Comparative Assessment of the Effectiveness of Online Vs Paper Based Post Graduate Courses in Occupational and Environmental Safety and Health at Edith Cowan University, Perth, Western Australia

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ABSTRACT

Although online / e-learning is shifting the teaching paradigm at tertiary institutions, there are limited studies that assess the effectiveness of online courses, particularly in the occupational and environmental health field and among mature aged students. The main aim of this study was to evaluate the effectiveness of online “Blackboard” units as compared to traditional “paper based” units taught as part of the Professional Masters in Occupational and Environmental Health at the Edith Cowan University.

Unit commencement and completion questionnaires were designed and distributed over two academic semesters (in 2004 and 2005) to evaluate students’ perceptions of the effectiveness of the modes of delivery. Some questions about characteristics of the students, their knowledge of technology and their expected learning outcomes were included. To obtain more detailed information, a focus group meeting was conducted. In addition lecturers were interviewed prior to and after teaching in the courses. The interview questions from lecturers provided information about their expectations from the unit content, rationale for selecting online as opposed to traditional paper based methods and their experience in teaching in traditional paper based mode versus virtual teaching methods.

It was found that online students and those studying both online and paper based units had significantly more lecturer-student and peer interactions than those studying solely paper based units. Furthermore it was established that in both teaching methods, students and some lecturers faced challenges and that neither teaching method was regarded as being significantly better than the other. The level of students’ and lecturers’ satisfaction with online learning was high and with appropriate strategies, there is the potential for online learning to be more effective.
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I wish to dedicate this thesis to my daughter, Brooke, who is too young to understand this but I hope this will inspire her to achieve her goals under any circumstances.

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CHAPTER 1. INTRODUCTION

1.1 Background to the study

Although online / e-learning is shifting the teaching paradigm at tertiary institutions, there are limited studies that assess the effectiveness of online learning courses, particularly in the occupational safety and environmental health field and among mature aged students. The main aim of this study was to evaluate the effectiveness of the online “Blackboard system” at Edith Cowan University (ECU) Perth, Australia as compared to traditional paper based units taught as part of the Professional Masters in Occupational and Environmental Safety and Health.

Moe and Blodget (2000) predicted that the number of Internet users in the USA would rise from 14 million in 1995 to 638 million in 2004. Universities have been expanding their online teaching capacity rapidly with an annual growth rate of 40%, thereby increasing the need to evaluate the effectiveness of online learning (Zhang et al, 2003). There are no arguments that the move to online teaching is mainly driven by compelling economics and the potential for effective learning.

A DCITA survey in December 2001 found that 23% (or 3.7 million) of Australians aged 14 years and over were using the Internet for educational services (DCITA, 2004). This has obvious implications for student expectations of higher education in Australia in the near future. This trend follows the USA, where the market for online learning training courses was $550 million in 1998 and it was expected to reach $11.4 billion in 2003. According to a report prepared for the president of the United States of America in 2000, the global market for e-
learning was estimated at $300 billion and it was expected to grow to $365 billion by 2003 (Kerrey et al, 2000). Despite rapid growth in the use of the Internet for teaching, an effective assessment tool for online learning systems is still not available and should be developed (Zhang et al, 2003).

With globalisation, increased international competition and a move from an industrial economy to a knowledge economy, the education industry has been transformed and is evolving to new dimensions. Distance education has been a unique model of teaching and has enabled students to access education and overcome time, geographical and other constraints associated with the need to attend classroom lectures. For a long time distance learning was based on correspondence and paper based readings supported by video or audio materials. More recently, with advances in technology, universities and organisations are utilizing the online learning environment, which enables interactivity and is capable of simultaneous as well as delayed communication. In this mode of distance learning, students expect interaction, which is more closely related to the traditional classroom environment (Schrum et al, 2002).

In many instances lecturers have to develop and design their activities and interactions in new ways regardless of their own personal use and knowledge of information technology (Schrum et al, 1998 and Candiotti et al, 1998).

The development of online courses presents a number of unique challenges including increased time for course delivery, creating a sense of an online community and encouraging students to become independent learners (Wiesenberge et al, 1996).

According to Raineri et al, (1997), traditional lectures by the lecturers provide little opportunity for students to explore ideas, to apply the course in novel situations and to make use of their cognitive and inductive thinking. Professor
Huebler at the University of Illinois has developed an online teaching tool called “Cyberprof” and has expanded it to 16 courses and 20 remote institutions. Cyberprof has not replaced the traditional classroom setting instead lecturers spend the lecture time engaged in discussion and collaborative learning. This has resulted in higher lecture attendance and increased enrolment (Raineri, 1997).

According to Riegel (1998), online learning enables effective and efficient facilitation of learning through “Learner controlled interactivity”. This is made possible by a shift of university lecturers from being instructivist (information transmission mode) to constructivist, (facilitating learning mode). This in turn can lead to networked learning, which is a co-operative and collaborative learning method that also allows for individual and independent learning. Unfortunately most Web based teaching even today is still focused on information transmission and is limited and fragmented (Zhang et al, 2003).

At the Stanford University Center for Teaching and Learning (1996), lecturers who had used online teaching methods indicated an improvement in teaching and learning outcomes. They also reported that students were better prepared and discussions were more advanced if students had access to billboards, class forums and emails.

According to Welsh (2000), to enhance the learning of students, the technologies developed should take into account peer interaction and interaction with lecturers.

Learning is also about motivating students to acquire knowledge. Student's motivation and expectation of educational outcomes, instructional content and pedagogical skills of the lecturer using the technology play important roles in the achievement of effective learning (Mitchell et al, 2001). However little attention is
given to what students expect upon entering a university or college or how institutions should respond to students (Bank et al, 1992). Market segmentation is common amongst many organisations and is a model of identifying homogenous groups and segmenting customers based upon their needs, expectations and preferences. Most universities segment their learners based on demographics such as age, years of program, gender, special needs and grade point average, rather than segmenting their market, based on students’ needs, expectation and satisfaction of courses (Rogers et al, 2001).

Many online training courses in the area of occupational safety and health are being developed at exponential costs, without any evaluation of their effectiveness and usability. Policies and guidelines aimed at improving the learning environment for OHS professionals need to be based upon well founded research into the effectiveness and appropriateness of various forms of delivery.

Although ECU carries out unit evaluations at the end of each semester, the comparative study such as this research in the occupational / environmental health and safety field has not been conducted.

This research compares the effectiveness of paper based distance learning versus the online “Blackboard system”. The comparison evaluated the effectiveness of the courses based on the students' and lecturers' expectations, satisfaction and experience in a post graduate course.

The aim of the research was also determine if the online learning course is capable of providing similar or improved lecturer and peer interaction.
1.2 Significance of the study in the field of occupational and environmental safety and health

Most national and international occupational safety and health legislation include requirements for worker and employer training in order to reduce workplace incidences of injury and illness.

In Australia Occupational Safety and Health (OSH) professionals often have to provide training. In order to provide training they might develop or purchase training packages. Currently such training packages vary from traditional classroom settings to online training. The personal experiences of OHS graduates as online students may impact upon their future decision making in this regard.

The effectiveness of many forms of OSH training is largely unmeasured, or the results are varied and inconclusive. Very few OSH training programs provide an evaluation of training impact (Loos, 2001), which is essential in measuring the performance of the training tool and providers. The USA National institute for Occupational Safety and Health (NIOSH) conducted an extensive review of the positive effects of OSH training (Cohen 1998) and recommended that the transfer of learning from an instructional environment to the workplace is the ultimate purpose of training. The review also indicated that personal experience, beliefs and characteristic influence training outcomes, therefore self-directed online learning can accommodate a great diversity of students and workers.

Literature review of recent research relating to online learning in Occupational safety and Environmental Health indicated small number of relevant projects. The searches led to only one relevant project that was conducted in 2005 in Manchester, examining the preferences of the post graduate occupational physicians and hygienists. That project also compared traditional printed text to online learning. This will be discussed further in Chapter 2.
1.3 Lecturers’ perception, attitudes and satisfaction

Online students face the challenge of adapting to a new learning environment and understanding and learning the required IT tools before they can begin to acquire any new subject knowledge (Yakimovic et al, 1995). Similarly, lecturers may require additional technical and pedagogical support in making the transition to online teaching (Broad, 1999).

Lecturers teaching online courses have to develop strategies to ensure the success of their teaching program. These strategies were summarised by Schrum et al, (2002) as follows:

- Lecturer-student and student-student interaction to encourage collaboration;
- Support via phone, email or face-to-face to address any problems in the course;
- Socialising including informal gathering to establish a sense of community.

A number of studies have been conducted to evaluate various websites. Hislop (1999) and Schrum et al, (2002) identified seven important components of successful online learning. Although courses and their guidelines are emerging as quickly as the technology, there are factors that lead to the success of online learning. These factors include access to tools; technology experience; learning preferences; study habits and skills; goals or purposes; lifestyle factors and personal traits and characteristics.
1.4 Students' preferences and satisfaction

According to Quattrochi (2002), online learning is moving away from interpreting the information and instead focuses on selecting useful information and findings to build on the conceptual understanding of real problems.

The challenges for the universities are to develop a learning network that engages the students in the learning. To achieve this, staff members have to be convinced that online learning is effective.

The online learning environment should also take into account the students' learning preferences and the skills that may be required to enable effective use of online teaching delivery (Hannafin et al, 1997).

In North America, a coordination task force (1996) reviewed the strategic development of 125 Canadian and American post secondary institutions and ten universities. None of the institutions used a segmented approach based on learners' needs. The universities still applied traditional segmented methods for students, rather than identifying learner segments and applying that knowledge in their academic programs. They therefore did not differentiate and meet the individual needs of their mixed learners. This is especially relevant as technology is moving rapidly and new generations of students are very competent and vocal and have a higher expectation of quality and service, including quality teaching methods.

A study related to students’ frustration, anxiety and confusion due to technical breakdown (King, 1998), showed that these factors play a significant role in the ultimate success and level of satisfaction of students in online versus traditional paper based courses. People have different learning preferences. Individuals need to recognize their own abilities, limitations and their preferred styles of
learning. While some prefer working in groups, others prefer to work individually learning better visually or via audio.

Schrum et al, (2002) reported that in their research that many online students were concerned about learning alone and would prefer learning in a more collaborative and social environment.

1.5 Purpose of the study

This research aimed to conduct a comparative study of postgraduate students undertaking online units in Environmental Health and those enrolled in traditional paper based units in Occupational Safety at ECU.

A review of several research studies indicates that online learning has positive outcomes in terms of learning, enrolment, and application of information (Riegel, 1998, Schrum et al, 2002). Do the findings of this review relate to Occupational Safety and Environmental Health courses as well as Information Technology courses or are there frustrated students and lecturers trying to overcome the confusion, frustration or anxiety of the new information technology environment? As online learning increases in popularity and becomes more accepted as a method of teaching, students, (particularly mature aged students) have to be prepared for new demands associated with the transition towards technology. This is not a trivial issue especially for courses in the public health domain, where a sound knowledge and use of technology has not been a pre-requisite for students previously.

This study measured the experience, preference and level of satisfaction of students and lecturers in undertaking paper based versus online courses. Recommendations are made for the improvement of learning outcomes and experiences for both teaching methods. Particularly as new courses are being developed and materials in existing programs are updated.
This study also provides relevant recommendations aimed at improving the integration of information and communication technology into both online and paper based teaching and learning processes.

1.6 Definition of terms

**Paper based:** Majority of the instruction occurs when students and instructor are not in the same place. Students receive correspondence in a form of reading materials, audio or video.

**Online learning:** Instruction may be synchronous or asynchronous. Students receive correspondence via computer technology.

**Readers:** At Edith Cowan University, the reading materials sent to students are called Readers.

Faculty: Lecturer and support staff

“Courses" and "units" of study will be used interchangeably. Throughout the literature review, evaluations were undertaken of university courses however at ECU, they are called units.

1.7 Research Questions

This research tested the following questions:

1. Is online learning in the environmental health units better than traditional paper based occupational safety units?

2. Do students who undertake online units have a better experience than those undergoing traditional paper based units?
3. Do units that are solely based on online learning provide appropriate lecturer and peer interaction for students?
CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

The World Wide Web (WWW) has provided higher education institutions with an effective medium to offer course materials to students in remote sites using the Internet. There has been a proliferation of web course development tools which enable various institutions to create course materials, however evidence of effectiveness of online compared to traditional face-to-face courses is still lacking. While there have been studies claiming online students perform better than students taught in a traditional classroom setting (Schutte, 1996), other researchers have disputed these claims and questioned the research design and methodology used in those studies (Neal, 1998).

The Internet provides many facilities and technologies that can be used for teaching; hence teaching styles have been adapted to this new tertiary Information technology environment. Universities now constantly have to adjust to the new pedagogy that uses technology as an integral component of teaching. Many lecturers, who are not familiar with technology, need to be trained to teach and to meet the course objectives using Internet facilities. In many cases lecturers provide information and advice to students about the use of technology in addition to the subject matter. Therefore the role of tertiary lecturers within the context of an evolving teaching / learning environment has been undergoing profound changes (Beaudoin, 1998).

This chapter discusses the various models of learning and factors integral to learning which have impacted upon tertiary institutions and students. Furthermore the applications of various evaluations in relation to online and
traditional class room teaching and good practice models in online learning are explored.

The literature reviewed for this study included both national and international research in evaluation and comparative studies of online and traditional classroom learning. Furthermore the review identified important principles for the effective evaluation of traditional classroom and online courses. From the review, it became apparent that various studies tend to use the words “assessment” and “evaluation” interchangeably. Clearly, the term evaluation could replace the word assessment in any of the guiding questions, however, the debate is often about “who” should be involved in assessment and the role of the student in course evaluation.

2.2 Importance of distance education online learning and evaluation

"To have a good distance learning program, you have to absolutely throw out your notions of learning as that which happens in a classroom" (Holbrook, 2005).

Before Internet access became widely available, lecturers who delivered asynchronous instruction to distance learning students used phone lines, TV, videotapes or postal mail. More recently distance education using the Internet has become widely accepted in higher education institutions and this is now recognized as a powerful medium for distributing course information. Hundreds of distance education courses all around the world in almost all fields of study are offered via the Internet.

The main differences between online learning programs and the traditional classroom programs are that the students are separated from the lecturer by time and location. According to Verduin and Clark (1991), both face-to-face and distance education methodologies appear to achieve same cognitive outcomes,
however for distance education, there must be good student support systems and accessible modes of delivery and resources in order to achieve this parity in outcomes for learners.”

In addition learning outcomes need to be demonstrated with appropriate assistance and assessment to match those outcomes. Therefore institutions commitment to quality and effectiveness of learning via distance education as well as a defined plan and infrastructure for using technology are essential to support learning goals and activities. More importantly appropriate evaluations and student assessment and documentation together with elements such as qualified and trained lecturers on the use of technology ensure good educational delivery modes which support distance education (A’Harren, 2000).

Palomba and Banta (1999) suggested that in carrying out assessments / evaluations of any tertiary courses, including online courses, one must ask the following questions:

- What are the expected outcomes of assessment?
- Is it a formative and summative use of assessment?
- Does the assessment have faculty’s support?
- What assessment methods are used?
- Are the results of assessment shared and used?
- Is the assessment itself assessed?

2.3 Models of Learning

According to Hazari (1998) traditional classrooms use an objectivist model of learning which is based on Skinner's theory of transfer of knowledge from a
lecturer to the learner. In this model, the lecturer controls the material and pace of learning and information is directed to the whole class as a large group, and curriculum and instructional decision making is guided by the textbook (Cuban, 1993).

On the other hand, the capability of Internet delivery systems allows for the establishment of discussion groups and email transfer of text, graphics, audio, and video files. Chat in synchronous real time modes is also an option. Hence the online learning is based on a constructivist approach to learning. This model is student centered (Mitchell et al, 2001, Hofstetter, 1998, Berge, 1995, Coley et al, 1997). Here the lecturer acts as a moderator primarily responsible for facilitating learning. Information is provided to small groups, students help choose the content and decide on the learning material. Experienced lecturers may even allow students to choose the rules of behaviour, rewards, and punishment (Cuban, 1993). Moreover, those lecturers tend to provide several online teaching strategies rather than merely transforming hard copy text to online text. For example they may include students’ biographies; encourage frequent interaction and collaboration. Participation is made compulsory. They may also establish forums to ask questions, allow flexibility on topics and minimise technology requirements.

There are still some lecturers who believe online courses are the same as traditional classroom or paper based environments and the only difference is the way in which the materials are provided. These lecturers usually use the same course notes, assignments and reading materials for their courses. This conflicts with the constructivist model.
"The effectiveness of online learning is not a function of technology but a learning environment and the capability to do things that one could not do otherwise" (Alexander, 1995).

Astin (1993) suggested an input-environment-output (I-E-O) model as an appropriate evaluation tools for online courses. In the study, inputs refer to personal qualities such as the level of students' preparedness or students’ motivation to an educational program. Environment refers to the students' experiences during an educational program and outputs refer to the students' qualities and abilities at the end of the course assessment.

Schutte (1996) carried out a study at the California State University, Northridge, where 33 students in a Social Statistics course were randomly divided into two groups. The first group was taught in a traditional classroom and the other group in an online learning environment. This experiment was intended to assess the merits of a traditional classroom versus online environment on students' test performances and students' experiences. In both groups the text, lectures and exams were the same. The online class scored on average 20% higher than the traditional class in two examinations.

Further, the post-test results indicated the online class had significantly higher perceived peer contact, more time spent on class work, more flexibility and a better understanding of the material at the end of the semester than did the traditional class.

The authors concluded that although, face-to-face interaction with the lecturer is important in the learning process, in the online course, a lack of face-to-face interaction with the lecturer led to greater interaction between students and consequently higher students’ test results.
Hazari’s (1998) research was conducted at the University of Maryland at College Park. The aim of the research was to develop standard web course development tools, that lecturers could use to help them develop pedagogically useful course materials that would “offer students a consistent, virtual, meaningful, interactive environment to promote learning (Hazari, 1998).”

The lecturers were invited to two focus group sessions. Approximately 50 lecturers attended a two hour focus group meeting with computer mediated communication tools. This enabled the users to undertake collaborative work such as electronic brainstorming, voting, and anonymous discussions. Lecturers were provided with an online slide presentation on the use of the course delivery software, its features, and advantages to students. At the end participants were asked to complete a short electronic (one minute) survey. Their comments, questions and suggestions were recorded and then forwarded to the research committee.

Lecturers were then given the opportunity to work on the course as if they were the students and provided feedback on their brief experience with online course development tools.

The researchers concluded that the selection of the web tool is an important component of online learning and teaching. From the focus group meeting it became apparent that one single tool can not meet the needs of all individual lecturers across the university and that a variety of tools have to be available.

Involving the lecturers at the onset of the transition to online learning, increased the likelihood of them embracing the new teaching methodology. This research also identified the importance of training for lecturers on the use of technology and recommended peer training for students, instructional technology in a form of training or symposium for staff members. The symposiums were suggested in order to bring lecturers across the various schools of universities together to share experiences and ideas.
Hazari (1998) found that assessment questions that deal specifically with the online environment are lacking and many instruments used in the evaluation of online instruction are taken from traditional course settings and applied directly to evaluate computer-mediated instruction. In order to effectively evaluate the online environment, lecturers and staff members have to develop evaluations specific to the online environment and the course of study.

The range of parameters which have been used for such evaluations vary from effects of courses on the learning outcomes or job performance, job satisfaction to professional development. Other parameters for evaluation include cost-effectiveness of online delivery, technical quality of educational products and reactions of staff and students to the design and development of online products. (Hazari, 1998)

Berge and Myers (2000) conducted a review of thirteen published course evaluation instruments used to evaluate online college courses and found that there was little if any difference pedagogically between online and traditional instructional design.

Hislop (1999) conducted a project to evaluate online courses in undergraduate and graduates levels at Drexel University, Philadelphia. This review included the support structure and methodology for Asynchronous Learning Network (ALN) course delivery. The degree used for the evaluation was a Master of Science in Information Systems that was offered online as well as in traditional face-to-face mode.

The evaluation design included pre-degree, post class and post degree evaluations as well as measuring the learning outcomes based on the students’ grades. The students were all employed with some responsibilities related to Information systems and technology. The lecturer–student ratio for both courses was also compared.
Both online and traditional programs were identical except for the mode of delivery. Other identical factors included admission, program of study, lectures, course content, student's status and university records.

