?

Existing literature did not define physical learning environment. Researchers such as those identified in Chapter 2 tended to describe the learning environment broadly and often in intangible terms. Some even relied on the fact that 'everyone knows what a learning environment is' while other researchers considered goals, learning contexts, student interactions, the learning style used and behaviour of the student as being integral to the definition of a learning environment. Definitions were provided however, for online learning environments and virtual learning environments but these did not address the issue of the physical surroundings used by students. As a consequence of this, a physical learning environment definition was put forward by this author. This definition was

> 'a place or the surroundings where a person can gain knowledge or skills through study or experience, whether independently or by interaction with a teacher or other students' (Carpenter and Dekkers, 2006 p. 95)

RQ1.2 What types of physical learning environments are used by students?

An analysis of the results from the full sample indicates that the majority of student learning is completed at their place of residence. This is done with either web-based or paper-based materials. Very little learning is done in either the classroom or in a lecture theatre. Students have also indicated that the library and computer labs as learning environments are not frequently used. Only a small proportion of students indicated that they use self-help groups and small group sessions. Some respondents had also indicated that they do use other places to learn such as travelling to and from work and on public transport. This can pose some difficulties especially if the course they are studying is delivered online and the student does not have access to "mobile technologies" that permits them to utilise the online course materials.

RQ1.3 What types of physical learning environments are preferred by students and to what extent are they used?

The research data indicates that the respondents' most preferred physical learning environment is learning by themselves. Some preference is also given to a tutorial and a lecture theatre but to a far lesser extent. The least preferred learning environments are learning through interactive video conference sessions, giving presentations in front of the class and learning through self-help groups. The physical learning environment that respondents use most is learning in their home.

5.4.3.2 Research Question 2

To what extent is the student learning environment influenced by specific student characteristics?

This research question was posed to explore any differences that may be present between various cohorts of students. The cohorts were divided into mode of study, type of attendance, gender and age.

RQ2.1 – What is the influence of mode of study and attendance on the types of learning environments used by students?

This sub-question was asked to determine whether a student's mode of study – an on-campus student as opposed to a flex student – and their mode of attendance – a full-time student or a part-time student – had any influence on the types of learning environments the student used.

RQ 2.1.1 on-campus vs flex?

The results of the survey have shown that both cohorts prefer learning in their home environment. The difference however is in the resources used to carry out their study. The flex students tend to use ICT components more than on-campus students, and it appears that the majority of flex students are not really taking advantage of the online resources or the range of communication options available to them to facilitate their study. Additional help facilities such as self-help groups are also not being utilised to their full potential. Even though the usage ratio is higher with flex students compared to on-campus students one may have expected that the flex students may have made more extensive use of their online resources rather than using their textbooks. There could be a number of possibilities why this occurs. One could be the students' have less direct access to other forms of resources and their ability to access these resources quickly when required. Another could relate to these students' adapting their learning

style, or the learning strategies they use when learning to better cope with their circumstances.

R Q 2.1.2 full time vs part time?

The learning environment where the majority of the respondents' learning takes place and which the respondents' mostly prefer, is learning at home alone. There is a low preference for learning in classrooms, lecture theatres and computer labs and only sometimes is learning undertaken in these environments. The full-time cohort does tend to use these environments more than the part-time cohort. Interactive video conference sessions and self-help groups are used even less frequently more so by part-time respondents than full-time respondents.

In the majority of categories that relate to the use of online resources and administrative tools, the part-time cohort tended to use the technology more that their full-time counterparts. One explanation for this could be that approximately 85.0% of the part-time students are also flex students and do not have access to lectures and tutorials. The use of paper-based resources differs depending on the resource with handouts provided by the lecturer used more frequently by the full-time cohort than the part-time cohort and printed study guides used more by the part-time cohort compared to the full-time cohort. Again, one reason for this could be the number of part-time students who are also flex students.

RQ 2.2 - What is the influence of age and gender on the types of learning environments and resources used by students?

This question was posed to determine whether a student's age or gender has an influence on the types of learning environments and resources the student uses.

R Q 2.2.1 - mature age vs school leaver?

Due to the set up of the question relating to age in the LEQ and for reasons stated in Chapter 4, the two age groups used for this research question were younger age group (school-leavers) and older age group (mature-age). The results from this study showed that the older age group use their home environment to learn more so than their younger counterparts. Also the older group had a tendency to use online resources such as online course materials and online search tools, more frequently than their younger counterparts. Online communication such as email is also used more frequently by the older age group. The use of textbooks and printed study guides also shows a similar result. There is a difference however, when it comes to the use of online administrative tools with the younger age group using these resources more than the older age group. The library as a major learning environment is not used frequently by either cohort however electronic access to the library is used far more by the older age group than by the younger age group. Further research is needed to be able to provide an explanation for the above trend.

R Q 2.2.2 - male vs female?

A general assumption has been that technology has usually been a male-dominated field of expertise. The results from the LEQ have confirmed this assumption with the male cohort using online resources and communication tools more than the female cohort. This also aligns with the comparison of where the majority of the respondents learning takes place, where computer labs are used nearly twice as much by males than females. The use of paper-based resources however, was found to be similar for both cohorts. A rather unexpected result

was the apparent lack of use by both cohorts of handouts provided by the lecturer. This was more so by the female cohort than the male cohort. It has also been indicated that females had a higher preference for learning with a friend that their male counterparts, but there was a little preference for learning in interactive video conference sessions, giving presentations in from of the class and learning through self-help groups by the male cohort. There was no preference for these environments by the female cohort.

5.5 Implications from this investigation

There are several implications to be considered from the results of this research including future uses for the LEQ by other researchers, the need to consider the physical learning environment by teachers and course designers and developers, and the theory and practice in the use of ICTs by students. These aspects are discussed further in the following sections.

5.5.1 Use of the LEQ

With the minor modifications that are discussed in Section 5.6, the LEQ could be used to determine whether a student's physical learning environment has an impact on their use of ICTs or has an impact on their computer literacy skills. The LEQ could also be used to determine whether a student's physical learning environment coincides with their learning style as discussed in Chapter 2. It can also be used in future research with different cohorts of students to determine whether the results presented here can be generalized. When a more detailed study is undertaken, the LEQ will be expanded to include questions to determine

and clarify why students elect to use a particular learning environment and if there are any factors that affect these particular environments.

5.5.2 Research findings

Chapter 2 has shown that very little research has been done in the area of physical learning environments. From the results this research indicates that this is an important and neglected area of research especially if learning environments are viewed holistically and this aspect if further considered in Section 5.6.

The results from this research suggest that in identifying the types of physical learning environments and resources student use to study, course designers and developers can gain a better insight into the facilities that students use when studying. As well teachers and educators in general should be more aware of the role of the physical learning environments that their students use..

5.5.3 Theory and practice in the use of ICTs

Even though ICTs might be provided for students in particular courses such as SAD, the results of the LEQ have indicated that not all students use them. Through a review of the literature and from these results it appears that whenever ICTs are used for the delivery of course content, the resources and other materials need to be fully integrated into the course. The results also suggest the students have to be made aware of the importance of using these resources. As well the students should also be provided with additional help facilities if they feel that they no not have the appropriate level of computer literacy skills to fully

utilise these resources. The foregoing notions need to be incorporated in developing theory and practice in the use of ICTs for teaching and learning.

5.6 Further Research

The results from this study indicate that more research needs to be undertaken in the way students use physical learning environments. Aspects that need to be explored are

- factors that affect these environments such as noise levels and interruptions from family
- reasons for students choosing to use a particular environment
- the relationship between learning environments and students learning styles
- use of library resources by different age groups (see p. 114)

This suggests that by identifying the types of physical learning environments and resources used by students goes some way to identifying student requirements. The data from the LEQ has identified that even though ICTs were available to students, they were not being utilised to their full potential. With further investigations into the reasons why students elect to use only specific resources and favour some resources over others, additional support facilities and programs can be put in place to assist students.