Student grade evaluations showed equal or better results for online delivery as compared to traditional face-to-face delivery. There were some discussions of online courses having greater economies of scale by increasing the number of students per lecturer, however Hislop (1999) suggested that the current student-lecturer ratio should be maintained, because of the high level of interaction required among participants. It was also suggested that online courses require more mature students who prefer flexibility in their study. Therefore, students need to be more disciplined, require more support, and a transitional period to adjust to the new learning environment. “Not everyone will adapt to operating in an ALN environment” (Hislop 1999).

Online courses must be positioned as strategies that make education more relevant and engaging for learners. The courses need to keep students in step with IT changes that are reshaping contemporary society (Harassim et al, 1995).

Phipps and Merisotis (1999) contend that more research attention needs to be paid to the input portion of Astin’s model; this encompasses the abilities and knowledge that students bring to the educational experience. “Learner characteristics are a major factor in the achievement and satisfaction levels of the learner” (Phipps and Merisotis, 1999).

There have been many studies that demonstrate that face-to-face interaction makes a difference in student test performance (Schutte, 1996, Achtemeier, 2003, Mitchell et al, 2001).

Mitchell et al,(2001) conducted a comparative study of ten faculties of education and a case study of an undergraduate computer course at Ontario University. The differences between students' interaction, and perceptions as well as
lecturers’ views and perceptions between face-to-face and online classes were compared. They argued that most faculties have “Lone Rangers” or “Greenhorns”. Lone Rangers are lecturers with some expertise in information technology, who integrate the course content into online course with minimal or no support from the university. Greenhorns on the other hand are very experienced in face-to-face course delivery but have no experience in online delivery. The Greenhorns require support and expert advice. It was further concluded that a “Wagon Train” approach is needed for successful online delivery. This refers to the institutional requirements that need to be in place for effective online delivery. Institutional policies and procedures together with supporting infrastructure and funding are key components of the Wagon Train.

Loos and Diether (2001) found that a major shortcoming in the asynchronous programs that they reviewed was that, assignments were largely based on factual knowledge and did not test the students’ abilities to apply their knowledge in “real” situations.

Reeves (2003) discussed in some depth pedagogical dimensions that can be used as criteria for evaluating different forms of computer-based education. He proposed a model incorporating ten dimensions of interactive learning. These include pedagogical philosophy, learning theory, goal and task orientation, source of motivation, teacher role, meta-cognitive support, collaborative learning, cultural sensitivity and structural flexibility. He also recommended evaluation of each dimension. For example, sources of motivation for the student would be assessed along a continuum from extrinsic to intrinsic.

Achtemeier (2003) investigated the definitions and principles of effective teaching and learning in undergraduate distance education. The widely referenced “Seven Principles for Good Practice in Undergraduate Education” developed by Chickering and Gameson (1983) and Graham and Cagiltay (2001) were used for this evaluation.
Of the eight areas of concern that were assessed, the most important items based on frequency of inclusion, were student-lecturer contact, followed by satisfaction with learning activities, clearly articulated course goals, and overall evaluation of the course. While these questions are important, the evaluation of students' skills and knowledge of technology for online learning are crucial. Furthermore students’ perception of the lecturer’s subject knowledge, availability, enthusiasm, question-answering ability, and overall performance should be measured (Bourne et al, 2004, Achtemeier, 2003).

According to Palomba and Banta (1999) assessment criteria should be preceded by explicitly stated outcomes and the Seven Principles for Good Practice in Undergraduate Education should be addressed in assessment questions. Furthermore, tertiary institutions must consciously consider online evaluations as the starting point of construction or revision of any online course or evaluation instrument.

It was also suggested that additional questions should be included to assess good practice in tertiary education. These questions are further discussed in section 2.8 of this chapter.

An element that may impede the formation of effective online teams by students is the fact that they have to be able to express themselves without ambiguity and respond fast. Paik et al, (2004) conducted research at the Yonsei University in Korea where 450 undergraduate students were sampled to investigate the barriers faced by online learning groups. Groups found it difficult to successfully communicate due to a lack of spontaneity in communication, difficulty in accessing Internet or email, lack of students' participation and a lack of confidentiality of messages.

Berge et al, (2005) conducted a research of postgraduate hygienist and occupational physicians to explore the students' preference in paper based versus online learning.
2.5 Factors important to online learning (Interaction, Faculty support, Student motivation and satisfaction)

While Vygotsky (1986) suggested the use of social dialog and interaction as an essential part of the learning process. Ritchie and Hoffman (1997) emphasized that well designed courses include elements that motivate the learner. They also recommended that courses should provide clear guidelines on objectives, encourage the learner to recall and apply previous knowledge and provide new information and offer guidance and feedback.

Schrum and Berger (1998) sought to identify dimensions of successful online learners by examining primary screening documents and mapping them out. They invited experienced online lecturers to review the dimensions and provide strategies they use to ensure student’s success. In determining successful online learning, seven factors were identified and confirmed as significant. These factors included access to tools, technology experience, learning preferences, study habits and skills, goals, lifestyle factors and learners’ traits and characteristics.

Stacey (1999) showed the importance of group collaboration in online learning and suggested group online discussions are integral to the learners’ effective understanding. They also found that a socially constructed learning environment is essential for effective learning.

Stacey and Rice (2002) conducted a study of online evaluation at Deakin University, Australia. The study cohort consisted of Master students studying in open and distance education modes. The research focused on students online learning processes and learning outcomes in a computer conferencing environment. Students’ discussions were observed and students’ results and frequency of interactions were also analysed. In addition they collected data through a voluntary online focus group conference. The results indicated that the
majority of online students found the computer conference learning environment engaging, flexible and easy to use. Stacey and Rice (2002) also concluded that the role of the lecturers and time and activities which established cognitive and social interactions were very important in a successful online course.

Rouke et al, (2000) refer to the participation of online groups as a “community of inquiry” dividing the community into three elements: cognitive presence, social presence and teacher presence. These elements are similar to the content analysis framework defined by Stacey et al, (2002) in exploring the online evaluation.

The scale of the technical and support structures are other important factors in an effective online learning (Goodwin et al, 1995). The information about student’s perceptions, expectations and satisfaction with their learning were used to assess effectiveness of online learning.

Goodwin et al, (1995) found that some students found it easy to access resource materials and carry out discussions, while other students had difficulty.

The focus of researching the roles of social, cognitive and teacher presence has defined the framework for evaluating the effects of online learning on students' learning. The relationship between interaction and learning is based on Rouke et al’s (2001) model as depicted in Figure 2.1:
**Figure 2.1: Rouke and Anderson’s model**

Below is a brief description of the sections in the model:

**Interaction with content:**

Online discussion and learning is more supportive of experimentation, this promotes divergent thinking, cognitive and social presence and an understanding of complex issues (Jian and Ting, 2000).

**Interaction with Lecturers:**

Teaching presence refers to the design and institution facilitation of a discourse with direct instructions which, are linked to students’ learning (Shea et al, 2003, Sherer et al, 2003). The quality and quantity of lecturers’ interaction with students and ongoing feedback and assessments are linked to student learning (Hew and Cheung, 2003, Jian and Ting 2000).
Interaction with peers:

Student learning improves when the lecturers place importance on students’ interaction, and there is high quality and quantity of online discussions (Jian and Ting, 2000).

Schutte (1996) hypothesized that face-to-face interaction with the lecturer was crucial to students’ test performance. However, the results of a comparative study indicated that lack of face-to-face interaction with the lecturer led to higher students interaction and produced better students’ test results. The online students seemed more frustrated, but not entirely due to the technology. Rather their frustration stemmed from their inability to ask questions of the lecturer in a face-to-face environment. Some students established their own virtual networks and study groups among peers. Results showed that the highest performing students (in both classes) reported the most peer interaction. From the data, they concluded that much of the performance differences can be attributed to students’ collaborations rather than to the technology and that lecturers should provide time for collaboration in the online setting.

Ragan (1999) of Pennsylvania State University (USA) reinforces the importance of students and peer interaction and support systems as well as student-lecturer interaction in the online environment.

2.6 Challenges of online learning

Hislop (1999) found that students studying online courses had to work harder than those attending traditional classroom lectures, because there was a lack of face-to-face contact, and the online class was more boring than traditional class.
Paik et al, (2004) showed that approximately 50% of students in the online courses experienced barriers that prevented them from forming a collaborative learning team.

Table 2.1 presents a summary of the main obstacles identified through the literature review.

*Table 2.1: Online learning challenges*

- Difficulty of communicating instantly;
- Problem with email service or Internet connection;
- Difficulty to reach consensus;
- Lack of students participation;
- Slow rate of propagating opinion;
- Difficulty with keeping confidentiality of messages;
- Lack of lecturer and technological support;
- Lack of support for the collaborative and dynamic nature of learning;
- Lack of incentives and structure for developing / sharing content;
- Licensing issues (limitation and associated costs);
- Integrating a distance component into a standard, class room based program;
- Lack of adequate resourcing in terms of technology, and staffing (e.g. in some cases one staff member is responsible for several duties such as
program coordinator, curriculum developer, lecturer and counsellor);

- Lack of appropriate assessment of the students’ needs and delivery mechanism;

- Lack of budget allocation for users’ costs such as home telephone service, monthly costs of Internet service and computers repairs;

- Lack of professional development or job descriptions for staff members assigned to online programs


There is also an increased burden on lecturers to detect and contact students who fall behind, as someone may “disappear” more easily in an electronic environment than in a physical classroom (Graham et al, 2000).

2.7 Advantages of online learning

Online education is an appealing alternative for individuals balancing the demands of full time jobs and care of their families with the desire to advance their careers and gain new skills. It offers synchronous as well as asynchronous communication tools. It is appealing to students who like to interact and work in teams and exchange information and knowledge. Online curricula are designed around constructivism and conversational learning pedagogies suited to online users (Paik et al, 2004).

The new generation of online course development tools provides features that let lecturers adapt components according to learning outcomes of the course.
Use of such tools can promote collaborative learning, enhance critical thinking skills and give every student an equal opportunity to participate in discussions.

Other advantages of online learning relate to convenience factors such as better access to and communication and interaction with online lecturers (Hislop, 1999).

With sound pedagogical design, web based instruction can create meaningful learning environments by engaging students in the active application of knowledge and by giving them an opportunity to control the pace of learning. The Internet eliminates time and place constraints. Online courses are often more engaging and achieve better results (Schutte, 1996). The Internet tools enable lecturers to include text, graphics, audio and video in their courses, thus making the courses more interesting and engaging.

Online learning and especially asynchronous learning provides an opportunity for students to think critically and hence develop higher order learning in a way that was not previously possible (Garrison et al, 2004).

Some key advantages of online learning are summarised in Table 2.2.

Table 2.2: Advantages of online teaching

- Flexibility of time;
- Access 24hours per day 7 days a week;
- Flexibility of location and duration;
- Learning materials may be visited / revisited numerous times;
- Accommodates diverse learning environments (home, office, university);
- Discussion forums are easily established;
- Provides an opportunity for students to benchmark their work;
- Self directed, and self paced therefore adaptable to students with different learning styles, interests and cultural backgrounds;
Students construct knowledge and can ask questions that they may not ask in conventional settings;
Learning on demand opportunities;
Reduced cost in lecturer's time to attend lectures;
Time saving;
Personalisation of the learning;
Simple to publish and update content;
Directory structure;
Consistent interface;
Can support interactivity and collaborative learning environment.


2.8 Principles of good practice in online learning

Chickering and Gameson (1983) developed seven principles to assist in good practice in undergraduate education. The principles were compiled in a study supported by the American Association of the Higher Education, the Education Commission of the States (USA) and The Johnson Foundation.

These principles have been well utilised and tested by several researchers in order to evaluate different modes of studies including online learning (Graham et al, 2000, King, 2000, Achtemeier, 2003). In 2000, Graham and his colleagues at the Centre for Research on Learning Technology at Indiana University applied the seven principles specifically to online education and the evaluation of four online courses. Based on their findings, they were able to provide suggestions on how to address each principle in an online learning environment. Below is a summary of principles aimed at assisting in the design of an online evaluation framework.
Principle 1: Good practice encourages student-staff contact

Frequent student-lecturer contact is an important factor in student’s motivation and involvement. If lecturers show an interest in their students’ progresses and address their concerns, students are more likely to get through rough times and keep on working. When students know a few lecturers well, their intellectual commitment is enhanced and they are more likely to think about their own values and future plans. Email and online access enhance this interaction. However, Graham et al, (2000) found that students felt ignored if the lecturer did not respond immediately to an email. The students studying online courses expect lecturers to be available 24 hours a day and on weekends.

Examples:

It is useful for the university to set clear standards of timeframes for lecturers’ responses to messages. For instance the university could develop a policy describing the expectations regarding communication over phone, email or discussion boards (Graham et al, 2000). Both lecturers and students must be made aware of any standards or policies.

Principle 2: Good practice encourages cooperation among students

Good learning is collaborative and social, not competitive and isolated. Working with other students often increases involvement in learning.

Examples:

Sharing one's own ideas and responding to others' reactions improves thinking and understanding. In order to promote the principle of cooperation among students, Graham et al, (2000) suggested developing “structured community activities” facilitated by the lecturers. These could include group projects and assignments that require meaningful peer interaction. Pictures of both lecturers
and students could be posted and students be assigned to problem-solving teams to encourage interaction (King, 2000).

**Principle 3: Good practice encourages active learning**

Students must talk and think about what they are learning, write about it, relate it to past experiences, and apply it to their daily lives.

**Examples:**

Active learning can be encouraged by lecturers asking students to email their work to the rest of the class or encourage online debates to facilitate active learning (King, 2000).

**Principle 4: Good practice gives prompt feedback**

Students need help in assessing existing knowledge and competence. Appropriate feedback on their performance and suggestions for improvement are required. Students also benefit from opportunities to reflect on what they have learned, what they need to know and how to assess themselves.

**Examples:**

Two types of feedback are required. Initially, immediately upon receipt of the assignment, an acknowledgement needs to be sent. This will reassure students that the assignment has been sent correctly and has been received by the appropriate person.

Prompt feedback regarding the content of the students' work is then required within a reasonable period of time.

There is some debate about the impact of feedback on students with some students adversely affected by either too much or too little feedback (Hacker and Niederman in Weiss et al, 2000).
Principle 5: Good practice emphasizes time on task

Efficient time-management skills are critical for students and professionals alike. By establishing how the institution defines time expectations for students, lecturers, administrators, and other professional staff can help establish the basis for high performance for all.

Examples:

To encourage students’ time on tasks, lecturers can give structured assignment deadlines throughout the term. Nevertheless the assignments should require resources that are easily accessible to online students.

Principle 6: Good practice communicates high expectations

When lecturers and institutions hold high expectations of the students and make extra efforts, good students’ performance becomes a self-fulfilling prophecy.

Examples:

To communicate high expectations in an online class, lecturers can post exemplary student performance on discussion boards. They can also provide periodic feedback to individuals and groups on their own performance.

Principle 7: Good practice respects diverse talents and ways of learning

People bring different talents and styles of learning to the learning environment. Students with good hands-on experience may not do so well with theory. Once such students have had an opportunity to demonstrate their knowledge and learn in ways that work for them, they can be encouraged to learn easily.

Examples:

Online students must be encouraged to participate and feel their point of view and contributions are valued.
Achtemeier (2003) examined course-related literature with the widely utilised Chickering and Gameson’s principles. They concluded that in addition to these principles, another 11 elements needed to be added. These elements include the following questions pertaining to students’ experiences:

1. Were the course goals, learning objectives and outcomes made clear to you at the beginning of the course?
2. Did you have the necessary technological equipment and skills required for this course?
3. Was there adequate technical support if you encountered difficulties?
4. Was the format and page design of the online course easy to use?
5. Were there sufficient instructions given for you to complete all assignments?
6. Did you feel hindered in your online course experience in any way? Please describe.
7. Were standards for evaluation of assignments made clear?
8. Did you receive prompt feedback on your completed assignments?
9. Did you participate in online conversations with your lecturer during the course?
10. Did you participate in online conversations with your classmates during the course?
11. What learning activities most influenced your learning in this course?

Richardson and Turner (2001) asserted that online communication was ineffective and fragmenting the learning community. As a remedy they suggested a set of tutor guidelines to facilitate online discussions that incorporated many of the seven principles.


2.9 Characteristics of students in online courses

According to Paik et al, (2004) mature students with good interpersonal and communication skills are more successful in online learning. Furthermore online students with strong communication, social and cognitive skills are more likely to succeed. Students need to be independent and learn more individually.

According to Hazari (1998) online learning courses attract students, who may not be able to attend traditional colleges and universities, while working towards a qualification or enhancing professional skills that may result in a promotion or changing careers.

Miltiadou et al, (2003) found that students who have good communication social and cognitive skills are more successful in an online learning environment than others who are weaker in these areas.

2.10 Limitations of other studies

According to Schutte (1996) little if any, experimental evidence has been generated to demonstrate the effects of online versus traditional classroom format on students’ performances. What has appeared is largely qualitative or devoid of comparative analysis to highlight deficiencies in teaching methods. Quantitative data tends to be based on a single class and hence there are not many experimental comparisons or samples of two or more classes.

Considering the amount of money being expended in higher education on infrastructure, software, training and technological pedagogy, there is a need for additional experimental evidence that can be used to guide decision making.

Schutte (1996) further commented that research done on students from the same class undertaking the same course was lacking and needed to be carried
out. Peer interaction is another key variable that should be controlled in research on the subject of online teaching.

Hazari (1998) found that there was an absence of questions dealing specifically with the online environment and course of study therefore compromising the validity and reliability of various studies.

2.11 Literature on Methodology

Marsh (1984) documented that students provide accurate evidence about their actual experiences and their satisfaction with those experiences. Students can also provide reflections on their own preparation and effort in addition to personal background information. Therefore in assessing which teaching method is more effective, in this study, the students’ views will be collected which will form useful evidence.

Focus group settings by Moran (1993) and Krueger (1994) provided good insights into focus group composition, objectives, participant characteristics, topic orders and scenario development.

Zimitat and Crebert (2002) of Griffith University, Australia suggested that conducting an email evaluation is far better than introduction of the assessment in an active Internet community. In other words the researcher does not alienate students by introducing the survey into the Internet discussion group and making sure the students remain anonymous.

The literature also suggests some standards for soliciting student responses: (1) Good questions should be worded clearly and simply and should not be biased or leading; (2) Each question should stand alone, address only one issue, and have appropriate response categories; and (3) The order of the questions
should follow a logical layout, preferably proceeding from general to specific and asking for more personal information at the end of the instrument.

All of the above guides and standards were considered during the development of the research methodologies utilised in this study.

2.12 Summary

While all students across various universities and colleges around the world continue to use online learning systems and there is evidence that the web is useful for increasing access to education. Therefore there is a need to look at online course delivery from pedagogical perspectives as well as from institutional, methodological, and technological perspectives. The online courses support a different form of teaching and learning from the traditional classroom experience and student directed approaches. Online courses are student centered and support the constructivist models of learning.

Online teaching can impact upon learning outcomes (Harassim et al, 1997, Marsh, 1984, Mitchell et al, 2001). Factors that influence learning outcomes in an online learning environment include the expectations, level of motivation and satisfaction of the students, lecturers’ experiences and skills using the technologies, instructional content and the integration and implementation of the technology itself. All these issues are important factors to consider in research related to online learning. What works in traditional face-to-face courses does not always work in an online environment.

In this chapter different learning models as well as challenges and advantages of online learning were described. The good practice principles in both traditional classroom and online tertiary courses were also reviewed.
3.1 Introduction

In this research, a comparative study of two different university teaching methods was performed utilising a mixed methodology. The study design included both qualitative and quantitative aspects. The study will propose a series of recommendations, implementation of those recommendations could provide practical outcomes for both lecturers and students.

The study was conducted at the Edith Cowan University (ECU), Perth, Australia in the Faculty of Computing Health and Science. Occupational Safety and Health (OSH) units and Environmental Health (EH) units were all offered through distance education (off campus) and were delivered either in paper based or online mode.

Data collection commenced in Semester 2, 2004 and was concluded at the end of the semester 1, 2005.

Overall 18 units were taught over the two semesters (nine units in semester 2, 2004 and nine in semester 1, 2005). In each semester, six units were offered as paper based and three were fully online.

There were 547 students enrolled over the two semesters, with 376 completing the units and 171 withdrawals (discontinuing). There were three categories or groups of students. One group only studied online units, another group studied only paper based units and finally there was a group enrolled in both online and paper based units.
There were a number of differences and similarities between the online and paper based units offered during this period. All the units were offered off campus (external mode). In paper based units, most resources were primarily print based or available on CD-Rom. Online access was not compulsory. The reading materials (readers) were sent to students via mail at the commencement of semester.