The results obtained from the LEQ has also given some insight into the places that students elect to undertake their learning. Having knowledge of these environments should enable course developers and designers additional insight

into the facilities that are used by students when studying. Further research does need to be undertaken however to clarify the choices that students make and the factors that affect these environments. When this additional data is obtained it would enhance the knowledge available to course designers and developers when preparing courses.

A more detailed study that incorporates a broader student participation base should also be undertaken to confirm the findings of this study. This should include the use of the LEQ across different courses.

5.7 Summary Conclusions

It has been indicated that from this initial use of the LEQ the learning environments of the students are not all that different across all cohorts (age, gender, full-time/part-time, and on-campus/flex) and that the learning environment most used and most preferred is their home. Whether this has anything to do with the way that university courses are presented also needs to be determined. This somewhat anomalous result may be attributed to a combination of factors. Firstly, the university in which the research took place, does not have in place protocols that require the student to undertake aspects of the course in certain ways. The course presentation differs from course to course and also across faculties. This suggests that when designing online courses, developers should be including all options available.

For many students force of habit means that they are still submitting assignments through the mail and not taking advantage of the online submission process. This again depends on the submission procedures for each course. For example

currently, for some courses, students have the option of submitting assignments online or through the mail. In the case of SAD all students are required to submit their assignments online unless there are mitigating circumstances to the contrary. Furthermore all students in this study made rather selective use of online resources in the SAD course.

An assumption that course designers and developers make is that students are able to use ICTs and are able to maximize its potential for meeting their needs and demands for learning. This assumption has been proven to be somewhat incorrect with the results of this study showing that students do not fully utilise the resources available to them either out of unawareness of the resource's usefulness or the students' reluctance to change the way that they have studied previously. Strategies need to be developed that will encourage and facilitate students to use the range of resources available to them. In this way there is a greater probability that students needs and demands will then be realized.

The application of the LEQ by this researcher to identify the types of physical learning environments used by students has laid the foundation for further research to be undertaken that can identify whether the types of physical learning environments used by students impacts on their level of computer literacy skills. As well as identifying the types of physical learning environments used by students, the LEQ can also be used by researchers in conjunction with an instrument already available to further explore a student's computer literacy skills. Comparisons between the two sets of data can then be made to ascertain whether the student's learning environment does impact on their computer literacy skills.

Several areas of further research have been identified which when combined with this research can give a better view of the places and resources students use to study. In summation, Chapter 2 indicated that there has been very limited research done in the area of physical learning environments. In order to gain a more holistic perspective of learning environments, the physical learning environment needs to be taken into consideration.

Finally, with increased use of ICTs in the context of online courses used by the higher education sector, more research is needed to develop theory and practice that will result in the provision of quality learning experiences for students. In this respect it is considered that this particular research has contributed to this end.

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Appendices

Appendix A – Initial draft version of the LEQ

SECTION A - BACKGROUND INFORMATION

1. Gender:

Male, Female

2. Age Group:

19 or below, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55 or above

3. How many online courses have you undertaken?

None, 1, 2, 3 or more

4. What program are you studying?

Certificate, Diploma, Higher Diploma/Associate Degree, Bachelor, Masters, PhD, Other (Please specify)

5. What Faculty does your program of study belong to?

Arts, Health and Science, Business and Law, Education and Creative Arts, Informatics and Communication, Other (Please specify)

6. Prior to commencing this program, what was your highest level of education?

Never finished High School
Completed High School – Grade 10 Grade 12
TAFE course University
Other learning institution (Please specify)

7. How often do use the following elements as part of your study?

Online Course materials
Bulletin Board (online forum)
White board
Course schedule
URL links to resources
Student online activity tracking
Online assignment submission
Online search tools
Email
Chat room
Workgroup (eg group project)
Electronic Library access
Online grade checking
Online tests/quizzes
Technical support

SECTION B – THE LEARNING ENVIRONMENT

Interaction with materials

Interaction with others

Student approach to learning

When selecting your mode of study, (ie. online, internal) what factors contributed to your choice? (Select all that are appropriate)

Distance from the campus
Family commitments
Work commitments
Timing of classes
Course structure (eg course only offered in distance mode)
Tutorial support
Availability of resources

Tutor approach to learning

These questions require you to comment on the amount of tutorial support you receive

The tutor helps me clarify problems in my studies
The tutor's feedback is constructive
The tutor encourages me to express myself
The tutor replies promptly to my queries
The tutor's feedback is encouraging
The tutor facilitates online discussion sessions

Accessibility

Please give a response to the following questions that best describes your view

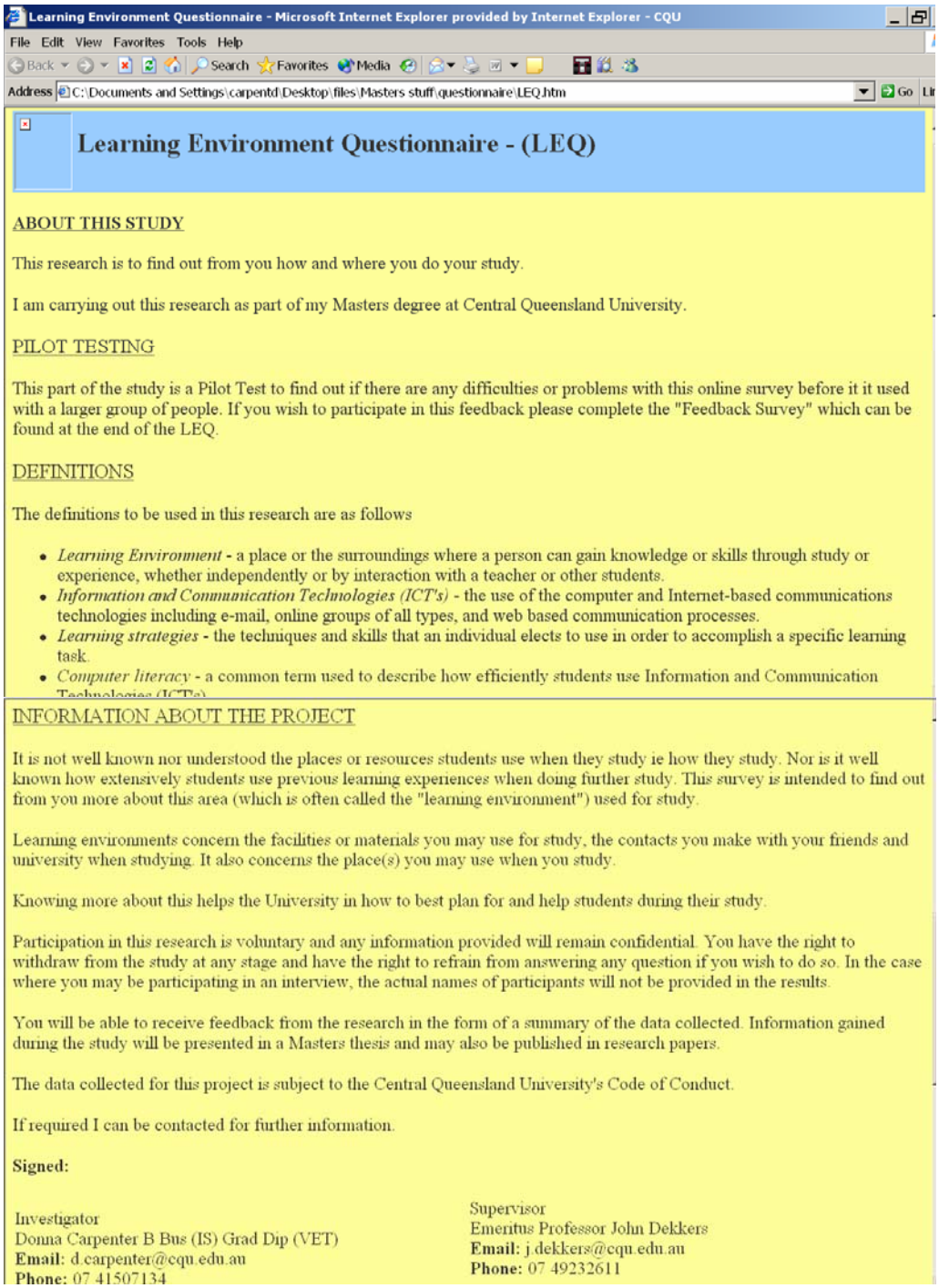
I can easily access the online materials
When studying my Internet connection is reliable
When studying my Internet connection is fast
My study materials arrive on time

Physical Environment

The following questions require you to nominate how often you have participated in these situations.

Private Tuition (one to one learning)
Small group sessions
Distance Education with paper-based learning materials
Distance Education with web-based learning materials
Self-paced learning
Classroom learning with paper-based materials
Classroom learning with web-based materials
Discussion forums
Email lists

Appendix B – Introduction/Instruction page of LEQ



Learning Environment Questionnaire - Microsoft Internet Explorer provided by Internet Explorer - CQU

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Learning Environment Questionnaire - (LEQ)

ABOUT THIS STUDY

This research is to find out from you how and where you do your study.

I am carrying out this research as part of my Masters degree at Central Queensland University.

PILOT TESTING

This part of the study is a Pilot Test to find out if there are any difficulties or problems with this online survey before it it used with a larger group of people. If you wish to participate in this feedback please complete the "Feedback Survey" which can be found at the end of the LEQ.

DEFINITIONS

The definitions to be used in this research are as follows

- *Learning Environment* - a place or the surroundings where a person can gain knowledge or skills through study or experience, whether independently or by interaction with a teacher or other students.
- *Information and Communication Technologies (ICT's)* - the use of the computer and Internet-based communications technologies including e-mail, online groups of all types, and web based communication processes.
- *Learning strategies* - the techniques and skills that an individual elects to use in order to accomplish a specific learning task.
- *Computer literacy* - a common term used to describe how efficiently students use Information and Communication Technologies (ICTs)

INFORMATION ABOUT THE PROJECT

It is not well known nor understood the places or resources students use when they study ie how they study. Nor is it well known how extensively students use previous learning experiences when doing further study. This survey is intended to find out from you more about this area (which is often called the "learning environment") used for study.

Learning environments concern the facilities or materials you may use for study, the contacts you make with your friends and university when studying. It also concerns the place(s) you may use when you study.

Knowing more about this helps the University in how to best plan for and help students during their study.

Participation in this research is voluntary and any information provided will remain confidential. You have the right to withdraw from the study at any stage and have the right to refrain from answering any question if you wish to do so. In the case where you may be participating in an interview, the actual names of participants will not be provided in the results.

You will be able to receive feedback from the research in the form of a summary of the data collected. Information gained during the study will be presented in a Masters thesis and may also be published in research papers.

The data collected for this project is subject to the Central Queensland University's Code of Conduct.

If required I can be contacted for further information.

Signed:

Investigator
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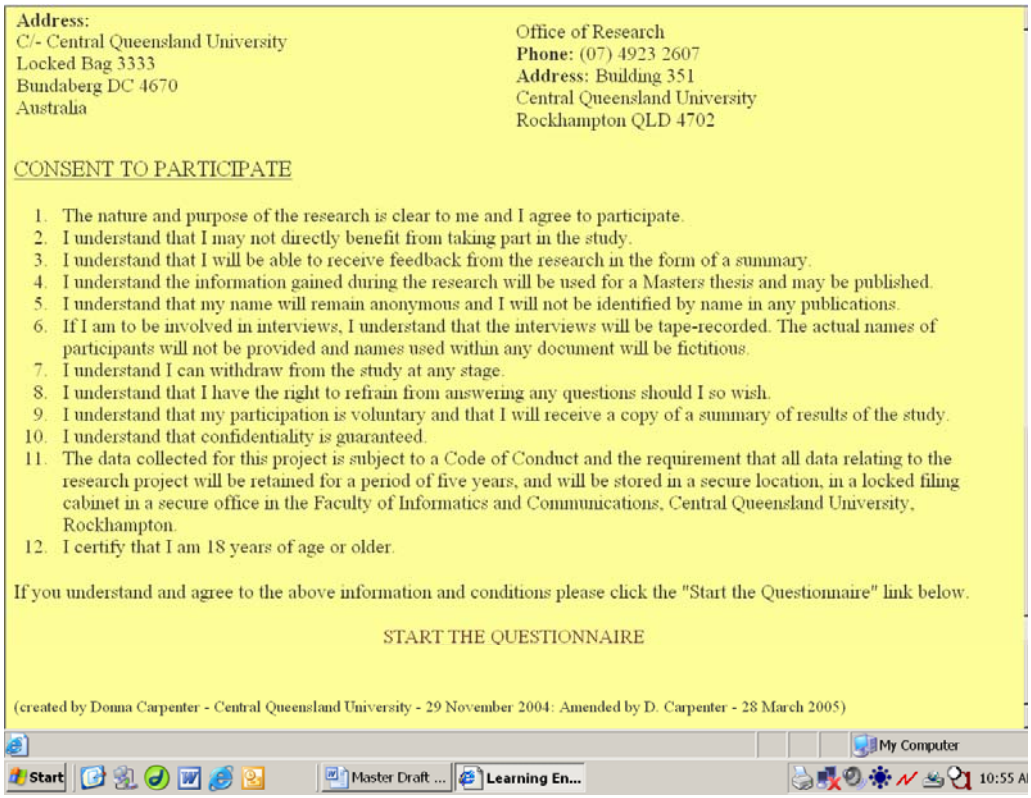

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Central Queensland University
Rockhampton QLD 4702

CONSENT TO PARTICIPATE

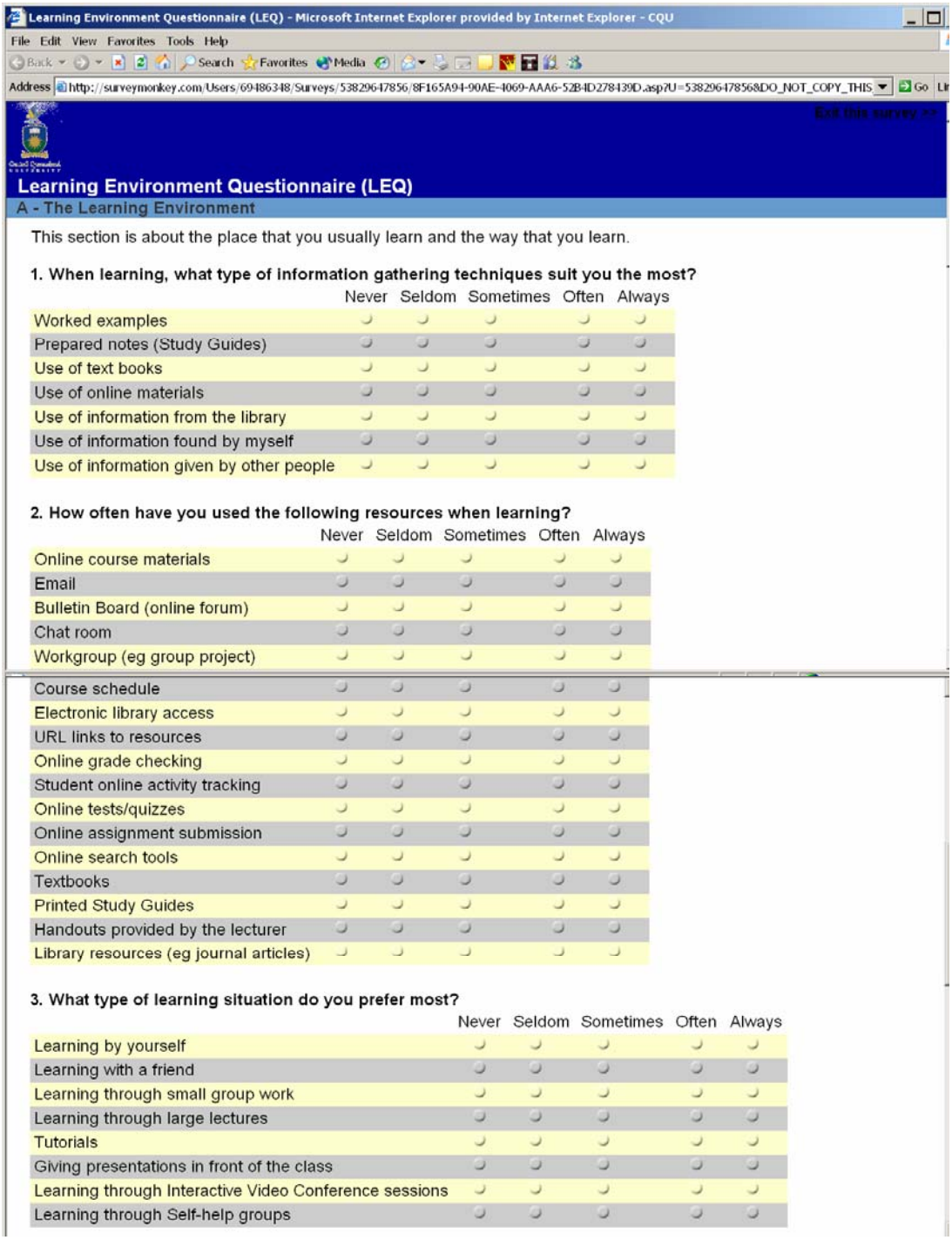
1. The nature and purpose of the research is clear to me and I agree to participate.
2. I understand that I may not directly benefit from taking part in the study.
3. I understand that I will be able to receive feedback from the research in the form of a summary.
4. I understand the information gained during the research will be used for a Masters thesis and may be published.
5. I understand that my name will remain anonymous and I will not be identified by name in any publications.
6. If I am to be involved in interviews, I understand that the interviews will be tape-recorded. The actual names of participants will not be provided and names used within any document will be fictitious.
7. I understand I can withdraw from the study at any stage.
8. I understand that I have the right to refrain from answering any questions should I so wish.
9. I understand that my participation is voluntary and that I will receive a copy of a summary of results of the study.
10. I understand that confidentiality is guaranteed.
11. The data collected for this project is subject to a Code of Conduct and the requirement that all data relating to the research project will be retained for a period of five years, and will be stored in a secure location, in a locked filing cabinet in a secure office in the Faculty of Informatics and Communications, Central Queensland University, Rockhampton.
12. I certify that I am 18 years of age or older.