In the online units, all resources were mainly online and available on the Internet. In some online units, there were supplementary materials such as readers and a CD-Rom were mailed out to students before the commencement of the course. All online units were delivered via a university supported system called “Blackboard system”.

In both modes of delivery there was no face-to-face meeting or interactions initiated by the lecturers. However students could contact lecturers and meet with them if they chose to do so.

3.2 Target Population

This study population consisted of all students currently enrolled in units towards the Professional Masters in Occupational Safety and Health (OSH) and Environmental Health (EH) at ECU and their teaching staff in semester 2, 2004 and semester 1, 2005.

Students were drawn from the same cohort. There were 187 students enrolled in online units and 360 students enrolled in paper based units. All students were exposed to either or both online and paper based materials during their studies. The lecturers consisted of three full time and two sessional lecturers, who provided the lecturers’ perspectives for this research. The two student cohorts and teaching staff included in the study comprised of:
a) A new intake of students in semester 2, 2004. This group was exposed to both paper based and online delivery. During semester 2, 2004, students completed both a pre and post semester questionnaire. They were selected as potential participants, because they were enrolled in units that were part of the Professional Masters in OSH and EH at the ECU. They were advised that if they agreed to take part in the study, they would be requested to complete a short questionnaire prior to the start of the semester and again at the end of the semester.

b) Existing students and new students who were enrolled in various units of the Professional Masters in semester 1, 2005 completed both the pre and post semester questionnaires. Many of the students would have been exposed to both modes of delivery during this study, as it was conducted over two semesters.

c) Lecturers who were teaching in both paper based and the Blackboard online units were interviewed at the commencement of study (beginning of semester 2, 2004) and completion of study (end of the semester 1, 2005).

d) All groups of students were invited to a focus group meeting in an attempt to solicit more qualitative and detailed responses. The focus group meeting was held at the completion of the study (end of the semester 1, 2005). Four students attended the focus group meeting.

3.3 Study design

Several instruments were utilised for the collection of data. These included questionnaires, interviews, student feedback on discussion boards and a focus
group discussion. The instruments were compiled using previously validated questionnaires (Zimitat et al, 2002, Berge et al, 2000)).

3.3.1 Phase 1: Development of Criteria

An extensive literature search of national and international comparative studies was carried out in order to develop a set of criteria for the evaluation of the courses and questionnaire design (Graham et al, 2000, Mitchell et al, 2001, Zhang et al, 2003). The criteria used, incorporated the seven principles for evaluating online course applied by Graham et al, (2001).

The comparison of course evaluations conducted in terms of the universities and international quality assessment criteria provided information about the effectiveness of the online courses (Loos et al, 2001, Herrington, et al, 2001). A number of online OHS training courses available to employers or workers (Safework SA, 2006) and the ECU guidelines on quality assurance of online learning were also reviewed (2005 ECU Off campus guides, Herrington et al, 2001).

The criteria for interaction were based on the Rouke et al, (2001) model of the relationship between interactions and learning in online environments.

3.3.2 Phase 2: Students’ Surveys

The study proposal was approved by the ECU human research ethics committee. Questionnaires were designed to compare and evaluate the effectiveness of paper based and online units. For the complete questionnaires refer to Appendix A. An information letter outlining the purpose and nature of the study and methodology was attached to the student’s questionnaire. The information letter can be viewed in Appendix B. Students were emailed the letter with a copy of the questionnaire and were encouraged to contact the researcher by email or telephone to answer any questions or enquiries. The online students also had access to the questionnaire and information letter via a
Blackboard posting. The questionnaires were distributed to all students studying online and paper based units at the beginning and end of each semester (over 2 semesters) i.e. at the beginning and end of semester 2, 2004 and semester 1, 2005. In the survey the respondents remained anonymous, therefore there was no follow up of the respondents. A series of quantitative and qualitative instruments were used to collect the data on participants’ interactions, their satisfaction, experiences and perceptions (Curran, 2002, Rogers et al, 2001, Ragan, 1999, Schutte, 1996)

The survey was designed to test the following research questions at the Edith Cowan University:

1. Is online learning in the environmental health units better than traditional paper based occupational safety units?

2. Do students that undertake online learning units have a better experience than those undergoing traditional paper based units?

3. Do units that are solely based on online learning provide appropriate lecturer and peer interaction for students?

The evaluation criteria determined the majority of the content of the questionnaire. There were set criteria for each research question to explore information further.

The evaluation criteria for question 1 aimed to explore the following aspects:

- Students’ expectations of the learning outcome
- Students’ satisfaction of different teaching methods
- Students’ preferred method of delivery
- Units relevance to their job and career development
• Suitability of the unit to specific teaching method

• Lecturers' perception of different teaching methods

• Students' computer literacy

The evaluation criteria for question 2 consisted of the following aspects:

• Barriers faced in learning

• Students’ positive or negative experiences based on teaching methods

• Lecturers’ positive or negative experiences based on teaching methods

The criteria for question 3 explored the following aspects:

• Students’ interactions with other students

• Students’ interaction with both lecturers and support staff

Students’ experience, satisfaction and interactions with students or lecturers and the ECU in general was assessed through open ended questions in the questionnaires as well during the focus group meeting. The questionnaire consisted of 20 questions, three of which were demographic and related to age, gender and occupation of the respondent.

In addition, other factors were considered for students undertaking online units to develop an understanding of issues that could have contributed to the students’ overall experiences. These included:

• Students literacy in Information technology

• Ease of navigation, and use online material

• Aesthetic appeal of the online courses
• Opportunities for networked learning (such as chat room, discussion board, emails).

3.3.3 Phase 3: Lecturers’ Interviews

All lecturers teaching units in the OSH and EH field were identified and contacted via email and by telephone to arrange interview times. They received an information letter about the study with the interview questions prior to the interview date. This allowed the lecturers to become familiar with the topic and issues to be explored. Lecturers were interviewed at the commencement (semester 2, 2004) and completion of the study (end of the semester 1, 2005). The interviews were audio taped. The information about the study and all the questions are provided in Appendix C and D. The commencement interviews were conducted via telephone conference at the beginning of the semester 2, 2004 and included question as outlined above such as expectation of the lecturers, expected learning outcome, interactions and support in development of the unit. Each interview took approximately 45 - 60 minutes to complete.

At the end of the semester 1, 2005 all the lecturers were contacted again and interviewed using similar questions, but this time they were interviewed face-to-face. As soon as the interviews were completed, the responses were scribed. Lecturers were given an opportunity to review their responses and provide any input or feedback if their point of view was not adequately articulated. The majority of interviewees were pleased with the scribe and some made changes to their responses.

These questions provided them with the opportunity to express their experiences over the past semester. The interviewed lecturers were asked to respond to the following:

• Lecturers’ expectations from the unit content
• Expected learning outcome of the unit
• Role of the lecturers in facilitating interactions
• Role of the lecturers in developing and implementing the unit’s materials
• Rationale for selecting a specific teaching method
• Awareness of policies / procedures for development of the course outline
• Time / cost issues affecting various delivery methods
• Lecturers’ literacy levels in information technology
• Unit’s assessment (exam, assignments)
• Lecturers’ focus and emphasis in teaching their units

Additional information was gathered from lecturers to assist in comparing the similarities and differences between the paper based and online Blackboard units. These included enrolment procedures and assessment and lecturer-student interaction. Students’ achievements were tracked through their end of year results and the numbers of students who completed or discontinued specific units were noted.

3.3.4 Phase 4: Focus Group Interview / meeting

Although all students were invited to respond to questionnaires, there was a low response rate from the student’s survey. Hence a student focus group was established. Students were advised of the focus group meeting via email through an invitation letter. They were invited to attend the meeting which was held at ECU. The invitation letter can be viewed in Appendix E. The initial invitation was followed up with another reminder email explaining the process of the meeting, duration and the topics for discussions (agenda items). Students were asked to respond and confirm their attendance. The setting up of the focus group was adopted from Stacey et al,(2002), whereby students were invited to
volunteer to attend a focus group meeting. The voluntary focus group enabled students to respond to questions and provide feedback about their experiences in studying online versus paper based units. The difference between this research methodology and Stacey et al (2002) focus group was that this focus group meeting was held face-to-face whereas Stacey et al (2002), held an online focus group conference.

Four students attended the focus group meeting. The questions were also emailed to any students who could not participate in the focus group due to long distance. Focus group discussions were tape recorded. Three students emailed their responses. They were all asked the same open ended questions which allowed participants to elaborate and provide detailed input / feedback regarding their online and paper based units. The questions are included in Appendix F.

The focus group was relatively diverse as two of the members had not yet taken any online units but were enrolled in such units for the following semester. The other two focus group members had done both modes of studies and were able to draw a clear and concise picture of the differences.

3.3.5 Other sources consulted

Other information collected and reviewed from ECU related to University policies and procedures, student information about external studies, guidelines on developing and evaluating online units, using discussion boards and other relevant materials.

3.4 Procedure

Several techniques were used in data collection. Table 3.1 provides a summary and audit trail of the data types, when the data was collected, the target samples.
### Table 3.1: Conceptual framework

<table>
<thead>
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<th>Completion Phases</th>
<th>Target samples</th>
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<td>End of the semester 2, 2004</td>
<td>All Students enrolled in OHS and EH units</td>
<td>Questionnaire</td>
</tr>
<tr>
<td></td>
<td>Beginning of Semester 1, 2005</td>
<td>End of the semester 1, 2005</td>
<td>All Students enrolled in OHS and EH units</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Lecturers interviews</td>
<td>Beginning of Semester 2, 2004</td>
<td>End of the semester 1, 2005</td>
<td>All lecturers teaching in units</td>
<td>Interview questions, either face-to-face or tele-conference</td>
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<td>Focus Group Interview / meeting</td>
<td>-</td>
<td>End of the semester 1, 2005</td>
<td>Students enrolled in OHS and EH units</td>
<td>Open ended questions</td>
</tr>
<tr>
<td>Document search</td>
<td>ECU documents: policies, procedures, guidelines and information</td>
<td>Throughout study 2004-2005</td>
<td></td>
<td>Internet</td>
</tr>
<tr>
<td>Anecdotal Feedback</td>
<td>Discussion with staff faculties</td>
<td>End of the semester 2004 and 2005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.4.1 Ethics and Values in unit evaluations

Some lecturers interview participants requested that their comments not be scribed but just be noted as background information. The information provided in confidence was not included as it was solely background information and did not impact upon the research outcomes.

Transparency and openness was ensured by providing lecturers with a draft scribe of their interview at the end of the semester 1, 2005. Butcher’s papers
were used during the focus group meeting and students were able to view their responses.

3.5 Confidentiality

All information gathered from students for this study was solicited anonymously and remains confidential. If the student returned his/her questionnaire by email, the questionnaire was saved electronically and the original email was deleted immediately, thus removing any information about the respondent. Hard copy questionnaires did not include any identifying information and once entered into the computer file, hard copy questionnaires were filed in a locked cabinet, where they will remain for a period of 5 years after completion of the research after which time they will be shredded and all computer files will be deleted.

3.6 Data Analysis

3.6.1 Student surveys

Regardless of which teaching methods students were initially exposed to, it was inevitable that at some stage they would experience both modes of delivery. It is therefore safe to assume that the majority of students who participated in this study were exposed to both online and paper based modes of delivery over the two semesters of this research.

The student respondents remained anonymous. The cohorts that completed the questionnaires were therefore not necessarily the same people at the commencement and the end of each semester, even though the same pool of students was sampled at each semester. This became apparent when comparing the demographics of the responses at pre and post semester and therefore a T-Test could not be employed as paired samples. Similarly an
independent T-Test could not be performed as the sample may not have been different either. The quantitative data was analysed in percentages.

The sample groups were described based on the enrolment and demographic data of respondents. Where the questions asked respondents to elaborate, descriptive information and common themes were developed (Guilfoyle et al, 2002, Denzin & Lincoln, 2000).

3.6.2 Lecturers’ interviews

Lecturers’ interviews considered the following factors in regards to lecturers’ attitude towards two teaching methods, their expectations, satisfaction or dissatisfaction, required time and cost, coping strategies with problems and power or control issues. Lecturers interviewed at the commencement of the study, were also interviewed at the end of the study, except for one lecturer, who could not be interviewed due to extended leave. Two sessional lecturers teaching in semester 1, 2005 participated in the end of study interviews. The scribed notes were analysed qualitatively and listed under common themes.

3.6.3 Focus group meeting

The participants’ comments were tape recorded as well as scribed. Butchers papers were used when it involved group participation. For example in listing the advantages and disadvantages of the online/paper based, group participation was encouraged. The scribed notes were then listed under common themes. The main component of the qualitative research aimed to explore common and disparate views between students undertaking online versus paper based units.

3.7 Reliability and Validity

Data was collected with the University’s consent. Students volunteered to participate in this study. Lecturers were asked and responded favourable to
participate. Lecturers’ responses were scribed and then were sent to them for confirmation or additional comments.

The data for questionnaires were developed from various sources (McNamara, 1999, Frary, 2002, Curran, 2002, Rogers et al, 2001, Ragan, 1999, Schutte, 1996). Questions were also reviewed by peers and colleagues prior to distribution.

3.8 Internal and external validity

The students’ focus group participants as well as respondents to the surveys were ‘self selected’.

In other words, students who were willing to be part of the research, attended the focus group meeting. Hence they were self selected. One can assume that they were either very dissatisfied or very satisfied students and therefore more likely to participate, therefore there was the potential for the introduction of bias. The lack of randomisation may have reduced external validity, therefore generalization may be problematic. However among those students who responded there was a high level of consistency in the responses regarding their experiences and perceptions.

Internal validity was increased by using reputable published studies to develop instruments. The study was also conducted over a two semester period, thus replication improved internal validity. In addition the responses by the participants were not influenced as the respondents were anonymous and the research was conducted by an external researcher. The study was therefore solely independent of any other confounding variables.
3.9 Limitations of the study

The response rate was 11% and that may have some impact on the results and data analysis. One of the lecturers could not be interviewed at the end of study, which may also have had some impact on the results.

The response rate was very poor and during both semesters strategies were implemented in an attempt to increase the response rates. Online tutors sent students emails and requests to complete the questionnaires both at the start and end of the semester. The initial request went out very early in the semester in order to minimise the impact on student work load. The messages related to the study and a link to the questionnaire was posted on the announcement page in Blackboard where students would have seen it each time they logged in. In the paper based units, the letters requesting student participation were posted out with the questionnaires. In covering letters it was also pointed out that this research was a student initiated project aimed at improving the quality and mode of delivery of materials in the future.

The low participation rate could possibly be related to the fact that no incentives were offered and it was made clear that non-participation would in no way influence student marks or progression. The “post” survey at the end of the semester would have coincided with final exam preparation. It can possibly be surmised that students were too busy with their studies and work pressures to be bothered to complete a “non-essential” questionnaire. The issue of low response rate will be further discussed in Chapter 5.

3.10 Summary

This chapter considered the methodologies used for conducting the research. The students who were enrolled in online or paper based units were surveyed
using questionnaires at the commencement and at the end of each semester. They were also invited to attend a focus group meeting.

Lecturers were interviewed at the beginning and at the end of the study. They were asked to comment on their satisfaction, perceptions and teaching experiences over the past semester.

The next chapter presents the results and analysis of the data gathered from students’ surveys, lecturers’ interviews and students’ focus group meeting.
CHAPTER 4. RESULTS AND ANALYSIS

4.1 Introduction

The analysis of the data presented in this chapter, is divided into three sections. The first section relates to analysis of post graduate student surveys investigating interactions at various levels, expectations and satisfaction of students. There is a comparison of students’ responses at the commencement and end of the semesters. The second section analyses the lecturers’ interviews and their comments and explores their expectations, level of satisfaction and attitude towards different teaching methods. The final section is essentially a qualitative analysis of the students’ responses as elicited during a focus group meeting which incorporates more detailed data gathered from students. The results of the survey, open ended interview questions and focus group meeting were analysed using common themes and patterns. The data, was analysed using quantitative analysis of the survey responses and qualitative analysis of lecturers’ interviews and students’ focus group discussions.

4.2 Analysis of Students’ Survey

A total of 360 students were enrolled in paper based and 187 students enrolled in online units during semester 2, 2004 and semester 1, 2005. Two hundred and sixty six (73%) of the students completed paper based units while 110 (58%) of the students completed their online units.

Edith Cowan University students enrolled in the Occupational Safety and Environmental Heath units are generally wide spread geographically across Western Australia, Australia and overseas. For the majority of the students there is no opportunity to meet face-to-face. Therefore one of the hypotheses of this
research was that online learning is more effective than paper based units because it provides opportunities for group and lecturer interactions thus overcoming distance barriers.

The questionnaires were distributed to all students at the commencement and again at the end of semester 2, 2004 and semester 1, 2005. At the commencement of semester all students enrolled in the units were sent a questionnaire and they were asked to complete the questionnaires within the first two weeks of the semester. At approximately two weeks before the end of each semester, students were sent the second (end of the semester) questionnaire and once again they were given two weeks to respond.

It was important to ensure the students remained anonymous and could not be identified, so that they could express their views freely. Therefore it was impossible to link individual pre and post semester responses and data were interpreted in group format only. Several students were enrolled in one or more units in the same semester or over their study period; hence it was assumed that the majority of respondents would have exposure to both modes of study.

As part of the analysis the students are grouped according to their teaching method, in other words their responses are separated based on the mode of study they were undertaking at the time, e.g. online unit, paper based unit or both (paper based and online) units.

In this chapter the respondents are referred to as the followings:

1. Online students or

2. Paper based students or

3. Students undertaking both units.
A total of 40 (8.8%) out of 547 students who completed the units responded to the surveys. The respondents were comprised of 26 (9%) online students, six (5.4 %) paper based students and eight students undertaking both units.

The findings of the results were considered in relation to the seven principles of good practice in education, developed by Chickering and Gamson (1983) and will be evaluated accordingly in the next chapter.

Table 4.1: Demographic data of students undertaking different modes of study

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Online respondents N=26</th>
<th>Paper based respondents N=6</th>
<th>Both (online and paper based) respondents N=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (%)</td>
<td>M 65%</td>
<td>M 75%</td>
<td>M 16.7 %</td>
</tr>
<tr>
<td></td>
<td>F 35%</td>
<td>F 25%</td>
<td>F 83.3 %</td>
</tr>
<tr>
<td>Age (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24 year</td>
<td>0</td>
<td>0</td>
<td>66.7 %</td>
</tr>
<tr>
<td>25-34 year</td>
<td>30%</td>
<td>12.5 %</td>
<td>16.7 %</td>
</tr>
<tr>
<td>35-44 year</td>
<td>32.5%</td>
<td>25 %</td>
<td>16.7%</td>
</tr>
<tr>
<td>45+ year</td>
<td>37.5%</td>
<td>62.5 %</td>
<td>0</td>
</tr>
</tbody>
</table>

As indicated in Table 4.1 the majority of students only undertaking online or paper based units were male and mature aged (35 - 44 years and 45+ years). The respondents undertaking both paper based and online units were mainly female and younger (15 - 24 years).
Table 4.2: Comparison of respondents’ profession in relation to different teaching methods

<table>
<thead>
<tr>
<th>Professions (%)</th>
<th>Online students</th>
<th>Paper based students</th>
<th>Both (online and paper based units) students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator for a major electricity generator</td>
<td>7.1%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emergency Services Coordinator</td>
<td>5%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ex RAAF, disability pensioner</td>
<td>5%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HR Manager / Officer</td>
<td>5%</td>
<td>62.5%</td>
<td>0</td>
</tr>
<tr>
<td>Medical Practitioner</td>
<td>5%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Occupational Therapists</td>
<td>5%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Occupational transport administration</td>
<td>0</td>
<td>12.5%</td>
<td>0</td>
</tr>
<tr>
<td>Occupational Research Assistant</td>
<td>5%</td>
<td>0</td>
<td>66.7%</td>
</tr>
<tr>
<td>OHandS Consultant / Manager / Coordinator</td>
<td>55.7%</td>
<td>25%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>0</td>
<td>0</td>
<td>16.7%</td>
</tr>
<tr>
<td>Sales</td>
<td>7.1%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Results in the above table (Table 4.2) indicate that the majority of online respondents (55.7%) were working in the field of Occupational Health and Safety as Safety Managers, Advisors or Coordinators, whereas paper based respondents were mainly HR managers (62.5%). Those respondents studying in
both online and paper based modes had careers as Research Assistants (66.7%), Occupational Safety and Health Consultants (16.7%) and Registered Nurses (16.7%). Occupation of respondents could play an important role when considering access to computers and the Internet at work and at home.