If you understand and agree to the above information and conditions please click the "Start the Questionnaire" link below.

START THE QUESTIONNAIRE

(created by Donna Carpenter - Central Queensland University - 29 November 2004: Amended by D. Carpenter - 28 March 2005)

Appendix C – The Learning Environment Questionnaire (LEQ)



Learning Environment Questionnaire (LEQ) - Microsoft Internet Explorer provided by Internet Explorer - CQU

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Learning Environment Questionnaire (LEQ)

A - The Learning Environment

This section is about the place that you usually learn and the way that you learn.

1. When learning, what type of information gathering techniques suit you the most?

	Never	Seldom	Sometimes	Often	Always
Worked examples	○	○	○	○	○
Prepared notes (Study Guides)	○	○	○	○	○
Use of text books	○	○	○	○	○
Use of online materials	○	○	○	○	○
Use of information from the library	○	○	○	○	○
Use of information found by myself	○	○	○	○	○
Use of information given by other people	○	○	○	○	○

2. How often have you used the following resources when learning?

	Never	Seldom	Sometimes	Often	Always
Online course materials	○	○	○	○	○
Email	○	○	○	○	○
Bulletin Board (online forum)	○	○	○	○	○
Chat room	○	○	○	○	○
Workgroup (eg group project)	○	○	○	○	○
Course schedule	○	○	○	○	○
Electronic library access	○	○	○	○	○
URL links to resources	○	○	○	○	○
Online grade checking	○	○	○	○	○
Student online activity tracking	○	○	○	○	○
Online tests/quizzes	○	○	○	○	○
Online assignment submission	○	○	○	○	○
Online search tools	○	○	○	○	○
Textbooks	○	○	○	○	○
Printed Study Guides	○	○	○	○	○
Handouts provided by the lecturer	○	○	○	○	○
Library resources (eg journal articles)	○	○	○	○	○

3. What type of learning situation do you prefer most?

	Never	Seldom	Sometimes	Often	Always
Learning by yourself	○	○	○	○	○
Learning with a friend	○	○	○	○	○
Learning through small group work	○	○	○	○	○
Learning through large lectures	○	○	○	○	○
Tutorials	○	○	○	○	○
Giving presentations in front of the class	○	○	○	○	○
Learning through Interactive Video Conference sessions	○	○	○	○	○
Learning through Self-help groups	○	○	○	○	○

4. How often you have been involved in these different learning situations?

	Never	Seldom	Sometimes	Often	Always
Private tuition (one on one learning)	○	○	○	○	○
Learning with a friend	○	○	○	○	○
Small group sessions	○	○	○	○	○
Learning alone at home with paper-based learning materials	○	○	○	○	○
Learning alone at home with web-based learning materials	○	○	○	○	○
Classroom learning with paper-based materials	○	○	○	○	○
Classroom learning with web-based materials	○	○	○	○	○
Online Discussion forums	○	○	○	○	○
Self-help groups	○	○	○	○	○

5. Where do you actually do the majority or your learning?

	Never	Seldom	Sometimes	Often	Always
At home	○	○	○	○	○
In the classroom	○	○	○	○	○
In a lecture theatre	○	○	○	○	○
In the library	○	○	○	○	○
At my place of work	○	○	○	○	○
At a learning centre	○	○	○	○	○
In a computer lab	○	○	○	○	○
At a friends place	○	○	○	○	○
Other	○	○	○	○	○

6. If other, please specify.

7. How would you describe the convenience of resources you use for learning?

	Never	Seldom	Sometimes	Often	Always
Paper-based Study Guides are readily available	○	○	○	○	○
Internet connection is reliable	○	○	○	○	○
Online study materials are convenient	○	○	○	○	○
Course resources are easily accessible	○	○	○	○	○
Library resources are readily available	○	○	○	○	○
Onsite library information is readily available	○	○	○	○	○

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Learning Environment Questionnaire (LEQ) - Microsoft Internet Explorer provided by Internet Explorer - CQU

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Learning Environment Questionnaire (LEQ)

B - Your Background

This information is being used to ascertain the different groups of respondents. No indentifying information will be obtained

8. Your Gender

○ Male
○ Female

9. Your Age Group

○ 19 yrs and below
○ 20-29 yrs
○ 30-39 yrs
○ 40-49 yrs
○ 50 yrs and above

10. The number of courses you have previously undertaken with an online component

○ None
○ 1
○ 2
○ 3 or more

11. Your current Program of study

- Certificate
- Diploma
- Associate Degree
- Bachelor
- Masters
- Phd
- Other (please specify)

12. Your highest level of previous education

- Never finished High School
- Completed Secondary School - Grade 10
- Completed Secondary School - Grade 12
- Trade Course
- University
- Other (please specify)

13. Where has the majority of your previous education been undertaken?

- Australia
- Other (please specify)

14. The highest qualification you currently hold

- None
- Trade Certificate
- Diploma
- Bachelor
- Masters
- PhD
- Other (please specify)