Satisfaction of students can relate to a wide range of aspects of the unit including interactions, IT support and access, lecturers’ feedback and correspondence, units’ objectives and guidelines and supporting reading materials. Therefore it cannot be assumed that satisfaction was linked solely to a teaching method.

**Satisfaction**

**Q: How would you rate your satisfaction with the online method as opposed to paper based units?**

**Table 4.3: Comparison of students’ satisfaction for different teaching methods**

<table>
<thead>
<tr>
<th>Commencement of semester</th>
<th>1 Very unsatisfied</th>
<th>2 Unsatisfied</th>
<th>3 Don’t know</th>
<th>4 Satisfied</th>
<th>5 Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>16.67%</td>
<td>8.33%</td>
<td>25.00%</td>
<td>33.33%</td>
<td>16.67%</td>
</tr>
<tr>
<td>Paper based</td>
<td>100%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Both</td>
<td>0.00</td>
<td>33.33%</td>
<td>33.33%</td>
<td>33.33%</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>End of the semester survey</th>
<th>1 Very unsatisfied</th>
<th>2 Unsatisfied</th>
<th>3 Don’t know</th>
<th>4 Satisfied</th>
<th>5 Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>15.38%</td>
<td>15.38%</td>
<td>7.69%</td>
<td>38.46%</td>
<td>23.08%</td>
</tr>
<tr>
<td>Paper based</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>Both</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>0</td>
</tr>
</tbody>
</table>
Both the above table and Figure 4.1 indicate that at the commencement of semester there were more dissatisfied paper based students (100%) than online (25%) students, whereas by the end of the semester 100% respondents were satisfied with the paper based unit and 61.5% satisfied with online units.

Those undertaking both units were not sure at the commencement of the semester, however by the end of the semester the respondents indicated 100% satisfaction with both units.

![Satisfaction- Commencement of semester](image1)

![End of semester](image2)

**Figure 4.1: Satisfaction with the unit at the commencement and end of the semester**

An important criterion to consider in the evaluation of online and paper based units is interaction. There is a wide body of research indicating that peer-student and lecturer-student interactions play important roles in student performance and also can lead to the success of online learning and teaching (Jian and Ting, 2000, Richardson and Swan 2003).

The quality and quantity of student interactions with lecturers and with peer students is linked to students’ learning and provides a sense of belonging or community in an online learning environment.
Interaction with faculty

Q: Do you expect this unit to provide appropriate faculty interaction for you?

Q: Did the unit provide appropriate faculty interaction for you?

Students were asked if they expected to have faculty interactions including interaction with administrative support staff. They were asked at the commencement of semester to establish their expectations and at the end of the semester to highlight whether their expectations were met.

Table 4.4: Students’ expectation and experience in relation to faculty interaction

<table>
<thead>
<tr>
<th></th>
<th>Paper based (%)</th>
<th>Online (%)</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected faculty interactions</td>
<td>100%</td>
<td>80%</td>
<td>66.67%</td>
</tr>
<tr>
<td>Had Experienced faculty interactions</td>
<td>66.67%</td>
<td>78.57%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The majority of online students (80%) expected to have a high level of interaction with lecturers and administrative support staff and these expectations appeared to have been met (78.5%). Paper based students initially expected to have interactions, only two thirds (66.7%) reported that they did in fact have interaction. Although 66.67% of students in both paper based and online units expected faculty interaction, 100% reported that they had interactions.

A respondent enrolled in both online and paper based units did not expect to have much more interaction regardless of modes of study and said: “In either case there is not much interaction with faculty”. Another respondent had received more interactions from online than paper based study “I felt there was more interaction with the online unit.”
Lecturer-student interaction

Q: Do you expect the unit to provide lecture - student interactions? If no what would you suggest improving it?

Q: Did the unit provide lecturer - student interaction? If no what would you suggest improving it?

Good lecturer- student interaction is important in good practice learning, therefore the comparison of the two teaching methods at the commencement and end of the semester provided useful information about each individual's expectation of what constitutes interaction and what is more effective.

Regular interaction with lecturers in either teaching methods has been shown to be essential for the maintenance of activity and focus of students (Stacey et al, 2002).

Table 4.5: Comparison of respondents’ expectations and experience of lecturer- student interaction

<table>
<thead>
<tr>
<th></th>
<th>Online students (%)</th>
<th>Paper based students (%)</th>
<th>Both (online and paper based) students (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected lecturer Interactions</td>
<td>66.7%</td>
<td>0</td>
<td>33.3%</td>
</tr>
<tr>
<td>Had lecturer Interactions</td>
<td>87.5%</td>
<td>40%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The results from Table 4.5 indicate that the majority of online students (66.7%) expected some lecturer- student interaction and surprisingly 87.5% reported interaction. Paper based students or those undertaking both units, had far lower expectations at the beginning of the semester, however, there appeared to be more lecturer- student interaction than initially expected.
Comments included:

- “Email correspondence with tutor and online with class mates.”

- “Tutor was contactable by telephone. The postings by the tutor in announcements were therefore my only source of additional information apart from the initial assignment questions; then averaged one announcement every 2 weeks or so.”

- “Not really. Most interaction takes too long to receive. An average of 2 days for an email reply.”

For some students it was difficult to comment at the beginning of the semester as everything online was a new learning process. “Unsure as this is my first online subject” or “will be better able to comment at completion of the unit”.

Some respondents suggested that the discussion boards were useful as they could read other people’s responses and then construct their own responses. “The discussion board was useful and I had reasonable contact with the lecturer.”

When comparing online and paper based units, some students indicated that online was more engaging and provided a flexible learning environment. One student commented: “Greater amount (of interaction) than paper based if studying external. I had no contact at all with other students when doing paper based”. Another student supported this and said ”I feel that more interaction is achieved via an online style of study.”

Another student at the end of the semester supported this and said: “Good interaction with tutor. The lecturer was easily contactable and responded in a
timely manner. I felt this encouraged me to confidently approach the tasks he had set.”

Those studying paper based units had different expectations in relation to interactions, on the one hand one student was distressed due to a lack of face-to-face interaction and commented: “I found it difficult partly because I was returning to tertiary education after a long break. Also I felt that sometimes 5 minutes (face-to-face) discussion with the tutor could have saved me a weekend of work going off on a tangent (especially as the tutor had a very strong ethnic accent which was very difficult over the phone)”. On the other hand, lack of interaction with lecturers or administrative staff was not an issue for some in the paper based units, once the appropriate resources and reading materials were provided. As one student commented “[lecturer interaction] not required if enough reading material supplied.”

Student-student interaction

Q: Do you expect the unit to provide student - student interaction? Please comment.

Q: Did the unit provide student - student interaction?

Student - student interactions were highest in online units (87.5%) compared to paper based units (40%). It was noted that a greater proportion of online students (91.7%) expected to have peer interactions and their expectations were met (87.5%). On the contrary paper based students, who did not expect any student interactions at the commencement of semester, 40% reported some student interaction at the end of the semester.

Figure 4.2 illustrates that online students reported much higher interactions than paper based students. Although 66% of respondents undertaking both modes of study reported they expected some peer interaction and 100% reported they had some peer interactions.
Figure 4.2: Students’ expectation of peer-student interaction and whether those expectations were met

Students were asked to provide their points of view and perspectives about any peer interactions. Their comments included:

- “The only other interaction was via the discussion boards with other students. As this was students only [discussion boards] I had no way of validating if they were on the right track with the advice given. I found it intimidating at times as they seemed to be going a different way to how I was planning to approach an assignment and I began to worry that I was missing something important. In the end, I did not use the discussion boards as these made me worry too much (the same issue with Internet info for research. If you see it in writing you unconsciously seem to think it is coming from authority and knowledge).”

For some it was important to have interaction with other students and they had peer interaction in online units and there was a lack of interaction in paper based units. As one student commented “I have received far more interaction with the online study facility. With my other units that have been purely external, I have
had a feeling of isolation etc. Online study promotes discussion within the group.”

Barriers and overcoming barriers

Q: Have you experienced any barriers in distance education? If yes please explain.

Q. If you experienced any barriers how did you overcome them?

The same questions were asked of both online and paper based students. It was important to find out if the students experienced any barriers and to explore their coping and problem solving abilities. This may also provide an insight into the level of satisfaction of students with those units.

Table 4.6: Percentage of students experiencing barriers while undertaking online, paper based or both units

<table>
<thead>
<tr>
<th>Experienced Barriers</th>
<th>Online students</th>
<th>Paper based students</th>
<th>Both (online and paper based) students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commencement of semester</td>
<td>58.33 %</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>End of the semester</td>
<td>46.15%</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Results as summarised in Table 4.6 indicate that at the commencement of semester, all students undertaking paper based or both units, reported experiencing barriers in distance education, compared to 58.33% of online students. However at the end of the semester, 50% of students undertaking paper based and 46.1% of online units reported barriers compared to students in both units.
The following commentaries are from those students who said they had experienced barriers in distance education. The most common barriers, regardless of teaching methods, were related to lack or low level of communication with the lecturer or other peer students leading to a feeling of isolation and frustration in completing assignments. Other barriers included difficulty accessing discussion boards or Blackboard system, Internet or reading materials and cost associated with use of Internet or postage of borrowed materials or resources.

**Online Students**

<table>
<thead>
<tr>
<th>Experienced any barriers in distance education?</th>
<th>How did you overcome barrier?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respondent (R) 1:</strong> Support and interaction with students / lecturers. Industry contacts.</td>
<td><strong>R 1:</strong> Difficult to overcome this type of barrier.</td>
</tr>
<tr>
<td><strong>R2:</strong> Feelings of isolation and initial shyness and resistance in contacting tutors.</td>
<td><strong>R2:</strong> Realising that if I wanted to know something, I needed to ask and that I was actually paying for the service. Using the discussion boards to find people doing the same course of study.</td>
</tr>
<tr>
<td><strong>R3:</strong> Costs of telephone calls exceeded my ability to pay (on a DSP) due to negligence of Government dept. Poor Government assistance (Financial).</td>
<td><strong>R3:</strong> Yes the MCS CFS makes me lead a very isolated existence and with my families' help and patience and understanding as well as a good disability support from the university and its lecturers has helped me progress this far.</td>
</tr>
<tr>
<td>Experienced any barriers in distance education?</td>
<td>How did you overcome barrier?</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td><strong>R4</strong>: Not on the online unit.</td>
<td><strong>R4</strong>: Spoke to next level supervision.</td>
</tr>
<tr>
<td><strong>R5</strong>: Communication with tutor and other class members can be difficult.</td>
<td><strong>R5</strong>: Did not so much overcome them just tolerated them.</td>
</tr>
<tr>
<td><strong>R6</strong>: Not getting sufficiently detailed answers to questions I ask by email discourages me from asking in future.</td>
<td>-</td>
</tr>
<tr>
<td><strong>R7</strong>: Delays in the post (for paper based studies) and access to the web page (online) - both times have felt I've started in late and therefore have felt pushed to try to catch up.</td>
<td><strong>R7</strong>: I took some time off work last time. Am only a few days behind this time, so am hoping to catch up more easily this time.</td>
</tr>
<tr>
<td><strong>R8</strong>: At times, the Blackboard did not connect - I had difficulties checking if there were any updates for assignments etc. With a part of an assignment due every 1-2 weeks, and inability for me to log on every day, this makes it difficult to keep in touch.</td>
<td><strong>R8</strong>: Email to IT- at least this gave me some idea if the problem was going to be fixed soon. Hope for pot luck if an assignment was due and I could not log in to check the announcements.</td>
</tr>
</tbody>
</table>
**R9:** Always difficult to find telephone numbers for information.  

**R9:** Email.

**Experienced any barriers in distance education?**

**How did you overcome barrier?**

**R10:** Most of all, access to resources. Even though this unit is online, access to some resources was required for further understanding of the subject matter. The library at ECU is very efficient, but the rules of borrowing times are not aimed at external students that have to wait an average of one week to receive items and one week to return them. Cost of postage is also a barrier.  

**R10:** I used my knowledge of the Internet and search methods to access resources. I could see no reason why I would not be able to obtain any pertinent information on the Internet.

**R11:** [I was] missing was the contact with other students to work in groups although through the message board there was some form of contact. This however did suit my own circumstances and I do not feel I was disadvantaged because of this.
One online student expressed the following concerns:

“The course hamstrung me in that I needed to have an Internet connect within good net speed and also having to print tonnes of material. Living in the country and having to travel to sites where I could not access the Internet or use my computer caused me to fall behind on occasions. Where possible I would download the material to research and print it. This became an absolute nightmare at times. I could read through the hard copy text or material whenever I had a spare moment, with reliance on a PC and the Internet a lot of time when I could have studied, were wasted as I did not have my PC or access to the Internet. When I did the initial subjects using the traditional paper based methodology I was easily doing three units a semester and keeping pace. When I changed to online study I struggled to keep up with the demands of two units a semester. On estimation I must be spending 20 plus hours a week on Internet doing research and spending a further 10-15 hours writing the assignments on the PC.”

When asked how they overcame the barriers, they responded:

“I believe it is up to the students to make the effort to get together when they can. It is recognised that generally we are all very busy with work and family commitments so time is not readily available.”

**Students in paper based units**

<table>
<thead>
<tr>
<th>Experienced barriers</th>
<th>How did you overcome barrier?</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1: Difficulty in contacting tutors.</td>
<td>R1: University to supply all reading and books to complete course.</td>
</tr>
<tr>
<td>R2: Yes.</td>
<td>R2: Struggled.</td>
</tr>
</tbody>
</table>
R3: I found it difficult partly because I was returning to tertiary education after a long break. Also I felt that sometimes 5 minutes face-to-face discussion with the tutor could have saved me a weekend of work going off on a tangent because of misunderstandings (especially as the tutor had a very strong ethnic accent which was very difficult over the phone).

R3: Just by taking a lot more time than was really necessary and by probing the tutor with emails and phone calls (as much as I dared and as much as the tutor was willing to go and that was minimal). I don't mean that the tutor was unwilling but he didn't want to give much away via that medium.

Students in both units

<table>
<thead>
<tr>
<th>Experienced any barriers</th>
<th>How did you overcome barrier?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R1:</strong> Due to technical difficulties access to site was denied for over 1 week. My own computer skills are hindering me learning.</td>
<td><strong>R1:</strong> Time and patience and help from other members of family and friends.</td>
</tr>
<tr>
<td><strong>R2:</strong> Some access to hard printed material and timeframes for postage.</td>
<td><strong>R2:</strong> I used materials that I could access such as Internet resources and alternative texts.</td>
</tr>
<tr>
<td><strong>R3:</strong> I find it extremely important to listen to information in order to fully understand the content. It seems to solidify the information in my mind and it helps me to understand better. It is much harder to gain a deep understanding by simply reading material. I really miss discussion and interaction with my teachers and</td>
<td><strong>R3:</strong> I am the OSH rep at my work and I was required to attend the basic OSH course at Swan TAFE. I used the TAFE course as an opportunity to discuss with the TAFE lecturers issues or concerns that I had with the course content from my University unit.</td>
</tr>
</tbody>
</table>
peers. It's also harder to get in contact with tutors.

Because it is so hard to get in contact with tutors, I usually let concerns or questions accumulate and then try and make contact once to avoid the run-around over and over.

The online course is a bit easier because you can write questions and leave them on the Blackboard for people to comment on.

<table>
<thead>
<tr>
<th>Experienced any barriers</th>
<th>How did you overcome barrier?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R4:</strong> I find that dialogue between my peers and tutors is really important to clarify learning material- you can't get that with external study.</td>
<td><strong>R4:</strong> For the online unit, I read the Blackboard as often as I could and contacted the unit coordinator when I had problems. The paper based unit did not provide any type of interaction.</td>
</tr>
</tbody>
</table>

Suitability of content

Q: Is the current unit content suitable for online / paper based learning?

Q: Was the current unit suitable for online / paper based learning?

When students were asked if the content was suitable for specific teaching methods, the responses were surprisingly positive both at the commencement and the end of the semester.
Table 4.7: Students reporting content suitability for different teaching methods

<table>
<thead>
<tr>
<th>Content suitability</th>
<th>Online students</th>
<th>Paper based students</th>
<th>Both (online and paper based)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commencement of semester</td>
<td>90%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>End of the semester</td>
<td>85.7%</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The majority of students believed the content was suitable for the specific teaching methods used, whether they were undertaking paper based, online or both types of units.

Learning outcome

Q: What do you expect (learning outcome) to learn from the unit?

Comments from online students at the commencement of semester included:

- “About occupational toxicology and hygiene”
- “Fundamental principles”
- “Practical and research experience in EH”
- “Greater knowledge of specific details in hygiene management”
- “An introduction to the fundamentals of Environmental Health and Safety”
- “I am happy if I can understand and use and apply the information”
- “Basic toxicology and how to monitor a workplace then recommend actions”
• “Expansion of knowledge of the impact of occupational health beyond the local sphere (i.e. the workplace) to the wider community and environmental health.”

• “Increase technical knowledge (OSH, environmental health), research”

• “Mostly whatever I teach myself what I learnt from doing assignments”

Comments from online students at the end of the semester included:

• ‘I expected to learn the content as described in the beginning of the unit materials”

• “General understanding of the unit concepts”

• “To develop knowledge in areas I felt needed addressing”

• “Basic understanding of communicable disease control”

• “Understanding in new subject and it succeeded”

• “Further increase knowledge in chosen field to increase employment opportunities”

• “I expected to understand the concepts of the unit as they applied to my work to broaden my knowledge in the field. I also expected to achieve a sense of accomplishment at completing online units and on both matters I was satisfied.”

• “With the amount of research involved a fair bit of learning was going to happen.”
Comments from students undertaking both units at the commencement of semester included:

- “The outcomes listed as that which will be required to pass the unit”
- “The underlying principles of occupational Health and safety”

Comments from students undertaking paper based units at the end of the semester included:

- “A better understanding of the prevention of accidents and incidents at work”
- “Qualification”

Suitability of units for employment

Q. Are you currently employed?

Q: Do you expect the unit will help you in your job?

As mentioned at the beginning of this chapter all the students responded yes to this question. They were all employed and the majority expected to improve their career prospect by undertaking the units.

Below are comments about the students’ expectations of how the unit would help them:

- “Further both my practical and report writing skills”
- “More skills and knowledge in my chosen field”
- “Requirement of specialty training”
- “I am just embarking on my OHS / EH career and this unit will provide me with practical experience in the area.”
• “Greater understanding of requirements”

• “I am currently employed in the mining industry as an OHS professional and even though I have three years experience in OHS, I feel I need to receive recognised qualifications in my profession.”

• “My company is in an expansion mode. The qualification and knowledge from this unit may help me to advance into my new job opportunities.”

• “I am the OSH rep in my current position and I am working towards becoming an Organisational Psychologist so the information will be particularly relevant for the rest of my career.”

• “Awareness of safety practices in the broader community that may impact on the health of my clients and in the workplace.”

• “Increase general knowledge of field (occupational health) broader understanding”

• “Further enhance my job and career prospects”

• “Dealing with injury management and OHS regulators”

Positive / negative experiences

Q: In undertaking the unit so far, have you had positive / negative experiences?

Responses were collected at the commencement of semester knowing that many students would not yet have had much contact with the unit.

However it was important to note whether there were any differences in previous experiences based on the teaching methods. Most students either reported a positive experience or too early to comment.
Other comments from online students at the commencement of semester included:

- “No the unit has just commenced. I have been feeling a bit daunted by the practical aspect due to my lack of exposure at an operation level. My prior experience with online units has been nothing but positive.”

- “The last unit was very positive due to Tutor being available.”

- “I have had a negative experience because as of yesterday I was unable to log onto the system. However the IT helpdesk team member Steven was very helpful to get me online”.

- “Nothing either way as yet.”

- “A bit early to say. I’ve found it extremely stressful – the only guide we have is the assignments and one paper; I’m used to a lot more structure (a bit more spoon feeding) in studies. I feel like I do not even know where to begin. I must admit the panic has already begun to set in!!”

- “Good interaction via emails.”

Online students also reported positive experiences at the end of the semester. Although tasks may have been challenging at the time, many found the unit rewarding.

Comments included:

- “Positive in that I have had an exposure to the environmental side of things.”

- “Some positive, some negative. Have learnt that the university does not use a standard for publishing courses for example like the ANTA standards for competency based training. There could be a lot of positive
work done in this area. On a positive note, I believe some learning has occurred (I hope) on the part of the tutor in the area of working towards students needs.”

- “Positive, other than having trouble keeping up due to needing to use a PC and have access to the Internet, the learning experience has been rewarding.”

- “Positive, took up a lot of time but it has been worth it”

- “Enrolling online is not a user-friendly system.”