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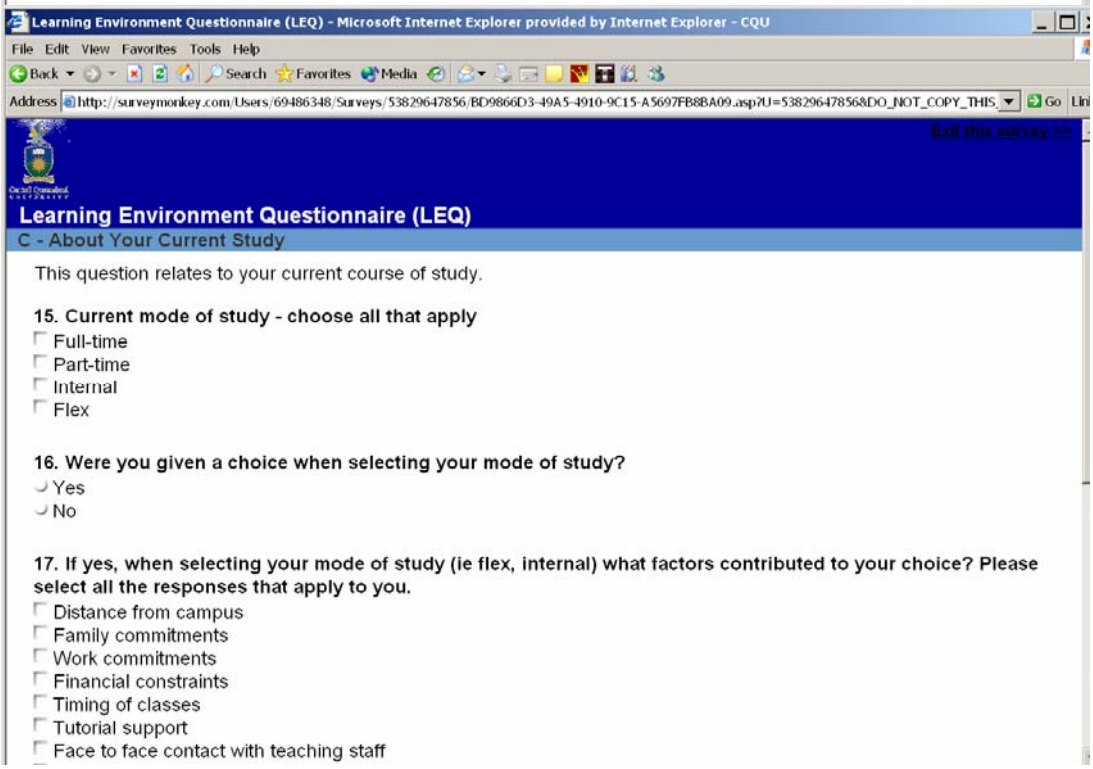

Learning Environment Questionnaire (LEQ)

C - About Your Current Study

This question relates to your current course of study.

15. Current mode of study - choose all that apply

- Full-time
- Part-time
- Internal
- Flex

16. Were you given a choice when selecting your mode of study?

- Yes
- No

17. If yes, when selecting your mode of study (ie flex, internal) what factors contributed to your choice? Please select all the responses that apply to you.

- Distance from campus
- Family commitments
- Work commitments
- Financial constraints
- Timing of classes
- Tutorial support
- Face to face contact with teaching staff

Interaction with other students
Availability of resources
Other

18. If No, when selecting your mode of study, what factors would you have chosen if you did have a choice? Please select all that apply.

Distance from campus
Family commitments
Work commitments
Financial constraints
Timing of classes
Tutorial support
Face to face contact with teaching staff
Interaction with other students
Availability of resources
Other (please specify)

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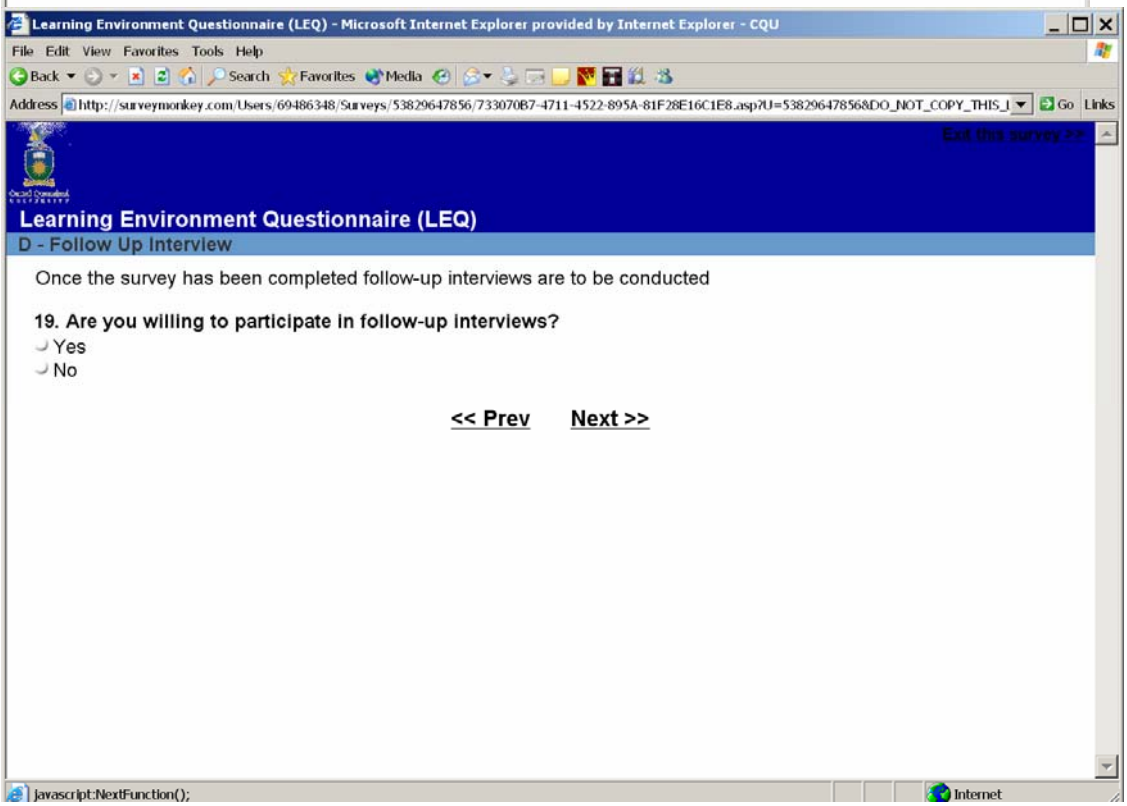