- “I found the whole online experience was fulfilling and suited my commitments, so it has been a very positive experience for me.”

- “Neutral”

- “All positive- big workload”!

- “Positive in that I have not been party to destroying forests to undertake learning.”

These comments were especially important because students undertaking both online and paper based units were able to make a comparison based on their experience in each teaching method. The comments from students undertaking both units at the commencement of semester included:

- “Paper based modules were great, Internet based module terrible.”

- “The expectation of self direction is the part that I am finding difficult to cope with.”

- “It can be extremely time consuming printing off all the material that you need. My paper based unit provides me with three thick readers, a unit
guide and unit outline. To print all that off can also be extremely expensive and when you’ve already paid $1,000 it doesn’t make you feel like you got your money’s worth. Positive: better interaction with lecturer and peers (although the lecturer only checks in once a week).”

In general, paper based students had a positive experience and below are their comments at the end of the semester:

- “Positive, has provided me with knowledge to a better approach in various aspects of work.”
- “Units are clear and understandable and well-presented.”
- “It was a positive experience but I found that the emails, letters, notes sometimes made simple things hard. For me coming back into tertiary study I found that I was bombarded with information and I sometimes couldn’t see the forest from the tree. Also SIMO didn’t work at first and the website is always out of date.”

Computer literacy

Information technology literacy was particularly relevant for students in online units, as it was assumed by the university that enrolled students were computer literate and able to access computers and the Internet. This question was asked of both paper based and online students.

Q: How literate are you in the use of technology?

Q: Do you believe computer literacy plays a role in completing the unit?

Figure 4.3 demonstrates a consensus amongst respondents that IT literacy played an important role in completing the unit. At the commencement of the unit 100% of the online students agreed that computer literacy was important, and at the end of the semester 77.78% of the online students and 100% of those
undertaking both online and paper based, thought computer literacy played an important role in successful completion of the unit.

![Computer literacy of respondents](image)

**Figure 4.3: Computer literacy levels of all respondents**

Online students supported this with the following comments:

- “You require a basic understanding of computers to complete the unit.”
- “It all seems very daunting at this stage.”
- “I have used the Internet extensively for research etc during these units.”
- “Navigation around the different areas.”
- “Of course it does. If someone with little to no computer skills was to take this course online they would find it extremely difficult to achieve and complete the course.”
- “Being able to use IT has advantages of easily navigating the data minefield and getting out still focused on what you were looking for rather than being distracted by the technology.”
• “Someone completely computer illiterate would obviously struggle. However a high level of expertise does not seem necessary.”

• “I am regarded at work as the informal tech support despite no computer training, and therefore by my peers as advanced. However am still feeling like I am struggling with a few concepts e.g. the discussion boards, how the virtual classroom works etc. I know many people who are a lot less literate than me and a lot less game to click on it and see, and anticipate that they would struggle even getting started.”

• “Assumed level of competency i.e. Internet, email.”

• “You do need a certain experience with computer literacy because you have to use the computer all the way in online learning.”

• “Without it, completion is impossible.”

A student undertaking both units commented “It was not very easy to use straight off the mark. It’s not similar to software that people would use in day-to-day life.”

At the end of the semester the online students provided the following comments:

• “Developing and publishing documents online takes some knowledge of how these systems work, I noticed some students didn’t know how to do this.”

• “Need PC access understanding of word and Microsoft programmes?”

• “Made me faster, research took a lot of time.”
• “It would be difficult for people to complete study this way if they didn't know how to use a computer.”

• “Understanding the way to get information from the Internet was critical to the unit I completed. It would have been a struggle if I did not understand that.”

• “You have to use a computer to access the information so you have to know how to use them.”

• “Made things less stressful.”

Another student enrolled in both units commented “Working out how to use it took some time but after that it’s easy.”

**Online specific questions**

Specific questions were asked of online students in relation to the unit’s aesthetics, networked learning and ease of navigation.

**Q: Is the online unit easy to use / navigate?**

**Table 4.8: Students’ responses in relation to ease of navigation of online units**

<table>
<thead>
<tr>
<th>Easy to navigate</th>
<th>Online students (%)</th>
<th>Students undertaking both units (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commencement of semester</td>
<td>84.62%</td>
<td>33.33%</td>
</tr>
<tr>
<td>End of the semester</td>
<td>87.50%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 4.8 indicates that, while the majority (84.62%) of online students found the units easy to use or navigate, only 33% of the students undertaking both units at the commencement of semester found it easy. It was interesting to note, however, that by the end of the semester 87.5% of online students and all respondents who were undertaking both units reported that the online unit was easy to use or navigate.

**Networked learning**

**Q:** Do you expect the unit to provide you with networked learning (e.g. Blackboard, forums, chat-line)?

Although 91.7% of online respondents expected to have a networked component such as a chat-line or discussion forums, only 33% of students undertaking both paper based and online units expected that.

**Aesthetic design**

**Q:** How do you find the graphic design (was it aesthetically appealing)?

Most online students and those undertaking both units agreed that the graphic design was okay, however that was not a major issue for them. Some comments included:

- “Yes, easy to follow.”
- “Excellent, clear and obvious.”
- “Not really an issue of importance to me.”
- “I have not seen details as yet but based on the past this is ok.”
• “It was fine but it really is not that important to me.”

Teaching preference

Q: If you had a choice of the teaching methods for your unit which would you prefer: paper based or online? Please explain why?

Figure 4.4 illustrates that the percentage of online students who preferred online teaching methods had increased from 70% (at the commencement of semester) to 90% by the end of the semester. In comparison, all students undertaking paper based units preferred paper based units at the commencement but only 75% preferred paper based teaching at the end of the semester. Nine percent (9%) of online students preferred both teaching methods. Interestingly all of the respondents undertaking both units preferred the online teaching method and as one commented “[It] provides more interaction and support. More research required on your part so you learn more. [it is] more practical”.

![Preference for teaching methods](image)

**Figure 4.4: Students’ preference for online, paper based or both teaching methods**
At the end of the semester online students commented:

- “Less hassle in submitting assignments.”

- “Apart from the fact that it saves trees, it is less of a hassle. All of your materials are online and you do not have to carry them all around with you. Very convenient.”

- “Online but only if people on the uni end know what they are doing with online delivery, are prepared to learn the delivery method, and are very conversant with the media.”

- “I did one last semester and found it easier to do because of regular contact with and prompting by lecturer.”

Any other comments

Students had the opportunity to provide additional useful comments at the end of the survey. At the commencement of semester the online students commented:

- “Look forward to continuing study in this method.”

- “I think that online will become the norm and face-to-face lectures will become the exception.”

- “Only that this is the beginning of my first online unit so it is difficult to make an appraisal.”

- “All online may increase eye strain for full time students using computers etc.”
• “Another very important issue that needs to be addressed is the lack of receipts to emailed assignments to lecturers. I think there needs to be a system in place whereby when a lecturer receives your assignment via email, she / he sends you back a brief email just to say 'they received it' as sometimes you might hear nothing at all for weeks and weeks (or sometimes longer) and then you start to wonder if they received it. Just a brief proforma receipt of some sort to let you know they got it.”

A student studying a paper based unit commented:

• “I will not be doing any more courses without clear guidelines, readings and text books.”

Students undertaking in both units said:

• “I was placed within this unit and it is my first such unit so I am still finding my way.”

• “I dislike the use of paper and resources for no reason other than 'usual practice'; it is wasteful and not necessary.”

• “I would like all units, paper based or online, to have a Blackboard component where you can email questions to your peers and lecturers. I don’t see why a paper based unit can’t have this function somewhere online.”

At the end of the semester the online students commented:

• “The lecturer and the course designer were very supportive and did an excellent job at administering the unit with great feedback on assignments etc.”
• “Yes for the course HST5116, the coordinator needs to obtain an objective proof reader for the course material. The unit has many grammatical errors and would benefit from some publishing from a third party. The course also needs to reflect the level of work expected from the students, allowing the possibility that the work expected, is required to be of a higher standard than the unit material, lots of arrogance and double standards. Having my grammar corrected (which I applaud) is a bit rich when the unit materials are nowhere near the same standard. For your questionnaires in the future, may I suggest that you use about 26 point font spacing for answer lines so if people are hand writing the answers they can write within a suitable line size. There were also some grammatical errors that should really be looked at.”

• “The whole online experience was daunting to start with, but it turned out to be a challenging yet rewarding experience. I hope there are more units like it I can take.”

• “Enjoyable though demanding unit. Jack is a champion with advice and time constraints / assignments deadlines.”

Paper based students at the end of the semester commented:

• “What I suggest [is] that the important dates such as exam application closing dates and other important dates should be reminded frequently through email and reminders should pop-up each time we log on to email.”

• “The tutor was pleasant and did as well as he could under the circumstances.”
4.3 Analysis of lecturers’ interviews

All lecturers teaching in Occupational Safety and Environmental Health units were interviewed at the beginning of this study (semester 2, 2004) and at the end of the study (end of the semester 1, 2005). The analysis yielded five descriptive themes including: a) communication, b) information technology, c) attitude, d) fear of unknown and e) policy and guidelines.

Two new sessional lecturers were appointed in semester 1, 2005 and they were interviewed at the end of the semester 1, 2005.

The questions asked from lecturers teaching online, paper based or both teaching methods were the same in each interview session. For a complete list of interview questions refer to Appendix C. In some instances the lecturers were asked for more details or clarification. The aim of the interviews was to enable a comparison of level of satisfaction, expectation and attitudes of the lecturers towards their teaching methods and whether there was a relationship between their attitude and experiences (positive or negative) in teaching the units.

Communication

- Students interaction with lecturer

In interviewing the lecturers, it was noted that engaging and interacting with students were considered important aspects of learning. In comparing the responses from lecturers who taught both online and paper based units, they had their own preferences which one worked better. One lecturer was convinced that online was better and said “The way the units have been designed are based around assignments and are problem based and students are directed to current resources most of which are online and text books of their choosing. Far
superior to paper based because paper based is all outdated, there is no interactivity, students can’t communicate with each other and resources constantly have to be updated and the students don’t really get much out of it. They go straight to their assignments, do the assignments and hand them in.

It was noted that different methods of interactions were used to encourage student-lecturer interaction. For example in one of the Environmental Health units, the lecturer allocated marks (up to 5%) towards interactions via discussion boards. Therefore the students were rewarded if they participated in relevant topics and were actively involved in discussions. As the lecturer said “The marks allocation was for the use of discussion board related to a certain assignment task. This task generally opened up into a more open interactive learning environment. Students were quite good in putting their concerns, views and discussions on the specific assignment task on the boards. Some, who would not have normally got involved, participated in the discussion board and put their points of view forward.”

Similarly in another unit, the lecturer commented that the discussion boards and emails were constantly used and the lecturer actively promoted interactions “because I get them (students) to post copies of their assignments to the discussion boards for other students to review and comment.”

The same lecturer suggested that an online unit provides more interaction and in fact he mentioned that in the paper based unit “you feel isolated”.

Another lecturer teaching both online and paper based believed in more traditional face-to-face interactions, phone or email and had even organised a BBQ get together, in order to encourage lecturer and peer interactions. According to this lecturer “Interaction was mainly via telephone or email. I also organised a function at start of semester and students living in the metropolitan area attended. It was a BBQ get together so that students could meet each other and the lecturers and also a number of members of the Safety Institute
were also present. This provided for mentoring opportunities. The Librarian and Career Advisory Officer gave talks and explained their roles and how they could help students. The President of the Safety Institute of Australia (WA Branch) talked about opportunities for mentoring by Safety Institute members to help the students with their studies and employment opportunities. As a result of that function students met each other, got work experience and employment opportunities.”

- Students’ interactions with their peers

With the online units, it is possible for the students not to interact or communicate with anyone and not to participate in the discussion boards or post any questions or messages. The question of who is responsible to initiate and facilitate any discussion became very relevant in the discussions (should it be the students or the lecturers?).

As one lecturer commented “It is up to them (students); I never had to force them to do that. I suppose, I do in a way force them to do it because I get them to post copies of their assignments to the discussion boards for other students to review and comment and there is a bit of discussion unanimously. For those students who wanted interactions there were interactions. Some may read the message but don’t reply or contribute.”

It is important to note that at ECU there are two discussion boards for student use called the “General Boards” and the “Courseware Discussion Boards”. The general boards are not related to any specific course of study and can be used across the University for students and staff to communicate with one another. This is especially useful for paper based units and allows students to discuss issues of common interest such as assignments or studies.

The courseware discussion boards are generally available through online units. Students are provided with a link on their unit’s website. Not all online units
however make use of this discussion board option. Students or tutors can create a discussion thread and invite others to post their ideas or comments on the specific topic.

The courseware discussion boards in the Environmental Health units usually consist of an introduction section and a discussion board related to each assignment topic. In addition there is a notice board. The introduction section allows students to introduce themselves at the beginning of the semester, which can encourage others to interact. The assignment boards are created for students’ use. Students can communicate about their assignment topics, share resources and ideas. The notice board is an area where the lecturer can post important information to all enrolled students.

In the case of the online unit with marks allocated for discussion, it seemed to have far better results, as the lecturer commented “because marks were allocated even introverted students got involved and contributed towards the discussions. Otherwise you would only get some people use the discussion board, by allocating marks to using discussion boards. It promotes most students to put in their views on a particular task or assignment. The marking depended on how much they contributed towards the discussions about assignments or tasks and the students got between 3-5 marks. Whilst they [students] can address a problem or an issue within an assignment they may not be incorporating the entire problem. With interaction while they were working on the same issues, they could learn from different points of views or other rational arguments.”

Regardless of teaching methods, in some units the students did not have much interaction. As one of the lecturers teaching paper based units responded: “Minimum student interaction. I returned the assignments with the comments. I would ensure they are on the right track. They [students] have the opportunity to communicate with me via email, on the phone or by fax.” The same lecturer
elaborated that a very small number of students requested face-to-face consultation in the office and according to university guidelines that could not be offered “because it was not cost efficient for the University.”

Another online lecturer said: “The discussion board was not used much. They [students] were told that they are required to post assignments on discussion boards after I had reviewed and marked them, only 2 out of 5 did that. The others emailed their assignments to me.”

In one online unit, one of the lecturers mentioned that “the discussion board was not used to its full potential and there was not much interaction”. When the lecturer was asked who should facilitate or initiate the discussion, the lecturer responded “We should. Perhaps it is my job. I only started thinking about it recently. I wasn’t given much induction and didn’t know much about the electronic system.”

Another lecturer was very pleased with the use of discussion boards and said: “Students talked to each other on discussion board. Some teamed up in their own group and I also heard of some social gatherings. The benefit of the discussion board is that they [students] can point each other to the right resource, or literature. If there is a change of legislation or act, they can keep up to date. I was able to post messages to students when specific themes came up or a few students had raised similar questions, I would send it via discussion board and point everyone in the right direction.”

When comparing the interaction between paper based and online one lecturer at the commencement of semester said “I don’t know because I haven’t had experience with online. I haven’t had any experience and for the first week, the student and I haven’t been able to access it together at any time. You probably find that at the end of the semester when we can both access it and sort things out.”
With the paper based one, again the way I have contact [with students] is via phone, email or turn up in my office, which I have had a fair bit of experience so I know they do all three. Also with the paper based often they [students] form their study groups where they meet face-to-face or via email or phone. If they live in the same country then they often work together in things.”

- Feedback

The delay in response to students’ emails or messages varied amongst lecturers. Some responded to emails even on the weekend and others had set one day a week for correspondence. One lecturer said “I made sure I would respond to emails even on Saturday or Sunday so they couldn’t criticize for lack of communication. It also helped them because if they were working on their assignment on the weekend they could continue and didn’t have to wait for a few days for a response.”

Another lecturer commented “Every Monday I respond to discussion boards messages, post directives to the students. Also I made myself available and respond to any emails within a few hours or clear my emails every day even if I was overseas. Students usually email or phone in and chat. Students were more able to contact me than with a paper based unit. Once every couple of weeks I would send an all message to every student globally to direct them in the right direction.”

Information Technology

- Training and support in IT

The lecturers, who developed the unit on Blackboard and were confident and comfortable in using information technology, were able to facilitate the units and monitor the discussions. However those lecturers, not familiar with the Blackboard system and who only had a brief introduction to the system, found it
difficult and noticed that the discussion board was not used effectively and as one interviewee commented, it was even “hijacked” by students. The lecturer said “Some students placed derogatory comments on the discussion boards. These were removed.”

In this case, although the lecturer was experienced in distance education course delivery, the lack of experience with online course delivery had led to frustration when some students placed derogatory messages on the discussion boards.

On the contrary, another online lecturer considered this would not have happened because: “I would not let anyone hijack the board. I would monitor and scan it. As a lecturer it is my role to facilitate as well as coordinate it and make sure students don’t get negative and spread that to others.”

The online course was initiated due to the motivation of ECU and the Faculty Dean and was developed through the efforts of one or two lecturers with very little support from other staff members. In the Public Health area, the lecturers’ educational and professional backgrounds were non-technical. Therefore only one or two lecturers, who had more experience with IT, embraced the initiative and started using the online units initially. They were able to solve technical problems confidently and offer online resources to students.

The following semester, other lecturers were encouraged to teach their units via online learning. The interview responses indicated that the lecturers who had the expertise in information technology and originally set up the online units had to shift the attitude of others to embrace the new technology. Hence, due to leadership and interest on their part, it spread to other units. Other lecturers had to teach online, even though they may not have chosen online as the best option. One of the lecturers, who had just started teaching online for the first time when interviewed in semester 2, 2004, indicated a high level of frustration with the system and IT access. It became clear that the lecturer was distressed as the Blackboard system was disabled for the first few weeks of the semester.
In fact, the lecturer had to assist students and provide IT instructions as well as course related instructions. The lecturers became frustrated when they were not able to assist students to solve their problems even though it was only associated with technological difficulties and capabilities.

To address this problem, the University promptly responded and allocated funds to ensure fast and accessible technical support were provided and the situation was remedied for the online students the following semester. When that specific lecturer was interviewed at the end of the study (semester 1, 2005), the lecturer was satisfied and had a positive experience. The lecturer commented “students were able to access materials easily, no one was angry.” It was obvious the lecturer’s attitude had shifted and the lecturer was pleased and more confident with teaching online units. The lecturer commented: “Students could have discussions with each other. This was particularly useful when the students placed useful information / references online for assignments. I found that similar references were used by a number of other students. I checked discussion boards on a daily basis and sorted out problems if they occurred. The online unit took ¾ of my work time. I don’t anticipate problems for this semester because the University has spent over $300,000 fixing online access problems. Also this time the students [who] have chosen to study online are probably computer literate. The online units of study for this semester have comprehensive study guides, readings and only have assignments due every two weeks. All assignments have suggested word lengths.”

ECU has invested in getting a larger server and addressing the technological incompatibilities. It was mentioned that a large sum had to be spent to address the issue. It was interesting to note that the attitude of the frustrated lecturer had shifted and was positive even though in the previous semester the lecturer had been very distressed and negative about online teaching.

- Access to computer and Internet taken for granted
There was a level of acceptance and agreement between all the lecturers that students undertaking online units were assumed to have access to computers and the Internet. It was also assumed that they were able to use them. As one lecturer mentioned “There is an assumption that if students don’t have access to a PC, they would buy one, get online and pay for it.”

One of the sessional lecturers, who worked from home, mentioned that on some occasions he had difficulty with his own server and was not able to access the University’s IT helpdesk. Since he did not use the University’s system, he had to access an external IT expert and incur the cost. The same lecturer reported that the advantage of working from home was that it enabled the lecturer to respond to phone calls or emails enquiries any time, including week nights and weekends. According to the lecturer, this was well received by the students. The results driven from personal feedback from students showed they were quite happy.

Another lecturer did not believe students needed to be computer literate but did need access to the Internet. The lecture commented “I don’t think that is a requirement. What you need to do is to have access to a computer, if you don’t have that you have got a problem. I tried using Internet café, [although] you can get to online stuff, you can’t send attachments or print it off. You are going to have to find a computer that you can send attachments. If you are trying to use Internet café to be able to do it, it may still be hard”.

When the same lecturer was interviewed at the end of study, the lecturer’s response did not change. “Students often work in remote locations where they don’t have access to computers. I had students who were military soldiers studying while [he was fighting] in the war in Iraq and sometimes they had no access to electricity and couldn’t use computers. Online is not always practical. We have had students in prison and they are not allowed to have access to online information. There are no requirements that students had to be computer
literate, but a pamphlet sent to students indicated that the entire course is online."

**Attitude**

- **Setting the agenda and learning outcome**

All lecturers who taught online courses were given the unit's objectives and access to the Blackboard system with the associated materials. Some lecturers were more critical of the online units and suggested that there was a high demand on their time. The commented that they were expected to coach students on all aspects of the unit not only the content but also in basic information technology and the use of the Blackboard system or discussion boards.

Another lecturer who developed the unit and then taught online was very satisfied with all aspects of the teaching and in fact believed it "saved a lot of time, it was self directed and the system is very easy to use."

- **Positive or negative experiences**

Lecturers were asked to comment if they had positive or negative experiences in teaching the unit. The responses of online lecturers varied from feelings of frustration and distress to confidence. One lecturer said "Positive. I liked the unit. I found the unit interesting because students can have different perspectives and experiences and achieve a good outcome at the end. They don't have to have a background in EH but can learn from it."

Another supported the above lecturer and said "Generally positive. At the beginning of semester students expressed fear and concern and at the end I received a number of emails and informal phone calls to thank me that they have learnt a lot from the unit and for making them use Internet. I also received a number of positive emails in my personal emails, but haven't kept those
emails. I had a better experience this semester (semester 1, 2005) than last one because there was not so much resistance towards the online method."

Other lecturers did not have a positive experience, at least to start with. When interviewed at the beginning of the study (semester2, 2004), one lecturer said “A bit of both. Positive: First unit I’ve done in this way. Negative [because] I didn’t like there were not enough interactions. I felt I should have been more available to them. There are a lot of things you can’t explain in an email. I got 3 assignments from one student delivered just before the end of the semester. I hadn’t heard from this student and thought she must have withdrawn. One of the assignments was 64 pages! Perhaps we need to give them an indication of length.”

Another lecturer was interviewed and responded "Most students and the lecturer could not access the study materials online for most of the first 2 weeks and at times after this during the semester. Studying online was new to most of the students so I had to help, [using telephone instructions], many of the students to be able to access and use their study materials and to teach them how to use online information. Many of the students wanted to have information to be able to manage occupational safety and health in their own workplace. What this unit of study did was to look at global trends in occupational and environmental safety and health. The unit really had no study guide to help the students, who were just beginning to learn the basic information related to the topics in the unit of study. For a payment of over $1000 a unit of study, they wanted more information to provide them with perceived value for money. Assignments were due once a week. Some students wrote over 100 pages for each assignment and had trouble keeping up with the workload. As the unit of study was online, for this unit of study I found that almost all of the references used, were online information. There was minimal evidence that the students had read any research based articles or books. I worked over time helping the students in this
unit of study and spent most of my days on the telephone or answering emails to help them.”

It should be noted however that some of the comments made by these lecturers related to the fact that they were teaching a new unit that they were also unfamiliar with and content related changes needed to be made. The issues would therefore have arisen in any event – irrespective of the mode of delivery.

- Advantages or disadvantages

Some lecturers were quite clear about their preferences for the teaching methods and they were able to suggest reasons why one is not effective and in fact a risk. One of the lecturers with experience of online delivery units, mentioned that “Online courses have the advantage that the copyright and intellectual property is protected whereas with paper based readers, there are issues with copyright infringement, as many of the resources were copied.”

As one of the lecturers mentioned “online is far superior to paper based because paper based is all outdated, there is no interactivity. It doesn’t engage the students.” At the other end of the spectrum another lecturer suggested that the content of their unit was most suited to paper based teaching. The lecturer said “Some enquiries with both students yielded results that paper based is very much preferred and good proportion of Australian and overseas students do not have the computer facility. It is believed for at least several years, my opinion is based on my discussions with my students and other (experts), that we have to have paper based units either on their own or parallel with online. It was not a formal research, however another lecturer told me that probably 20-30% of students wanted to cancel their enrolment. Others had to arrange to print out what was online.”

One lecturer was not prepared to select one against another, as they emphasised that students may perform better according to their learning style.
The lecturer said “I don’t think anyone is more effective, you need to look at individual style and how they learn by reading or practical activities, and they can do things in their life. They may get a huge breadth by going through the Internet. I think to be really nice but not very practical is to have a variety of teaching methods. The place that I went to was Delft Technical University, for the Masters Occupational Safety and Health, what they have they spend a week where they do face-to-face activities, they learn by doing activities and learning, they also have printed materials, have instructions and assignments they have to do. They can also access a lot of information if they need it like online, library, journals so they get the breadth of information. In Netherlands, that is a good method of learning because it takes a lot of learning styles into account and the students interact with each other. Again students work together and those that are good in one type of learning will help other students in that situation. That was good but not practical from the cost point of view. The cheapest way to teach is the online, [because] the students have to print the material. That way you’re cutting the cost. Once the course is developed you don’t need preparation for your teaching which you do when you’re teaching in the class, because you have to keep up to date with newspaper.”

The lecturer continued “With online you have problems and students say my computer is not powerful enough to be able to do online, I have to buy another computer or go to other people’s house, or go to work to access the Internet. They could get into trouble because the employer doesn’t think they have to pay for them to access the Internet, so all methods have advantages or disadvantages. For the university the more profitable option is online, however for the best learning outcome, take a variety of teaching methods.”

The lecturer was convinced that many students preferred paper based delivery and when they found out it was online, many withdrew from the unit. They also suggested that in one semester, when one of the units was offered both in online and paper based delivery modes, they had a higher number of students
enrolled in paper based than online units. As one lecturer said “The only way I can judge is when students were asked to enrol online more than half of these students (31 out of 42), and (24 out of 38) requested paper based unit information to be sent to their home address.”

Another lecturer was also not sure if online teaching is the solution. As the lecturer said “I have a huge problem with it. First of all they put it in the wrong format or I couldn’t access it for one day. I can’t access it today. When I could access it, none of the students could access it, because I had a phone call she said that the only place she could get it was at work, she had problems and I sorted out her problem. I received an email from someone who didn’t give me their names, “where do I go to find, what am I supposed to study and due dates etc”. I don’t know who that is, I responded to that email and ask that they would respond back with their contact details so that I can talk them through what they had to do.”

Interestingly one of the lecturers suggested that online units were a more preferable option for lecturers than students because they had a “seamless approach and it’s easier as a lecturer to teach online than paper based.”

However, if they had to study and could choose the teaching method, they would prefer a paper based unit. They essentially suggested that because the reading materials were provided in the paper based units and there were no issues in relation to a virus or lack of Internet access, they preferred paper based for studying.

One lecturer teaching a paper based unit was not convinced changing to online was a good option. The lecture said “[In the] paper based unit, there are three assignments, if [it was changed to] online students would have to submit every week. This is unworkable.” Again this is an issue related to the unit design. The unit was developed to have multiple submission points spread throughout the semester in order to engage the students in online discussions. The lecturer,
who was accustomed to a 3 assignment paper based system of delivery, perceived every submission to be equal to a full assignment. This was clearly not the intent and the lecturer’s comment may in fact be related to a lack of induction into the expectations of the online unit and the lecturer’s role in online teaching.

**Fear of unknown (expectations)**

- **Independence**

The teaching professionals are independent and heavily reliant on their knowledge and being able to guide students. They are expected to respond to enquiries related to their units. In the case of those lecturers who were teaching online units for the first time with limited IT support, this led to frustration and distress due to a lack of knowledge about how to use IT and their inability to assist students. This in essence became an unknown sphere and variable that was out of their control and therefore compromised their sense of independence. They were faced with learning quickly and thinking on their feet in order to advise the students.

Some lecturers suggested that through online units, the students were not guided on what was expected of them in terms of presentation, formatting and submission of assignments and as one said “they were too much in the dark”.

- **Currency of materials and references**

For some lecturers currency of materials was very important and hence online was a better option while others did not believe their unit’s materials had to be updated every semester. As one lecture said, “General principles of accidents are formulated by Heindrich in 1930 and 1950, which will still be valid in twenty years time. We add minor revisions every two years. Our course is a science based course, same principles as physics such as Newton’s physics. Nothing in
our unit can be obsolete or invalid although some additional resources can be added.”

**Policy and guidelines**

Lecturers were asked if they were aware of any guidelines or policies in developing units. They all mentioned that there were specific policies in place to deal with the development of University courses. However no-one mentioned a specific guideline or policy for the development of web-based courses. There was some mention of specific Blackboard training programs which had been offered to the lecturers; however attendance was not compulsory.

Students were provided with a guideline related to distance education called “Guide to off-campus study at ECU”. The guide provided a checklist for off-campus study. It also had a series of frequently asked questions about relevant contacts, fees and costs involved, submission of assignments and learning materials. Throughout the guide there were references to the online units and the need to have access to the Internet. The University not only provided computer laboratories around the metropolitan areas, it also offered to send printed materials to those students who cannot access the Internet. In addition there was a paragraph about ergonomic principles and students are encouraged to apply good ergonomics in their study environment.

**4.4 Analysis of students’ focus group discussions and email responses**

This section summarises some key recurring themes that emerged during the focus group meeting. Four students attended the meeting. The focus group participants included two students studying a paper based unit and two students who had undertaken both paper based and online units. Three other students, who were not able to attend the meeting, emailed their responses. These students were studying online units. Participants were asked open ended
questions which allowed participants to elaborate and provide detailed input regarding the advantages or disadvantages of online and paper based units, students’ expectations and satisfaction and any barriers experienced.

They were ‘self selected’, because they chose to respond to the invitation and attend the meeting. Although it cannot be assumed that the focus group participants represent the views of all students enrolled in Occupational Safety and Environmental Health units, their comments are consistent with the findings from the students’ surveys.

In regards to improving the teaching methods, their comments were useful. In fact as part of the focus group meeting, participants were also asked to provide suggestion to improve the learning outcome and meet students’ needs.

As previously mentioned in the Chapter 1, many universities do not consider students as customers or they do not market and provide services to meet their needs. However as the market competition increases, the provision of good service becomes an important aspect for students choosing to study at a particular university. At the focus group meeting it became apparent that ECU has to address students’ needs and provide clear guidance and guidelines for what is expected. The analysis of the focus group discussions and comments led to five themes including: a) Provision of specific guidelines, b) Issue of Access, c) Lecturer-student interaction, d) Importance of student-student interaction and e) Issue of currency of materials.

A) Provision of specific guidelines

- **Surprise element - not knowing what to expect**

It was noted that some of the students felt distressed and frustrated at times, due to a lack of guidelines or clarifications, regardless of the teaching methods.
They did not know what to expect with the online or paper based units. They certainly expected to have some reading materials or interactions. As one participant mentioned he did not realise one of the units was ‘totally online’. He further commented: “I had not contemplated that. I thought it may be external studies with some online component and not every reading material, everything online.”

Uncertainty can create unnecessary fear or distress for students. It appeared that students did not know what they were attempting. In fact, simple instructions about the complexity of assignments or even word counts created frustration for some students. As one student said “[The] guidelines are not clear.”

- **Competency level lower than expected**

The requirements for assignments in paper based units were as confusing as the online units. It seemed that the assignment and level of expectation in one or some of the paper based units were well below those usually expected from a university student. This became frustrating as some students spent more time researching and completing an assignment when there was no need to go “so deep into it”. As one participant described it “I came through the TAFE system, when I started doing paper based. I am thinking it is a university course and expected it to be harder. I was told my responses were relevant for a Masters course and should keep the assignment responses, because I could use it in my Master’s level. Me and a few others were quite confused what we were actually meant to be doing at this level.”

- **Timely advice and information**

Students were keen to have access to their unit’s information in a timely manner. One student studying a paper based unit reported that they had not received the materials two weeks into the semester, whereas they had already started the online unit.
Similarly with one of the online units, there were some issues regarding access
to the Blackboard system and it took more than a week into the semester for
some students to access their unit’s materials. This caused stress and
frustration as the lecturer could not get access either, so students did not have
any way of getting advice or information from their lecturer.

**B) Issue of access**

While some participants were able to study at work and used a computer and
the Internet at work and were able to use online resources, others had to buy a
computer and link up to the Internet at home.

Issues such as Internet speed and lack of Internet access and viruses also
created more frustration and stress, as one participant commented:

“For me the greatest impact has been the need to have access to a computer
and the Internet. Travelling a lot I found having paper based notes could easily
be read on the plane and when in hotels. Having to use a PC and the Internet is
great when I’m at home but causes me to struggle when I’m away from home.
Also being in the country I’ve found net speed can be a big inhibitor, hence I try
and use the Internet via my work when possible as they have high speed
broadband. I think the most horrifying aspect of doing courses via the Internet
has been viruses. During the first semester I imported a virus on two occasions
which impacted on my assignments. On one occasion I lost all the information
on my PC including my assignment and back up, even though I had a reliable
virus checker.”

Internet connection or access to specific websites was not always easily
achieved. As one student commented, “When you are given a reference in the
online unit, you never know if that particular website is open [accessible] at the
time. Any time the website may not be available and it can happen during
assignments.”
• **Ongoing access to reading materials**

Students preferred to have access to reading materials even after the semester had ended. Some students studying paper based units suggested that some of the reading materials were used in other units “down the track”. The problem with online units is that once the students complete the unit, they no longer have access to those specific materials. As one student said “*With paper based the advantage is when you are given readings or scientific reports, you can file them away for a later stage but once your enrolment for the online is over you don’t get access to the stuff again. If you have done the paper based [unit] with OSH introductory some of the readers become the backbone for the future units.*”

Another student supported this comment and said “*Readers can be useful in the workplace, as you can apply the same principles.*”

**C) Lecturer- student interaction**

• **Feedback**

Participants were keen to receive quick responses and feedback from some lecturers and they were very satisfied when they received prompt responses. This was an advantage for online students. As one student studying online described it: "*No matter what aspect people have been quick to respond whether it was a phone enquiry or email enquiry or providing guidance. Most lecturers I have come across have been pretty efficient and helpful.*” Another supported this comment and said, “*Communication was better online. In the paper based unit, comments from the lecture took a lot longer.*”

However, when there was no or insufficient feedback from lecturers, students stopped asking questions and relied on their own judgement or the passing mark to indicate they were on the right track. As one commented, “*Not getting sufficiently detailed answers to questions I ask by email of my lecturers. This discourages me from asking in future. As a result the next time I have a query,*
say about an assignment, I go ahead and do whatever I think is the right thing and don’t bother asking.”

A number of participants mentioned that assignments are not returned to the online students. They only receive a mark with no comment or one paragraph of feedback. This did not only frustrate the students, it reduced their motivation to learn or improve. The students preferred to have criticism rather than no comments. According to one participant “I have never received an assignment back with appropriate comments and notes. I find this difficult and frustrating as I do not know to this day if what I wrote in [the] assignment was right or wrong. I miss out so much on learning because of this.”

Another said “Regardless of online or paper based, there was only three sentences in the feedback I received from lecturers last semester.”

• **Support for students**

Given the nature of distance education, many students rely on support from the staff and lecturers to clarify issues and to provide guidance regarding assignments or exams. One would assume that it is a “mutual obligation” and students and lecturers both play an important role in getting the information. However many students believe lecturers should initiate this and provide ongoing support and information. As one student commented, “You are left to find out everything for yourself and the onus is on you as a student to find it out.”

• **Access to printed information**

Most post graduate students need to have access to general information about post graduate studies such as can be found in the “post graduate handbook or Honour’s book”. This information is also available online. This caused some frustration for one of the focus group participants, because although the student was enrolled in distance education and online units, they expected to receive
more generic information in hard copy. As one student commented, "There appears to be a new arrangement whereby the university will no longer provide information to a student by hard copy, instead the student can access it online, which for some is alright and understandable but for many it is not alright."

Similarly some participants preferred to study paper based units mainly because they preferred to have the “Readers” to take with them in a bus or to a park. As one participants said "I like to have something tangible in my hands. With online I tend to print a lot of stuff which is cost to me, which is a cost that the university has put back on to students.”

D) Importance of student - student interactions

In some cases, online students suggested that the online unit was a tool to benchmark their learning with other students. As one said, "It shows the diversity of people’s opinions and broadens your thinking for a particular subject.”

Participants emphasized the importance of peer interaction at the beginning of the course and throughout the study. Online students were satisfied with the interaction as it gave them a sense of community and belonging to a diverse group of people. The discussion board was very important in reducing isolation, in particular the introduction discussion board: “I think one of the interesting things about online courses is the discussion boards. Because we are external and remote from other students and don’t get that interactions, but last semester through the introduction discussion boards, you are no longer the only one with all the issues and suddenly you get people with family and four kids, two jobs and he is trying to do that and you start to understand what you are going through and that we are all in this together. You actually never get to see the person but I think it brought a couple of students [together] that had some issues but only for the duration of that issue and then it wore off.”
The discussion board was also a tool for students to challenge each other’s ideas and clarify any issues and misunderstanding. As one participant suggested, “In some units, you get five marks by being involved in the discussion boards. That makes people more proactive because they know that marks are involved. Before you know it you have great interactions between students and there is great learning occurring as well as interactions and you are picking up ideas that perhaps you never thought of.”

Paper based units did not offer much peer interaction. As one of the participants commented, “With the paper based, you really don’t have an option to find out who else is in your class.” In one of the paper based units there was a suggestion for a one-off get together on the campus. The get together was suitable only for those who lived close to the campus and could attend the session. As none of the participants had attended the get together it was difficult to ascertain if it was a useful exercise.

In another paper based unit, students used the option to access the general discussion boards, which is the university’s generic discussion board available to all staff and students. Two of the participants in the paper based units used the discussion board and found it useful. According to one student, “Last semester there was nothing there. I thought I was the only one (enrolled in the unit), one person instigated the initial email and I and couple of others responded.”

E) Issue of currency of materials

Similarly to comments from the lecturers’ interviews, some participants reported that information in online units was up to date. “I've had problems when doing courses which are paper based which are primarily around the currency of the material supplied. In some units the material supplied was about twenty years out of date.”
Another participant supported this and commented, “One of the advantages of online is that you are guaranteed that the information you get is up to date. A code or reference material is indicated and then it is up to you to find out how the research was done and how they came up with the results.”

**Advantages or disadvantages of different teaching methods**

The focus group participants were asked to list their preference for paper based or online units and to specify why they preferred one teaching method over the other.

Those who preferred paper based teaching listed the following advantages:

- Lower cost and less time spent searching because references and resources are provided;
- Easy to access reading materials, because students are sent the “Readers”. Therefore it enables students to read anytime and anywhere for example in a bus or a park;
- Assignments are returned with comments / feedback ;
- Easy to reference;
- Sense of achievement when readers are completed;
- Can revisit reading materials throughout the course rather than only during semester;
- Hard copy is convincing;
- Some of the reading material can be used as a reference for other subjects;
- Readers accessible to everyone.

Disadvantages of paper based units were listed as follows:

- Daunting, due to large amount of reading;
- Feedback takes longer;
- Getting access to readers late;
• Sending assignment via mail;
• Usually there is an Exam;
• Material can be out of date.

In comparison the advantages of online units included:
• Quick feedback (2-3 days);
• Flexibility (but need self-discipline);
• No exams;
• References needed are available free and up to date;
• Better communication;
• Good supporting staff;
• Introduction discussion board was a good way to meet other students;
• Positive interaction between students through discussion boards for specific issues / problem;
• Information is up-to-date.

Disadvantages of online units were suggested as follows:
• Outage problems;
• Risk of viruses.
• Potential access problems (computer and Internet);
• Finding relevant information may take longer;
• There is a lot of printing and some materials may not be relevant;
• The "Readers" are not provided. There is a lot of reading but students have to find it and choose how much to read;
• Specific websites may be inactive at times;
• After the course is completed, there is no access to unit readers;
• Cost of access to Internet, printing;
• Assignments are not returned.
The participants also provided some comments regarding improving various teaching methods. Their recommendations were as follows:

- Improve guidelines about length, complexity of assignments.
- Make readers and relevant university information available.
- Subsidize the cost of computer access and printing.
- Include feedback and constructive criticism with the assignments.
- Offer an induction into the online learning system at the beginning of the course.
- Reduce lecturer’s workload to enable them to assist students. Students would then not feel they are imposing on the lecturers.

4.5 Summary of main findings

The students and lecturers are divided based on their preferred choice of teaching and learning.

It was interesting to note the expectations of students studying various teaching methods at the commencement of semester and then again at the end of the semester, particularly their expectations relating to interaction with administrative support staff and with lecturers or other students. Generally the students were satisfied, even though many had experienced barriers.

Comments obtained from the focus group meeting provided meaningful discussions which highlighted the advantages and challenges associated with various teaching methods.