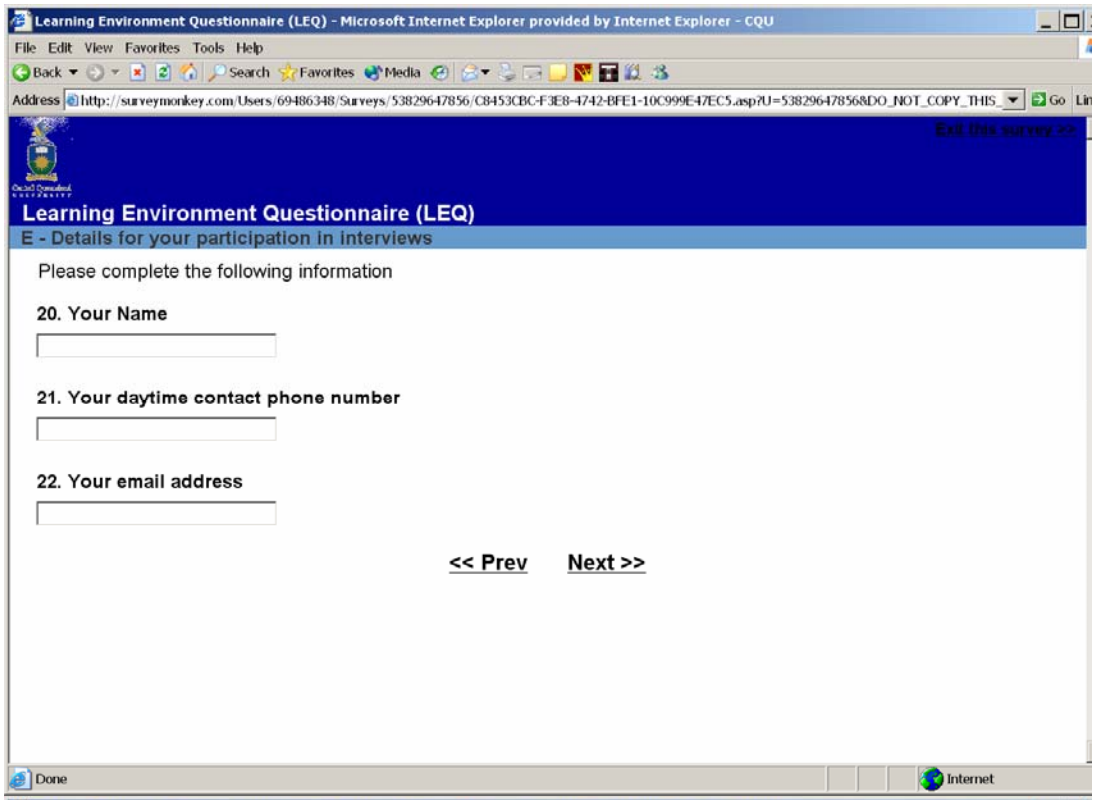
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Learning Environment Questionnaire (LEQ)
E - Details for your participation in interviews
Please complete the following information
20. Your Name
21. Your daytime contact phone number
22. Your email address
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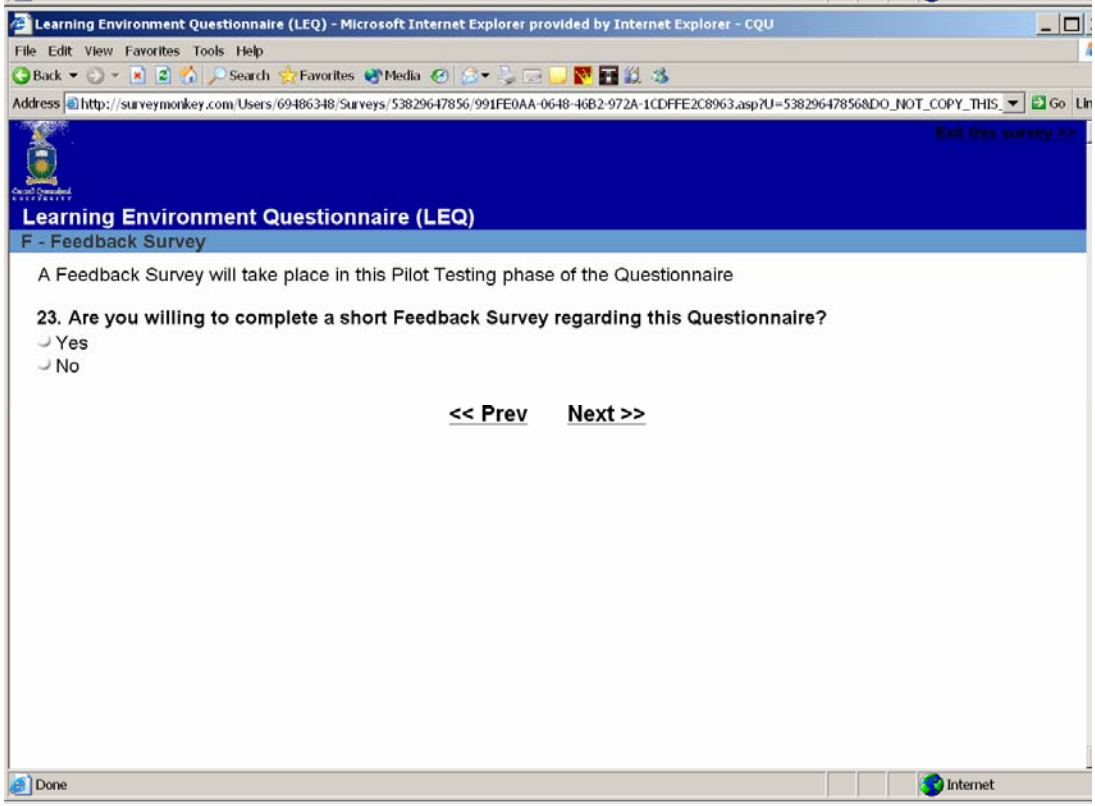
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Learning Environment Questionnaire (LEQ)
F - Feedback Survey
A Feedback Survey will take place in this Pilot Testing phase of the Questionnaire
23. Are you willing to complete a short Feedback Survey regarding this Questionnaire?
Yes
No
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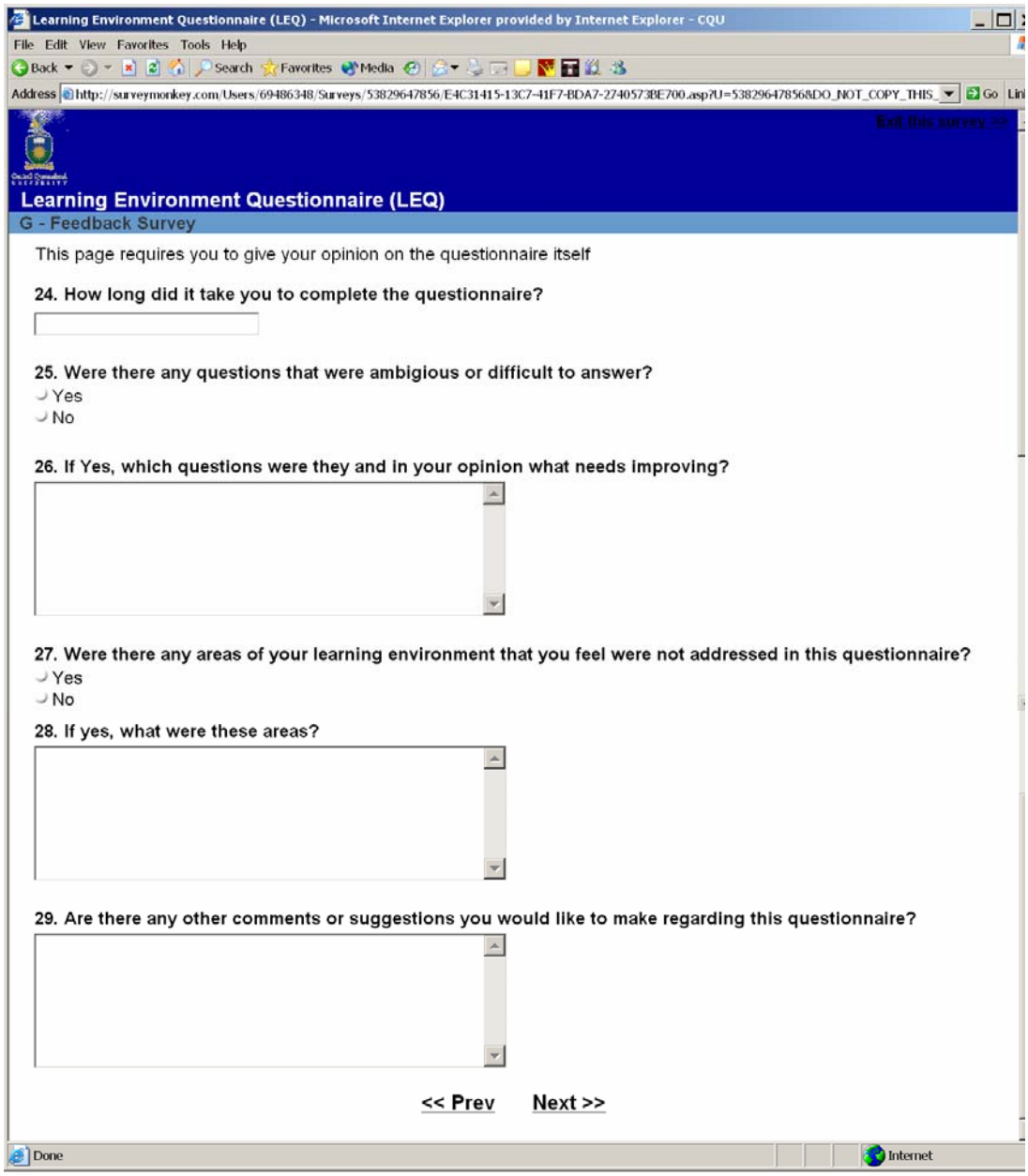
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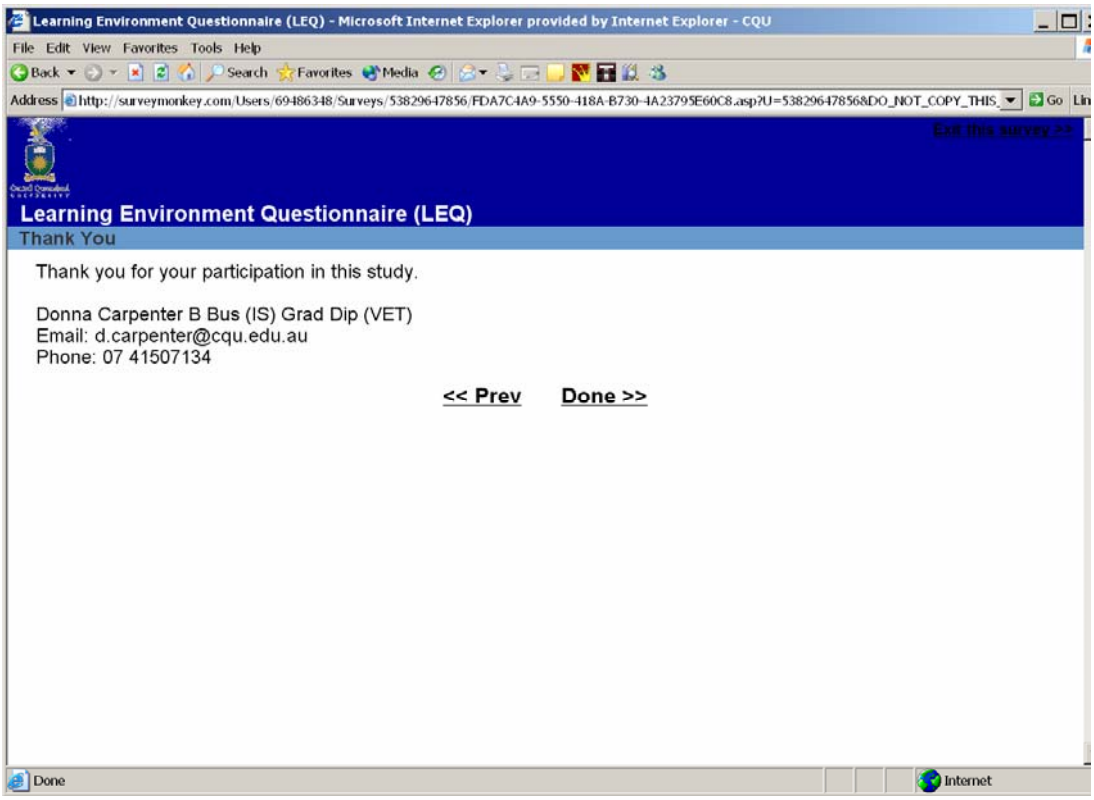
Learning Environment Questionnaire (LEQ)
G - Feedback Survey
This page requires you to give your opinion on the questionnaire itself
24. How long did it take you to complete the questionnaire?
25. Were there any questions that were ambigious or difficult to answer?
Yes
No
26. If Yes, which questions were they and in your opinion what needs improving?
27. Were there any areas of your learning environment that you feel were not addressed in this questionnaire?
Yes
No
28. If yes, what were these areas?
29. Are there any other comments or suggestions you would like to make regarding this questionnaire?
<< Prev
Next >>
Done
Internet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Go
Exit this survey >>
Learning Environment Questionnaire (LEQ)
Thank You
Thank you for your participation in this study.
Donna Carpenter B Bus (IS) Grad Dip (VET)
Email: d.carpenter@cqu.edu.au
Phone: 07 41507134
<< Prev
Done >>
Done
Internet