Some lecturers also had their preferred teaching methods. Some were convinced that paper based units are out dated and ineffective, and instead promoted the online units as the best option for distance education. Others still preferred paper based units.
CHAPTER 5. DISCUSSION AND CONCLUSION

The aim of this study was to explore the effectiveness of online versus paper based units in post graduate Occupational Safety and Environmental Health at ECU. To do this the study assessed the experience, preference and satisfaction of both students and lecturers in undertaking and teaching paper based and online units. In addition this study investigated interaction between lecturers and students and highlighted the challenges and advantages of each of the teaching methods.

This study also sought to identify ways to improve the learning outcomes and experiences of future students undertaking the units. This chapter will summarise the findings of the study and interpret them according to the three research questions stated previously and in this chapter. Conclusions related to each of the research questions will be drawn and implications of this study will be discussed. The findings will be discussed under certain themes according to the seven principles of good practice according to Chickering and Gameson, (1983) and Graham and Cagiltay (2001).

5.1 Key findings

Many issues have emerged from the findings of this study, regarding effectiveness of learning. The literature showed that several researchers have assessed the effectiveness of online learning. It also showed that online learning has not been used to its full potential, and many institutions have developed a hybrid combining both synchronous and asynchronous learning in a course. This study aimed to assess a comparative analysis of two teaching methods. The methodology for this study was adopted to analyse and provide evidence to
answer the following three research questions specifically for the Edith Cowan University:

1. Is online learning in the environmental health units better than traditional paper based occupational safety units?

2. Do students who undertake online learning units have a better experience than those undergoing traditional paper based units?

3. Do units that are solely provided via online delivery methods provide appropriate lecturer and peer interaction for students?

Q1: Is online learning better?

To address the first question, a comprehensive literature review was undertaken of relevant studies comparing online learning with other teaching methods across Australia and overseas. The literature review summarised relevant studies which assess the effectiveness of online learning compared to class room setting or paper based learning. It also showed that assessing the various teaching methods depends on a number of factors.

It was deemed important to consider the satisfaction and perception of lecturers and students through quantitative data as well as qualitative information when measuring the effectiveness of the specific teaching methods. Higher student satisfaction was one way of gauging whether the online units were better than the paper based units.

Results indicated that at the commencement of semester 50% of online students were satisfied; however none of paper based respondents were satisfied. By the end of the semester all paper based respondents were satisfied and high
number of online students (61.5%) were either satisfied or very satisfied with the online units.

Those undertaking both units were not sure at the commencement of semester, however by the end of the semester all the respondents indicated satisfaction with both units.

The relevance of students’ satisfaction with the unit was also raised during lecturers’ interviews. Some lecturers believed that higher number of withdrawal from the online unit was an indication that the students may not have been satisfied. This has been supported by Bourne et al (2004) suggesting that if the communication on web is not adequately planned and discussion forum are not appropriate, there will be a drop out of students rather than student learning.

The students’ perception of teaching also played an important role and was an indicator of their satisfaction as measured against certain criteria, including: teaching methodology, goals or learning outcomes, IT literacy (Schrum et al, 2002).

In this study the lecturers’ feedback on online learning was varied, and depended on whether they liked online methods or were against the concept. The level of computer literacy of staff may have also been influencing factors. Issues that distressed some of the lecturers included lack of familiarity in integrating teaching with technology. The lecturers who were experienced in distance education and in the use of computers, had not anticipated how different the instructional environment and communication were between paper based and online course delivery. They reported stress if they could not get the technology to work or to use it seamlessly. At times the computer system was disabled due to technical difficulties. Therefore, although information technology was not the principal factor in determining satisfaction of lecturers, it appeared to have frustrated the learning process and the lecturers’ perception if it was not adequately resourced.
Mitchell et al, (2001) also found in their study that the online teaching environment can create “unexpected constraints on engaging and focusing learning”, which was not related to the lecturers’ experiences and skills of the software.

For some lecturers, online delivery required less time, enabled regular updating of information and referencing and more interaction with students. Others reported it required a greater time commitment and was less effective and adequate. Therefore in this study there was no consensus between the lecturers of the effectiveness of online teaching.

With globalisation in the economy, OSH professionals are no longer restricted to employment in one state or country; rather they will be sought after around the world. Therefore online training is an appropriate solution for access to information globally.

Online learning at ECU offered good opportunities to students to develop critical thinking and higher order cognition skills because various assignments encouraged students to apply their knowledge in a case scenario. This is an important component of effective OSH training (Loos et al, 2001). Web based learning can facilitate critical thinking and develop higher order learning since it is self directed and it can be easily adapted to different learning styles and talents.

This study found that both the paper based and online teaching methods at ECU had deficiencies and advantages; neither was superior. Although there were some improvements in online courses at ECU moving towards a “Wagon Train” approach over the two semesters, there still needed to be a more planned approach, better professional development for staff and guidelines for students. Paper based units were preferred by some lecturers and students. Students preferred to have access to the text based reading materials which were
provided in the paper based units. Some lecturers believed paper based units required less time responding to technological problems, therefore they could allocate more time to respond to units specific questions.

When students were asked if the content was suitable for specific teaching methods, the majority of students believed the content was suitable for the specific teaching methods used, whether they were undertaking paper based, online or both types of units.

More importantly, the number of online students who preferred online teaching methods had increased by the end of the semester. In comparison, although all students undertaking paper based units preferred paper based units at the commencement of semester, less students preferred paper based units by the end of the semester. All of the respondents undertaking both units preferred the online teaching method.

All lecturers who taught online courses were given the unit’s objectives and access to the Blackboard system with the associated materials. Some lecturers were more critical of the online units and suggested that there was a high demand on their time. They were teaching a new unit therefore the unfamiliarity with the new contents would have arisen in any event – irrespective of the mode of delivery. Some lecturers suggested that through online units, the students were not guided on what was expected of them in terms of presentation, formatting and submission of assignments.

For some lecturers currency of materials was very important and hence online was a better option while others did not believe their unit’s materials had to be updated every semester.

The literature review indicated that if planning and cooperation of staff and infrastructure are in place, then the online learning can be engaging and achieve

From this study, it can not be concluded that the online is better than the paper based units, however if the ECU plans to expand the online learning, the University must ensure institutional plans; priorities and policies are in place to support online course delivery. The “Wagon Train approach” supports the findings of this study that important elements to future success of online education at ECU must include lecturer involvement, institutional infrastructure, uninterrupted access to services and content, adequate technical and instructional capacity, administrative support, appropriate budget and clarification of resources and roles (Mitchell et al, 2001, Bourne et al, 2004).

ECU may also consider adapting factors leading to success in both online and paper based teaching methods. For example students could receive their text based reading materials similar to paper based units, and access discussion forums and up to date resources all online. This suggestion is supported by Burgess et al, (2005) who also concluded that students preferred teaching materials to remain text based supplemented with online practical exams.

Q2: Do students studying online or paper based units have a better experience?

It was important to find out if the students experienced any barriers and to explore their problem solving abilities. Responses were collected at the commencement of semester knowing that many students would not yet have had much contact with the unit. However it was important to note whether there were any differences in previous experiences based on the teaching methods. Most students either reported a positive experience or too early to comment at the commencement of semester.
All respondents studying paper based units experienced barriers compared to online students (approximately 58%). Online students also reported positive experiences at the end of the semester.

Students doing paper based units reported that they had more challenges in undertaking their course than online students by the end of the semester, and hence less students preferred paper based units at the end of the semester indicating a shift in attitudes.

Online learning can be more effective if appropriate human and technological resources are provided for both students and lecturers, so that they experience few or no challenges.

The most common barriers, regardless of teaching methods, were related to lack or low level of communication with the lecturer or other peer students leading to a feeling of isolation and frustration in completing the assignments. Other barriers specific to online units included difficulty accessing discussion boards and Blackboard system, references, lack of access and cost associated with use of Internet. Uncertainty created unnecessary fear or distress for students. It appeared that students did not know what they were attempting.

Lecturers were asked to comment if they had positive or negative experiences in teaching the unit. Some online lecturers reported feelings of frustration and distress and others were confident and preferred online to paper based teaching.

Problems experienced early on in the transition to online learning included computer server and other technical incompatibilities. This was a broader university issue and was resolved effectively. These technical incompatibilities did impact on students’ and staff experiences in this study. Therefore the shift in attitude of some of the lecturers and students who were frustrated with online units in first semester but were quite excited by the end of the semester was
largely due to the university addressing the technical problems and the lecturers’ and students’ acquired familiarity with the Blackboard system.

This study has shown that at the commencement of semester, majority of online students faced more challenges than paper based students, however by the end of the semester they had less barriers and reported more positive experiences than students doing paper based units. Although tasks may have been challenging at the time, many online students found the units rewarding. Similarly lecturers, who were frustrated with online units in first semester, were quite excited in the second semester. Thus from this study it can be concluded that students studying online units had better experiences than students who were studying paper based units.

Q3. Do online units provide appropriate lecturer and peer interaction for students?

An important criterion to consider in the evaluation of online and paper based units is interaction. There is a wide body of research indicating that the quality and quantity of student interactions with lecturers and with peer students is linked to students’ learning and provides a sense community in an online learning environment (Jian and Ting, 2000; Richardson and Swan 2003).

In this study, the majority of online students (80%) expected to have a some interaction with lecturers and administrative support staff and these expectations appeared to have been met (78.5%). On the other hand, paper based students initially expected to have interactions, but only two thirds (66.7%) reported that they had any interaction.

The results also indicated that the majority of online students (66.7%) expected some lecturer-student interaction and surprisingly 87.5% reported interaction.
When comparing online and paper based learning, some students indicated that online was more engaging and provided a flexible learning environment.

Student-student interactions were highest in online units (87.5%) compared to paper based units (40%). It was noted that a greater proportion of online students (91.7%) expected to have peer interactions and their expectations were met (87.5%) compared to the paper based students, who did not expect any student interactions at the commencement of semester and only a small number of paper based students (40%) reported some student interaction at the end of the semester.

In most cases, online students emphasized the importance of peer interaction at the beginning and throughout the study. They were satisfied with the interaction as it gave them a sense of community and belonging to a diverse group of people. The discussion board was important in reducing isolation, in particular the introduction discussion board and was also a tool for students to challenge each other's ideas and clarify any issues and misunderstanding. Paper based units on the other hand did not offer much peer interaction.

In this study the online students were able to overcome the disadvantages of distance education through much higher interactions than paper based students. Although 66% of respondents undertaking both modes of study reported they expected peer interaction and 100% reported they had peer interactions by the end of the semester.

In the online units, lecturers posted all the course materials online, provided links to relevant web sites and resources, established email, discussion boards and online assignment procedures. Students received all their communications via the Internet and email. In the paper based units, all materials were provided in hard copy, however some lecturers occasionally contacted students via email.
ECU provided a modem pool to students and staff, with no monthly fee. This allowed access for research and university study; however personal web usage was not permitted. Students had to pay for call costs. Those students who had no computer or Internet access, could apply for “Hard Copy Correspondence” and the university sent out any information via mail.

In both the online and paper based modes, there was no face-to-face contact with lecturers. All materials were either sent via mail or email. Unit coordinators and tutors contacted students and encouraged interaction. Some lecturers provided all students with contact details of enrolled students and their email addresses, which had implications regarding privacy and the lecturers needed to seek permission to divulge the information. In the online units, there were opportunities for interaction including email or via the discussion boards. At the beginning of the semester all enrolled students were sent an email providing them with instructions on how to access their online materials.

In general, the online students reported far more interaction with the lecturers than the students studying paper based units. Similarly student-student interaction was far more frequent for online students. In comparison, students doing both paper based and online units seemed to have the highest level of peer student and lecturer-student interactions.

There were different views among the lecturers about which teaching method provided better interactions. Some lecturers believed the discussion boards and emails enabled positive lecturer-student and peer interactions.

Thus from the lecturers’ and students’ feedback, it can be concluded that the online units provided more interaction with lecturers and other students.

The findings of this study were also considered in relation to the seven principles of good practice in education as developed by Chickering and Gamson (1983)
and online assessment as suggested by Chickering and Gameson (1983) and Graham and Cagiltay (2001).

The seven principles of good practice in learning are as follows:

I. Good practice encourages student-staff contact

II. Good practice encourages co-operation among students

III. Good practice encourages active learning

IV. Good practice gives prompt feedback

V. Good practice emphasizes time on task

VI. Good practice communicates high expectations

VII. Good practice respects diverse talents and ways of learning

Below is a discussion of the seven principles relating this study to each principle.

I. Student - staff contacts

Good lecturer - student interaction is important in good practice learning, therefore the comparison of the two teaching methods at the commencement and end of the semester provided useful information about each student and staff interaction.

Regular interaction with lecturers has been shown to be essential for the maintenance of activity and focus of students (Stacey et al, 2002). The lecturer’s role in establishing a secure learning environment and modelling socially acceptable process of interaction are integral in improving the students’ interaction. According to Stacey et al, (2002) students do not maintain motivation or interest unless they feel connected to both the teacher and the
material and, in some cases, fellow classmates. Different methods of student-teacher interaction work best to address various student needs (e.g. phone, videophone, e-mail, orientations, meetings, and drop-in). Establishment of small collaborative groups is another useful way to facilitate continued group discussions and tasks (Stacey et al, 2002).

Data from the students’ indicated a higher number of online respondents reported lecturer-student and peer interaction as compared to students studying paper based units. At the end of semester, those students undertaking both paper based and online units reported most interaction. Therefore it could be suggested that the combined teaching methods offered most communication and interactions.

II. Cooperation amongst students

Similarly there was more student-student interaction in online units compared to paper based units. From the qualitative data it was possible to ascertain whether there was some cooperation amongst students. In both areas this was found to be minimal, however the discussion board enabled students to exchange ideas and seek cooperation from others. In paper based units, although some lecturers provided contact details and email addresses of other enrolled students, no one reported using email to contact fellow students.

The majority of online students valued other students’ perspectives and ideas, which they could access through the discussion boards in the online units. A small number believed that sometimes it confused them and they were not sure if they were on the right track. The focus group participants doing paper based units met other peer students through the University’s generic discussion board and formed cooperative groups and assisted each other with assignments.
III. Encourage active learning

Students’ feedback and comments supported the use of online learning to encourage an active learning environment. Within this method, the lecturers played an important role as moderators.

In this study, it became obvious that both the lecturers and most of the students were not prepared for online units and did not know what to expect in terms of time commitment and the required level of skills. The University had given little attention to instructional issues, server capabilities and IT training. This lack of attention caused considerable stress amongst some lecturers and students. Students became distressed when they were not able to access course content online or understand assignment directions. The lecturers were stressed due to a system breakdown which led to an inability to assist students with the IT queries and to post contents onto the Blackboard system. Few lecturers were not prepared for the amount of time required to maintain contact with the online students, facilitate discussions and respond to questions on the discussion board.

Students enrolled in both paper based and online courses reported that they felt isolated from time to time and even though the online students were eager to use the new learning environment, they were not sure how to meet the course objectives and assessment requirements.

IV. Prompt feedback

Data indicated that some online lecturers provided prompt feedback (within a day) and responded to students even on the weekend or at nights. In general, lecturers provided prompt feedback in relation to enquiries. The timing of the feedback was an issue for students. They were also frustrated that they only received a mark and did not receive any feedback with their assignments. This seemed to vary amongst lecturers. Some lecturers provided useful comments
and information about the assignments however others did not. Some online students complained that because they did not receive their assignments back, they did not get any feedback on how to improve.

V. Time on task

All students were provided information in terms of expected time frames for submissions. In one unit, the online students had to submit multiple assessments on a regular basis (every week or fortnight). This was a useful strategy in improving time management and preparing students for the workplace. However, in order to enable students to meet their deadline, the University needed to ensure resources were accessible at all times. In this study, data indicated that some students were not always able to access Blackboard systems and therefore could not submit their assignments. In addition, it was suggested that important dates such as exam or assignment due dates were not emailed to students or visible in the Blackboard system.

VI. Communicating high expectations

In general there was a lack of guidelines for both online and paper based students for example in terms of word length, depth of information expected for the assignments. In the focus group meeting, some students reported that the expected level for a Post Graduate Diploma course in the paper based units was lower or similar to a Diploma course at TAFE. This was supported by some lecturers; that some paper based units have a low expectation of post graduate students. They further suggested that this reduced students’ confidence in their performance in a workplace.

VII. Respecting diverse talents and ways of learning

Data indicated that the majority of the students were professionals and mature aged. For some online students who were working in remote areas, it was
impossible to study due to a lack of computers and Internet access, hence although the units respected diversity they did not accommodate different ways of learning. In comparison, those studying paper based units were satisfied that although there was a great deal of reading required, they could carry the notes with them and had access to their readers at all times.

5.2 Summary of findings

Data showed that the majority of students responding to the surveys were professionals, mature aged and committed to their studies. It would seem that a lack of guidelines and direction in both online and paper based units led to frustration. Students also reported that lecturers had different approaches to giving feedback and requested more constructive feedback on their assignments. It appeared that those studying both online and paper based units were more satisfied than those studying solely paper based or online units. Therefore one could suggest that both teaching methods have their merits and both encourage different learning processes.

5.3 Methodological issues

Reasons for low response rate can be related to a number of factors. Some of these factors relate to internal university specific issues and others are more generic. It was mentioned that some lecturers teaching paper based units boycotted the survey and advised their students not to respond to the survey. The lecturers mistakenly believed the study was a deliberate effort to justify removing all paper based units and replacing them with online courses. Therefore the low number of responses from paper based students could be due
to some lecturers discouraging students to participate in the survey. Another factor could be that most university students and staff are regularly asked to provide feedback on their university experiences and in some cases they are “over burdened” by requests (Zimitat et al, 2002).

The Graduate School at ECU conducted a survey in 2005 and also received a very low number of responses. Poor response rate in this study was therefore probably due to the fact that students were inundated with surveys (such as university evaluations, faculty specific evaluations etc). Therefore the students were then unlikely to complete any of them. The Schools and University should ideally have a coordinated approach to prevent this occurring in the future. At the end of the semester, responses may also have been low because many students may have been inclined not to participate in surveys coinciding with their examinations or assignments.

Some strategies were employed to improve response rate and these are summarised below.

In this study the sample group was known, therefore the researcher with the assistance of the faculty staff attempted to attract more respondents via follow up requests and reminders to complete the survey. The possibility of high non-response was addressed by conducting the surveys earlier in the semester.

Access to the Internet and levels of computer literacy were considered to vary amongst students therefore various modes of questionnaire distribution were utilised. These included email with follow up emails and also hard copy distribution via mail.

The provision of incentives to the students was considered in an attempt to increase the response rate, however it was decided not to proceed with an incentive system as that would compromise the anonymity of the responses and would also ultimately decrease the cost effectiveness of the online survey.
Future studies should explore this issue further and questionnaire completion should probably be linked to some tangible incentives.

Online research and surveys inviting volunteers to respond are at greater risk of sampling error because not every member of the sample size has an equal chance of responding to the survey. The higher rate of respondents in online units could be due to Internet access or better computer literacy (Zimitat et al, 2002). This could also explain the lower response rate from the students studying paper based units.

There is also the unresolved issue of whether respondents give different responses on web and paper surveys. Kiesler and Sproll (1986) reported that there were no differences in the quality or quantity of responses to open ended questions. Responses to open ended questions on email surveys were reportedly longer and more detailed than on paper questionnaires (Mehta et al, 1995; Schaeffer et al, 1999). This was noted in this study as well. The students studying paper based units who filled out the survey in ink and returned the survey via post gave shorter responses than some online students who typed their responses and returned them via email.

According to Zimitat et al,(2002), there are several errors which need to be avoided when conducting online research and evaluations.

Coverage error occurs when the surveyed sample is not representative of the broader population because some members are more likely to be sampled than others. In the case of university students, that was not the case because all students had an opportunity to respond. It is possible however that highly satisfied or very dissatisfied students were more likely to respond than others.

Sampling error may have been an issue, because only some of the students with Internet access and high computer literacy may have responded.
Measurement error was less likely to occur as the survey questions in this study were clear and in a plain and simple format and the target population were university students.

5.4 Further implications of the Findings

This study has shown that a good level of professional development for lecturers, better planning, resource allocation and support systems may have reduced the frustration and stresses related to the transition to teaching online units. The resistance of some lecturers to using online methods could have been alleviated through better involvement and communication from the outset of the course development. Some online lecturers who were frustrated at the beginning of the study provided positive feedback at the end of the study. Therefore their attitude had shifted through better technology and by learning how to use the Blackboard system and responding to students’ enquiries. The role of lecturers as moderators rather than instructors needs to be communicated and explained in the context of the constructivist teaching model compared to the objectivist traditional approach.

Similarly the students need adequate guidelines, support and training when they are faced with a new teaching method such as online teaching. The online server must be accessible at all times.