Appendix D – Survey Results – Full Sample

LEARNING ENVIRONMENT SECTION												
When learning what type of information gathering techniques suit you the most?		%		%		%		%		%		
		Never		Seldom		Sometimes		Often		Always		Response Average
Worked examples	1	1.79	5	8.93	16	28.57	18	32.14	16	28.57		3.77
Prepared notes (Study Guides)	0	0.00	2	3.45	15	25.86	24	41.38	17	29.31		3.97
Use of text books	1	1.72	2	3.45	14	24.14	20	34.48	21	36.21		4
Use of online materials	0	0.00	2	3.45	11	18.97	26	44.83	19	32.76		4.07
Use of information from the library	7	12.28	16	28.07	19	33.33	12	21.05	3	5.26		2.79
Use of information found by myself	0	0.00	4	6.90	23	39.66	17	29.31	14	24.14		3.71
Use of information given by other people	2	3.51	19	33.33	23	40.35	11	19.30	2	3.51		2.86
Total Respondents	58											
(skipped this question)	3											
How often have you used the following resources when learning?		%		%		%		%		%		
		Never		Seldom		Sometimes		Often		Always		Response Average
Textbooks	1	1.72	1	1.72	9	15.52	18	31.03	29	50.00		4.26
Printed Study Guides	2	3.45	2	3.45	13	22.41	19	32.76	22	37.93		3.98
Handouts provided by the lecturer	8	14.04	3	5.26	12	21.05	12	21.05	22	38.60		3.65
Library resources (eg journal articles)	6	10.34	11	18.97	20	34.48	13	22.41	8	13.79		3.1
Course schedule	2	3.51	8	14.04	14	24.56	21	36.84	12	21.05		3.58
Online grade checking	4	6.90	10	17.24	16	27.59	15	25.86	13	22.41		3.4
Student online activity tracking	10	17.86	15	26.79	20	35.71	8	14.29	3	5.36		2.63

Online tests/quizzes	0	0.00	4	6.90	15	25.86	23	39.66	16	27.59		3.88
Online assignment submission	2	3.45	1	1.72	12	20.69	24	41.38	19	32.76		3.98
Electronic library access	5	9.09	12	21.82	21	38.18	12	21.82	5	9.09		3
URL links to resources	2	3.45	9	15.52	14	24.14	23	39.66	10	17.24		3.52
Online search tools	0	0.00	3	5.36	10	17.86	23	41.07	20	35.71		4.07
Online course materials	1	1.75	1	1.75	10	17.54	25	43.86	20	35.09		4.09
Email	4	6.90	11	18.97	14	24.14	17	29.31	12	20.69		3.38
Bulletin Board (online forum)	12	20.69	11	18.97	21	36.21	8	13.79	6	10.34		2.74
Chat room	27	46.55	16	27.59	9	15.52	3	5.17	3	5.17		1.95
Workgroup (eg group project)	15	26.32	14	24.56	17	29.82	8	14.04	3	5.26		2.47
Total Respondents	58											
(skipped this question)	3											
What type of learning situation do you prefer most?		%		%		%		%		%		
		Never		Seldom		Sometimes		Often		Always		Response Average
Learning by yourself	2	3.45	0	0.00	6	10.34	22	37.93	28	48.28		4.28
Learning with a friend	4	7.02	8	14.04	25	43.86	15	26.32	5	8.77		3.16
Learning through small group work	6	10.53	15	26.32	27	47.37	6	10.53	3	5.26		2.74
Learning through large lectures	6	10.53	17	29.82	14	24.56	14	24.56	6	10.53		2.95
Tutorials	3	5.26	3	5.26	16	28.07	21	36.84	14	24.56		3.7
Giving presentations in front of the class	14	24.56	14	24.56	20	35.09	7	12.28	2	3.51		2.46
Learning through Interactive Video Conference sessions	22	38.60	14	24.56	15	26.32	4	7.02	2	3.51		2.12
Learning through Self-help groups	21	37.50	8	14.29	17	30.36	7	12.50	3	5.36		2.34
Total Respondents	58											