It is important to note however that the small number of participants in the study means that it would not be wise to generalize the conclusions beyond this particular study group. The study nevertheless offers some insights into both the topic of investigation and methodology which may be of interest to future researchers in this area.
The findings of the study identified the following areas which impact on the effectiveness of the online teaching methods:

- **Planning process**
  
  Planning must include resource allocation, technical infrastructure assessment of appropriate IT management systems and the development of cross functional teams.

- **Communication**
  
  Communication includes the development of relevant policies and guidelines, establishment of IT support, software development and involvement of course coordinator and lecturers. In addition, both students and lecturers must be encouraged to learn and use systems through role modelling. The University needs to provide adequate support systems for both staff and students.

- **Implementation process**
  
  This process includes professional development (knowledge development, i.e. IT training), integration and implementation of technology and promotion.

- **Monitoring**
  
  This includes readily testing the online system, to ensure the system is user friendly and accessible. Factors such as assessing usage, frequency of drop outs from the system and accessibility need to be recorded.
• Evaluating and reviewing

There needs to be ongoing evaluations and reviews through online surveys. Any changes need to be carried out in consultation with relevant lecturers, coordinators, and students.
CHAPTER 6. RECOMMENDATIONS

This chapter concludes the thesis. It provides a review of the results of the study and a discussion about the implications on evaluation of online and paper based learning. A number of relevant recommendations for specific public health faculty distance learning programs at ECU will also be proposed. Following from the previous chapter, the recommendations will relate to planning, policy development and implementation. This assists the development of a successful online environment, which integrates information technology, teaching processes with the development of new pedagogical skill sets for teaching and learning online.

The planning process is an initial stage to enable the University to ask the important five questions (why, what, where, who, when) to establish a seamless approach to online delivery. This will then lend itself to the development of a process of implementation, review and evaluation to ensure the process continues to meet the objectives of the university and the needs of the students and lecturers. Planning process needs to encompass all areas of institutional resources such as technical infrastructure and support, appropriate course content and structure, relevant services and support systems and network systems as proposed by McClure et al (1995).
6.1 Researcher’s recommendations:

1. It is imperative that the centre of Public Health critically assesses the motivation to introduce online courses initiatives and assess the relevance of the course in consultation with the industry professionals.

2. Appropriate correspondence policies, standards and guidelines must be developed. These should highlight the role of lecturers as
moderators and emphasise the importance of providing prompt feedback (including both acknowledgement and information feedback). Consistency in correspondence needs to be established.

3. Staff and students who have shown to be leaders in the delivery and development of online units should be nominated. The nomination could be organised annually or every semester for both lecturers and students and posted on the universities' website. This promotes high expectations.

4. The University budget needs to include sufficient full time software designers, and support personnel who would be able to advise staff and students on the use of the system.

5. Professional development for staff is essential and attendance of training should be included in performance management targets of relevant lecturers.

6. Introduction of mark allocations for student-student and lecturer-student interaction should be either for all or none of the online units.

7. A “Frequently Asked Questions” component should be added to the online Blackboard system.

8. The University should continue to evaluate students’ satisfaction and experiences and identify future barriers and strategies.

9. A chat line or discussion forum could be developed for paper based students. Alternatively the University could provide access to paper based students to use the discussion board on the Blackboard system. This will encourage a sense of community and enhance student-students as well as lecturer interactions.
Supplementary Recommendation.

10. Given the large amount of typing and computer use required, an induction module on ergonomics that includes a checklist on evaluation of a workstation should be implemented. This module should be compulsory for online students and should be introduced to users prior to giving students access to use of the Blackboard system.

6.2 Further research

This research has focused mainly on evaluating whether online learning is better and provides better experience for students and lecturers. The study also assessed if online units provided appropriate interaction as compared to paper based units at ECU. Loos et al, (2001) mentioned “the advantages of electronic formats are significant, so the educators must now move beyond recognition of these strengths and ensure e-training, lives up to its potential.” Therefore further research is essential.

It would be useful to implement the recommendations of this study and then assess how the online learning has improved. Another logical extension of this study would be to assess effectiveness of OHS online training in two or more industries.

There is also the potential to ascertain the effectiveness of online learning in developing students’ abilities to apply their knowledge. Such a study would aim to measure the perspectives of students and their employers by determining challenges and strengths of students when they first become employees.
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APPENDICIES

Appendix A

Commencement of semester Questionnaire – Online Student survey
Students undertaking Occupational and Environmental Health units

This is an anonymous questionnaire. Please ensure that you do not write your name, or any other comments that will make you identifiable, on the questionnaire. By completing this questionnaire, you are consenting to take part in this research. You should first read the enclosed Participant information letter carefully as it explains fully the intention of the research project. Please complete and return the questionnaire by 20th August 2004 to Suzanna Meier via email smeier@workcover.com or by post 13A Tapley Street Adelaide SA 5000

Thank you for taking time to complete this questionnaire.

1. Please select the type(s) of unit(s) you are taking?
   a. Environmental Health (online)
   b. Occupational Safety and Health (paper based)

2. Which learning style will be used for your unit?
   a. Online
   b. traditional paper based
   c. both
   d. don’t know

3. If undertaking online units, how would you rate your satisfaction with the online method as opposed to paper based units?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
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<tbody>
<tr>
<td>Very unsatisfied</td>
<td>unsatisfied</td>
<td>don’t know</td>
<td>satisfied</td>
<td>very satisfied</td>
</tr>
</tbody>
</table>

4. Do courses that are solely online provide appropriate faculty interaction for you?
   Yes No

Please comment .................................................................

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5. Have you experienced any barriers in distance education?
   Yes   No
   If yes Please explain ……………………………………………………………

6. If you experienced any barriers how did you overcome them?
   ………………………………………………………………………………………
   ………………………………………………………………………………………

Question 7: for students who are undertaking online units in this course only:

7. Is the content of your online unit more suitable to paper based education?
   ………………………………………………………………………………………
   ………………………………………………………………………………………

8. What do you expect (learning outcome) to learn from the unit?
   ………………………………………………………………………………………
   ………………………………………………………………………………………

9. How do you find the graphic design (was it aesthetically appealing)?
   ………………………………………………………………………………………
   ………………………………………………………………………………………

10. Are you currently employed?
    Yes   No
    If yes, go to q 11
    If no, go to q 12

11. Do you expect the unit will help you in your job?
    Yes   No
    If yes how…………………………………………………………………………
    ………………………………………………………………………………………

12. Is the online unit easy to use / navigate?
    Yes   No
    If no, why not ……………………………………………………………………….
13. In undertaking the unit so far, have you had positive / negative experiences?  
Please comment  
..............................................................................................................................................

14. Do you expect the unit to provide lecture / student interactions?  
Yes  No  
If no what would you suggest to improve it  
..............................................................................................................................................  
..............................................................................................................................................

15. Do you expect the unit to provide you with networked learning (e.g. Blackboard, forums, chat-line)?  
Yes  No  
If no, why not ................................................................................................................................

16. Is the current unit content suitable for online learning?  
Yes  No  
If no, why not ................................................................................................................................

17. How literate are you in the use of technology?  
Basic  intermediate  advanced  

18. Do you believe computer literacy plays a role in completing the unit?  
Yes  No  
If yes please explain ...........................................................................................................................

19. Do you expect the unit to provide student / student interaction?  
Yes  No  
Please comment...............................................................................................................................
20. If you had a choice of the teaching methods of your unit which would you prefer? Paper based or online, please explain, why?

........................................................................................................................................

21. Any other comments you would like to make

........................................................................................................................................

........................................................................................................................................

Optional:
Age
Gender
Occupation
End of the semester Questionnaire – Online Students survey

1. Please select what type of unit you are undertaking?
   a. Environmental Health units (Online)
   b. Occupational Safety and Health (paper based)

2. Which learning style do you prefer?
   c. online
   d. traditional paper based
   e. Both
   f. I don’t know

3. If undertaking online units, how would you rate your satisfaction with the online as opposed to paper based units?
   1  2   3  4   5
   Very unsatisfied  unsatisfied  don’t know  satisfied  very satisfied

4. Was your unit solely paper based?
   Yes   No
   Please comment…………………………………………………………………………………………

5. Did the unit provide appropriate faculty interaction for you?
   Yes   No
   Please comment ……………………………………………………………………………………………

6. Did you experience any barriers in distance education?
   Yes   No
   If yes Please explain …………………………………………………………………………………………”

7. If you experienced any barriers how did you overcome them?
   …………………………………………………………………………………………………………………
   …………………………………………………………………………………………………………………
8. Was the content of your unit more suitable for online education?
........................................................................................................................................
........................................................................................................................................

9. What did you expect (learning outcome) to learn from the unit?
........................................................................................................................................
........................................................................................................................................

10. Did you achieve what you expected to learn (learning outcome)?
   Yes  No
   Please comment ........................................................................................................
   ........................................................................................................................................

11. Did the unit help you in your job? (if applicable)
   Yes  No
   If yes how .....................................................................................................................
   ........................................................................................................................................

12. Was the unit easy to complete?
   Yes  No
   If no, why not ..............................................................................................................
   ........................................................................................................................................

13. In undertaking the unit did you have positive / negative experience?
   Please comment .............................................................................................................
   ........................................................................................................................................

14. Did the unit provide lecture / student interactions?
   Yes  No
   If no what would you suggest to improve it
   ........................................................................................................................................
   ........................................................................................................................................

15. Did the unit provide networked learning (forums, discussions, chat lines)?
   Yes  No
16. Was the current unit content suitable for paper based learning?
   Yes  No
   If no, why not .................................................................

17. How literate are you in the use of technology?
   Basic   intermediate   advanced

18. Did computer literacy play a role in completing the unit?
   Yes  No
   If yes please explain ..........................................................

19. Did the unit provide student / student interaction?
   Yes  No
   Please Comment..............................................................
   ..........................................................................................

20. If you had a choice of the teaching methods of your unit which unit would you prefer? 
    Paper based or online, Please explain
    why?..............................................................................

21. Any other comments you would like to make
    ......................................................................................
    ......................................................................................

Optional:
Age
Gender
Occupation
INFORMATION LETTER

Human Research Ethics Committee
For all queries, please contact:
Research Ethics Officer
Edith Cowan University
100 Joondalup Drive
JOONDALUP WA 6027

Comparative Assessment of the Effectiveness of Online Vs Paper Based Courses for Occupational and Environmental Safety and Health

Researchers and Contact details
Chief Investigator: Suzanna Meier, 13A Tapley Street, ADELAIDE SA 5000
Email: smeier@workcover.com
Supervisor: Dr Jacques Oosthuizen; Faculty, CHS; School of Nursing and Public Health j.oosthuizen@ecu.edu.au 6304 5876

Description of the research project
In my research project, under the supervision of Dr. Jacques Oosthuizen, I am interested in finding out the followings:
• Is online better than traditional paper based learning?
• Is the unit content suitable for online learning?
• Do units that are fully online provide appropriate faculty and peer interaction for students?
• Which teaching method is preferable?

You were selected as potential participants, because you are currently enrolled in a unit that is part of the Professional Masters in Occupational and Environmental Safety and Health at the ECU. If you agree to take part in the study, you will be requested to complete a short questionnaire prior to the start of the semester and again at the end of the semester.

Confidentiality of information
All information gathered for this project will be anonymous and confidential. You will not be asked to provide any personal information. If you return the questionnaire by email, the questionnaire will be saved to a computer file and the original email will be deleted.
immediately, thus removing any information. Hard copy questionnaires will not have any identifying information and once entered into the computer file will be discarded. The collected questionnaires (all in electronic format) will be collated and will be used by the investigator Suzanna Meier and the supervisor Dr Jacques Oosthuizen only. Computer files will be stored on a password-protected personal computer at Suzanna’s home and Dr Oosthuizen office and will be deleted after a period of 5 years. The information gathered will be used to improve the development of distance based materials for ECU students.

**Results of the research study**
Results of the research will be published in peer reviewed scientific journals and will be presented at conferences. Since personal information will not be known individual participants will not be identifiable.

**Questions and / or further information**
If you have any questions or require any further information about the research project, please contact: Suzanna Meier, Email: smeier@workcover.com or Dr Jacques Oosthuizen 6304 5876 j.oosthuizen@ecu.edu.au If you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact:
Research Ethics Officer
Human Research Ethics Committee
Edith Cowan University
100 Joondalup Drive
JOONDALUP WA 6027
Phone: (08) 6304 2170
Email: research.ethics@ecu.edu.au
Appendix C

Information about the study – Lecturers’ interviews

You were selected as potential participants, because you are currently lecturing in a unit that is part of the Professional Masters in Occupational and Environmental Safety and Health at the ECU. Because you have agreed to take part in the study, I will interview you now and again at the end of the semester.

Information you provided by you will be tape recorded and will be erased after the transcription. Are you comfortable with this? If you are not comfortable but would like to participate, please do not hesitate to let me or my supervisor know and we can offer an alternative more suitable arrangement such as sending you the questions as a questionnaire.

At the end of the project, the recording will be destroyed and only the script will be stored in a locked filing cabinet for a period of 5 years after completion of the research and then shredded.

Results of the research study

Results of the research will be published in peer reviewed scientific journals and will be presented at conferences. Since personal information will not be known individual participants will not be identifiable.
Commencement of Study – Lecturers’ interview questions

1. What units will you be lecturing this semester?
   - Online
   - Paper based

2. What is name of the unit you are lecturing?

3. Which learning style will be used for your unit? example online or traditional paper based

4. In your opinion, do units that are solely based on online provide appropriate faculty interaction? please comment

5. Is the content of your unit suitable to paper based / online education? Why?

6. What do you expect (learning outcome) your students to learn from the unit?

7. Do you expect the unit to provide lecture / student interactions?

8. How does the unit provide students with networked learning (e.g. Blackboard, forums, chat-line)?

9. How literate are you in the use of technology?

10. Only for the online lecturers => who designed the unit?
11. Do you believe your students have to be computer literate to complete the unit?

12. Do you expect the unit to provide student/student interaction?

13. How do you assess if your teaching method is effective?

14. Why do you believe this teaching method is more effective than other methods?

15. Any other comments…
End of study – Lecturers’ interview questions

1. What method of teaching did you use?
   a. Online
   b. Paper based

2. Was the learning style in your unit solely paper based, online or mixed? Please explain

3. What did you expect (learning outcome) your students to achieve from the unit? Did you achieve your expected learning outcome?

4. In teaching the unit did you have positive / negative experiences? Please explain

5. Did the unit provide lecture / student interactions? How did you make yourself available to the students?

6. If online, did the unit provide networked learning (forums, discussions, chat lines, workshops) how was that achieved?

7. Did the unit provide student / student interaction? Can you provide examples?

8. Do you think it is important to have student / student interaction? In your opinion who should facilitate / provide opportunities to ensure student / student interaction was achieved?

9. Did you assess if the unit and teaching method was effective? How was the assessment carried out?
10. In your opinion, which teaching method is provides better learning opportunities and outcomes / more effective, paper based or online or mixed? Please explain?

11. Did you have involvement / were you consulted during the development of the unit?

12. If online course, would you expect that your students have to be computer literate to complete the unit? If yes how is that communicated to students during enrolment period?

13. If selecting one teaching method over another what is your rationale? Have your thoughts changed since the unit was introduced?

14. Did you experience any barriers / problems while teaching the unit? If yes, how did you overcome the problems? Could you explain how that could have been mitigated?

15. Have you received any feedback from students regarding their preferred method of teaching? Can you explain and provide examples. Were you able to address any issues raised by the students?

16. Will you be making any changes to the next semester unit outline or teaching method? What would you change? Why?
Comparative assessment of the effectiveness of online vs paper based courses

Would you like to participate?

I am currently undertaking a Master by Research under the supervision of Dr. Jacques Oosthuizen. We are interested in comparing the effectiveness of online vs paper based courses for occupational and environmental safety and health.

In particular, in this project, we would like to find out the following:

- Is online better than traditional paper based learning?
- Is the unit content suitable for online learning?
- Do units that are fully online provide appropriate faculty and peer interaction for students?
- Which teaching method is preferable?

You were selected as a potential participant because you are currently enrolled in an Occupational or Environmental Safety and Health unit.

Description of the research project

The purpose of our project is to find out what helps and hinders students from learning and are there differences in learning outcomes of students based on various teaching methods. Your experiences and views are valuable. We would very much appreciate it if you could participate in this project and provide us your views and any suggestions for improvements.
All information gathered for this project will be anonymous and confidential. You will not be asked to provide any personal information. Names of individuals will not appear in anything written about the project and nobody will be quoted without their permission.

The information gathered will be scripted and will be used by the investigator Suzanna Paul (nee Meier) and the supervisor Dr Jacques Oosthuizen only. Computer files will be stored on a password-protected personal computer at Suzanna’s home and Dr Oosthuizen office and will be deleted after a period of 5 years. The information gathered will be used to improve the development of distance based materials for ECU students.

If you would like to contribute to this project, we would love to hear from you and encourage you to attend a focus group meeting. We are aware of your time constraints and aim to complete the focus group session within approximately 45 minutes.

**When:** Tuesday 26 July 2005  
**Time:** 10am  
**Where:** Edith Cowan University  
Joondalup Campus  
Building 19, Room 398  
**RSVP:** smeier@student.ecu.edu.au

Results of the research will be published in peer reviewed scientific journals and will be presented at conferences. Since personal information will not be known individual participants will not be identifiable.

If you have any questions or require any further information about the research project, please contact: Suzanna Paul, Email: spaul@workcover.com (prior to 17 July) or Dr Jacques Oosthuizen joosthuizen@ecu.edu.au or phone (08) 6304 5876.

We look forward to hearing from you!
Appendix F

Introduction and Questions – Students’ Focus group meeting

Comparative assessment of the effectiveness of online vs paper based courses

I am currently undertaking a Master by Research under the supervision of Dr. Jacques Oosthuizen. We are interested in comparing the effectiveness of online vs paper based courses for occupational safety and environmental health.

In particular, in this project, we are interested to find out the following:

- Is online better than traditional paper based learning?
- Is the unit content suitable for online learning?
- Do units that are fully online, provide appropriate faculty and peer interaction for students?
- Which teaching method is preferable?

You were selected as a potential participant because you were enrolled in a post graduate course in Occupational Safety and Health unit.

Description of the research project

The purpose of our project is to find out what helps and hinders students from learning and are there differences in learning outcomes for students based on various teaching methods. Your experiences and views are valuable. I appreciate your attendance today to provide us with your views and any suggestions for improvements.

All information gathered for this project will be anonymous and confidential. You will not be asked to provide any personal information. Your names will not appear in anything written about the project and we will make up names, to ensure you are not identified.

I’ll transcribe the information gathered today and only Jacques and I will use that script. Under the university’s requirements, computer files will be stored on a password-
protected personal computer at my home and Jacque’s office and will be deleted after a period of 5 years. The information gathered will be used to improve the development of distance based materials for ECU students.

**Points of clarification:**

Distance based, paper based vs online not class room

Interaction does not mean face-to-face

If the responses get too specific or are outside of the scope of project, I would interject and get everyone back to the project scope.

**House keeping**

Duration of the meeting will be 45 minutes, 11:00

Evacuation procedures
Focus Group Meeting Questions

1. Who completed online units? Who completed paper based or both?

2. Was it solely online, paper based or was it mixed?

3. When did you complete it semester 2, 2004 or semester, 2005?

Expectation of students / satisfaction with the unit, Barriers / problems

4. Were you satisfied with the teaching methods, online vs paper based units? Why / why not?

5. Did you achieve (your learning outcome) what you were expecting to learn from the unit?

6. In undertaking the unit, did you have positive / negative experiences? Please comment

Interactions: Faculty / students / lecturer

7. Did the course provide appropriate faculty interaction for you?
   a. Yes No
      Please comment.

8. Did you have any interaction with other students that assisted you in your studies? How did you facilitate that!

9. Did you have adequate lecture / student interactions?
   i. Yes No
      Comment, If no, what would you suggest to improve it?

10. Did you access any networked learning (eg Blackboard discussion boards etc)?
BARRIERS / ISSUES, SOLUTIONS

11. Did you have any barriers / problem in distance education?
   a. Yes   No
      If yes Please explain

12. If you experienced any barriers how did you overcome them? Could that have been mitigated?

SUITABILITY OF UNIT and TEACHING METHOD

13. Was the current unit content suitable for online / paper based learning?
    Yes  No
    If no, why not

14. Did you have to be IT literate to complete the unit? Did you know this when you enrolled?
    Yes  No
    If yes please explain

15. If you had a choice of the teaching methods of your unit which would you prefer?
    Paper based or online, please explain, why?

16. Discuss the advantages and disadvantages of each teaching method?

17. Any other comments