(skipped this question)	3											
How often you have been involved in these different learning situations?		%		%		%		%		%		
		Never		Seldom		Sometimes		Often		Always		Response Average
Private tuition (one on one learning)	26	45.61	14	24.56	12	21.05	4	7.02	1	1.75		1.95
Learning with a friend	5	8.77	14	24.56	19	33.33	17	29.82	2	3.51		2.95
Small group sessions	11	19.30	17	29.82	19	33.33	8	14.04	2	3.51		2.53
Learning alone at home with paper-based learning materials	0	0.00	0	0.00	9	15.52	22	37.93	27	46.55		4.31
Learning alone at home with web-based learning materials	0	0.00	2	3.45	12	20.69	18	31.03	26	44.83		4.17
Classroom learning with paper-based materials	5	8.77	6	10.53	19	33.33	20	35.09	7	12.28		3.32
Classroom learning with web-based materials	12	21.05	11	19.30	20	35.09	11	19.30	3	5.26		2.68
Online Discussion forums	12	21.43	17	30.36	15	26.79	8	14.29	4	7.14		2.55
Self-help groups	24	42.11	13	22.81	11	19.30	7	12.28	2	3.51		2.12
Total Respondents	58											
(skipped this question)	3											
Where do you actually do the majority or your learning?		%		%		%		%		%		
		Never		Seldom		Sometimes		Often		Always		Response Average
At home	0	0.00	0	0.00	5	8.77	12	21.05	40	70.18		4.61
In the classroom	12	21.43	5	8.93	13	23.21	18	32.14	8	14.29		3.09
In a lecture theatre	12	22.22	8	14.81	19	35.19	10	18.52	5	9.26		2.78
In the library	17	30.36	16	28.57	15	26.79	7	12.50	1	1.79		2.27
At my place of work	29	51.79	9	16.07	11	19.64	4	7.14	3	5.36		1.98

At a learning centre	32	59.26	10	18.52	6	11.11	4	7.41	2	3.70		1.78
In a computer lab	10	18.18	9	16.36	14	25.45	18	32.73	4	7.27		2.95
At a friends place	28	50.91	7	12.73	12	21.82	6	10.91	2	3.64		2.04
Other	28	66.67	3	7.14	5	11.90	2	4.76	4	9.52		1.83
Total Respondents	58											
(skipped this question)	3											
If other please specify.												
Total Respondents	9											
(skipped this question)	52											
How would you describe the convenience of resources you use for learning?		%		%		%		%		%		
		Never		Seldom		Sometimes		Often		Always		Response Average
Paper-based Study Guides are readily available	1	1.72	1	1.72	19	32.76	24	41.38	13	22.41		3.81
Internet connection is reliable	0	0.00	2	3.45	12	20.69	25	43.10	19	32.76		4.05
Online study materials are convenient	0	0.00	2	3.45	13	22.41	27	46.55	16	27.59		3.98
Course resources are easily accessible	0	0.00	0	0.00	11	19.30	27	47.37	19	33.33		4.14
Library resources are readily available	5	8.93	14	25.00	15	26.79	15	26.79	7	12.50		3.09
Onsite library information is readily available	10	17.86	7	12.50	16	28.57	20	35.71	3	5.36		2.98
Total Respondents	58											
(skipped this question)	3											

DEMOGRAPHIC SECTION												
Your Gender												
	Response Total											
Male	46	75.41										
Female	15	24.59										
Total Respondents	61											
(skipped this question)	0											
Your Age Group												
	Response Total											
19 yrs and below	5		Under 30 years									
20-29 yrs	41	46.00										
30-39 yrs	13		30 years or older									
40-49 yrs	2											
50 yrs and above	0	15.00										
Total Respondents	61											
(skipped this question)	0											
The number of courses you have previously undertaken with an online component												
	Response Total											
None	9											
1	5											

2	5											
3 or more	41											
Total Respondents	60											
(skipped this question)	1											
Your current Program of study												
	Response Total											
Certificate	0											
Diploma	3											
Associate Degree	1											
Bachelor	54											
Masters	1											
Phd	1											
Other (please specify)	1											
Total Respondents	61											
(skipped this question)	0											
Your highest level of previous education												
	Response Total											
Never finished High School	0											
Completed Secondary School - Grade 10	4											
Completed Secondary School - Grade 12	20											
Trade Course	6											
University	12											

Other (please specify)	19											
Total Respondents	61											
(skipped this question)	0											
Where has the majority of your previous education been undertaken?												
	Response Total											
Australia	33											
Other (please specify)	28											
Total Respondents	61											
(skipped this question)	0											
The highest qualification you currently hold												
	Response Total											
None	11											
Trade Certificate	6											
Diploma	27											
Bachelor	11											
Masters	0											
PhD	0											
Other (please specify)	6											
Total Respondents	61											
(skipped this question)	0											

Current mode of study - choose all that apply		
	Response Total	
Full-time	39	
Part-time	9	
Internal	4	
Flex	19	
Total Respondents	61	
(skipped this question)	0	
Were you given a choice when selecting your mode of study?		
	Response Total	
Yes	43	
No	17	
Total Respondents	60	
(skipped this question)	1	
If yes when selecting your mode of study (ie flex internal) what factors contributed to your choice? Please select all the responses that apply to you.		
	Response Total	
Distance from campus	19	
Family commitments	18	
Work commitments	24	
Financial constraints	9	

Timing of classes	14											
Tutorial support	16											
Face to face contact with teaching staff	12											
Interaction with other students	8											
Availability of resources	11											
Other	3											
Total Respondents	44											
(skipped this question)	17											
If No when selecting your mode of study what factors would you have chosen if you did have a choice? Please select all that apply.												
	Response Total											
Distance from campus	9											
Family commitments	7											
Work commitments	8											
Financial constraints	12											
Timing of classes	10											
Tutorial support	5											
Face to face contact with teaching staff	9											
Interaction with other students	7											
Availability of resources	11											
Other (please specify)	0											
Total Respondents	21											
(skipped this question)	40											

Are you willing to participate in follow-up interviews?												
	Response Total											
Yes	29											
No	32											
Total Respondents	61											
(skipped this question)	0											
Your Name												
Total Respondents	29											
(skipped this question)	32											
Your daytime contact phone number												
Total Respondents	27											
(skipped this question)	34											
Your email address												
Total Respondents	29											
(skipped this question)	32											

Are you willing to complete a short Feedback Survey regarding this Questionnaire?												
	Response Total											
Yes	35											
No	26											
Total Respondents	61											
(skipped this question)	0											
How long did it take you to complete the questionnaire?												
Total Respondents	34											
(skipped this question)	27											
Were there any questions that were ambigious or difficult to answer?												
	Response Total											
Yes	3											
No	31											
Total Respondents	34											
(skipped this question)	27											
If Yes which questions were they and in your opinion what needs improving?												

Total Respondents	3											
(skipped this question)	58											
Were there any areas of your learning environment that you feel were not addressed in this questionnaire?												
	Response Total											
Yes	2											
No	33											
Total Respondents	35											
(skipped this question)	26											
If yes what were these areas?												
Total Respondents	2											
(skipped this question)	59											
Are there any other comments or suggestions you would like to make regarding this questionnaire?												
Total Respondents	14											
(skipped this question)	47											

Appendix E – Research papers presented from this thesis

Book Chapters

Carpenter d and Dekkers J (2006) "Towards meeting student needs and demands through online study", Open and distance education in global environment: opportunities for collaboration, S Garg, S Panda, CRK Murthy and S Mishra (Eds), Viva Books Private Ltd, New Delhi, p 94-105

Conference Papers - Refereed

Ruth A and Carpenter D (2002) "And now to answer your question - Lecturer presence in an Online Learning Environment", , 4th International ITiRA Conference, S. Marshall, W. Taylor and C Macpherson (Eds), Rockhampton, pp 259-269, 2002.

Carpenter D (2003) "Learning Styles and how they related to the Online Learning Environment - a review of the literature", *Breaking New Ground*, Women in Research Conference, Bundaberg.

Carpenter D and Dekkers J (2005) "Towards meeting student needs and demands through online study", ICDE International Conference on Open Learning and Distance Education, New Delhi, India, 19-23 November.

Carpenter D and Dekkers J (2005) "An Exploration of the Use of ICTs by Students in a First Year University Course", Technology Conference, Hyderabad India, 12-15 December.

Journal and Refereed Articles

Carpenter D and Dekkers J (2006) "Use of information and Communication Technology by Students at Undergraduate Level" *The International Journal of Technology, Knowledge and Society*, Common Ground Publishing, Melbourne